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Development and challenges for global offshore wind markets

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Indice / Index

1. Wind energy - Growth trajectory
2. Offshore wind outlook
3. Technology trends – turbine size and company market share
4. Offshore supply chain
5. Global offshore wind initiatives: Global Offshore Wind Alliance (GOWA) and Ocean Energy Pathway (OEP)
6. Update on Vietnam PDP8
7. Hot markets for offshore wind

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1. Wind energy’s growth trajectory towards Net Zero

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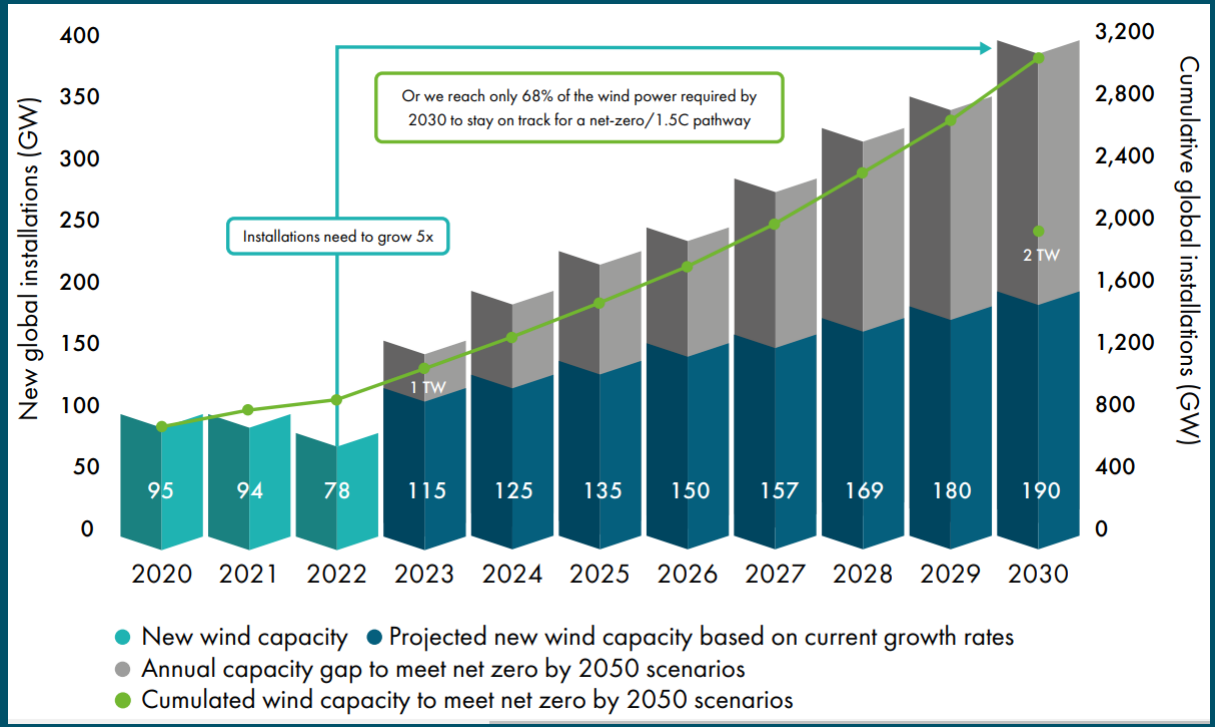
Windpower reaches 1TW, and 2TW milestone is expected to be achieved in just seven years

- GWEC expects a significant acceleration of growth over the coming years. This rate is still **not rapid enough** to reach Paris Agreement targets or Net Zero by 2050.
- However we do expect significant further policy upside
- The milestone of a **second TW** is likely to be passed **before the end of 2030** – provided anticipated growth materialises in the three key wind markets of **China, Europe and the US.**

Total wind power capacity additions for 2023-2030 have been increased by 13%



Source: GWEC Market Intelligence; IEA Net Zero by 2050 Roadmap (2021)

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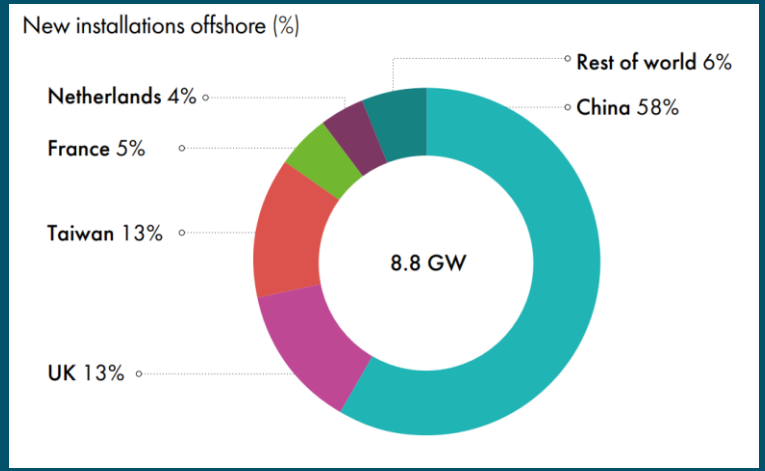
2022 was the second highest year in offshore wind history

