

# Time to accept that wind farm costs are not falling

Author: Kathryn Porter - Energy Consultant, Watt-Logic 14/06/2023

**There has been a consistent narrative that the cost of building new wind farms is falling, with falling subsidy prices being offered as evidence. I have challenged<sup>1</sup> this narrative in the past, pointing out that evidence from the accounts of wind farms themselves does not support this argument, citing the work of Professor Gordon Hughes<sup>2</sup> at the University of Edinburgh, and indeed his work has subsequently been replicated<sup>3</sup> by Andrew Montford of the Global Warming Policy Foundation (“GWPF”). However, there is another big reason to question this narrative: turbine manufacturers are losing money hand over fist.**

Falling subsidy prices at the same time as massive manufacturing losses makes no sense and is clearly not sustainable. Of all the projects that secured Contracts for Difference (CfD) agreements in the most recent subsidy round, known as AR4, only two have actually taken their Final Investment Decision (FID) – ScottishPower’s East Anglia 3<sup>4</sup> project, and Moray West<sup>5</sup> which is a joint venture between EDP Renewables and ENGIE. Ørsted has warned<sup>6</sup> that Hornsea 3 could be at risk without Government action “to maintain the attractiveness of the investment environment”. It has said<sup>7</sup> it will make its final investment decision later this year.

The Government has said that the CfD is structured to take inflation into account, but other than introducing 100% capital allowances for a limited period in a bid to stimulate business investments in the Spring Budget<sup>8</sup>, it has offered little additional help to renewable developers. “Long-life assets” only benefit from 50% relief, with many commentators believing that wind turbines will be considered to be “long-life assets” – these are typically assets with a life of at least 25 years, which tends to be the upper limit of the life of a wind turbine.

With the pot of money available for AR5 being lower than for AR4 there are now real questions about the sustainability of the trend of ever lower strike prices, and whether the AR4 projects will ever see the light of day.

So, what’s going on? Something in this market is clearly broken, the questions are what, and what can be done about it?

## **Turbine maker losses have been growing over the past three years**

Turbine manufacturer losses began to be commented upon last year, and largely explained away as being a result of supply chain costs increasing due to covid and the Ukraine war. But looking at the figures more closely it is clear that the losses pre-date these events.

<sup>1</sup> <https://watt-logic.com/2022/04/11/cost-of-renewables/>

<sup>2</sup> <https://www.ref.org.uk/Files/performance-wind-power-uk.pdf>

<sup>3</sup> <https://www.thegwgf.org/content/uploads/2021/02/Offshore-Wind-LCOE.pdf>

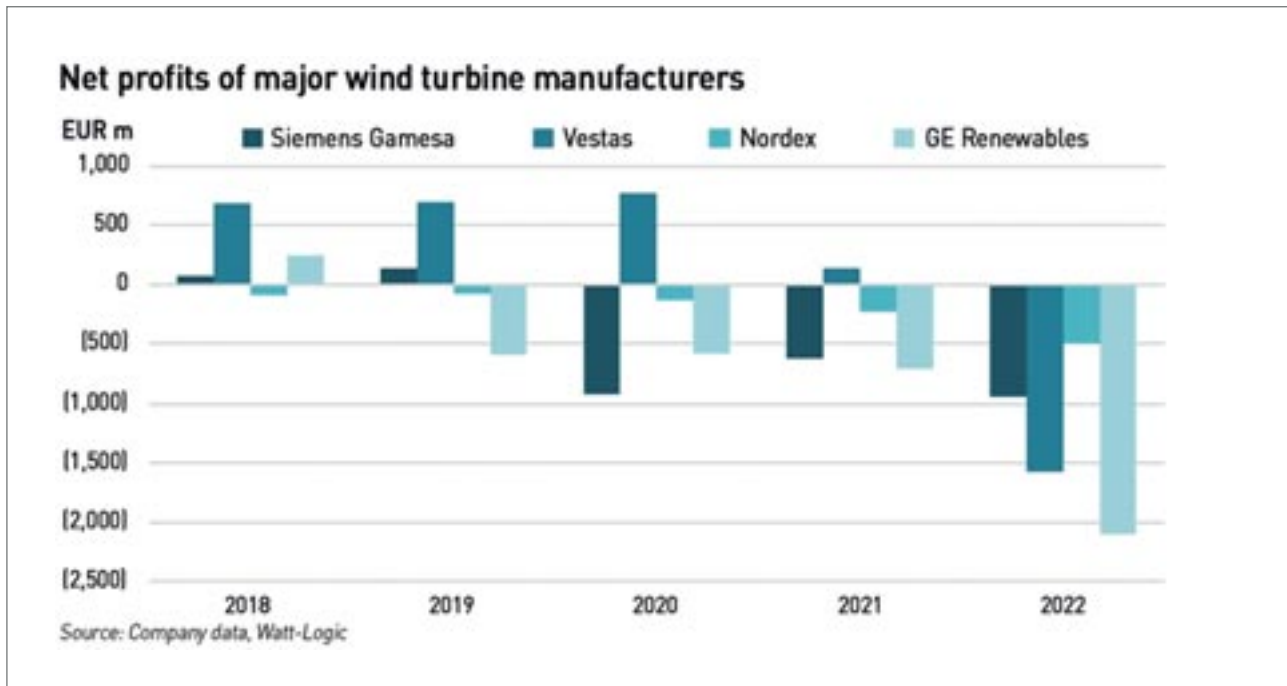
<sup>4</sup> <https://www.iberdrola.com/press-room/news/detail/iberdrola-formalises-biggest-ever-contract-award-13billion-for-east-anglia-three-offshore-wind-farm>

