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National Audit Office

REPORT

Upgrading the electricity transmission network

Department for Energy Security & Net Zero

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National Audit Office

Upgrading the electricity transmission network

Department for Energy Security & Net Zero

Report by the Comptroller and Auditor General

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Gareth Davies
Comptroller and Auditor General
National Audit Office

3 September 2026

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Key facts

£70bn

amount of investment to upgrade and maintain the transmission network in Great Britain (the grid) that Ofgem considers may be required from 1 April 2025 to 31 March 2031 (in 2023-24 prices)

£1.9bn

amount paid in 2025-26, to electricity generators to either turn up or down their electricity to balance the grid. This helps manage thermal constraints on the grid and are known as thermal constraint costs (2024 prices)

£7.8bn

upper estimate of amount thermal constraint costs could reach in 2030 if grid upgrades are not accelerated

The Department for Energy Security & Net Zero's (DESNZ's) Clean Power target

73% proportion of Great Britain's electricity generation that came from clean power in 2025

95% proportion of Great Britain's electricity generation that DESNZ wants to come from clean power sources (primarily renewables and nuclear) by the end of 2030

Costs and benefit to consumers (2025-26 prices)

£44 the amount a typical household paid towards building and maintaining the grid in 2025-26

£104 the amount that Ofgem forecasts a typical household will pay towards building and maintaining the grid by 31 March 2031

£30 Ofgem's estimate of the net saving to a typical household's 2030-31 energy bill compared to the constraint and wholesale costs that would occur if grid upgrades are not accelerated to complete by 31 March 2031

Project progress

80 number of grid upgrade projects identified by the National Energy System Operator (NESO) as necessary to meet Clean Power 2030

56 number of projects ongoing: 12 have been completed and 12 subsumed into newer projects

4 number of the 56 projects that are currently expected to be delivered after 2030

8 number of additional projects that NESO said would help lower constraint costs if they were accelerated. They have not yet been accelerated

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Summary

1 This report focuses on the electricity transmission network in Great Britain (the grid). This is the highvoltage system of cables, overhead lines and substations that carries power from where it is generated to local distribution networks. These then supply homes and businesses. Consumers pay for all the costs of maintaining and upgrading the grid through their energy bills, at £44 for a typical household in 2025-26.

2 Much of the grid was built between the 1950s and 1970s. It was designed for large fossil fuel stations close to centres of demand. Large parts are now ageing. It is also poorly matched to how electricity is produced today. Renewable electricity is often generated far from where it is used, including offshore.

3 Three private companies, known as Transmission Owners, own and manage the grid. Three public bodies are responsible for overseeing the grid.

- The Department for Energy Security & Net Zero (DESNZ) is responsible for energy policy and the overall energy system.
- The Office of Gas and Electricity Markets (Ofgem) regulates and approves spending by the Transmission Owners.
- The National Energy System Operator (NESO) operates the electricity transmission system – balancing supply and demand across the grid. It also plans and advises DESNZ and Ofgem on the future energy system.

4 DESNZ has two targets for Great Britain to become a 'clean energy superpower'. It wants to generate at least 95% of electricity from clean sources by 2030 (Clean Power 2030). It has also a legal requirement to decarbonise the economy by 2050 (Net Zero). These targets mean the network must carry more electricity, over longer distances, and at different times than in the past.

5 When the network cannot transport electricity efficiently, NESO intervenes to keep supply and demand in balance. It often pays generators, usually wind, to reduce output and pays others, usually gas, to increase output elsewhere. This helps manage the physical limits of the network. Some of these thermal 'constraint costs' are necessary in an efficient system. But high levels increase reliance on gas, carbon emissions and costs for consumers. Reducing them is a key aim of upgrading the grid.

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6 This report examines DESNZ, Ofgem and NESO's:

- rationale for upgrading the transmission network (Part One);
- progress with the upgrade (Part Two); and
- oversight of the upgrade (Part Three).

7 DESNZ believes Clean Power 2030 will deliver wide benefits, such as decarbonisation and economic growth, but has not quantified these in an impact assessment. We have not assessed these benefits as part of this report.

Key findings

Upgrade rationale

8 DESNZ has allowed renewable electricity generation to expand faster than the grid, which has led to increased constraint costs. Successive governments' 'connect and manage' approach has allowed new generation projects to connect before the network was ready. As a result, thermal constraint costs have risen from £0.6 billion in 2018-19 to £1.9 billion in 2025-26 (in 2024 prices). The majority goes to generators to increase output at short notice. These are mainly gas power stations in England, with costs linked to global gas prices. The remainder goes to generators to reduce output. These are often wind farms in Scotland. Other countries have seen a similar rise in constraint costs due to limited grid capacity as their use of renewables has grown (paragraphs 1.7 to 1.15 and Figure 6).

9 Opportunities to upgrade the grid earlier were missed. In 2015, DESNZ adopted a more market-led approach to grid planning. Without an agreed spatial plan, DESNZ, Ofgem and the system operator lacked a shared view of future investment needs. As a result, Ofgem did not approve some proposed grid upgrades when they were first proposed. Some are now being approved at higher cost, at a time of intense global competition for labour and equipment (paragraphs 1.14 to 1.15 and Figure 7).

10 Constraint costs could reach £6.6 billion to £7.8 billion in 2030 if grid upgrades are not accelerated to match new generation as part of the Clean Power 2030 plan. In its November 2024 advice to DESNZ, NESO identified 88 grid projects for Clean Power 2030. Of these, it said: 77 were already due by 2030; that it was necessary to accelerate three existing projects to reduce constraint costs to £2.8 billion to £3.6 billion; and that it would be beneficial to accelerate eight projects to limit constraint costs to £1 billion to £1.9 billion. In contrast, it said that without any upgrade at all to the grid, constraint costs could reach £12.7 billion a year. These estimates all assume that all planned renewable generation is added to the grid under the Clean Power 2030 plan regardless of whether the grid is ready to accommodate it and are stated in 2024 prices (paragraph 1.18 and Figure 4).

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11 Ofgem estimates that Transmission Owners will need to spend up to around £70 billion over 2025-2031 on grid upgrades, quadrupling the current rate of investment. This includes £62 billion specifically to increase the capacity of the grid. Annual spending on grid upgrades rose from £0.6 billion in 2010-11 to £2.5 billion in 2025-26. Ofgem has approved in principle annual investment to increase to over £11 billion a year between 2027-28 and 2030-31 (paragraphs 1.17 to 1.18 and Figure 8).

12 Ofgem estimates this investment will save consumers about £30 a year compared to the increased constraint costs if projects are not accelerated. Ofgem expects the £70 billion of investment to increase a typical household's annual network charge to £104 in 2030-31, £60 higher than 2025-26. However, the investment would support the acceleration of the three grid upgrades recommended by NESO, avoiding around £4 billion of constraint costs in 2030 and reducing dependence on gas. Ofgem estimates that these benefits would more than offset the higher network charges, leaving consumers around £30 a year better off than if the projects were not accelerated (paragraphs 1.19 to 1.20 and Figure 10).

13 NESO has recommended a total of around £89 billion of further investment in the grid beyond 2030. DESNZ expects electricity demand to more than double between 2024 and 2050 as more of the economy shifts from fossil fuels to electricity, including transport, heating and industry. It believes this will require further expansion of both generation and the transmission network. This investment will be subject to Ofgem's review in future price control periods (paragraph 1.23).

14 Faster and more predictable connections to the grid are also necessary to support economic growth. The number of projects waiting to connect has grown significantly. Delays are also increasing. The proportion of projects that received an offer of a connection at the time they wanted fell from around two-thirds (64%) in 2019-20, to around one-sixth (16%) in 2023-24. DESNZ, Ofgem and NESO are taking steps to reform the connections queue, including removing projects that were not progressing and prioritising those ready to deliver. They are now starting to focus on connecting demand from an increasing number of energy-intensive projects, such as data centres and new housing. Improving the speed and predictability of connections, and not just the queue, is important to ensure these projects can proceed and to support wider economic activity (paragraphs 2.26 to 2.32).

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Upgrade progress

15 Many of the 88 grid upgrades are at risk of not being completed when needed. Transmission Owners have already completed 12 and a further 12 have been subsumed into newer projects. Most of the 64 remaining projects are at an early stage of development, and are not expected to be connected by the dates NESO originally said would be optimal for keeping constraint costs down between now and 2030. Many also face significant risks to the delivery of their current forecast delivery date. There has been no significant acceleration of the three projects that NESO recommended in 2024 be accelerated to reduce constraint costs. One further project has been delayed beyond 2030. We found limited public transparency on the cost, progress and status of the portfolio of projects (paragraphs 2.2 to 2.5 and 2.9, and Figures 11 and 12).

16 NESO does not know the full financial impact on consumers of delivering grid upgrade projects after they are needed. NESO estimates that potential delays to what it considers to be the seven most critical projects could add up to £6.7 billion a year in constraint costs if they are not delivered when needed. NESO does not know the financial impacts of delivering the other projects after they are needed, which makes it difficult to prioritise between projects. NESO told us it does not recalculate constraint costs for each delay because of the resources that this would require, and because it judged that updated estimates were not necessary to support planning decisions (paragraph 2.6).

Managing delivery risks

17 DESNZ, Ofgem and NESO are working to speed up the delivery of grid upgrade projects. DESNZ's appointed Electricity Networks Commissioner made recommendations in 2023 on how to reduce delivery times for new transmission infrastructure from 12–14 years to around seven. DESNZ has 10 workstreams which address the issues raised. It currently rates half as 'red' or 'amber–red'. Among the most important and challenging areas identified by DESNZ are (paragraphs 2.10 to 2.25 and Figure 14):

- **Planning, consenting and community acceptability:** DESNZ's consultation respondents reported that delays in securing agreement for land on which to build infrastructure can add up to three years to project timetables. More than half the projects have yet to start. DESNZ has announced reforms intended to streamline and reduce delays from securing consent, land access and rights. It also has a workstream intended to make sure local communities benefit from the upgrade to the grid.

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- **System access:** Transmission Owners need planned outages to upgrade, facilitate new connections, and maintain the network. These can be cancelled or rescheduled at short notice. In 2025-26, two-thirds (15,300) of the total number of applications for system access via network outages (23,400) that NESO worked on had to be cancelled or rearranged, due to changes to the outage plan by either NESO or the Transmission Owner. In spring 2026, DESNZ made proposals to improve the planning for system access.
- **Supply chain constraints:** Demand for materials is exceeding supply, increasing costs and extending delivery times. These pressures are being seen internationally, adding to competition for equipment. Ofgem has begun to allow Transmission Owners to procure some materials in advance of planning consent to reduce delays.
- **Skills constraints:** A shortage of skilled workers needed to build and maintain the network affects the pace of delivery. DESNZ plans to address this through, for example, an industry-led sector growth plan, expected in autumn 2026.

Upgrade oversight

18 The chosen upgrades reflect the projects NESO considered would best deliver Clean Power 2030 within the time available, rather than the outcome of a whole-system assessment of alternatives. Grid upgrades are funded through electricity bills rather than public expenditure and are not supported by a full business case, options appraisal, or assessment of overall value for money. Instead, DESNZ has supported new renewable generation, NESO has recommended the grid upgrades needed to support it, and Ofgem has approved investment largely by reference to reducing constraint costs. Most of the recommended grid upgrades were chosen because they were already in development. In the absence of an integrated spatial plan or whole-system appraisal, the government has not demonstrated that these projects represent the best way of achieving its objectives (paragraphs 3.4 and 3.5).

19 DESNZ has improved government oversight of grid upgrades. It established the Electricity Networks Programme (ENP) to oversee grid upgrades. The ENP brings together DESNZ, Ofgem, NESO and industry representatives to oversee 10 policy workstreams, monitor project delivery and manage strategic risks. The ENP Board has improved coordination and helped address system-wide risks across the programmes and 64 projects. It shares information with the Clean Power Unit, which oversees progress towards Clean Power 2030 and works to help unblock barriers to delivery of key grid upgrades. The board has started to operate as a portfolio management function, but there is scope to do more (paragraphs 3.2 and 3.3).

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- While accountability for individual projects rests with the Transmission Owners, no single person is accountable for delivery of the portfolio as a whole.
- The ENP Board has limited oversight of the portfolio. It tracks progress on individual projects but there is scope to strengthen how it monitors whether the portfolio remains on track to deliver its intended benefits, or prioritise projects and resources across the programme.
- Transmission Owners provide information on projects on a voluntary basis.
- Both the ENP Board and the Clean Power Unit have limited formal powers and therefore rely on influence to drive action across organisations and government.

20 Ofgem has adapted its regulatory approach to support rapid expansion of the grid, reducing its emphasis on detailed scrutiny of construction costs. Ofgem's historical approach was designed for a relatively stable asset base. It is now being applied to a period of unprecedented growth in network investment. The increased volume, pace and complexity of approvals place pressure on Ofgem's capacity. This requires faster and more flexible decision-making. For its price control regime for April 2026 to March 2031, Ofgem aims to (paragraphs 3.7 to 3.17):

- **Approve project funding in phases:** Many projects are at too early a stage to provide all the funding for the five-year price control period upfront. Ofgem has therefore approved projects in principle, with upfront funding of £17.7 billion out of the total £70 billion investment that Ofgem considers may be required from 1 April 2025 to 31 March 2031. Ofgem will make its final decisions through staged phases.
- **Focus on faster approvals over detailed scrutiny:** The phased approach still requires Ofgem to scrutinise project costs and risks over time. Volatile prices and the bespoke nature of many projects reduce Ofgem's ability to rely on benchmarks, requiring it to make broader judgements about whether Transmission Owners are managing and procuring projects efficiently. This places greater demands on Ofgem's capacity. However, any delays could increase constraint costs for consumers. It has therefore changed its risk appetite to prioritise faster funding decisions, where possible, over more detailed scrutiny of project costs and risks.
- **Reduce duplication with NESO's assessment of need:** Ofgem introduced a streamlined project approval process in 2022, the Accelerated Strategic Transmission Investment (ASTI) framework. This seeks to reduce duplication in its project approval with NESO's assessment of strategic need. Twenty-six of the 88 projects use this process.
- **Place increased reliance on incentives:** Ofgem's current price control relies on incentive payments and penalties for Transmission Owners to control costs and deliver upgrades on time. However, these reward delivery ahead of regulatory target dates, which are often later than NESO's assessment of when projects would be optimally delivered.

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21 DESNZ and Ofgem are considering wider reforms, but these will not significantly affect the delivery of current projects to support Clean Power 2030. These reforms are intended to make sure generation, demand and the grid are developed in a more coordinated way. Key elements include the following (paragraphs 3.18 and 3.19).

- **The Strategic Spatial Energy Plan (SSEP):** NESO will set out a long-term plan for the type, location and timing of energy infrastructure between 2030 and 2050. This is intended to differ from the current regime, where network upgrades respond to generation decisions by planning the whole energy system together. NESO plans to publish its plan in 2027, subject to approval by the Secretary of State for Energy Security and Net Zero. It then intends to publish a Centralised Strategic Network Plan (CSNP) in 2028 to set out the required grid infrastructure investment required to support the SSEP.
- **The Reformed National Pricing:** DESNZ's April 2026 delivery plan has three broad aims: to encourage new generators to locate in areas aligned to the SSEP, through changes to network charges and connection arrangements; to reduce the need for constraint payments through better use of network capacity, storage and flexibility; and to reduce balancing costs through reforms to the way NESO manages the grid.
- **Competition:** Ofgem intends to open future connections and upgrade projects to new entrants to reduce costs, an approach it has not yet applied to the Clean Power 2030 projects. NESO is assessing which future projects are suitable for competition.

Conclusion

22 DESNZ views upgrading the electricity transmission network as necessary to support Clean Power 2030, longer-term net zero objectives, and economic growth. Its case for action arises largely from the need for the grid to catch up with the growth in renewable generation and limit rising constraint costs borne by consumers.

23 Value for money now depends on delivery. Delivering all the grid upgrades by 2030 will be very challenging. There remain significant planning, supply chain and system access risks and some of the projects are already forecast for delivery after 2030. This means some new generation is likely to connect before necessary grid upgrades are complete. It is important to minimise this gap, as delays will increase project and constraint costs and postpone the benefit of achieving clean power.

24 DESNZ, Ofgem and NESO have taken steps to accelerate approvals, enable earlier investment, and join up their oversight. The upgrades represent a significant shift from historical regulatory approaches and will test systems not designed for delivery at this pace and scale. Delivering upgrades at lowest cost to consumers will require stronger oversight of delivery, transparent monitoring of progress, and sufficient regulatory capability to scrutinise costs and the operation of incentives.

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Recommendations

25 DESNZ, Ofgem and NESO have plans in place to improve spatial planning and coordination of generation, grid capacity and demand. These will not have an impact until after 2030. In the meantime, to improve their oversight and alignment of grid upgrades in the run up to delivery of the Clean Power 2030 target, they should:

a **strengthen the grid upgrades portfolio management function.** While grid projects are delivered by privately owned and regulated companies, DESNZ has established a portfolio management function because delivery depends on coordinated action across government, the regulator and industry. To make best use of this function, DESNZ, Ofgem and NESO should:

- **develop a single, consistent view of portfolio performance,** including agreed definitions of project milestones and progress, common reporting across organisations, and a clear assessment of whether the portfolio remains on track to deliver Clean Power 2030;
- **assess and prioritise projects according to their impact,** including developing a better understanding of the consequences of delays for constraint costs, the connection of new generation and future demand. NESO should support this through more transparent and regular forecasts of constraint costs;
- **identify the projects and risks that present the greatest threat to achieving Clean Power 2030** and establish clear routes for escalation and intervention where project risks exceed agreed tolerances; and
- **identify the interventions available to address the most significant delivery risks and barriers,** and assign clear responsibility for taking action to DESNZ, Ofgem, NESO, Transmission Owners or other stakeholders, as appropriate.

b **publish regular updates on the cost, timetable and delivery status of grid projects.** This may require either changes to licensing or voluntary agreement from the Transmission Owners. Greater transparency would improve accountability to Parliament and consumers and provide a clearer picture of progress towards Clean Power 2030. This would strengthen the Transmission Owners' incentives for delivery of projects by combining existing financial incentives with greater public accountability for project performance.

c **review options for Clean Power 2030 generation projects expected to connect to the grid before sufficient network capacity is available.** Connecting these projects may result in substantial constraint costs, but delaying them could unpick existing agreements and increase investment risk (with potential knock-on impacts for future investments). DESNZ should assess the available options and these broader trade-offs to ensure its chosen approach is value for money and in the best interests of consumers and the energy system.

