green alliance...

Closing the clean power gap

September 2017

Executive summary

The UK has suffered a policy freeze on renewable energy. This has led to a 95 per cent fall in investment between 2017 and 2020, which has taken the UK off track to hit its climate targets. Recent clean power auctions show that renewables are now the cheapest source of power.

But government has been cutting back on renewables just as they have become cheap. Our analysis shows there is a queue of 65TWh of renewable power waiting to be developed, or around 20 per cent of the UK's consumption, which could be built for less than the cost of gas plants.

Continuing to hold back clean power could cost consumers £2.6 billion by 2025, compared to the alternative of building gas plants. To realise these savings for consumers, the government will need to change course and hold auctions for additional clean power contracts.

Executive summary...continued

Looking forward, into the late 2020s, this will be a challenge for the nuclear industry. Britain could easily meet its carbon budgets with only two new nuclear sites, and could manage with no new nuclear reactors in the 2020s, after Hinkley C is built.

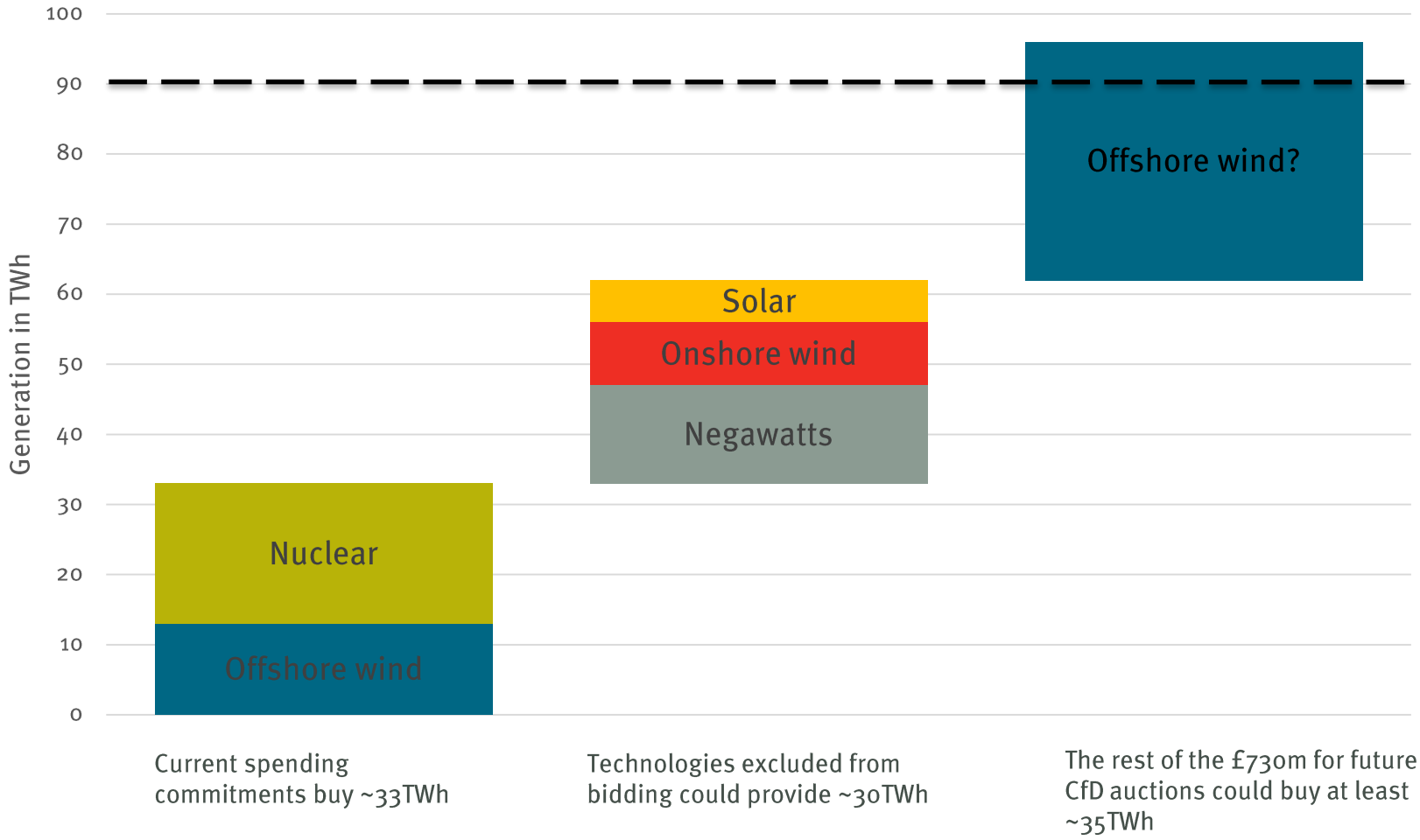
However, under current plans, nuclear spending will rise to five times that of offshore wind by 2025, with a further steep rise in cost out to 2030. We estimate that nuclear costs will need to fall below £65/MWh if it is to compete, even accounting for the system costs of renewables.

Cutting carbon and keeping bills affordable are no longer conflicting goals. On the contrary, a strategy which aims to keep energy costs down should maximise the deployment of energy efficiency and renewables.

