Reforming our electricity markets



Summary

Delivering Clean Power by 2030 requires an ambitious and actively planned approach from both government and business. Action is needed to shape and enable effective markets. This approach is central to the development and operation of the 2030 system and will only grow in importance as the system becomes more distributed and flexible in 2030 and beyond. To be successful in delivering clean power by 2030, we need to:

- **Support investor certainty** by ensuring wholesale market reforms, as being developed under the Review of Electricity Market Arrangements (REMA) programme, are delivered quickly and progress towards delivery is communicated clearly. We will do this by:
 - Publishing a REMA update alongside this 2030 Action Plan to provide further clarity on how our future electricity market might be designed;

- Committing to a decision across the REMA programme by around mid-2025 and in time for the next CfD allocation round (AR7); and
- Supporting interim measures from NESO and Ofgem, in the balancing market and on TNUoS respectively, whilst the REMA programme is completed.
- Reform the Capacity Market to provide clear and viable routes to decarbonisation for unabated gas, enable low-carbon flexible capacity, including consumer-led flexibility to increase its contribution to security of supply, and incentivise investment into existing capacity.
- Accelerate reforms to balancing markets, maintain system operability and reforms to network charging to ensure that the electricity system can be operated securely and cost effectively.
- Unlock the full potential of consumer-led flexibility through timely delivery of
 Market-wide Half Hourly Settlement in the retail market

The measures set out in this chapter seek to bring forward investment in low-carbon generation and flexibility while driving efficiencies in market operation. The proposals below address the more immediate challenges in our electricity system and will work alongside our ongoing efforts to drive the rollout of low-carbon generation and transition away from unabated gas generation while maintaining security of supply.

The challenge

While the state must play a role as system architect, markets are, and will, remain central to the development, delivery, and operation of the power system. It is widely accepted that the set-up of our electricity market with associated regulation and incentives needs to adapt to the future shape of our renewables-dominated power system. This need to adapt is recognised in the range of reform programmes and measures being undertaken by government, including REMA, which is considering the enduring market arrangements which are needed for the 2030s and beyond. The delivery of clean power by 2030 needs to proceed at pace whilst we ensure that electricity markets are redesigned for the long term. Given the impact that market reforms will have on the long-term future of our energy system, it is crucial the potential reforms are properly and robustly considered. We recognise that in order to invest and build at the scale and speed necessary to deliver our 2030 target, the government must provide investors with greater clarity on short term risks, and long-term outcomes from policy and market changes. Therefore, this chapter sets out a clear way forward and timeline on this programme of work, together with the accompanying REMA update published alongside this plan.

Taking action

We have identified four key areas which require action and a clear direction of travel, to enable the delivery and maintenance of a clean power system by 2030. Some of these actions require additional policy development, while other areas require the acceleration of existing reforms to resolve existing challenges in the market. These actions are:

- Setting a clear direction of travel for wholesale market reform
- Reforming the Capacity Market
- Accelerating reforms to balancing markets, maintaining system operability and reforms to network charging
- Reforming the retail market to deliver better for consumers

Setting a clear direction of travel for wholesale market reform

Government seeks to reduce the uncertainties arising from policy and regulatory change as much as possible, to minimise the extent of policy and regulatory risks, which can be a significant barrier to investment. We have considered a wide range of options for wholesale market reform. Alongside this Action Plan, the government has published an Autumn Update on REMA providing greater clarity on the status of the different longer-term options for market reform. It is clear that "no change" is not an option in any scenario.

We have narrowed down policy development to improve locational and operational signals to two sets of options: zonal pricing (where the single electricity wholesale market is split into several zones) and retaining national pricing alongside a range of reforms to its existing arrangements. Whilst no decision has yet been taken between zonal pricing or reformed national pricing, and both options are under equal consideration, significant progress on narrowing down the options has been made, with policy development continuing at pace.

We are continuing to conduct further analysis and are aiming to conclude the policy development phase of the REMA programme across all policy areas by mid-2025. We will ensure that these REMA timelines align with the timetable for the next CfD allocation round (AR7). We plan, therefore, to announce the final decisions on REMA and the timetable for their implementation, particularly in relation to wholesale market reform and any transitional or legacy arrangements, before the AR7 auctions open, giving investors clarity for prospective bids. We will aim to provide ongoing clarity to industry, where possible, throughout the decision and transition periods.

We recognise that significant market reform creates uncertainty for investors and market participants. Government recognises the potential implication for cost of capital of transferring locational risk to generators. We will take these factors into account in our Cost-Benefit Analysis and in final decisions on whether to introduce zonal pricing or reformed national pricing. However, no change is not a viable option given the significant changes in the generation mix that will take place. In the REMA publication we provide an update on policy development for legacy and transitional arrangements. This includes:

- Confirming our commitment to treat agreements under the next CfD allocation round in the same way as existing CfD agreements, in relation to any legacy or transitional arrangements.
- Setting out our expectation that if zonal pricing was to be introduced, existing and AR7 CfD contracts would be amended to use a local zonal reference price, insulating these agreements from zonal price risk.

Reforming the Capacity Market: Shortterm changes to ensure security of supply and support the transition to Clean Power 2030

As Great Britain's primary mechanism for ensuring security of supply, we are proposing a suite of near-term reforms to the Capacity Market that will contribute to both Clean Power 2030 and Great Britain's electricity security. These changes are critical to ensure continued investment in and the commercial viability of assets critical to security of supply.

The Capacity Market is a well-established, technology-neutral scheme in which existing and new-build electricity capacity (in the form of generation, interconnectors, consumer-led flexibility and other technologies) receive revenue (£/MW) based on capacity. Participants secure agreements through auctions which require them to make capacity available at times of system stress.

The nature of risks relating to electricity security faced by the system are changing. As the amount of renewable generation increases, reform is needed in order to meet peak demand in an increasingly electrified economy or demand over periods of low renewable output. Flexible technologies can, and will, play a critical role in enabling the safe transition away from gas to clean power and the Capacity Market will adapt to this new landscape. Government is taking steps now to reform the Capacity Market to provide clear and viable routes to decarbonisation for unabated gas, enable low-carbon flexible capacity to increase its contribution to security of supply, and incentivise investment into existing capacity to ensure security during the transition to Clean Power^{87,88}.

Measures aimed at supporting the decarbonisation of existing and new unabated gas assets include:

- Consulting on an exit pathway for unabated gas plants with multi-year agreements to leave the Capacity Market without penalty and transfer to a Dispatchable Power Agreement, facilitating conversion to power CCUS once the technology is available.
- Calling for evidence on additional pathways that could be implemented in the future to enable decarbonisation of unabated gas, such as conversion to Hydrogen to Power.
- Placing an obligation on power plants. This includes all substantially refurbishing power plants and new combustion power plants participating in the 2026 Capacity Market auction to declare that they will comply with new Decarbonisation Readiness legislation recently introduced alongside these proposed changes to the Capacity Market. This legislation will require new build and substantially refurbishing unabated gas and other combustion power plants in England to be built in such a way that they can readily convert to hydrogen-firing or by retrofitting carbon-capture technology within the plant's lifetime⁸⁹.

In parallel, the government is actively developing proposals to improve our understanding of the system's capacity and to ensure electricity security during the transition to Clean Power by:

⁸⁷ DESNZ (2024), '<u>Consultation: Capacity Market: proposals to maintain security of supply and enable flexible capacity to decarbonise</u>' (viewed in December 2024).

⁸⁸ DESNZ (2024), '<u>Call for Evidence: Capacity Market: call for evidence on proposals to maintain security of supply and enable flexible</u> <u>capacity to decarbonise</u>' (viewed in December 2024).

⁸⁹ Draft Statutory Instrument (2024), '<u>The Environmental Permitting (Electricity Generating Stations) (Amendment) Regulations 2024</u>' - provisionally expected to come into force from 28 February 2026 (viewed in December 2024).

- Exploring future options for developing NESO's modelling of longer-term capacity needs, including indicative future capacity targets eight years ahead depending on responses to the call of evidence published in October. As the grid decarbonises, it is particularly important to ensure we have as much clarity regarding future capacity needs as possible.
- Making it easier for refurbishing plants to access multi-year Capacity Market agreements, providing greater revenue certainty and encouraging the type of investment that ageing plants need to extend their operating life.

The government recently published a policy update on the Capacity Market Phase 2 policies.⁹⁰ The government intends to introduce these proposals ahead of next year's Capacity Market prequalification window. This includes:

- Enabling low-carbon technologies to access 3- year agreements with no capex thresholds, facilitating CM access and supporting investment in low carbon, low capex technologies, and
- Introducing a new 9-year capex threshold for low carbon projects, so that new and refurbished projects with costs which fall between the existing 3-year and 15-year threshold are not prevented from coming forward in the Capacity Market.

Consumer-led flexibility involves voluntary actions taken freely and directly by energy consumers to shift their electricity use. This enables consumers to be rewarded with cheaper electricity by flexibly adjusting their usage to times of lower demand on the grid. The government is reducing administrative barriers to consumer-driven flexibility. Building on feedback already received from industry the government will publish a package of proposed changes to the Capacity Market shortly, that aims to improve the contribution that consumer-driven flexibility can make to our electricity security. This will seek views on how to better value, integrate and incorporate consumer-led flexibility within the Capacity Market.

Maintaining operability and managing constraints

Rapid progress will need to be made to ensure that the electricity system can be operated securely and cost effectively using zero carbon ancillary services. In the nearer term, this will include overcoming barriers to more advanced IT and digitalisation, including integrating new technology into NESO's control room. Additional changes to the wider market are needed to help ensure decarbonised system operability, including constraint management. These changes will help to ensure continued investment in renewables and reduce costs.

NESO will continue developing short and medium-term balancing service markets, in order to help deliver a cost-efficient system: NESO's Roadmap⁹¹ outlines measures to enhance utilisation of batteries in providing flexibility services and introduce new stability and voltage markets to increase accessibility to low-carbon technologies. Further detail on measures to enhance the efficiency of batteries are outlined in the Short-duration Flexibility chapter.