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d **review whether the Security and Quality of Supply Standard strikes the right balance between maintaining system reliability and allowing network upgrades to be completed more quickly.** DESNZ, Ofgem and NESO should provide advice to ministers on the trade-offs between resilience, cost and speed of delivery so ministers can decide their tolerance of risk.

26 The number of approvals expected up to 2030, combined with the need to support timely project delivery, places greater demands on Ofgem's regulatory capacity. Ofgem should:

e **assess the effectiveness of its regulatory approach in protecting consumers while supporting rapid delivery of network upgrades.** Ofgem should compare actual project costs and delivery of projects under the current price control framework and identify any evidence of systematic bias in cost estimates. It should publish a full evaluation of the current price control framework and use this to strengthen future price controls and determine whether additional consumer protections are required.

27 To strengthen decision-making for future network investment after 2030, and demonstrate that the chosen projects are optimal, DESNZ, Ofgem, and NESO should:

f **consider and set out the economic, social, resilience, security and environmental costs and benefits** when:

- NESO explains why the pathways set out in its proposed Strategic Spatial Energy Plan provide the best mix of projects;
- DESNZ advises ministers on which pathway to choose, informed by NESO's modelling; and
- Ofgem makes decisions about specific projects and future price control periods.

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Part One

Addressing the need for network upgrades

1.1 In this part of our report, we

- introduce the electricity transmission network;
- provide an overview of the state of the network; and
- examine the government's rationale for network expansion.

The electricity transmission network

1.2 The electricity transmission network (the grid) is the system of high-voltage cables, overhead lines, and substations that moves electricity long distances from where it is generated to where it is used.[1] Local distribution networks deliver it to homes and businesses (**Figure 1**).

1.3 The grid in Great Britain is divided into three geographical areas, each owned and managed by a separate private company, known as a Transmission Owner:

- National Grid Electricity Transmission (NGET): England and Wales.
- SP Energy Networks (SPEN): southern Scotland.
- Scottish & Southern Electricity Networks Transmission (SSENT): northern Scotland.

4 Three public bodies are responsible for the grid:

- The **Department for Energy Security & Net Zero (DESNZ)** sets the policy and leads government's mission for Britain to become a 'clean energy superpower'.[2]
- The **Office of Gas and Electricity Markets (Ofgem)** regulates the sector and approves how much each Transmission Owner can spend on the grid (whose costs are passed onto energy consumers).
- The **National Energy System Operator (NESO)** operates the electricity system, and plans and advises DESNZ and Ofgem on the development of the gas and electricity networks in Great Britain.

1 This report focuses on Great Britain. Northern Ireland Electricity Networks operates as part of a single electricity system spanning Northern Ireland and the Republic of Ireland.
2 References to DESNZ include its predecessor departments responsible for Energy policy before machinery of government changes: the Department of Energy & Climate Change (DECC: 2008–2016) and the Department for Business, Energy & Industrial Strategy (BEIS: 2016–2023).

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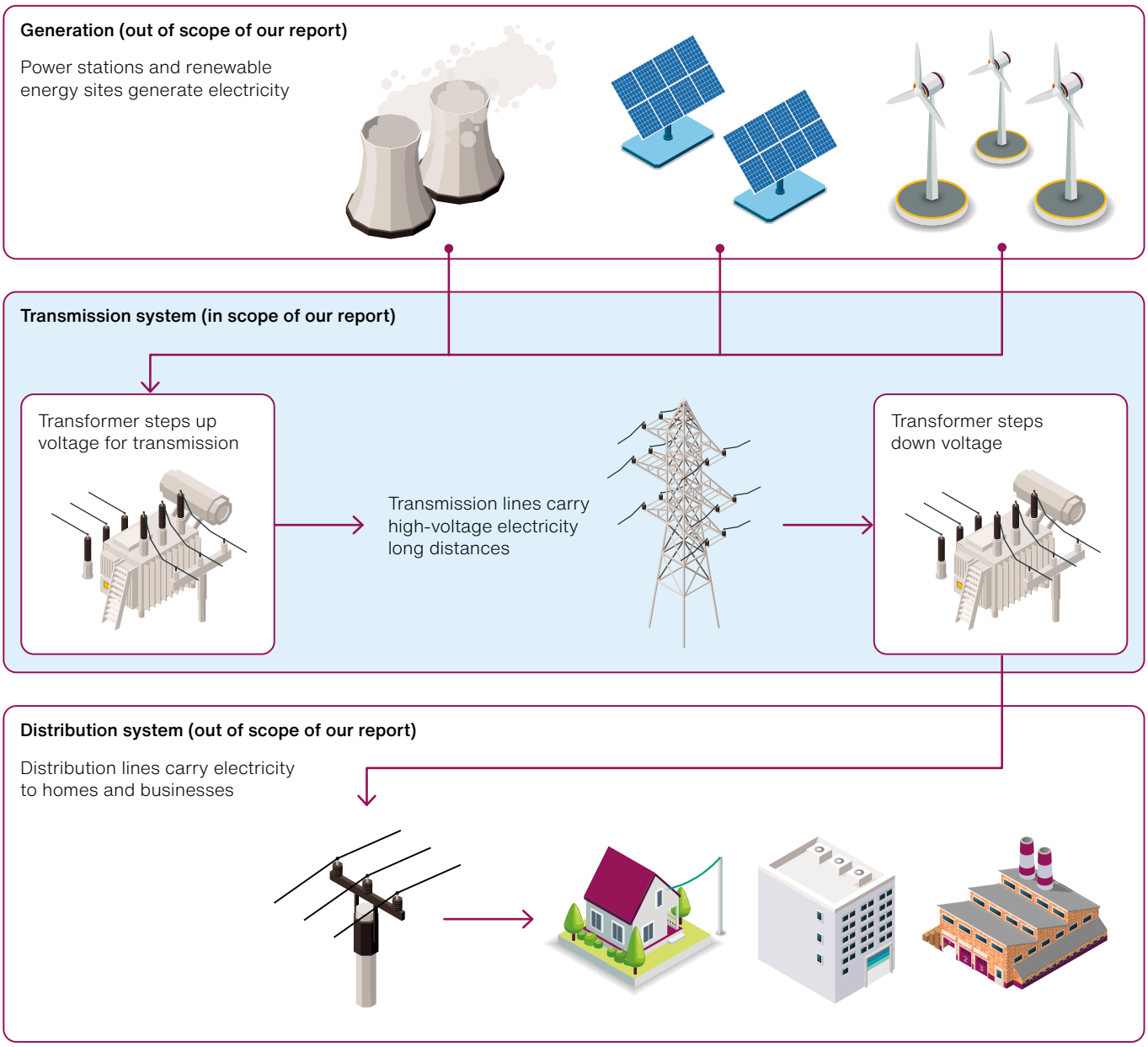
Figure 1
The electricity transmission network in context

The transmission network carries electricity from where it is generated to local distribution networks



Note

1 This figure is intended to be illustrative and provides a high-level summary of the key processes involved in the electricity system. It does not represent every component or operational detail of the network.

Source: National Audit Office analysis

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Paying for the transmission network

1.5 The costs of running the electricity transmission network are funded primarily through three regulated charges:

- **Transmission costs:** Transmission Network Use of System (TNUoS) charges are paid by electricity generators and suppliers to cover the costs incurred by Transmission Owners to build, operate and maintain the network. These charges totalled £5.1 billion in 2025-26.
- **Balancing costs:** Balancing Services Use of System (BSUoS) charges are levied on electricity suppliers to cover the day-to-day costs incurred by NESO in operating the transmission system. They totalled £2.7 billion in 2024-25, largely driven by the costs of managing physical constraints on the network (paragraphs 1.9 to 1.10).
- **Connection charges:** the Transmission Owners costs of designing, building and maintaining new connections are charged to those seeking access to the network, such as wind farms, batteries, data centres, local distribution networks, and interconnectors with other countries. In 2025-26 these were forecast at approximately £400 million.

1.6 Consumers pay for the costs of running and upgrading the grid through their energy bills. Ofgem's price cap groups these costs alongside electricity distribution and gas network costs, under 'network costs' (**Figure 2** on pages 17 and 18). For a typical dual-fuel household paying by direct debit, annual electricity and gas costs were £1,641 at the price cap level set in April 2026. Within this, £83 went towards network costs (TNUoS), up from £51 in 2025-26, and £40 went towards balancing the grid (BSUoS).[3]

Moving to green energy

1.7 DESNZ is responsible for the government's mission to make Britain a 'clean energy superpower'. This includes two targets. 'Clean Power 2030' requires clean power sources (primarily renewables and nuclear) to generate at least 95% of Great Britain's electricity by the end of 2030 – up from 73% in 2025. DESNZ estimates this will require a doubling of installed generating capacity in Great Britain, from 111 gigawatts (GW) in 2024 to between 204 and 231 GW by 2030. DESNZ is also seeking to 'Accelerate to net zero', by implementing policies to achieve its legal commitment to achieve net zero greenhouse gas emissions in the UK by 2050.

3 Most TNUoS costs relate specifically to the grid, but TNUoS also includes additional smaller transmission costs such as offshore transmission connections and interconnectors with other countries. In 2025-26, £44 of the £51 TNUoS charges related solely to the onshore transmission network (the grid). This is the figure used in Ofgem's modelling of the impact of network investment.

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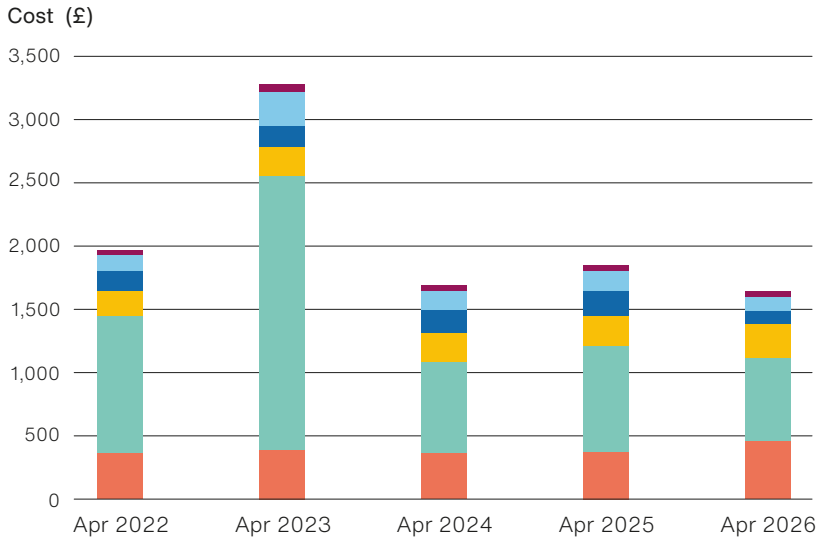
Figure 2

Energy price caps, 2022–2026

In the past five years, a typical household has paid between £35 and £83 a year for the electricity transmission grid, and a further £27 to £41 a year for balancing costs, a small but significant part of their overall energy bill



	Apr 2022	Apr 2023	Apr 2024	Apr 2025	Apr 2026
Suppliers earnings (allowance for suppliers' profits before interest or tax)	35	59	40	45	42
VAT and other	132	275	151	158	103
Government social and environmental schemes (policy costs)	153	165	188	198	106
Supplier business costs (operating, debt and industry costs)	203	223	223	235	274
Buying energy for customers (wholesale costs and Contract for Difference costs)	1,077	2,170	720	841	652
Build, fix and repair pipes and wires to transport energy (network costs)	371	388	368	372	463
Of which:					
Balancing costs	27	41	30	41	40
Electricity transmission	35	45	40	51	83
Other electricity and gas network costs	309	302	298	280	340
Total	**1,971**	**3,280**	**1,690**	**1,849**	**1,641**

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Figure 2 *continued*
Energy price caps, 2022–2026

Notes

1 Each quarter Ofgem updates an energy price cap, setting an absolute, top-level price per unit of electricity and gas for customers on domestic default tariffs in Great Britain. Annual energy bills displayed here are calculated by Ofgem by applying these unit charges to its assumption of a typical household's annual energy consumption.

2 Energy bills set out here are for annual bills, as charged for dual fuel direct debit customers. Wholesale costs include Contracts for Difference payments to providers of renewable electricity.

3 Wholesale costs include Contracts for Difference payments to providers of renewable electricity.

4 'Suppliers' earnings' are 'Earnings Before Interest and Taxation', allowing for an operating profit for suppliers. Ofgem assumes an 'efficient' producer would be able to earn profits on this scale.

5 In 'VAT and other' we have included a range of items, such as payments to cover uncertain costs and risks (headroom), and making sure prepayment and Direct Debit customers pay the same standing charge (levelisation allowance).

6 Network costs include the costs of the electricity transmission network, the electricity distribution network, the gas transmission system, and gas distribution network.

7 Electricity Transmission costs are known as the Transmission Network Use of System charges (TNUoS). The main TNUoS costs relate specifically to the grid, but TNUoS also includes additional smaller transmission costs such as offshore transmission connections and interconnectors with other countries.

8 Balancing costs are known as the Balancing Services Use of System (BSUoS) charges. They are levied on electricity suppliers to cover the day-to-day costs incurred in operating the transmission system, including constraint costs.

9 All prices are nominal.

Source: Ofgem, *Energy price cap default tariff levels*; NESO, *Balancing Costs in Consumer Bills*

1.8 The general shift towards renewables and electrification creates challenges for managing the grid, including:

- **Increased generating capacity:** the move to renewables has increased total capacity, as additional capacity is needed to maintain supply when wind and solar output is low, either locally or across the system. Higher-generation capacity requires greater grid capacity to transmit the additional energy.
- **Increased demand:** NESO is forecasting electricity demand to more than double between 2024 and 2050. This is consistent with the Climate Change Committee's recommendations on the need to electrify transport and heating to help decarbonise the economy. This also requires greater grid capacity.
- **Dispersed generation:** the transition to decarbonised power involves a shift away from a previous system built around a smaller number of large coal, gas and nuclear power stations. The new system needs to be built around more dispersed generating sites, often located in more remote areas, such as offshore wind farms in the North Sea (**Figure 3**). This requires a wider grid network.
- **Maintaining system stability:** Large fossil-fuel power stations have heavy spinning turbines that help keep the frequency of the system stable when the supply or demand for electricity changes. The transition to clean power reduces these sources of stability and requires other means of stabilising the grid.

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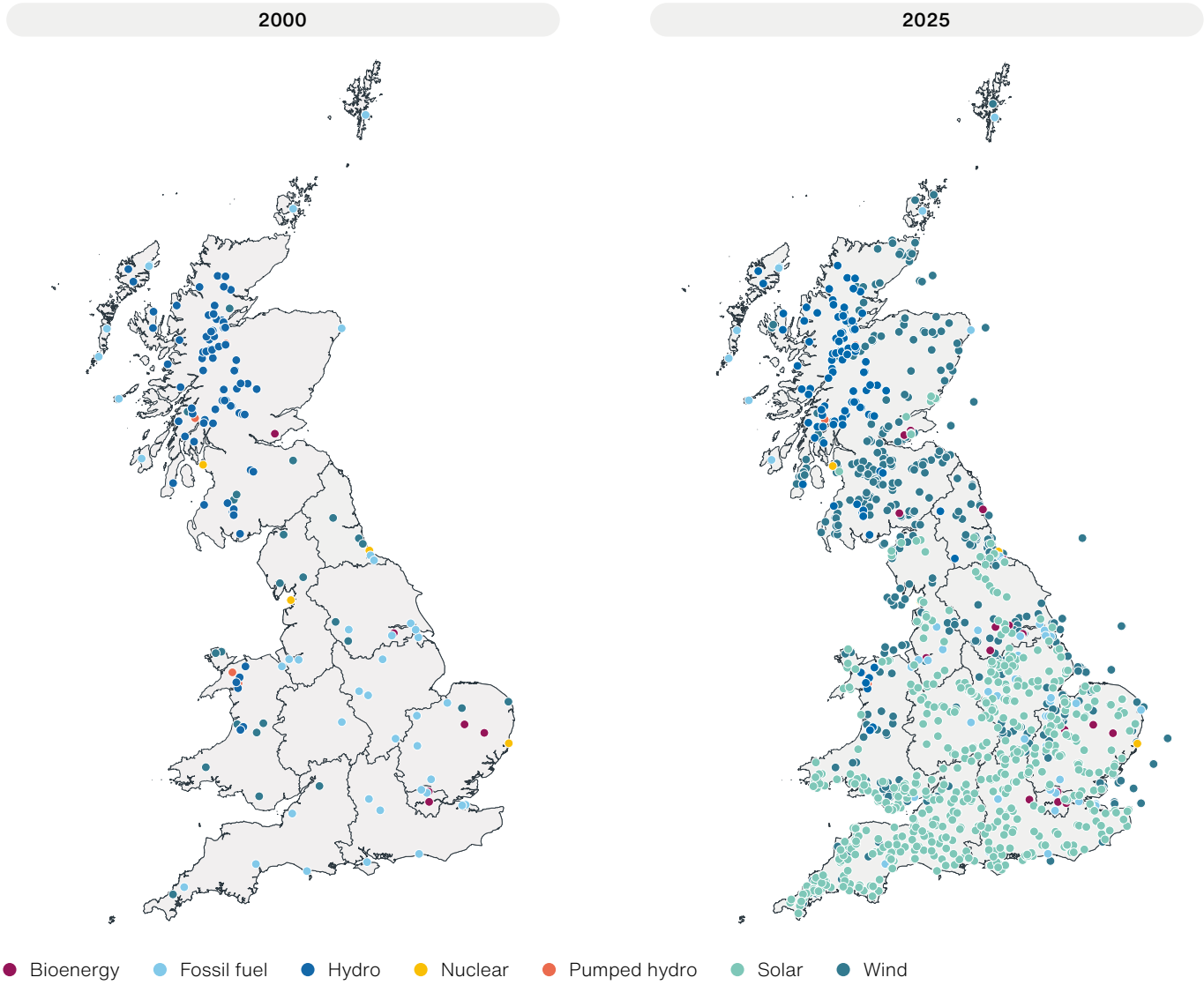
Figure 3

Comparison of electricity generation sites in Great Britain in 2000 and 2025

The number of sites generating electricity has increased and become more dispersed over the past 25 years



Notes

1 These maps show the major power generation sites in Great Britain – defined by the Department for Energy Security & Net Zero as any company whose prime purpose is the generation of electricity. The 2000 map shows the 179 generation sites commissioned in or before 2000. The 2025 map shows all 1,317 generation sites commissioned by 2025 and still in operation, including those commissioned in or before 2000. This reflects both the connection of a large number of new generation sites, and the closure of a smaller number of older power stations.