<sup>5</sup> <https://www.oceanwinds.com/news/uncategorized/moray-west-offshore-wind-farm-reaches-financial-close/>

<sup>6</sup> <https://www.4coffshore.com/news/%C3%B8rsted-raises-concerns-for-hornsea-3-27s-future-amongst-rising-costs-nid27383.html>

<sup>7</sup> <https://www.reuters.com/article/orsted-energy-windfarm/orsted-expects-to-take-fid-on-hornsea-3-wind-farm-this-year-idUSL8N3801XW>

<sup>8</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1144441/Web\\_accessible\\_Budget\\_2023.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1144441/Web_accessible_Budget_2023.pdf)



Senior participants at last year's WindEurope 2022 conference<sup>9</sup> said that the trend of turbine manufacturers selling at a loss will (self-evidently) threaten renewable generation targets.

*"The state of the supply chain is ultimately unhealthy right now. It is unhealthy because we have an inflationary market that is beyond what anybody anticipated even last year. Steel is going up three times...It is really ridiculous to think how we can sustain a supply chain in a growing industry with these kind of pressures...Right now, different suppliers within the industry are reducing their footprint, they are reducing jobs in Europe. If the government thinks that on a dime, this supply chain is going to be able to turn around and meet two to three times the demand, it is not reasonable,"*

**- Sheri Hickok, Chief Executive for Onshore Wind, GE Renewable Energy**

According to Nordex chief executive, José Luis Blanco, the economics in the wind industry had been destroyed due to price pressures from competitive tenders coupled with a low visibility of wind capacity pipelines due to failed government policies even before the

Ukraine war. This is reflected in the financial results of turbine manufacturers.

*"We are still selling at loss, because of the dynamic of auctions, the low predictability of volumes. We are investing in volumes in trust in market dynamics, then the volume doesn't come, then a factory is empty, [and then] it is better [to have] some cash flow than no cash flow — and [consequently] the sector enters into a self-destructive loop ... The energy independence is supported by a supply-chain dependency policy. This a huge risk."*

**- José Luis Blanco, Chief Executive, Nordex**

Blanco said he was not only referring to rare earths, but also "normal things" such as metallic turbine shafts, 95% of which originate in China.

Enercon's chief executive Jürgen Zeschky went even further, saying that over the past eight years, cost was the only driver for developments, with low levelised costs of energy and low turbine prices driving the industry. As a result, companies have been shedding manufacturing jobs in Europe, moving production to lower cost countries. The job cuts<sup>10</sup> continued with GE

<sup>9</sup> <https://www.rechargenews.com/wind/were-all-in-trouble-wind-turbine-makers-selling-at-a-loss-and-in-a-self-destructive-loop-bosses-admit/2-1-1197217>

<sup>10</sup> <https://www.ft.com/content/0e747284-64da-4690-b416-3acabaaf4943>

Renewables and Siemens Gamesa, both cutting staff last Autumn.

Turbine manufacturer losses have continued into 2023. Siemens Gamesa reported<sup>11</sup> its first-quarter net loss more than doubled due to higher warranty provisions as a result of faulty components – the company has been struggling with operational issues including problems with the 5.X onshore turbine. The net loss in October-December, the company’s fiscal first quarter, increased from €403 million in the same period last year to €884 million this year. Competitor Vestas has also had warranty issues in the past year.

*“The negative development in our service business underscores that we have much work ahead of us to stabilise our business and return to profitability.”*

**- Jochen Eickholt, Chief Executive, Siemens Gamesa**

Nordex also reported<sup>12</sup> increased losses in Q1 2023, which went up by 9% compared with Q1 2022, which it attributed<sup>13</sup> to “old contracts with a poor cost structure”. Its EBITDA margin remained broadly stable at -9.4% compared with -9.5% last year. The company’s rate of installation has grown this year and it expects profitability to improve due to “revised pricing and contract arrangements”.

GE Renewables saw Q1 2023 losses in line with 2022, with a net loss of US\$ 414 million compared with US\$434 million in the same period last year. There was a slight improvement in the profit margin from -15.1% to -14.6% due to the effects of cost cutting.

Siemens Gamesa said the outlook for the wind industry remained good, pointing to the US Inflation Reduction Act (“IRA”)<sup>14</sup> and the EU’s RePowerEU<sup>15</sup> programme, but said that “governmental action is needed to close the gap between ambitious targets and actual

installations”. There are signs that the IRA is having a positive impact<sup>16</sup> on US manufacturing with companies growing production capacity in the country in response to its incentives. Vestas, Siemens and GE have all announced plans to build new turbine component factories in New York and New Jersey, albeit contingent upon securing orders and receiving state and federal funding.

