

## Briefing

# How a decarbonised power system can boost UK energy security and save money

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The war in Ukraine has heightened the need to reduce reliance on volatile international fossil fuel markets through the decarbonisation of the UK's power system. The government has responded by announcing an imminent energy security strategy, which is an opportunity to move faster towards meeting its commitment to [decarbonise the power system by 2035](#), as part of its effort to protect against climate change.

Achieving a decarbonised power system, largely powered by renewables, by 2035 is widely projected to be the cheapest way to power the UK and is central to enhancing energy security. But what should this system look like and how large a role will renewables play?

### **Aiming for 2035 is feasible and affordable**

Renewables are the cheapest form of electricity generation in the UK, on a [levelised cost basis](#) (ie the total cost of building and operating the asset over its lifetime). Offshore wind costs are just [£45 per megawatt hour \(£/MWh\)](#), compared to the pre-gas price spike cost of [£85/MWh](#) for gas. Onshore wind and solar are cheaper still, with onshore wind currently [six times cheaper](#) than gas, while volatility in fossil fuel prices continue to expose the UK to much higher electricity prices.

In 2020, zero carbon power sources accounted for [nearly 60 per cent](#) of UK electricity supply, with renewables alone providing 43 per cent. Projections [agree](#) that renewables can safely supply at least 75 per cent of the UK's electricity, in a power system producing at least 50 per cent more electricity than today.

Significantly scaling up deployment of offshore wind, onshore wind and solar is a no regret option. It is not possible to overbuild renewables in the near to medium term. Renewables are also [quick to deploy](#), solar takes just one year to get up and running and wind power sources can be ready in six years or less. Changes to the planning system, that put in place better, clearer planning policies for all renewables and properly weigh the energy benefit against other impacts, could speed up renewable deployment further still.

Lower costs of renewables are reflected in business decisions already. There is a strong pipeline of projects including, 86GW of offshore wind across all stages of planning and development, according to [RenewableUK](#) analysis.

As the share of renewables expands, there will be costs involved in integrating them into the system, including strengthening transmission networks and deploying greater reserve generation capacity. But system benefits also occur from deployment at scale. An integrated offshore transmission network for offshore wind can minimise the need for onshore connection points and pylons. This could reduce local and environmental opposition to new projects and overall system costs. Reform of the capacity market would also spur innovation in methods of zero carbon

power generation that can adjust power output according to demand, known as dispatchable power.

On a whole system basis, a zero carbon power system can be cheaper than a fossil fuel one. A study by [Imperial College London](#) looking at a cost optimised 2035 power system, showed that a predominantly renewables powered system could be 19 per cent cheaper than today, even before the gas price spike. The [Climate Change Committee](#) (CCC) concurs, concluding that a flexible system, powered predominantly by renewables, could deliver system savings of £10 billion by 2050 compared to a high carbon system. This is driven by large operational cost savings from renewable technology which is cheaper to run, resulting in total costs being lower than investment costs.

### **Renewables increase energy security**

A renewables based power system increases UK and European energy security. The 86GW of UK offshore wind currently in planning and development could provide [380 terawatt hour \(TWh\)](#) a year of electricity. This is more than the combined dependence of the UK and EU on Russian gas for power. The UK is currently a net electricity importer, but in a renewables powered system, it can become a net exporter of electricity and provide energy security for itself and Europe.

The economy is set to electrify over the coming decades as home heating, transport and industry switch from fossil fuels to electricity. A zero carbon power system also leads to energy security and [cost savings](#) elsewhere in the economy as it lowers reliance on volatile international fossil fuel markets.

### **The role of non-renewables**

In the future, renewables can power at least 75 per cent of the power sector. A number of zero carbon technologies can provide the remaining 25 per cent, but we do not yet know what the cheapest mix of these technologies is.

The government is considering a target for nuclear power to generate 25 per cent of electricity by 2050. Nuclear is likely to have a role in a zero carbon power sector, but it is one of the most expensive forms of electricity generation in the UK. Hinkley Point C is guaranteed a price of [£105/MWh](#) for 35 years, at 2019 prices. Solely deploying nuclear is unlikely to be the cheapest way to achieve zero carbon power at the timescale needed. The nuclear industry has a track record of delays and cost escalations, which limits nuclear's role in the near to medium term.

Alongside nuclear, a range of options exist for providing dispatchable power. Interconnectors with countries such as [Norway](#), that have significant hydropower generation, provide UK export opportunities and increase the UK's security of supply. Battery storage can provide shorter duration power needs of up to four hours, while new forms of long duration energy storage (LDES) in development could reduce system costs by [£1.1 billion](#) in 2035. This is equivalent to an annual saving of £26 for the average UK household. Hydrogen produced using excess renewable energy ('green hydrogen') can act as a long duration energy store and displace unabated fossil gas as a source of dispatchable power at a cost of £100/MWh. Finally, gas with carbon capture and storage (CCS) and bioenergy with carbon capture and storage (BECCS) remain options, though gas CCS would need gas prices to fall significantly from today and BECCS plants could cost up to [£130/MWh](#).

Demand flexibility also has an important role to play, alongside a focus on increasing supply. Smart demand shifting for electric vehicle charging, home

heating and industrial and commercial electricity can lower peak demand, facilitating a smaller power system than would be required without flexibility.

We do not yet know what the cheapest mix of zero carbon capacity could be provided by the technologies outlined. But facilitating private sector competition to deliver them in the cheapest way can be achieved by reforming the capacity market (see below).

### **How the government can build a secure power system by 2035**

In its energy security strategy the government should:

– **Commit to reform the capacity market in 2022**

The capacity market ensures security of electricity supply by providing a payment for reliable future sources of power generation capacity. In its current form, the purchase of fossil fuel capacity dominates, accounting for [78 per cent](#) of purchased capacity in the most recent auction. The government can use an energy bill to reform the capacity market so it increases the incentive to purchase zero carbon flexible generation. This will send important market signals for investment and innovation in the provision of new forms of zero carbon flexibility to balance a high renewables system.

– **Commit to create an integrated offshore transmission network**

A co-ordinated and integrated approach to development of the offshore transmission network would speed up the rate of deployment of offshore wind while reducing costs. [National Grid ESO](#) analysis found that an integrated offshore transmission network could deliver savings of up to £3 billion to consumers for projects from 2030. It can also minimise the onshore connection points that can be a source of local and environmental opposition to new projects.

– **Deploy renewables at speed and scale**

Renewables are already the cheapest form of electricity generation in the UK and the [quickest](#) to deploy, helping to reduce UK reliance on the global fossil fuel market in the near term. The government should target at least 45GW of offshore wind, and around 35GW of onshore wind and 45GW of solar by 2030.

– **Commit to create a Clean Power Plan**

A Clean Power Plan should set out a roadmap for how the government plans to deliver a decarbonised power sector by 2035. This is vital to provide clarity to private investors on what is needed, so they can direct investment to solutions. In addition to committing to review the capacity market in 2022 and boost renewable deployment, this plan should make clear how other policies supporting CCS and electricity storage will fit into the system's future needs.

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