2 We have cleaned the data. Where there were apparent coordinate errors, we corrected coordinates using records for the same location; where there were missing commissioning dates, we populated values using publicly available sources; and where there were postcodes in place of unavailable coordinates, we derived coordinates from postcode data. We could not find location data for one power station that was operational at the end of May 2025. We have excluded this station from the figure.

3 Due to the quantity of sites, many overlap at this scale. As a result not all sites are visible.

Source: National Audit Office analysis of Department for Energy Security & Net Zero data. Office for National Statistics licensed under the Open Government Licence v.3.0. Contains OS data © Crown copyright and database right 2026

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- **Accessing information on supply and demand:** New smaller generators, storage providers and flexible demand operators do not have to provide NESO with the same information as larger generators. This reduces NESO's visibility of activity across the system and increases its uncertainty when balancing supply and demand.

Despite this, NESO has maintained the reliability of electricity supply at nearly 100%.

Constraint costs

1.9 Constraints arise when the grid cannot securely transmit electricity from where it is produced to where it is needed. If too much electricity is transmitted over a cable, it can get too hot. Increased and more geographically dispersed generation, without additional network capacity or other ways to transmit the power flows, leads to higher 'thermal constraints'. To manage these constraints, NESO instructs:[4]

- assets behind a network boundary (i.e. a bottleneck in the high-voltage lines) to turn down their generation or increase demand; and
- assets on the other side of the boundary to either turn up their generation or reduce demand to balance supply.

In practice, this has typically meant paying Scottish offshore wind farms to turn down their supply and paying gas-fired power stations further south in England or Wales to increase theirs. These payments are known as 'constraint costs'.

1.10 Constraint costs have risen from £0.6 billion in 2018-19 to £1.9 billion in 2025-26 (**Figure 4** on pages 21 and 22) in 2024 prices. Two main factors drive this increase:

- Volume of constrained electricity: the amount of electricity that cannot be transmitted. This has increased from 5 terawatt hours (TWh) in 2018-19 to 14 TWh in 2024-25 (an increase of 172%). Other countries have experienced similar increases due to limited grid capacity as renewable generation has expanded. For example, countries including Germany, China, Chile and Brazil reported increasing constraints to the International Energy Agency in 2024.[5]
- Cost per unit of electricity: the price NESO pays generators to adjust output to manage constraints. The 'turn up' price NESO pays gas generators is affected both by volatile gas prices and the short notice orders it gives to manage emerging constraints on the system. Typically, this means that NESO pays a premium to increase gas-fired generation output, averaging around 30% over the wholesale electricity price for that day.

4 NESO also manages local voltage levels and system frequency constraints, which currently have relatively minor costs and are not covered by this report.
5 See, for example, International Energy Agency, *Electricity 2026 Analysis and forecast to 2030*, pages 50 and 163

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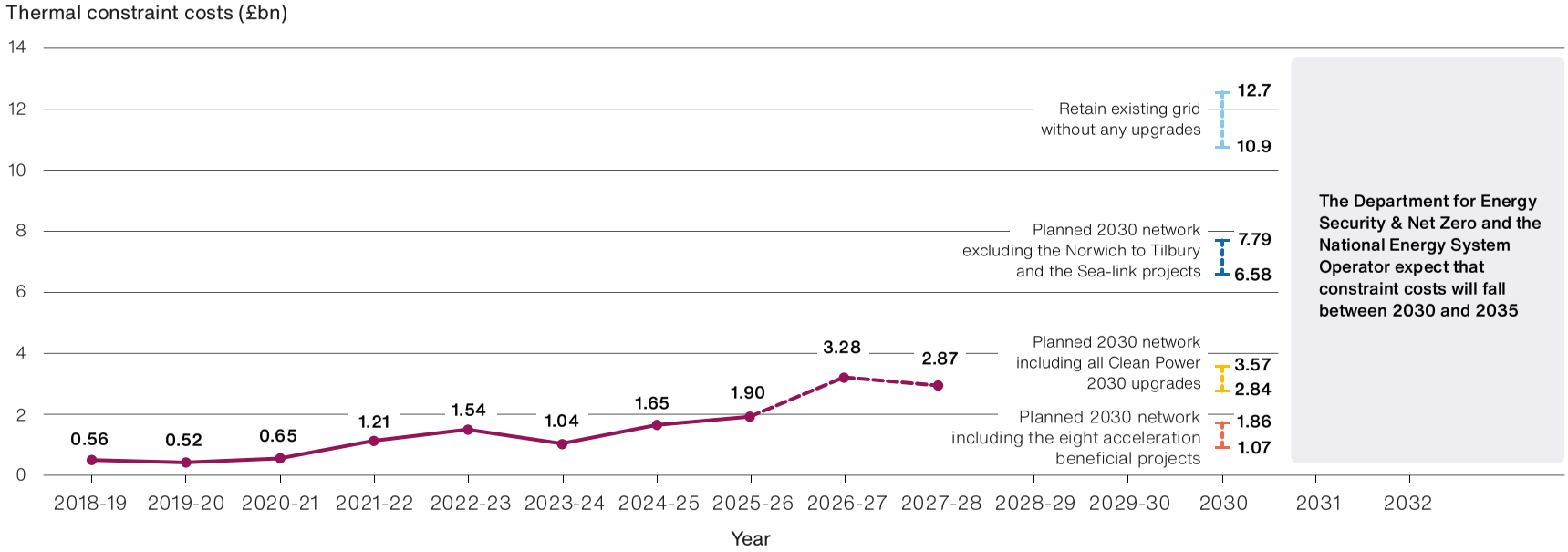
Figure 4

Annual thermal constraint costs, 2018-19 to 2024-25, and projected constraint costs in 2030 under four different scenarios of grid upgrades

Thermal constraint costs have risen since 2018-19 and are projected to rise significantly by 2030 as new renewable generation is delivered, but timely grid upgrades can reduce these costs



— Historic thermal constraint costs

-- The National Energy System Operator's forecast constraint costs for 2026-27 and 2027-28

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Figure 4 *continued*

Annual thermal constraint costs, 2018-19 to 2024-25, and projected constraint costs in 2030 under four different scenarios of grid upgrades

Notes

1 Thermal constraints happen when the amount of electricity that could flow from one region to another exceeds the capacity of the transmission lines connecting those regions. This can lead to overheating and potential failure of equipment if not managed properly, so generators are paid to stop producing electricity. Generators outside the region are paid to replace and rebalance the energy. This Figure shows:

- **Actual thermal constraint costs 2018–2026:** The historical data in this Figure is for financial years to 31 March. We have taken this from the National Energy System Operator's (NESO) *2025 Annual Balancing Costs Report*, June 2025, p.19. We have adjusted costs to 2023-24 prices, using inflators based on the Consumer Price Index (CPI) measure of inflation.
- **NESO projected constraint costs 2026–2028:** These are the NESO's short term forecasts for constraint costs available at NESO's website *24 Months Ahead Constraint Cost Forecast | National Energy System Operator*. They are for the financial years to 31 March, and adjusted to 2023-24 prices. We have adjusted costs to 2023-24 prices based on the Consumer Price Index (CPI) measures of inflation.
- **NESO forecast of constraint costs for 2030 under different scenarios for the delivery of grid upgrades:** The forecast constraint costs 2030 show different scenarios for the amount of grid upgrades delivered by 2030 as set out by NESO in its November 2024 *Clean Power 2030: Advice on achieving clean power for Great Britain by 2030* (p.36). These scenarios are: no grid upgrades; all the clean power 2030 upgrades are delivered except Tilbury to Norwich and Sea Link; all the clean power 2030 grid upgrades are delivered; and all the clean power 2030 grid upgrades are delivered plus a further eight beneficial projects. Two forecast constraint costs are calculated for each scenario. These reflect the two NESO scenarios for the generation necessary for Clean Power 2030: new dispatch; and further flex and renewables. All scenarios assume that the planned generation capacity is delivered on time for Clean Power 2030.

2 Clean Power 2030: Advice on achieving clean power for Great Britain by 2030 said that 80 projects were needed for delivery of Clean Power 2030 and that three were then forecast for delivery after 2030 and would need to be accelerated: Norwich to Tilbury, which is made up of two grid upgrade projects, and Sea Link. It also said it would be beneficial to accelerate a further 8 projects to 2030 to help manage constraint costs.

3 Ofgem used these 2030 scenarios to calculate its impact assessment for RIIO-3 grid upgrades (Figure 10). Retaining the existing grid without any upgrades would lead to around £8 billion of additional constraint costs compared to the planned Clean Power 2030 upgrades. This would translate to £100 per customer. Delivering the upgrades with three critical projects delayed would lead to around £4 billion of constraint costs compared to all the planned Clean Power 2030 upgrades being delivered. This would lead to a saving of £55 per customer.

Source: National Audit Office analysis of the National Energy System Operator's data

1.11 The majority of thermal constraint costs relate to increasing output from gas-fired generation, and increases cost to consumers (**Figure 5**). By contrast, when renewables such as wind farms are told to reduce their output, they are usually paid fixed compensation. This is based on the subsidies or support payments they would have received if they had generated as planned, through schemes such as Contracts for Difference or Renewable Obligation Certificates. As a result, most payments to renewables for reducing output are not an additional cost to consumers.

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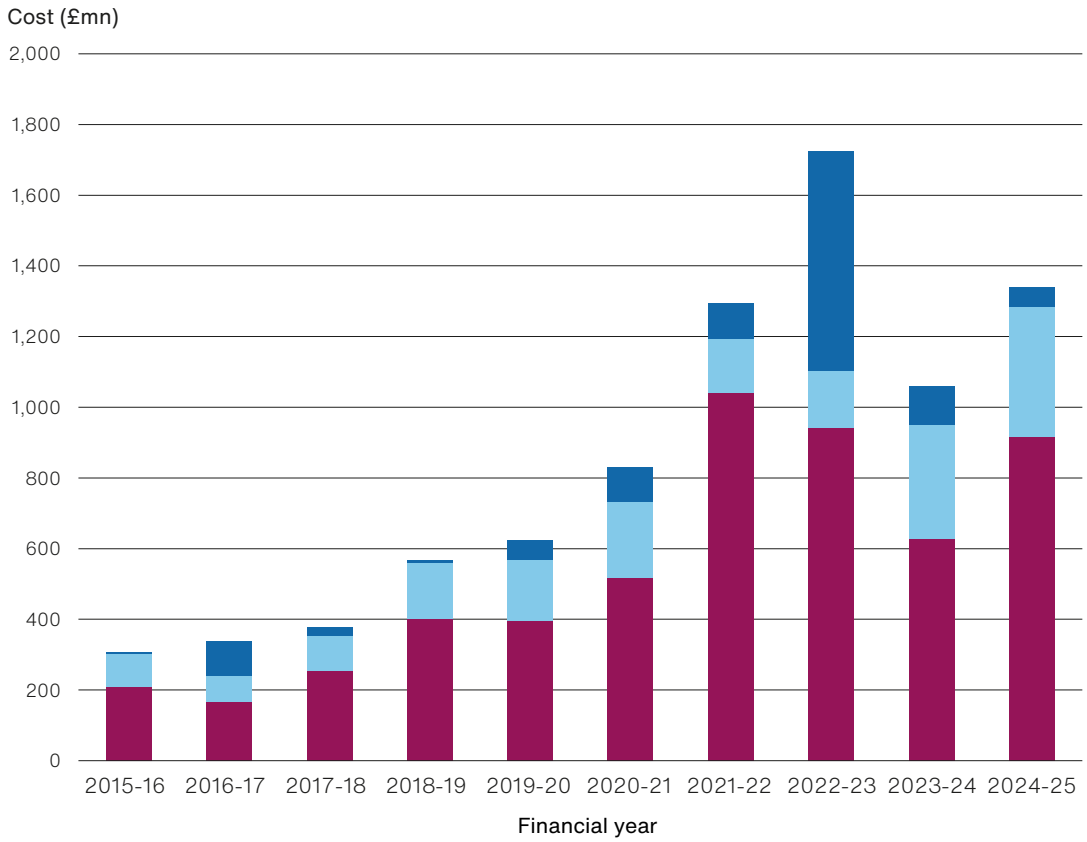
Figure 5

'Turn up' and 'turn down' elements of constraint costs, 2015-16 to 2024-2025

The majority of constraint costs are paid to gas-fired generators to 'turn up' their power at short notice



	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Gas turn up	211	165	254	403	397	519	1,040	943	627	916
Wind turn down	91	76	101	157	169	213	152	161	323	369
Other	6	98	23	8	57	98	101	622	109	56
Percentage gas turn up as proportion of constraint costs	69%	49%	67%	71%	64%	63%	80%	55%	59%	68%

Notes

1 The constraint costs shown in this figure relate to action costs for thermal constraints. These are payments for directly increasing or reducing electricity generation. Those shown include:

- Wind 'turn down' costs: net payments to wind generators to curtail their supply of electricity to avoid the grid overheating. These payments are mainly fixed at the price at which wind operators have contracted to generate electricity under their Contracts for Difference arrangements.
- Gas 'turn up' costs: net payments to gas generators to turn up their supply of electricity. These are volatile costs, driven by international gas prices. Typically, the National Energy System Operator (NESO) pays a premium of 30% over daily wholesale prices to increase gas-fired generation output at short notice to balance the grid.
- Other costs: the net (turn up and turn down) costs to generators other than turning down wind or turning up gas.

2 We have rounded the constraint costs to the nearest million.

3 These numbers do not match the headline constraint cost figures reported elsewhere in this report because this chart uses a different NESO dataset that measures thermal constraint action costs rather than NESO's wider system measure of thermal constraint costs.

Source: National Audit Office analysis of the National Energy System Operator's data

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How constraint costs and grid upgrades have been managed in the past

1.12 The government's approach to the development of the electricity network has evolved over time (**Figure 6** on pages 26 to 29):

- **Invest and Connect (prior to 2009):** generators were only offered connections once Transmission Owners had completed 'wider works' to reinforce the network.
- **Connect and Manage introduced (2009–2015):** Following a trial period in 2009, DESNZ introduced a 'Connect and Manage' policy in 2010, whereby generators were offered connection dates without waiting for wider network reinforcement. At the same time, DESNZ and Ofgem worked together to develop a strategic transmission network plan for 2020, under the Electricity Networks Strategy Group (ENSG). The ENSG reported quarterly on network project progress.
- **Market-led approach (2015–2019):** In 2015, DESNZ signalled its intention to intervene less in the sector, relying more on the market to shape the electricity system.[6] It disbanded the ENSG in 2017. From 2016, the system operator (the private sector predecessor of NESO) was tasked with producing annual Network Options Assessments, to set out required grid upgrades. However, DESNZ, Ofgem and the system operator did not have an agreed position on how much investment was required for the grid.
- **Net Zero introduced (2019–2023):** In June 2019, the government introduced a legal commitment to reach Net Zero by 2050. DESNZ subsequently accelerated its plans for new renewable energy generation. In 2020, it established the Offshore Transmission Network Review, which in 2022 led the system operator to produce the holistic network design for 2030.[7] In July 2022, DESNZ appointed Nick Winser as Electricity Networks Commissioner to develop recommendations on how to halve the development time for transmission infrastructure. But investment in the grid did not immediately increase, partly due to the necessary lead in time for projects.
- **Clean Power 2030 (2024–2030):** DESNZ introduced its Clean Power 2030 target in 2024. 'Connect and Manage' still applies, but NESO now provides advice on how to accelerate grid investment to meet the target.

6 Department of Energy & Climate Change, *Amber Rudd's speech on a new direction for UK energy policy*, 18 November 2015.
7 National Grid ESO, *Holistic Network Design*, July 2022.