Ratings agency Fitch, said<sup>17</sup> that “while turbine manufacturers’ profitability is under pressure due to increased raw material prices, supply chain difficulties and temporarily reduced orders”, the long-term sector fundamentals remain supportive. It pointed to significant cost increases in a market where most customer contracts are fixed-priced putting pressure on OEMs’ (Original Equipment Manufacturers) margins, and while OEMs have increased their selling prices over the past year, the pace of cost growth has been higher, leading to negative margins. Fitch expects margins to recover later in the year as it adjusts selling prices, and as raw materials costs fall, however, it says that the rate of new orders has slowed over the past year, due to adverse economic conditions and slow permitting processes in Europe.

Vestas, the leading OEM, with about 20% of installed onshore wind capacity worldwide, saw a decline in orders of about 18% in 2022 compared with the previous year. Nordex’s orders fell by 20% in 2022 versus 2021, while Siemens Gamesa’s onshore orders fell by 44%. However, in the first quarter of this year, most of these companies reported increases in orders.

### Actual capital and operating costs of wind farms

Back in 2020, Gordon Hughes published a paper<sup>18</sup> in which he analysed the capex and opex of wind farms larger than 10MW built in the UK since 2002. Most wind projects are individually incorporated as special purpose vehicles (SPVs) whose accounts are lodged with Companies House and available for public

<sup>11</sup> <https://www.reuters.com/business/energy/siemens-gamesas-q1-net-loss-widens-884-million-euros-2023-02-02/>

<sup>12</sup> <https://renews.biz/85707/nordexs-profits-decrease-in-q1-2023/>

<sup>13</sup> <https://www.rechargenews.com/wind/old-projects-with-poor-cost-structure-weigh-on-wind-turbine-group-nordex/2-1-1450291>

<sup>14</sup> <https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it>

<sup>15</sup> [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en)

<sup>16</sup> <https://www.cnbc.com/2023/04/17/from-ge-to-siemens-wind-energy-hopes-its-crisis-is-about-to-end.html>

<sup>17</sup> <https://www.fitchratings.com/research/corporate-finance/rising-costs-squeeze-european-wind-turbine-manufacturers-margins-07-02-2023>

<sup>18</sup> <https://www.ref.org.uk/ref-blog/365-wind-power-economics-rhetoric-and-reality>

inspection. SPVs rarely employ staff, so it is straightforward to determine actual operating costs. I replicated part of his work and can confirm his conclusions, which were that:

- The actual costs of onshore and offshore wind generation had not fallen significantly over the previous two decades and he saw little prospect that they would fall significantly in the next five or even ten years;
- While some of the component costs had declined, overall costs had not. The weighted return for investors and lenders had fallen sharply, especially for offshore wind, due to a reduction in perceived risk. In addition, the average output per MW of new capacity may have increased, particularly for offshore turbines, however, those gains were offset by higher operating and maintenance costs;
- The capital costs per MW of capacity to build new wind farms increased substantially from 2002 to about 2015 and then, at best, remained constant until 2020; and
- The classic period for early cost reductions was over by 2010 and did not work out quite as expected – while off-shore wind was in itself an immature technology, it was based on two significantly more mature technologies: onshore wind and oil and gas infrastructure, limiting the potential for learning curve benefits.

Hughes compared actual capital costs with costs reported in public announcements before or during construction – both adjusted for inflation (to 2018 prices). He found that on average, actual costs were 18% higher than reported costs and in a third of cases the cost overrun was at least 30%. Reported capital costs were clearly affected by an “optimism bias”, but even so, there was a large increase in the reported capital cost per MW of capacity for offshore wind farms over the 20-year period, with the main change being between projects completed up to 2009 and those completed in 2015-2018.

Part of the increase can be attributed to a move to deeper waters, but reported costs have increased even when adjustments are made for sea depth and other factors. The analysis of actual costs for UK offshore wind farms completed up to 2019 shows an even worse picture than that visible in reported costs: in real terms the average capital cost per MW of capacity more than doubled from 2008 to 2019.

