

Winterwind 2021

Record 2020 masks mounting onshore wind challenges

Isabelle Edwards

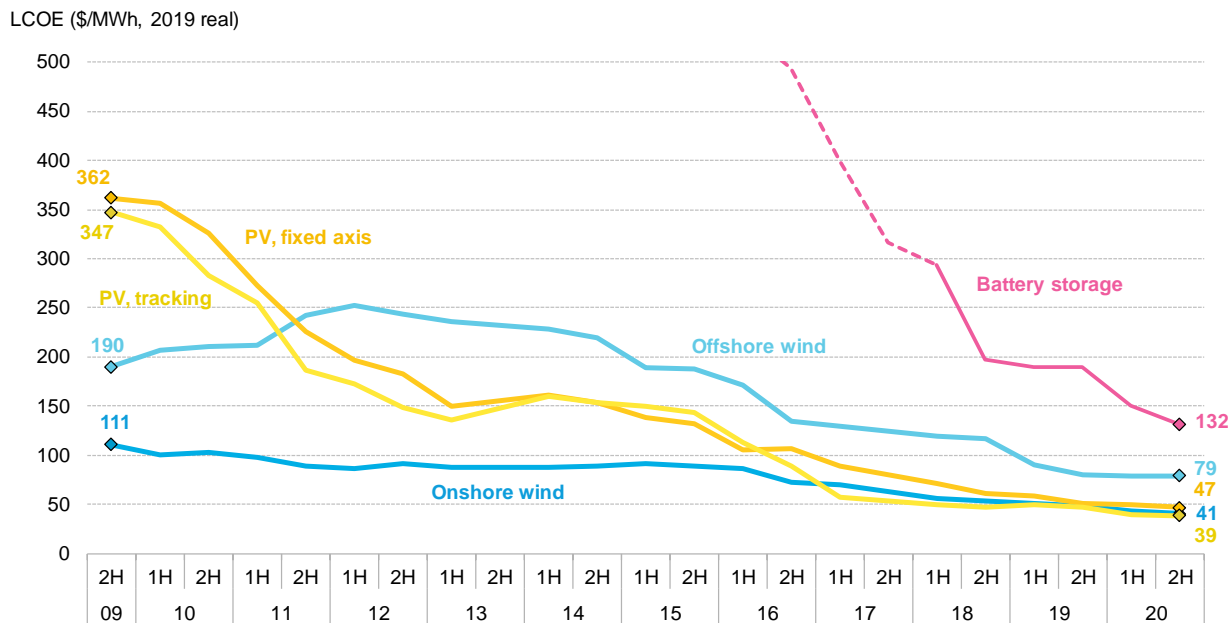
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April 19, 2021



BloombergNEF

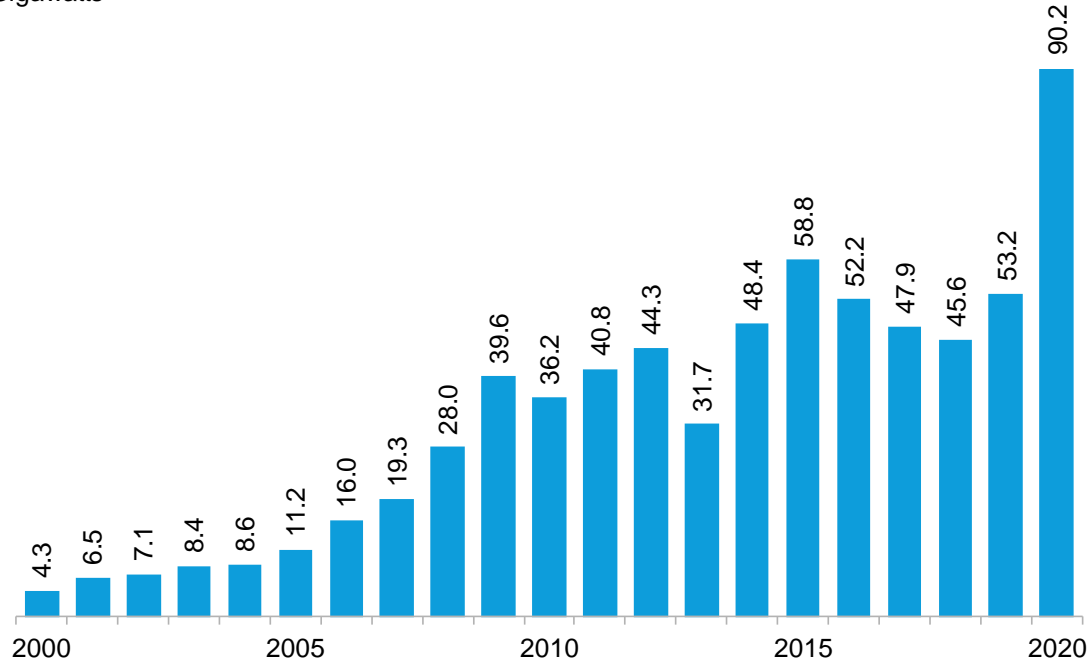
Global benchmarks – PV, wind and batteries



Source: BloombergNEF. Note: The global benchmark is a country weighted-average using the latest annual capacity additions. The storage LCOE is reflective of a utility-scale Li-ion battery storage system with four-hour duration running at a daily cycle and includes charging costs assumed to be 60% of wholesale average power price.

