PERSPECTIVES

FROM AMBITION TO ATTRITION:
The Financial Realities Behind Wind Project Suspensions

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

Introduction: Offshore Wind Projects Pulled Amid Cost Surges

The offshore wind industry has faced a wave of high-profile setbacks that have sent shockwaves through the global renewable energy landscape. The offshore wind industry was shocked when Denmark had to cancel 3 GW of offshore wind projects because the no-subsidy model was no longer working, according to Lars Aagard, Minister for Climate, Energy and Utilities.[1] This year, Equinor, the Norwegian energy company, suspended offshore construction on Empire Wind 1,[2] a multi-billion-dollar offshore development off the New York coast, with fears of being canceled by the developer lately raised.[3] The project was recently restarted after a stop-work order by the United States government was lifted. Recently, the UK net zero targets are on the brink, as Ørsted, the Danish renewable energy and wind farm developer, halted work on the Hornsea 4 project in the North Sea, a 2.4 GW project that could have powered more than a million houses.[4] The latest one came from New Jersey in the US, where Atlantic Shores requested to terminate a 1.5 GW development due to a withdrawal of the Air Permit[5] that related to the new presidential order dated 20 January 2025.[6]

These are not isolated cancellations. They reflect a broader trend of mounting financial and operational pressures across the offshore wind sector. So, what do all these cancellations have in common?

This is likely the perfect storm of macroeconomics factors, supply chain risk, and policy uncertainty which has brought the offshore wind industry to a standstill.

In this paper, we take a closer look at the financial underpinnings of wind energy by analyzing the Levelized Cost of Energy (LCOE) and its sensitivity to shifting economic conditions. We examine how policy uncertainty, macroeconomic factors and global supply chain dependencies—particularly with China—are driving up costs and adding further risk premium to wind energy projects. Finally, we highlight operational and construction improvements that can help mitigate cost pressures and restore investor confidence in both onshore and offshore wind developments.

Blowing Across Borders: A Transatlantic Comparison of LCOE between the US and Europe

Renewable energy projects – and especially wind projects – are under constant pressure to be economically competitive against other conventional sources of energy. In our view, achieving meaningful cost reductions during the design and construction phase is essential to securing long-term investment and ensuring project viability.

A widely recognized methodology involves using the Levelized Cost of Energy (LCOE). The LCOE allows measuring the average cost of electricity generation over a project's lifetime, enabling direct comparison across different sources of production. A key takeaway

[1] https://www.offshorewind.biz/2025/01/31/denmark-cancels-3-gw-offshore-wind-tender-govt-eyes-auction-with-state-subsidies/
[2] https://www.equinor.com/news/20250417-suspends-offshore-construction-activities-empire-wind
[3] https://www.reuters.com/sustainability/climate-energy/equinor-says-it-could-cancel-new-york-offshore-wind-project-over-trump-order-2025-05-12/
[4] https://orsted.com/en/company-announcement-list/2025/05/orsted-to-discontinue-the-hornsea-4-offshore-wind--143901911
[5] https://www.offshorewind.biz/2025/06/10/atlantic-shores-requests-to-terminate-1-5-gw-orec-contract-with-new-jersey-presidential-wind-memorandum-subsequent-actions-directly-impacted-project-feasibility/
[6] https://www.offshorewind.biz/2025/03/17/epa-withdraws-permit-for-atlantic-shores-offshore-wind-project/

is that renewable energies have prospects for cost reduction, especially when accounting for fuel sensitivity, tax subsidies, cost of equity and debt, or firming cost.[7] There is always a transitory landscape when calculating the LCOE that constantly changes due to several macroeconomic factors, including interest rates, firming costs, etc.

In our view, reducing costs during the construction phase offers a strategic advantage - particularly in comparison to more mature industries like oil and gas, where opportunities for cost optimization are more limited. For wind energy to maintain a competitive edge, continuous innovation and operational efficiency must be prioritized.

To better understand regional cost dynamics, we examined LCOE studies from both the United States and Europe. While these studies provide valuable insights, it is important to note that their findings are shaped by differing assumptions, input variables, and policy environments. As such, direct comparisons should be approached with caution.