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1.13 'Connect and Manage' was designed to unblock new generation, but it also increased constraint costs in the short term. Ofgem expected these to be managed down with spatial planning and investment in the grid. In 2015, Ofgem found that 'Connect and Manage' had increased constraint costs from £69.4 million in the year to September 2014 to £121.7 million in the year to September 2015.[8] However, it forecast these costs would fall to zero by 2023-24, on the basis that planned reinforcement projects, including an East Coast subsea link, would be completed by then (see paragraph 1.15).[9]

1.14 However, the market-led approach introduced in 2015 meant 'Connect and Manage' was not supported by an agreed spatial plan or investment strategy. This reduced coordination between generation and network planning. Without a clear policy direction as to the pace and scale of offshore wind generation, the system operator had to produce its own planning scenarios for growth in renewables. But Ofgem was less willing to approve new investment without clear evidence of need. In 2015 and 2016, Ofgem criticised the system operator for placing too much reliance on its most optimistic scenario and cautioned this could lead to more network projects than were financially justified.

8 Ofgem, *Monitoring the 'Connect and Manage' electricity grid access regime*, 14 December 2015. These figures are for the periods October 2013 to September 2014, and October 2014 to September 2015.
9 Ofgem, *Monitoring the 'Connect and Manage' electricity grid access regime*, 14 December 2015.

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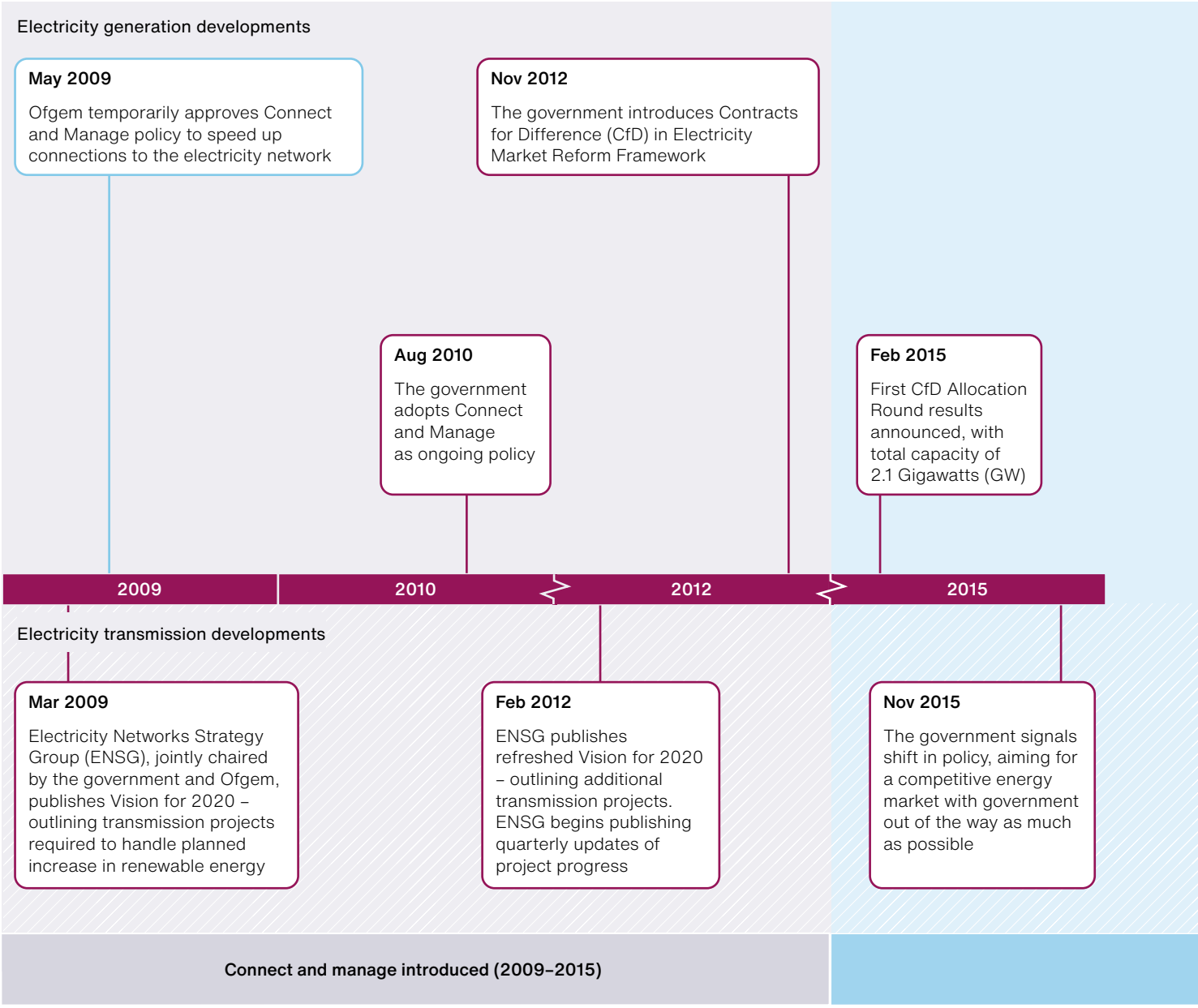
Figure 6

Timeline of developments in electricity generation and transmission policy, 2009–2030

The government has accelerated growth in renewable generation since the later 2010s, with transmission policy 'playing catch up' since 2020



- Government action
- Ofgem action
- System Operator/National Energy System Operator's action
- Other

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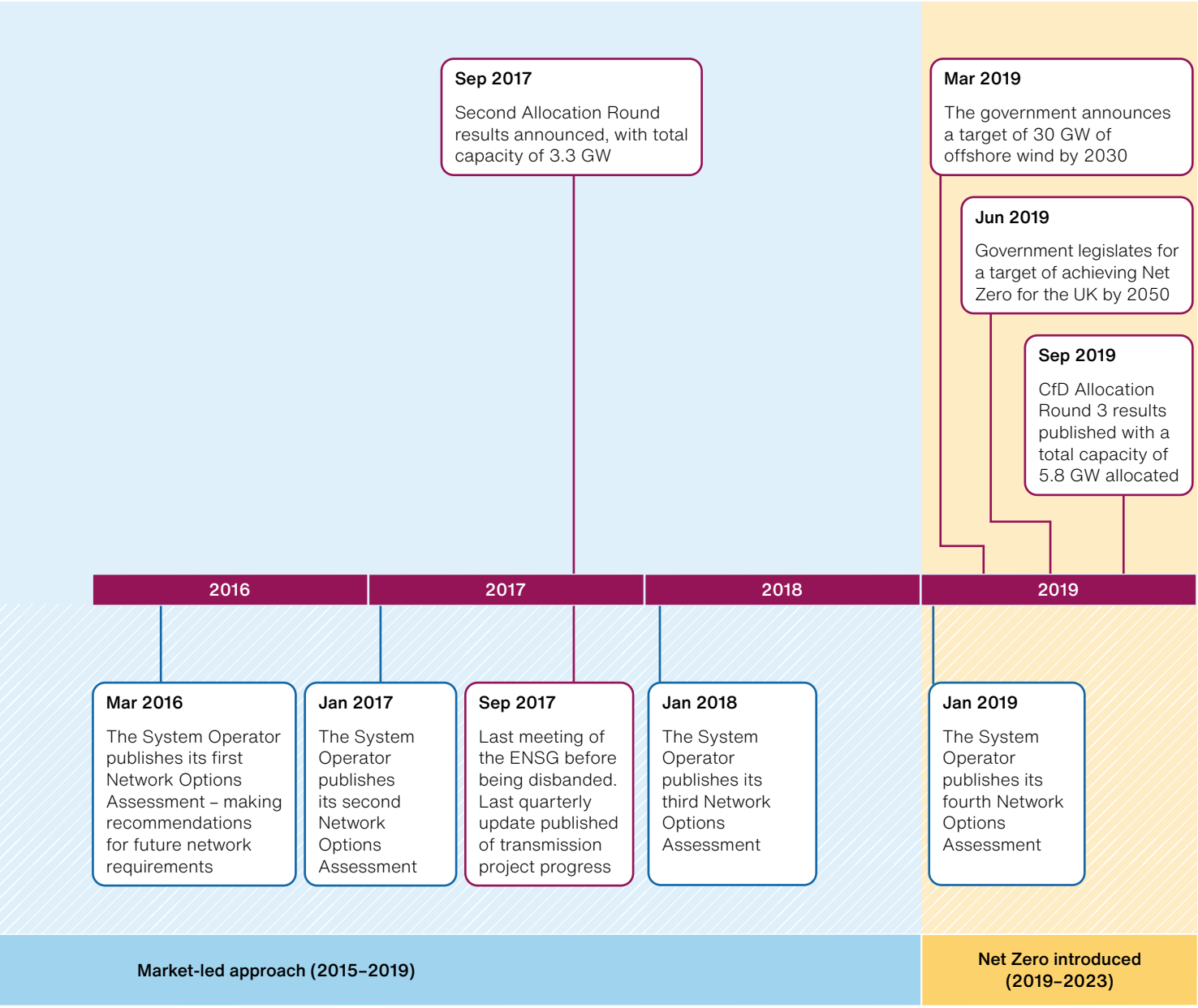

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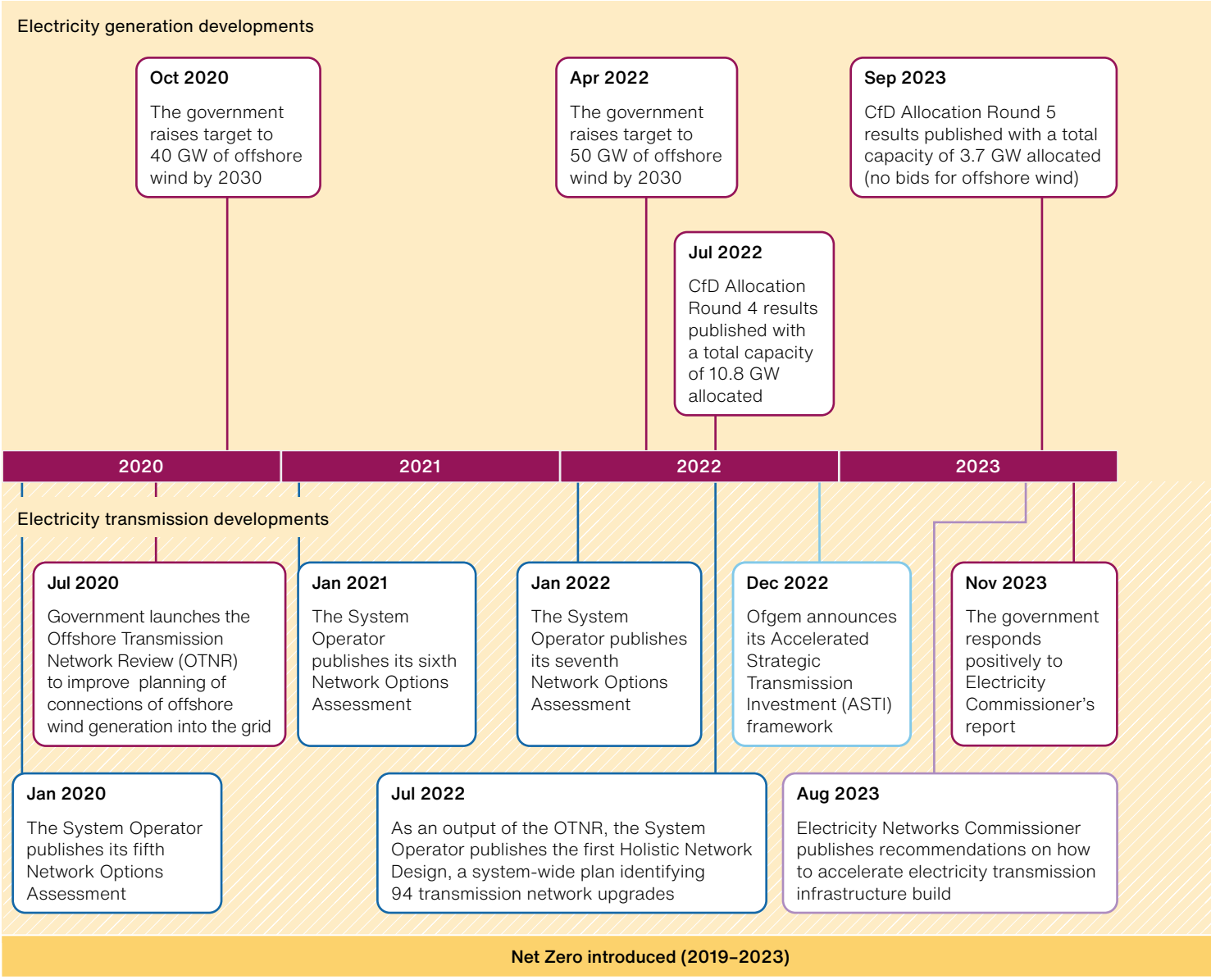
Figure 6 *continued*
Timeline of developments in electricity generation and transmission policy, 2009–2030



- Government action
- Ofgem action
- System Operator/National Energy System Operator's action
- Other

Notes

1 Ofgem's Accelerated Strategic Transmission Investment (ASTI) framework fast-tracks the approval and funding of critical transmission projects by prioritising timely delivery over detailed project needs assessments.

2 Contracts for Difference allocation rounds, first introduced by the government in 2014, are competitive auctions through which the government awards price support to renewable energy projects to help bring forward new low-carbon generation.

Source: National Audit Office analysis of published government documents

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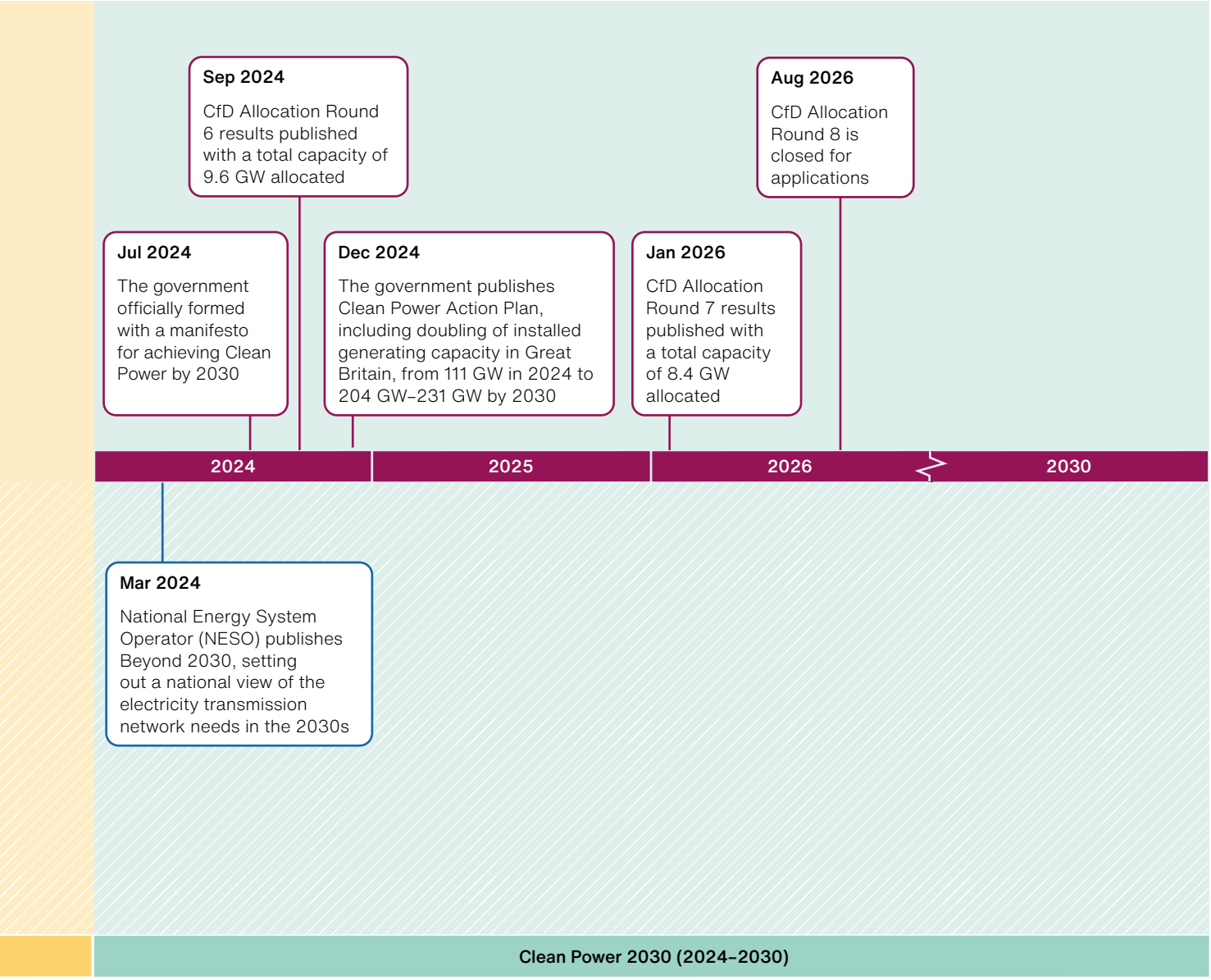

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1.15 As a result, opportunities to upgrade the grid earlier were missed. For example, the East Coast subsea link, seen as key to reducing constraint costs, is not expected to be completed until 2029. Now known as Eastern Green Links 1 and 2 (EGL1 and EGL2) they were originally proposed in 2009 and 2012 respectively, but full construction funding was not finally approved until 2024 (**Figure 7**).[10] This increases costs to consumers because:

- constraint costs have risen in the absence of these projects. NESO considers that, had EGL1 and EGL2 been completed in 2023-24 (as planned in 2016) they could have paid back their full construction costs by 2030 through reduced constraint costs; and
- delivering these projects later is more expensive, due to higher construction and financing costs and increased pressure on global supply chains as other countries expand their transmission networks.