The clean power delay

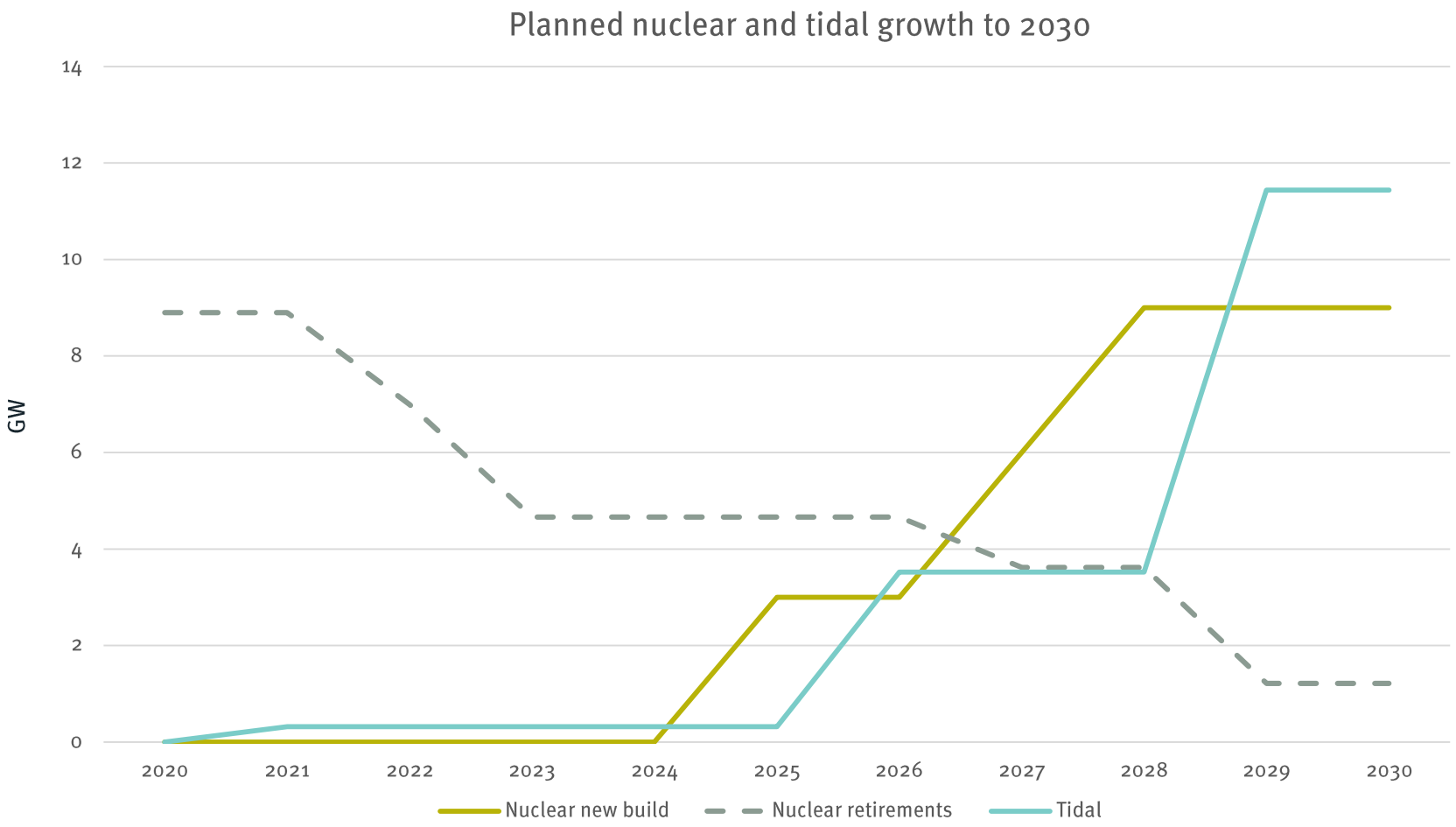
The UK has enough low cost, low carbon power…

The least cost way to meet climate targets is to steadily deploy low carbon generation, coupled with demand reduction measures. Taking account of retirements and new power generation to be built by 2020, to meet its carbon budgets, the government should aim for ~90TWh of low carbon power and efficiency between 2020 and 2025.



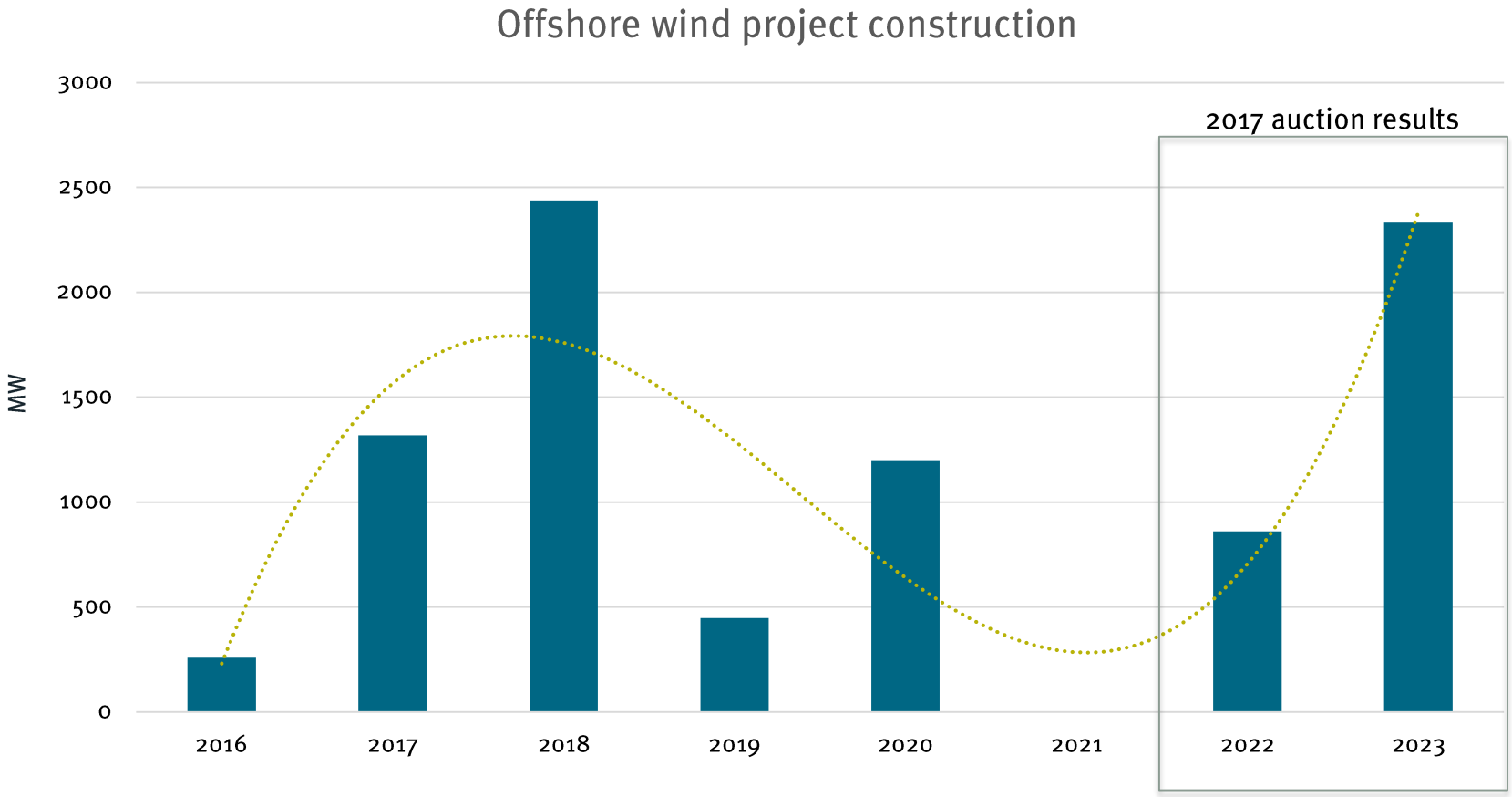
...but tidal and nuclear are already delayed

Nuclear and tidal plans have been pushed back to the late 2020s and may slip further. BEIS has plans for over 9GW of new nuclear, or around 2GW per year, after 2025 which is unprecedented for the UK. The tidal industry is also planning an unrealistic pace of growth.