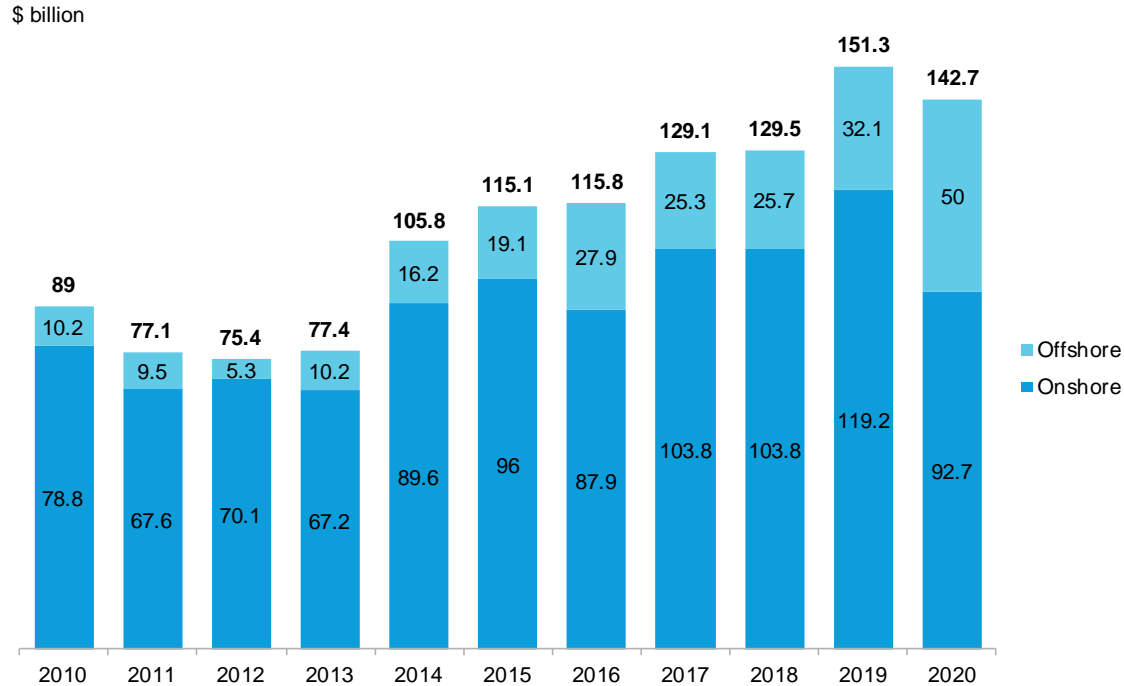
New onshore wind additions surge in 2020 as subsidies evolve in China, U.S.

Gigawatts



Source: BloombergNEF

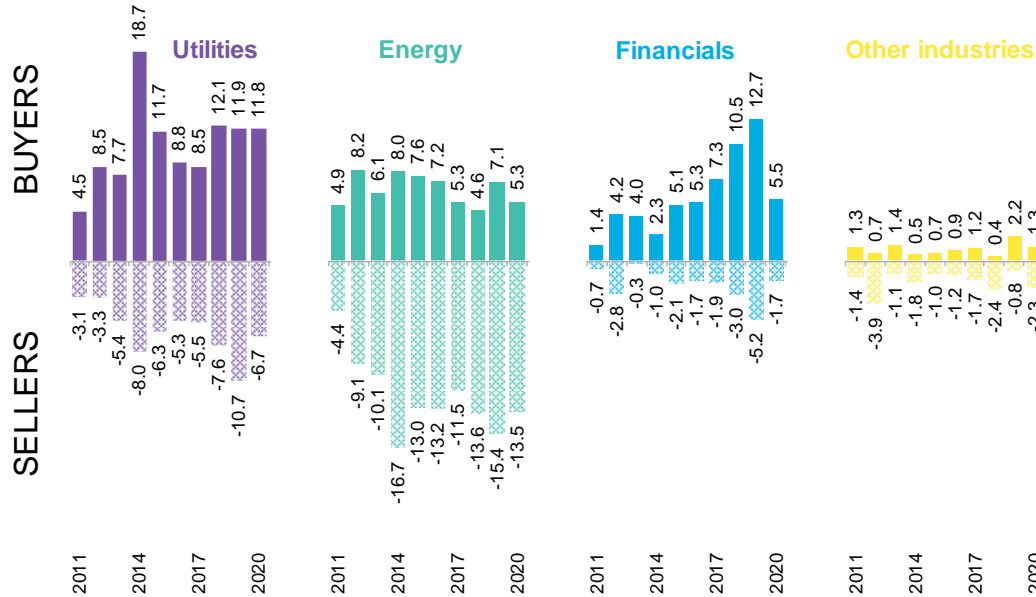
Offshore wind investment tops one third of all new wind investment



Source: BloombergNEF

Buying and selling volumes of onshore wind capacity, by industry

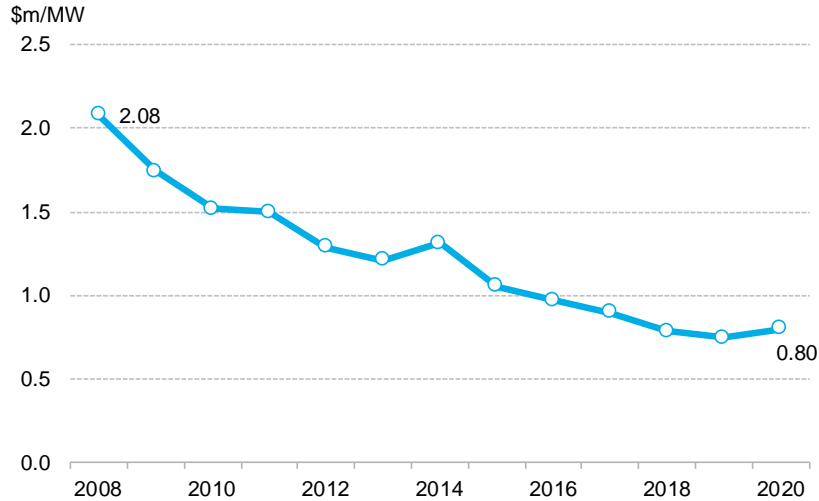
Gigawatt



Source: BloombergNEF. Note: Industry is determined using Bloomberg Industry Classification Standard. Other includes: industrials, real estate, materials, consumer discretionary, consumer staples, health care, communications, government and technology.

