

POWERING BRITAIN AFFORDABLY

POLICY PRIORITIES TO DELIVER A DECARBONISED POWER SYSTEM

INTRODUCTION:

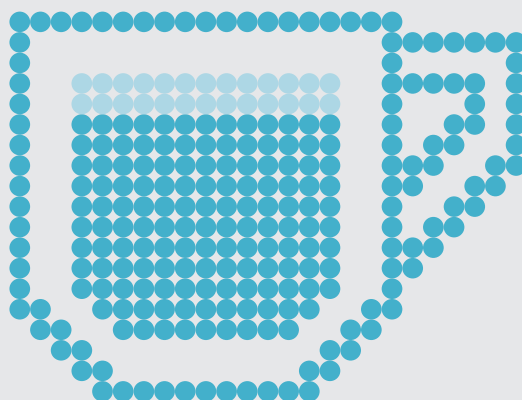
To reduce bills, improve energy security, and achieve net zero emissions by 2050, the UK needs to rapidly expand its renewable electricity supply and establish a grid that can deliver clean power across the country. The Government recognises this, with ambitious targets for offshore wind and solar, and a policy aim to fully decarbonise the power sector by 2035.¹

Progress so far has been positive. Power sector emissions rapidly declined between 2012-2020, and the UK's offshore wind sector is world-leading. However, further emissions reductions have plateaued, and eliminating remaining emissions to meet these targets will be challenging. Demand for electricity will double by 2050,² offshore wind and solar need to expand four- to five-fold respectively,³ and to accommodate this, more grid infrastructure must be installed in the next 7 years than in the last 30.⁴

As renewables won't always meet total electricity demand, there is the added challenge of creating low carbon flexibility and backup generation. This requires a rapid increase in new and existing battery storage technologies, as well as green hydrogen production, which is made with (and can store) excess electricity supply.

Decarbonising the power system will also rely on maximising efficiency and reducing demand. In January 2023, the Aldersgate Group published an [Espresso Briefing](#) outlining the policy priorities for increasing the UK's energy efficiency.

Powering Up Britain: The Energy Security Plan (April 2023), is a step in the right direction, but does not deliver at the pace required to decarbonise the power sector by 2035. Building on an in-depth report published by the Aldersgate Group and UCL in April 2023, *A zero-carbon power grid and the electrification of heavy industry: how to deliver on a twin challenge*, this briefing sets out priority policy to increase investment in renewables and storage (Section 1), accelerate grid expansion (Section 2), and establish low carbon flexibility (Section 3). These are the conditions that must be met to decarbonise the grid by 2035.



1: HM Government (2021) [Net Zero Strategy: Build Back Greener](#) [accessed 30/05/2023]

2: Climate Change Committee (2020) [The Sixth Carbon Budget: The UK's Path to Net Zero](#) [accessed 04/05/2023]

3: Climate Change Committee (2023) [Delivering a Reliable Decarbonised Power System](#) [accessed 04/05/2023]

4: National Grid (2022) [2022/23 Half Year Results Statement](#) [accessed 04/05/2023]



INCREASING INVESTMENT IN RENEWABLE GENERATION AND STORAGE:

Powering Up Britain's Renewables Sector

Despite the success of renewables to date, the UK cannot afford to be complacent when it comes to attracting new investment in the sector. It has taken 20 years to deploy 12GW of offshore wind,⁵ but by 2035 we will need around 200GW of electricity supply to meet demand, with 66GW from offshore wind (a 400% jump from today's capacity), 23GW from onshore (a 170% increase), and 60GW from solar (a 430% increase).⁶ However, **in the last year, the UK has become a less attractive place to invest, with a 10% fall in investment in the UK renewables sector.** Comparatively, **the US has seen a 24% growth, and Germany 17%.⁷**

Increased material prices, inflation, and political uncertainty have undermined investor confidence and increased costs for developers – as have planning and connection delays that prevent new generators making a return. Simultaneously, we are starting to see significant public fiscal support packages in other countries aimed specifically at incentivising investment in clean energy. The US Inflation Reduction Act (IRA) has tabled over a third of a trillion dollars for renewables and energy infrastructure, stimulating a response from the EU, who have put forward the Net Zero Industry Act, offering funding support and tax relief on new investment in clean energy.