…and policy is constraining renewables deployment

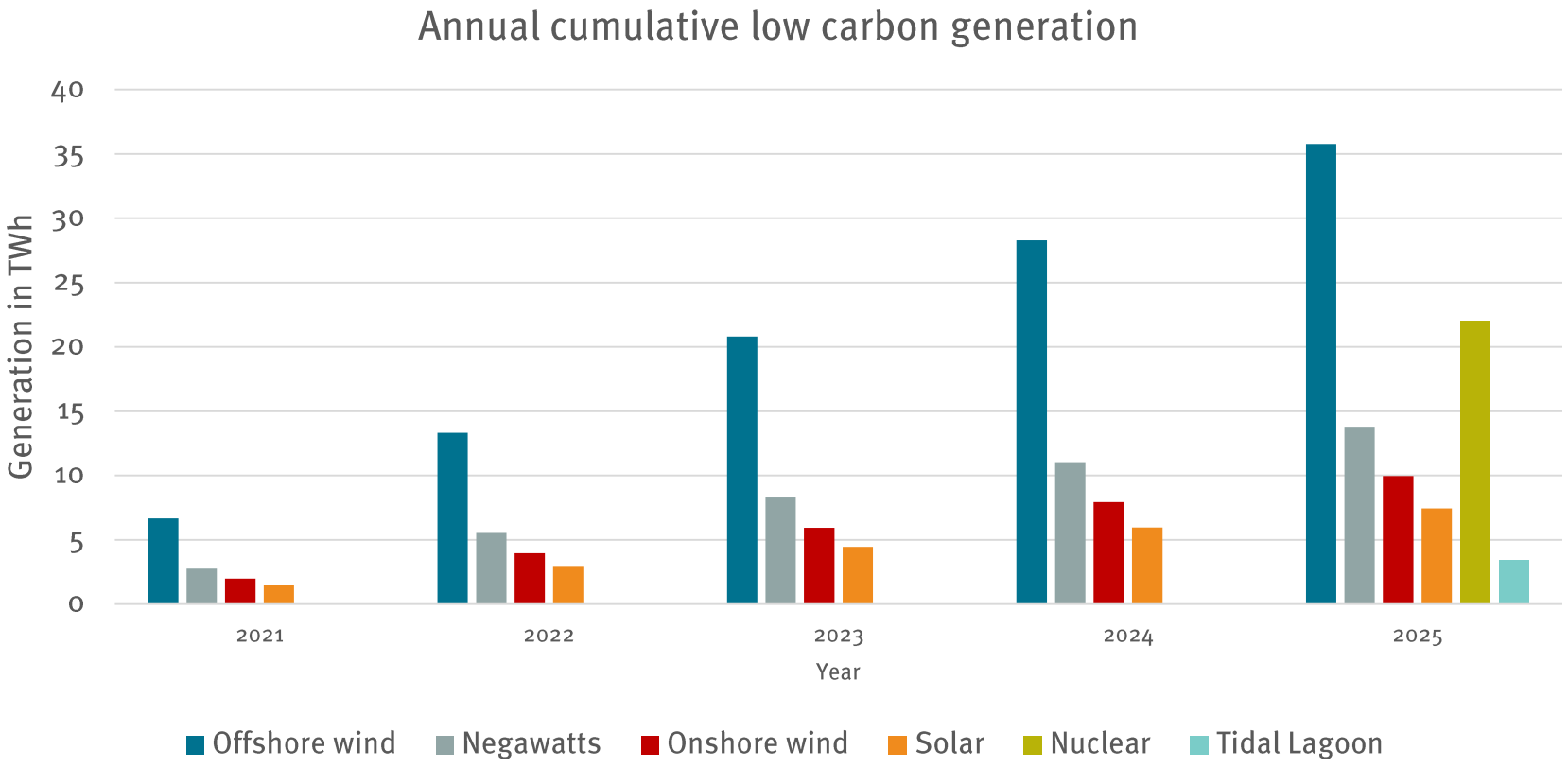
Onshore wind is currently banned, and solar power was last allowed to compete at auction in early 2015. There were no auctions in 2016, which may explain the slowdown in offshore projects in the early 2020s. In addition, despite offshore wind being at its lowest cost ever, the 2017 auctions have spent less than two thirds of the available budget for offshore wind. This underspend could have procured an additional 2GW.



The absence of auctions in 2016 or a timetable for further auctions till 2020 is preventing the purchase of cheap offshore wind

Before 2025, clean power can scale up quickly

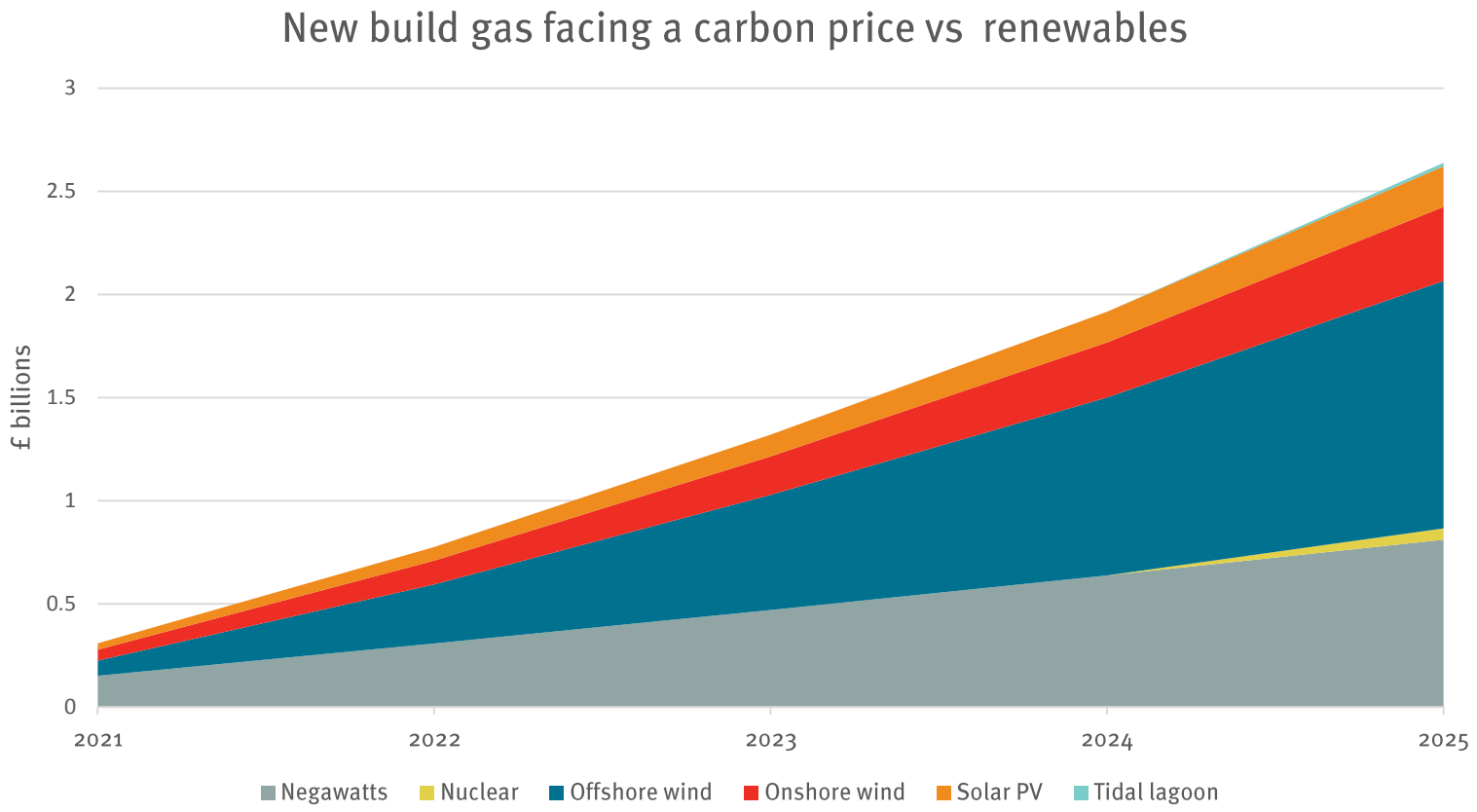
Renewables can scale up quickly before 2025, if the government holds more clean power auctions. The graph below shows what the least cost deployment would be, consistent with government plans and meeting carbon budgets. Here we assume that Hinkley C is delivered on time to meet an interim target of 76 TWh of new generation. Negawatts refers to energy efficiency or negative demand.



