# Ensuring energy security

When Putin cut off most gas supplies to Europe in 2022, energy prices for families and businesses in Great Britain increased dramatically, even though Russia provided only 4% of our gas imports[11]. Our dependence on globally traded gas for heating and electricity generation was the reason: so long as our energy supply can be weaponised by others, we will remain exposed to global supply shocks and price surges.

In an era of heightened geopolitical risk, switching fossil fuelled generation for homegrown clean energy from renewables and other clean technologies offers us security that fossil fuels simply cannot provide.

We understand that this is not always a like-for-like exchange. As we aim for clean power by 2030, it is crucial we complement renewables with flexible capacity to ensure we can deliver clean power no matter the weather. Historically, unabated fossil fuels have provided this flexibility, but that leaves us exposed to the rollercoaster of fossil fuel prices. This Action Plan sets out a pathway towards deploying low carbon flexible capacity technologies like long-duration electricity storage, power carbon capture, usage and storage (CCUS), and hydrogen to power, working alongside technologies such as nuclear generation, which provide round the clock reliable power.

[11] BEIS (2022), '*Energy Trends special article – Energy imports from Russia*' (viewed in December 2024).

Our 2030 mission will grow the UK's overall generation capacity and expand our network infrastructure so that we can safely and securely meet changing demand patterns in 2030 and beyond, driven by consumers' greener choices through the net zero transition. Taking account of this generational change in the UK's energy system, we are improving electricity market arrangements to ensure secure supply in a clean system transition, as outlined in further detail in the REMA Autumn Update.

As we rapidly deploy new infrastructure, we will maintain high levels of resilience and security – including to severe weather events which are expected to increase in intensity and frequency as a result of climate change, and in managing threats to our national security, such as cyber threats, as our energy system becomes increasingly interconnected. The government has empowered the independent National Energy System Operator with the responsibility to carry out resilience functions across the electricity and gas systems and we will continue to work with industry, regulators and other stakeholders to improve and maintain the resilience of old, new, and future energy infrastructure.

Our energy system must meet demand while protecting families and businesses from global supply shocks and volatile prices. That is what energy security means to this government, and that is what this Clean Power Action Plan delivers.

# Our pathway to 2030

### Defining the Clean Power target

Clean Power means that by 2030, Great Britain will generate enough clean power to meet our total annual electricity demand, backed up by unabated gas supply to be used only when essential.

In line with independent advice from the National Energy System Operator (NESO), our clean power target means transitioning to an electricity system with the following characteristics in a typical weather year:

- Clean sources produce at least as much power as Great Britain *consumes* in total, and;
- Clean sources produce at least 95%[12] of Great Britain's *generation*.

We expect delivering a clean power system with these characteristics will make Great Britain a net exporter of electricity and will reduce the carbon intensity of electricity generation from 171g$CO_2$e/kWh in 2023[13] to well below 50g$CO_2$e/kWh in 2030, well within the Climate Change Committee's Carbon Budget 6 advice[14]. The figures below visualise this target and set out the current generation mix.

To achieve the mission, we will aim to deliver above this ambition where the system and consumer benefits align so that potential challenges in some areas of clean power delivery can be compensated by deployment elsewhere.

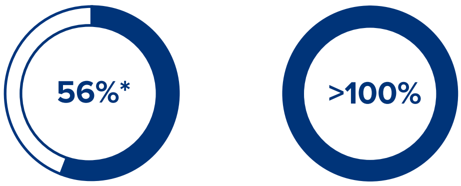
Delivering this target aligns with our ambitious 2030 Nationally Determined Contribution[15] and will help us meet Carbon Budget 6.

[12] See the technical annex for more detail on the definition of 2030 Clean Power.
[13] DESNZ (2024), '*DUKES*' (viewed in December 2024).
[14] Climate Change Committee (CCC) (2020), '*The Sixth Carbon Budget*' (viewed in December 2024).
[15] BEIS (2022), '*UK's Nationally Determined Contribution*' (viewed in December 2024).

**Metric 1a:**

**Clean sources produce at least as much power as Great Britain consumes in total.**

**2023** | **2030 Clean Power**

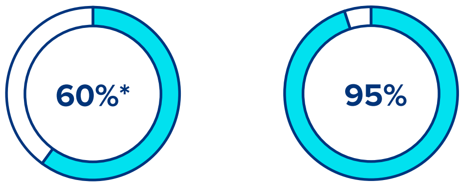



▼ 44 points below target

**Metric 1b:**

**Clean sources produce at least 95% of Great Britain's generation.**

**2023** | **2030 Clean Power**



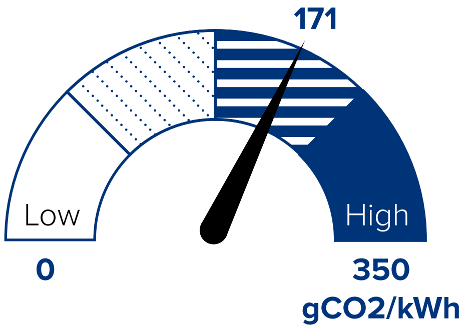

▼ 35 points below target

* This is the closest available official statistic to the clean power 2030 definition at the point of publication. This statistic is for the UK rather than Great Britain and includes gas CHP in the denominator and EfW in both the numerator (the proportion assumed to be from bioenergy) and denominator. Official statistics will be reviewed at a future date to allow us to accurately track delivery.

**Metric 2:**

**Emissions intensity of well below 50gCO2e/kWh by 2030**

**2023**




**2030 Clean Power**

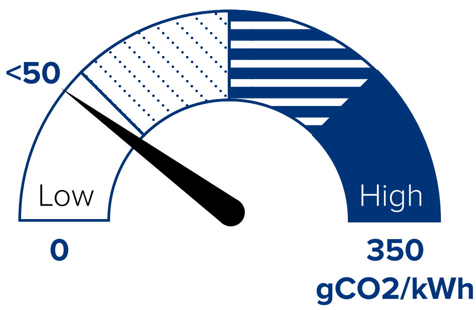
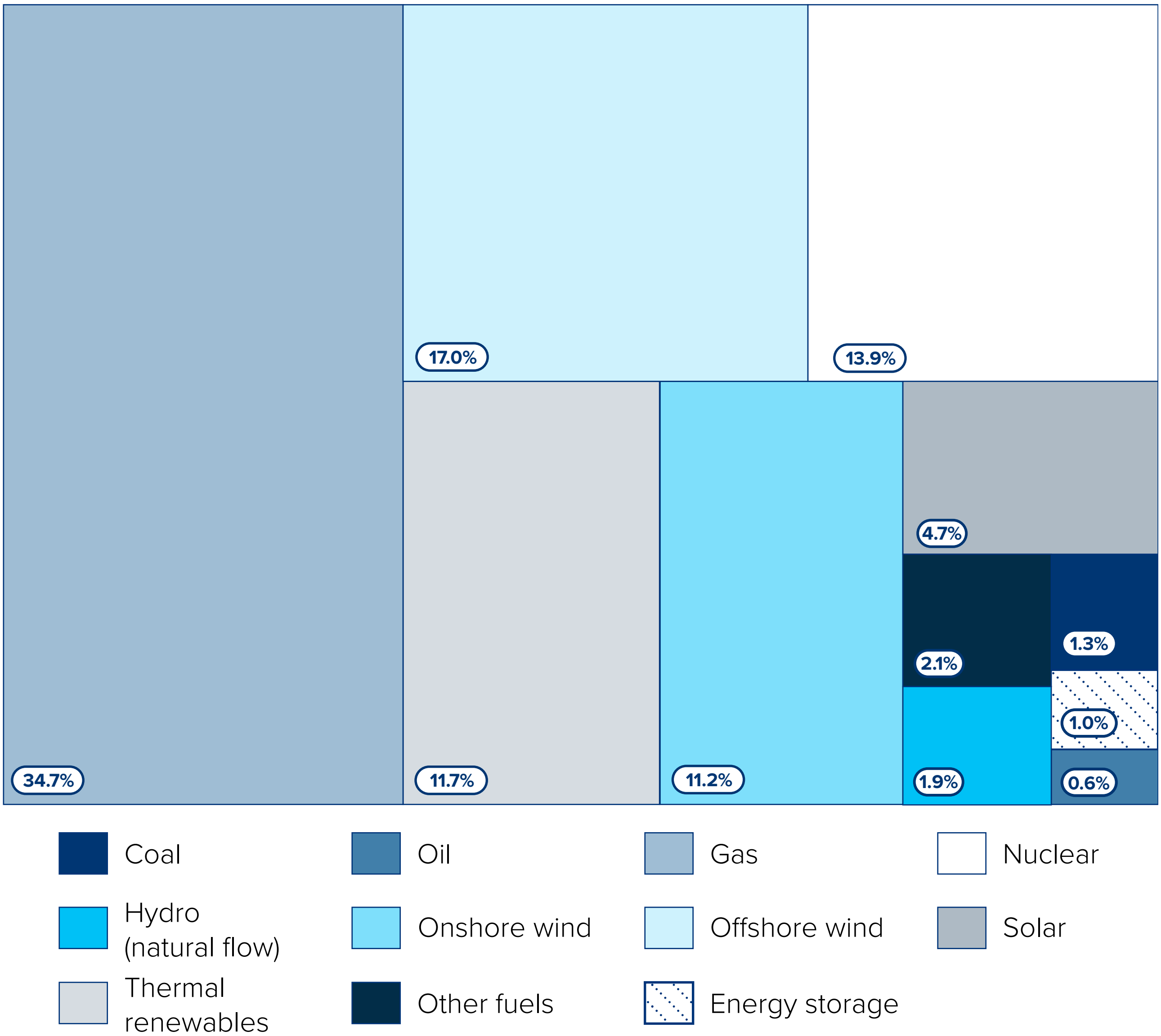