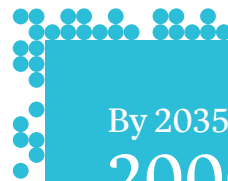
The UK is of course a different economy to the US and EU, and benefits from a mature renewables sector, boasting some of the largest installed capacity per capita in the world. Investment decisions are also not based solely on fiscal initiatives, and depend in large part on a strong regulatory and policy framework that supports investment and roll-out of clean energy infrastructure. However, the impact of competitive public funding support to stimulate private investment should not be underestimated. **Without a strong a response to the IRA, the UK risks losing business to other countries at a time when an exponential increase in low carbon capacity is needed most.** This would also weaken the clean energy supply chain, thereby increasing dependence on imports. With the poor performance of the pound against the dollar in recent years, excessive reliance on imports would be a poor commercial position for the UK economy and a missed opportunity for the UK to maximise the economic opportunities created by the growing offshore wind sector.

⁵: UCL, commissioned by the Aldersgate Group (2023) [A Zero Carbon Power Grid and the Electrification of Heavy Industry: How to Deliver on a Twin Challenge](#) [accessed 04/05/2023]

⁶: National Grid (2022) [Future Energy Scenarios](#) [accessed 01/06/2023]

⁷: The Guardian (2023) [UK Investment in Clean Energy Transition Falls 10%, Bucking Global Trend](#) [accessed 02/05/2023]

1 The Government should create an effective and proportional response to the Inflation Reduction Act for the UK, prioritising the establishment of competitive public funding support and the creation of a comprehensive policy and regulatory framework that removes barriers to private investment in clean energy. Direct public funding should support investment in clean energy and industry, first of a kind projects (new storage technologies), nationally significant infrastructure projects (domestic energy generation), and sectors in which technological requirements are understood but not being implemented quickly enough (grid expansion). Other incentives are also needed, such as tax relief on investments in clean energy and networks, and a permanent extension to the 3-year increase in capital allowance rates on renewables announced in the Spring 2023 Budget. As part of this process, the investment allowance set by the Electricity Generator Levy should be amended to, at a minimum, bring renewable generators in line with oil and gas generators (who currently face a lower effective tax rate).



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Unblocking Onshore Wind

While offshore wind and solar will provide the majority of renewable generation by 2035, complimented by nuclear, hydrogen and other forms of energy generation, **onshore wind will play a significant role in decarbonising the UK's power system.** In fact, in 2021, a quarter of the UK's low carbon electricity came from onshore wind, lowering bills, supporting electro-intensive industry, and protecting domestic jobs.⁸ Recognising its role in the net zero transition, **the onshore wind industry itself has a target for 30GW of capacity by 2030.**⁹

However, in the form of restrictive planning arrangements and a lack of access to Contracts for Difference (CfDs), **an effective 'moratorium' on onshore wind has stifled investment and development in the sector** for years, and stalled the creation of important domestic supply chain relationships, which are crucial to rolling out infrastructure at pace. While the Government, in 2022, committed to rolling out more onshore wind projects in England,¹⁰ there has been little movement from Government since, creating **uncertainty around the role of onshore wind in the Government's energy strategy** and disincentivising near-term investment.

Furthermore, in essence **the barriers to new onshore wind projects still exists:** the planning regime that governs new onshore wind projects allows single individuals to delay new projects for years, even in areas where there is overall support.

2 The Government should amend planning rules to allow onshore wind projects to be built where there is clear local support. Additionally, Government should set a clear target for onshore wind capacity alongside a detailed roadmap for how and when the technology will be rolled out. This target should be set between 23GW and 35 GW by 2035, to align with the recommendations of the offshore wind industry and the Climate Change Committee (CCC) in its balanced net zero pathway. The Department for Energy Security and Net Zero (DESNZ) should also publish a detailed strategy for the spatial location of onshore wind resources and the associated transmission infrastructure needed to transport power from likely areas of generation to consumers across the UK to prevent future system bottlenecks. To create local benefits and buy-in for new energy infrastructure, this needs to be accompanied by a community consultation strategy that enables the energy system to expand both at pace and in an equitable way.