- **China** continued to lead global offshore wind development with just over **5GW.**
- **With 2.5 GW offshore wind** capacity across six countries connected to the grid in 2022, **Europe** accounted for the majority of the remaining new capacity.
- In 2022 Europe relinquished its title as the world's **largest offshore wind Market to APAC.** Nevertheless, Europe continues to lead the way with floating wind.

New global offshore wind power installations in 2022



Source: GWEC Market Intelligence, March 2023

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4. Technology trends

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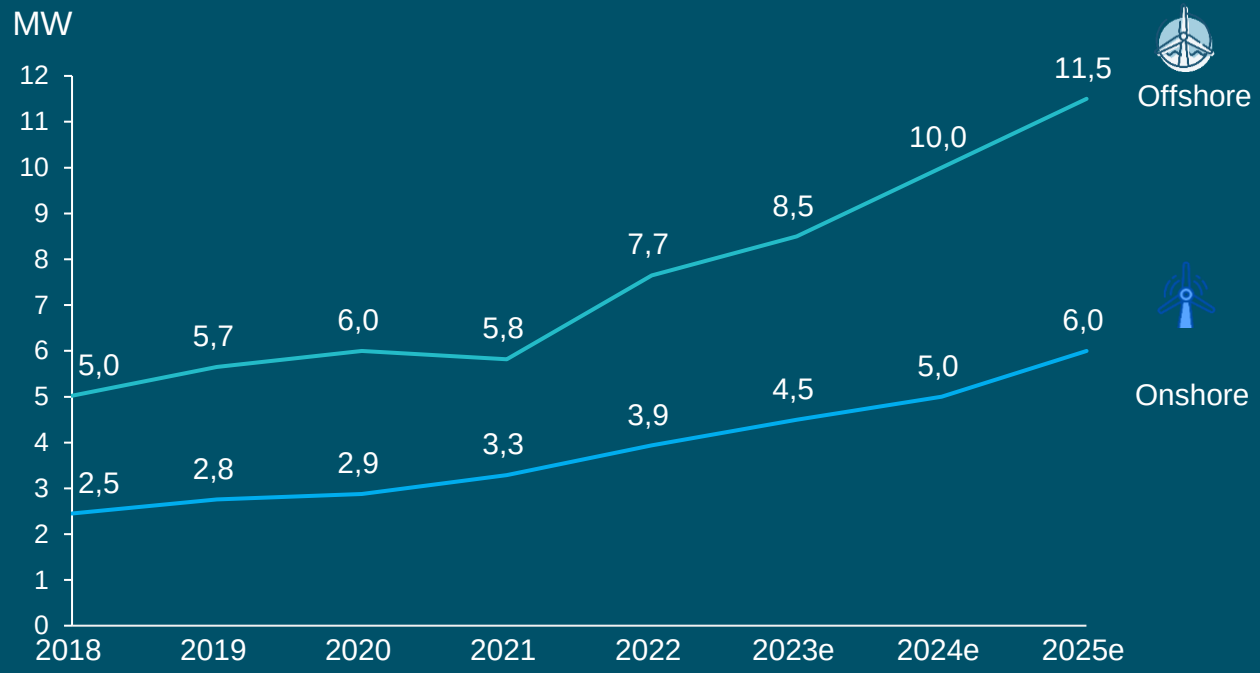
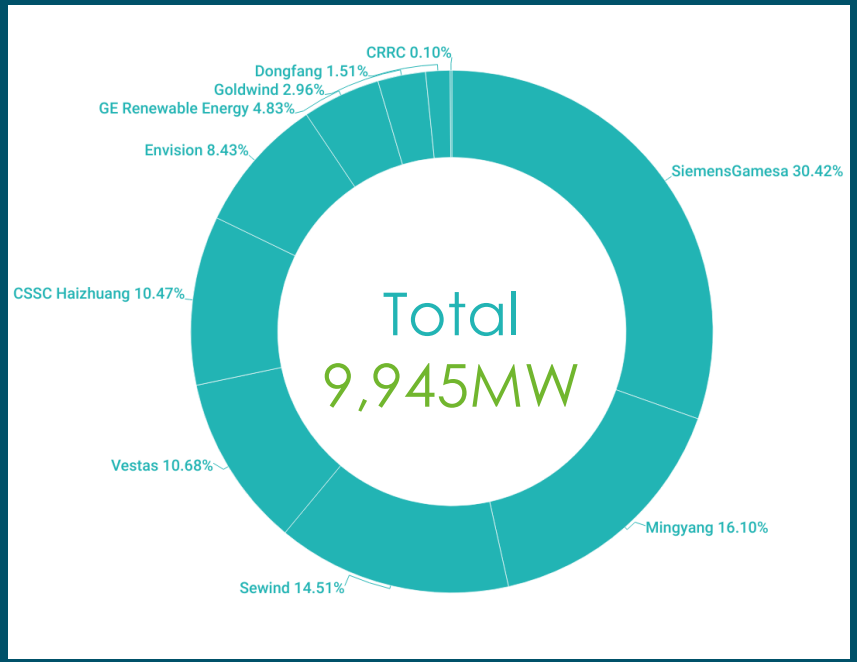
Global average turbine size 2015-2025e