Clean is cheaper than dirty

Low carbon power can save consumers £2.6 billion

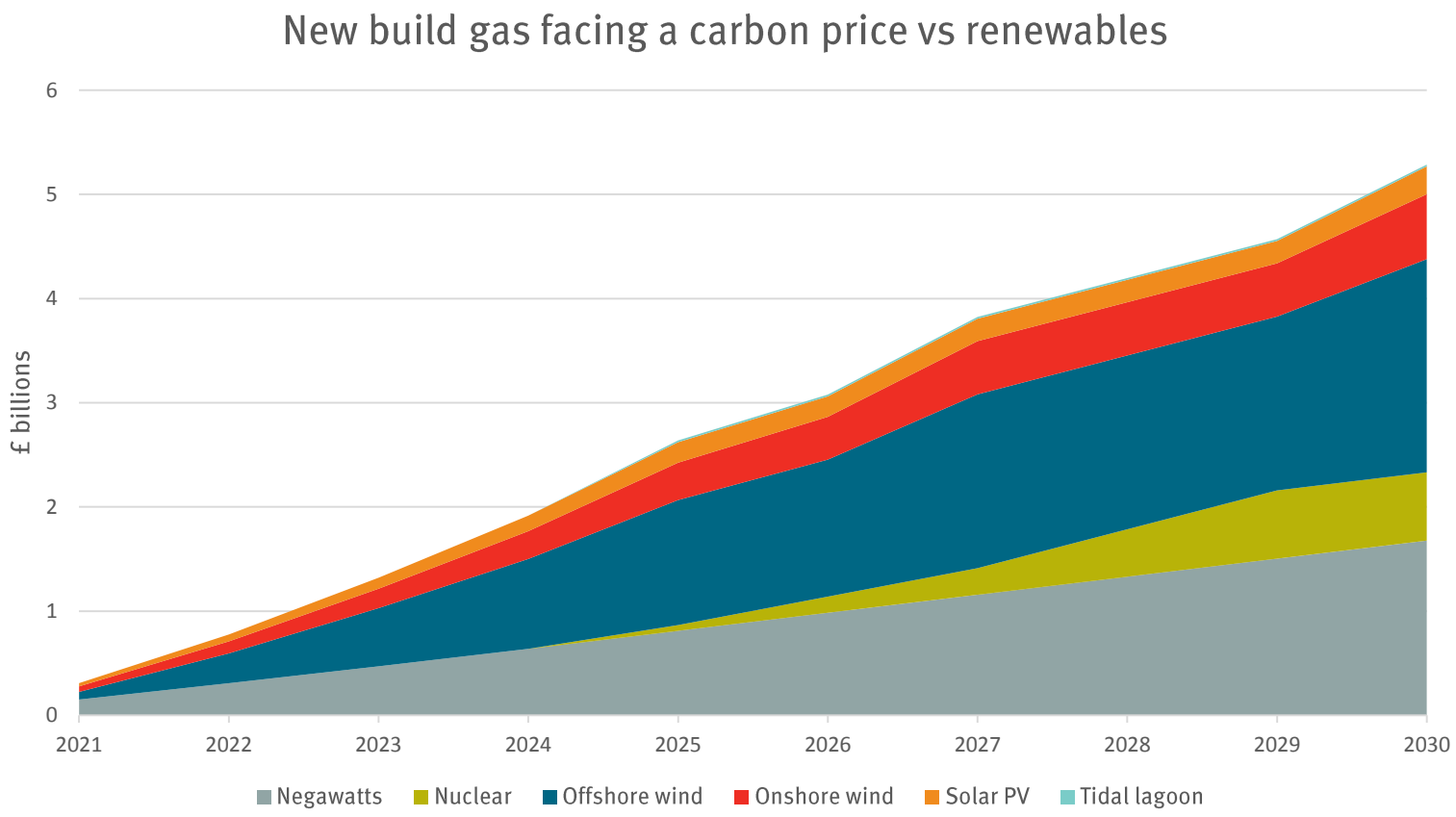
Our analysis shows that buying low carbon instead of gas will save consumers £1.8 billion per year (£2.6 billion if energy efficiency, or negawatts, are included) by 2025. Going slow on low carbon power just as it becomes cheaper would be an expensive mistake.



zero on the 'y' axis = the cost of gas facing a target consistent carbon price.

