



BDO Global Natural Resources

WIND

Market Update

July 2020



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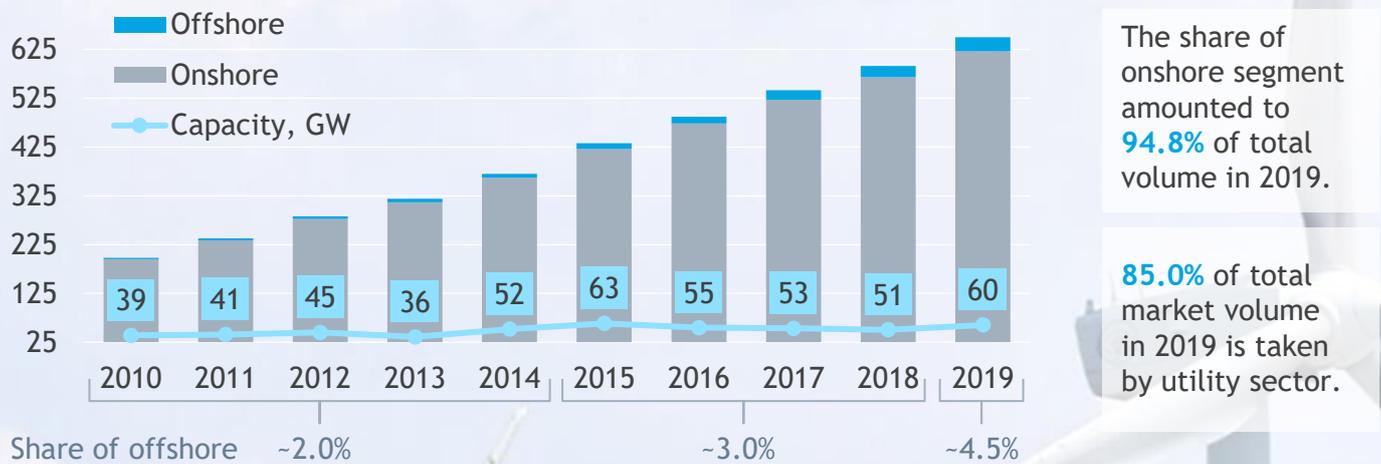
Current state of the wind power market

The wind power market has demonstrated growth in the last nine years and is estimated to rise by 4% (CAGR) in 2020-2024

Current market state

In 2019, global wind energy total capacity equaled to 651 GW¹, which is 10% higher compared to 2018. It is projected that 30% of all global electricity production will come from wind energy by 2050, with 12% from offshore wind and 18% from onshore wind².

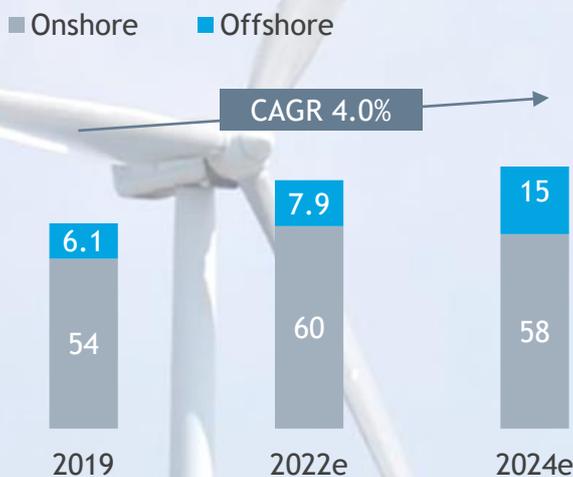
Total wind power number of installations and capacity



Market outlook

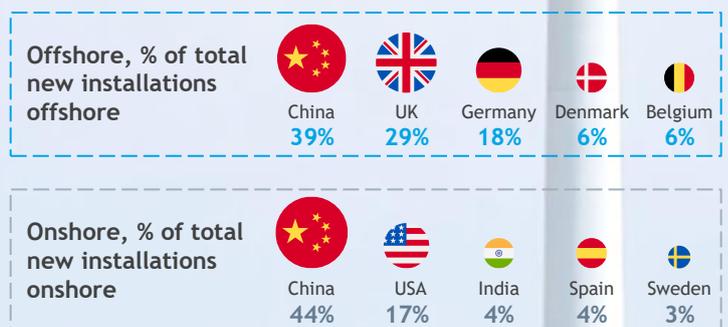
Globally, 2019 became the second-best year for wind historically with 60.4 GW of wind energy capacity installed, representing an annual 19% increase. Over 200 GW of new capacity is forecast to be added until 2024.