NESO are also leading on a **Constraints Collaboration Project** with industry, to develop options for improved constraint management. The project aims to reduce these costs to consumers by implementing market-based constraint management measures. Initial assessments indicate potential savings of up to 6% of thermal

⁹⁰ DESNZ (2024), 'Capacity Market: Policy Update – 2023 Phase 2 Consultation' (viewed in December 2024).

⁹¹ NESO (2024), '<u>NESO Roadmap</u>' (viewed in December 2024).

constraint costs per annum compared to the current balancing mechanism⁹².

This includes the potential for constraint management markets and the use of technical solutions such as the use of storage to increase the flow of electricity over constraints. The outcomes of this project should be available by early 2025. We will consider the outcomes of this project as part of the ongoing REMA programme.

There are several policy initiatives planned to maintain system operability through low-carbon flexible assets as the proportion of variable renewable generation grows:

- An electricity system operability strategy for 2030. This will provide clarity on how NESO will maintain system operability in a way that is consistent with Clean Power 2030, at best value to the consumer. The strategy will be published by NESO and we will work with NESO, Ofgem and stakeholders to develop a coherent and robust strategy, to be published in Spring 2025.
- NESO have agreed to improve forecasting of medium to long-term operability needs, including by location where relevant. This will help give investors and developers the level of certainty that they need for the future demand of these services to invest in low-carbon ancillary service capability.
- Improved greenhouse gas emissions reporting on NESO operability activity across all electricity markets. This will provide transparency on the greenhouse gas intensity of each ancillary service that is used to maintain operability, enabling the tracking of progress in the decarbonisation of these crucial services on which operability depends. These

measures will help to reach Clean Power 2030 and will work in conjunction with a longer-term strategy to resolve operability challenges.

Ensuring the continued investment in renewables:

The system is experiencing rising Transmission Network Use of System (TNUoS) Charges, creating a need for reforms to the network charging regime.

TNUoS charges recover the cost of building and maintaining the transmission network in England, Wales, Scotland, both onshore and offshore. They feature a price signal designed to reflect the costs that demand consumers and generators impose on the transmission system by connecting in different locations. The NESO's 10-year projection shows a trend of significant increases to TNUoS charges for Scottish generators, and a significant decrease to those in England and Wales. We also recognise that some of the highest charges are at the very end of the network resulting in some of the most productive wind assets facing the highest charges. We understand from some stakeholders that there is a need to address the volatility and long-term uncertainty arising from TNUoS charges. In particular, the increasing size of charges and the relationship with CfD marginal clearing strike prices can have an impact on investment.

Ofgem have proposed a temporary cap and floor to alleviate these concerns. In an open letter⁹³ Ofgem encouraged NESO to develop a temporary cap-and-floor solution in response to projected increasing costs and volatility of TNUoS to drive investment in renewables. We expect that this update will provide generators with greater certainty ahead of future allocation rounds including providing certainty on direction

⁹² NESO (2024), 'Constraints Collaboration Project – Final Report' (viewed in December 2024).

⁹³ Ofgem published an open letter to industry on 30th September 2024 proposing a cap-and-floor solution to the increasing cost and volatility of Transmission Network Use of System charges.

of travel ahead of AR7. We will continue to work with Ofgem and NESO as this modification progresses.

All the above proposals are at different stages of development; subject to the outcome of recent consultations and calls for evidence. The Clean Power 2030 Unit will work closely with NESO and Ofgem to ensure the timely delivery of these reforms. The earliest implementation for changes to network charges would be for the 2026 auction prequalification window.

Following this shorter-term reform, under the lead REMA design options, Ofgem would introduce enduring reforms to network charges to ensure that they send a stable, cost-reflective, and effective locational signal. These options are being developed and assessed through Ofgem's strategic review of transmission charging. We continue to work with Ofgem in this space and they seek to conclude policy thinking in line with REMA timeframes.

Unlocking the potential of the retail energy market

The future retail market will play a vital role in enabling consumer-led flexibility, outlined in greater detail in the short-duration flex chapter. The market needs the right price signals which accurately reflect the value of actions to the wider system, and which incentivise suppliers and consumers to engage in such consumer-led flexibility. Additionally, smart technologies will be needed to enable consumers to engage with new products and services, allowing them to benefit.

Market-wide Half-Hourly Settlement is a key enabler for the retail market, making its timely delivery critical for the 2030 target. This industry-led transformation programme, overseen by Ofgem, will change the landscape of the retail market. Consumers will be able to take advantage of this system to get lower bills. is critical for unlocking innovative approaches to managing consumer demand and will enable the successful delivery of Market-wide Half-Hourly Settlement. Improved price signals will align retail market incentives with a decarbonised energy system and demonstrate the value of consumer-led flexibility. The short-duration flexibility chapter contains actions to remove barriers to smart meter adoption.

In addition, the smart meter rollout

Consumer protections must enable trust in the market. In the future, smarter technologies, tariffs, and services should empower consumers to take advantage of lower price periods. We will progress work in this area so that all consumers can benefit, regardless of their level of engagement, energy needs, or income.

In coordination with Ofgem, we will ensure that consumer protections are designed in such a way that they protect consumers, whilst still enabling consumers to access the benefits that innovation can bring. This includes strengthening the regulator to ensure it can hold companies to account for wrongdoing, a consultation on regulation of Third Party Intermediaries, and a commitment to improving compensation as showcased in Ofgem's consumer confidence programme.

Government is committed to retaining the default tariff cap, and will work closely with Ofgem to ensure that the future price protection framework enables consumers to get the most out of a smarter and more flexible market, whilst also ensuring that those who are unable to use energy more flexibly are not unfairly penalised.

Next steps

We expect these actions, delivered alongside cross-cutting enabling actions in other chapters, to drive decarbonisation by enhancing investor confidence, spurring investment in clean technologies, and fostering a more adaptable and efficient energy system essential for meeting the 2030 target. The Clean Power 2030 Unit will work across government and industry to ensure we advance policy development on wholesale market reform. This includes the ongoing work of the REMA and Retail teams.

 The REMA Autumn Update provides further clarity for stakeholders – particularly investors – on REMA's progress, timelines, and the policy options still being considered.

- We will seek to conclude the policy development phase of the REMA programme by mid-2025. We will ensure that REMA timelines will align with the timetable for AR7 in order to provide investors the maximum clarity for prospective bids.
- On CfD reform and Capacity Market reform, we will ensure the timely delivery of reforms needed to enable 2030 Clean Power, whilst continuing to progress the longer-term reforms being considered under REMA.



Short-duration flexibility



Summary

Since Winter 2022, under the previous government, the National Energy System Operator has offered to consumers the option for them to take advantage of different tariffs at different times. This was a departure from a monolithic system where most consumers have received a single price, whatever time they used various appliances. There was a positive response from consumers to this voluntary offer.

A significant increase in short-duration flexibility of 29-35 GW across battery storage, consumer-led flexibility and interconnection capacity from 2023 levels is possible and can play a role in achieving clean power in 2030.

The opportunity is huge, as battery storage and consumer-led flexibility are scalable and could be relatively quick to deploy. Their deployment could not only cut bills for consumers but minimise the amount of more costly generation and associated network infrastructure that needs to be built, whilst maintaining security of supply. Key actions set out in this Chapter to address some of the biggest challenges include:

- Publication of a Low Carbon Flexibility Roadmap in 2025 to consolidate existing and further new actions to drive both short and long-duration flexibility for clean power in 2030 and net zero by 2050;
- Incremental market reforms to provide batteries and consumer-led flexibility with appropriate and fair access to, and utilisation within, relevant markets, to assist investment decisions;
- Enhanced management of the portfolio of disparate programmes, projects and activities that contribute to the delivery of consumer-led flexibility, including review of the Market-wide Half-hourly Settlement (MHHS) Programme's delivery model to ensure implementation.



Challenges and Actions

We have divided these challenges and actions into four subsections: battery storage; consumer-led flexibility; common enablers for both technologies; and electricity interconnection.



Source: Table 1

Grid scale⁹⁴ and small-scale⁹⁵ batteries can offer short-duration flexibility (currently typically a maximum of two hours' continuous supply of electricity without recharge). Long-duration electricity storage (currently defined as at least 6 hours of continuous supply of electricity), is considered in the long-duration flexibility chapter of this Action Plan.

Batteries can be used to store electricity when it is plentiful and low cost, such as

during low demand periods when wind and solar output is high, for use when electricity generation is less plentiful or during times of peak electricity demand. Batteries can reduce the amount of generation and associated network that needs to be built to meet peak demand, helping Britain reach clean power in a cost-effective way and reducing delivery risk associated with other types of energy infrastructure.

⁹⁴ Utility-grade batteries providing services to a region or the whole of GB.

⁹⁵ Those providing services to a household or business and sitting behind the meter for the premises.

Currently, there is 4.5 GW of battery storage capacity in Great Britain⁹⁶, the majority of which is grid-scale. Based on NESO and DESNZ battery storage growth scenarios for 2030, we expect 23-27 GW of battery storage to be needed by 2030 to support clean power, a very significant level of increase. The government expects the majority of this increase to come from grid-scale batteries, with small-scale batteries also making a contribution.

While there are many common enablers for both consumer-led flexibility and battery storage which are addressed later in this chapter, there are also specific actions necessary for battery storage to deliver on its potential for supporting clean power. In addition, DESNZ is considering the role heat batteries can play in decarbonising homes and hopes to be in a position to feed this work into the low carbon flexibility roadmap in summer 2025. Among the specific actions required for batteries, improving the time it takes for mature grid-scale batteries to obtain grid connections and planning decisions are the most significant actions in order to deliver the huge increase in grid-scale battery capacity. The table below sets out these hurdles and corresponding actions needed to address them, as well as specific hurdles and actions applying to small-scale batteries.

