

INSIGHT REPORT



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Global Onshore Wind Energy: 5 key things to look for in 2023



Executive summary

Western onshore wind markets will continue to grapple with supply chain challenges and capex increases in 2023. Wind turbine manufacturers and their suppliers will experience a challenging year, despite sustained efforts to increase price in light of global supply chain challenges. Still, a return to profitability is imminent due to unprecedented positive renewable energy policy momentum in the world’s largest markets.

The Chinese onshore wind industry looks to leverage its low-cost position and economies of scale to approach global markets, threatening the market share position of entrenched western OEMs. As a response, there will be increased calls for domestic manufacturing policies, which will lead to new trade barriers and increases in new factory investment. These dynamics will inevitably result in further increases in turbine pricing and capex.

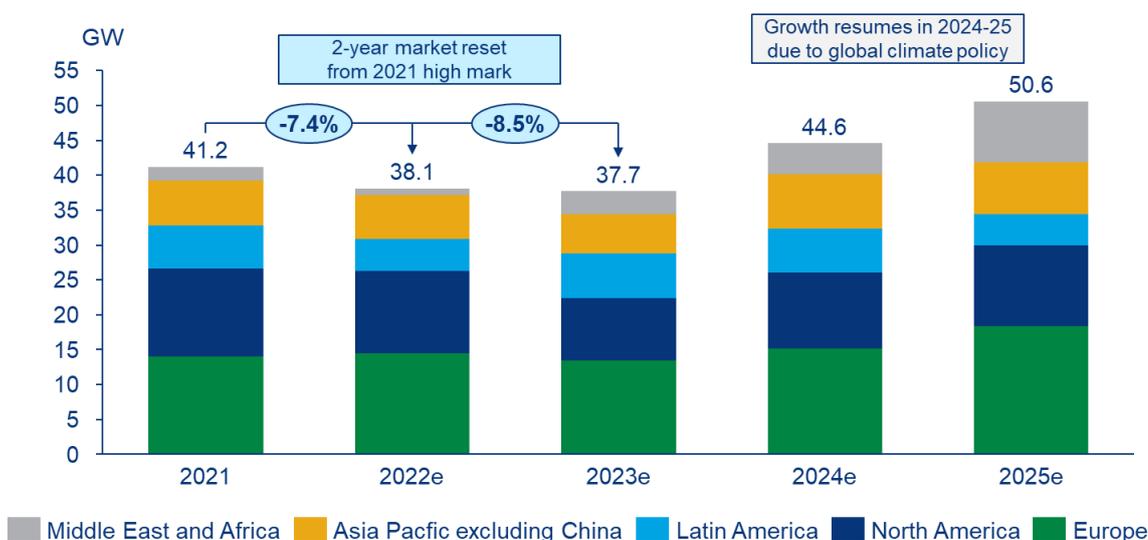
Many markets will react to increasing capex with a reset in power purchase agreement (PPA) prices, a lift in auction price caps and increased commercial and industrial (C&I) PPA pricing, driven by solid demand from C&I offtakers to meet environmental sustainability goals.

Read on for five key themes to watch for in the global onshore wind energy markets in 2023.

1. 2023 will remain painful for the wind energy supply chain but profitability turnaround will begin for western suppliers

- 2022 was a disastrous year for wind supply chain profitability.** The largest western wind turbine original equipment manufacturers (OEMs) have accumulated billions in losses over the course of 2022, leading many to close factories, lay off employees and increase pricing for wind turbine equipment.
- A perfect storm hit the OEMs with impacts lasting into early 2023.** The reasons for these struggles are multi-faceted but are primarily tied to supply chain issues, raw material inflation, dramatic increases in specialised logistics costs and a backlog of unfavourably priced supply contracts. These issues are expected to linger into at least the first half of 2023, which may lead to another round of layoffs or factory closures. Consolidation in the supply chain is possible as lingering overcapacity exists for towers, blades and other strategic components. GE’s split into three different companies will likely have mixed effects. The new GE Vernova energy-focused firm will have more autonomy but will not have the protection of the higher-margin aviation and medical businesses.
- 2023 will begin a profit turnaround and pathway to growth.** We anticipate a rush of new wind turbine orders in early 2023, following policy clarity in the US in the form of guidance from the US treasury on domestic content incentives. Permitting acceleration within the EU will also likely lead to a significant increase in new turbine orders. Supply chain constraints and raw material price volatility have been the primary drag on OEM profitability, but we expect them to subside in 2023. Policy certainty has never been stronger in major global markets, which leads Wood Mackenzie to forecast a return to growth in 2024, following 2 years of lower demand.