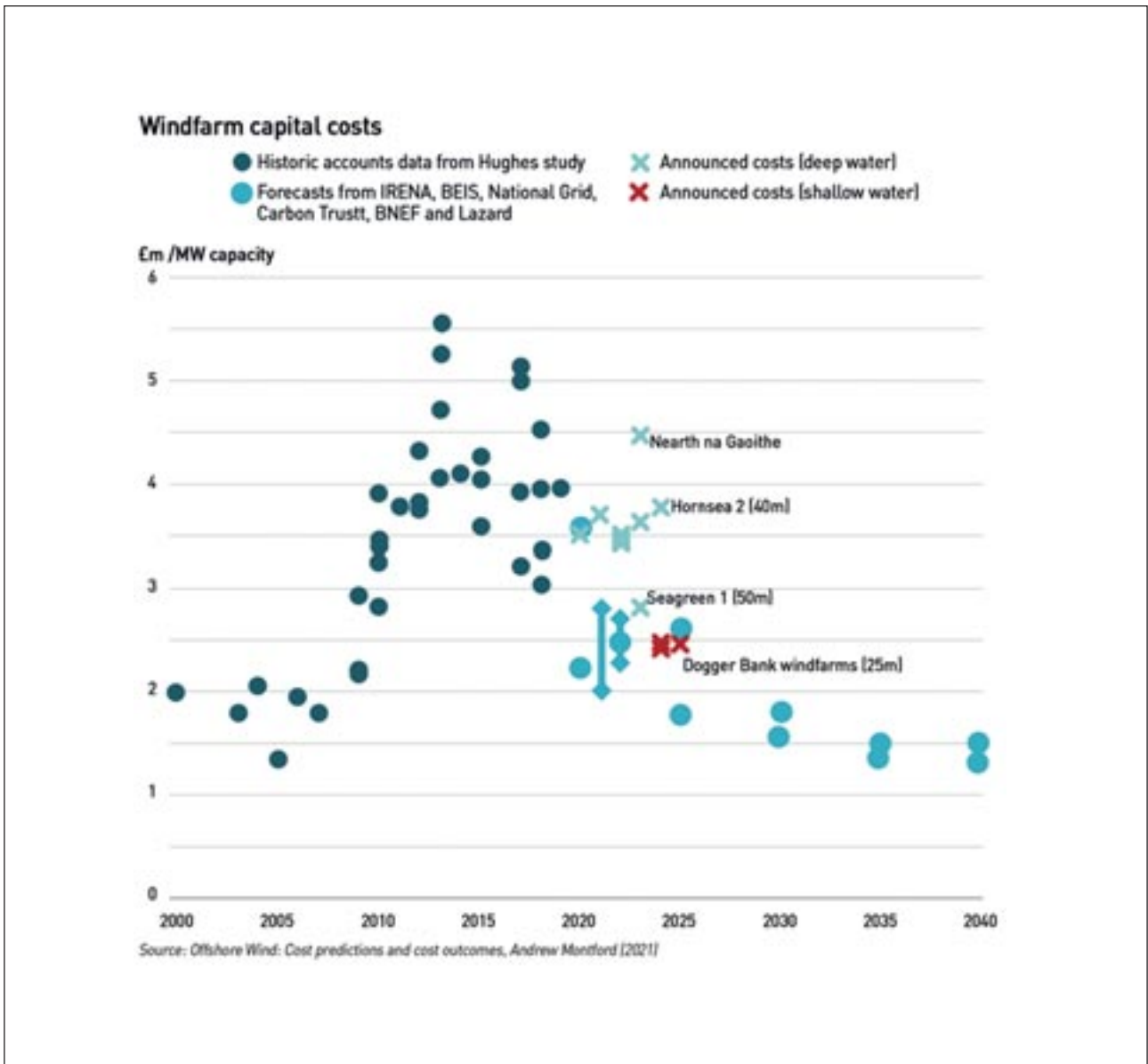
Actual capital costs for onshore wind also increased significantly in real terms from 2002-2004 to 2012-2014. From 2014-2019 onshore capital costs were roughly constant with no sign of any systematic decline. For a handful of individual projects, the switch to larger turbines (>3MW) reduced the capital cost, but average capex of all onshore projects with larger turbines actually increased since 2012. The median capital cost at 2018 prices of all projects completed in 2018 was over £1.6 million per MW compared to a median of £1.0 million per MW in 2006.

In terms of operating costs, there is strong empirical evidence of a powerful rising trend in opex per MW, with two factors driving the trend:

- As wind farms age, the average cost of operating and maintaining turbines tends to increase because equipment failures and breakdowns become more frequent. The average increase in operating costs with age is 2.8% per year in real terms for onshore wind and at least 5.0% per year for offshore wind (or 5.9% where operating costs included separate transmission charges); and
- The average cost of operating and maintaining new wind farms in their first or second full year of operation has also increased rapidly over time: on average 4.4% per year for onshore wind, and 5.5% per year for offshore wind, together with substantial additional costs for working at depths of either 10–30 metres or greater than 30 metres. After allowing for the combination of the underlying increase in costs, plus greater depth and changes in the regime for offshore transmission, the initial operating cost per MW of capacity for a typical offshore project quadrupled between 2008 and 2018.

While most wind turbines have a physical life of 25-30 years almost all are de-commissioned before they reach 25 years and many before 20 years, meaning their initial capital costs must be recovered over a shorter period and therefore the capital charge is correspondingly higher.

Despite the evidence from the audited accounts of actual wind farms, policy-makers persist in their belief that the costs of wind generation are (and have been) falling. They are supported in this view by all sorts of consulting firms and other interested parties, whose analysis suggests ever lower future costs. In his 2021 report for the GWPF, Andrew Montford compared the



historic capex data from Hughes’ analysis with forecasts by a number of such analysts. He then compared them with announced costs for new projects as shown above.

The data indicates that depth appears to be the main driver of capital costs. It became more expensive to build offshore wind farms between 2000 and 2010, although not all of this increase can be attributed to the move to deeper waters. Since then, costs remained

in the range £3–5 million/MW, with little evidence of a sustained fall. In terms of predictions, BNEF, Lazard<sup>19</sup> and Carbon Trust<sup>20</sup> all predicted that capital costs for a wind farm completing financing in 2019 (and therefore starting operations in 2021 or 2022) would be around £2.3–2.7 million/MW. BEIS<sup>21</sup> predicted that costs would fall to little more than £1 million/MW within ten years, with National Grid<sup>22</sup> being similarly optimistic.