Area	Hurdle	Action
Grid scale batteries	(a) Grid connections While there are many projects with grid agreements, these and other grid connection agreements are not ordered by project maturity or strategic need leading to long waits for a grid connection.	NESO have agreed to work with Ofgem and network companies to ensure that grid connection reforms and acceleration of grid infrastructure development timelines result in a sufficient capacity (in line with the 2030 clean power capacity range) of mature, grid-scale battery projects to connect and operate by 2030.
	(b) Planning Grid-scale batteries take a long time to gain planning approval and are not currently referenced in the national planning policy framework.	DESNZ will work with MHCLG to consider how grid-scale batteries, and their importance for clean power in 2030 and net zero, could be referenced in future planning reforms.
	(c) Health and safety Grid scale batteries are currently covered by a robust health and safety framework. This needs to be maintained as batteries deploy.	Defra will consult on including grid-scale batteries within the Environmental Permitting Regulations by June 2025.
Small scale batteries	(a) Affordability The upfront costs of home batteries can be high for consumers, particularly those on low incomes.	DESNZ will consider the financing options for retrofit works, including batteries, in the Warm Homes Plan.

Table 3: Battery-specific hurdles and actions

⁹⁶ Modo Energy (2024), 'Indices & Benchmarks' (viewed in December 2024).

(b) Final consumption leviesDESNZ and Ofgem will review tHome batteries and EV batteriesoptions available to remove finalproviding vehicle-to-grid servicesconsumption levies for home baare asymmetrically charged withand vehicle-to-grid EV batteriesrespect to final consumptionset out next steps in a 2025 Clear	
levies. This means that levies Power Flexibility Roadmap.	he
are charged on import but not	tteries
refunded on export, creating a	and
disincentive to providing flexibility.	an

Consumer-led flexibility





Source: Table 1

Consumer-led flexibility involves voluntary actions taken freely by energy consumers – or on their behalf by Demand Side Response Service Providers (DSRSPs) with consumers' consent – to shift some of their electricity use when they choose to be rewarded for this flexibility while still having their energy needs met⁹⁷. The financial benefits of flexibility on offer to consumers reflect the benefits to the wider electricity system (which in turn benefits all consumers).

A consumer could choose, for example, to receive cheaper electricity bills or other benefits in return for enabling a service provider to vary the electricity use of an

⁹⁷ These voluntary offers of flexibility by energy consumers (whether households or industries) can also be referred to as demand side response (DSR) or demand flexibility.

Energy Smart Appliance (ESA) such as their electric vehicle (EV) smart charge point or their smart heat pump while still meeting the consumer's needs (e.g. a charged EV by the morning or household temperature remaining within defined bounds).

All consumers will enjoy benefits from nation-wide consumer-led flexibility, as it will lower prices for peak hours by flattening the price curve.

Consumer-led flexibility also reduces Britain's aggregate electricity use at peak demand periods, thereby minimising the amount of generation and associated network that needs to be built to meet peak demand. It can therefore help Britain to reach clean power in a cost-effective way with reduced large infrastructure delivery risk. Ofgem monitors consumers' approach to flexibility and its role includes ensuring that sufficient consumer protection is in place for this growing sector. In 2023, following a scheme put in place by the National Energy System Operator, there was 2.5 GW of consumer-led flexibility utilised in Great Britain (not including electric storage heater flexibility), with 0.8 GW from smart heat pumps and flexible district heating, 0.5 GW from EV smart charging, 0.4 GW from other smart appliances and 0.8 GW from non-domestic consumer-led flexibility. Non-domestic consumer-led flexibility has fallen over time, reducing from 1.7 GW in 2021 to 1.2 GW in 2022 and then to 0.8 GW in 2023^{98,99}.

Up to now, only those consumers who were the best informed took up the flexibility on offer. With market-wide half-hourly settlement there is considerable potential for growth led by consumers.

Based on NESO and DESNZ scenarios for 2030, excluding electric storage heaters, we expect 10-12 GW of consumer-led flexibility capacity is possible by 2030 to support clean power. Government expects EV smart charging to be a key driver of consumer-led flexibility capacity growth.

⁹⁸ NESO (2024), '*<u>Future Energy Scenarios 2024</u>*' (viewed in December 2024).

⁹⁹ 4.8 GW is also assumed flexibility from storage heaters in 2023. The electric storage heaters providing current flexibility have in most cases been in place for a long time, and this capacity is expected to fall over time. It will be important that when consumers replace storage heaters that they adopt new and efficient forms of low carbon heating such as heat pumps.



Figure 13: Consumer-led flexibility at peak (GW), 2023-2030

Note: Data excludes storage heaters that shift around 4 GW. NESO refers to consumer-led flexibility as demand flexibility.

Source: NESO (2024), 'Clean Power 2030'

Ensuring that all consumers have the potential benefit of this flexibility requires the delivery of a large number of different policies, projects and programmes across many different organisations, summarised at a high level in the diagram below.

Enhanced rewards for consumers choosing to participate in flexibility	 Market-wide Half-hourly Settlement Programme Growth in flexibility markets Growth in flexibility consumer products (eg. TOU tariffs)
Market access for flexibility providers	 Balancing Mechanism and ancillary services Capacity Market Markets operated by Distribution System Operators
Rollout of Energy Smart Applicances (ESAs)	EV smart chargers Heat pumps Domestic batteries
Consumer protection	 Licensing of flexibility providers Interoperability and security standards for ESAs Retail consumer protection policies
Coordination of flexibility activities	Flexibility Roadmap Flexibility Markets Facilitator

While there are many common enablers for both consumer-led flexibility and battery storage, there are also specific actions necessary to further increase the scale of choice and opportunity for consumer-led flexibility and enhanced energy bill savings. Some areas requiring a step change are presented in the table overleaf, where the hurdle they present to consumer-led flexibility capacity is set out. For context, the wider government net zero programmes supporting the electrification of transport and heating will also be fundamental to the amount of consumer-led flexibility that becomes available by 2030.

Area	Hurdle	Action
Market-wide half-hourly settlement	Swift introduction of market-wide half-hourly settlement is vital for incentivising all energy suppliers to reward consumers for being flexible, but the programme has faced delays.	Ofgem as programme sponsor will review the market-wide half-hourly settlement programme delivery model by the end of FY24/25, including to ensure that industry parties have credible plans to complete market-wide half-hourly settlement in a timely way and maximise the amount of half-hourly consumption data available.
Smart Secure Electricity Systems	Trust in consumer-led flexibility is essential to uptake, requiring interoperability of ESAs (e.g. to support choice and competition in service provision for consumer- led flexibility), effective regulation of DSRSP engagement with consumers, and safeguards against cyber-security and grid stability risks.	DESNZ will publish in Spring 2025 a government response to the 2024 package of Smart Secure Electricity Systems Programme consultations on ESAs interoperability, a new licensing regime for service providers for consumer-led flexibility and load controllers, and tariff data accessibility. This will be followed up with detailed consultations on draft "first phase" ESA legislation establishing minimum cyber-security requirements for appliances in scope and a smart mandate for heat pumps; draft DSRSP and load controller regulation and licence conditions; and measures to improve time of use tariff data accessibility.
Delivery Coordination for consumer- led flexibility	Successful delivery of consumer- led flexibility requires coordination across a large number of policies, projects and programmes spanning government departments, Ofgem, NESO and industry. More strategic coordination and portfolio management is required.	The Clean Power 2030 Unit will work with policy teams to review necessary organisational requirements to effectively plan and track delivery data for consumer- led flexibility across all relevant organisations, and address obstacles, on an ongoing basis.

Table 4: Consumer-led flexibility-specific hurdles and enablers

Area	Hurdle	Action
Metering	Smart meters Consumers looking to participate in consumer-led flexibility need to be able to quickly obtain a smart meter.	DESNZ is working with Ofgem to introduce new Guaranteed Standards of Performance relating to smart metering in 2025. These may include standards relating to the timely installation and maintenance of smart meters, compensating consumers where they are not met.
	Device meters Current device metering regulation requires meters to have external displays, which adds to manufacturing costs of smart appliances.	DBT will continue stakeholder engagement on allowing for remote display options in the Measuring Instruments Regulations, for meters used for trade, and plan to consult on options to amend the existing requirements during the first quarter of 2025.
Consumer engagement	Consumer-led flexibility is a voluntary activity, and it is crucial that consumers are well informed of what it involves and how to participate, which evidence shows is not always currently the case.	DESNZ will, in Summer 2025, publish a consultation on consumer engagement, including on the potential to better coordinate and amplify accurate messaging on consumer-led flexibility.
Large non- domestic consumer- led flexibility DSR	Consumer-led flexibility capacity from large non-domestic energy consumers has fallen from 1.7 GW in 2021, to 1.2 GW in 2022 and then to 0.8 GW in 2023 ¹⁰⁰ .	DESNZ, NESO and Ofgem will set out specific actions for supporting an increase in large non-domestic consumer-led flexibility in a Low Carbon Flexibility Roadmap in 2025, following industry engagement.
EV smart charging	Increasing access to EV private charging Landlords can increase the costs of charging EVs for tenants who need to access a communal smart charger, making EV smart charging unduly expensive for some.	Ofgem will consider reform on the Maximum Resale Price, seek views on what needs to change to address identified issues and update the current requirements, as required, setting out progress and next steps in the 2025 Flexibility Roadmap.

¹⁰⁰ Figures illustrate the loss of incentive, including the Triad changes during this period, not the decline in actual DSR capacity.

Area Hurdle

Action

Increasing access to smart

public charging. Charging of electric vehicles in public on-street locations has the potential to deliver short-duration flexibility. However, charge point operators are only just beginning to provide flexible tariffs to their customers.

DESNZ together with **DfT** will explore with industry options to accelerate deployment of smart charging at public charge points and set out progress and next steps in the 2025 Flexibility Roadmap.

Common enablers for consumer-led flexibility and battery storage

Some of the greatest hurdles faced by consumer-led flexibility and batteries are common to both, in particular around market access. Unlike low carbon generation and other forms of low carbon energy storage, battery and consumer-led flexibility projects are wholly dependent on forecast market revenues for investment decisions. Therefore, confidence that there will be appropriate access to, and utilisation within, relevant markets is crucial for scaling up battery storage and consumer-led flexibility for Clean Power 2030.