**Figure 1: Shares of electricity generated (GWh), 2023**



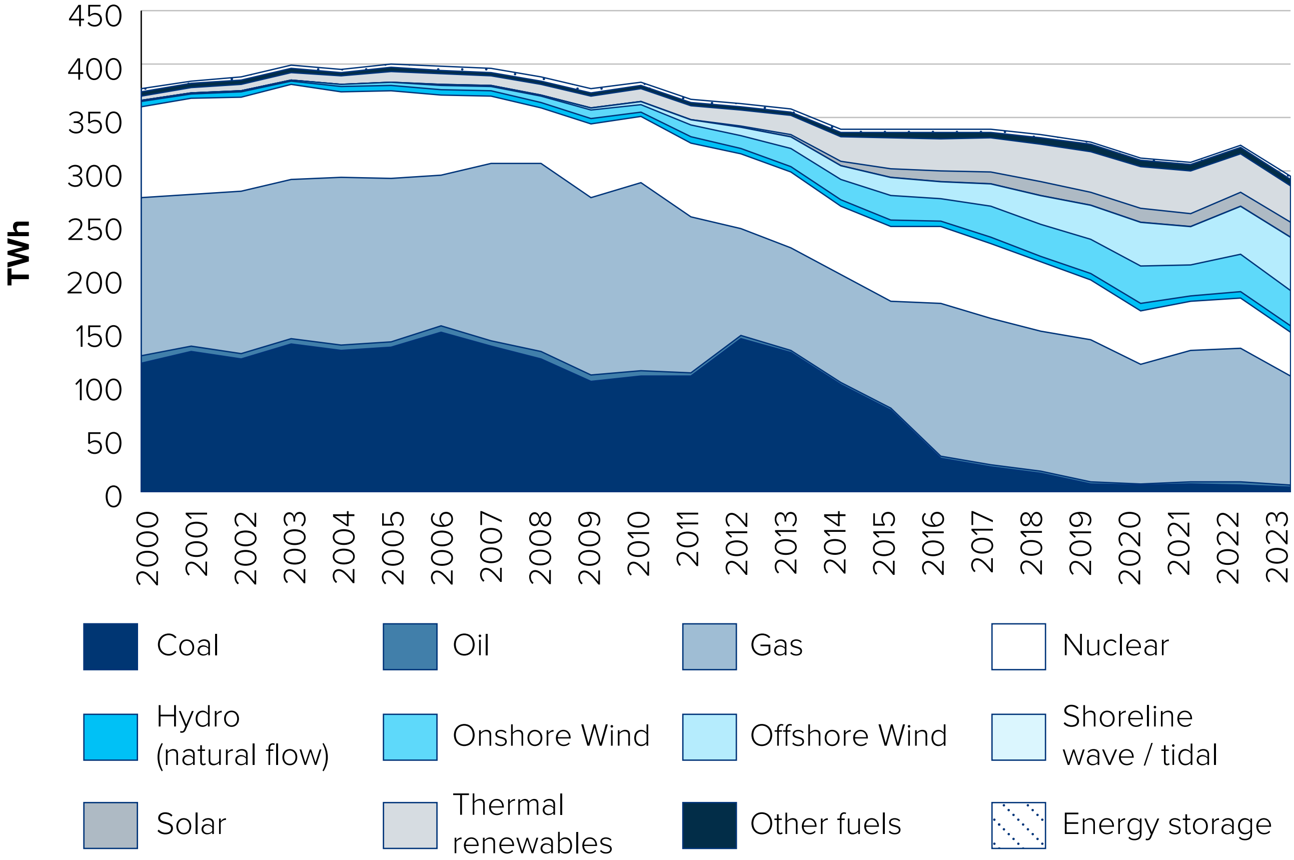

**Source:** DESNZ (2024), 'DUKES'

**Note:** The shares of electricity generated are on a UK basis.

## What a Clean Power system will look like

Whilst the expansion of renewables in the power system has reduced the share of fossil fuel generation to date – see figure 2 – all routes to a Clean Power system will require mass deployment of offshore wind, onshore wind, and solar[16]. Securing affordable,[17] homegrown renewables means we will be able to run our power system for increasing periods on low carbon generation, with renewables providing the vast majority of generation, and nuclear continuing to deliver a backbone of vital firm low carbon power.

**Figure 2: Electricity generation mix (TWh), 2000-2023**




**Source:** DESNZ (2024), 'DUKES'

**Note:** The generation mix is on a UK basis.

[16] NESO (2024), '*Clean Power 2030*' (viewed in December 2024).

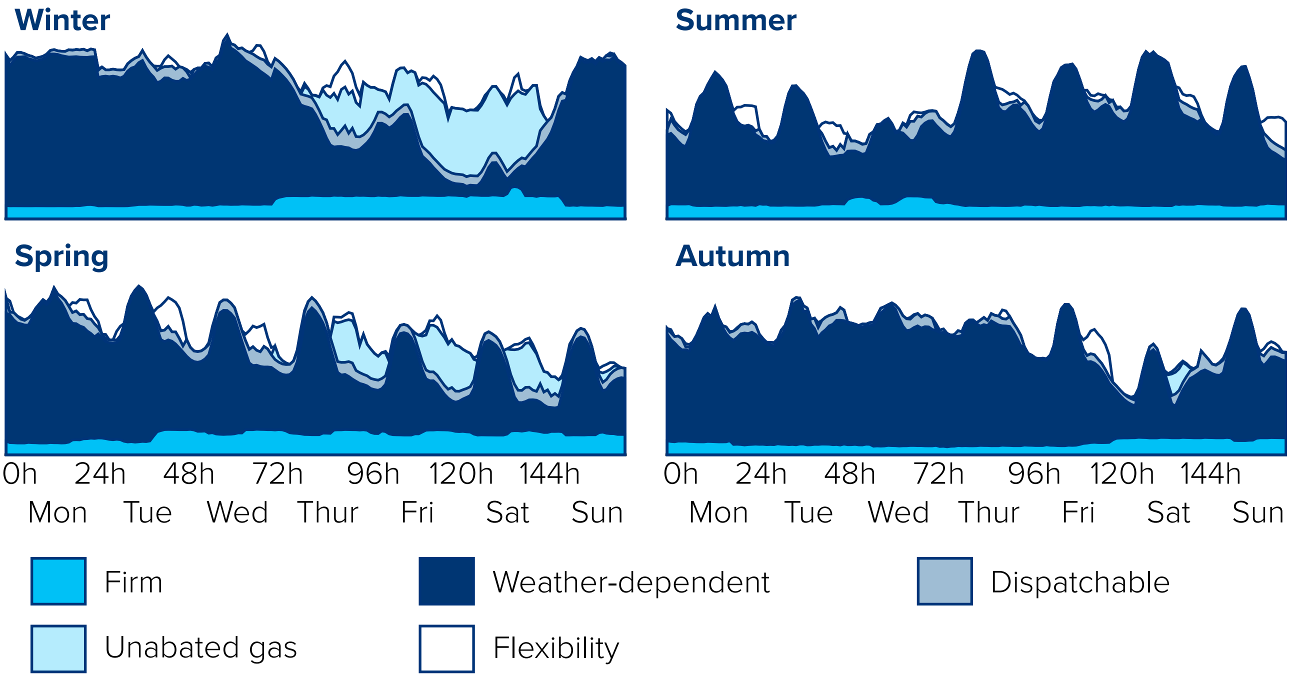
[17] BEIS (2023), '*Electricity Generation Costs 2023*' (viewed in December 2024). The published evidence demonstrates that intermittent renewable electricity sources like offshore wind, onshore wind and solar PV are the cheapest sources of new electricity generation to build and operate.