<sup>19</sup> <https://www.lazard.com/news-announcements/lazard-releases-annual-levelized-cost-of-energy-and-levelized-cost-of-storage-analyses-19-october-2020/>

<sup>20</sup> <https://www.carbontrust.com/our-work-and-impact/guides-reports-and-tools/policy-innovation-and-cost-reduction-in-uk-offshore-wind>

<sup>21</sup> <https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020>

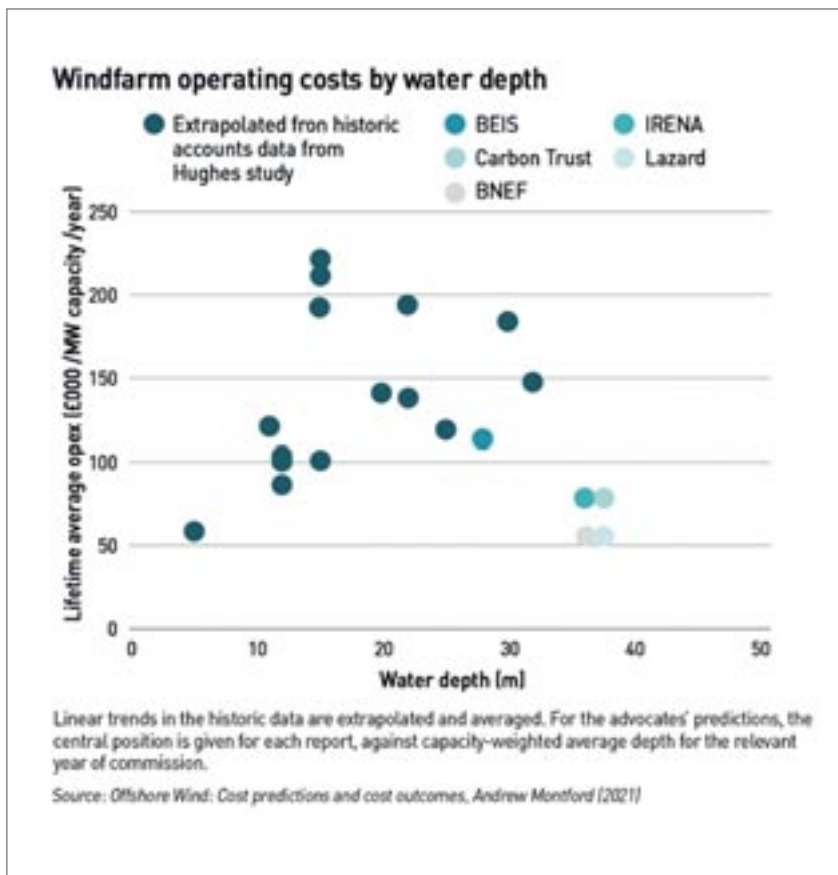
<sup>22</sup> <https://www.nationalgrideso.com/document/181961/download>

Despite this, the costs announced by developers (bearing in mind Hughes' findings that announcements tend to understate actual costs) showed an expectation among developers that capital costs in deep waters would remain largely unchanged, at least until 2024–25.

Similarly, the opex costs predicted by various analysts have been optimistic, particularly considering the ongoing trend to move into deeper waters. BNEF and Lazard have issued the most aggressive predictions, suggesting that opex costs of little more than £50,000/MW per year is likely for projects commissioning over the coming years.

IRENA<sup>23</sup> includes some discussion of operating costs, saying: “for 2018, representative ranges for current projects fell between [£54,000 and £100,000 per MW] per year (IEA et al., 2018; Ørsted, 2019; Stehly, T et al, 2018).” However, Stehly et al actually give a representative opex figure for offshore wind equivalent to around £111/kW/year (converted from US\$ at 1.29).

Neither BEIS nor its successor department, DESNZ appear to have updated the official UK Government cost analysis since 2020 despite clear evidence that costs are unlikely to follow their previously predicted path.



### Low CfD auction prices indicate strategic bidding rather than a genuine reduction in costs

Wind farm developers are warning<sup>24</sup> that projects are at risk as a result of recent supply chain cost inflation and rising interest rates which have boosted financing costs. They are seeking tax breaks or enhanced subsidies from the UK government and claim that the sharp rise in costs is putting British projects at risk. According to the FT, several companies that won contracts in the AR4 CfD round last year have warned ministers that the projects will be difficult to deliver at the agreed prices.

Last year's auction was the largest to-date, and secured the lowest strike price so far, which surprised me at the time since the issue of cost inflation was already established when the auction took

place. Developers I spoke to afterwards told me they were confident of delivery, but that did not seem credible at the time. I think it is reasonable to question the auction strategies of these developers, when not only were rising costs evident at the time of the auction, turbine manufacturer losses had been growing for a number of years. This should have provided a strong signal that prices would have to rise since no company can be expected to trade at a loss indefinitely.

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<sup>23</sup> [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA\\_Costs\\_2019\\_EN.pdf?la=en&hash=BFAAB4DD2A14EDA7329946F9C3BDA9CD806C1A8A](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Costs_2019_EN.pdf?la=en&hash=BFAAB4DD2A14EDA7329946F9C3BDA9CD806C1A8A)

<sup>24</sup> <https://www.ft.com/content/80dee308-a564-4ee4-b1f2-ab7dbed643cd>

When the auction results were announced, they were widely celebrated<sup>25</sup> as “proving” that renewables are cheap and that we should build more<sup>26</sup> of them to reduce the country’s reliance on potentially very expensive gas, with claims<sup>27</sup> that the projects securing contracts would “save consumers £58 a year compared to the cost of power from gas”.