The table below sets out more detail on this and other common hurdles, and corresponding actions for addressing them and turning them into enablers for battery storage and consumer-led flexibility. Additional work that has the potential to improve market opportunities for consumer-led flexibility and batteries, including wider change to GB market arrangements that could send sharper price signals, is discussed in the 'Reforming our electricity markets' chapter of this action plan.



consumer-led flexibility technologies and their treatment and handling within the

Capacity Market.

Table 5: Consumer-led flexibility and battery storage common enablerhurdles and actions

Area	Hurdle	Action
Market Access	 Access to some energy markets (e.g. the Balancing Mechanism, other NESO/DSO markets and the Capacity Market) is currently challenging for some kinds of short-duration flexibility. Issues include: Overly stringent market entry requirements for flexibility; The System Operator's shills the sume of the string of	 NESO have agreed to set out, for inclusion in the Low Carbon Flexibility Roadmap, progress on and further actions to support providing flexibility assets with appropriate and fair access to the markets it manages, including: removing unnecessary or overly restrictive rules or participation requirements to the greatest extent possible, allowing access to more types of flexibility assets;
	 ability to use all low carbon flexible assets (such as batteries and consumer-led flexibility) effectively and incorporate them fully into the economic dispatch process has been hindered due to legacy systems, manifesting in "skip rates"; and Barriers to the stacking of revenues by flexibility assets across different markets 	 providing increased transparency as well as improvement to the systems NESO uses to dispatch flexibility, with evidence of reductions in flexibility asset skip rates; further facilitating revenue stacking across different markets; and an assessment of the potential to create additional measures to enable a wide range of flexibility providers to offer services to meet system needs (including constraint management).
across different markets.	DESNZ will, ahead of the 2025 Capacity Market prequalification period in summer 2025, implement the Capacity Market policy proposals as outlined in its July 2024 and October 2024 responses to the 2023 Phase 2 Capacity Market consultation. These include permitted augmentation of storage, adjustments to Extended Performance Testing Requirements and making available 3-year Capacity Market agreements for low carbon technologies whose CAPEX is £0/kW. In addition, DESNZ plans to publish shortly a Consultation and Call for Evidence to invite stakeholder views on how to better reflect the diversity of	

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Area	Hurdle	Action
Flexibility Roadmap	Great Britain lacks an up-to- date framework for prioritising and managing the delivery of ongoing actions across government, NESO, Ofgem and industry. This will be crucial for maximising the potential of flexibility for Clean Power 2030 and net zero by 2050.	 DESNZ will publish with Ofgem and NESO a joint Low Carbon Flexibility Roadmap in 2025. The Flexibility Roadmap will set out clear short and long-duration flexibility milestones and measures required for both clean power in 2030 and net zero by 2050, building on those within this Action Plan. The Roadmap will also provide a framework for planning and tracking the delivery of these key flexibility measures. As part of this, DESNZ, working with Ofgem and NESO where appropriate, will review current measures to assess where further changes or new policies are needed to support Clean Power 2030 and net zero by 2050.
Digital- isation	There is insufficient visibility of – or sharing of data on – distributed energy including local generation and flexible assets on the grid, hampering the integration of these assets and potential for their utilisation within flexibility markets.	DESNZ and Ofgem will work with NESO to set out measures in the Low Carbon Flexibility Roadmap in 2025 to enable greater visibility of distributed energy assets to unlock further flexibility and assist with network planning.
Innovation support	Further innovation is needed to accelerate the deployment of short-duration flexibility for 2030, for example to reduce the costs of bidirectional chargers for vehicle-to-grid and develop consumer-led flexibility interoperability standards.	Further innovation across DESNZ will ensure the flexibility innovation needed to facilitate clean power 2030 and net zero.



Electricity interconnection

Current installed capacity compared to the DESNZ 'Clean Power Capacity Range' in 2030 (GW)



Source: Table 1

Electricity interconnectors connect the transmission systems of two countries, enabling us to import and export electricity. At the end of 2023, Great Britain had 9.8 GW of interconnector capacity across 9 interconnectors, with a further 2 interconnectors (1.9 GW of capacity) in construction¹⁰¹. Based on both government and NESO modelling of clean power trajectories, we expect 12-14 GW of interconnector capacity by 2030 to deliver clean power. Interconnectors can bring a wide range of system and consumer benefits. Electricity interconnectors support security of supply by enabling access to more diverse generation over a wider geographic area. They also provide system flexibility by helping the system rapidly respond to changes in supply and demand. This means that, when we generate more electricity than we need, a strong interconnector system will allow us to export the excess electricity, thus contributing towards the clean energy superpower role of the United Kingdom.

Finally, interconnectors contribute to European-wide decarbonisation, as they can allow for more efficient use of intermittent renewables between connected countries.

The table overleaf sets out the key hurdles to maximising the growth of electricity interconnection by 2030. There may be additional, project specific hurdles that DESNZ will work with developers to action, as appropriate. Additionally, the Supply Chain and Workforce section of this document details how the UK will use our established manufacturing capacity to support the delivery of Clean Power 2030.

¹⁰¹ Ofgem (2024), 'Interconnectors' (viewed in December 2024).

Area	Hurdle	Action
Grid connections and planning	The grid connection and planning processes mean that interconnectors awarded cap and floor agreements by Ofgem in the third cap and floor window / Offshore Hybrid Asset pilot a) might have been awarded a connection agreement for later than 2030, or b) might not be operational by 2030.	NESO and Ofgem will ensure that the grid connection reforms support the interconnection capacity required to meet the 2030 clean power capacity ranges, and MHCLG will consider how planning reforms can support this capacity for the 2030 clean power capacity ranges.
HVDC supply chains	The supply chains for HVDC cables are tight and present risks to interconnector projects with cap and floor agreements from the third cap and floor window / Offshore Hybrid Asset pilot not being operational by 2030.	DESNZ is exploring a range of options to mitigate supply chain challenges including measures to develop the domestic supply chain.

Table 6: Electricity interconnection hurdles and actions

Next steps

The implementation of the actions in this chapter should make a strong impact in helping to achieve the benefits for consumers made possible by clean power in 2030, particularly by rapidly improving market access and utilisation for battery storage, increasing opportunities for consumer-led flexibility, implementing market-wide half-hourly settlement, and significantly reducing grid connection and planning timelines for grid-scale batteries and interconnectors.

The government will continue to work with Ofgem, NESO and industry to review the need for further actions and we will include these new actions within the Low Carbon Flexibility Roadmap that we will publish in 2025. Success will involve evidence that investments and operational assets are ramping up short-duration flexibility capacity in line with the capacity ranges for Clean Power 2030 that are set out in this Action Plan. The Clean Power 2030 Unit will be closely monitoring this.

Delivery of this short-duration capacity for clean power in 2030 will also significantly help with meeting carbon budget and net zero requirements¹⁰², enabling the power sector to accommodate the significant increase in future electricity demand that will result from the electrification of other sectors such as transport, heat and some parts of industry.

¹⁰² BEIS (2021), '<u>Smart Systems and Flexibility Plan</u>' (viewed in December 2024).

Long-duration flexibility



Summary

Long-duration flexible technologies can add significant value to the system and can provide a secure supply of electricity during extended periods of low renewables output. There are a number of innovative low carbon technologies such as power carbon capture, usage and storage (CCUS), hydrogen to power (H2P) and forms of long-duration electricity storage (LDES), capable of replicating the role of unabated gas. We estimate between 40-50 GW¹⁰³ of dispatchable and long-duration flexible capacity could be needed by 2030. Whilst we will continue to rely on unabated gas to ensure security of supply, we will drive the deployment of these low carbon technologies, cementing our position as a world leader at the cutting edge of the clean energy revolution.

The following interventions will support the deployment of long-duration flexible technologies in driving towards Clean Power 2030:

¹⁰³ The sum of low carbon dispatchable power, unabated gas, and LDES capacities in Table 1, rounded to the nearest 5 GW. Dispatchable technologies are ones which combust fuel to produce electricity and, by varying the rate at which fuel is burned, can respond to meet the needs of the grid with varying levels of flexibility.

- We have announced a groundbreaking deal with Net Zero Teesside, our first power CCUS project delivering secure, low carbon power from 2028.
- We are developing a hydrogen to power business model¹⁰⁴ to de-risk investment and bring forward hydrogen to power capacity at an accelerated rate. We intend to provide further market engagement on the design of the business model in Spring 2025.
- Ofgem will introduce the cap and floor scheme to support investment in long-duration electricity storage, aiming to open the scheme to applications in Q2 2025.



Long-duration electricity storage

Current installed capacity compared to the DESNZ 'Clean Power Capacity Range' in 2030 (GW)



Source: Table 1

¹⁰⁴ DESNZ (2024), 'Hydrogen to power: market intervention need and design' (viewed in December 2024).



Source: Table 1

Note: Low carbon dispatchable power includes biomass, power BECCS, gas CCUS and hydrogen to power. Dispatchable technologies are ones which combust fuel to produce electricity and, by varying the rate at which fuel is burned, can respond to meet the needs of the grid with varying levels of flexibility.

The challenge

Long-duration flexible technologies can adjust their output quickly to match supply with demand and can provide a reliable source of electricity for managing daily and seasonal demand peaks and longer periods of low renewable output (such as 'Dunkelflaute' conditions). Today, most of that flexibility is provided by around 35 GW of unabated gas and around 3 GW of pumped storage hydro¹⁰⁵, currently the only mature technologies capable of providing this flexibility.

Between 40-50 GW¹⁰⁶ of dispatchable long-duration flexible capacity could be needed by 2030. Whilst we expect the majority of this capacity will come from unabated gas, it will be running less frequently as we support the deployment of low carbon alternatives and approach 2030. In this chapter we focus on driving forward the delivery of the low carbon long-duration technologies, such as power CCUS, H2P and LDES, that are closest to maturity and could play a key role in a 2030 system. Biomass and BECCS are covered in more detail in the Renewable and nuclear project delivery chapter.

Deploying new low carbon long-duration flexible technologies can add significant value to the system as they can replicate the role of unabated gas currently plays, minimise system costs and reduce delivery pressures on other technologies, such as offshore wind. NESO have noted in their report that even relatively small levels of operational capacity materially reduce the overall challenge of the rest of the programme.