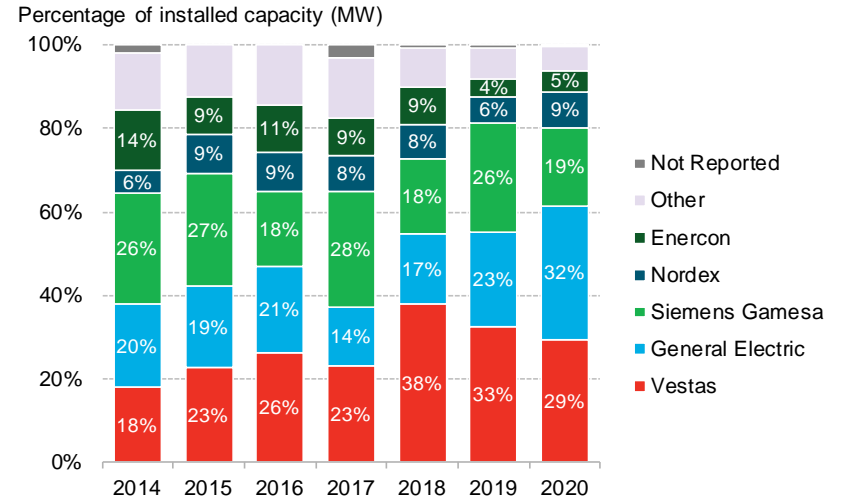
Price competition has squeezed out smaller turbine makers

BNEF Wind Turbine Price Index, 2H 2020



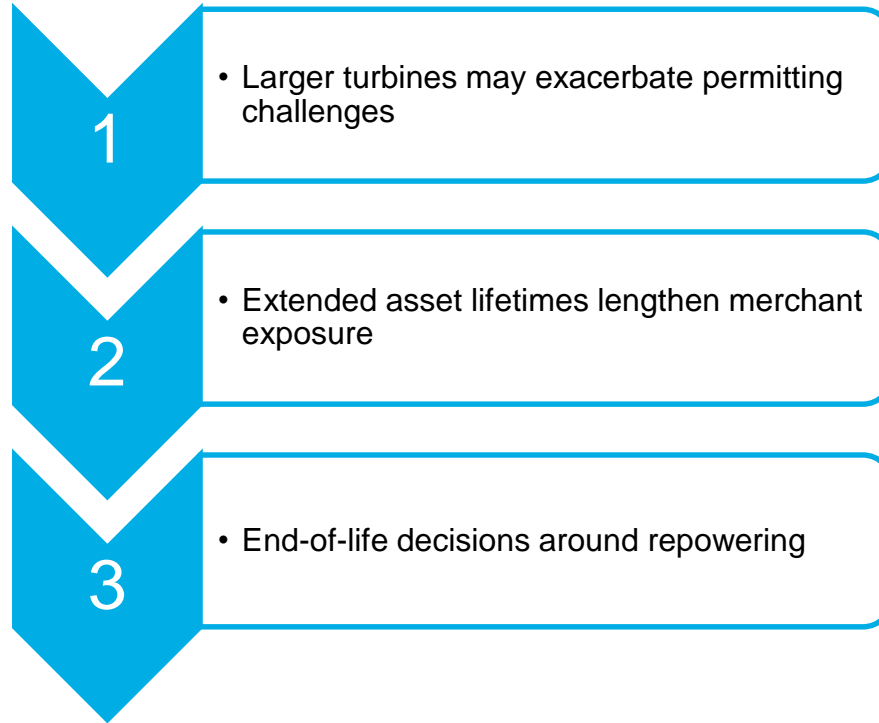
Source: BloombergNEF.

Wind turbine market shares, ex-China

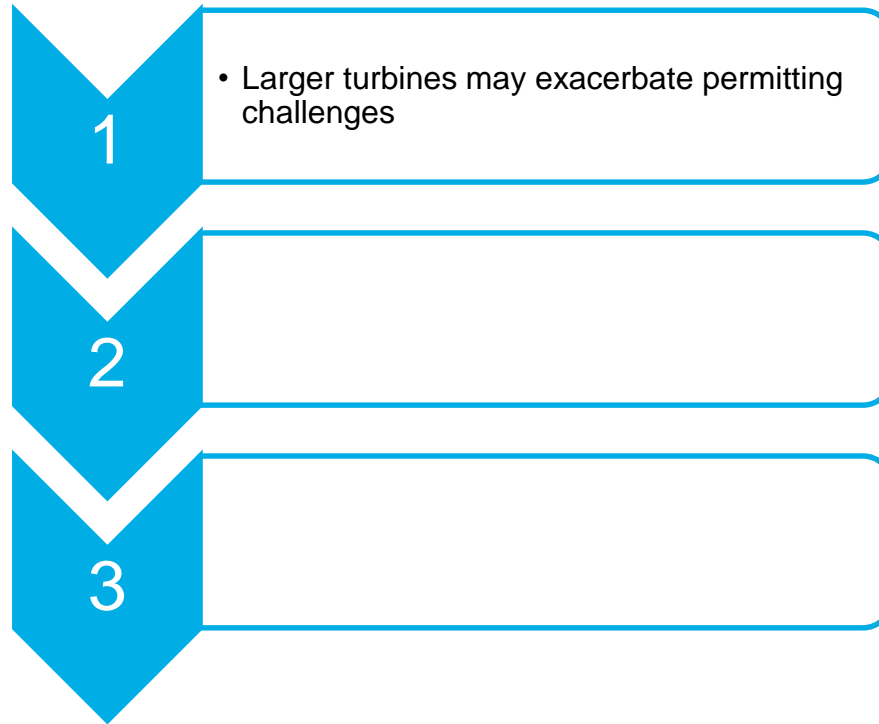


Source: BloombergNEF. Note: Companies are shown post-merger across the years. For example, Vestas Wind Systems A/S and MHI Vestas Offshore Wind A/S are grouped under Vestas for all years.