However, there will be periods over the year, mostly during winter and autumn, where weather conditions and higher electricity demand mean our fleet of renewables and firm generation alone are not able to meet electricity demand. Many of these periods will only be for a few hours. These short periods offer opportunities for flexible, low carbon solutions to meet our needs.

Where renewables alone are unable to meet demand for longer periods, we will enable a suite of technologies to be deployed and maintained to provide longer-duration power capacity. This could be a combination of pumped hydro storage, first-of-a-kind low carbon dispatchable technologies like gas CCUS or hydrogen to power (H2P), or innovative technologies like liquid air energy storage (LAES).

Whilst deploying of longer-duration technologies will help reduce unabated gas generation, we recognise the importance of gas capacity to maintain security of supply. We will see a fundamental shift in the role and frequency of unabated gas generation, moving from generating almost every day of the year, to an important backup to be used only when essential, with generation decreasing as we move towards 2030 – see figures 3-5. This is consistent with NESO's view[18] and aligns with the Climate Change Committee's advice[19] that maintaining gas capacity to use as backup is consistent with a fully decarbonised power system.

**Figure 3: Modelled 7-day hourly generation profile in 2030 in the NESO 'Further Flex and Renewables' Scenario (MW)**

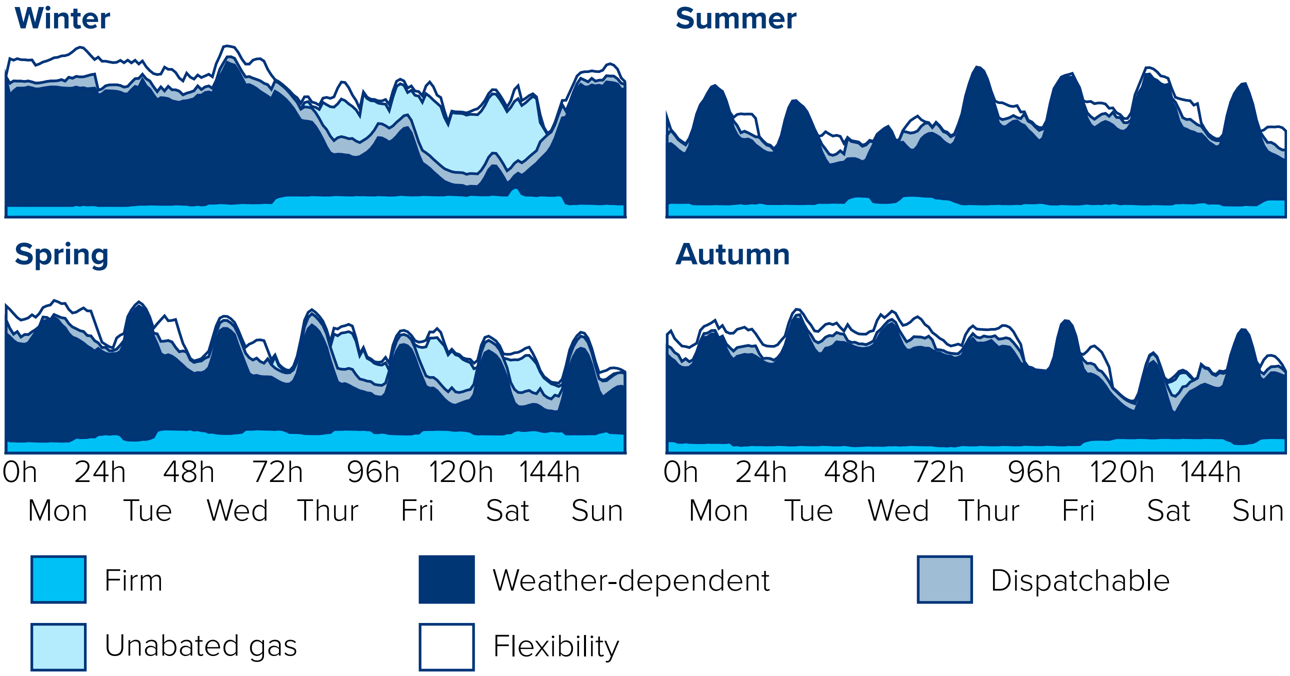



**Notes: Firm** includes nuclear, hydro, CHP and waste. **Weather-dependent** includes onshore wind, offshore wind and solar. **Dispatchable** includes biomass, pumped hydro, gas with CCS and hydrogen to power. **Flexibility** includes batteries and residential flexibility. Chart only shows when flexibility is discharging, not charging.

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

[18] NESO (2024), '*Clean Power 2030*' (viewed in December 2024).
[19] CCC (2023), '*Delivering a reliable decarbonised power system*' (viewed in December 2024).

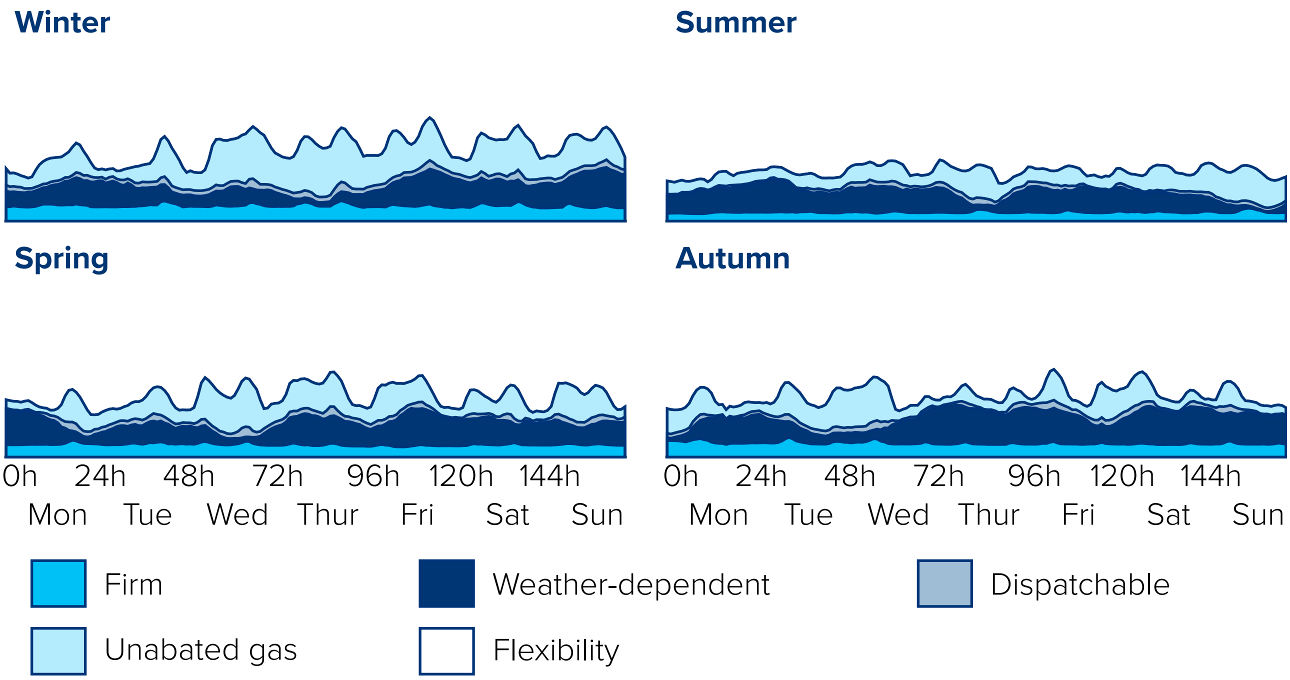
**Figure 4: Modelled 7-day hourly generation profile in 2030 in the NESO 'New Dispatch' Scenario (MW)**




**Notes: Firm** includes nuclear, hydro, CHP and waste. **Weather-dependent** includes onshore wind, offshore wind and solar. **Dispatchable** includes biomass, pumped hydro, gas with CCS and hydrogen to power. **Flexibility** includes batteries and residential flexibility. Chart only shows when flexibility is discharging, not charging.

**Source:** NESO (2024), '[Clean Power 2030](Clean Power 2030)'

**Figure 5: Historical 7-day hourly generation profile in 2023 (MW)**




**Notes: Firm** includes coal, nuclear, hydro, CHP and waste. **Weather-dependent** includes wind. **Dispatchable** includes biomass, pumped hydro. **Flexibility** is not identified in the historical data. Wind and solar generation are underestimated because they exclude embedded generation and wind farms which do not have operational meters.