Improving the CfD Regime

The Contracts for Difference (CfD) regime has helped the UK to become a world leader in offshore wind while delivering cost reductions that would have seemed unimaginable 20 years ago: the latest CfD auction awarded contracts for as little as £37.35 per MWh for offshore wind projects. However, as the power market changes and other countries seek to attract renewable developers, **the CfD regime must be amended to ensure it remains an effective mechanism for attracting new investment in renewables.**



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⁸: RenewableUK (2021) *The Onshore Wind Industry Prospectus*

⁹: *ibid*

¹⁰: The Guardian (28 Nov, 2022) [No 10 set to allow new onshore wind projects in England in U-turn](#) [accessed 01/06/2022]



Adjustments to the administrative strike prices of forthcoming CfDs is now needed to ensure that contracts are economically sustainable. **Prices of raw materials such as steel have increased, inflation continues to curtail growth, and labour costs have increased. However CfD strike prices are still decreasing** (to below pre-energy crisis prices), meaning developers on CfDs are seeing margins disappear. This weakens the incentive for renewable generators to take up CfDs, in turn affecting consumer prices as there are fewer generators operating on fixed-price contracts that pay back the difference between strike and wholesale price, the latter which is set by gas up to 98% of the time and typically much higher than the average price of all CfDs.¹¹

Early action to attract developers to voluntarily switch to a CfD is particularly important, as developers often hedge for several years, meaning it will take a number of years to realise the benefits of voluntary CfDs (vCfDs).

The budget for the latest round of CfDs is also significantly smaller than needed to stimulate the scale of investment in renewables needed to decarbonise power and must be increased.¹² Moreover, while annual auctions are a welcome change, **forward clarity on pot structures, administrative strike prices and delivery years for future allocation rounds is needed** to create certainty and confidence in CfDs.

3 Government should expand the budget for CfD rounds from AR6, and increase the administrative strike price of forthcoming CfDs to reflect inflation and increased labour and material costs. In addition, Government should provide forward clarity on future allocations rounds' budgets and pot structures to improve certainty.

Creating a Market for Tradeable Long-Term Power Purchase Agreements

In addition to expanding the CfD regime, the Government should prioritise expanding the take-up of long-term Power Purchase Agreements (PPAs): **long-term contracts between generators and consumers that provide stable prices over a defined period, granting predictability of costs for off-takers and revenues for generators.**

However, take-up of PPAs has been low, especially for electro-intensive industries that face uncertainty regarding their future (such as the steel sector), and are therefore unable to enter into a long term contract.

One solution is for Government establish a market for tradeable long-term low carbon PPAs, which would help such industries access clean electricity while also growing the demand for new renewable energy generation projects.

An additional option is for Government to directly support the credit-worthiness of such consumers by underwriting their contracts. The Government should work with retail market stakeholders to better understand how to improve the accessibility of PPAs for major energy suppliers.

Grounded in the declining cost of unsubsidised renewable electricity sources, these contracts would avoid the indirect costs of carbon prices, and would provide a valuable alternative to CfDs to the benefit of both consumers and generators.

4 The Government should support the establishment of a market for tradeable long-term, low carbon electricity contracts by the mid-2020s, explore options for underwriting consumer credit, and work with retail market participants to improve the accessibility of PPAs for major suppliers.

Inflation, labour costs and prices of raw materials **continue to increase.** But CfD strike prices are still decreasing, meaning developers on CfDs are seeing margins disappear.

¹¹ UCL, commissioned by the Aldersgate Group (2023) [A Zero Carbon Power Grid and the Electrification of Heavy Industry: How to Deliver on a Twin Challenge](#) [accessed 04/05/2023]

¹² RenewableUK (2023) [UK risks missing out on investment in renewable energy projects under latest Government plans](#) [accessed 04/05/2023]



ACCELERATING GRID DEVELOPMENT:

The Changing Profile of the UK's Power System

At current, **the UK's grid is not able to keep pace with the rapid expansion of renewables and growing electricity demand.** System bottlenecks are already emerging and likely to worsen as the economy electrifies. Similarly, new technologies, such as smart meters, electric vehicles and rooftop solar, which can reduce bills by allowing consumers to shift usage and sell power back to the grid, are also not being integrated into the system as quickly as needed.