Record 2020 masks mounting concerns

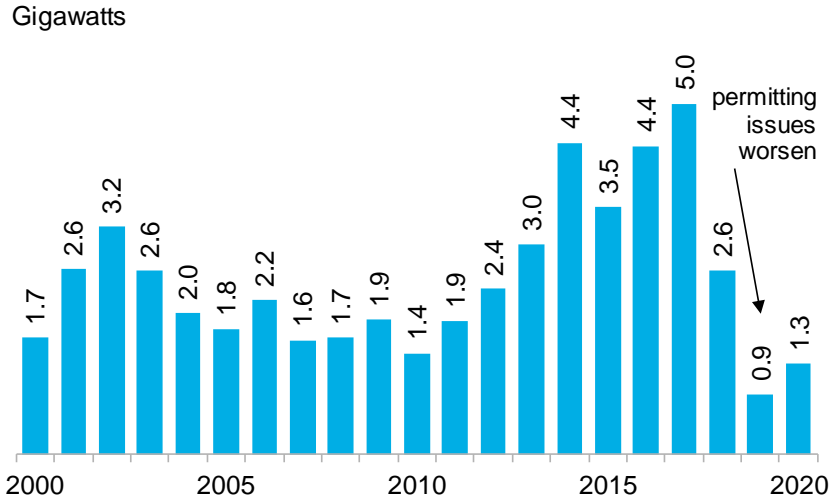


Larger turbines may exacerbate permitting challenges



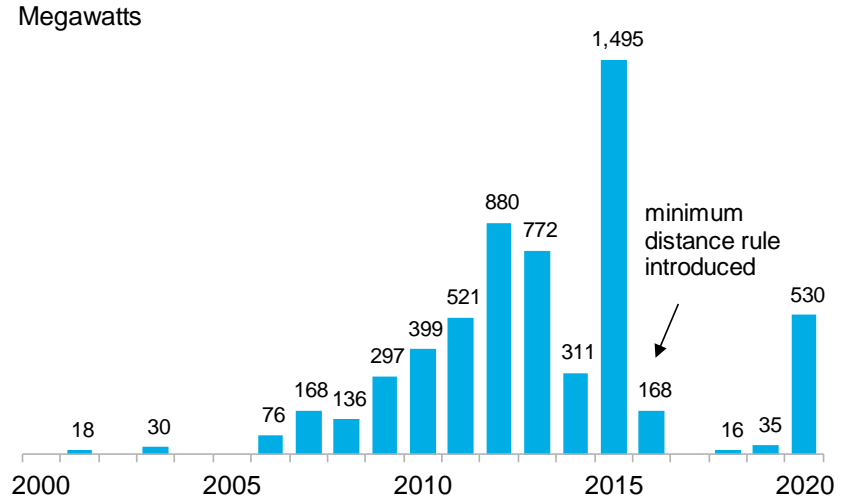
When policy turns off onshore wind

New onshore wind installations, Germany



Source: BloombergNEF.

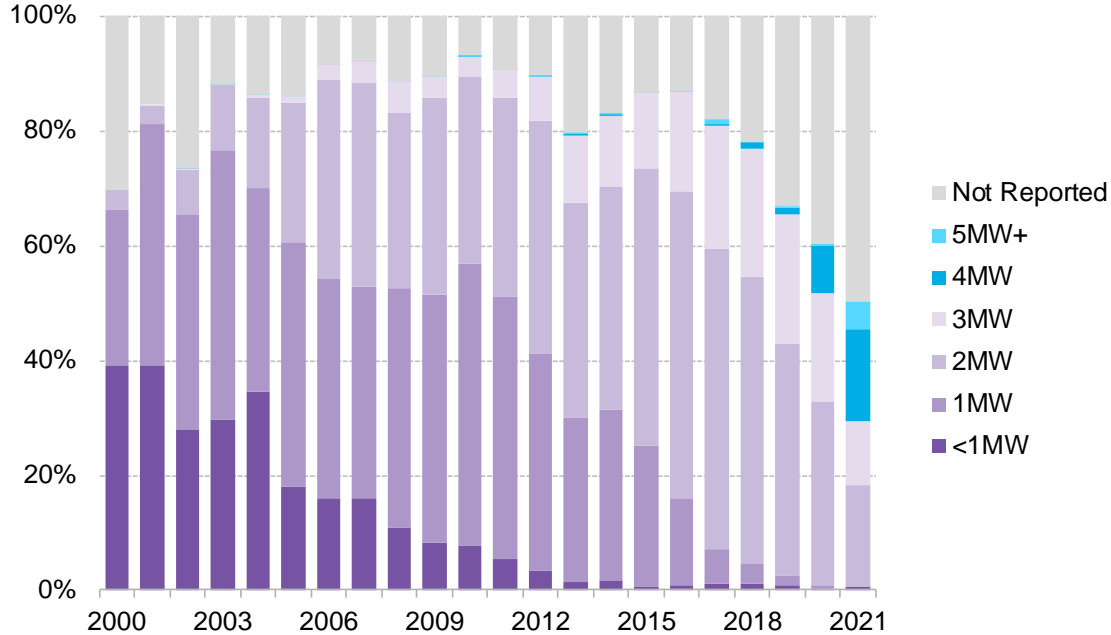
New onshore wind installations, Poland



Source: BloombergNEF.

Turbines between 4-6MW set to account for at least 20% of installations in 2021

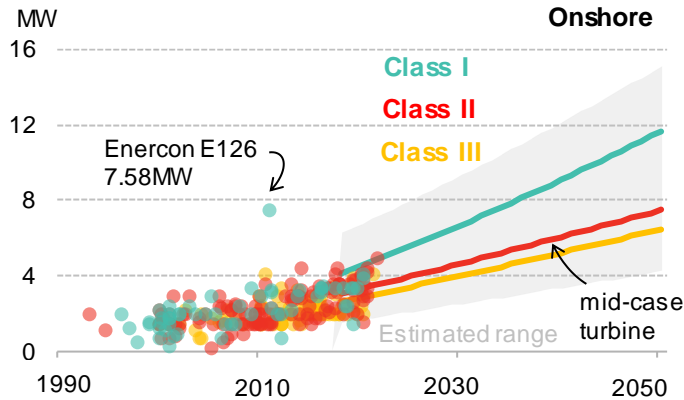
Share of new onshore wind capacity (% of MW)



Source: BloombergNEF.

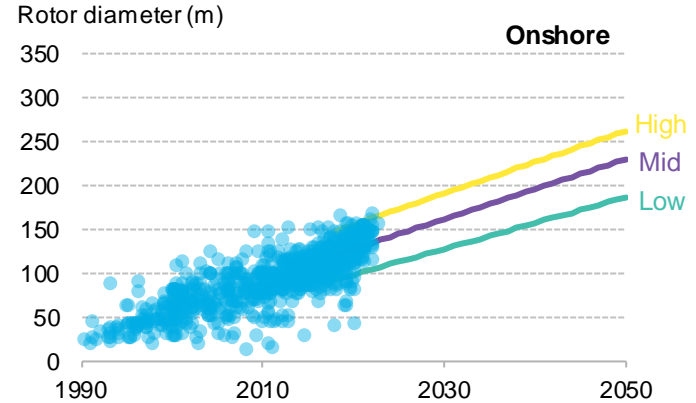
Turbine capacity, rotor diameters to double by end of 2050