New wind power installations outlook³, GW



Top markets in terms of new wind installations in 2019

The world's 5 leading markets in 2019 for new installations were China, USA, UK, India and Spain, taking **70%** of the global installation last year.



Source: Global Wind Energy Council

Notes: (1) Gigawatt; (2) Which approximately amounts to 14,000 TWh, equivalent to the current power output of the USA, Europe and China combined; (3) Pre-COVID-19 forecast

Wind power market drivers and trends

Ongoing innovations and technology enhancements in wind energy facilitate the massive wind power potential.

Market drivers

Larger-capacity turbines and rotors have improved energy yields and reduced capital and operation costs per unit of installed wind energy capacity and are providing widespread business opportunities to the market.

Weighted average cost for installed onshore and offshore wind energy worldwide, USD / kW¹



Favourable government policies

A growing number of countries are working to slash greenhouse gas emissions to net zero by 2050².

Private sector initiatives

Firms that joined the RE100³ group are pledging to source 100% of their power from renewables⁴.

Decreasing costs

Advanced technology and cost-effective solutions for onshore, offshore installation and wind turbines decrease the cost for the wind energy, hence, make it an attractive source of renewable energy.

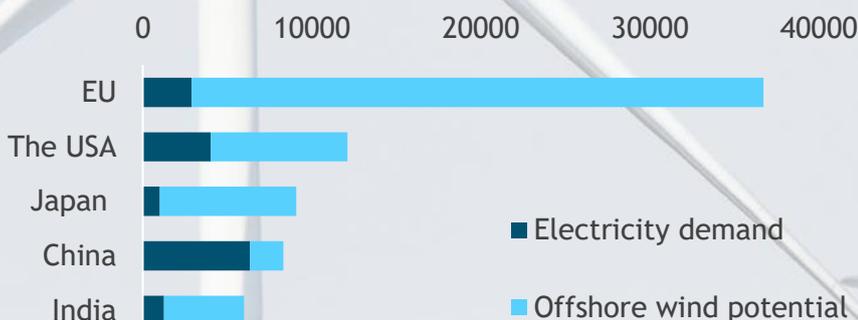
Growing electricity demand

Electricity demand might rise by 1.1% or 3.8% per year on average in OECD and non-OECD countries respectively.

Market trends

Offshore wind power might become a 'game-changer' for energy systems, being able to meet the world's electricity demand in the future.

Offshore wind potential and electricity demand, TWh⁶, 2018



Smart turbines

Adoption of smart turbines using big data, AI and the automatic regulation helps to prevent unscheduled downtime and extend the turbines' lifecycle.

Hybridisation

The combination of wind energy with another energy source might guarantee stable supply and expand revenue opportunities.

Offshore wind projects momentum

Offshore wind now grows faster than onshore due to impressive technical advances and cost reductions. Offshore wind capacity is forecast to grow by over 80 GW till 2024, achieving an impressive CAGR of more than 25% during this period.

Power electronics optimisation

Power inverters reliability and dimensions optimising could reduce operation costs.