¹⁰⁵ DESNZ (2024), '<u>DUKES</u>' (viewed in December 2024).

¹⁰⁶ The sum of low carbon dispatchable power, unabated gas, and LDES capacities in Table 1, rounded to the nearest 5 GW. Dispatchable technologies are ones which combust fuel to produce electricity and, by varying the rate at which fuel is burned, can respond to meet the needs of the grid with varying levels of flexibility.

Power CCUS and hydrogen to power plants in Great Britain present a great opportunity for low carbon long-duration flexibility. We will also need to scale up the deployment of pumped hydro storage and drive forward innovation in more nascent LDES technologies.

Government is committed to the transition away from unabated gas whilst maintaining security of supply.

Taking action

Power carbon capture, usage and storage

Power CCUS, which is natural gas fuelled generation equipped with carbon capture technology, can provide non-weather-dependent, dispatchable low carbon generation that will support a renewables-based 2030 system. The Power CCUS business model, known as the Dispatchable Power Agreement (DPA), has been designed to ensure that Power CCUS plays a valuable mid-merit role, dispatching behind renewables, but ahead of unabated gas generation. The DPA will enable both new build projects and the retrofit of existing plants which will be key to enabling the transition away from unabated gas.

NESO have suggested that we could need to deploy up to 2.7GW of power CCUS and H2P by 2030 – see Table 1¹⁰⁷. The importance of power CCUS beyond 2030 is also highlighted by the Climate Change Committee in their Carbon Budget 6 report where they model that power CCUS would provide 30TWh of generation a year by 2035 as part of the balanced pathway scenario¹⁰⁸.

As well as supporting the clean power mission, CCUS more broadly is vital to

decarbonising a range of industrial sectors and the deployment of negative emission projects. It will enable a just transition for industrial regions by decarbonising in a way that drives growth in the UK, with CCUS projected to support up to 50,000 jobs as the sector matures in the 2030s and adds £5 billion of value annually by 2050¹⁰⁹. Carbon capture is a safe technology, and geological CO₂ storage is a proven technology that has been in operation globally for decades. In the UK we have the technical expertise and a geographical and geological advantage with a shallow seabed and 78 billion tonnes of theoretical CO storage capacity distributed across the UK continental shelf¹¹⁰.

Additionally, the proximity of emission centres to the geological storage sites provides the right opportunity for these industrial clusters to decarbonise through the CCUS cluster approach that we have established. This approach involves the strategic selection of industrial clusters to maximise the number of capture projects and is designed to fairly distribute cost and enhance the cost efficiency of transport and storage infrastructure, benefiting a larger number of capture projects. The deployment of CCUS in the UK will pioneer technical advancements and a world-leading regulatory framework to help Britain benefit from the opportunities of first mover advantage.

¹⁰⁷ NESO (2024), '<u>Clean Power 2030</u>' (viewed in December 2024).

¹⁰⁸ CCC (2020), '<u>The Sixth Carbon Budget</u>' (viewed in December 2024).

¹⁰⁹ DESNZ (2019), 'Energy Innovation Needs Assessments' (viewed in December 2024).

¹¹⁰ Energy Technologies Institute (ETI) (2016), '<u>Strategic UK CCS Storage Appraisal</u>' (viewed in December 2024).



Net Zero Teesside

The world's first at scale gas power plant with carbon capture.

Groundbreaking deals announced on 10th December 2024 mean construction of the UK's new carbon capture industry will start in 2025.

Contracts were signed with Net Zero Teesside, the world's first at scale gas power plant with carbon capture, supplying up to one million homes with low carbon, secure power from 2028.

Combined with Northern Endurance Partnership (NEP), the supporting CO₂ Transport and Storage project, the East Coast Cluster will capture and store carbon emissions from the region. This investment will directly support an average of 2,000 jobs in the North-East, marking the latest milestone in the government's mission to reignite its industrial heartlands, tackle the climate crisis and turbocharge growth for decades to come. It follows the government's £21.7 billion funding commitment to ensuring the UK's vision for CCUS becomes a reality in the UK.

By signing the first Dispatchable Power Agreement (DPA) with industry, the government is proving that this world-leading CCUS business model – developed over years in collaboration with stakeholders – is delivering real results by attracting investment and getting this game-changing technology off the ground. The DPA has been specifically designed to support projects like Net Zero Teesside to dispatch low carbon power ahead of unabated gas but not displace renewables.

The DPA showcases the UK's ability to create innovative solutions to address the challenges of achieving net zero and this milestone is a testament to the collaborative efforts of industry and government, reflecting our shared vision of a decarbonised power sector. This is a landmark step forward in our plan for Clean Power 2030.

HyNet and beyond

In addition to Net Zero Teesside in the East Coast Cluster, there is a strong pipeline of potential Power CCUS projects in development across the UK which can deploy and play a key role in a decarbonised power system¹¹¹. In north-west England and north Wales, government is working with industry to deliver the HyNet Cluster, which aims to store up to 4.5 million tonnes of CO₂ per year by 2030¹¹². The HyNet CO₂ Transport and Storage (T&S) network will enable the safe onward transport of CO₂ from CCUS projects to permanent undersea storage. There is a power CCUS project which, among other CCUS projects, is aiming to connect to HyNet by 2030.

In addition to the East Coast Cluster and HyNet Cluster, the UK has an exciting pipeline of further CCUS clusters at a mature stage of development. These include Acorn in north east Scotland and Viking in the Humber which contain power CCUS projects at the heart of their plans.

Upstream emissions

We are clear that future emissions from the production of natural gas will need to reduce in the UK and across the world. Domestically, DESNZ is working with industry to decarbonise upstream emissions of natural gas production. The North Sea Transition Authority (NSTA) estimates that between 2018 and 2023, operators have reduced flaring by 49% and overall emissions from domestic upstream oil and gas production have decreased by approximately 28%. Through the North Sea Transition Deal, industry is committed to extend the overall emissions reduction to 50% from 2018 to 2030¹¹³. Internationally, we are also committed to the World Bank's zero routine flaring initiative which aims to eliminate the practice by 2030 for oil producing platforms. The UK is also a member of the Global Methane Pledge, to collectively reduce global methane emissions by at least 30% by 2030 compared to 2020 levels¹¹⁴. In addition, we are working with the US, EU and others to develop a framework to better measure, monitor, and report methane emissions from imported gas. We also share technical expertise and best practice internationally on reducing emissions in the energy sector.

Financing

CCUS was one of the five sectors which will benefit from the additional £5.8 billion allocated to the National Wealth Fund. This capital will be deployed by the National Wealth Fund to finance projects which are facing barriers to investment, helping to mobilise private finance into them.

CCUS for net zero

In the 2030s and as we accelerate to net zero, it is important industry and government enable the development of a self-sustaining UK CCUS sector that supports delivery of our Missions, jobs and reduces emissions, putting the UK at the forefront of global CCUS.



¹¹¹ Subject to meeting necessary planning and other regulatory approvals.

¹¹² Eni (2024), '<u>HyNet North West Project</u>' (viewed in December 2024).

¹¹³ North Sea Transition Authority (2024), '*Emissions Monitoring Report 2024*' (viewed in December 2024).

¹¹⁴ Global Methane Pledge (2024), 'Global Methane Pledge' (viewed in November 2024).

Hydrogen to Power

Hydrogen to Power can play a key role in our electricity system at a range of scales and is the primary low carbon technology capable of providing low carbon inter-seasonal storage, whilst providing a decarbonisation pathway for unabated gas. Our analysis indicates H2P is economic at lower load factors (below 30%), enabling it to be cost effective in a clean power system where flexible load factors are expected to fall as renewable generation increases¹¹⁵. H2P faces two primary deployment barriers – increased investment risk and cost from being a first of a kind technology, and exposure to cross-chain risks from reliance on a nascent hydrogen value chain. There is a critical dependence on access to enabling grid-scale hydrogen infrastructure, such as new build transport and storage facilities, which typically have long lead-in times. Ensuring the deployment of hydrogen transport and storage infrastructure, alongside supporting H2P plants, will be critical in enabling delivery of H2P to deploy whilst also providing the infrastructure to support industrial decarbonisation through hydrogen.

Hydrogen to power business model

To accelerate deployment of H2P, government is implementing a H2P business model (H2PBM) to de-risk investment and mitigate our identified deployment barriers, as committed in the government's December 2024 response to the consultation on 'H2P need for and design of a market intervention'. We will deliver a H2PBM based on a Dispatchable Power Agreement style mechanism. To progress development of the H2PBM, we intend to publish a market engagement document in Spring 2025 outlining further detail on the proposed design of the H2PBM. We are establishing an H2P expert working group to support our policy development.

Hydrogen storage

Hydrogen storage will play a vital role in the hydrogen economy and the wider energy system. Storage is key for managing within day network balancing and providing security of supply to hydrogen off takers. Large-scale deployment of H2P will require access to geological hydrogen storage via hydrogen pipelines, to enable delivery of H2P plants.

Developers face barriers to investment including high costs, long lead-times, and uncertainty around how quickly demand for transport and storage will increase. This is why we are committed to designing, in 2025, new business models for hydrogen transport and storage infrastructure to address these barriers and unlock private investment. Public and private investment in transport and storage infrastructure will in turn unlock further private investment in the wider hydrogen economy, by helping to increase the geographical availability, reliability and cost-effectiveness of hydrogen supply.

The Energy Act 2023 provides the legislative framework that will underpin the delivery of the hydrogen transport and storage business models. We are currently progressing the design of the commercial models and the process for awarding them at pace.

Hydrogen production

Hydrogen production capacity is vital to increase the supply of the fuel for H2P plants and support is being provided through the Hydrogen Production Business Model. This provides hydrogen production projects with a route to market and we are already making progress, with the October announcement of £21.7 billion of available funding to

¹¹⁵ DESNZ (2023), 'The Need for Government Intervention to Support Hydrogen to Power' (viewed in December 2024).

launch the first CCUS projects including CCUS-enabled hydrogen¹¹⁶.