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

Therefore, the clean power scenarios in Table 1 include technologies that play a range of key roles – variable generation that is renewable, firm generation to meet baseload demand, and dispatchable generation and flexibility for periods of low wind or sun, or higher electricity demand. For each technology, Table 1 shows current installed capacity, alongside, NESO's 'Further Flex and Renewables' scenario, and NESO's 'New Dispatch' scenario.

Using these scenarios, alongside an assessment of maximum feasible deployment based on current knowledge of the project pipeline, we have developed a DESNZ 'Clean Power Capacity Range', which is a range of possible installed capacities for each technology in 2030 – see Table 1. This reflects that there is no singular path to achieving clean power, but instead, that there are a range of scenarios that could get us there. Over time, there will be more clarity on which scenarios are most likely, depending on the outcomes of negotiations and other contract-award processes, and through monitoring delivery of assets with long lead-times, such as the transmission network, offshore wind, and nuclear. This new information will allow the pathway to 2030 to be refined over time, enabled where needed through prioritising connections offers, helping to determine the precise capacity mix required to deliver Clean Power 2030.

Therefore, whilst the 'Clean Power Capacity Range' provides a foundation to guide rapid policy development and focus delivery, the scenarios developed now cannot be exhaustive or definitive, and it is only right that some optionality is retained. In the first instance, this means:

- Government accepts the NESO advice on the infrastructure required for 2030 – decisions are required now to ensure the grid needed for the system in 2030 can be put in place.
- Government sets ranges for deployment of each technology by 2030 and will maintain some optionality until more clarity on which scenario is most likely is available. The 'Clean Power Capacity Range' is provided in Table 1.

There may be technologies not included in these scenarios that could have a role in providing clean power to the system and we will continue to refine our view on these. For example, biomethane is a domestically-produced low carbon gas currently primarily used to decarbonise heating. Biomethane can be used flexibly across many different end-uses – heat, power, industry, transport, agriculture, and hydrogen production – and it may also be able to contribute to low-carbon dispatchable power generation.

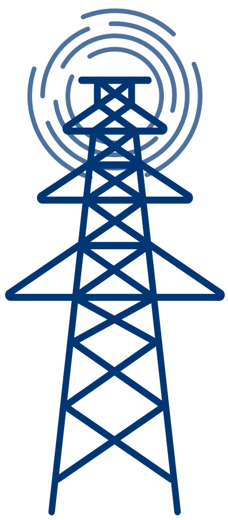


**Table 1: Installed capacity in 2030 in the NESO 'Further Flex and Renewables' and 'New Dispatch' scenarios, and the DESNZ 'Clean Power Capacity Range', compared to current installed capacity (GW)**

| Technology | Current installed capacity[20] | NESO 'Further Flex and Renewables' Scenario | NESO 'New Dispatch' Scenario | DESNZ 'Clean Power Capacity Range'[21] |
|---|---|---|---|---|
| **Variable** | | | | |
| Offshore wind | 14.8 | 51 | 43 | 43 – 50 |
| Onshore wind | 14.2 | 27 | 27 | 27 – 29 |
| Solar | 16.6 | 47 | 47 | 45 – 47 |
| **Firm** | | | | |
| Nuclear | 5.9 | 4 | 4 | 3 – 4 |
| **Dispatchable** | | | | |
| Low Carbon Dispatchable Power[22] | 4.3 | 4 | 7 | 2[23] – 7 |
| Unabated gas | 35.6 | 35 | 35 | 35[24] |
| **Flexible** | | | | |
| LDES | 2.9 | 8 | 5 | 4 – 6 |
| Batteries | 4.5 | 27 | 23 | 23 – 27 |
| Interconnectors | 9.8 | 12 | 12 | 12 – 14 |
| Consumer-led flexibility[25] | 2.5 | 12 | 10 | 10 – 12 |

[20] Latest publicly available data for Great Britain at the point of publication. The data source for renewables is DESNZ (2024), *'Energy Trends 6.1'*, Q2 2024 data. The data source for nuclear, unabated gas, and LDES is DESNZ (2024), *'DUKES 5.12'*, 2023 data. The data source for consumer-led flexibility is NESO (2024), *'Clean Power 2030 Table 2'*, 2023 data. The data source for batteries is Modo Energy (2024), *'Indices & Benchmarks'*, Q4 2024 data. The data source for interconnectors is Ofgem (2024), *'Interconnectors'*, 2024 data. Low carbon dispatchable power includes biomass, power BECCS, gas CCUS and hydrogen to power. The data source for biomass/ power BECCS is NESO (2024), *'Clean Power 2030 Table 2'*, 2023 data. Gas CCUS & hydrogen are new technologies so there is no installed capacity at the point of publication.

[21] In addition to the two NESO scenarios, these ranges have been informed by internal modelling and an assessment of maximum feasible deployment based on current knowledge of the project pipeline. Therefore, the range differs from the range of the two NESO scenarios in some instances. However, for solar, there is scope to exceed the 47GW upper limit, subject to system need, noting for example the potential of rooftop solar to boost deployment – see Connections Annex for further details.

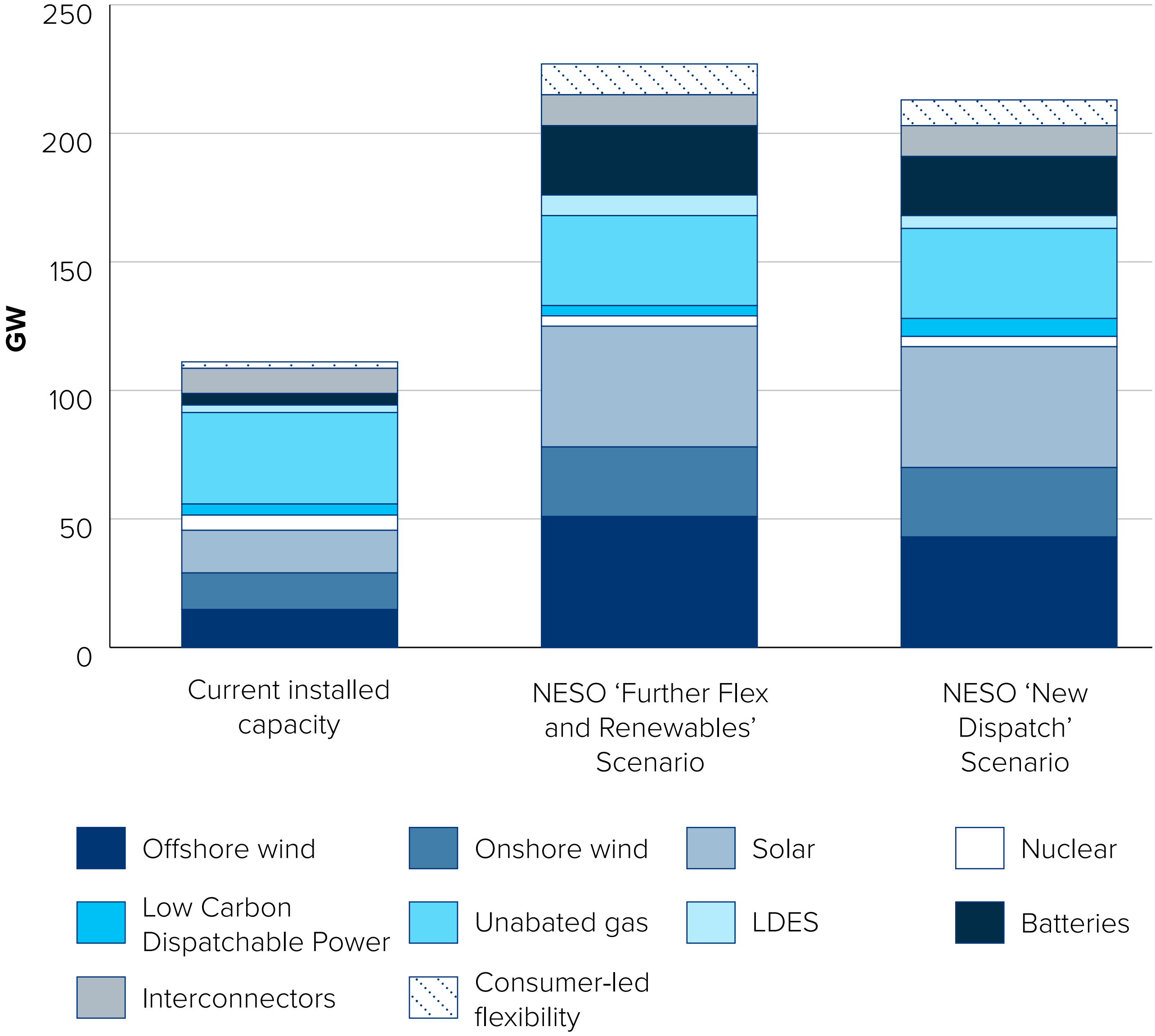
[22] Dispatchable technologies are ones which combust fuel to produce electricity and, by varying the rate at which fuel is burned, can respond to meet the needs of the grid with varying levels of flexibility. This category includes biomass, power BECCS, gas CCUS and hydrogen.