New build onshore wind market, excluding China and repowering, GW



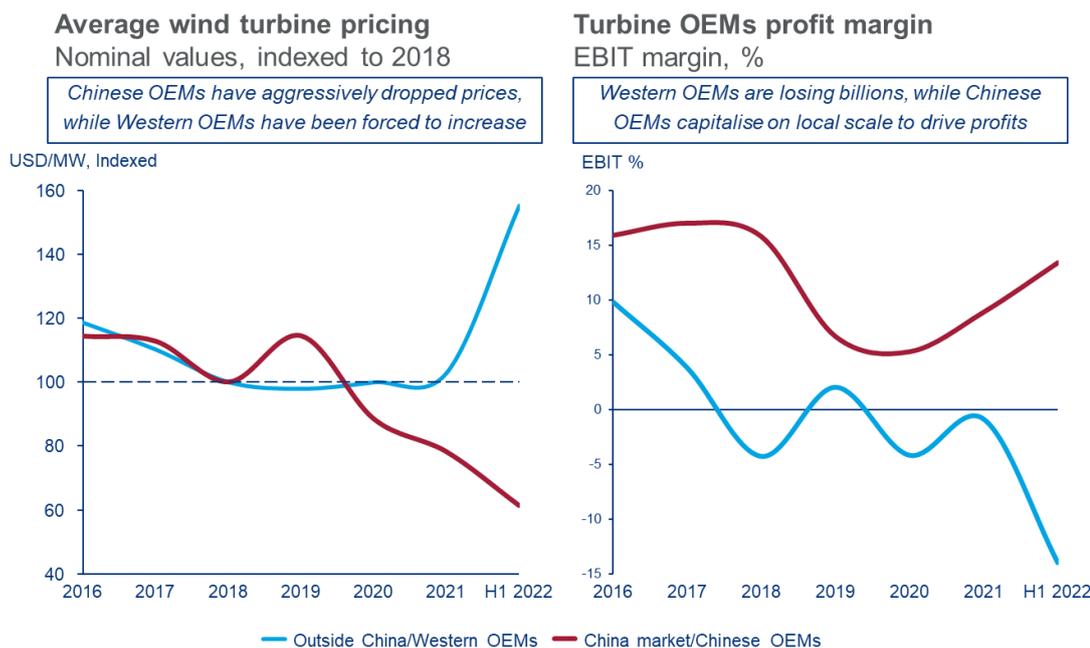
Source: [Global wind power market outlook update: Q4 2022](#), Wood Mackenzie, December 2022



2. Wind PPA and auction prices will rise to reflect wind energy capex growth, cost of capital increases and strong demand from C&I offtakers.

- **Capex increases will ultimately propel power prices up.** Western turbine OEMs have been raising turbine prices in reaction to sustained supply chain and profitability challenges. The rise in prices has led to a drop in new orders but it will ultimately to drive wind energy offtake agreement power prices higher in the long term.
- **Undersubscribed auctions in Europe will drive auction price caps higher.** Spain, Germany and France have all experienced severely undersubscribed renewable power auctions in 2022. Many developers view historically-high merchant power prices as a more attractive option to long-term contracts, particularly with current price ceilings in place. Many auction price caps will be increased in response to low subscription levels.
- **Strong demand from C&I offtakers will prompt a price premium.** Renewable energy PPAs allow commercial and industrial companies to meet environmental sustainability goals. Wind PPAs have also been widely used to save costs by hedging against volatile and historically-high wholesale power pricing. Increased demand from the C&I sector will drive PPA prices up in reaction to turbine price hikes.
- **We forecast that wind LCOE will increase in the near term and stabilise.** Capex increases will inflate LCOE in the near term before moving back to long-term cost reduction driven by technology advances and the deployment of 5 MW+ wind turbines in global markets. These LCOE levels will manifest in higher offtake prices.
- **China will continue to buck the trend.** Onshore wind capex dropped by over 25% in 2022 in China, driven by intense competition among Chinese OEMs, overcapacity within the Chinese manufacturing base and rapid migration to 5 to 7 MW wind turbines. Wind LCOE will continue to drop within China, which will affect the Green Power Trading schemes emerging across many Chinese provinces.