Eleven electrolytic hydrogen production projects were selected for contract award in the first Hydrogen Allocation Round (HAR1), and we expect these projects to be operational by 2026. We intend to publish a shortlist of HAR2 projects in due course and we are currently developing our approach to future HARs, including HAR3, and we will invite feedback through a market engagement exercise in due course.

We intend to publish the next edition of the Hydrogen Strategy Update to the Market shortly.

Financing

Hydrogen was one of the five sectors which will benefit from the additional £5.8 billion allocated to the National Wealth Fund. This capital will be deployed by the National Wealth Fund to finance projects which are facing barriers to investment, helping to mobilise private finance into them.

Long-duration electricity storage

Long-duration electricity storage (LDES) is a key enabler to a secure, cost-effective and low carbon energy system. LDES can help to decarbonise the system by supplying electricity continuously from several hours to up to several days without recharge, replacing flexibility from unabated gas and helping to alleviate constraints on the grid. It includes pumped storage hydro, a long-established and mature technology, and other more recently developed technologies such as liquid air energy storage. As well as providing electricity during protracted periods of low wind/sun, LDES technologies also provide a range of essential grid services such as inertia, voltage support, short circuit and demand response.

There is currently 3 GW of pumped storage hydro capacity connected to the grid¹¹⁷, but long build times combined with revenue uncertainty have inhibited investment in LDES development over the last 40 years¹¹⁸. This has been the greatest challenge to LDES development, which this government has now addressed through announcing our decision to introduce a cap and floor investment support scheme with Ofgem acting as regulator and investment support scheme delivery body¹¹⁹.

The Clean Power Capacity Range in Table 1 suggests that we could need 4-6 GW of LDES in total by 2030¹²⁰. The actions below will help bring forward more LDES onto the system.

¹¹⁶ DESNZ (2024), '<u>Government reignites industrial heartlands 10 days out from the International Investment Summit</u>' (viewed in November 2024).

¹¹⁷ LDES in Table 1.

¹¹⁸ DESNZ (2024), 'Long-duration Electricity Storage Policy Framework Consultation' (viewed in November 2024).

¹¹⁹ DESNZ (2024), '<u>Consultation outcome: Long-duration electricity storage: proposals to enable investment</u>' (viewed in December 2024).

¹²⁰ NESO (2024), 'Clean Power 2030' (viewed in December 2024).

Cap and floor scheme

Following government's decision in October 2024 to introduce a cap and floor investment support scheme for LDES:

- Ofgem will publish an open letter on specific aspects of the scheme where it would like further stakeholder input and will provide further information around cap and floor scheme implementation timings.
- In Q1 2025, DESNZ and Ofgem will publish a Technical Decision Document to provide clarity on outstanding areas of the cap and floor scheme design
- Ofgem expects to open the first cap and floor allocation round in Q2 2025 following publication of the Technical Decision Document
- NESO have agreed to provide advice on the range of LDES capacity that Ofgem should seek to provide cap and floor schemes for in the first allocation round, and support Ofgem in assessing projects that apply

Financing

Building on the two investments the National Wealth Fund has already made in LDES companies, it will continue to engage with LDES projects at Technology Readiness Level 7 and above – including those preparing to apply for the cap and floor – exploring financing solutions where there are barriers to private investment.

Capacity Market

The Capacity Market is the primary mechanism to secure capacity and ensure security of electricity supply in Great Britain. The scheme provides participants with revenue (£/MW), allocated through competitive auctions. This revenue is provided in exchange for the capacity being available at times of system stress. LDES projects, where meeting qualifying criteria, are eligible to and currently participate in the Capacity Market.

DESNZ will, ahead of the 2025 Capacity Market pre-qualification period in summer 2025, implement the Capacity Market policy proposals as outlined in its July 2024 and October 2024 responses to the 2023 Phase 2 Capacity Market consultation. Changes include increasing the build period extension available to support projects qualifying for the Capacity Market long stop mechanism. This will allow generators requesting an extension (at the point of application), to have up to 6 years in a T-4 Capacity Market agreement to come online (via a 24-month extension). We expect this specific change to be in place ahead of the auctions in early 2026. This will be an addition to the existing 12-month extension option.

Innovation

Innovation can make an important contribution to the deployment of LDES. More nascent technologies, such as liquid air energy storage, offering greater locational flexibility than pumped storage hydro, have quicker build times, and help to diversify the LDES technology portfolio. Approximately £100m of innovation funding has been provided over the last decade to support the advancement of many novel LDES technologies¹²¹. The current Net Zero Innovation Portfolio has funded novel technologies such as liquid air and flow battery energy storage, advancing them to demonstrator stage and catalysing investment in them, which has enabled these innovations to be viable options for low carbon flexible capacity by 2030 and beyond. Further innovation will ensure that

¹²¹ Approximate cumulative innovation funding for LDES provided by the Department since 2014 from innovation funding programmes, including the Energy Innovation Programme and the Net Zero Innovation Portfolio.

a range of novel technologies develop and deploy at pace and scale.

Planning and grid connections

Government, Ofgem, NESO, and network companies can ensure grid connection reforms and acceleration of grid infrastructure delivery timelines that result in sufficient capacity (in line with 2030 clean power capacity ranges) of LDES projects connecting by 2030, including those that co-locate with renewables projects. We will work with the Ministry of Housing Communities and Local Government to consider how LDES, and its importance to clean power in 2030 and net zero, could be referenced in future planning reform.

In Scotland, responsibility for planning and consenting is devolved to the Scottish Government. Through their Fourth National Planning Framework (NPF4), the Scottish Government has placed climate and nature at the centre of their planning system and made clear their support for all forms of renewable, low-carbon and zero emission technologies, including transmission and distribution infrastructure. Potential impacts on communities and nature, including cumulative impacts, are important considerations in the decision-making process.

Unabated gas

As clean power substantially reduces the amount of electricity generated by gas-fired plants, unabated gas will change its role in the system. Under a clean power system, it will play a back-up role at specific times throughout the transition to clean power. This means retaining sufficient unabated gas capacity until well beyond 2030, when it can be safely replaced by low carbon technologies that can provide the amount of long-duration flexibility necessary to keep the system balanced at all times. We currently rely on ~35 GW of unabated gas on the system to provide long-duration flexible capacity¹²². This firm capacity is crucial for electricity security, and will be required as strategic back-up to respond to certain periods of high demand, even as we aim to reduce fossil generation (i.e. gas running hours) overall.

Existing assets

Retaining the existing gas fleet where possible is likely to be the most cost-effective means of meeting the capacity we need for gas to fulfil its strategic function in 2030. Current fleet intelligence suggests most existing gas assets will remain online until 2030, but we are also consulting on measures to make it easier for gas assets to stay in the Capacity Market and for plants to access multi-year Capacity Market agreements, encouraging investment in life extension of older plants.

Decarbonisation readiness

To provide the clarity investors need to make long-term decisions, we are introducing decarbonisation readiness requirements. This will ensure that new or substantially refurbishing combustion power plants in England, which submit their environmental permit application from 28th February 2026, must have a credible plan to decarbonise either through converting to hydrogen firing or through retrofitting carbon capture. Requiring developers to demonstrate the viability of their decarbonisation plan will ensure that the developers of new or substantially refurbishing combustion power plants have considered how they will access low carbon hydrogen or CO₂ storage in the future, and that land necessary to enable that decarbonisation has been set aside. This will support providing visibility to investors over which sites are well placed to decarbonise in future.

¹²² NESO (2024), '<u>Clean Power 2030</u>' (viewed in December 2024).

Moreover, to help ensure that capacity coming forward before the implementation date consider their decarbonisation plans, we are placing an obligation on substantially refurbishing or new combustion power plants in England, participating in the 2026 Capacity Market auction to declare that they will comply with the Decarbonisation Readiness requirements.

We are complementing this with measures intended to enable gas assets tied into long term Capacity Market agreements to exit without penalty and transfer to the power CCUS Dispatchable Power Agreement, enabling conversion to low carbon through retrofitting carbon capture equipment. We are exploring additional routes for gas assets in the Capacity Market to decarbonise including the feasibility of gas assets exiting long term agreements to enable conversion to H2P through H2PBM support.

As low carbon flexible technologies become more established, unabated gas will increasingly move to a reserve role on the system, essentially called upon as a last resort to meet peak demand, and demand during long periods of low supply from variable sources. Maintaining this reserve generating capacity is important for reaching clean power by 2030. As set out in the market reform chapter, we are taking steps to reform the Capacity Market to ensure there is sufficient unabated gas capacity on the system to maintain security of electricity supply as it moves into this reserve role. The reforms we are announcing to existing market frameworks are the best way to ensure that the necessary strategic reserve capacity of unabated gas generation remains on the system. The government's view is that a novel out-of-the-market mechanism to manage that reserve may have a role in the long-term phase-out of unabated gas capacity once its volume in the system has significantly reduced and long-duration low carbon flexible technologies have been deployed at scale.

Next steps

The actions outlined in this section will be critical to delivering a strong pipeline of low carbon long-duration flexible technologies and driving forward innovative and nascent technologies that can play an important role in delivering clean power. It also makes clear the important role that unabated gas will continue to play in a new back-up role to provide security of supply into the 2030s and beyond, whilst giving clarity for investors on the future routes to decarbonisation for these assets.

Supply chains and workforce



Summary

Lowering barriers to investment into resilient supply chains and workforce development is vital to ensuring we meet the demand for Clean Power 2030 and to capturing the benefits of this change for our economy. This is an opportunity to support UK growth by building domestic supply chains, growing the skilled workforce and spreading good jobs across the country. Government will support industry to secure the supply chains and skilled workforce they need by:

Giving developers greater route-to-market certainty so that they can plan and secure necessary supply chains and workforce, sooner.

Rapidly convening a new supply chains and workforce industry forum for key Clean Power 2030 sectors, including trade unions, to develop a deep understanding of system-level supply chain and workforce planning needs for Clean Power 2030 delivery, exploring bold solutions and devising targeted collective actions to ensure they are met. **Maximising domestic opportunities for clean energy supply chains** through crosseconomy work such as the UK's Industrial Strategy in Spring 2025, and clean power specific policy actions.