The Price of Wind: US LCOE in the Context of Policy Volatility

As cost competitiveness becomes a defining factor in the energy transition, US wind projects are under pressure to deliver value amid rising construction costs and fluctuating LCOE benchmarks. These financial realities are particularly stark in offshore wind, where LCOE remains the highest across the wind sector.

The construction cost in the US for the onshore wind turbines increased from 1.4% to 10%, depending on the wind farm capacity.[8] On average, the onshore wind LCOE in 2024 ranged between $27/MWh and $73/MWh, or alternatively between $45/MWh and $133/MWh when accounting for storage costs.[9] The 2025 estimates of the same analysis have clearly worsened the onshore LCOE which is estimated to be between $37/MWh and $86/MWh, and a marginal improvement is sought when accounting for storage costs with an LCOE ranging from $44/MWh to $123/MWh.[10]

However, the offshore industry is currently the most expensive wind source with a LCOE between $74/MWh and $139/MWh during 2024,[11] and slightly widening this range in 2025 from $70/MWh to $157/MWh.[12]

Fortunately, there is a goal to significantly reduce several of these costs. Recent predictions from the National Renewable Energy Laboratory (NREL)[13] suggest that from 2023 to 2035 onshore wind could reduce the LCOE from 39$/MWh to 27$/MWh. The analysis points out that a net 32% capital expenditure (CapEx) reduction could be achieved through wind plant economics of scale, turbine scaling with less material use, and efficient manufacturing, contributing to a reduction of 9$/MWh.

For fixed-bottom offshore wind projects the LCOE could be reduced from 95$/MWh to 61$/MWh in the same period with a reduction of 27$/MWh associated with a 38% net CapEx reduction through the same efficiencies plus optimization of foundation design. The 51% net CapEx reduction would result in 61$/MWh from the baseline case of 145$/MWh for floating offshore projects.

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[7] https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf
[8] https://www.eia.gov/todayinenergy/detail.php?id=63485
[9] https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf
[10] https://www.lazard.com/media/eijnqja3/lazards-lcoeplus-june-2025.pdf
[11] https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf
[12] https://www.lazard.com/media/eijnqja3/lazards-lcoeplus-june-2025.pdf
[13] https://www.nrel.gov/docs/fy25osti/91775.pdf

Other independent findings suggest an LCOE reduction of 23.6% from scaling turbine and plant capacities.[14] Whilst further cost reductions could come from investment in higher-voltage or high-voltage direct current (HVDC) export cables; more efficiently designed monopiles, and alternate installation strategies that eliminate the wind turbine installation vessel (WTIV), such as self-erecting wind turbines[15] could also be utilized. The latter would be extremely beneficial since heavy-lift vessels are in short supply, especially to reach European wind targets.[16]

The trade war between China and the US, however, is expected to have a negative impact on wind energy project costs. The reduction from 145% to 55% on Chinese imported products to the US[17] is indeed good news for the industry. Nonetheless this 55% will still have severe impacts. As pointed out by Ørsted CEO Rasmus Errboe, the cost of wind projects will have a meaningful impact due to tariffs on aluminum and steel.[18]

Moreover, US tariffs on Chinese goods will continue to affect domestic wind projects, given that China is the largest manufacturing hub for wind energy components, holding between 50% to 70% of the global market share.[19] These trade dynamics introduce new layers of uncertainty and cost volatility, suggesting that NREL estimations may need to be revisited in light of these new trade policies.

The combination of the tariffs with executive orders halting offshore leasing in federal waters[20] are resulting in uncertain times for wind projects in the US, as we have seen in the recent case of Atlantic Shores. The global supply and demand dynamics arising from the combined effects of trade wars and change of policies are yet unknown, but they look far from promising.

Under Pressure: Europe's Wind Energy Costs in a Competitive Landscape

Across the Atlantic, wind energy costs show a similar LCOE, reflecting both regional market dynamics and evolving project scales.