…and the savings will double by 2030

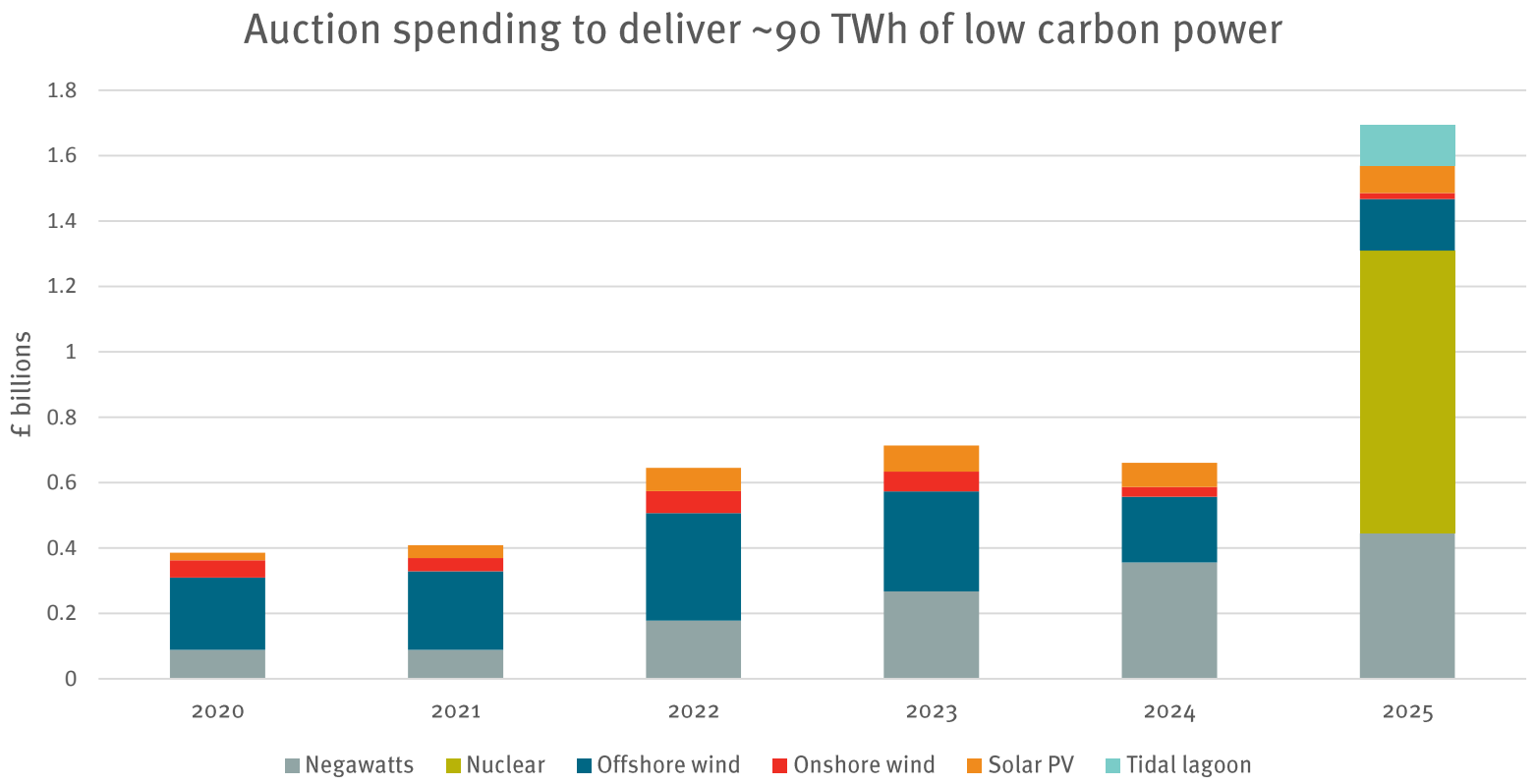
After 2025, continuing to build renewables and pursuing energy efficiency will save consumers even more: £3.7 billion per year by 2030 (or £5.3 billion including negawatts (energy efficiency measures) by the end of the decade).



zero on the 'y' axis = the cost of gas facing a target consistent carbon price.

But new low carbon auctions are needed

No new generation can be built without auctions, so to meet climate targets and keep energy costs down, a total of £1.7 billion in auction spending is needed by 2025. The government has already committed £730 million, so the additional spend would be £970 million. The falling cost of renewables means this is £1 billion less than two years ago.



What will happen if carbon is not priced correctly?

A low carbon price scenario

Our analysis assumes a ‘target consistent’ carbon price, meaning carbon is priced in a way that is consistent with the UK meeting its legally binding carbon budgets. Using this price allows fair comparison between technologies.

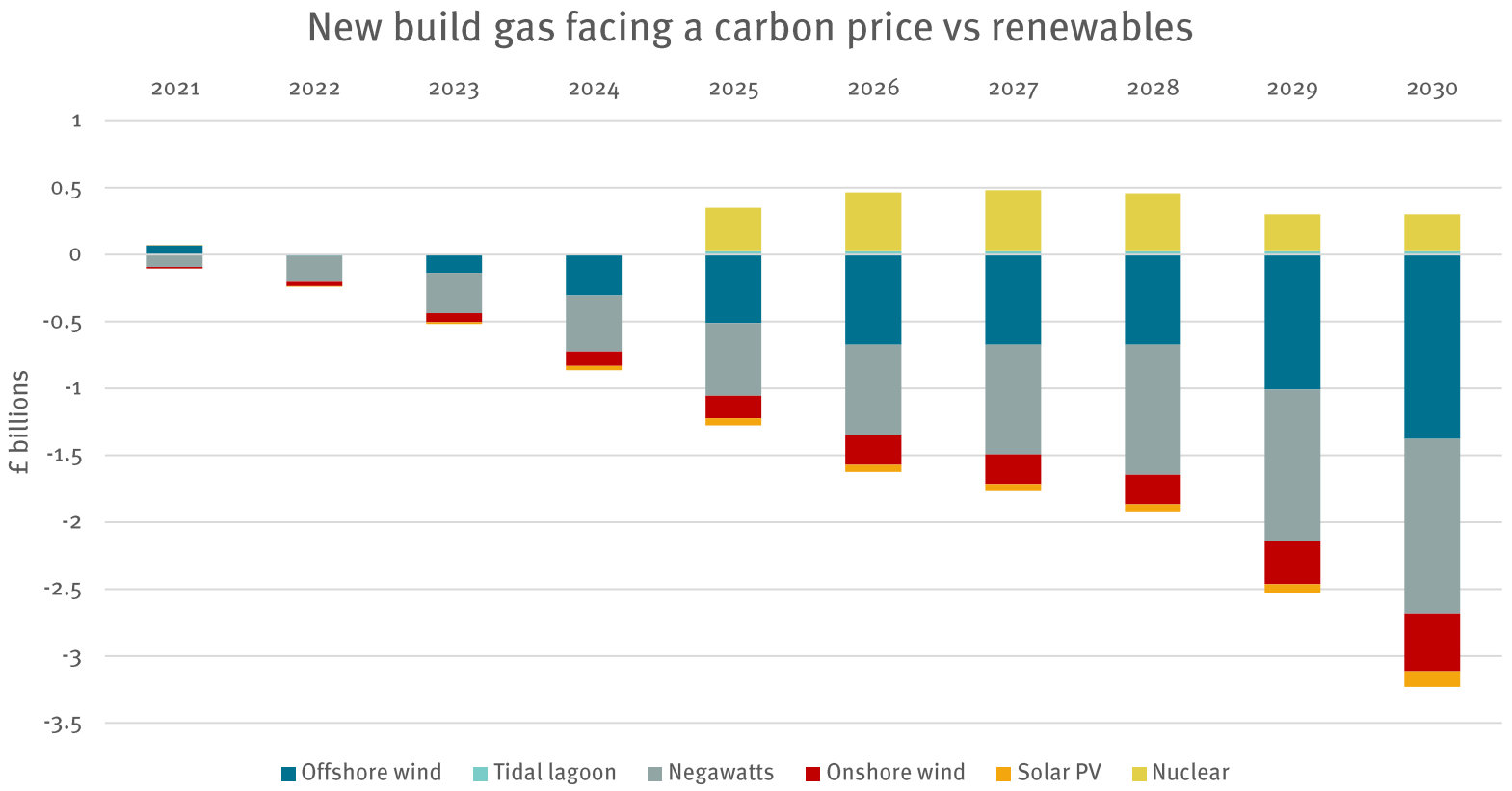
However, in practice, carbon pricing has not been the tool used by the UK to drive decarbonisation. Instead, it has frozen the carbon price, in an attempt to shield manufacturers from paying for their pollution when their international competitors do not. Freezing the carbon price does not cut the cost of meeting carbon budgets, it simply shifts the cost.