Exploring where international collaboration can support supply chains, including via trade agreements and international co-operation. The government is determined to work with other countries to diversify international supply chains.

Driving an increase in capacity of our domestic clean energy workforce to match the scale of the deployment challenge through our investment into clean energy sectors, and accelerating wider reforms led by the Office for Clean Energy Jobs, the Department for Education, and Skills England alongside targeted clean power offers, working closely with the devolved governments, industry, and trade unions.

Boosting awareness of clean energy job opportunities by publishing data on future clean energy workforce and skills needs, to ensure a common understanding of trends and challenges to inform action.

The challenge

Supply Chains

To deliver Clean Power 2030 we need secure, sustainable, competitive and reliable supply chains to provide the components and materials it requires. The UK will need to source more components by both powering up our domestic manufacturing and ensuring access and competitiveness in international markets. As we achieve this, we are committed to unlocking the growth benefits that come with scaling up deployment and manufacturing of clean energy technologies. Our ambition is to see a sustained increase in supply chain activity both up to 2030 and continuing out to 2050. Domestically, the UK has established manufacturing capacity in some of the key technologies needed to deliver Clean Power 2030. We have strengths in offshore wind engineering services, cables, electrolysers and electrical equipment, as well as parts of the wind turbine generator and monopiles. We also have suppliers with expertise in both high-voltage alternating current and high-voltage direct current (HVDC) electrical systems and are aiming to build capacity in HVDC cables. The upcoming Industrial Strategy will look to attract investment in growth-driving sectors including clean energy industries, and work is being carried out to determine the key subsectors on which it will focus. More broadly, we are a world-leading investment location, with a strong pipeline of potential projects that could strengthen our base further, although we will always need to also buy inputs and finished components from the international market.

We have been working with industry to make an initial assessment of the industry procurement challenges that may be faced for Clean Power 2030, building on previous evidence produced in collaboration with Baringa and the Industrial Growth Plan^{123,124}. This work has identified constraints across several key sectors, with supply chains close to full manufacturing capacity, long lead times for key components, and reliance on single international sources in places. Alongside these constraints, there are several cross-sectoral challenges associated with procuring components and delivering the resilient supply chains we need for Clean Power 2030:

- Investment confidence for buying components and investing in domestic manufacturing. Developers need greater certainty in the clean power deployment pathways and associated order books to secure supply chain components as early as possible, especially those with long lead times. In turn, this will give greater confidence to the supply chain to make investment decisions committing to basing or increasing future manufacturing capacity in the UK. We also know that UK supply chain companies need early, strategic engagement from developers to help develop and refine their product and service offerings to market needs.
- International buying power. There is growing global competition for clean energy supply chains, with competition for key components across different countries and sectors, which can result in prices being driven up. The UK will always be reliant on international supply chains to some extent: alongside stronger

domestic supply chains, it is essential that UK developers have reliable access to and are able to compete in international markets for materials or components.

 Logistical constraints. On a sector-by-sector basis, there are specific issues that prevent or delay transport and deployment of supply chain components

 most prominently in transmission networks, offshore and onshore wind, where ports, vessels, and abnormal load issues are acute.

Workforce

The wider transition to net zero is expected to support hundreds of thousands of jobs, with Clean Power 2030 playing a key part in stimulating a wealth of new jobs and economic opportunities across the country¹²⁵. These jobs will cross a range of skill levels and occupations, including technical engineers at levels 4–7 (and particularly 6+ including roles in civil, mechanical, electrical and design), along with electrical, welding, and mechanical trades at levels 2–7, and managerial roles including project and delivery managers at levels $4-7^{126}$. Many of these occupations are already in high demand across other sectors such as house building, construction, and wider manufacturing, and there also is a relatively high degree of transferable skills and knowledge between many carbon-intensive sectors and clean energy sectors, so wider coordination will be vital¹²⁷. The 'Assessment of the Clean Energy Skills Challenge' evidence annex sets out further evidence on key clean energy occupations, gathered through a range of sources.

¹²³ Baringa (2024), '<u>UK renewables deployment supply chain readiness study</u>' (viewed in December 2024).

¹²⁴ RenewableUK, Offshore Wind Industry Council, TCE, & The Crown Estate Scotland (2024), '<u>Offshore Wind Industrial Growth Plan</u>' (viewed in December 2024).

¹²⁵ CCC (2023), '<u>A Net Zero Workforce</u>' (viewed in November 2024).

¹²⁶ UK Government, '<u>What qualification levels mean</u>' (viewed in December 2024).

¹²⁷ Experimental job advert analysis shown in figure 14 suggests there is relatively high transferability of skills from many carbon-intensive sectors to clean energy sectors, suggesting workers in carbon-intensive sectors are likely to have many of the skills needed across the Clean Power workforce. The challenge will be in enabling the reskilling of these workers, quickly.

The challenge of finding employees with the right skills to take on these roles is already significant and expected to remain so. Through industry engagement, we have identified several key barriers to securing the Clean Power 2030 workforce:

- Delivering future skills needs: There are a number of gaps and key occupations that need to be better targeted in the post-16 skills system. Exacerbating the challenge is the high proportion of small and medium sized enterprises in clean energy sectors, some of whom have struggled to engage with the existing skills system. The UK also has an ageing workforce, and many individuals with the skills we need have left the workforce or are retiring soon.
- **Reskilling and transferability:** Most of the workforce we need for 2030 is already employed, so retraining, upskilling, and increasing the transferability of workers between sectors is essential.
- Awareness, perceptions and accessibility of clean power jobs: Lack of awareness of green sector jobs is exacerbating role shortages and putting future skills supply at risk. The Learning and Work Institute reported that 87% of 16–24-year-olds did not know what 'green skills' were when asked¹²⁸, reducing uptake of skills and training provision. In addition, we are not fully utilising the talent and ambitions of our workforce, for example, only 16.5% of the engineering workforce is female¹²⁹ and only 7% of the offshore wind workforce are from non-white backgrounds¹³⁰.

Regional pressures: Several clean energy sectors, like offshore wind and carbon capture, are heavily clustered in specific regions of the UK. With limited data on skills needs, local skills providers are struggling to identify and tailor skills requirements around the rapidly evolving needs of their local areas. They can also find it challenging to respond to these needs given constraints on the teaching workforce and on the availability of facilities and equipment that support clean energy skills development.



¹²⁸ Learning and Work Institute (2023), '*Skills for a net-zero economy: Insights from employers and young people*' (viewed in November 2024). ¹²⁹ EngineeringUK (2022), '*Women in Engineering: Trends in women in the engineering workforce between 2010 and 2021*' - Based on ONS Labour Force Survey data (viewed in December 2024).

¹³⁰ Offshore Wind Industry Council (2023), 'Offshore Wind Skills Intelligence Report' – Based on job record data provided by employers (viewed in December 2024).

Figure 14: Similarity of skills demanded by online job adverts across several carbonintensive and clean energy sectors



Manufacturing and production sectors

Note: 'Similarity' refers to cosine similarity, calculated using skills and their prominence across SIC groupings and clean energy sectors. The following traditional sectors are considered: Construction (Section F), Water (Section E), Electricity and Gas Supply (Section D), Manufacturing (Section C), Mining excl. Oil and Gas (SIC 05, 07, 08, 099), Oil and Gas (SIC 06, 091). There may be a small proportion of job adverts which fall into both groups being compared.

Source: DESNZ experimental analysis of Lightcast online job advertisement data (2024). The Clean Energy Job Adverts Analysis: Charts and Methodology document provides more detail on this analysis.



Clean energy sectors

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Taking action

We will take action to address these barriers. through broad UK government industrial policy, English skills reforms and through targeted Clean Power 2030 initiatives. Similar approaches are being taken across the devolved governments, such as those outlined in the Scottish Green Industrial Strategy,¹³¹ the Welsh Economic Mission¹³² and the Northern Ireland Executive's Path to Net Zero Energy¹³³. We want to give developers of clean power infrastructure the best chance of securing the supply chains and workforce they need to deliver Clean Power 2030, and we are committed to delivering Clean Power by 2030 in such a way that retains value for money and balances cost considerations with delivery.

This starts with giving developers greater clarity and certainty over their routes to market, to enable them to plan and mobilise the supply chains and workforce they need to deliver new generation. This will help give forward sight to supply chain companies to prepare and have capacity to supply clean power infrastructure projects. We have aimed to do this elsewhere in this plan, particularly in sections covering market reform, Contracts for Difference reform for upcoming allocation rounds, proposed changes to planning and consenting, and connections queue changes. For network companies, greater flexibility to secure supplier capacity earlier and for the longer term will be given primarily through the launch of Ofgem's Advanced Procurement Mechanism¹³⁴.

The Clean Power 2030 Unit, in collaboration with the Office for Clean Energy Jobs, will convene key stakeholders from Clean Power 2030 sectors in a new industry forum in early 2025. This will be a collaborative vehicle for proactive supply chain and workforce planning. Further information on this forum is included in the government's approach to delivering Clean Power 2030 chapter as a case study for how we will drive delivery through a new, mission-focused approach.

Alongside the work of the forum to develop collective actions for Clean Power 2030 delivery, UK government has a further role in:

- Maximising domestic opportunities for clean energy supply chains through cross-economy work such as the UK's Industrial Strategy in Spring 2025, and clean power specific policy actions.
- Exploring where international collaboration can support supply chains, including via trade agreements and international co-operation. The government is determined to work with other countries to diversify international supply chains.
- Driving an increase in capacity of our domestic clean energy workforce to match the scale of the deployment challenge through our investment into clean energy sectors, such as the Clean Industry Bonus and Great British Energy, and accelerating wider reforms led by the Office for Clean Energy Jobs, the Department for Education, and Skills England alongside targeted clean power offers, working closely with the devolved governments, industry and trade unions.

¹³¹ Scottish Government (2024), '<u>Green Industrial Strategy</u>' (viewed in December 2024).

¹³² Welsh Government (2023), 'Economic mission: priorities for a stronger economy' (viewed in December 2024).