In Germany, recent studies suggest the 2024 LCOE for offshore wind turbines range between €55/MWh to €103/MWh (i.e. $62/MWh to $116/MWh) and between €43/MWh to €92/MWh for its onshore counterparts[21] (i.e. $48/MWh to $103/MWh). Another study suggests that EU-wide LCOE costs between 2019 and 2022 for onshore wind ranged between €33/MWh and €74/MWh, and €61/MWh to €140/MWh for bottom-fixed offshore[22] ($37/MWh, $83/MWh, $68/MWh, and $157/MWh, respectively). However, the same study recognizes that cost increases due to commodity price inflation, increasing shipping costs and supply chain disruptions, which led to an increase of wind turbine prices. The EU projections forecast a LCOE between €19/MWh and €33/MWh for onshore wind by 2050, and €30/MWh to €60/MWh for bottom-fixed offshore.

[14] Shields, M., Beiter, P., Nunemaker, J., Cooperman, A., & Duffy, P. (2021). Impacts of turbine and plant upsizing on the levelized cost of energy for offshore wind. *Applied Energy, 298*, 117189. https://doi.org/10.1016/j.apenergy.2021.117189
[15] Shields, M., Beiter, P., Nunemaker, J., Cooperman, A., & Duffy, P. (2021). Impacts of turbine and plant upsizing on the levelized cost of energy for offshore wind. *Applied Energy, 298*, 117189. https://doi.org/10.1016/j.apenergy.2021.117189
[16] https://www.offshorewind.biz/2025/06/16/unprecedented-expansion-of-heavy-lift-vessels-needed-for-europe-not-to-miss-offshore-wind-targets-report-says/
[17] https://www.weforum.org/stories/2025/06/us-china-deal-and-other-international-trade-stories-to-know-this-month/
[18] https://www.reuters.com/business/energy/trump-tariffs-have-impact-cost-orsteds-us-projects-ceo-tells-ft-2025-04-10/
[19] https://www.iea.org/energy-system/renewables/wind
[20] https://www.spglobal.com/market-intelligence/en/news-insights/articles/2025/1/trump-executive-order-chills-us-wind-industry-87200237
[21] https://www.ise.fraunhofer.de/content/dam/ise/en/documents/publications/studies/EN2024_ISE_Study_Levelized_Cost_of_Electricity_Renewable_Energy_Technologies.pdf
[22] https://airbornewindeurope.org/wp-content/uploads/2023/11/clean-energy-technology-observatory-wind-energy-in-KJNA31678ENN.pdf

Industry data confirms China has not only led as the turbine original equipment manufacturers (OEMs) during the past years but, in 2024, the top three OEMs' market share have been taken by Chinese companies,[23] strengthening its worldwide position. However, the EU offshore wind sector has recently seen a promising shift, as Siemens Gamesa recently surpassed all its competitors to position itself as the top turbine supplier.[24] While economies of scale can contribute to cost reductions, they may also exacerbate supply chain bottlenecks, increase manufacturing concentration, and amplify exposure to policy shifts – factors that collectively elevate the risk and cost profile of wind energy projects across Europe and other regions where supply chains are under strain.

Wind Rewired: Navigating Complexity, Accelerating Change

In the context of evolving regulatory landscapes, a climate of policy and regulatory uncertainty has a negative correlation with firm-level capital investment[25] and directly affects the cost of capital, especially on industries depending on government subsidies,[26] such as wind energy.

At the same time the weighted average cost of capital (WACC) for offshore wind is higher than its onshore counterpart or solar developments,[27] putting further pressure in a climate of relatively high interest rates – especially compared to recent historical lows. Different sources of energy compete differently when accounting for the sensitivity on the WACC, which is linked to specific operational characteristics and the resulting risk / return profile.[28]

In Europe, the WACC for offshore wind has risen by 3 to 4 percentage points from 2020 to 2024 not only due to higher interest rates but also due to an increase of projects under merchant models,[29] exposing revenue risk due to uncertain electricity consumption and, at the end, increasing the WACC. It is estimated that this increase of 3 to 4 percentage points is consistent with an LCOE increase of around 30%.[30] In essence, access to a low cost of capital remains critical, particularly for capital-intensive technologies like offshore wind, where financing costs significantly influence competitiveness and investment viability.