The unintended consequence of suppressing carbon prices is to make gas generation appear cheaper than it really is, and renewables seem relatively more expensive.

We illustrate how the cost competitiveness of renewables and energy efficiency, compared to gas, changes in an artificially low carbon price scenario.

Gas cannot compete, even at a low carbon price

Even if gas plants do not cover the cost of their pollution, renewables are still cheaper. Savings rise to £900 million (including negawatts) by 2025 and to £2.9 billion by 2030. There is now no credible cost argument in favour of gas over renewables. The graph shows that from 2023, all renewables are cheaper than gas even if it does not pay the right price, consistent with a 2 degree trajectory, for its pollution.

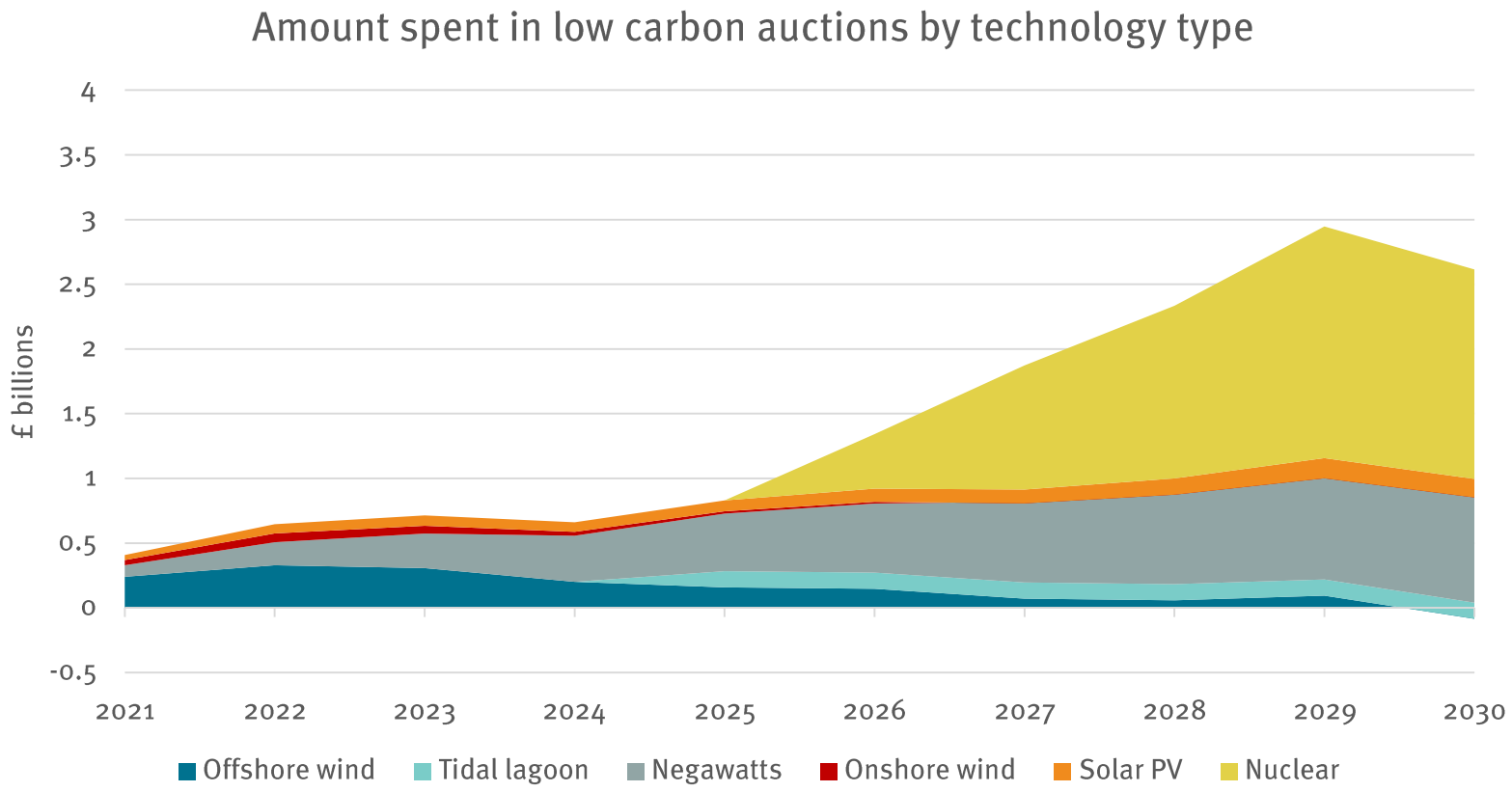


zero on the 'y' axis = the cost of gas facing a low carbon price.

What if nuclear isn't built on time?