Source: International Energy Agency; International Renewable Energy Agency; Wind Europe; Media overview
 Notes: (1) Kilowatt; (2) For instance, the UK plans to derive 30% of its electricity from offshore wind by 2030; (3) Global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity.; (4) It is estimated that those companies will need to buy an estimated 210 TWh of green electricity by 2030; (6) Terawatt-hour

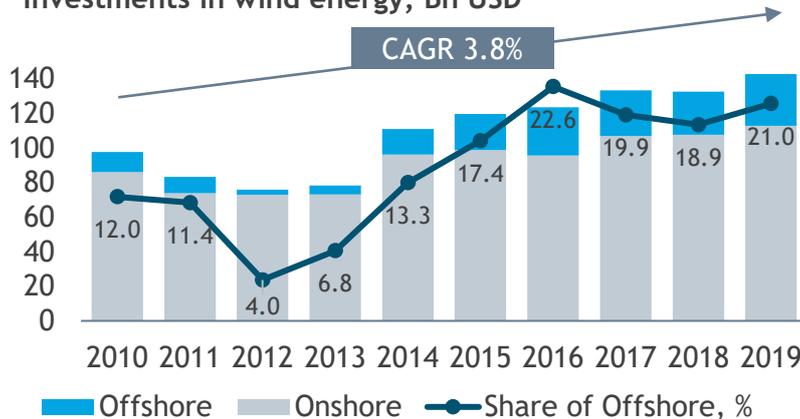
Wind power market investment climate

Wind power market attracted investments in a record size of 142.7 Bn USD in 2019, that was provoked by the offshore project financings boom.

Current investment climate

Investments in wind energy are mainly supported by the falling cost of wind. However, at the same time they are still growing at the low pace due to the execution challenges¹ in world-class wind markets such as India and Germany.

Investments in wind energy, Bn USD



The investments in onshore wind have decreased after the outbreak of Covid-19, whereas investments in offshore wind have increased by four times in H1 2020 compared to H1 2019.

Largest wind power transactions in 2020²

Transaction name	Country	Value (Bn)
Asian Renewable Energy Hub (11GW)	Australia	15.6 USD
General Electric Refinancing 2020	The USA	15.0 USD
Acquisition of Alstom's Energy Business ³	France / The USA	13.6 USD
RWE Essent Acquisition	The Netherlands	10.6 USD
Acquisition of APA Group	Australia	9.4 USD
Jacksonville Electric Authority Privatisation	The USA	6.8 USD

M&A activity on the wind power market remains upbeat. However, new investments in the industry in 2020 are projected to be around the same level as in 2019 due to the delay in wind farm construction and project financing.

Future wind power investments

Average projected annual wind investments⁴ in 2020-2030, Bn USD / year

Onshore wind
146.0

Offshore wind
61.0

Investments in offshore wind are projected to increase in 3 times by 2030, while in onshore they might double.

Average projected annual wind investments⁴ in 2020-2030, Bn USD / year

North America

26.0
7.0

Latin America

5.0
0.2

Europe

6.0
18.0

MEA⁵

9.0
N.A.

Asia

98.0
36.0

Oceania

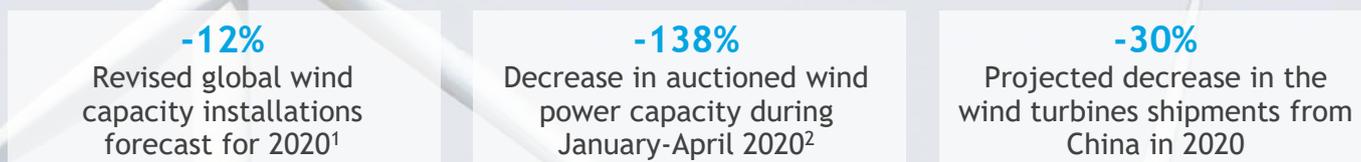
1.0
0.2

The impact of COVID-19 on the Wind power market

Construction schedule delays, capacity decrease, issues with project financing and wind farm maintenance have emerged as a result of COVID-19.

Wind power market challenges caused by the COVID-19 pandemic

COVID-19 market impact in numbers



Wind project issues caused by COVID-19

Project financing

Reduced debt market liquidity made lenders less likely to offer funds³. Tax equity financing also became less available.