[23] The low end of the range represents the minimum capacity we expect to have in 2030. There is uncertainty on the amount of biomass capacity that will be on the system in 2030 with some existing support arrangements ending from 2027 onwards. HMG is considering the position on potential future support arrangements, but no decisions have yet been taken.

[24] While delivering its Clean Power ambition for 2030, the government's aim is to ensure there will be sufficient flexible capacity on the system to meet security of supply. This includes retaining existing unabated gas capacity.

[25] Excluding storage heaters.

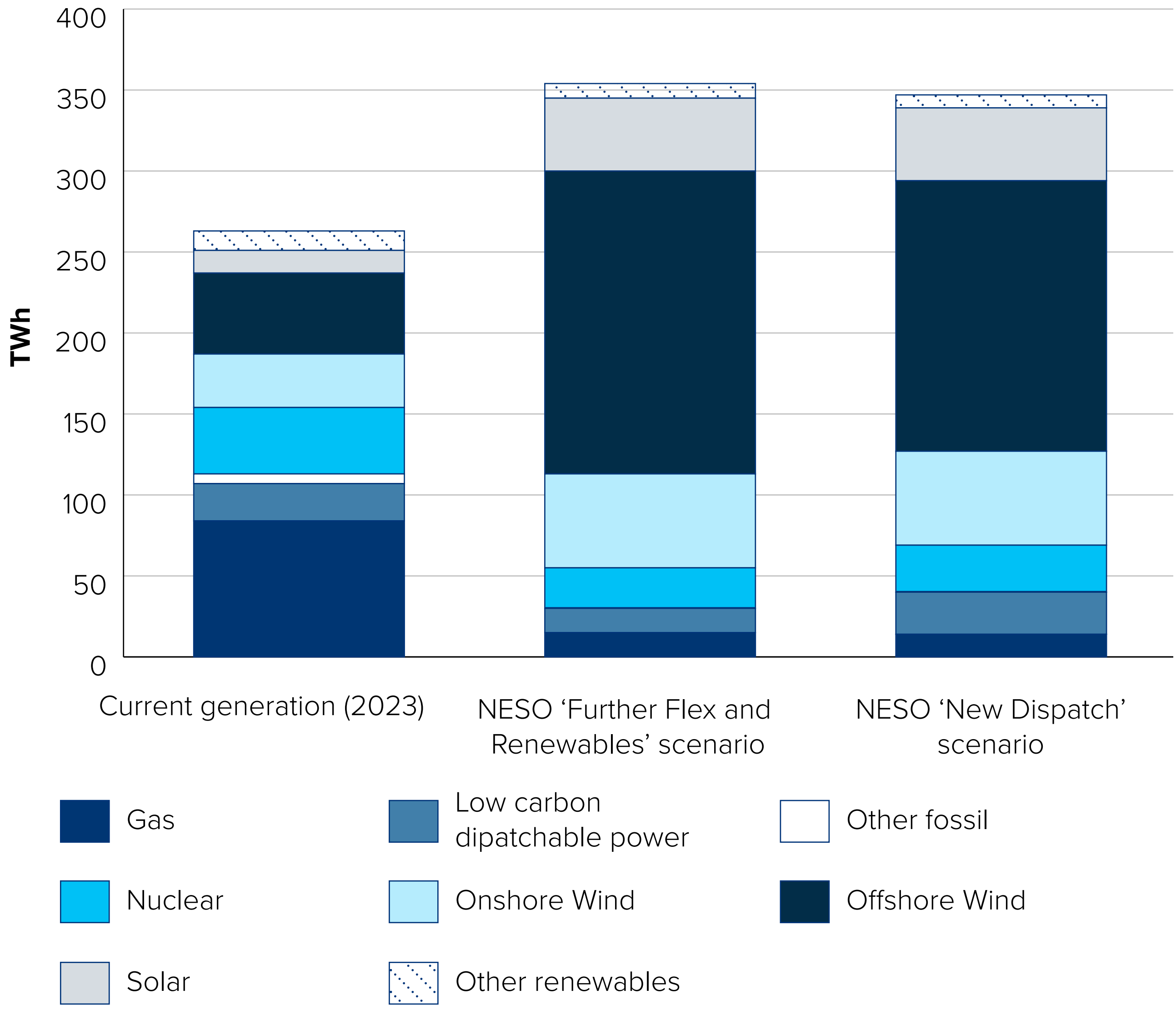
**Figure 6: Installed capacity in 2030 in the NESO 'Further Flex and Renewables' and 'New Dispatch' scenarios, compared to current installed capacity (GW)**




**Note:** Numbers for this visual can be found in Table 1

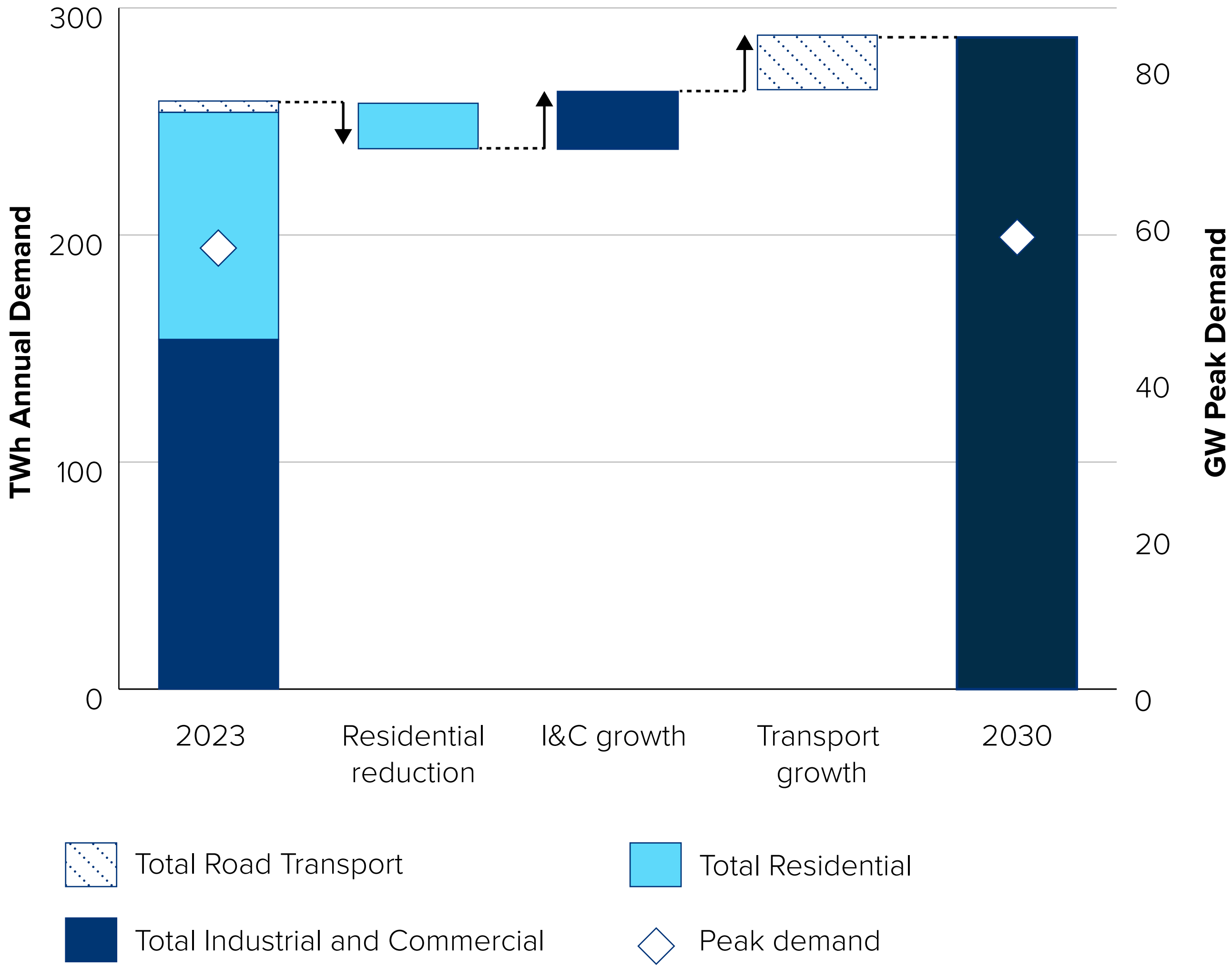
**Source:** Table 1 and NESO (2024), 'Clean Power 2030'

**Figure 7: Generation in 2030 in the NESO 'Further Flex and Renewables' and 'New Dispatch' scenarios, compared to current generation (TWh)**




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

**Figure 8: Changes in consumer electricity demand (TWh annual demand, GW peak demand), 2023- 2030**




**Note:** Peak demand is Average Cold Spell (ACS) peak demand. Peak demand is after smart charging and heat flexibility that occur daily, but does not include V2G and DSR that are less frequently used in the modelling.