*“Low auction prices confirm that renewables are cheapest but we could have had a lot more. Now is the time to extend the use of Contracts for Difference to create a new deal between low carbon generators and the UK consumer.”*

**- Johnny Gowdy, Director, Regen**

Of course, since then gas prices have fallen<sup>28</sup>, and the successful AR4 projects are at risk of not being built, meaning consumers will save zero.

The pot and administrative strike prices for AR5 are lower than for AR4, leading to further concerns about the viability of Government targets. The administrative strike price in AR5 for offshore wind has been reduced from £46/MWh to £44/MWh. The auction results are expected in early July, but many in the industry are calling<sup>29</sup> on the Government to adjust the auction parameters or risk climate targets further:

*“Unfortunately, in the light of global inflationary pressures, the budget and parameters set for this year’s CfD auction are currently too low and too tight to unlock all the potential investment in wind, solar and tidal stream projects which the industry could deliver ... At a time when the US and EU are bending over backwards to offer incentives for renewable energy developers to come to them to build new projects, the UK is sending the wrong investment signals. As a result, we risk losing vital opportunities to scale*

*up our supply chains around the UK, denying communities the industrial-scale benefits which our sector offers... We’re calling for the Government to revise the CfD budget so that we can stay on track to deliver on our renewable energy targets, as well as creating tens of thousands of high-quality green tech jobs and attracting billions in private investment in the years ahead.”*

**- Michael Chesser, Economics and Markets Manager, RenewableUK**

Unfortunately, Chesser made similar claims<sup>30</sup> ahead of AR4. Although the Government set the budget for AR4 it did not force developers to bid, and the fact that a record number of contracts was awarded showed there was in fact strong developer appetite at the set budget. Or at least, so it appeared, until they started asking for more. The question is why did they bid the way they did knowing that costs were rising and that OEMs were losing £ billions? They must have known, or at the very least feared, that they would not actually be able to build these projects at the prices they bid at. This suggests their strategy was to secure contracts on the expectation they would be re-negotiated, because no-one would be able to deliver on them, providing the developers collectively with some kind of market power. Essentially, they got themselves a free option.

### What happened to the Supply Chain Plans for the AR4 projects that are now apparently at risk?

Developers of projects that have a capacity of 300MW or more must apply for a Supply Chain Plan (SCP) Statement from BEIS if they are planning to take part in a CfD auction, which they must provide to National Grid ESO (as the delivery body) as part of their CfD application. This is to ensure that:

<sup>25</sup> <https://windeurope.org/newsroom/news/uk-awards-almost-11-gw-in-biggest-ever-national-renewables-auction/>

<sup>26</sup> <https://www.regen.co.uk/contracts-for-difference-allocation-round-4/>

<sup>27</sup> <https://www.blog.renewableuk.com/post/record-amount-of-new-clean-energy-capacity-secured-at-record-low-prices-for-consumers-ar4-low-down>

<sup>28</sup> <https://www.blog.renewableuk.com/post/record-amount-of-new-clean-energy-capacity-secured-at-record-low-prices-for-consumers-ar4-low-down>

<sup>29</sup> <https://utilityweek.co.uk/cfd-budget-sends-the-wrong-investment-signals/>

<sup>30</sup> <https://www.energylivenews.com/2023/03/17/renewable-energy-projects-at-risk-uks-latest-plans-could-cause-missed-investments/>

*“generators commit to a range of actions that can improve the competitiveness, productivity and capability of their supply chains. The rationale is that this, in turn, would increase competition and drive down the cost of generation over time, contributing to lower costs to consumers”.*

It’s difficult to see how costs of wind power could have been driven down in AR4 compared with previous auctions when (a) supply chain costs were clearly rising due to higher raw materials prices which are fully outside the control of OEMs, and (b) those OEMs have for the most part already posted two years of significant losses suggesting that not only was there little scope for further price reductions, but that prices would likely rise.

In 2021, the Government modified<sup>31</sup> the SCP process to accelerate supply chain development in light of its net zero targets. The SCP questions became more detailed, and BEIS introduced a more rigorous monitoring process to track SCP implementation. The delivery of a project’s SCP is assessed in a Supply Chain Implementation Statement issued by BEIS after a project has reached its milestone delivery date. Projects that do not score at least 60% of total marks in each section of their SCP at the implementation stage (or 50% overall for floating projects with projects under 300MW) are unlikely to fulfil one of the Operational Conditional Precedents in the CfD contract, which may lead to CfD contract termination. Termination is recognised to be a significant consequence and is a last resort. The Government has subsequently consulted<sup>32</sup> on making further changes to the SCP process.

Since the move to annual auctions the Non-Delivery Dis-Incentive (NDD), which prevents a developer from entering future auctions in relation to a particular site, has weakened since the exclusion period has shortened in line with the increased frequency of auctions. Last year the Government consulted on strengthening the NDD. Several respondents suggested it should be strengthened through the use of bid bonds<sup>33</sup> particularly for Pot 1 technologies, with a

quicker development process. (Pot 1 includes: energy from waste with CHP, hydro (>5MW and <50MW), landfill gas, off-shore wind, on-shore wind (>5MW), remote island wind (>5MW), sewage gas, and solar PV (>5MW).