With **more grid infrastructure required in the next 7 years than the last 30,**¹³ most of the challenges we face in decarbonising the power system are infrastructural ones. Tackling these efficiently will require not only large-scale investment (both public and private), but planning and connections reform, and a clear plan for how infrastructure will be put in place (and by whom).



In the last two years, applications to connect to the grid have doubled, leaving some facing wait times of up to **13 years** for a grid connection.



Speeding up and Improving the Connections Process

The Government's **Powering Up Britain: Energy Security Plan recognises that improved networks and grid connections are fundamental to rapid renewables deployment,**¹⁴ and proposes a series of welcome actions, such as a commitment to publish, later in 2023, a plan on accelerating electricity network connections. But **further action is needed to plug outstanding policy gaps** and accelerate progress towards a decarbonised energy system.

¹³: National Grid (2022) [2022/23 Half Year Results Statement](#) [accessed 04/05/2023]

¹⁴: HM Government (2023) [Powering Up Britain: Energy Security Plan](#) [accessed 04/05/2023]

For example, to deliver clean power to end users, the UK's expanding fleet of renewables need to be connected to the grid. **In the last two years, connection applications have doubled,** creating a 'queue' of over 600 projects with a total potential capacity of 240GW. **This has left some new renewables facing wait times of 13 years for a grid connection.** As connections applications increase, without action this situation will worsen.

At current, connection applications are assessed on a 'first come, first serve' basis, and with low barriers to entry, **many developers are able to secure a place in the queue regardless of the maturity of their project.** With developers rarely leaving the queue, **projects ready to connect sooner can be blocked or delayed by others that aren't.** This not only threatens the UK's ability to decarbonise its power system, but deters new investment, as developers seek areas with fewer project delays, and delays the cost benefit for consumers that will come with increased renewable power supply.

National Grid recently trialled a 'TEC Amnesty', offering projects the opportunity to leave the connections queue with little or no penalty. With take-up of the offer low, National Grid is now considering legal options to remove stagnating projects from the queue.¹⁵ To ensure that the connections process can operate more effectively now and well into the future, Government must act quickly to establish a queue management system that allows viable projects to proceed at pace.

5 Working with industry, **DESNZ and Ofgem should establish new 'connections queue management' rules,** requiring developers to meet key milestones throughout their connection journey, or make way for other projects further back in the queue that are ready to proceed. Milestones should include demonstrating land rights have been secured, a detailed construction programme has been developed, and/or the final investment decision has been taken. It is crucial that new queue management rules provide developers with enough flexibility to navigate delays beyond their control, but prioritise the progress of viable projects.

¹⁵: The Guardian (2 June, 2023) [British energy developers to be told: speed up projects or leave queue for grid](#) [accessed 07/06/2023]



Improving the Efficiency of the UK's Planning System

Across England, Wales, Scotland and Northern Ireland, energy projects are covered by a number of different planning regimes (both according to a project's size and/or location). Low carbon power generators have reported that, due to a combination of bureaucratic inefficiencies, lack of resourcing in inspectorates, and a need to comply with a variety of regimes, they face wait-times of up to 10 years for planning permission on projects that could be built in under a year.¹⁶ Difficulty in securing land rights and consents are also a major contributor to project delays. This significantly weakens the case for new renewable projects, and could result in capital flight should other jurisdictions resolve planning issues more efficiently than the UK.

6 The Government should streamline planning guidance to remove barriers that prevent renewable projects and low carbon energy infrastructure from progressing through the planning and permitting process.

This should include amending planning rules that allow one objection to prevent projects from progressing altogether, and using the upcoming consultation on treating renewables and energy networks as Nationally Significant Infrastructure Projects (NSIPs) as the first step in speeding up the planning process for clean energy infrastructure. It is important that community agency and local benefits are front of mind during this process to maximise approval.

7 Government should work closely with industry, Local Authorities and the Green Jobs Delivery Group to identify skills gaps and create detailed sectoral pathways for skills expansion in planning inspectorates and the energy networks sector.

This should focus on increasing personnel and skills at both the national and local level to manage the increased demand on planning bodies, and establishing a skills pipeline in the UK that can deliver new transmission and distribution infrastructure at the scale and pace required to decarbonise the grid by 2035. Drawing on the Net Zero Business and Industry Group and Green Jobs Taskforce, these skills pathways should establish a plan for the power sector akin to the North Sea Transition Deal between government and industry. This will ensure the UK has adequate resource in the energy sector to not only accelerate grid connections, but to improve the quality of existing connections for off-takers looking to electrify.