**Source:** NESO (2024), '[Clean Power 2030](Clean Power 2030)'

## Delivering Clean Power 2030

Delivering capacity that aligns with the 'Clean Power Capacity Range' in Table 1 requires deployment at a very significant scale and pace, which can only be delivered by taking rapid action to unblock delivery challenges. For most technologies, meeting the 'Clean Power Capacity Range' is achievable through delivering and accelerating projects already in the pipeline. Still, these technologies require significant policy action to unblock barriers to ensure timely delivery.

Delivering new capacity for 2030 could be more challenging for some technologies with longer lead-times. Clean Power 2030 capacities are most stretching for hydrogen to power and power bioenergy with carbon capture and storage (BECCS), due to limited availability of transport and storage infrastructure for hydrogen and $CO_2$ respectively. The amount of overall capacity required also depends heavily on peak demand, which is driven by consumer uptake of technologies such as electric vehicles and heat pumps, usage patterns, and levels of consumer-led flexibility.

To increase our chances of delivery, the 'Clean Power Capacity Range' provides a foundation to prioritise the most critical infrastructure to meet Clean Power 2030, which we know will be key to supporting further progress into the 2030s:

- **Connections:** Fundamental reform of the connections process is urgently needed to operationalise Clean Power 2030 and ensure the electricity system meets longer-term strategic needs. Our capacity range provides a framework for NESO to work with Transmission Owners and Distribution Network Operators to prioritise connection offers for strategically aligned projects that can demonstrate they have the means to deliver. To enable NESO to deliver efficient reform, we have set out regional breakdowns of our capacity range for onshore wind, solar, and batteries – providing clarity to developers, investors and network operators on what to connect, where. To continue progressing infrastructure required beyond 2030, our Connections Annex also sets out technology capacity ranges that NESO proposes to use as an indication of what is required on the system by 2035, to guide new connection offers until the Strategic Spatial Energy Plan is published in 2026. This will provide a 10-year horizon for connection agreements. These ranges are mostly derived from NESO's net zero-aligned Future Energy Scenarios (FES), with a bespoke approach[26] proposed for onshore wind and unabated gas. See the 'Networks and Connections' section for more detail.

- **Strategic Spatial Energy Plan:** Our 2030 capacity range is a key input to the development of this Plan, forming its baseline. The SSEP will build from the 2030 capacity range to offer a longer-term spatial plan for the energy system beyond 2030. This will help to ensure strategic coherence between short-term action to deliver 2030 Clean Power and longer-term spatial planning, to enable long-term decarbonisation and energy security.

- **Planning:** Accelerating clean infrastructure projects through the planning system is critical to achieving our goal and unleashing investment to support the Prime Minister's Growth Mission. Our capacity range will ensure that planners and statutory consultees at the national and local level have a clear sense of which projects to prioritise for consideration and, where appropriate, fast-track through the process to enable decisions on consent to be taken sooner[27]. See the 'Planning and consenting for new energy infrastructure' section for more detail.

- **Visibility to industry and investors:** As a challenging goal, delivery of Clean Power 2030 will only be possible if there is a clear understanding across the sector of what needs to be achieved, and if we offer to investors a clear prospectus of the opportunities.

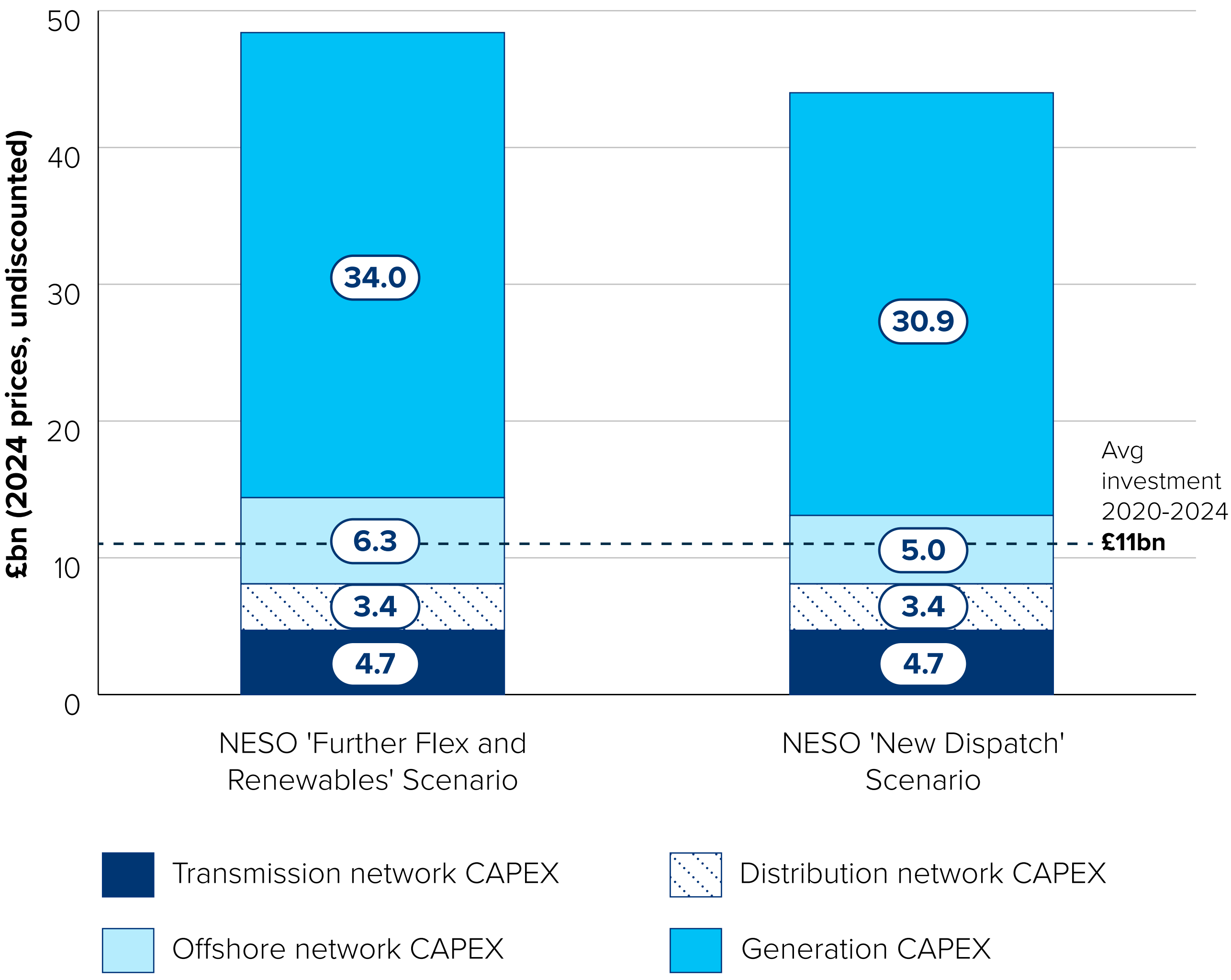
[26] We are proposing a bespoke approach for onshore wind because the FES projections are based on assumed ONW growth rates in England and Wales which pre-date the decision taken by Secretary of State in July to remove the de-facto onshore wind ban. As a result, we have increased the capacity range for onshore wind to 2035 – see Connections Annex for further detail.
[27] Final decisions on planning consent remain subject to meeting necessary planning and other regulatory approvals.

## Cost and consumer impacts of Clean Power 2030

The level of deployment set out in Table 1 will require substantial investment across the country, an estimated **£40 billion**[28] on average per year between 2025-2030, much of which will be private investment.

This broadly aligns with NESO's investment estimate – see figure 9. In addition, by transforming the way we generate electricity, we will build a power system that is not just cleaner, but importantly less reliant on fossil fuels, thereby reducing our exposure to volatile gas prices.

**Figure 9: Average annual investment in the NESO 'Further Flex and Renewables' and 'New Dispatch' scenarios, 2025-2030, £ billions, 2024 prices, undiscounted**




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

[28] Undiscounted, 2024 prices. This includes £30bn investment in generation assets, and £10bn investment in transmission network assets. See the technical annex for more detail on how this was calculated.