Onshore wind turbine capacity forecast



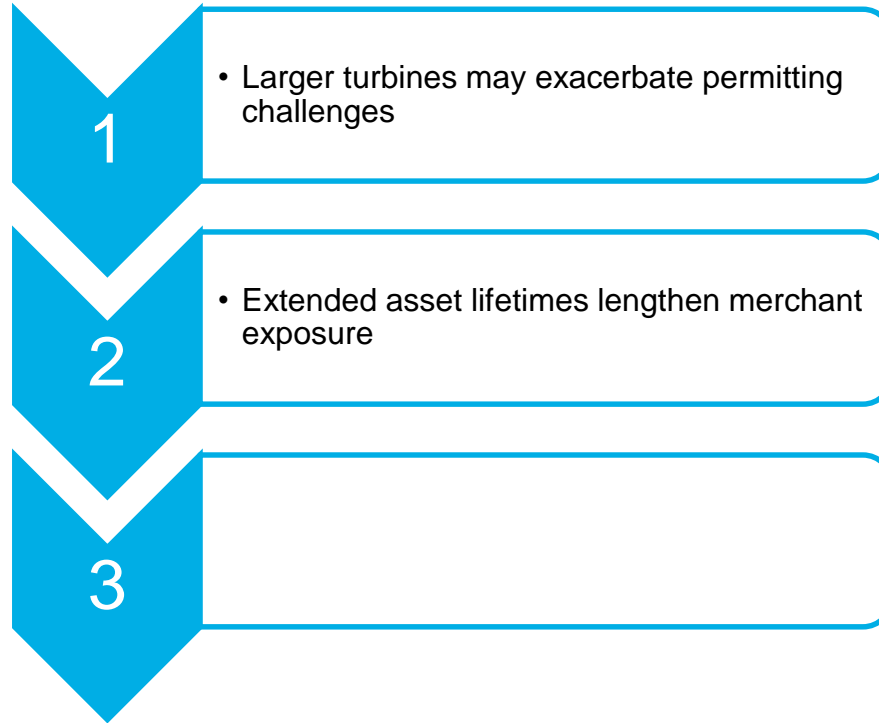
Source: BloombergNEF. Note: Dots represent the year a turbine model was first commissioned on a project. Mid-case turbine assumed as class II model with mid-case rotor diameter.

Onshore wind turbine rotor diameter forecast



Source: BloombergNEF. Note: Dots represent the year a turbine model was first commissioned on a project. Mid-case takes average trend across all data points, high and low-case take the trend of the 95th and 5th percentile of data points across a two-year interval.

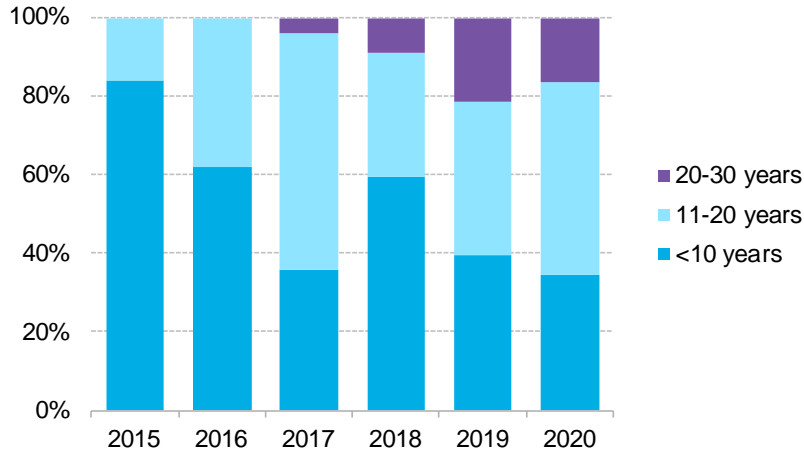
Extended asset lifetimes lengthen merchant exposure



30-year asset life promoted with longer service agreements

Service agreements beyond 25 years account for 20% of all contracts

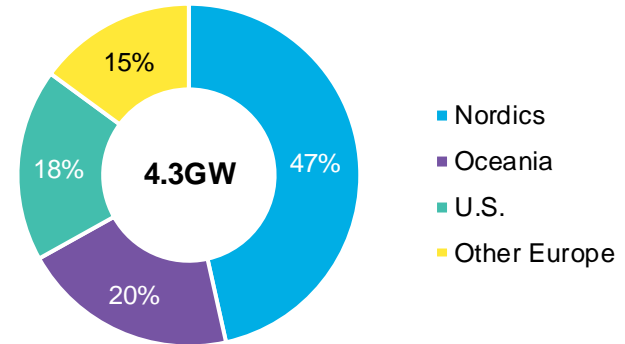
Share of ordered turbine capacity (MW)



Source: BloombergNEF. Note: includes service agreements disclosed by wind turbine makers which include a service agreement of a disclosed duration.

Over half of service agreements beyond 25 years signed in Nordics

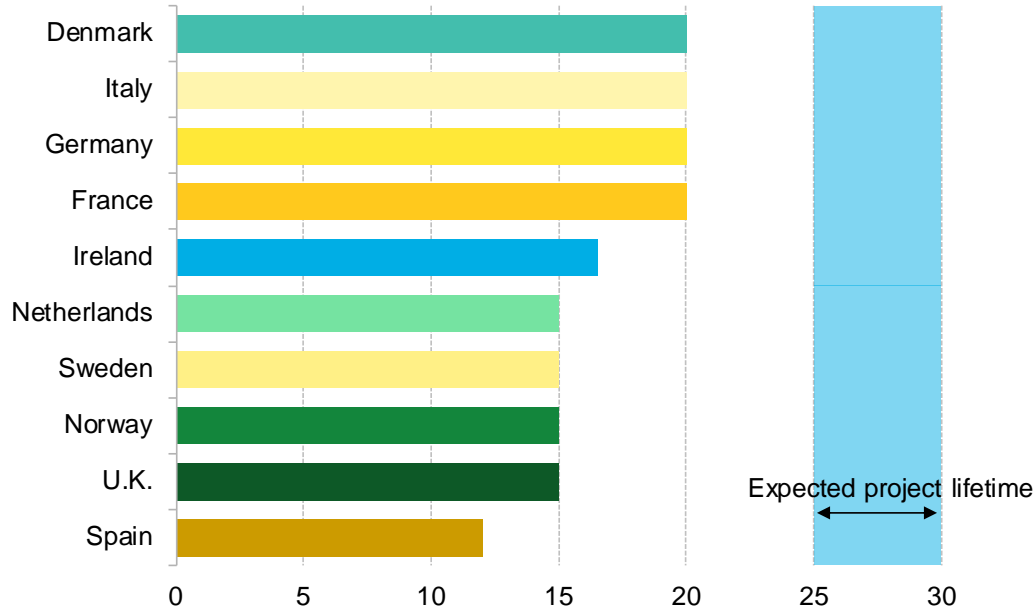
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Source: BloombergNEF. Note: includes service agreements disclosed by wind turbine makers which include a service agreement of a disclosed duration.