¹³³ Northern Irish Executive (2021) 'Path to Net Zero Energy' (viewed in December 2024)

¹³⁴ Ofgem (2024), 'Electricity Transmission Advanced Procurement Mechanism Consultation' (viewed in December 2024).

 Boosting awareness of clean energy job opportunities by publishing data on future clean energy workforce and skills needs, to ensure a common understanding of trends and challenges to inform action.

Maximising domestic opportunities for clean energy supply chains

A range of work is already underway in government to support cross-economy development of domestic supply chains. In spring 2025, we will publish an Industrial Strategy including a clean energy sector plan. Government's approach to stimulating investment and activity in growth-driving sectors will be set out in this upcoming Industrial Strategy, which we will continue to actively shape to maximise its benefits for clean power industries. The strategy will outline government's next steps to securing growth opportunities in these industries, and a clear approach to enabling sectors to overcome barriers to growth and investment, including in supply chains. A new supply chains taskforce will assess where supply chains critical to the UK's economic security and resilience are vulnerable – focussing in the first instance on supporting the development and delivery of the Industrial Strategy.

In addition, we are taking action to focus investment into boosting our supply chain capacity and create pathways for efficient procurement processes:

- Delivering the new Contracts for Difference (CfD) Clean Industry Bonus.
 This initiative allows clean energy developers in fixed and floating offshore wind to access additional CfD revenue for investments in manufacturing in our coastal and energy communities and cleaner, more sustainable supply chains.
- Consulting on targeted reforms to the CfD mechanism for upcoming allocation rounds, including improving transparency

and predictability in the timing and scale of future CfD allocation rounds, which in turn can support increased investment in clean power supply chains. Further detail on these reforms is included in the Renewable and Nuclear Project Delivery chapter.

- Delivering the Floating Offshore Wind Manufacturing Investment Scheme (FLOWMIS) which was set up to provide grant funding to support the development of port facilities for large-scale floating offshore wind deployment. The Port of Cromarty Firth and Port Talbot have been placed on the FLOWMIS primary list, meaning they have been taken forward for detailed due diligence, subsidy control assessment and negotiation of grant terms. Further detail on the role of floating offshore wind is included in the Renewable and Nuclear Project Delivery chapter.
- Mobilising government investment into the clean power sector via the National Wealth Fund and Great British Energy. At least £5.8 billion of the National Wealth Fund's capital will focus on five other sectors relevant to clean power: green hydrogen, carbon capture, ports, gigafactories and green steel. £8.3 billion over the course of this Parliament has also been committed to the newly created Great British Energy, which will work in lockstep with the National Wealth Fund. It will work to support the growth of clean power supply chains across the UK, ensuring the benefits of these are widely distributed.
- Supporting Ofgem's development of the Electricity Networks Advanced
 Procurement Mechanism to be launched in early 2025 with the aims of providing greater flexibility for Transmission Owners to secure supplier capacity and to bulk procure multiple factory slots across a portfolio of projects ahead of need.

Exploring where international collaboration can support supply chains

We recognise that, though it is crucial to build domestic capacity, some of our supply chain needs will be met by the global rather than the domestic market. Where this is necessary, we want to give developers the best possible opportunity to secure what they need. We will do this through:

- Collaborating with international partners through international initiatives such as the Global Clean Power Alliance and other bilateral and multilateral initiatives, to diversify and strengthen supply chains. This has the potential to support new sources for critical clean power components, address bottlenecks and reduce costs.
- Exploring international solutions to ensure the UK is able to secure the critical goods it needs for the energy transition and explore international trade frameworks and institutions that can support the transition to net zero.

Driving the increase in capacity of our domestic clean energy workforce

Wider reform of the skills and employment system are underway across government to shape the domestic workforce and support the delivery of Clean Power by 2030. The skills and expertise of workers from the oil and gas will be central to the success of our Clean Energy Mission. There is a huge opportunity for re-skilling and transferability of skills of the oil and gas workforce across the economy. As skills policy is devolved, we will commit to continue our ongoing dialogue and collaboration with our counterparts in the devolved governments to ensure a coordinated and joined-up approach. The Scottish Government published the Green Industrial Strategy in September 2024¹³⁵. This outlines that the availability of high quality, appropriately skilled and ambitious people is critical to the willingness of a business to start, scale and invest. Significant work is progressing to reform the Scottish education and skills system so that it is more responsive to economic needs and ambitions. The Scottish Government will continue to invest in that system and the infrastructure that supports it, including for example, schools, colleges, universities, apprenticeships and our Innovation Centres, to enable the transition to net zero as well as broader ambitions.

The Welsh Government has published the Stronger, Fairer, Greener Wales: Net Zero Skill Action Plan¹³⁶, to provide practical steps towards understanding where and how skills needs will change over time and indicate how the Welsh Government will support this transition. Other planned Welsh initiatives include the publication of Clean Energy Sectors Skills Roadmaps, an Energy Sector Deal, supporting the Heat Strategy for Wales to advance decarbonisation, developing a new renewable energy apprenticeship framework and fostering industry collaboration to enhance supply chain opportunities.

The Northern Ireland Executive is also looking to influence and shape developments in green skills and has facilitated an industry-led Green Skills Action Plan. The Green Skills Action Plan initially focusses on the following three areas: large-scale energy production; infrastructure; and domestic low carbon technologies and energy efficiency to ensure that courses and apprenticeships are in place to provide the skills needed for the energy transition.

¹³⁵ Scottish Government (2024), '<u>Green Industrial Strategy</u>' (viewed in December 2024).

¹³⁶ Welsh Government (2023), '<u>Stronger, Fairer, Greener Wales: Net Zero Skill Action Plan</u>' (viewed in December 2024).

Ongoing UK government work includes:

- Setting up The Office for Clean Energy Jobs, which has been created to focus on ensuring we have the skilled workforce in core energy and net zero sectors critical to meeting Clean Power 2030. It will focus on supporting regions transitioning from carbon-intensive industries to clean energy sectors, ensuring clean energy jobs are high quality, with fair pay, favourable terms and good working conditions, and increasing diversity in the clean energy workforce. It will engage across the energy sector, trade unions and industry to deliver on this.
- Designing a pilot scheme to support regional skills interventions that will help transition the UK workforce from carbon-intensive sectors to clean energy sectors. This will be achieved by identifying and addressing skills gaps and challenges through targeted interventions trials on a regional basis. Interventions could include local skills and workforce mapping, career transition advisors, funding for direct training provisions.
- Setting up Skills England to provide an authoritative assessment of national and regional skills needs; work with Combined Authorities to ensure these are met; align a comprehensive suite of apprenticeships, training and technical qualifications with skills gaps; and advise on a new growth and skills offer. DESNZ will work with DfE and Skills England, together with the devolved governments, on early reform priorities to ensure that policy implementation begins as soon as possible to have the greatest impact on Clean Power 2030. The government will also evolve the apprenticeships offer into a more flexible growth and skills offer, delivering greater flexibility for learners and employers, aligned to the Industrial Strategy, creating routes into good, skilled jobs in growing industries such as

clean energy. DESNZ will work with DfE, Skills England, and the sector to inform the offer. DESNZ will also work with DfE on transforming further education colleges into specialist Technical Excellence Colleges and on ways to enhance the further education workforce in clean energy and related sectors. The Curriculum and Assessment Review closed its call for evidence recently, and many clean energy industry bodies provided information.

 Taking forward the 'Get Britain
 Working' White Paper. This sets out plans for reforms to employment support to tackle economic inactivity, such as the Youth Guarantee, a new jobs and careers service to support more people into work and help them get on in work, and locally led Get Britain Working Plans for areas across England. DESNZ, DWP and DfE will work together to develop proposals for how the specific reforms mentioned within the White Paper will be implemented to support delivery of the workforce needed for Clean Power 2030.

In addition to this cross-economy work, we are taking the following clean power specific action to secure the 2030 workforce demand:

Exploring targeted skill interventions to reskill and upskill workers across the economy, including identifying the regions that will be most impacted by the transition to clean energy. As of October 2024, DESNZ has come onboard as a strategic partner of the Skills Passport project. The passport is an industry led initiative overseen by Renewable UK and Offshore Energy UK and supported by the UK and Scottish Governments which will align standards, recognise transferable skills and qualifications and map out career pathways for suitable roles. This new digital tool for workers is set to be piloted by January 2025.

 Developing ways to support access to training schemes in key clean power sectors needed for 2030. Government is developing several new economic and investment policies which will crowd investment into the sector and create future potential opportunities to channel funding into skills provisions and training.

Boosting awareness of clean energy job opportunities

Ensuring an improved uptake of clean energy upskilling and reskilling offers will be essential, we will do this by establishing a common understanding of the barriers and collaborating with industry to overcome them. We will do this by:

- Publishing the 'Assessment of the **Clean Energy Skills Challenge'** evidence annex alongside this Action Plan, comprising data gathered across government, industry and company leaders, academics and further education representatives. This evidence is based on previous 2035 targets. However, the key near-term occupation shortages and workforce challenges sectors are expecting to face are anticipated to be largely similar. This evidence will be used as a basis for government, industry, and other key partners to better understand the 2030 workforce requirements and support targeted skills planning with confidence.
- Exploring public awareness campaign options, working between government and industry to see how we can coordinate messaging promoting the opportunities from clean energy jobs, help employees and employers navigate the skills landscape, and improve diversity in the clean energy workforce.

Next steps

- The first meeting of the new collaborative forum will take place in early 2025, convening key partners across private and public sectors to work collaboratively on supply chain and workforce planning.
- Our new, modern, Industrial Strategy 'Invest 2035', including a sector plan for clean energy industries, will be published in Spring 2025, setting out the government's approach to growth opportunities in clean energy industries across both supply chains and skills.
- We will deliver an updated carbon budget delivery plan in due course to the end of Carbon Budget 6 in 2037 with full detail of policy packages for all the sectors. This will provide a long-term line of sight, outlining the policies and proposals needed to deliver carbon budgets 4-6 and the Nationally Determined Contributions in 2030 and 2035 on a pathway to net zero.
- Government is developing a new Trade Strategy which will support the energy transition in alignment with Clean Power 2030, and ensure resilient global supply chains.