In their advice, NESO set out their analysis of potential impacts of delivering Clean Power on electricity costs in 2030[29]. This indicated it could be delivered with similar costs to today, with scope for lower electricity costs and bills by 2030 as wider changes are taken into account.

This plan proceeds on the basis of the NESO analysis. The precise impact we will see on bills in coming years will depend on a range of factors, including the pathway chosen and other policy choices made going forward as well as the impacts of exogenous factors such as gas prices. As set out above, there are multiple capacity mixes that can achieve Clean Power in 2030. The government will scrutinise every policy choice for the impact it can have in reducing bills facing consumers, as well as value for money and affordability.

The new, more flexible consumer-led energy system will also offer many opportunities to lower the bills customers face. We already see individuals with solar panels and EVs taking advantage of these technologies. The government is determined to ensure it is not just those who are the best informed or better off who have access to these ways to save money. That is why rolling out half-hourly settlement, for example, is so important so that consumers have lower tariffs on offer for consumption at different times of day.

Importantly, Clean Power will protect electricity consumers from volatile gas prices. As the electricity system decarbonises, unabated gas generation is used less often. As a result, there will be an increase in the proportion of generation being paid a contracted price rather than the potentially volatile wholesale price, while the wholesale electricity price itself will also be increasingly decoupled from gas prices. As we rollout renewables, we will see a significant reduction in wholesale prices, the foundation for building an energy system that can bring bills down for good.

During the recent energy crisis, following the invasion of Ukraine, we saw the electricity price cap increase by over £1,300 in a year, peaking at £2,000. To protect businesses and consumers, government put in place energy support schemes at an estimated cost of £44 billion[30]. If a clean power system had been in place at the peak of the gas price crisis, it could have saved significant sums for households, businesses and taxpayers. This is the scale of the prize on offer in terms of stability and energy security.

## The role of a clean power system in reaching net zero by 2050

Meeting the Clean Power 2030 goal is key to accelerating to net zero, not only in eliminating emissions that currently come from electricity generation but also via the application of clean power in the buildings, transport and industry sectors. A range of technologies, including electric vehicles and heat pumps, can help us switch away from the use of fossil fuels in these sectors, often improving the efficiency of the energy system in the process.

The shift to a clean power system by 2030 forms the backbone of the transition to net zero, as we move to an economy much more reliant on electricity. By 2050, annual electricity demand is likely to at least double as a result of electrification.[31] Over the period to 2030, most of the emissions reduction from clean power will come directly through displacing fossil fuel electricity generation. By contrast, in the period from 2030 to 2050, the further emissions reductions from

[29] NESO (2024), '*Clean Power 2030*' (viewed in December 2024).
[30] NAO (2024), '*Report – Value for money: Energy bills support: an update*' (viewed in December 2024).
[31] BEIS (2022), '*Electricity networks strategic framework, Appendix 1 – Electricity Networks Modelling*' (viewed in December 2024).

clean power will come indirectly, through its application to displace fossil fuel use in other sectors, for example in boilers and vehicles.

The Climate Change Committee estimate in the Sixth Carbon Budget report that a clean power system will nearly eliminate the emissions relating to electricity generation by 2050 (currently 12% of total UK greenhouse gas emissions)[32]. In addition, a clean power system will enable transport, buildings and industry sectors to switch from fossil fuels to electricity and contribute 47% of the further emissions reductions required by 2050.[33]

However, although electrification provides the most potential for reaching net zero, it is not the solution for every use of energy across the economy, and will need to be supplemented by targeted deployment of CCUS and hydrogen, alongside action outside the energy system. Delivering Clean Power 2030 is the first part of a longer journey and the challenges for the clean power system will change over time, reflecting the greater long-term emphasis on electrification and the opportunity and necessity to deploy technologies with long lead-times:

- **At least a doubling of demand:** Electrification and other needs for clean power as part of net zero are likely to result in at least a doubling of electricity consumption compared to today, with even larger amounts required if there are significant roles for electricity-intensive decarbonisation routes such as green hydrogen and e-fuels for aviation and maritime. This will require strong growth in power generation from a diverse range of clean sources on a sustained basis through the 2030s and 2040s. There is an essential role for innovation on the path to 2030, to ensure the right technologies are supported to progress through technology readiness levels in the coming years, to enable mass deployment in the decades to come.
- **Nuclear:** Nuclear will play an important role in our future energy system, providing low-carbon, baseload power to the grid. Government will continue to seek to streamline regulatory processes, and foster innovation in nuclear technology, to ensure that nuclear continues to play an important role in the net zero transition after 2030. The budget set out that final decisions on Sizewell C and the Great British Nuclear-led Small Modular Reactor programme will be taken at the Spending Review.
- **An ever-smarter system:** As the extent of electrification of the wider energy system grows, so will the opportunity for a huge amount of short-duration consumer-led flexibility through flexible use of electric heating and smart charging of vehicles – promising wider access to smart tariffs for consumers aiming at lowering their bills, and lower system costs for the nation.
- **More seasonal and spikier demand:** While the within-day picture for electricity demand may be quite smooth in the longer term, electrification of space heating for buildings will lead to demand for electricity that is considerably more seasonal than today, and more changeable due to the requirements for heat on particularly cold days. This suggests a particularly important role for offshore wind in matching demand, as it tends to generate more strongly in the winter than other times of year, as well as low carbon dispatchable power to provide a very long-duration storage solution, including meeting demand during periods that are cold but less windy.

[32] DESNZ (2024), ‘*UK territorial greenhouse gas emissions national statistics*’ (viewed in December 2024).
[33] CCC (2020), The Sixth Carbon Budget - The UK’s path to Net Zero, Figure 2.6 (viewed in December 2024).

- **Reforming our market arrangements:** Our current electricity markets were largely designed for the fossil fuel-based power system of the past. The Review of Electricity Market Arrangements (REMA) Programme is considering the reforms needed to ensure that our market arrangements remain fit for the renewables-dominated power system of the future.
- **Further need to strengthen networks:** Higher, and spikier demand for electricity due to electrification will inevitably require strengthening of electricity networks, particularly at the distribution level. The timing and extent of this will, to some extent, depend on the precise mix of heat decarbonisation solutions deployed.

These are all challenges that we need to plan for now in order that the 2030 Clean Power system is fit for its pivotal role beyond 2030 in reaching net zero. Our actions sit alongside a wider framework being developed to lay the foundation for the longer-term plans for the GB energy system: the Strategic Spatial Energy Plan (SSEP), Centralised Strategic Network Plan (CSNP), and Regional Energy Strategic Plans (RESPs).

# Integrating clean power and the natural environment

**The world is facing twin climate and nature crises** which threaten our global health, wealth and security. These are inextricably linked. The government is committed to accelerating to net zero, to delivering clean power by 2030, and also to restoring nature – for example through its commitment to delivering the Environment Act targets in England and honouring our international commitments under the UNCBD. This will mean halting the decline in species abundance by 2030, and effectively protecting our Marine Protected Areas as part of the global 30 by 30 commitment.

The UK is one of the most nature depleted countries in the world, so it is not enough for us to "protect" or "conserve" the nature we still have left. This is why this Government has committed to restoring nature through such targets, and our related international commitments.

Climate change is itself one of the greatest threats to nature in the years ahead, which is why one of the most important things we can do to protect nature is deliver clean power by 2030 - tackling the UK's dependence on fossil fuels and driving international climate action. Equally, nature is a key ally in helping us tackle the climate crisis, both through mitigation and adaptation.

**We should therefore ensure delivery of our climate and nature targets wherever possible, in an integrated and joined up way**. This means ensuring habitats like peatlands store rather than emit greenhouse gas emissions; or restoring salt marshes and sea grasses so that they are sequestering carbon as well as protecting our coastal communities from rising sea levels and extreme weather. This means that new energy infrastructure should be built in a way that protects the natural environment by following a "mitigation hierarchy" to do what is possible to avoid damage to nature, and then minimising, restoring and delivering compensation when damage is impossible to avoid.

**The real opportunity available to the UK is to deliver clean power by 2030 in a nature positive way,** such as rewetting lowland peat soils at the same time as constructing new solar farms or creating new wildlife corridors alongside or underneath linear energy infrastructure.

This approach is not so much about "balancing" energy and the environmental needs; it's about *integrating* them. It's about rebuilding our natural infrastructure at the same time as building the new energy infrastructure we need.

**Government will launch an engagement exercise in early 2025 to invite communities, civil society and wider stakeholders to submit their ideas on how government can best encourage nature-positive best practice into energy infrastructure planning and development**. Feedback from this exercise will allow government to better understand how we can integrate nature restoration through Clean Power 2030.