Source: GWEC Market Intelligence, April 2023

- The **average turbine size grew rapidly** since the global shift to auctioning **from 2015 and** pressure on the turbine OEMs when "subsidy free" project kicked-in in both onshore wind (China) and offshore wind (Germany, Netherlands, Denmark and China).
- The **average size of offshore wind turbines** installed in **Europe** and **China** was **8.8 MW** and **7.4 MW** respectively in 2022, bringing the global average to **7.6 MW** in 2022. Following the technology road map announced by turbine OEMs worldwide, GWEC expects the **average turbine size for offshore wind to** reach **11.5MW** by **2025**.
- Projects are also increasing in size, with the **average units per project going up to 50 in 2022**, more than five times larger than that in 2000. This trend is expected to continue based on identified project pipelines.

Top offshore wind turbine suppliers' annual installed capacity 2022



Source: GWEC Market Intelligence, April 2023

- **Ten manufacturers** installed 1,300 units of offshore wind turbine - nearly 10 GW - in a single year. The new additions are 70 per cent lower than the bumper year of 2021 but still make 2022 the second highest year in offshore wind history.
- Taking the advantage of strong offshore wind growth at their home market, **seven Chinese OEMs** are listed on the global top ten list in 2022, same as the previous year.
- **Siemens Gamesa** installed 338 offshore turbines, totalling 3 GW, in six markets last year, making it the global leader, a position held by Chinese Sewind in 2021.
- **Mingyang** retains the number two position from 2021 with 86 per cent of its new installations (1,380 MW) located in its home market and the remaining in Vietnam and Italy. The company installed offshore turbine in Europe for the first time in 2022.
- **Sewind** remains the largest offshore wind turbine supplier in its home market, but it fells two position to the third place last year due to its new installations dropped by 66 per cent compared with 2021.
- **Vestas** retains the fourth position from 2021,although the Danish supplier's new installations in 2022 is just one third of the capacity that it added in 2021.
- **CSSC Haizhuang** and **Envision** move up one and two position to **fifth** and **sixth place** respectively, but **Goldwind** and **Dongfang** fell to **eighth** and **ninth place** respectively in 2022.
- **GE Renewable Energy** commissioned its first offshore wind project in France last year, making it the world's seventh largest offshore wind turbine supplier in 2022.
- Chinese supplier **CRRC** installed a 10MW offshore wind turbine prototype in China last year, representing its first breakthrough into the offshore wind market.

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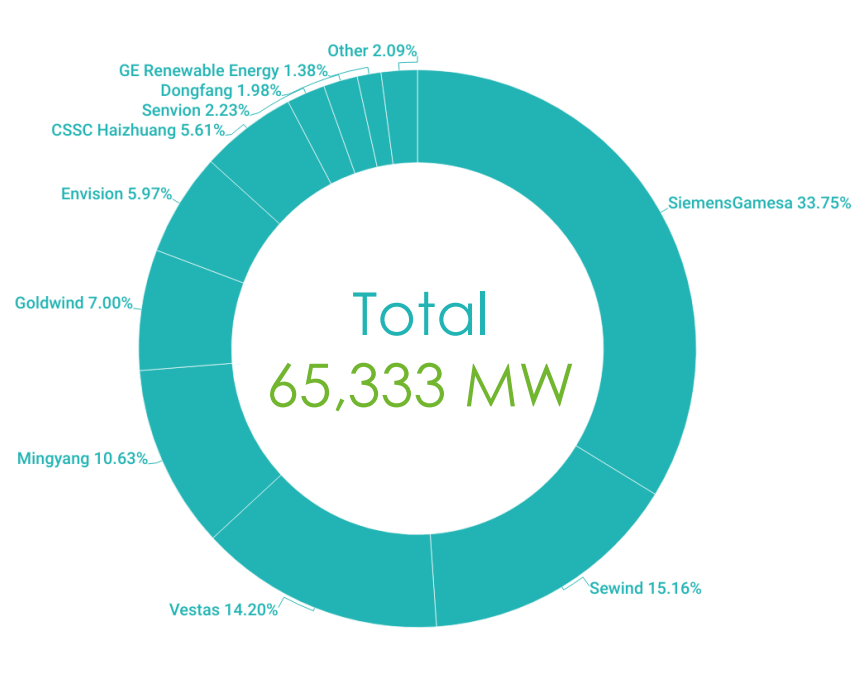
Top 10 offshore wind turbine suppliers' cumulative capacity to end of 2022