1.16 Overall, investment in expanding the transmission network declined in real terms between 2016 and 2020, and only began to significantly increase again from 2023-24 (**Figure 8** on pages 32 and 33). In 2026, DESNZ acknowledged that there had been "historic underinvestment" in the network.[11] Between 2013 and 2021, Transmission Owners underspent their expected allowances by 20% (£4.8 billion); between 2021 and 2025, their underspend was 12% (£1.3 billion) as some network investment and maintenance work was delayed, scaled back, reprioritised or moved into later periods.[12]

10 Eastern Green Link 1 (EGL1, also known by its NESO code, E2DC) will run between Torness in East Lothian to Hawthorn Pit in County Durham. Eastern Green Link 2 (EGL2, also known as E4D3) will run from Peterhead in Aberdeenshire to Drax in Yorkshire.
11 DESNZ, *Reformed National Pricing (RNP): delivery plan*, April 2026, p. 12.
12 Ofgem, *RIIO-ET1 Performance Summary 2020-21*, September 2022, p.12. Ofgem, *RIIO-2 Electricity Transmission: annual report 2024 to 2025*, January 2026, p.32. Both underspends restated to 2025-26 prices.

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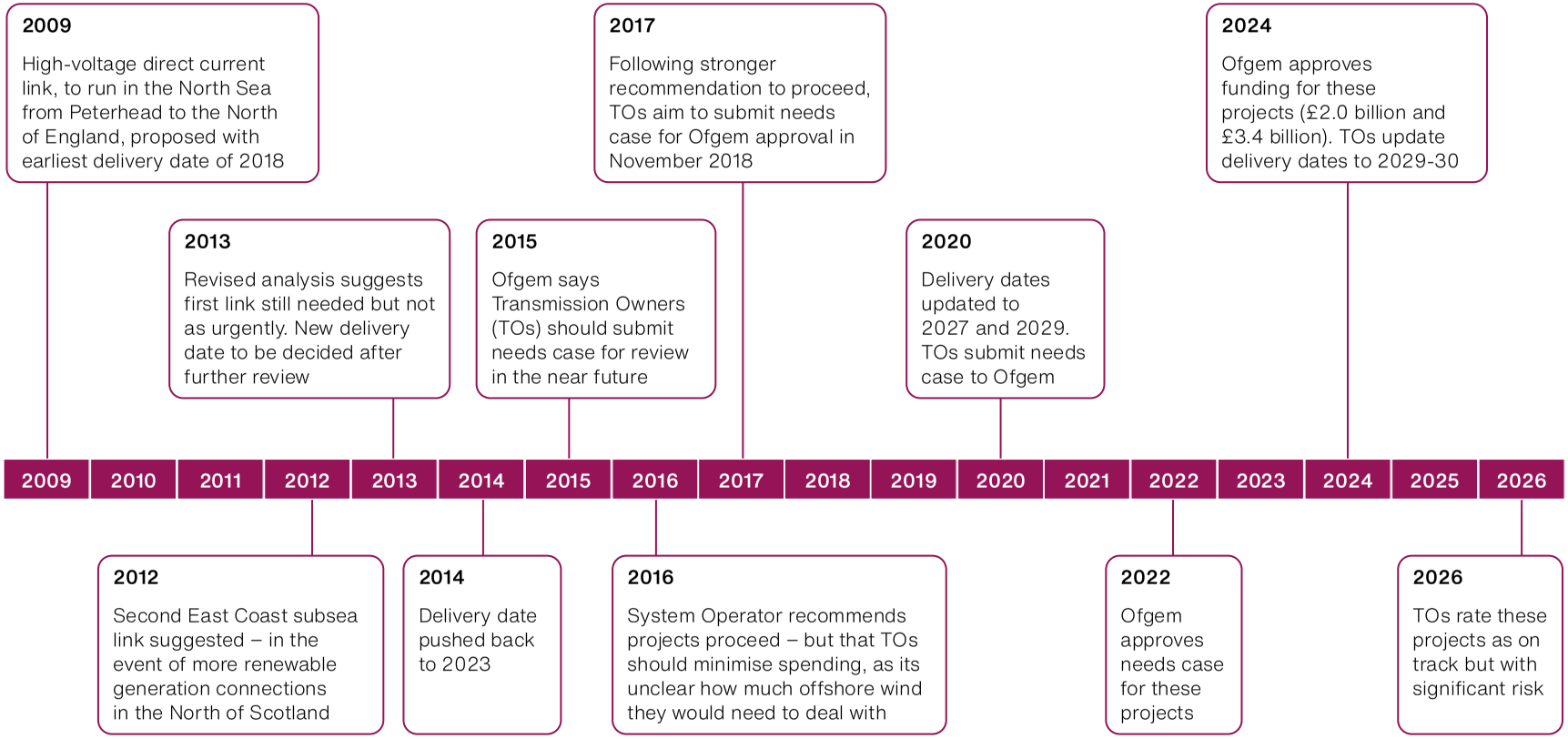
Figure 7

Timeline of two critical subsea transmission links for Clean Power 2030

Eastern Green Link 1 was first proposed in 2009 and Eastern Green Link 2 in 2012. Both will be delivered several years later than originally planned



Note

1 These projects were originally proposed by the Electricity Networks Strategy Group, a stakeholder forum chaired jointly by the then Department of Energy & Climate Change and Ofgem, which aimed to shape strategy for electricity networks in the transition to a low-carbon future. It was disbanded in 2017.

Source: National Audit Office analysis of information from the Department for Energy Security & Net Zero, Ofgem, and the National Energy System Operator

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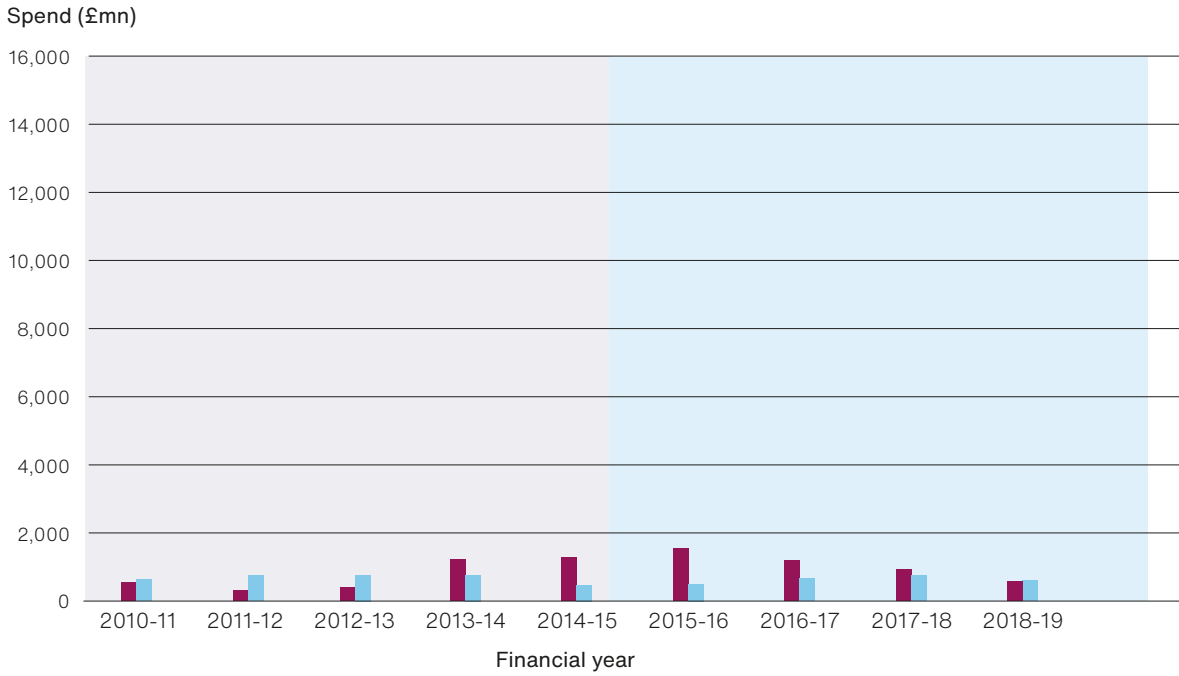
Figure 8

Total spend on transmission networks upgrades and maintenance, 2010-11 to 2030-31

Spend on increasing network capacity (upgrades) declined after 2016 but is set to increase substantially in the next five years



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Spend on upgrades (£mn)	554	329	412	1,268	1,326	1,635	1,295	918	668
Spend on maintenance (£mn)	657	775	792	794	490	597	720	777	712

Budget for upgrades (£mn)

Budget for maintenance (£mn)

Connect and manage introduced	Market-led approach

Notes

1 'Upgrades' refers to what Ofgem categorises as 'load-related investment': projects that enlarge the capacity of the electricity load that the transmission network can handle. 'Maintenance' refers to 'non load-related investment': work that repairs or replaces the existing network without expanding the capacity of the network overall.

2 Projected spend is the approved level of spend set out in the Ofgem RIIO-3 determination.

3 We have converted all spending to 2025-26 prices, using inflators based on the Consumer Price Index (CPI) measure of inflation. We have rounded spend to the nearest million.

4 The time period labels illustrate how the government's approach to electricity network development has evolved over successive time periods, detailed further in paragraph 1.12.

Source: National Audit Office analysis of Ofgem data

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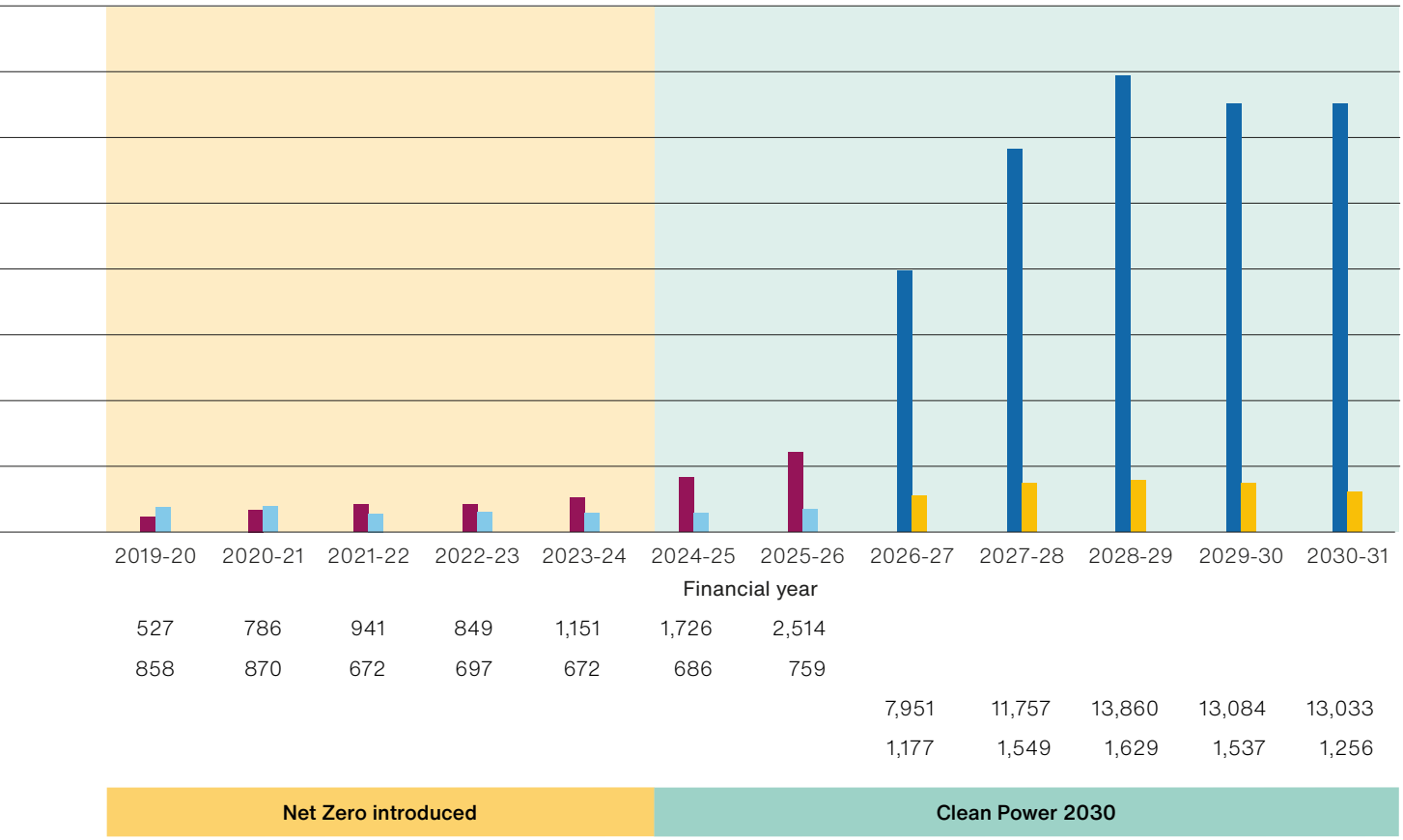

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Rationale for upgrades to the network for Clean Power 2030

1.17 In its November 2024 Clean Power 2030 advice to DESNZ, NESO identified 88 existing grid upgrade projects.[13] Of these, it said 80 were necessary to meet the Clean Power 2030 target (**Figure 9**). Figure 4 sets out NESO's estimates of the impacts on constraint costs in 2030 of accelerating these projects and Part Two considers project progress.

1.18 Ofgem estimates Transmission Owners will need to invest £70 billion in the grid from 1 April 2025 to 31 March 2031 (Figure 8).[14] This includes £62 billion for projects to upgrade the capacity of the grid (including the 88 projects) and £8 billion to maintain the stability of the grid. These six-year totals are in 2023-24 prices to align with Ofgem's announced decision. These estimates imply Transmission Owners will need to more than quadruple their annual expenditure on grid upgrades, from £2.5 billion in 2025-26 to over £11 billion by 2027-28. These annual figures are in 2025-26 prices. Transmission Owners will then need to sustain high levels of investment to at least 2030-31.

1.19 Ofgem estimates that this investment will save a typical household £60 a year by 31 March 2031, compared with 2025-26 (**Figure 10** on page 36). It will increase the amount they pay for the grid through their bills from £44 in 2025-26 to £104 in 2030-31. This is an increase of £60. But this is offset by savings of £120 because:

- **grid upgrades will avoid the constraint costs that would otherwise occur.** If the grid stayed the same into 2030, NESO estimated that there would be around £8 billion in additional constraint costs, which is the difference between the estimated constraint costs of £3.6 billion to £2.8 billion for the planned network and £12.7 billion to £10.9 billion for retaining the existing grid, as shown in Figure 4. This equates to £100 a year for a typical household; and
- **grid upgrades will reduce dependence on gas which can push up prices for other forms of generation.** Ofgem estimated that, in 2025, the wholesale gas price set the wholesale electricity price 90% of the time. Ofgem expects that by 2030-31, gas will continue to set the wholesale price around 30% of the time. Ofgem estimates this will reduce bills by at least £20 a year.

NESO's estimate of constraint costs are in 2024 prices as set out in its November 2024 advice for Clean Power 2030. Ofgem's calculation of the impact on consumers are in 2025-26 prices.

13 National Energy System Operator, *Clean Power 2030: Advice on achieving clean power for Great Britain by 2030*, November 2024.

14 Ofgem, *RIIO-3 Final Determinations for the Electricity Transmission, Gas Distribution and Gas Transmission sectors,* 4 December 2025, page 5. We explain the RIIO-3 price control in Part 3 of this report. £70 billion stated in 2023-24 prices is the equivalent of £74 billion in 2025-26 prices.

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Figure 9

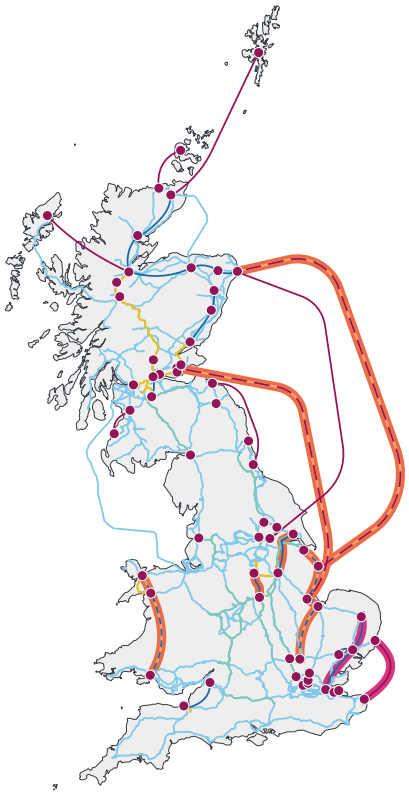
Electricity transmission network – existing and planned for 2030

The National Energy System Operator identified that 88 network infrastructure projects are required to upgrade the grid

Existing transmission network (2024)

Existing transmission lines

Planned transmission network for 2030
(up to £70 billion of investment)



- Existing transmission lines
- Substation upgrade or new substation
- New offshore network infrastructure
- New onshore network infrastructure
- Voltage increase on network
- Existing network upgrade
- Three projects NESO said would require acceleration for Clean Power 2030
- Eight projects that NESO said were not necessary for Clean Power 2030 but would help lower constraint costs if they were accelerated

Note

1 These maps show the existing grid and projects planned for Clean Power 2030. The locations and routes of network shown are however illustrative, highlighting identified needs to transmit electricity from point A to point B. They do not represent specific transmission routes or updates needed for ongoing connections.

