The impacts of no new offshore wind CfDs

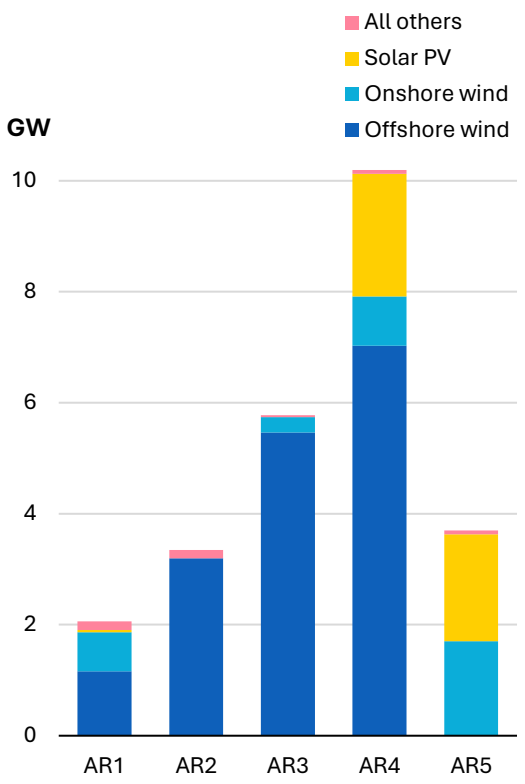
The UK announced the results for their 5th Contract for Difference auction earlier this month, but not a single bid was received from an offshore wind project. Developers criticised the decision to leave the maximum strike price for offshore wind unchanged at £44 / MWh, citing this as being too low given the cost pressures the industry has faced over the last two years.

The Government had aimed to support up to 5 GW of offshore wind through this auction. Failing to attract bids may substantially affect their ability to meet their target of 50 GW of offshore wind by 2030. In this report we show that this 'lost' capacity will leave an annual shortfall of 26 TWh electricity generation later this decade. This will have to be met by increased generation from natural gas power stations and imports from abroad, increasing power sector emissions by 21–23%, and pushing up wholesale electricity prices by £4.50–7.50 per MWh.

No new offshore bids were received in 2023

The UK has held annual auctions for renewable electricity generation support through the Contracts for Difference (CfD) scheme since 2015. In 2023, this auction failed to attract any offshore wind bids for the first time, despite 5 GW of 'shovel-ready' offshore wind capacity being eligible to compete[1]. The strike price – which dictates the revenue that renewable operators receive per unit of electricity generated – was set at a similar level to last year's action (£44 / MWh).

Offshore wind developers warned that this strike price did not reflect the recent cost increases from supply chain pressures and rising interest rates. Alarm bells should have been ringing when earlier this year Vattenfall paused development of the 1.4 GW Norfolk Boreas wind farm, citing recent inflationary pressures that have made the project uneconomical at the record low CfD strike price it was awarded in 2012 (£37.75 / MWh in 2012 terms)[2]. Despite a record number of other renewable projects supported by AR5 [3] with 1.9 GW of solar and 1.7 GW of onshore wind, the total contracted capacity was only 34% of last year's round.



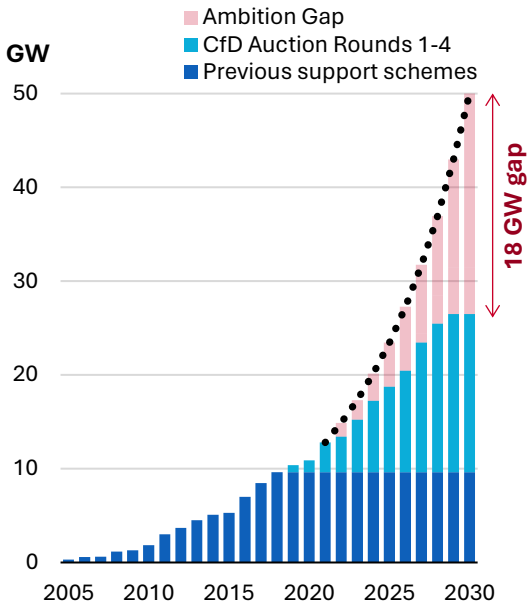
Renewable capacity awarded in the five CfD Auction Rounds (AR1 to AR5).[4]

[1] Greenpeace, 2023. Likely failure of Renewable Energy Auction.
[2] Drax Electric Insights, 2023. Offshore Wind Held Up by the Inflation Storm.
[3] Department for Energy Security and Net Zero, 2023. Contracts for Difference Allocation Round 5: Results.
[4] Low Carbon Contracts Company, 2023. Allocation Round Dashboard.

This leaves the UK's energy transition targets in question

Offshore wind is a central part of the UK's dicarbonisation strategy. Government raised its 2030 target from 40 GW to 50 GW of offshore wind capacity in response to last year's global energy crisis. With ambitious targets and the largest offshore wind fleet outside of China, the UK was in a strong position to lead internationally.

However, the setback in AR5 brings into question the UK's leadership and its target of building 50 GW by 2030. The current 14 GW of capacity must more than triple in just 7 years. Capacity must grow by 17% each year until the end of this decade to still meet the 50 GW target. With AR5 bringing no new capacity online before 2028, committed projects get us only slightly above half way towards the 2030 target.