Some also suggested that annual allocation rounds might increase the risk of speculative bids, as applying for a CfD could be seen as a risk-free alternative to merchant options. It was suggested that the NDD process should be strengthened to include fines for delays or non-delivery during the development phase (with a claw-back mechanism if the terms of the Supply Chain Plan were not met).

The Government decided that if a CfD offer is not signed or if a CfD is entered into and subsequently terminated in certain circumstances of non-delivery, then the eligible generator will not be allowed to make an application for a CfD in the next two allocation rounds in respect of certain sites, to apply from AR5 onwards. It also said it would closely monitor the results of AR4 to see whether the NDD remains an effective disincentive, while meeting the objective of increasing the generation capacity of renewables.

In other words, the penalty for non-delivery is a restriction on applying for future CfDs for a certain period at the site in question, which is arguably a weak disincentive – it might discourage speculative bids in isolation, but where the entire market appears to have bid at unrealistic prices, the Government risks the collapse of the entire round with few if any developers actually building their projects. This means that the developers end up with the market power with the Government facing pressure to improve the economics of the auction notwithstanding the low headline price. And the worst outcome for developers is just a two-year delay in progressing that particular project.

### Should the Government improve the AR4 economics to ensure projects are built?

The Government has an unattractive choice: either it can insist on maintaining AR4 with its current economics, risking a failure of the round with few of the projects actually being built, which would undermine progress to net zero, or it could agree

<sup>31</sup> <https://www.gov.uk/government/publications/contracts-for-difference-cfd-allocation-round-4-supply-chain-plan-questionnaire-and-guidance>

<sup>32</sup> <https://www.gov.uk/government/consultations/contracts-for-difference-allocation-round-6-amendments-to-the-supply-chain-plan-questionnaires>

<sup>33</sup> [https://uk.practicallaw.thomsonreuters.com/4-107-6493?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/4-107-6493?transitionType=Default&contextData=(sc.Default)&firstPage=true)



*“The offshore wind developers seeking additional subsidies are treating taxpayers as fools. CfD contracts are inflation-indexed, so electricity customers will be paying higher prices for their electricity until 2040 and beyond as a consequence of recent inflation. The notion that there has been an unexpected increase in capital costs since bids were submitted last summer is ridiculous, as suppliers have been warning of severe cost pressures for at least 18 months. The reality is that offshore operators have been submitting unsustainable CfD bids ever since 2017, hoping that something would turn up. Even a period of very high market prices is not enough, so now they want to be bailed out by tax breaks. The Chancellor should just say No.”*

**- Professor Gordon Hughes, University of Edinburgh**

economic enhancements with developers. This would mean abandoning the narrative of ever-falling prices – arguably this should be abandoned anyway since it does not reflect economic reality – but the bigger problem is that it does nothing to discourage moral hazard. It leaves a bad taste to allow developers to get away with making artificially low bids to secure contracts they know they are unlikely to deliver on the expectation of persuading the Government to sweeten the pot later on.

It is time for the Government and the market to recognise more explicitly that the role of subsidies has changed. Two decades ago, when they were first introduced, it was on the understanding that subsidies were required to support immature technologies and would be discontinued once the technologies matured and became cost competitive. However, there is a growing realisation that the market is unlikely to ever be sustainable without subsidies. This is because the more electricity is generated with technologies that have near-zero operating costs, the lower wholesale electricity prices will become. If we look forward a couple of decades to a time when in most settlement periods during the year, the market price is set by intermittent renewables, they are unlikely to ever repay their capital costs through selling electricity (in those hours when prices are higher, intermittent renewables are unlikely to be generating and therefore will not benefit).

The Government recognises this in the REMA consultation, but it does not seem to be connecting that logic with the performance of the CfD. Of

course, we are not yet in that sort of market yet, but there is clearly a floor that is significantly above zero below which the strike prices are unlikely to fall if they are to reflect the true capital costs of the projects and likely income from selling electricity. The nature of the CfD is that developers do not benefit when market prices are higher, regardless of whether they are generating. In fact, they are insulated from market prices altogether.

Perhaps in recognition of this, the Government is consulting<sup>34</sup> on including other factors in the CfD process such as sustainability, capacity building, innovation addressing skills gaps and enabling system flexibility and operability. Of course, this will make the auctions complicated to run – how would the auction process differentiate between a cheaper project which has few non-price benefits and a more expensive project which does? Some approaches are outlined in the consultation and described here<sup>35</sup>.

The key drivers of project costs are materials, labour and finance costs, all of which vary based on economic cycles. Of course, technological developments continue, as evidenced by the increasing size of turbines, but there have been quality control issues with some of these larger turbines, leading to increased warranty claims by developers, which has contributed to the poor financial performance of the OEMs. Privately some speculate that it's time to pause the quest for ever larger structures and focus on getting the basics right.

In any case, it should be obvious that the status quo is unsustainable.

<sup>34</sup> <https://www.gov.uk/government/calls-for-evidence/introducing-non-price-factors-into-the-contracts-for-difference-scheme-call-for-evidence>

<sup>35</sup> <https://cms-lawnow.com/en/ealerts/2023/04/desnz-consults-on-further-reforms-to-the-cfd-regime>

<sup>36</sup> <https://www.gov.uk/government/publications/electricity-generator-levy-introduction>

## Government policy needs to be coherent and recognise changing economic realities

It's interesting that news about developer concerns peaked in mid-March ahead of the Spring Budget, with developers using public and no doubt also private channels to try to persuade the Government to extend support to renewable generation projects in the budget. Despite this not happening to any material extent, things have gone quiet since, but at the same time, there has not been any great progress on the AR4 projects with only two out of six offshore wind projects representing under 30% of the total capacity (2.28GW out of the total 7.89GW offshore wind awarded CfDs in AR4). None of the 1.5GW onshore wind projects has progressed to the construction phase either.