Source: National Energy System Operator, *Clean Power 2030 Annex 2: Networks, connections and network access analysis*, November 2024

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Figure 10

The impact of the £70 billion grid upgrades on 2030-31 bills

The £70 billion investment in the grid between 1 April 2025 and 31 March 2031 should save consumers £60 a year on their bills by 2030-31 compared with not doing the upgrades and £30 a year compared with investment staying at current levels. These estimates assume all the planned generation is delivered for Clean Power 2030 on time

The impact of doing the upgrades[1]		The impact of accelerating the upgrades to align with Clean Power 2030[1]	
Compared with – not doing the grid upgrades		Compared with – investment stays at current levels so the upgrades take longer	
	Impact on 2030-31 bills		Impact on 2030-31 bills
	£ (2025-26 prices)		£ (2025-26 prices)
Cost of the grid upgrades		Cost of accelerating the grid upgrades	
Ofgem's forecast of network cost impact on a typical consumer bill in 2030-31[3]	104	Ofgem's forecast of network cost impact on a typical consumer bill in 2030-31[3]	104
What this would be if there were no grid upgrades	44	What this would have been had investment remained at the 2025-26 levels	59
Therefore, the increase in consumer bills due to the £70 billion upgrades	60	Therefore, the increase in consumer bills of accelerating the investment up to 31 March 2031	45
Savings from the grid upgrades		Savings from accelerating the grid upgrades	
The avoided additional constraint costs of around £8 billion that would occur if there were no grid upgrades	100	The avoided additional constraint costs of around £4 billion that would occur with some but not all the grid upgrades	55
The impact of reducing dependence on gas in the system[4]	20	The impact of reducing dependence on gas in the system[4]	20
Total savings from the grid upgrades compared with no new investment	**60**	**Total savings by accelerating the grid upgrades to align with Clean Power 2030**	**30**

Notes

1 This figure sets out Ofgem's calculation of the bill impact of grid upgrades with different counterfactuals. These use forecast constraint costs taken from the National Energy System Operator's (NESO's) November 2024 Clean Power 2030: Advice on achieving clean power for Great Britain by 2030 for different scenarios for the delivery of grid upgrades (Figure 4). The two calculations are:

- **The impact of doing the upgrades.** This is against a counterfactual of not doing the upgrades. It is based on the published RIIO-3 Impact Assessment, adapted at our request. It compares NESO's forecast of the constraint costs in the scenario of not doing upgrades (£10.9 billion to £12.7 billion) with NESO's forecast of the constraint costs if all its recommended grid upgrades are completed on time (£2.84 billion to £3.57 billion). This provides a saving of around £8 billion. This is equivalent to £100 for a typical domestic consumer.
- **The impact of accelerating the upgrades to align with Clean Power 2030.** This is against a counterfactual of keeping investment in grid upgrades at the current rate. It is based on Ofgem's published RIIO-3 Impact Assessment of the impact of RIIO-3 compared to rolling forward RIIO-2. It compares NESO's forecast for the constraint costs in the scenario of doing all the grid upgrades except Tilbury to Norwich and Sea Link (£6.58 billion to £7.79 billion) with NESO's forecast of the constraint costs if all its recommended grid upgrades are completed on time (£2.84 billion to £3.57 billion). This provides a saving of around £4 billion. This is equivalent to £55 for a typical domestic consumer.

  Both calculations assume that all the generation capacity necessary for Clean Power 2030 is added to the grid on time.

2 If there were no grid upgrades, Ofgem estimates network costs would rise in the short term due to changes in the cost of capital, before falling back to current levels by 2030-31.

3 NESO has only modelled the likely constraint costs in 2030-31 so it is not possible to give the total bill impact for other years or calculate present values.

4 Ofgem's impact assessment estimates that, in 2025, the wholesale gas price set the wholesale electricity price 90% of the time. Ofgem expects that by 2030-31 grid upgrades will enable gas to set the wholesale price around 30% of the time. This will reduce the price charged by renewables and other generators. Ofgem believes this will benefit consumers by around £20 a year.

5 These estimates are subject to significant uncertainty. For more details, see the Ofgem RIIO-3 Final Determination Impact Assessment.

6 All numbers are in 2025-26 prices except for Ofgem's estimate of the £70 billion required investment which is in 2023-24 prices.

Source: National Audit Office analysis of Ofgem's RIIO-3 Determination Impact Assessment and supporting financial model

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1.20 Ofgem's published Impact Assessment for grid investment from 1 April 2026 to 31 March 2031 focuses on the impact of accelerating the grid upgrades. It assumed that new investment would happen in the grid anyway, so calculated the impact of completing the upgrades to align with Clean Power 2030. It calculated that this would benefit consumers by £30 a year by 31 March 2031 (Figure 10).

1.21 Ofgem's estimates of the savings to consumers are subject to significant uncertainty. Its assumptions and uncertainty are explained in full in its impact assessment for the current price control period.[15]

1.22 Ofgem primarily assesses the value for money of the transmission investment by reference to avoided constraint costs. Its approach implies investment should continue until project costs equal the marginal savings from reduced constraints. Ofgem told us it is not economic to reduce constraint costs to zero as this would require the network to be over-sized most of the time. However, this approach has limitations:

- the value for money of projects is sensitive to forecasts of gas prices, as constraint costs are largely driven by 'turn up' costs of gas generation;
- the scale and timing of upgrades can increase constraint costs in the short term, due to planned outages in the network to enable construction;
- constraint costs do not capture wider impacts, such as increased carbon emissions when wind generation is curtailed and gas generation is increased. Overall, DESNZ expects investment in the transmission network to give rise to wider benefits, including decarbonisation and economic growth. While Ofgem recognises reducing carbon emissions as a social benefit, it does not include it directly in its value for money calculation; and
- some of the required investment in the transmission network does not increase the capacity of the grid but is required to maintain and renew ageing infrastructure.

1.23 NESO estimates that constraint costs will then fall significantly between 2030 and 2035 if the upgrade to the grid is successful. However, further investment beyond 2031 is likely to be needed to reduce future constraint costs and accommodate increasing demand for electricity and further increases in renewable generation. DESNZ expects electricity demand to more than double as more of the economy electrifies, including transport, heating and industry. NESO recommended a total of £89 billion of network investment beyond 2030.[16] This will be subject to future Ofgem decisions and price controls. In Part Three, we discuss plans for how DESNZ will align the investment of both generation and transmission capacity through better strategic spatial planning.

15 Ofgem, *RIIO-3 Final Determinations – Impact Assessment*, Ofgem, 4 December 2025.
16 National Energy System Operator, *Beyond 2030 - Electricity Transmission Update*, June 2026.

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Part Two

Delivering progress

2.1 In this part of the report, we cover:

- progress of the 88 grid upgrade projects; and
- efforts to speed up delivery and manage delivery risk.

Progress of the 88 grid upgrade projects

2.2 In November 2024, NESO identified 88 grid upgrade projects in its advice for Clean Power 2030.[17] Of these, 77 were deemed necessary for Clean Power 2030 and Transmission Owners had already agreed with NESO they could deliver by the end of 2030 (nine had already been built). It recommended that another three that were due after 2030 were also necessary for Clean Power 2030 and should be accelerated to before 2030. It also said it would be beneficial to accelerate a further 8 to reduce constraint costs. These 8 projects are known as 'acceleration beneficial' projects.

2.3 Of the 88 network projects 64 are still ongoing. Transmission Owners have now built 12. The National Energy System Operator (NESO) and the Transmission Owners assessed that another 12 projects were no longer needed because their scope was incorporated into newer projects. Most of the 64 projects remain at an early stage and only 17 are in construction (**Figure 11**).

2.4 Most of the 64 ongoing projects are not expected to be connected by the dates NESO originally said would be optimal for keeping constraint costs down between now and 2030. NESO defined an optimal delivery date for each project, representing the year when the system is expecting to require it to be live and connected to the transmission network ('energised'). Fifty-six of the 64 ongoing projects are those NESO deemed to be essential for Clean Power 2030. The 56 excludes the eight acceleration beneficial projects. As at March 2026, of the 56 projects:

- three are expected to be delivered earlier than their optimal date;
- 50 are forecast to be delivered after their optimal date. Of these: 22 are forecast to be less than one year late; seven are forecast to be between one and two years late, six by between two and three years, nine by three and four years, four by between four and five years, one by between five and six years and one by between six and seven years; and
- three are uncategorised because the Transmission Owners have not yet forecast when the project will be energised.

17 NESO, Clean Power 2030: Advice on achieving clean power for Great Britain by 2030, November 2024, p 33.

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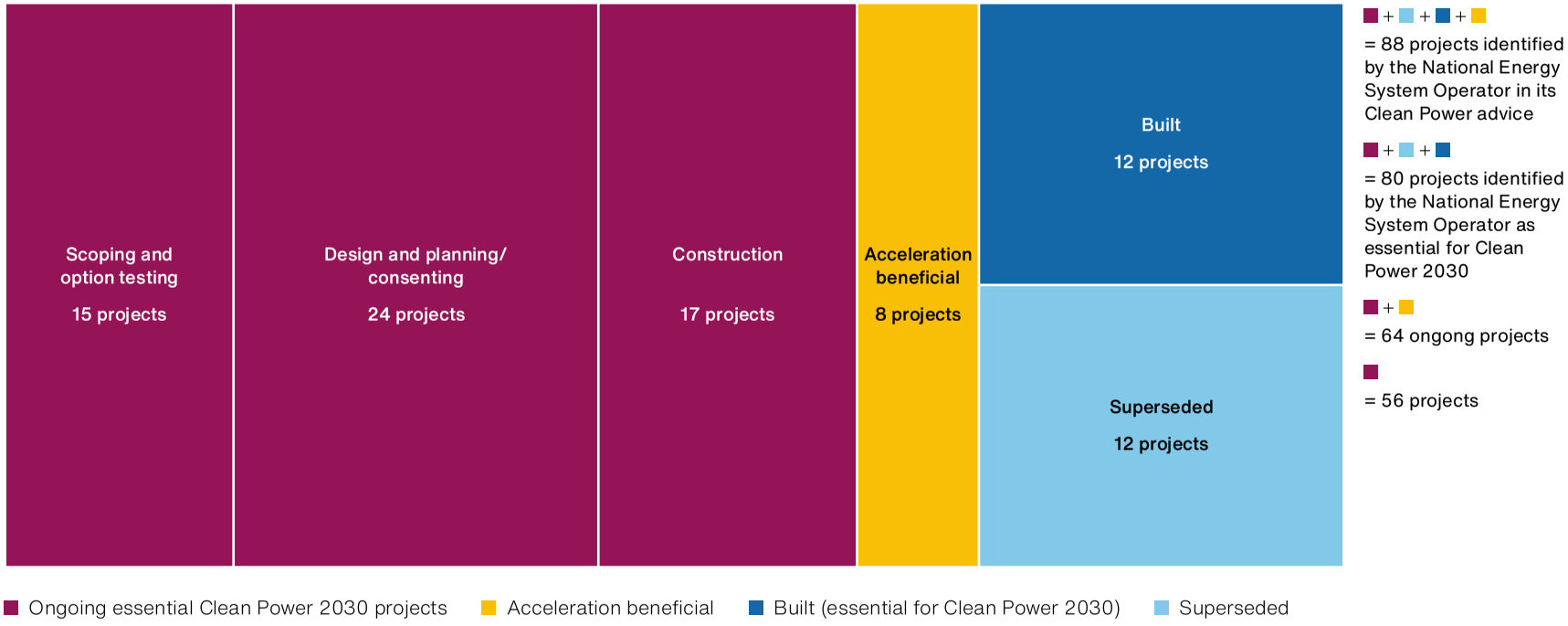
Figure 11

Transmission network projects to meet Clean Power 2030, as at March 2026

Most projects to meet Clean Power 2030 are at the early stages of development



Notes

1 This figure refers to the projects that the National Energy System Operator (NESO) identified in its advice for meeting Clean Power 2030.

2 For the purposes of this figure we assigned each ongoing project to one of three categories to provide an overview of their current status.

3 'Acceleration beneficial' projects are not required to meet clean power for 2030, but NESO has concluded that advancing these projects would reduce constraint costs.

Source: National Audit Office summary of the Department for Energy Security & Net Zero's management information

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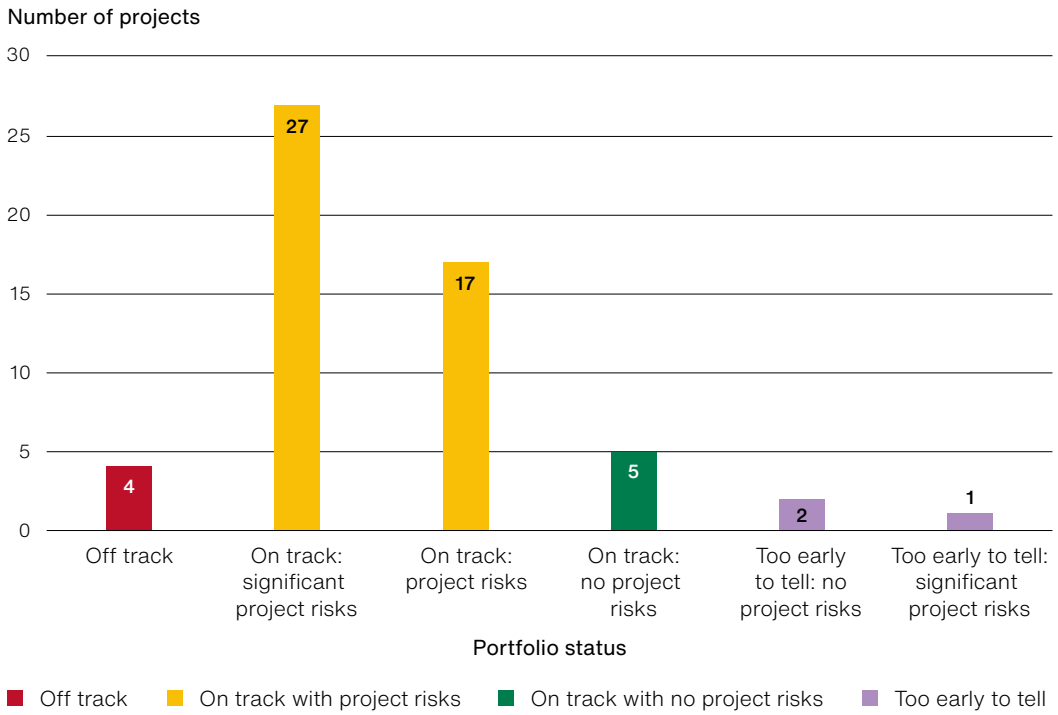
2.5 Four of the 56 projects deemed necessary for Clean Power 2030 are expected to be delivered after 2030, an increase of one additional project since NESO published its advice in November 2024. None of the eight 'acceleration beneficial' projects are currently expected to be significantly accelerated.

2.6 There are also significant risks to the current forecast delivery dates. Transmission Owners share information on project progress and risk against these delivery dates with the Department for Energy Security & Net Zero (DESNZ) on a quarterly basis. Twenty-eight of the 56 ongoing projects deemed essential for Clean Power 2030 face significant risks to meeting their agreed delivery date. Transmission Owners consider that it is too early in the life of three projects to judge progress (**Figure 12**).

Figure 12

Project delivery ratings of essential Clean Power 2030 projects, as at March 2026

32 of the 56 ongoing projects are off track or face significant risks to meeting their delivery date



Notes

1 This figure refers to the projects that the National Energy System Operator (NESO) identified in its advice for meeting Clean Power 2030. It excludes the 12 projects that, as of March 2026, have been stopped and subsumed into other projects. It also excludes 12 built projects and 8 projects that NESO deemed 'acceleration beneficial' (not essential for Clean Power 2030).

2 Ofgem agrees each project's delivery date on the basis of the Transmission Owners' delivery plans and what it deems deliverable. This means that projects may be on track for their delivery date but still late for Clean Power 2030.

3 The 32 projects facing significant risks to meeting their delivery date include 27 projects that are on track, four that are off track, and one that is too early to tell.