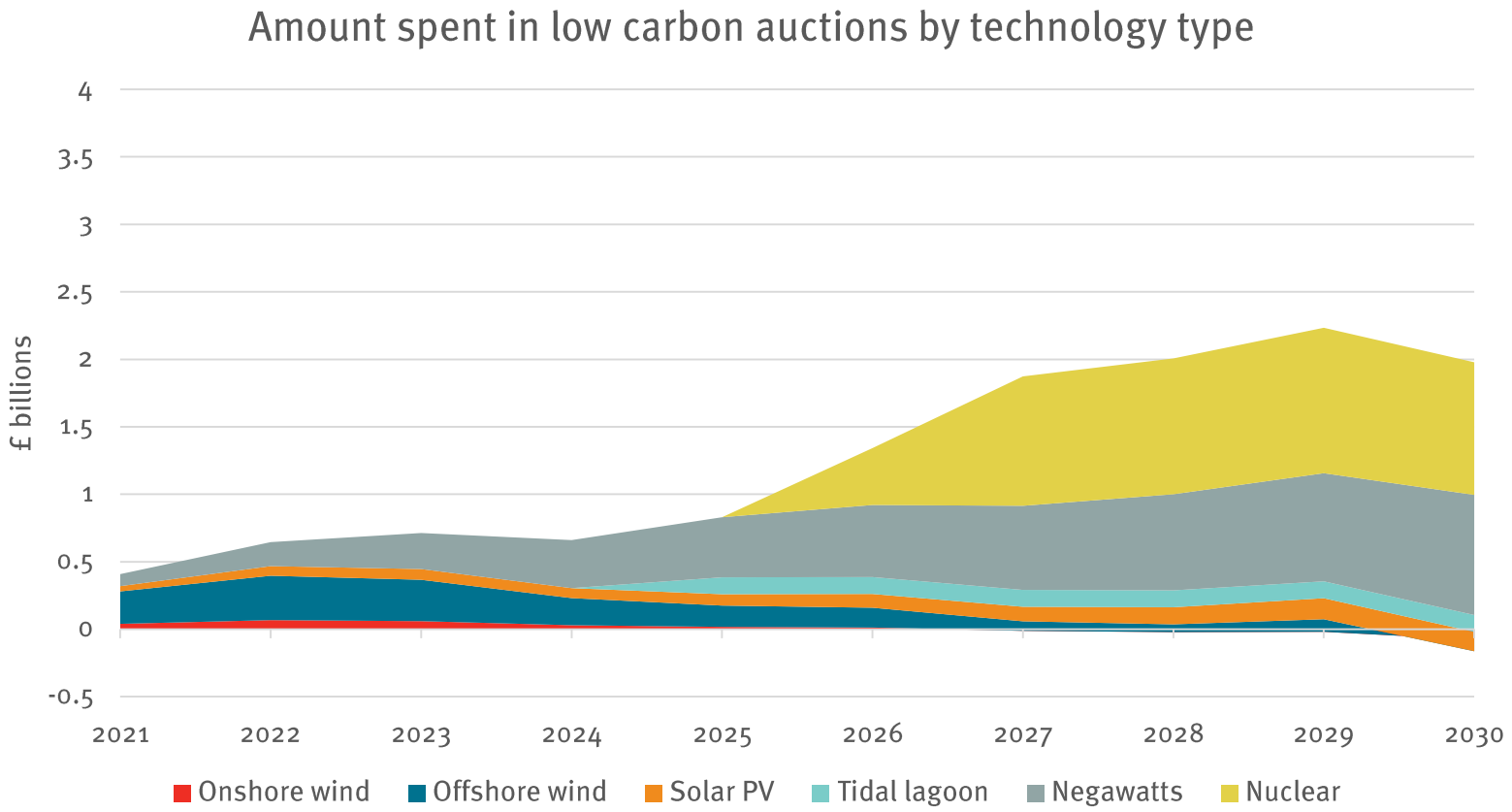
Two stations in the 2020s will be enough

New nuclear plants are beset with problems. If Hinkley C and only one other site go ahead, the UK can easily meet its climate targets under the fourth and fifth carbon budgets. But this would mean spending rising to twenty times more on nuclear than offshore wind, even though the latter would provide more power.



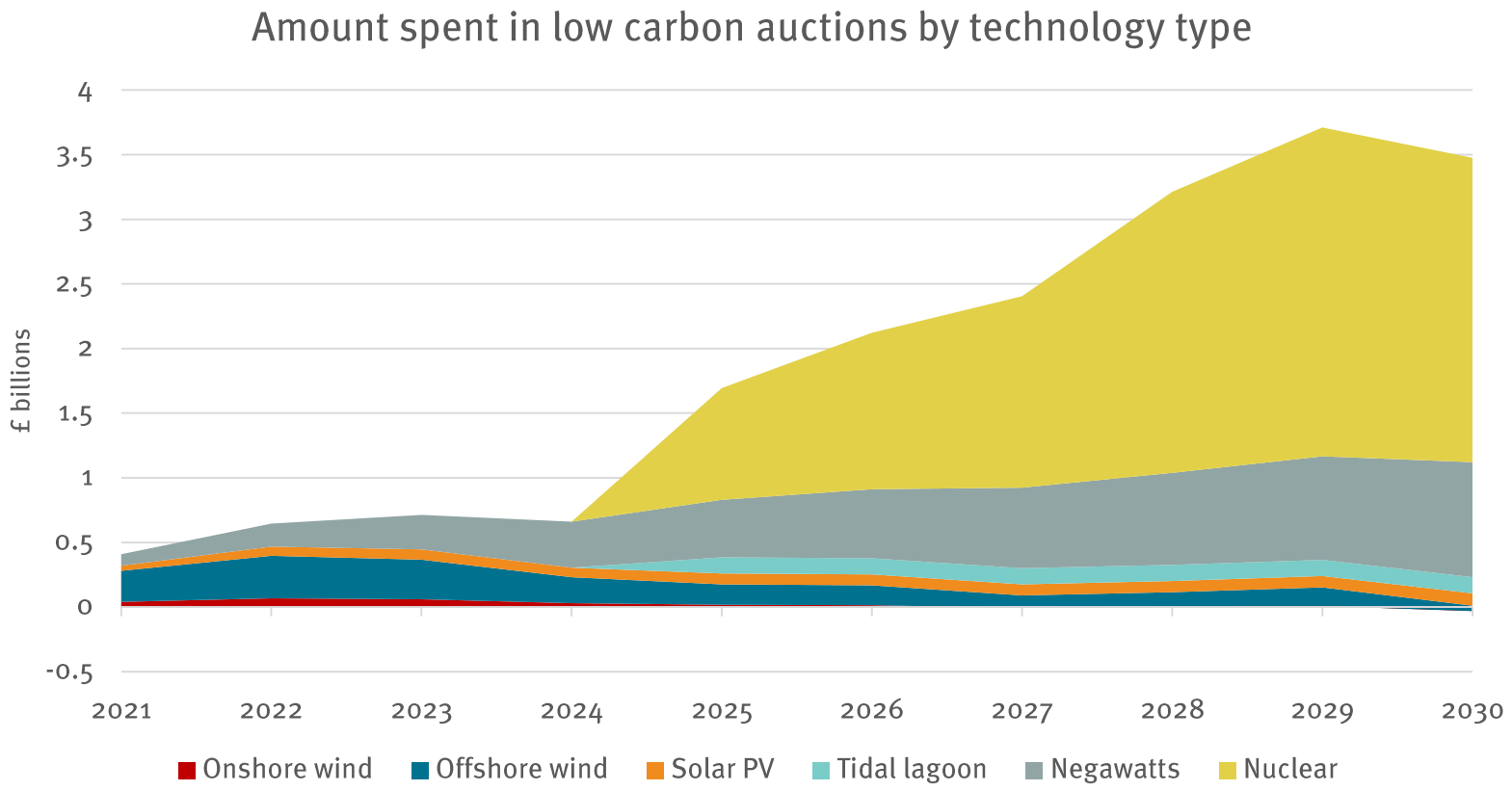
The UK could manage with just Hinkley C

If only Hinkley C goes ahead, the UK can still just meet the targets under the fifth carbon budget through heavy deployment of lower cost offshore wind.