Of course, there is nothing to stop developers from going the merchant route, and building renewable projects outside the CfD regime. This will allow them to benefit from market prices for electricity that are likely to remain above the strike price for some time. However, this approach is hampered by the Electricity Generator Levy<sup>36</sup>, which imposes a temporary 45% charge on sales of electricity at a price in excess of a benchmark level of £75/MWh, for companies providing more than 50GWh per year. The levy applies only to exceptional receipts exceeding £10 million per year and is due to expire on 31 March 2028. While the levy in its current form is due to expire relatively soon in the context of the lives of these projects, its introduction will make investors more cautious of merchant models in case the levy is extended or new, similar levies are introduced in the future.

It is clear that the UK Government, like many of its counterparts around the world, wants to encourage a lot of wind capacity to be built. Unfortunately, while other jurisdictions are increasing tax breaks and other support mechanisms, the UK Government seems determined to reduce them. This means that in a competitive international market, developers are turning their attention to projects elsewhere, and manufacturers are focusing on expanding their own capacity in countries such as the US where the IRA has created a very favourable investment environment. With access to raw materials constrained and likely to become more so as the energy transition progresses, the UK cannot afford to fall behind.

Of course, I am not personally in favour of a race to build more wind. The rapid increases in balancing and curtailment costs indicate that the GB grid is struggling to accommodate the intermittent renewable generation it already has – it makes sense to properly

digest what has already been built before hurrying to build more. It might be smarter to focus attention on investments in grid infrastructure and demand reductions rather than pushing for ever larger amounts of wind capacity, in a competitive international market. But either way, the Government needs to recognise economic reality and ensure its policies are coherent: if it wants a lot more wind capacity to be built it needs to understand that costs are rising and therefore the investment landscape needs to be made more attractive, whether this is through higher CfD strike prices, tax breaks or other incentives. Failing to think this through risks leaving UK taxpayers with the worst of all worlds.

## Footnote

This paper was originally written in June 2023, before AR5 which took place in September 2023. I expected it to be difficult for off-shore wind, but in the event there were no bids at all for offshore wind projects in AR5. Criticism of the Government has been severe. One industry source was quoted in Utility Week<sup>1</sup> as saying the Government “really needs a kicking”, while others characterised the auction as a “major setback”, a “catastrophic outcome,” an “avoidable yet deeply harmful failure” and the “biggest disaster for clean energy in almost a decade.” The Government has been accused of failing to listen to developers who warned that the price was too low, however, another source said that developers have complained about low strike prices before and auctions have still succeeded. Developer RWE says a 70% uplift in CfD prices is needed to ensure the delivery of new projects<sup>2</sup>.

Cost pressures are causing projects around the world to dry up. During the whole of 2022 there were no offshore wind investments in the EU other than a handful of small floating projects. Several projects had been expected to reach financial close last year, but final investment decisions were delayed due to inflation, market interventions, and uncertainty about future revenues. Overall, the EU saw only 9GW worth of new turbine orders in 2022, a 47% drop on 2021<sup>3</sup>.

A recent tender in Germany was undersubscribed<sup>4</sup> – despite the target volume having been close to halved during the process, it still came up short of capacity offered. This is by no means the first disappointing German wind auction, with developers preferring the more commercially friendly auctions in the Netherlands. Over in the United States, despite the support offered by the Inflation Reduction Act, wind farm projects are also struggling. Orsted, the global leader in offshore wind, has indicated it may write off more than US\$2 billion in costs tied to three US-based

projects that have not yet begun construction. It may withdraw from these projects altogether (Ocean Wind 2 off New Jersey, Revolution Wind off Connecticut and Rhode Island, and Sunrise Wind off New York) if it can't find a way to make them economically viable.

In August, the US Government held an auction for wind leases in the Gulf of Mexico which attracted almost no interest from developers. One company, RWE, made a bid for one of three lease areas and won due to a lack of competition. There were no bids on the other two lease areas. Analysts said companies were reluctant to bid because the states along the Gulf coast do not have requirements to buy electricity from offshore wind farms. Meanwhile, requests for an average 48% increase in guaranteed prices for projects off New York were recently rejected<sup>5</sup>.

Long-term power contracts for the electricity produced by offshore wind farms (known as Power Purchase Agreements or PPAs) have been cancelled, with wind farm developers paying exit penalties. Developer Avangrid, a subsidiary of Spanish giant Iberdrola, cancelled<sup>6</sup> its contracts for output from the planned 804MW Park City wind farm and the 1.2GW Commonwealth Wind project. It plans to re-bid these projects in future auctions, but for now they have been terminated. Shell, Equinor and Orsted have all also sought to cancel or re-negotiate similar contracts, while the Ocean Winds-Shell project, SouthCoast Wind, agreed to pay US\$60 million to cancel contracts with Massachusetts utilities.

It's not just the UK Government that is grappling with the new economic realities of offshore wind.

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