Source: National Audit Office analysis of National Grid Electricity Transmission, Scottish and Southern Electricity Networks and SP Energy Networks data

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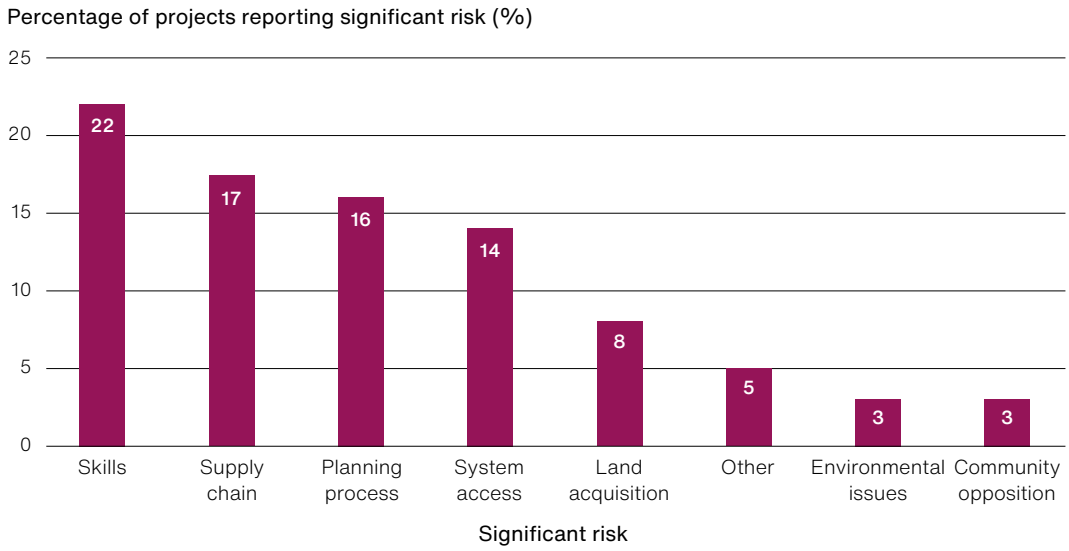
2.7 Across projects, skills was the most common risk to delivering projects identified by Transmission Owners, followed by the supply chain, planning processes and system access (**Figure 13**).[18]

2.8 DESNZ, NESO and Ofgem have not estimated the impact on consumers of delays to all the individual projects. NESO told us it does not recalculate constraint costs for each delay because of the resources that this would require and because it judged that updated estimates were not necessary to support planning decisions. But it has assessed the impact for seven of the most critical projects: Norwich to Tilbury, Sealink, Eastern Green Link 1 and 2, Yorkshire Green, and Brinsworth to Chesterfield/ Chesterfield to High Marnham.[19] It estimated these could add up to £6.7 billion a year in constraint costs if not delivered by 2030. As at March 2026, three are off track for Clean Power 2030 and four are on track but are facing significant risks to meeting their delivery dates.

Figure 13

Significant risks faced by Transmission Owners in upgrading the electricity transmission network, as at March 2026

Across projects, 'Skills' is the most common significant risk for electricity transmission network projects identified by Transmission Owners



Notes

1 The risks shown in this figure represent *significant project risks* – defined by the Department for Energy Security & Net Zero as "risks which may require government support or are uncontrolled and likely to have a material impact on the project energisation timeline".

2 We have rounded percentages to the nearest whole percent. We calculated these by dividing the number of occurrences of each risk by the total number of projects included in the analysis. We based the analysis on 64 projects, excluding those projects that are built and those not relevant to Clean Power 2030.

Source: National Audit Office analysis of National Grid Electricity Transmission, Scottish and Southern Electricity Networks and SP Energy Networks data

18 Risk here is defined by DESNZ as "risks which may require government support or are uncontrolled and likely to have a material impact on the project energisation timeline". DESNZ calls this a *significant project risk*.
19 The 'Norwich to Tilbury' upgrade covers two separate projects.

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2.9 Publicly available information gives a partial and inconsistent view of progress towards upgrading the grid. Coverage is incomplete and key delivery risk metrics are missing. As a result, the available datasets cannot be reconciled with each other or the data we received from Ofgem, NESO and DESNZ, and they do not give a clear view of overall portfolio delivery status.

- **Ofgem** publishes whether projects are on track annually, but only for those approved and funded within the price control framework. Its dataset should include the 17 projects in construction as at March 2026, but we could not identify all 17. Transmission Owners provide quarterly updates, but Ofgem publishes data less frequently.[20]
- **NESO** provides project-level changes to delivery dates at a single point in time, but does not show the scale of delays or the likelihood of meeting revised dates.[21]
- **DESNZ** does not publish regular project level updates on progress.
- **Transmission Owners** publish various information on individual projects, such as on location, purpose, timing, and expected benefits. However, it is difficult to bring this together into an overview of progress and cost of the portfolio.

Speeding up delivery and managing risk

2.10 DESNZ accepted the Electricity Networks Commissioner's conclusions and recommendations (see paragraph 1.12). The Commissioner found that planning processes were "slow, iterative and case-by-case". He set out recommendations to halve delivery timelines from 12–14 years to seven years, supported by stronger central planning and a whole-system view of future network needs. This would give Transmission Owners greater long-term visibility, helping them engage the supply chain and invest against a clearer pipeline of work.

2.11 DESNZ's Transmission Acceleration Action Plan (TAAP), published in November 2023, reflected this approach and emphasised the interdependencies between reforms. DESNZ established 10 workstreams to address the Commissioner's recommendations. Of these 10, it assessed, together with NESO and Ofgem, that (**Figure 14**):

- delivery of **one** workstream is rated 'Amber-Green' – it will probably meet the agreed outcomes as there are no current major issues affecting delivery;
- delivery of **four** workstreams are rated 'Amber' with resolvable issues that need management attention to avoid major long- term problems;
- delivery of **three** workstreams are rated 'Amber-Red', reflecting major issues in several key areas which require urgent attention to establish whether resolution is possible; and

20 Ofgem, *ET_annual_report_2024_25_Supplementary_datafile,* January 2026.
21 NESO, *Clean Power 2030 Data Workbook_V003 (3),* April 2025.

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- delivery of **two** workstreams are rated 'Red' – reflecting major issues considered not currently manageable or resolvable.

We discuss the five higher-risk workstreams below.

Figure 14

The Department for Energy Security & Net Zero's (DESNZ's), Ofgem and the National Energy System Operator's (NESO's) risk assessment of the 10 delivery workstreams

The planning and consenting and the connection reform workstreams face the most challenging risks to delivery

Workstream	Risk assessment
Offshore transmission owners Delivering offshore electricity connections through a competitive regime that aims to reduce costs.	Amber/Green
Strategic network planning Setting a coordinated, long-term plan for where and when transmission infrastructure is needed to meet future generation and demand.	Amber
Community acceptability Improving engagement and local benefits for communities hosting transmission infrastructure to reduce opposition.	Amber
Electricity network charging Reforming grid charges to encourage locations that reduce congestion and overall system costs.	Amber
Network regulation and competition Strengthening incentives, oversight and competition to improve network company performance.	Amber
Supply chain and skills Ensuring there is sufficient workforce capability and domestic supply chains to deliver at pace.	Amber/Red
System access Improving how and when parts of the transmission network are taken out of service for upgrades.	Amber/Red
Strategic demand connections Accelerating strategic demand connections through new legislative powers and stronger network performance incentives.	Amber/Red
Planning and consenting Reducing delays to transmission network delivery by reforming planning, land access, rights and consenting processes.	Red
Connections reform Prioritising projects that align with national energy plans and reducing delays.	Red

Note

1 DESNZ, NESO and Ofgem use 'red-amber-green' ratings to show confidence in delivering each workstream, based on progress against milestones, risks, and barriers and whether planned actions are sufficient to address challenges to progress. DESNZ defines these ratings as:
- Green: the workstream is likely to meet its stated outcome, with no current outstanding issues affecting delivery.
- Amber/Green: the workstream will probably meet its stated outcome and there are no major issues affecting delivery.
- Amber: the workstream has resolvable issues which require swift action to avoid long-term problems.
- Amber/Red: there are major issues in several key areas which require urgent action.
- Red: there are major issues that are not currently manageable or resolvable.

Source: National Audit Office analysis of the Department for Energy Security & Net Zero's documentation

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Planning, consenting and community acceptability

2.12 Around 25 projects have yet to submit planning consents and planning consents are being considered for a further 26 projects. Projects will need to obtain their relevant permissions more quickly than has historically been the case if all the grid upgrades are to be delivered before 2030. Many of the larger projects in England and Wales are or will be deemed Nationally Significant Infrastructure Projects (NSIP). Most other projects will be handled by the process set out in the Electricity Act 1989. This means most decisions:

- in England and Wales are taken by the Secretary of State; and
- in Scotland are taken by a Scottish minister.

2.13 Transmission Owners face considerable challenges including:

- **Acquiring land rights:** responders to a DESNZ call for evidence reported delays to project timelines in securing compulsory land rights ranging from 18 months to three years. Some claimed that the cost and time involved led them to abandon projects.
- **Obtaining consents:** DESNZ told us NSIPs can typically take over four years to gain consent. It can take a similar length of time to secure consent for projects in Scotland.
- **Potential legal challenges:** Around 58% of NSIPs across all sectors have judicial reviews. DESNZ told us that judicial reviews can typically take around 18 months and are a significant contributor to the overall time to gain consent.

2.14 The government has taken steps to accelerate the process of obtaining consents and address land access issues in England and Wales and in Scotland including:

- in July 2025, DESNZ consulted on reforms to improve certainty and speed up delivery. This included increasing the distance threshold at which electricity project would need to go through the full NSIP process; allowing more projects to use a simpler consenting approach; and giving Transmission Owners wider land access rights to speed up upgrades. DESNZ confirmed these reforms in its April 2026 consultation response but has not published a timetable for their introduction.[22]
- in December 2025, the government introduced new powers in the Planning and Infrastructure Act to streamline the consenting process for every NSIP. This includes removing some pre-application requirements to shorten the process by up to a year. It also introduced a number of measures designed to reform the electricity infrastructure consenting process in Scotland; and

22 Department for Energy Security & Net Zero, Electricity Network Infrastructure: Consents, Land Access and Rights, Government Response to the consultation, April 2026

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- in May 2026, the government proposed that the most important clean energy projects be designated as of 'Critical National Importance', with the aim of reducing the scope for legal challenge.

2.15 DESNZ also has a workstream intended to make sure local communities benefit from the upgrade to the grid:

- A **bill discount scheme** for households living within 500 metres of new transmission infrastructure, offering up to £2,500 over 10 years. DESNZ expects payments to start in 2027; and
- **Community benefits** developed with local areas, including financial and non-financial support (for example, funding for local projects and investment in local services), applicable to projects starting construction from March 2025.

System access

2.16 DESNZ expects the scale of transmission upgrades to drive a substantial increase in system access requests. 'System access' is the process by which Transmission Owners request planned outages to take parts of the network offline to carry out maintenance, upgrades and new connections. NESO coordinates these outages to make sure the electricity system remains safe, secure and reliable.

2.17 While these upgrades should increase capacity and reduce constraint costs once complete, outages during construction can increase constraints in the short term. For example, the UK Energy Research Centre found that system access on key Scotland-to-England routes meant lines operated at around 60% capacity on average in 2024.[23]

2.18 NESO must maintain system security. It operates the network in line with its Security and Quality of Supply Standard. This is broadly consistent with what is often known as the 'n-2' approach, meaning it aims to always keep sufficient network capacity at all times to avoid a loss of supply if, for example, any two lines or substations fail. This can delay network upgrades, as planned outages might be suspended if another part of the network is already out of service. This can happen, for instance, when scheduled network upgrades overrun, or when a fault on the system occurs, creating an unplanned outage.

2.19 Delivering planned outages is complex. In 2025-26, NESO delivered 8,100 planned outages. In addition, it cancelled or rearranged another 15,300 outages. Changes can arise, for example, when construction or maintenance work overruns and needs longer access, when there are unplanned faults on the network, or when planned work is brought forward.

23 Callum MacIver and Keith Bell, *Transmission Network Unavailability – the Quiet Driving Force Behind Rising Curtailment Costs in Great Britain*, UK Energy Research Centre, 16 June 2025.

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2.20 DESNZ has identified improving system access as critical to accelerating network upgrades and connections. In spring 2026, it set out measures including:

- reflecting system access impacts on constraint costs in new connection business cases;
- reviewing NESO's outage planning criteria while maintaining security of supply; and
- publishing a joint NESO and Transmission Owner six-year system access assessment.

Supply chains

2.21 DESNZ, Ofgem, NESO and Transmission Owners told us that they faced procurement and supply chain challenges, including:

- **Procurement timing constraints:** previously, Transmission Owners were typically required to wait for project-specific cost approval from Ofgem before procuring, limiting their ability to secure manufacturing slots in a constrained global market;
- **Global competition:** other countries are also expanding their electricity networks, increasing demand for materials and equipment. DESNZ estimates that some equipment costs have risen to up to five times their 2022 levels, with longer lead times. Buyers must now secure production slots several years in advance, increasing costs and reducing flexibility; and
- **Reliance on imports:** the UK relies heavily on imported components, increasing exposure to global competition and supply shocks. DESNZ aims to strengthen the domestic supply chain, with plans expected in an Electricity Networks Sector Growth Plan due in autumn 2026.

2.22 Ofgem has revised its approach to supporting Transmission Owner procurement for network upgrades in response to these challenges. Its Advanced Procurement Mechanism (APM), introduced in June 2025, allows Transmission Owners to access up to 20% of procurement costs before fully developing plans for the project. It is based on a similar mechanism Ofgem introduced for ASTI. It is designed to enable Transmission Owners to reserve manufacturing capacity for certain specified types of equipment. The APM prioritises equipment that can be repurposed across projects, reducing the risk of waste if projects are not approved, and aims to encourage investment that supports construction.

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Skills

2.23 Delivering transmission upgrades depends on access to skilled labour. The UK faces a significant skills shortfall and an ageing workforce, with gaps expected to persist to 2030, particularly in engineering, management and multi-skilled craft roles. This increases reliance on migration to meet demand. Research carried out by the government and Ofgem in 2022 suggested that investment in upgrading the grid could directly support an additional 50,000 to 130,000 jobs by 2050.[24]

2.24 Our 2026 report Increasing construction skills highlights some wider risks that are relevant for the electricity networks sector to manage:

- **Demanding targets:** Infrastructure pipeline plans depend on unprecedented expansion of a construction sector that is already experiencing skills shortages. This increases the challenge for the government and employers: they must expand and upskill the available workforce simultaneously.
- **Competition for workers:** Different sectors are competing for some of the same specialist skills.
- **Training constraints:** The pace and scale at which future workers can upskill is constrained by shortages in further education provision and work placements with employers. Addressing these underlying constraints is therefore an important enabler of ambitious plans for workplace development.[25]

2.25 In October 2025, DESNZ's Clean Energy Jobs Plan set out measures, including:

- £1.2 billion a year of investment in skills over the course of the Parliament;
- expanding the Energy Skills Passport to electricity networks, to support workers moving from carbon-intensive industries into clean energy roles;
- developing an industry-led Electricity Networks Sector Growth Plan, due autumn 2026; and
- working with industry and trade unions to improve pay and conditions.[26]

24 DESNZ and Ofgem, *Electricity Networks Strategic Framework: Appendix 1 – Electricity Networks Modelling*, August 2022.
25 Comptroller and Auditor General, *Increasing construction skills*, Session 2026-27, HC 264, National Audit Office, July 2026.
26 DESNZ, *Clean Energy Jobs Plan*, 19 October 2025.

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Grid connections

2.26 DESNZ believes that faster grid connections, across both transmission and distribution networks, could bring forward up to £90 billion of private investment in generation and demand projects over 10 years. Removing inactive projects from the connections queue also means NESO plans for less additional demand, reducing forecast constraint costs and network investment needs.

2.27 In recent years, both the number of applications to connect to the grid and the proportion of requested connection dates that were not met have increased:

- **Rising applications:** applications from energy developments, including generation, storage and demand, to connect to the electricity transmission network were almost four times higher in 2023-24 than in 2019-20. Once an application is submitted, developers propose a preferred connection date, which Transmission Owners assess before offering a formal date.
- **Longer lead time to connect:** the average gap between the date requested by a developer for a connection and the date offered increased from 18 months in 2019-20 to 57 months in 2023-24. Over the same period, the proportion of developers that received an offer of a connection date later than they had requested increased from 36% in 2019-20 to 84% in 2023-24. Transmission Owners told us the developers' requested connection dates did not always take account of the scale of works required for the connection.

These factors above have contributed to a connection queue of over 700 GW. This constrains the roll-out of low-carbon generation and demand projects and, according to NESO, can lead to unnecessary network upgrades, increasing costs to consumers. DESNZ has estimated that the generation and storage capacity required for Clean Power is between 204 GW and 231 GW.

2.28 DESNZ has taken steps to address these issues. In November 2023, it published a Connections Action Plan which included proposals to:[27]

- move away from a 'first come, first served' approach and prioritise projects that are readier to progress or make quick use of capacity;
- prioritise the most strategically important projects to explore timely connection;
- reduce the average delay of projects to connect to six months; and
- remove stalled projects from the queue that failed to meet agreed milestones.

27 Department for Energy Security & Net Zero and Ofgem, *Connections action plan: Speeding up connections to the electricity network across Great Britain*, 22 November 2023

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2.29 Additionally, under the current price control framework, Transmission Owners will receive financial rewards for connecting customers early or on time, and penalties for connecting customers more than 30 days later than the contracted date. Customers, however, will not be compensated for such delays.

2.30 Under the new process, 550 GW of projects were removed from the main queue, and many others deprioritised. Of the remaining projects, 143 GW is prioritised for connection by 2030 and 238 GW by 2035. Some projects were protected from being deprioritised, for example where these were already well-advanced.

2.31 In March 2026, DESNZ started to consult on proposals to increase the prioritisation within the queue for connections for demand projects such as data centres and to meet demand for earlier connections from, for example, housing. This was because there had been rapid growth in the connection queue for these projects, which risked delaying projects across the system.

2.32 DESNZ wants its proposals to make the connections process more efficient, reducing delays, and to support wider economic activity. However, it is not yet clear whether the new process is reducing connection times, unlocking additional growth, or primarily filtering out speculative applications. DESNZ, Ofgem and NESO are not currently tracking connection speeds, as revised offers are still being issued and the process will not conclude until January to March 2027.

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Part Three

Oversight challenges

3.1 In this part, we examine

- governance of the Electricity Networks Programme;
- Ofgem's regulation of the costs of transmission upgrades; and
- wider strategic reforms.