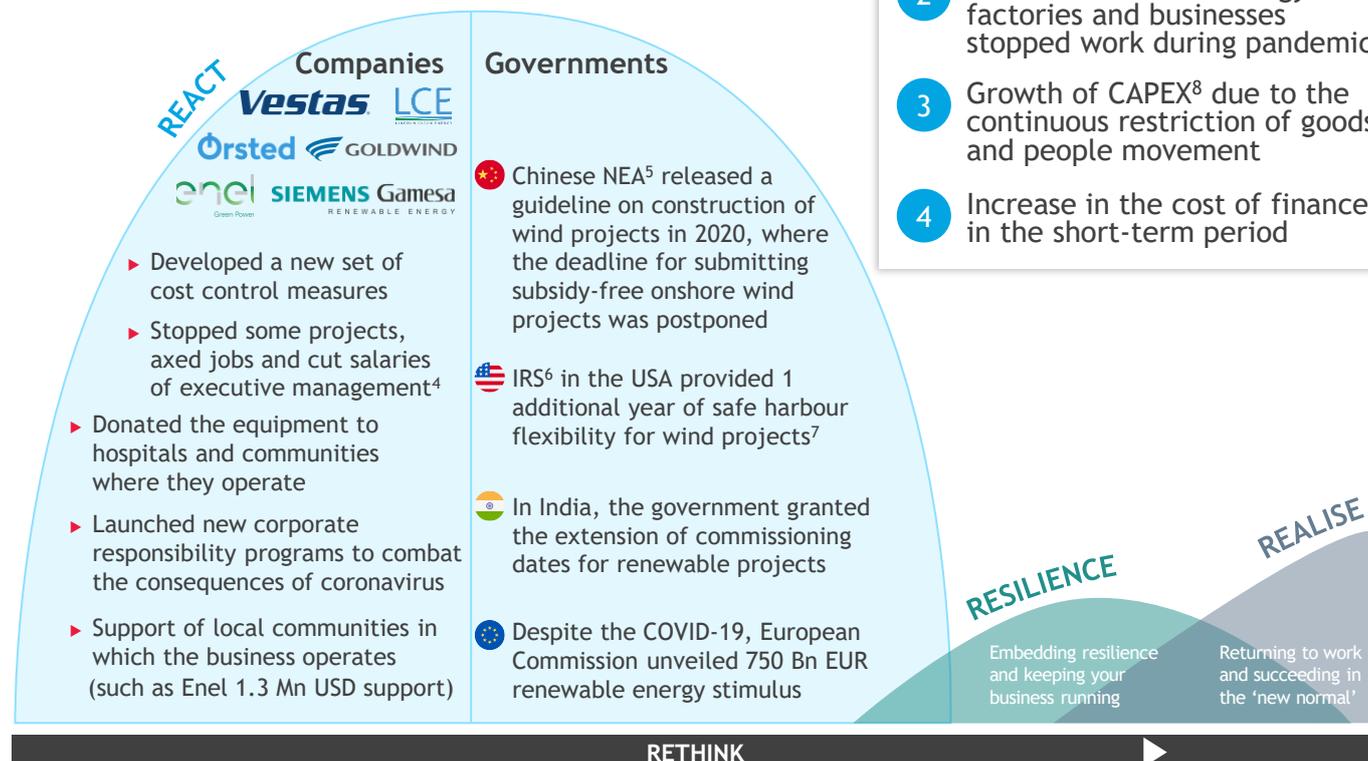
Project planning

Project costs may increase due to the considerable delays in wind project construction, leading developers to cut projected rates of return for projects.

Wind farm maintenance

Due to the shortage of turbine technicians, wind operators face maintenance delays. In some cases, disregarding maintenance schedules can void turbine warranties.

Wind market participants response to the COVID-19 pandemic



Wind farm developers' challenges

- 1 Disruptions in supply chains as the industry is reliant on imports of wind equipment
- 2 Fall in demand for energy as factories and businesses stopped work during pandemic
- 3 Growth of CAPEX⁸ due to the continuous restriction of goods and people movement
- 4 Increase in the cost of finance in the short-term period

Source: REN21; GWEC; BloombergNEF; Companies' websites

Notes: (1) In comparison with the same period in 2019; (2) Forecast change for Q4 2019 – Q1 2020; (3) Typically non-recourse debt provides 58% of all capital raised for new wind energy projects; (4) Vestas; (5) National Energy Administration; (6) Internal Revenue Service; (7) For the projects that started construction in 2016-2017; (8) Capital expenditure

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