Under current plans, nuclear spending dominates

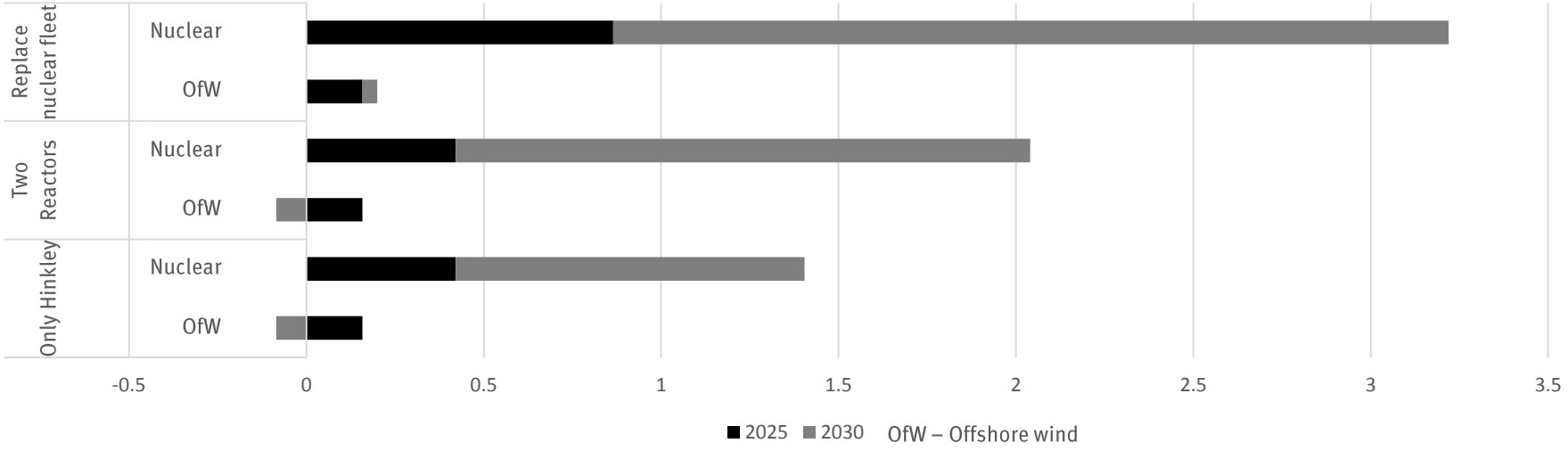
If the UK wants to replace its existing nuclear fleet, as planned, in the late 2020s, and nuclear costs do not fall, nuclear spending by 2025 would be nearly five times that of offshore wind, despite producing 40 per cent less power. Total support would rise sharply until 2029.



Offshore wind is more cost effective than nuclear

Before 2025, offshore wind's ease of deployment gives it an advantage. Unless the nuclear industry can reduce its costs below £65/MWh, further investment in nuclear power significantly increases total costs, even accounting for system costs.

Total costs by technology across three nuclear scenarios



	Offshore wind generation in 2025 (TWh)	Nuclear generation in 2025 (TWh)	Offshore wind generation in 2030 (TWh) (cumulative)	Nuclear generation in 2030 (TWh) (cumulative)
Only Hinkley C	36	10	73	25
Two reactors	36	10	73	45
Replace nuclear fleet	36	20	53	72

Conclusions

Conclusion one:

Offshore wind can deliver almost half of the necessary new low carbon generation required in the 2020s at half the cost of existing plans.

This would mean growing offshore wind from ten to 30 per cent of the electricity supply between 2020 and 2030 (20 per cent in 2025).

Doing so would require the government to use the £730 million it has already committed for clean power auctions, rather than restricting the auctions. Post-2025, a consistently higher wholesale price and falling levelised costs will mean that doubling offshore wind generation will cost only £110 million.

As this is the cheapest option, the government should commit a further £250 million beyond its existing commitments.

Conclusion two:

The government can meet its carbon targets for the power sector without major investment in conventional nuclear plants beyond Hinkley Point C.

New nuclear plants will need to contract at £65/MWh or less if they are to compete with offshore wind post-2025. This implies a minimum cost reduction of 30 per cent, alongside shorter contracts.

The energy sector is undergoing a fundamental shift towards more distributed, low carbon, flexible generation sources. Cheap renewables will increasingly shape the space for other power sources.

Maximising the benefit of these cheap technologies means ensuring that low or zero carbon flexibility is available. Current nuclear designs are not intended to operate flexibly, which makes them vulnerable to low cost renewable competition. If the government is to continue to invest in nuclear, it should ensure that future nuclear is cheap and flexible enough to support a high renewables future.

Annex

Notes

All costs are in British pounds (at 2012 rates), and include a target consistent carbon price.

The table below outlines modelled carbon prices in the two scenarios:

Scenario	Carbon price
Low carbon price	£22 in 2020 rising to £23 in 2025 and £49 in 2030
Target consistent carbon price	£23 in 2020 rising to £78 in 2030

The three nuclear sensitivities are outlined below

Scenarios	Nuclear deployed (2025-2030)
Replace nuclear fleet	9.5 GW of new capacity installed
Two reactors	5.8 GW of new capacity installed
Only Hinkley	3.2 GW of new capacity installed

In this report we have two representations of cost:

- **auction cost**, which shows the size of low carbon auctions; and
- **cost vs gas**, which measures how much more or less low carbon would cost compared to building the alternative: new gas CCGTs.

There is no zero spending option, which would risk energy security. The latter, 'cost vs gas' comparison, shows what the lowest cost option would be.

Assumed nuclear pipeline

Plant, type & proponent	Proposed capacity (net)	Current stage	Expected generation date	Realistic generation date[1]	Cost (£/MWh)
Hinkley Point C EPR, EDF	3.2 GW, 2 units of 1.6 GW	Approved, under construction	2025	2026-28 for both units	92.5
Wylfa Newydd ABWR, Horizon	2.6 GW, 2 units of 1.3 GW	Application for nuclear site licence submitted in March 2017 to Office for Nuclear Regulation. Expected start of construction is 2020 with strike price below Hinkley.	2025	2027-28 for both units	85 (estimate)
Moorside AP1000, Nugen	3.4 GW, 3 units of 1.13 GW	Site assessment permission obtained. Kepco has joined the talks to have a stake in the project after Toshiba's nuclear subsidiary Westinghouse declared bankruptcy	2027	2029-30	85 (estimate)
Oldbury B ABWR, Horizon	2.7 GW, 2 units of 1.38 GW	Dependent on the process and work on Wylfa, as the developer believes cost reductions are possible based on the progress made on Wylfa plant.	2030	2033[2]	75 (estimate)
Total	12.3 GW				

Endnotes

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