Programme governance

3.2 The Department for Energy Security & Net Zero (DESNZ), Ofgem and the National Energy System Operator (NESO) have adapted their approach to oversight to reflect the large scale and importance of accelerating grid upgrades over the next few years. DESNZ has established:

- **The Clean Power Unit (CPU)** in 2024 to oversee delivery of Clean Power 2030 across generation, transmission and distribution. It monitors progress, risks and delivery barriers across these different programmes. It has also worked across government, and with Transmission Owners, to support the delivery of key projects and to influence policy.
- **The Electricity Networks Programme (ENP)** in 2023 to deliver the Transmission Acceleration Action Plan (paragraph 2.11) and oversee grid upgrades. It shares information with the CPU and brings together DESNZ, Ofgem, NESO and industry representatives to oversee the 10 workstreams, monitor project delivery and manage strategic risks.
- **The Electricity Networks Delivery Forum** to provide ministerial oversight and escalate issues that cannot be resolved through normal governance arrangements. It is attended by cross government officials, devolved governments and wider industry.

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3.3 DESNZ drew on lessons from previous programmes with the aim of creating a more joined-up approach to programme management. An internal audit review in April 2025 identified strengths in governance, risk management and delivery of the ENP. While we found the ENP Board has improved coordination, we identified four limitations in overall governance:

- **No single point of accountability:** No person or organisation is accountable for the overall progress and value for money of the portfolio;
- **Limited management of the projects as a portfolio:** While the ENP Board has started to operate as a portfolio management function, Transmission Owners are responsible for the projects and there is scope to strengthen how it monitors whether the portfolio remains on track to deliver its intended benefits, and prioritises projects or allocates resources;
- **Limited access to project information:** Transmission Owners share information on projects on a voluntarily basis; and
- **Limited formal powers:** DESNZ, the CPU and the ENP Board have few formal powers and depend largely on influence and coordination across government to address delivery risks.

Strategic network planning

3.4 Grid upgrades are funded through consumer bills rather than public expenditure and are not subject to a full government business case or options appraisal. DESNZ has supported new renewable generation, NESO identified the grid upgrades needed to support it, and Ofgem has approved investment largely by reference to reducing constraint costs. As a result, no single body has had a whole-system view of both transmission and generation costs, options and trade-offs.

3.5 The chosen upgrades reflect the projects NESO considered would best deliver Clean Power 2030 within the time available, rather than the outcome of a whole-system assessment of alternatives. We found:

- DESNZ lacks a clear policy on how decisions about the scale, pace and location of generation should account for network capacity or constraint costs
- DESNZ produced a business case for the 10 ENP workstreams but not for the grid upgrades themselves. Few of its internal submissions it provided for our review acknowledged the scale of network investment required and none presented or evaluated alternative options for expanding capacity.

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- The projects NESO put forward for Clean Power 2030 drew principally on existing network plans and projects already under development that could be delivered by 2030.[28] Many had been developed to support the previous government target of increasing offshore generation to 50 GW.[29]
- Ofgem has produced an impact assessment for the grid upgrades, but this was on the basis that the generation had already been approved.

3.6 NESO is developing a different approach for future investment beyond 2030. In October 2024, the UK, Scottish and Welsh Governments commissioned it to prepare a Strategic Spatial Energy Plan (SSEP), to set out the preferred type, location and timing of future generation, storage and network infrastructure. This will set out recommended pathways for the Secretary of State to select. NESO expects to publish the SSEP in 2027 and a Centralised Strategic Network Plan in 2028, setting out the grid investment needed to support it.

Regulatory oversight

3.7 As monopolies, the amount Transmission Owners can charge consumers is regulated by Ofgem rather than set by competition. Ofgem does this through a price control framework known as RIIO ('Revenue = Incentives + Innovation + Outputs'). There have been three price control periods under this framework so far:

- RIIO-1 ran from 2013 to 2020;
- RIIO-2 ran from 2021 to 2026; and
- RIIO-3 (the current period), runs from April 2026 to March 2031.

3.8 In setting out RIIO-3, Ofgem adapted its approach for the step-change expected in investment. At the end of the RIIO-1 period in 2020-21, the Transmission Owners were managing assets with a regulatory value of £20.3 billion. This increased to £22.8 billion at the end of the RIIO-2 period in 2024-25. It is now expected to grow to £76.7 billion by the end of the RIIO-3 period in 2030-31 (all values in 2025-26 prices).

28 National Energy System Operator (NESO), *Clean Power 2030 Annex 2: Networks, connections and network access analysis*, 17 January 2025
29 NESO, *Holistic Network Design*, July 2022 and *Beyond 2030 - A national blueprint for a decarbonised electricity system in Great Britain*, March 2024.

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3.9 Below, we set out how Ofgem has adapted its regulatory approach to the scale and pace of this investment programme.

Taking a phased approach to approving funding

3.10 Ofgem is increasingly approving project funding in phases, reflecting the scale of investment and the limited maturity of some projects. It has:

- approved a baseline total capital and operating cost allowance of £17.7 billion for Transmission Owner projects, against the potential programme of up to £70 billion from 1 April 2025 to 31 March 2031 (2023-24 prices);
- moved to a staged funding model, where funding is approved as projects progress and bring forward individual full business cases, rather than setting full allowances upfront; and
- set out adjustment mechanisms, including 're-openers', to vary allowances where project scope, costs or circumstances are uncertain and subsequently change.

Balancing faster approvals and detailed cost approvals

3.11 Ofgem's phased approach still requires detailed scrutiny, but spread over a longer period. For each project, it seeks to assess whether grid upgrade costs are efficient and whether risks are borne by those best placed to manage them. The number of approvals expected up to 2030, combined with the need to support timely project delivery, places greater demands on Ofgem's regulatory capacity. This is because:

- Transmission Owners hold more information than Ofgem about projects. As a result, Ofgem normally spends six to nine months testing business cases, project designs and cost estimates through an iterative process of challenge and evidence gathering, supported by independent technical advisers.
- Ofgem must challenge both the reasonableness of Transmission Owners' cost and risk assessments and whether particular risks should be borne by consumers or companies. These judgements can materially affect project, financing and contingency costs.
- Many projects are bespoke and current supply chain pressures make prices more volatile. This reduces Ofgem's ability to rely on historical benchmarks when assessing costs and risks.

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- Ofgem therefore increasingly relies on information from Transmission Owners and their assurance processes to assess whether projects are being designed, procured and managed efficiently. This requires a broader assessment than reviewing project costs alone.
- The regulatory framework allows some funding decisions to be revisited as projects develop, helping to reduce windfall gains and losses. This requires ongoing monitoring and regulatory judgement throughout project delivery.

3.12 To support timely delivery, Ofgem told us it is seeking, where possible, to prioritise timely decisions and accept a higher degree of uncertainty in project costs and risks. This recognises the cost consumers will pay if projects are delayed but inevitably reduces Ofgem's emphasis on detailed scrutiny of construction costs. To support this trade-off and reduce demands on its capacity, it has also:

- increased resources for assessing projects from an estimated 3.9 full-time equivalent (FTE) staff in 2013 to 21.8 FTE in 2026;
- increased the threshold at which it reviews costs in detail from £100 million to £300 million;
- established a framework to appoint Independent Technical Advisors to provide assurance on complex, high-value projects; and
- introduced engineering design standards, known as 'Pre-Approval of Solution by Engineering' (PASE). Projects that do not meet these standards will be subject to additional scrutiny.

Reducing duplication

3.13 Ofgem has simplified its approval process for large projects to reduce duplication and speed up delivery. Under its previous frameworks, such as the Large Onshore Transmission Investment (LOTI) process, projects were approved sequentially. This contributed to projects taking 11 to 14 years. In 2022, Ofgem introduced the Accelerated Strategic Transmission Investment (ASTI) framework for 26 large onshore transmission projects needed for 2030. ASTI was introduced to accelerate strategic transmission projects needed to connect 50 GW of offshore wind by 2030. ASTI:

- removes an Ofgem assessment of the strategic need for a project on the basis that NESO has already identified it as necessary;
- reduces the number of regulatory approval stages; and
- allows Transmission Owners earlier access to project funding before planning consent is secured, allowing early work to begin.

3.14 All three Transmission Owners told us they were broadly positive about the framework. Ofgem has applied this approach more widely across RIIO-3.

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Performance incentives

3.15 Ofgem has increased the use of financial incentives in ASTI and RIIO-3 to encourage Transmission Owners to control costs and deliver projects on time. These incentives are designed to reward companies that meet or exceed performance targets and to share the impact of overspending and underspending with consumers.

3.16 The impact can be significant. Ofgem estimates RIIO-3 incentives could increase Transmission Owners' average annual return on regulated equity by up to 6.7 percentage points or reduce them by up to 4.6 percentage points. Ofgem can also penalise poor delivery. In 2022, it required two companies to return £158 million to consumers after a project was delivered two years late.

3.17 Transmission Owners told us they supported this stronger focus on delivery. However, the design of the incentives matters. We found:

- **Incentives are weighted towards early delivery:** Citizens Advice argued that higher rewards for delivering projects early than for reducing delays to late projects could encourage Transmission Owners to prioritise projects that are already on track rather than projects at risk of delay. Ofgem considers this reflects the greater challenge of delivering projects early, but it may not maximise benefits for consumers where delays increase constraint costs.
- **Target dates reflect when projects are deliverable rather than when they are needed:** Ofgem sets target delivery dates based on what it deems realistically deliverable, given Transmission Owners' plans. Under ASTI, Ofgem set target dates 12 months after the system operator said projects were ideally needed to meet the government's ambition at the time for 50 GW of offshore wind by 2030. Under RIIO-3, Ofgem sets delivery dates as the later of NESO's Optimal Delivery Date, given Clean Power 2030 needs, and the Transmission Owner's 'P50' date, where delivery is equally likely to be before or after the target. Transmission Owners can earn additional returns for delivering projects early and can get penalties for late delivery. But projects can perform well against regulatory targets even where they are forecast to be delivered after the point at which NESO considers they would provide maximum benefit to consumers.
- **Baseline returns influence the importance of incentives:** For RIIO-3, Ofgem used European comparators when setting allowed returns. Citizens Advice told us this approach is generous. It estimated that using a lower estimate based on more recent data could have reduced costs to consumers by £256 million over the five-year price control period. Higher baseline returns increase costs to consumers and mean a smaller proportion of Transmission Owners' returns depends on outperforming incentive targets. In response to this point, one Transmission Owner told us that Ofgem had made an informed decision to include benchmarks from Spain and Italy, whose regulatory frameworks closely resemble that in Great Britain. It stressed that Ofgem must also weigh up the risk to consumers from underinvestment if returns are insufficient to attract the required capital.

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Wider strategic reforms

3.18 In April 2026, DESNZ published its Reformed National Pricing delivery plan, setting out proposals for how generation is located and how the electricity system is operated and charged for.[30] These proposals require further consultation and it will be challenging to make reforms that significantly affect outcomes before 2030. It aims to:

- **Better align where generation and storage are built with future network needs** through potential changes to 'siting and investment levers' including network charging and connections arrangements. These changes are intended to support the SSEP and encourage investment in areas where network capacity is available or planned.
- **Reduce the need for constraint payments** by making better use of the existing network, electricity storage, interconnectors and schemes that reward consumers for shifting their demand. This should reduce the amount of generation that needs to be turned down when the network is congested.
- **Reduce the cost of balancing the electricity system** by changing how the system operator manages the network in real time. This includes considering changes to balancing and settlement arrangements and the information available to system operators to improve day-to-day operation of the system.

3.19 Ofgem also intends to introduce competition to support further expansion of the network beyond the three Transmission Owners. Its Competitively Appointed Transmission Owner (CATO) onshore early competition framework aims to reduce costs by allowing a competitively selected company to deliver new electricity transmission assets. The CATO regime has not been used to deliver any onshore or Clean Power 2030 transmission projects yet; NESO is reviewing potential future projects to identify those suitable for competition.

30 Department for Energy Security & Net Zero, *Reformed National Pricing: (RNP): Reformed National Pricing Delivery Plan and and consultation on reforms to the siting and investment levers*, April 2026.

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Appendix One

Our audit approach

Our scope

1 This report examines whether the Department for Energy Security & Net Zero (DESNZ), Ofgem and the National Energy System Operator (NESO) are effectively overseeing and supporting the upgrade of the electricity transmission network to deliver the government's Clean Power 2030 ambition.

2 This study follows up progress on electricity transmission since our previous reports, *Electricity networks* (2020) and *Decarbonising the power sector* (2023), which highlighted challenges in planning, investment and coordination across the electricity system.

3 We focused on:

- the rationale for upgrading the electricity transmission network;
- progress in delivering upgrade projects; and
- the effectiveness of oversight, regulation and support arrangements.

Our evidence base

4 Our conclusions are based on analysis of evidence collected between January and June 2026. We used a combination of quantitative analysis, document review, interviews, case studies, and an expert panel.

Quantitative analysis

5 We undertook quantitative analysis to:

- assess trends in constraint costs and generation capacity;
- analyse the scale and trajectory of investment in transmission upgrades;
- evaluate project delivery progress and risks across the portfolio; and
- examine the potential financial impacts on consumers.

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6 Our analysis drew on data from:

- DESNZ and NESO modelling and management information;
- Ofgem price control data and impact assessments;
- Transmission Owner project reporting; and
- publicly available datasets on energy generation, demand and costs.

7 We:

- analysed time series data on constraint costs, generation capacity and network investment;
- compared planned and actual delivery dates for upgrade projects;
- assessed project risk ratings and performance metrics; and
- examined forecasts (including NESO modelling) of future system costs.

Estimating the impact of transmission network upgrades on household bills

8 Ofgem's RIIO-3 impact assessment estimated the effect of its final decisions against a counterfactual in which investment continued at levels consistent with the previous electricity transmission price control (RIIO-2). This approach estimates the impact of additional investment relative to continued investment, rather than relative to no upgrades.

9 We asked Ofgem to adapt its model to create a counterfactual which modelled a scenario where additional load-related investment (otherwise known as 'upgrades') to expand transmission network capacity did not take place, while other transmission investment continued (otherwise known as 'maintenance'). This provided an estimate of the impact of the transmission upgrade programme on household bills. We reviewed the model to gain an understanding of its key assumptions and methodology.

Document review

10 Documents analysed in this study included:

- programme business case and related documents, as well as documents concerning governance and programme management, relating to DESNZ's Electricity Networks Programme;
- Ofgem price control documentation (including RIIO-3 impact assessments);
- NESO plans, modelling outputs and Clean Power 2030 analysis;
- ministerial submissions and internal briefing papers;
- project-level documentation for selected network upgrades; and
- publicly available reports and data releases.

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11 We reviewed documents to:

- understand the development of policy and strategy for transmission upgrades;
- assess the robustness of the business case and investment rationale;
- examine governance, oversight and regulatory processes; and
- evaluate how progress and risks are monitored.

Interviews

12 We interviewed officials from:

- DESNZ;
- Ofgem;
- NESO;
- Transmission Owners: National Grid Electricity Transmission (NGET), SP Energy Networks (SPEN), and Scottish & Southern Electricity Networks Transmission (SSENT);
- Scottish Government; and
- Welsh Government.

13 In addition we interviewed Nick Winser, the Electricity Networks Commissioner.

14 We conducted interviews to:

- gain a detailed understanding of the Electricity Networks Programme, NESO's approach to the balancing mechanism and system planning, and Ofgem's approach to price control and project supervision; and
- explore perspectives on recent policy history, and plans for the future of the network.

Expert panel

15 We organised two expert panel sessions. These brought together a range of stakeholders with expertise in electricity networks, regulation, policy, and consumer issues. Participants included individuals and representatives from the following organisations:

- Adam Bell (Stonehaven);
- Professor Keith Bell (University of Strathclyde/UK Energy Research Centre);
- Professor Jim Watson (UCL Institute for Sustainable Resources);
- BEAMA – the trade association for energy infrastructure and systems;

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- Citizens Advice;
- Confederation of British Industry (CBI);
- E3G;
- Energy Networks Association;
- Energy Systems Catapult;
- Energy UK;
- The National Infrastructure and Service Transformation Authority (NISTA);
- Regen; and
- RenewableUK.

16 We established an expert panel to:

- improve our understanding of key issues affecting electricity transmission, including lessons from past policy and current delivery challenges;
- obtain feedback on our study design, scope and lines of enquiry; and
- test emerging themes and potential areas for recommendations in our report.

17 We convened two expert panel meetings during the study:

- an initial session in February 2026, focused on informing our study design and identifying key issues; and
- a followup session in April 2026, focused on discussing emerging themes, potential recommendations, and areas for inclusion in the report.

Case studies

18 We undertook an analysis of a sample of transmission projects to:

- examine how project-level decisions are made and assured;
- assess how costs are estimated and scrutinised; and
- understand how risks are managed in practice.

19 We selected case study projects to reflect:

- a range of project types and scales;
- different stages of development; and
- projects identified as strategically significant for Clean Power 2030.

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Artificial intelligence

20 We used artificial intelligence (AI), through Microsoft CoPilot, to support aspects of our work. Examples included identifying themes in data and documents and editing draft text. We carefully governed the use of these tools to ensure compliance with applicable auditing standards. The use of AI did not replace professional auditor judgement; all outputs were subject to oversight, review and interpretation by the audit team.

Indexation

21 This report compares numbers produced by DESNZ, NESO and Ofgem that are prepared on different bases. Where possible we have retained the basis of the number that they have previously announced to avoid confusion. We have restated numbers using the CPI index where necessary to aid comparisons. In general:

- Ofgem RIIO-3 investment six-year investment totals are stated in 2023-24 prices;
- Ofgem Impact assessment cost and savings to consumers are in 2025-26 prices;
- NESO's estimates of constraint costs in 2030 are in 2024 prices; and
- other prices are nominal unless otherwise stated.

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