Comparison between Chinese and western wind turbine supplier metrics



Source: [Looking west: Overseas expansion of Chinese wind companies](#), Wood Mackenzie, November 2022

3. Chinese wind companies are set to take market share from western OEMs.

- **Chinese OEMs are gaining strength while western OEMs are on the ropes.** Wind turbine OEMs in China remain profitable despite dramatically falling turbine prices. Driven by the economies of scale in the Chinese supply chain, reduced exposure to raw material inflation and lower logistics volatility, this profitability contrasts with the significant losses occurring within western OEMs.
- **Chinese OEMs are leapfrogging western technology.** The average turbine size for orders placed in China for 2022 was over 5.4 MW which eclipses the 4.2 MW average rating for western OEMs. This discrepancy contrasts the historical trends, where the Chinese market has traditionally deployed smaller turbines.

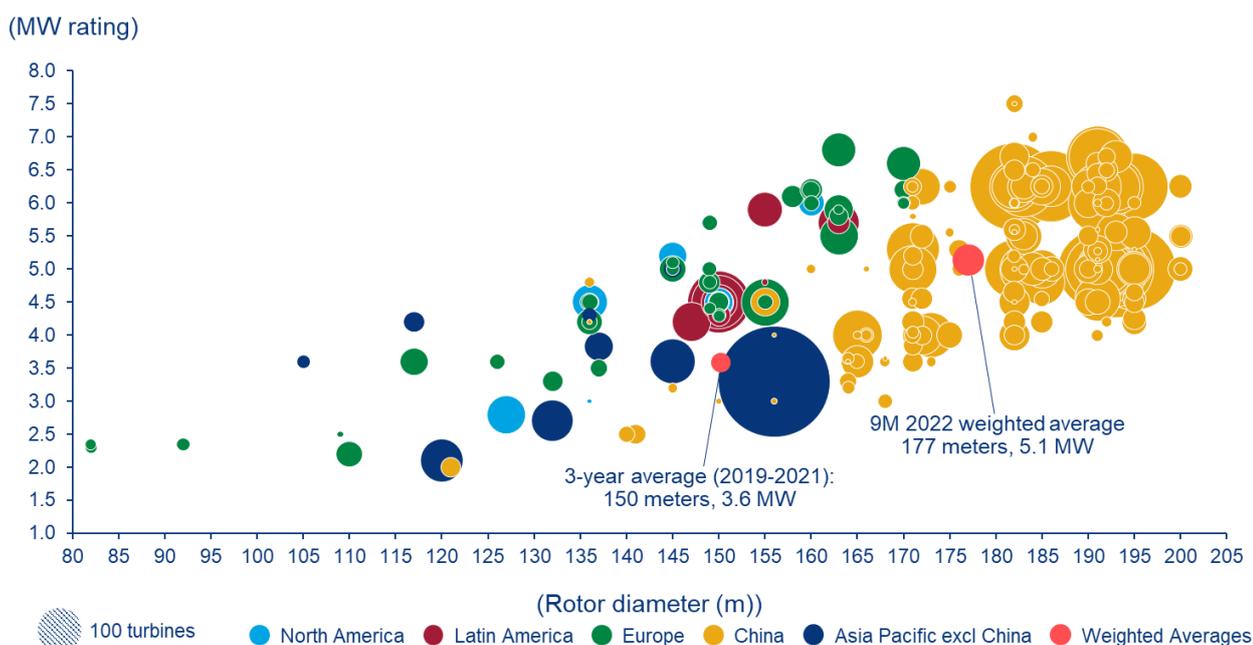


- **China’s overseas investment will be packaged across the value chain.** The top five asset owners in the world are Chinese state-owned entities. The scale of these companies and their diversification across fuel types provides stability and financial strength that can underwrite overseas expansion. The Belt and Road Initiative will also encourage these investors as it promotes direct foreign investment by Chinese firms. Asset owners will drive decisions further down the value chain, including awarding contracts to Chinese wind turbine OEMs, EPC providers and component vendors.
- **Emerging markets will be the primary focus for Chinese exports, the US and EU will be less exposed.** Chinese companies will focus on the rest of Asia, Africa, the Middle East and South America for overseas expansion, driven by the Belt and Road Initiative. However, the western wind energy strongholds of Europe and the US will see fewer Chinese imports. This targeted focus is due to growing geopolitical tensions, entrenched competition from western OEMs, trade barriers that increase the cost of Chinese imports and technical obstacles that could ultimately culminate in intellectual property battles.

4. Countries will deploy protectionist policies to increase local jobs, but likely to drive up capital costs further.

- **The Inflation Reduction Act will spur new investments in US wind manufacturing.** The section 45X Manufacturing tax credit and the bonus Production Tax Credit, available to projects that meet domestic content thresholds, will incentivise manufacturing activity in the US. As a result, we anticipate announcements for new blade and tower facilities in early 2023.
- **European OEMs will apply more pressure for domestic content.** Existing European factories are facing significant cost pressures and potential closures or employee reductions. Consequently, wind turbine OEMs and suppliers will press the EU Commission and national governments to promote local manufacturing.