Investment mechanisms to improve attractiveness, including government subsidies and regulatory certainty, can certainly ease the financial pressure. Nonetheless, the viability of a subsidy-based financial model for wind projects remains a subject of ongoing debate. However, the reality is clear: the sector is under pressure, wind projects are being hit hard and dampening investors' confidence due to policy uncertainty, macroeconomic factors, and supply chain risk.

Looking closer to the supply chain risk, the wind industry's supply chain is highly globalized and fragmented. On one side, China dominates the production capacity of wind turbines, rotor blades, nacelles, towers, and foundations.[31] On the other, the extraction of raw materials – such as iron, zinc, and copper – is heavily concentrated in different countries, each with

[23] https://www.4coffshore.com/news/goldwind2c-envision-and-mingyang-lead-the-wind-turbine-market-in-2024.-nid30883.html
[24] https://about.bnef.com/blog/chinese-manufacturers-lead-global-wind-turbine-installations-bloombergnef-report-shows/
[25] Huseyin Gulen, Mihai Ion, Policy Uncertainty and Corporate Investment, *The Review of Financial Studies*, Volume 29, Issue 3, March 2016, Pages 523–564, https://doi.org/10.1093/rfs/hhv050
[26] Drobetz, Wolfgang and El Ghoul, Sadok and Guedhami, Omrane and Janzen, Malte, Policy Uncertainty, Investment, and the Cost of Capital (October 5, 2017). Journal of Financial Stability, Available at SSRN: https://ssrn.com/abstract=2980918 or http://dx.doi.org/10.2139/ssrn.2980918
[27] Dukan, M., Gumber, A., Egli, F., & Steffen, B. (2023). The role of policies in reducing the cost of capital for offshore wind. iScience, 26(6), 106945. https://doi.org/10.1016/j.isci.2023.106945
[28] https://www.lazard.com/media/eijnqja3/lazards-lcoeplus-june-2025.pdf
[29] https://cdn.orsted.com/-/media/www/docs/corp/com/about-us/whitepaper/offshore-wind-at-a-crossroads.pdf/?msg_pos=2
[30] https://cdn.orsted.com/-/media/www/docs/corp/com/about-us/whitepaper/offshore-wind-at-a-crossroads.pdf/?msg_pos=2
[31] https://www.ebrd.com/content/dam/ebrd_dxp/assets/pdfs/financial-institution/sustainable-finance/environmental-and-social-risk-management/issues/Wind-sector-supply-chain-guidance.pdf

its own geopolitical and economic risks. The refining of critical rare earth minerals for wind turbine permanent magnets is dominated by China accounting for 92% of the REPM market, which uses pricing, volume production and exports to keep its market position.[32]

The reliance on Chinese manufacturing and extraction of rare elements for wind turbines adds another level of risk premium to the equation. Whilst the trading relationships between Europe and China appear to be stable, tensions between the US and China introduce a significant risk premium. Nevertheless, worldwide supply chain risks are increased by the strained relationship between these two superpowers, adding complexity to the forecasting dynamics of the market and project cost budgeting everywhere else.

Conclusion

Advancing and scaling up technology offers some prospective relief. However, the current landscape remains riddled with challenges, far from the smooth energy transition that most countries anticipated. As cost and financial pressures escalate, we can expect increased friction between stakeholders and certainly several disputes in the construction of onshore and offshore wind projects.

Yet, within these challenges lie opportunities. The design and construction of wind projects present opportunities to innovate and optimize processes. The growing pressure to bring down the overall cost – so that wind energy can remain competitive with conventional power sources – may serve as a catalyst for accelerated research and development, whereas high-capacity factor turbines can be a differentiator.[33] Strategic investment in innovation, supply chain resilience, and construction efficiency will be essential to overcoming current barriers and unlocking the full potential of onshore and offshore wind projects.

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[32] Depraiter, L., Goutte, S., & Porcher, T. (2025). Geopolitical risk and the global supply of rare earth permanent magnets: Insights from China's export trends. *Energy Economics, 146*, 108496. https://doi.org/10.1016/j.eneco.2025.108496
[33] https://www.vestas.com/en/media/blog/technology/boosting-wind-project-roi---lower-wacc-with-high-capacity-factor

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