Unlocking Private Investment in the UK's Electricity System

In some cases, we already have a good idea of the infrastructure needed for a low carbon energy system, and where it will need to go. For example, offshore wind will largely be in the North and Irish Seas with connections to Scotland, Northern England, the Midlands, and Wales; solar farms in the sunnier Southwest, sending power north and eastwards; and some new nuclear in East Anglia, sending power to the rest of the country.

However, **network operators have been discouraged from undertaking anticipatory investment in these areas, directed instead to focus on minimising nearer-term costs rather than future costs and emissions.** This is due, in part, to the remit of energy regulator Ofgem having revolved primarily around near-term costs to consumers, rather than longer-term savings and emissions reductions. This has prevented early investment in grid and renewable energy expansion, leading to greater costs down the line and higher emissions now. It has also prevented coordinated grid development of the type that could see several projects connecting together, thereby reducing overall costs across the UK's energy system.

The Aldersgate Group therefore welcomes the Government's decision to table an amendment to the Energy Bill that will create a legal obligation for Ofgem to support the UK's net zero target. This is an important step towards accelerating the rollout of renewable energy, and establishing a robust network that can deliver zero carbon power to consumers. Allowing the regulator to make decisions based on long-term savings and emissions reductions will enable the UK's clean energy sector to drive early investment in low carbon generation and grid infrastructure, and clear bottlenecks in the system that are constraining expansion. As renewables are now the cheapest form of energy generation, this will help to lower emissions as well as bills for households and businesses.

¹⁶ UCL, commissioned by the Aldersgate Group (2023) [A Zero Carbon Power Grid and the Electrification of Heavy Industry: How to Deliver on a Twin Challenge](#) [accessed 04/05/2023]



ESTABLISHING LOW CARBON FLEXIBILITY:

Establishing Electricity Storage and Backup Generation

In addition to renewable and nuclear power generation, flexible low carbon energy sources will be needed to meet total demand. In a low carbon power system, abated gas and bioenergy with CCS (BECCS) may provide some flexible generation, **but the vast majority of low carbon dispatchable power will likely come from power stores such as batteries** (storing surplus power), **electrolytic hydrogen** (produced when surplus electricity is used to split water into hydrogen and oxygen), **and pumped hydro storage** (power generated when water passes through a turbine set between an upper and lower reservoir, with the water pumped back up using surplus power).¹⁷


By 2035, the UK will need a total of 46GW of storage (equal to just under a quarter of all demand) to manage the intermittency of renewables, more than half of which will need to be long-term (8 hours to several weeks).¹⁸ However, the **Government has not provided detailed information on how renewables and nuclear will be complemented by green hydrogen, battery storage, and pumped hydro storage** to ensure that a low carbon power system is reliable throughout the year. A blueprint is desperately needed to indicate how and where various storage options will play a role in the energy system, alongside incentives to crowd-in private finance.

While some storage technology options are mature, they are all operating at very low capacity in the UK, in need of significant scale-up. **Others are less mature and therefore require investment in research and development.** Incentives to crowd-in private finance are therefore crucial for the energy storage sector.


Furthermore, the Government does not intend to make a decision on the role of hydrogen in home heating until 2026 . This is too late and is creating uncertainty about both the role of electrification in home heating and where the associated infrastructure will be rolled out. It also creates uncertainty regarding the availability of hydrogen for industry and heavy transport, sectors that have fewer opportunities to decarbonise via electrification, and could make better use of scarce hydrogen supplies.

In the Sixth Carbon Budget, the CCC state that **a power market structure suitable for delivering net zero needs to be fully designed by no later than 2025**, meaning that the UK must establish a plan for low carbon flexibility and storage, and the mechanisms to incentivise it, by no later than the end of 2024.¹⁹

8 Government should set out a blueprint for the role and location of green hydrogen, battery storage and pumped hydro storage in the GB energy system. As part of this, Government should bring forward its decision on the role of hydrogen in home heating from 2026 to the end of 2023, focusing early supplies sectors less able to electrify. Government should also expand and accelerate the deployment of funds from the Net Zero Hydrogen Fund (NZHF). This is needed to accelerate the expansion of the UK's green hydrogen production capacity and to create greater certainty regarding the role of hydrogen across different areas of the economy. The allocation of £37.9m to 15 successful applicants from strands 1 and 2 of the NZHF is a welcome start,²⁰ but deployment of the remaining bulk of the fund (£202m) should be prioritised to accelerate growth in the sector.