- **Local content requirements exist in many emerging markets, with mixed results.** India, Brazil, Turkey, South Africa and other countries currently have or previously implemented local content requirements for wind projects. These incentives are intended to promote job creation but ultimately lead to higher-cost equipment, more fragmented supply chains and underutilised factories. More domestic content requirements in the world’s largest markets may also lead to long-term overcapacity in the manufacturing export-oriented hubs of China, India, Mexico and Southeast Asia.
- **Growing turbine sizes and associated logistics costs may encourage local supply.** The next generation of 5 MW+ turbines is becoming standard in many global markets. The sheer scale of these blades, nacelles and towers will also begin to dictate local manufacturing to reduce logistics expenses.

Onshore wind turbine orders, by rating and rotor diameter, 9M 2022



Source: [Global wind turbine order analysis: Q4 2022](#), Wood Mackenzie, December 2022



5. Wind technology will consolidate to 5 to 7 MW+ medium-speed drivetrains.

- **All leading OEMs now have onshore portfolios of 5 to 7 MW turbines.** Larger turbines provide opportunities for cost savings, particularly in balance of plant (BOP) and operations and maintenance (O&M). Many of these products have advanced beyond prototype stage and 2023 is expected to bring global commercialization for the latest generation of massive wind turbines.
- **The drive to modularity will consolidate global product portfolios.** Many western OEMs have been advancing modular turbine architectures, which allow multiple turbine types to use many of the same components to realise economies of scale and cost savings. While this approach has potential to provide cost savings, it will lead to the consolidation of turbine types around a specific size range. This will lead many OEMs to abandon legacy turbine portfolios in the 2-3 MW range in some markets.
- **The pace of new turbine introductions will begin to slow.** After years of rapid product launches and intense competition, Western OEMs will slow the rate of new turbine introductions. This slowing will allow companies to leverage modular constructions and realise the full commercial lifecycle of next-generation turbines as they seek to recover profitability. This is contrasted by the Chinese market, which appears to be accelerating next generation wind turbine development, driven by a hyper-competitive environment among Chinese OEMs.
- **Drivetrain architecture changes will shift towards medium-speed architectures.** Medium-speed drivetrains provide the benefits of reliability savings and the potential for cost savings when combined with modular architectures. At the same time, the deployment of direct drive turbines in the onshore wind market will become nearly extinct over the next five years. Many leading OEMs will continue to pursue high-speed geared architectures, particularly for smaller turbines, but medium speed technology is expected to finally realize the commercial promise that has been under development for the past decade in the wind energy market.



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