Merchant exposure increasing up to 50% of asset lifetime

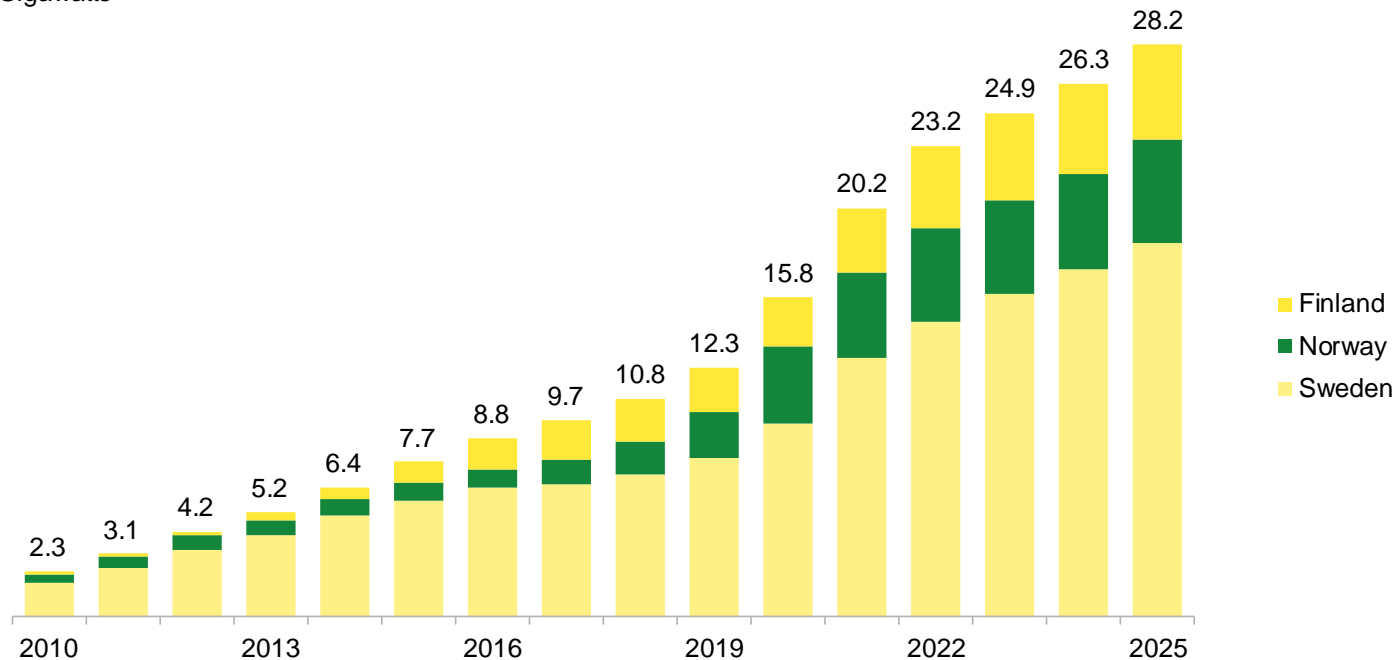
Subsidy duration (years)



Source: BloombergNEF

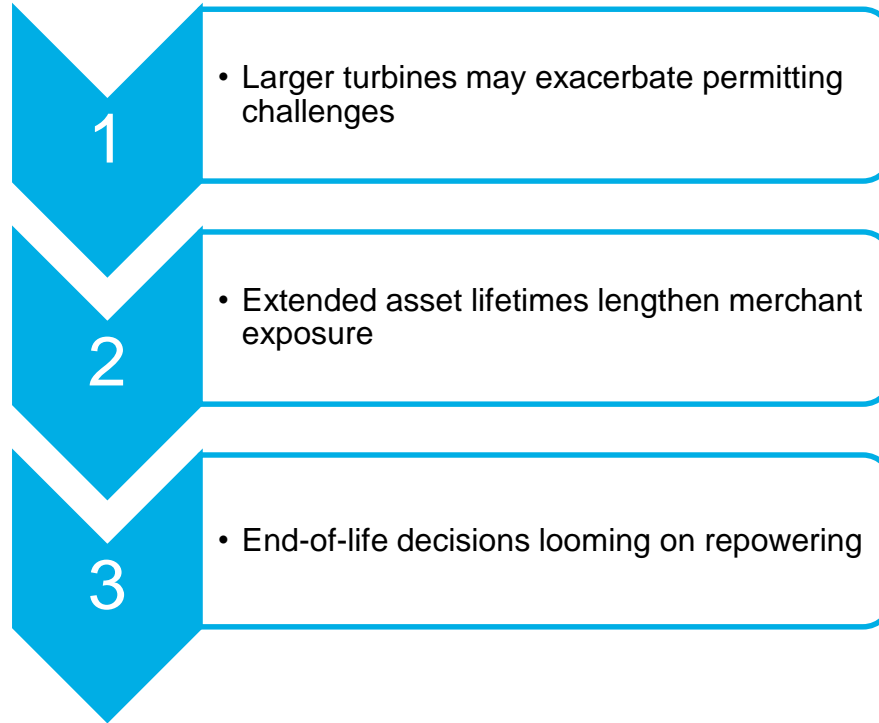
Wind installations in the Nordics set to double in five years