# Supporting businesses and promoting growth

With 90% of global GDP covered by net zero targets[34], clean energy industries represent a significant potential growth area. These industries can generate new jobs through domestic manufacturing and services and preserve our Energy Intensive Industries in a decarbonised economy. Additionally, the only way to guarantee our energy security and protect billpayers permanently is to speed up the transition away from fossil fuels and towards homegrown clean energy.

By accelerating the transition to renewable energy sources, we are creating a more stable environment that is conducive to growth and minimises energy price led inflation. This stability is crucial for businesses, as it helps ensure that energy bills stay low, and allows them to plan and invest with confidence, knowing that they will not be subject to the volatility of fossil fuel prices. If gas price spikes occurred even once every decade, it could cost the UK between 2-3% of GDP annually, adding 13% of GDP to public debt by 2050[35].

Another of the key benefits of Clean Power 2030 and the scale up of clean energy sectors is the creation of new job opportunities in locations across the UK, particularly in coastal regions for offshore wind farms and in regions like the North West of England and North Wales for hydrogen production and carbon capture[36] whilst also supporting industrial jobs.

[34] Climate Action Tracker (CAT) (2023), '*CAT net zero target evaluations*' (viewed in December 2024).
[35] Office for Budget Responsibility (OBR) (2023), '*Fiscal Risks & Sustainability*' (viewed in December 2024).
[36] CCC (2023), '*A Net Zero Workforce*' (viewed in December 2024).

As we invest in the development of wind, solar, and other renewable energy projects, we will see a surge in demand for skilled workers in these industries and the industries and services that support their deployment. Reskilling our workforce will play a crucial role, with evidence suggesting a high degree of transferability between the UK's oil and gas workforce and the offshore renewables sector[37]. This will not only provide employment opportunities but could also stimulate local economies and drive innovation[38]. Studies have shown that green jobs tend to provide increased productivity and higher wages than non-green jobs, especially for middle and lower skilled workers[39]. A significant proportion of these jobs are expected to be in the energy efficiency and low carbon heating sector[40]. Increased jobs are also expected in low carbon energy, CCUS, hydrogen and electric vehicle manufacturing.

Decarbonising the UK economy could reduce regional inequalities, creating new jobs and supporting existing jobs in industrial heartlands and preventing decline in areas dependent on the oil and gas sector. For example, according to EDF[41], the Hinkley Point C project is helping young people stay and thrive in Somerset. The local area has seen a 25% growth in young people aged 25-39 – 3 times greater than the national average and local areas seeing a growth in the number of medium-sized companies that is ten times higher than anywhere else in the South West[42].

The Scottish Government has invested in a package of skills interventions in the North East of Scotland, supporting the transferability of the workforce across sectors to meet the needs of the net zero transition. This includes an Energy Skills Transition Hub and National Energy Skills Accelerator.

There are also opportunities for the UK to capture more of the value chain for key clean energy industries and the potential to drive inward investment in domestic supply chains. In Spring, the government will publish the new Industrial Strategy, with Clean Energy Industries as a priority growth sector.

[37] Robert Gordon University (2023) '*Powering up the workforce*' (viewed in December 2024).
[38] Zenghelis et al. (2024), '*Boosting growth and productivity in the United Kingdom through investments in the sustainable economy*' (viewed in December 2024) and CCC (2023), '*A Net Zero Workforce*' (viewed in December 2024).
[39] CCC (2023), '*A Net Zero Workforce*' (viewed in December 2024).
[40] CCC (2023), '*A Net Zero Workforce*' (viewed in December 2024).
[41] EDF (2024), '*Socio-economic Impact Report 2024*' (viewed in December 2024).
[42] EDF (2024), '*Helping Britain achieve net zero*' (viewed in December 2024).

# How Clean Power 2030 will transform our energy system

Clean Power 2030 will be a major step towards realising an ambition of a clean, contemporary, digitalised energy system based largely on electricity, to be developed further in later years as part of decarbonising the whole economy. For energy consumers and citizens this will be a transformation in their relationships with energy.

Just as it has in so many other sectors before, such as banking, media, and retail, digitalisation will pave the way for a consumer-led transformation of the energy system, characterised by new business models, firms, and markets. While this will gain momentum in the period to 2030, it will continue to do so far beyond that date, as part of decarbonising the whole economy.

Lessons from other sectors are clear: digitalisation can increase consumer choice, bring down costs for everyone, and lead to the development of more consumer-friendly products and services.

Importantly for the energy system, this digitalisation will simultaneously unlock transformation of the demand side, a critical part of the energy system in the move to clean power and one which has been historically overlooked, failing to serve the best interests of consumers.

The system of the future will give consumers choice over how they engage, ranging from little change to today, through to being able to benefit from bill discounts thanks to smart tariffs. They will be able to engage physically by using appliances when electricity is cheaper or via automated systems managing this on their behalf. These would control how major appliances like car chargers, heat pumps, water heaters, washing machines/dryers, and fridge/freezers use their electricity to take advantage of low prices within the day and integrate the outputs of any residential generation such as rooftop PV, and household energy stores, potentially including the battery in your electric car.

The government is clear that engagement with these systems will be entirely voluntary, led by consumers. Under the previous government, consumers were offered the option to take advantage of different tariffs at different times. The evidence was that consumers were enthusiastic about the possibilities[43]. But this should not be a choice just given to the most informed consumers but to all. That is what the system of the future is about.

[43] NESO (2023) '*Household engagement with the Demand Flexibility Service 2022/23*'

# What Clean Power means for local places

**Boosting industry and transforming local economies with clean, homegrown energy**

After the grid was first consolidated from 1926-33, energy became a lot cheaper, and this had a beneficial impact on industry, driving down costs[44].

In the same manner but on a much larger and more transformative scale, Clean Power 2030 will catalyse a new era of renewable energy, opening up the possibility for new ventures previously held back by the price of fossil fuels.

It will ensure that the benefits of clean power are spread throughout the country, driving new investment and industry into local places and communities. For example, enabling the development and growth of new energy intensive industries such as data centres across Scotland.

These changes will have a profound impact on people's livelihoods, as they bring with them new, higher value, future-proof jobs and employment.

[44] Butler (2001), '*The nature of UK electricity transmission and distribution networks in an intermittent renewable and embedded electricity generation future*' (viewed in December 2024).

**Creating a fairer, more equitable energy system**

Clean Power 2030 will create the conditions needed to drive investment in, and scale, locally led, owned and managed energy developments. Local leadership will be empowered to play a more active role in delivering the transition – for example, through partnering with and providing support to community energy groups and local and combined authorities, GBE's Local Power Plan will support the rollout of renewable energy projects using established technologies to contribute up to 8GW of clean, homegrown energy.

Communities and the people who live in them and the businesses that serve them, will see clearer links between local projects, and local benefits.

For example, the UK's first hospital-owned solar farm has not only contributed to the daily power needs of Morriston Hospital in Swansea, but also covered 100% of its demand for prolonged periods of time, helping save carbon and bills.

Through its Community and Renewable Energy Scheme, the Scottish Government supports the growth of community energy and helps communities engage in and benefit from the energy transition. To date, the Scheme has advised over 1200 organisations and provided over £67 million in funding to communities throughout Scotland, supporting over 960 projects and the installation of 63 MW of renewable energy.

**Building trust, knowledge and confidence to support household technology adoption**

Enabling truly local energy led by local citizens, businesses and local leaders will also play a vital role in citizen engagement, with local developments and business models in some cases representing the first real, 'tangible' occasion that local people can learn about and experience renewable energy.

These experiences will help to grow public trust and knowledge. Greater visibility and demystifying of renewable energy at the local level across Great Britain will support electrification right down to the level of the individual household, providing citizens with the confidence to adopt low carbon technologies, keeping us on track for our wider net zero targets beyond 2030.

# Removing roadblocks: lowering barriers to investment, development and deployment

Delivering Clean Power 2030 will require reforms to the overarching structures that underpin delivery and operation of the energy system, to ensure they do not act as blockers to deployment of clean power projects.

We need to make sure that consenting regimes work to bring new projects through the system at pace, that the network expands rapidly so that our vast supply of clean electricity can be transported to centres of demand, and that the underpinning supply chain and workforce are available and capable to ensure this transformation is delivered.

We also need to ensure that the market works in tandem with support schemes to deliver the right investment signals, and that any sector-specific barriers to deployment are appropriately addressed, to enable the huge volume of deployment that will underpin Clean Power 2030.

This section of the Action Plan sets out how government will ensure this is delivered, with chapters covering:

- Planning and consenting for new energy infrastructure
- Networks and connections
- Renewable and nuclear project delivery
- Reforms to electricity markets
- Short-duration flexibility
- Long-duration flexibility
- Supply chains and workforce