Source: GWEC Market Intelligence, April 2023

- Globally, a total of **65,333 MW** offshore wind energy was installed as the end of 2022.
- The two offshore wind pioneers, **Siemens Gamesa** and **Vestas** together made up **48 per cent** of total global offshore wind installations **by the end 2022**, one per cent lower than in 2021.
- **Siemens Gamesa** remained the **global leader** in terms of cumulative installed offshore wind capacity. However, the company lost 0.6 per cent market share last year compared with 2021.
- Compared with their ranking in cumulative installation in 2021, the suppliers in the positions 2 to 10 stay the same.

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5. Key Initiatives to accelerate deployment: Global Offshore Wind Alliance (GOWA) and Ocean Energy Pathway (OEP)

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GOWA – A global driving force for offshore wind

- GOWA unites 15 countries and a number of leading entities and companies with offshore-wind interests and expertise all promoting clean energy for all.

- GOWA is focused on 3 workstreams:
  1) Streamlining permitting processes.
  2) Developing market frameworks.
  3) Maximizing socio-economic benefits

- A Secretariat has been established to support the day-to-day activities. A steering group and Co-Chairs support decision-making.

- GOWA will expand its membership across the private and public sector and civil society. Diversity is our strength.

- GOWA is designed to reduce duplication and will leverage synergies with other initiatives to make progress.

- GOWA will organize events to shape its work at COP28, G20/CEM, G7 and G20 to scale up and communicate with targeted stakeholders

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GOWA: Members around the world

Type	GOWA Members
Country	Australia
Country	Belgium
Country	Colombia
Country	Denmark
Country	Germany
Country	Ireland
Country	Japan
Country	Netherlands
Country	Norway
Country	Portugal
Country	Saint Lucia
Country	Spain
Country	Romania
Country	United Kingdom
Country	United States
Non-Country	IRENA
Non-Country	GWEC
Non-Country	ESMAP
Non-Country	Corio
Non-Country	Orsted
Non-Country	Ocean Conservancy
Non-Country	SSE
Non-Country	Vestas
Non-Country	CIP

Co-Chairs
Colombia
Denmark
IRENA
GWEC

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OEP Governance

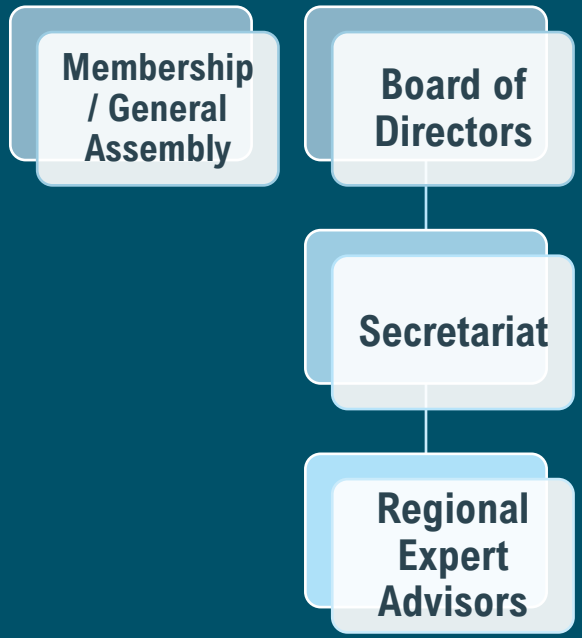
OEP has been established as a **not-for-profit organization**

Members provide advice, strategic direction, & oversight through **the General Assembly**

- Membership comprised of stakeholders from industry, philanthropy, NGOs, and global institutions
- Founding members have the benefit of shaping OEP direction & strategy

Board of Directors pursues the objectives of OEP

The **Secretariat** is supported by **Expert Advisors**, who will be commissioned based on country demand



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Obrigado!
Thank you!