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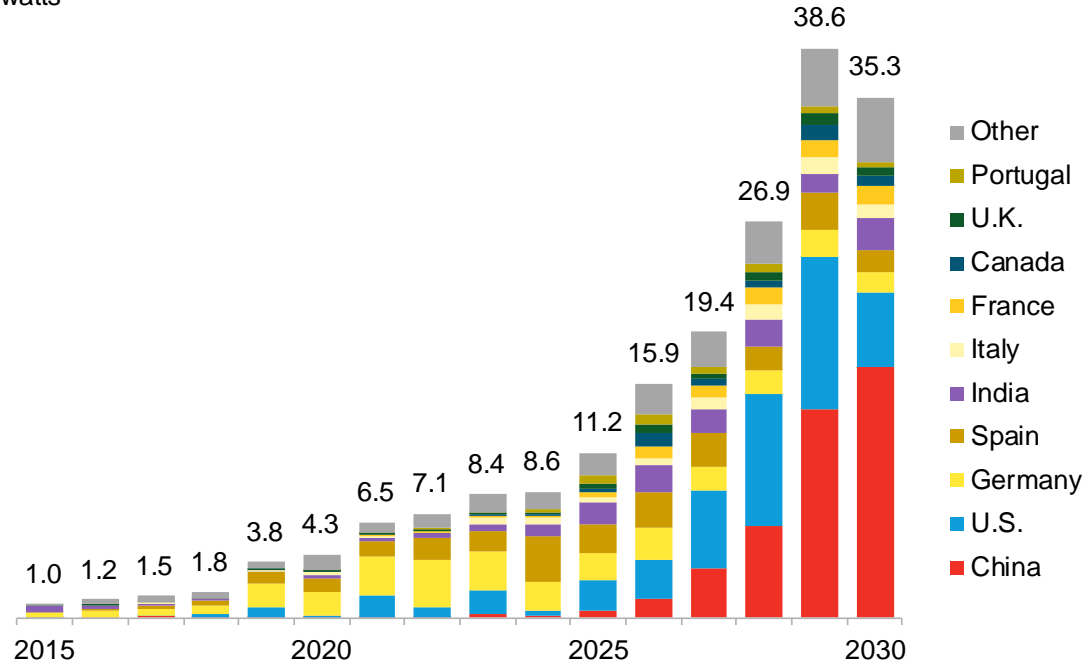
Source: BloombergNEF.

End-of-life decisions around repowering



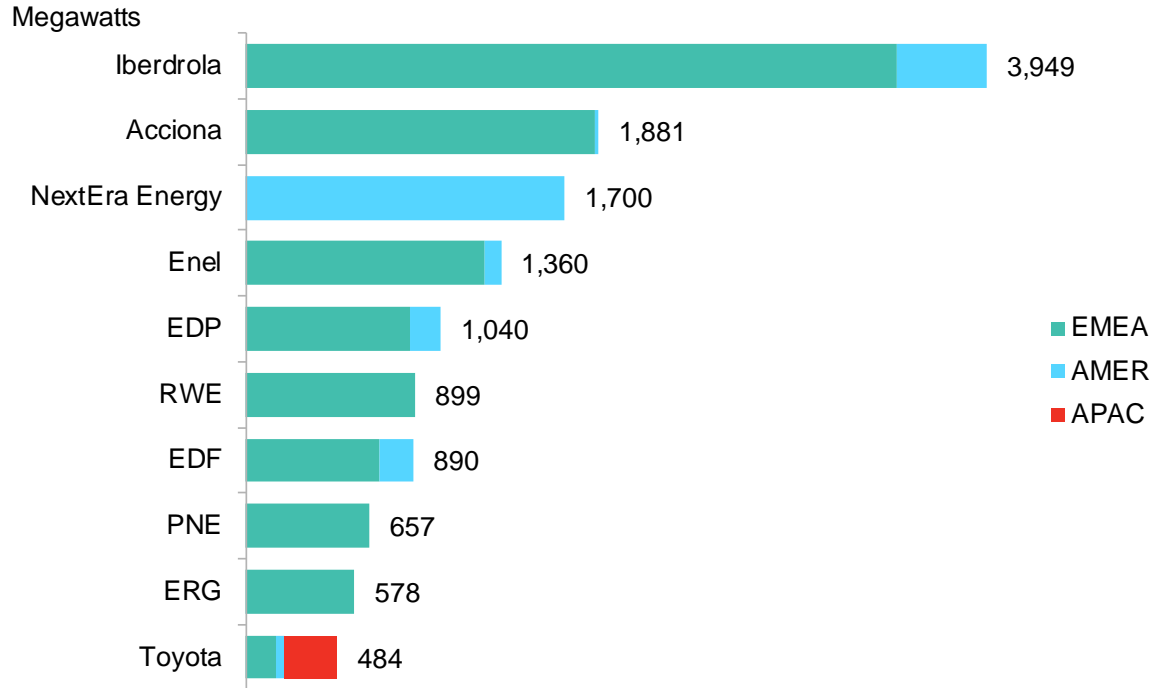
Onshore wind capacity reaching the end of its 20-year design life

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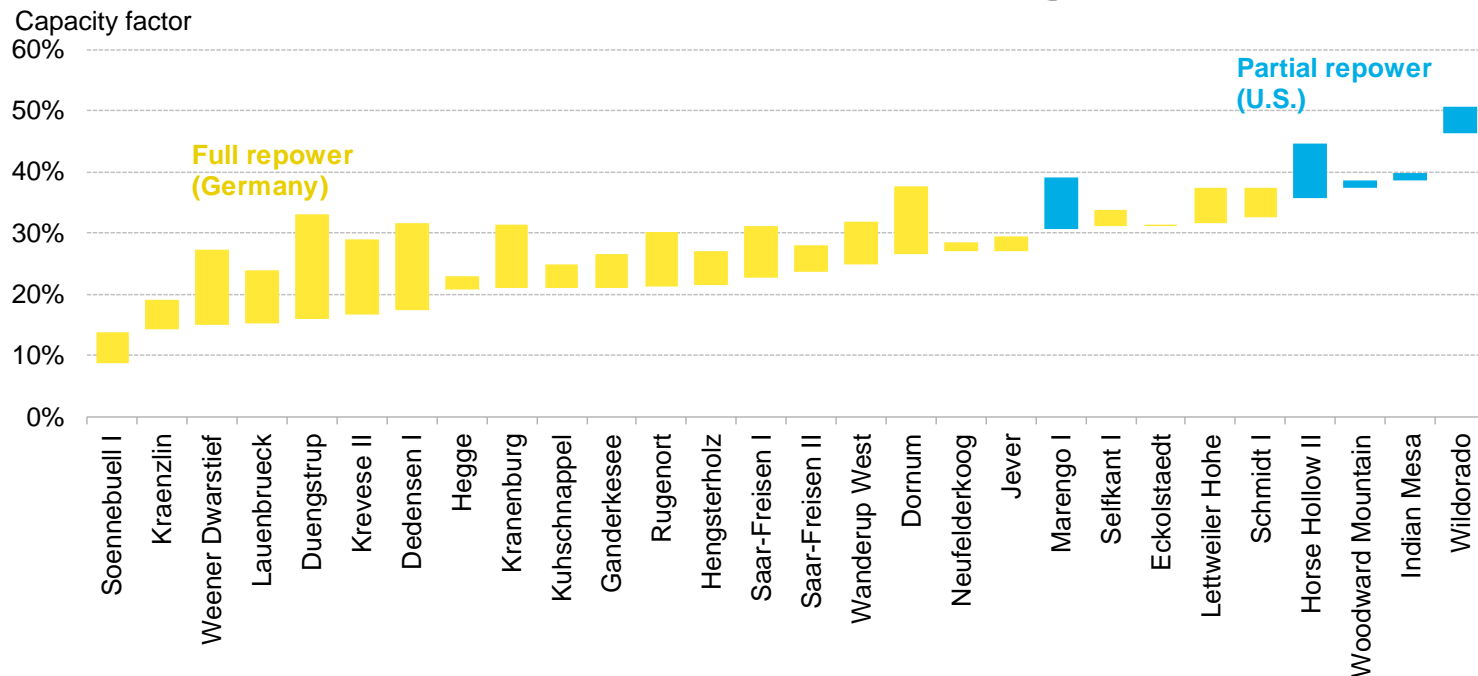
Source: BloombergNEF