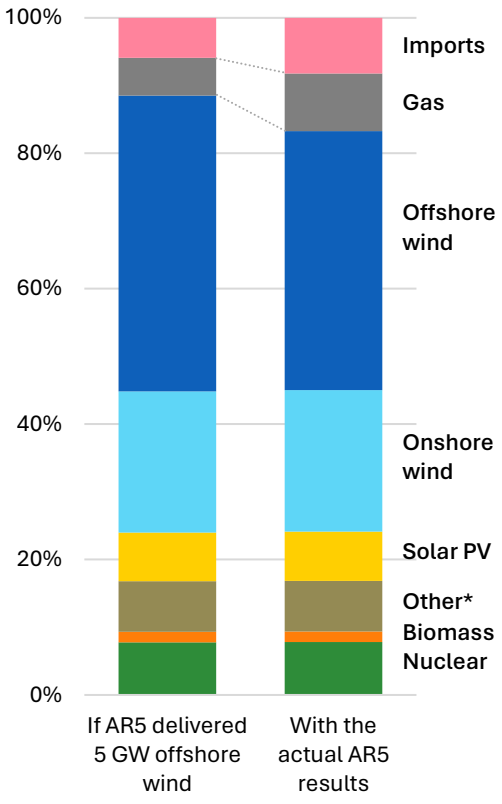


The UK's current and committed offshore wind capacity versus government targets.

Less wind capacity means more reliance on gas and imports

No new offshore wind not only affects targets for the sector, but also wider roadmap for power system decarbonisation. If 5 GW of offshore wind farms[5] had materialised, they would have generated around 26 TWh of electricity[6] per year, around 6% of the UK's expected electricity demand in 2030.

Using a power sector model developed at Imperial College London,[7] we find that without these farms in place, the lost 26 TWh would primarily be replaced by fossil-fuel generation in the UK (57–65% natural gas), with imports making up the remainder (15–19% from France, and the remainder from our other neighbouring countries.



Britain's electricity generation mix in 2030 if AR5 had delivered 5 GW of wind versus without this investment being made.

[5] There is no fixed value for how much offshore wind 'should' have been delivered in AR5. Up to 5 GW of offshore wind projects were eligible[1], with 3.2 GW expected by EnergyUK based on the available budget, and 7 GW of offshore wind capacity supported in the previous auction (AR4).

[6] Based on a 59% capacity factor for the locations of proposed projects, assessed using the Renewables.ninja tool. This compares to an average of 42% for Britain's current offshore wind farms, and 61% modelled by BEIS.

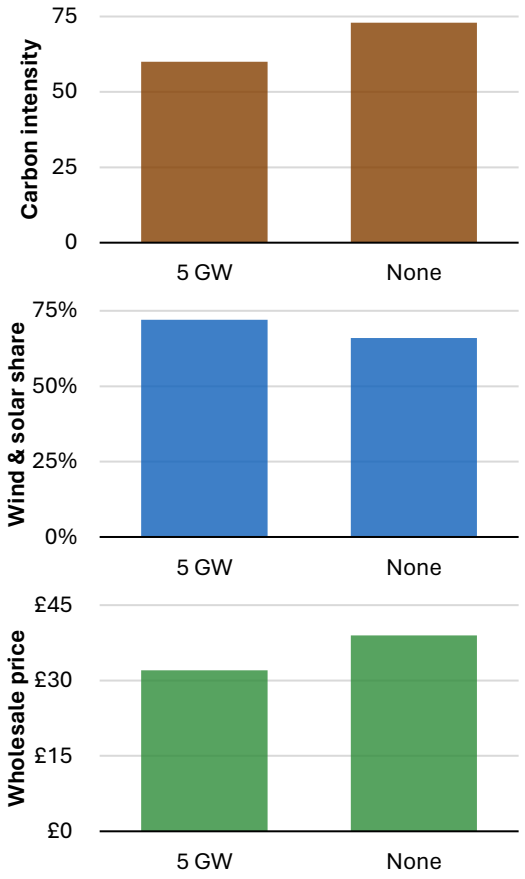
[7] EuroMod, which is a techno-economic electricity market model covering all of Europe, with a focus on generating more realistic wholesale prices.

This would raise electricity prices and carbon emissions by a fifth

Greater reliance on natural gas will push up carbon emissions. We model that this will increase the power sector emissions in 2030 by 21–23%, or 5–6 million tonnes of CO_2.[8]

Renewables are the cheapest source of electricity in the UK, despite the recent inflationary pressures they have faced. Heavier reliance on natural gas and imports will also raise the average wholesale price of electricity, by £4.50–7.50 / MWh (15–27%), assuming that gas prices return to their pre-2021 levels. If gas prices and foreign electricity prices remain high in the coming years, this penalty will be steeper. This translates to an extra £1.9–3.2 billion per year spent on electricity production.

Increased renewables penetration on the UK's electricity grid would also reduce our exposure to natural gas price fluctuations, which was a substantial contributor to the 'cost of living' crisis experienced in the UK towards the end of 2022.



Comparison of key power system metrics in 2030 if AR5 had delivered 5 GW offshore wind (left) versus none (right). Units: g/kWh for carbon intensity; £/MWh for power prices.

Rebalancing the UK's approach to decarbonising the power system

Is this an example of the consequences of putting all our eggs in one basket? The UK has placed a heavy emphasis on offshore wind as the backbone of its decarbonisation strategy. This reduces some risks, such as exposure to volatile gas and carbon prices; but as this year's CfD auction has shown, it introduces other risks such as exposure to volatile steel prices and interest rate changes.

The failure of the CfD auction in 2023 to attract any offshore wind bids has substantial implications for the power sectors decarbonisation, putting the UK's target of 50 GW of offshore capacity by 2030 at risk and adding billions of pounds per year onto electricity production costs. It brings into focus the issues involved with relying too heavily on a single technology to support the decarbonisation of the UK's electricity system, suggesting that taking a more balanced approach that distributes the share of heavy lifting done by different low carbon technologies would be more effective.

[8] Variation in results is across different scenarios and weather years that were modelled. These were the four National Grid FES scenarios, and the weather years of 2017 to 2020.