In the Sixth Carbon Budget, the CCC state that a **power market structure** suitable for delivering net zero needs to be fully designed by no later than 2025.



¹⁷: Aurora Energy (2022) [Long Duration Electricity Storage in GB](#) [accessed 01/06/2023]

¹⁸: ibid

¹⁹: Climate Change Committee (2020) [The Sixth Carbon Budget: The UK's Path to Net Zero](#) [accessed 04/05/2023]

²⁰: Department for Energy Security and Net Zero (2022) [Net Zero Hydrogen Fund strands 1 and 2: summaries of successful applicants round 1 \(April 2022\) competition](#) [accessed 01/06/2023]



9 Government should accelerate the development of business models for hydrogen production, hydrogen storage, and electricity storage, with an aim to release funds by the end of 2024. These business models should aim to maximise private finance in long-term duration storage technologies that exist but have not been commercially scaled. In addition, targeted funding for research and development in nascent battery and storage technologies should be provided to create new options for low carbon flexibility and backup generation. As proposed in **Recommendation 1**, investment in first-of-a-kind-technologies should be incentivised by the offer of tax relief.

Cross-border electricity trade is equally important. Upon leaving the EU, the UK ceased participation in the intra-day and day-ahead electricity markets with neighbouring EU markets. This is estimated to have resulted in £45m of lost trade in 2021 alone.²³

10 The Government should maximise opportunities for cross-border electricity trade by restoring the UK's participation in the intra-day and day-ahead electricity markets with neighbouring EU countries, and working with international partners to establish greater interconnected capacity.

Including Consumers in System Balancing

In addition to flexibility solutions and greater energy efficiency, **new technologies offer the UK a new avenue for shifting usage and reducing demand.** For example, electric vehicles and solar panels are able to return power to the grid at times of high demand, or draw power for charge at times of surplus. Similarly, smart meters can help customers to more closely monitor their electricity consumption, and if paired with smarter tariffs, shift consumption to times of high generation and/or low demand. Crucially, **this can enable consumers to reduce bills by consuming at times when electricity is cheaper.** However, digitalisation of the grid is needed to enable these technologies, as well as broader rollout of the technologies themselves and incentives to use them.

11 The Government should work closely with suppliers to encourage the offer and uptake of smart tariffs and new technologies (such as smart meters and solar panels), to optimise energy efficiency and system balancing services via the shifting of electricity consumption. **Section 2** of this report outlines the policies needed to expand the UK's grid, which will be needed to integrate new technologies such as EVs and Solar PVs into a smarter grid.

The Aldersgate Group is an alliance of major businesses, academic institutions, professional institutes, and civil society organisations driving action for a sustainable and competitive economy. Our corporate members, who have a collective turnover in excess of £550bn, believe that ambitious and stable low carbon and environmental policies make clear economic sense for the UK.



Each 1GW of interconnection capacity can reduce UK wholesale electricity prices by 1–2%

Increasing the UK's Interconnected Capacity and Cross-Border Electricity Trade

Interconnectors between the UK and nearby countries will play a vital role in diversifying the supply of electricity capacity from renewables and providing dispatchable power. The CCC estimate that between now and 2050, **interconnected supply will need to triple to 18GW.**²¹

Each 1GW of interconnection capacity can also reduce UK wholesale electricity prices by 1–2% by making available low cost, low carbon imports from other markets,²² and can facilitate balancing of increasingly variable supply and increasing demand.

21: Interconnected electricity supply cannot be guaranteed as low carbon until the power system of the connected country is completely decarbonised.

22: UCL commissioned by the Aldersgate Group (2018) [UK Industrial Electricity Prices: Competitiveness in a Low Carbon World](#) [accessed 04/05/2023]

23: UCL commissioned by the Aldersgate Group (2021) [Delivering Competitive Industrial Electricity Prices in an Era of Transition](#) [accessed 04/05/2023]