Top 10 owners of wind farms aged 15 years or over



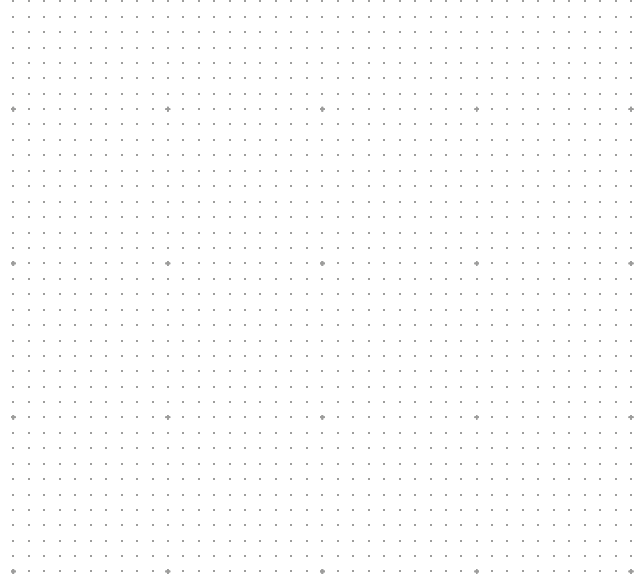
Source: BloombergNEF. Note: Totals adjusted for owners' percentage equity stake in projects.

Capacity factors of selected onshore wind farms before and after repowering



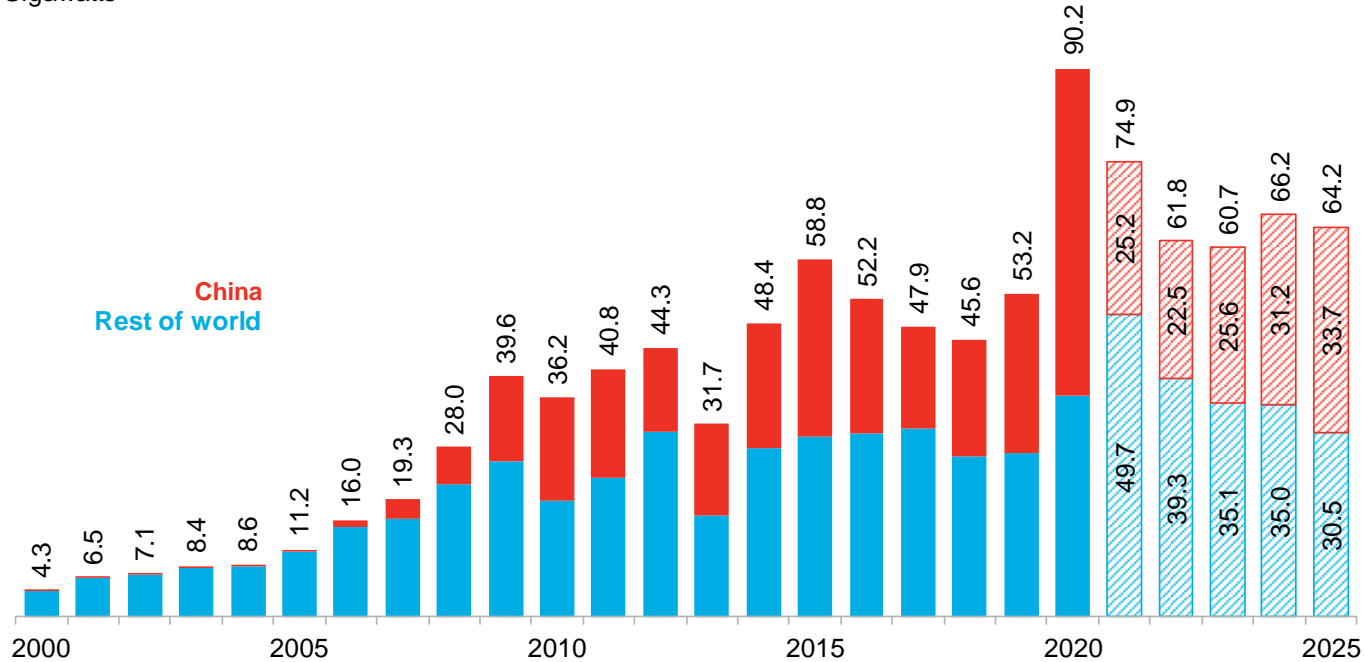
Source: BloombergNEF. Note: Bars show change in capacity factor – the bottom of each bar shows the initial capacity factor, the top shows the capacity factor of the repowered project. Capacity factors calculated using BNEF's Wind Farm Capacity Factor Tool ([web](#) | [terminal](#)).

Outlook



Onshore wind additions slow down outside of China

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Source: BloombergNEF

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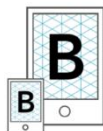
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