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# Britain's vast national gamble on wind power may yet pay off

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The London Array has shattered records, lifting renewables to 25pc of UK power earlier this year CREDIT: EMILY GOSDEN

Wind power has few friends on the political Right. No other industry elicits such protest from the conservative press, Tory backbenchers, and free market economists.

The vehemence is odd since wind generates home-made energy and could be considered a 'patriotic choice'. It dates back to the 1990s and early 2000s when the national wind venture seemed a bottomless pit for taxpayer subsidies.

Pre-modern turbines captured trivial amounts of energy. The electrical control systems and gearboxes broke down. Repair costs were prohibitive.

Yet as so often with infant industries, early mishaps tell us little. Costs are coming down faster than almost anybody thought possible. As the technology comes of age - akin to gains in US shale fracking - the calculus is starting to vindicate Britain's vast investment in wind power.

The UK is already world leader in offshore wind. The strategic choice now is whether to go for broke, tripling offshore capacity to 15 gigawatts (GW) by 2030. The decision is doubly-hard because there is no point dabbling in offshore wind. Scale is the crucial factor in slashing costs, so either we do it with conviction or we do not do it all. My own view is that the gamble is worth taking.

Shallow British waters to offer optimal sites of 40m depth. The oil and gas industry knows how to operate offshore. Atkins has switched its North Sea skills seamlessly to building substations for wind. JDR in Hartlepool sells submarine cables across the world. Wind power is a natural fit.

We live in a world that has just signed the COP21 climate deal in Paris. That implies a steadily rising penalty on carbon emissions. It also implies that those dragging their feet on renewables will ultimately be punished, as the Chinese have grasped.

As I write this August series on the UK's energy woes, some readers have written suggesting that we exploit Brexit to walk away from our climate pledges and opt for the cheapest forms of fossil power. I rule this out entirely. Nothing would be more disastrous for the diplomatic credibility of this country in the febrile post-Brexit mood than to resile from core global commitments. Nor is it necessary.

The vast new turbines are five times taller than their primitive 20th Century ancestors, reaching 720 feet and generating seven or eight megawatts (MW) each. Most no longer have gear boxes. Drones are replacing inspectors dangling on ropes.

This form of dangerous and costly inspection will soon be done by drones

Turbines have aerodynamic 'smart' blades made of carbon composite with wireless sensors, and can 'pitch' in and out of the wind in response to shifts in air flow. "There has been a huge leap forward in technology even over the last couple of years. They are pushing the boundaries of energy capture," said Cian Cornroy from the offshore experts ORE Catapult in Glasgow.

"They are using new metals in the generators that cut the need for servicing. Theere are cameras to relay digital data through cloud computing that can reset the turbines. You have to be bullish," he said.

Onshore projects in Texas, Iowa, and China's northern plains are now among the cheapest forms of energy in the world, but this has little relevence to most of Britain. Land prices are higher here and the population is denser. Onshore wind has almost reached the limits of social acceptance. It will increase a little further but may peak near 11 GW by 2020.

The UK debate is essentially over offshore wind. This source used to be twice as expensive - with subsidies to match - but the gap is narrowing fast. Dong Energy has just signed an offshore deal in the Netherlands at less than £63 per megawatt hour (MWh), with sweetners from the Dutch state. "This reflects what the industry is now capable of delivering in general," said Samuel Leupold, Dong's executive vice-president.

"Offshore wind is a very young technology. The equipment we are using is completely different from what we had even four or five years ago. The foundations use less steel, the cranes are getting lighter," he said.

Just 35-40pc of the overall cost of offshore wind is the turbine. The rest is spent on the complex task of driving shafts into the seabed, and operating winds arrays far from land, and servicing them.

This is where the giant 8 MW towers and vast arrays of 1 GW entirely change the game. "We need fewer cables  and need to install less turbines. The cost of renting very expensive vessels is going down dramatically," he said.

The biggest offshore companies have together vowed to cut costs to €80 per MWh - or £69 - by 2025. If so, the strike prices may start to match the wholesale price of electricity in the UK market. They may even come below the market price, in which case they will pay money back to society under Britain's 'contract for difference' system.

The Government's next three offshore auctions will see a staggered fall in strike prices to a maximum of £85 per MWh by 2020, and they will arguably keep falling step by step thereafter until market forces prevail.

The industry's research arm Inwind is already drawing up plans for the next generation of 10-20 MW turbines. The Sandia National Laboratories in the US are exploring 50 MW monsters with 'segmented ultralight morphing rotors' - once science fiction - that could in theory halve costs again.

The reality is already remarkable. The European Wind Energy Association says the average 'capacity factor' for new offshore plants has risen to 42pc from 30pc a decade ago.  The wind flows at sea are less variable than on land, and they can be anticipated.

"The newest offshore wind farms deliver annual load factors around 50pc. Projects such as Dogger Bank have the potential to be even higher. The National Grid can predict tomorrow's wind power more accurately than tomorrow's electricity demand," says Matthew Knight from Siemens.

Intermittency remains a curse but claims that anticyclones can halt the offshore wind industry for weeks at a time are a dinner party myth. "Calm conditions persisting for one day are extremely rare. When they do occur, they cover a small fraction of the UK, and there is no evidence to suggest that they persist for long periods of time," says Graham Sinden from Oxford University.

What does happen is that wind yield diminishes in the summer, partially offset by rises in solar output. The neuralgic issue is this whole debate is of course how much back-up power will be needed, and here we are dealing with fast-moving shifts in technology that split the experts.

The latest official data shows that the renewable share of UK power surged to a record 25.1pc in the first quarter of this year. Half of this was wind. At these volumes - which will rise much higher - headaches for the grid become acute.

Some of this will be mitigated by the new electricity interconnectors being built from Norway and Sweden, giving Britain an extra 2.8 GW of back-up from Scandinavian hydro power. This is on top of the 4 GW of existing interconnectors.

The latest Statoil floating wind farm off Scotland comes with its own lithium-ion battery storage. As I wrote last week, a massive push by the US Energy Department and America's top labs promise a revolutionary break-through in energy storage across a range of technologies by the early 2020s.

On the demand side - too often forgotten - the transforming force is digital know-how to shut down non-critical energy use automatically at peak times, and flatten patterns of daily use - saving money in the process. In short, intermittency can be confronted and defeated, with gas plants are an insurance policy for back-up during the transition.

The bet on wind power does not exclude other options. I remain an enthusiast for micro-nuclear and molten salt reactors, as well as carbon capture, and will be writing about these in coming days. The Americans are fighting for energy independence on every front at once, with every form of technology that holds promise. So should Britain.