

Learning from the Experts Webinar Series

Emerging International Markets for Offshore Wind



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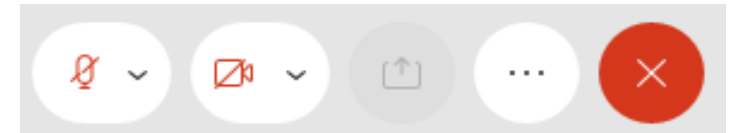
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Participation for Members of the Public:

- > Members of the public will be muted upon entry.
- > Questions and comments may be submitted in writing through the Q&A feature at any time during the event. Please submit to **All Panelists**.
- > If technical problems arise, please contact Adam.Hauck@nyserda.ny.gov



You'll see  when your microphone is muted

Learning from the Experts

This webinar series is hosted by NYSERDA's offshore wind team and features experts in offshore wind technologies, development practices, and related research.

DISCLAIMER:

The views and opinions expressed in this presentation are those of the presenter and do not represent the views or opinions of NYSERDA or New York State.



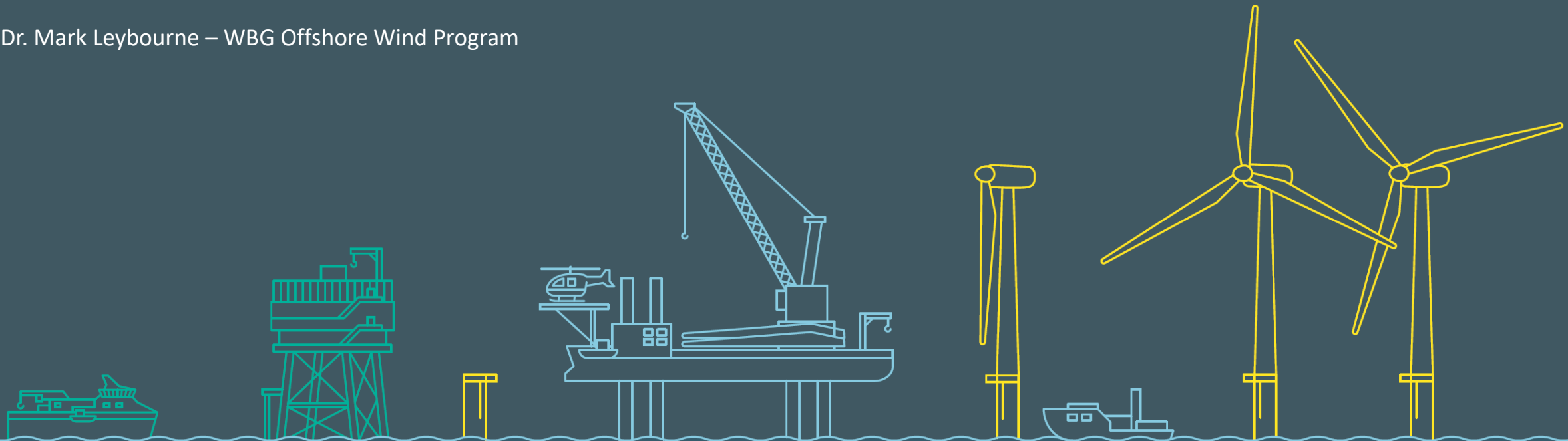
NYSERDA



Offshore Wind

Deploying in New & Emerging Markets

Dr. Mark Leybourne – WBG Offshore Wind Program



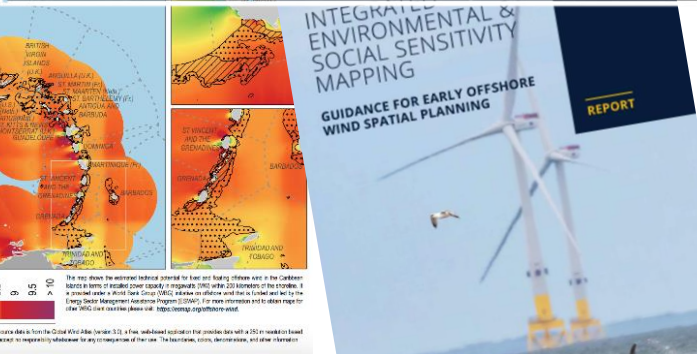
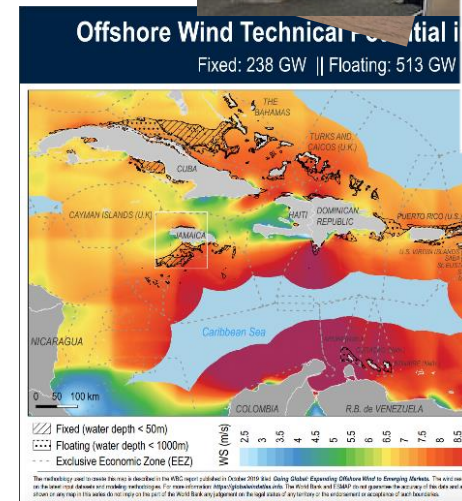
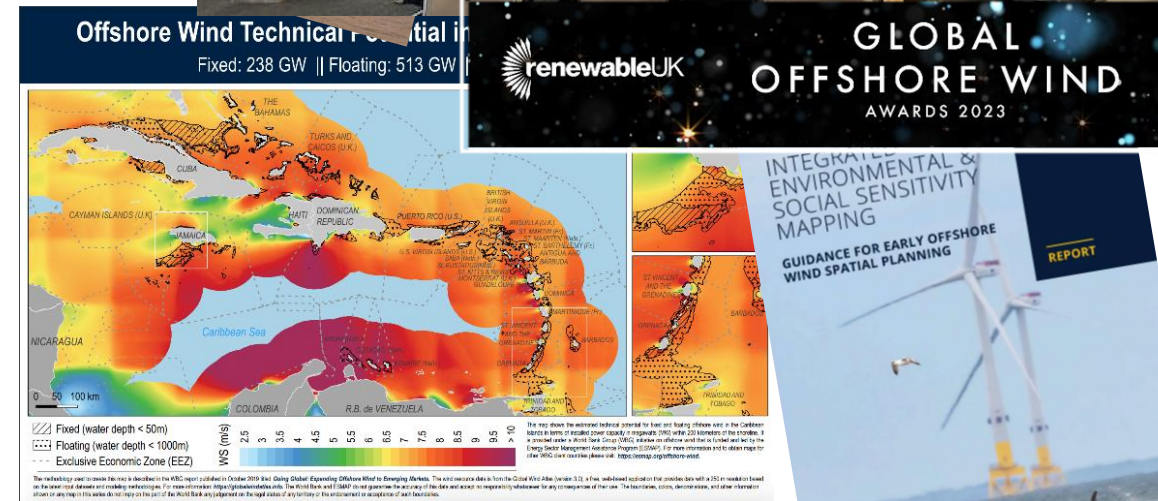
World Bank Group *Offshore Wind Development Program*

About the Program:

- Objective: **Accelerate deployment of offshore wind in emerging markets**
- Led by ESMAP in partnership with the International Finance Corporation (IFC)
- Global team of 15, with over 80 staff engaged across WB and IFC

Program's work to date:

- Supported 26 country governments since 2019
- Eight Roadmaps: Azerbaijan, Brazil, Colombia, Philippines, Sri Lanka, Romania, Türkiye, and Viet Nam
- Global Reports, Study Tours, Technical Assistance
- Received 'Global Offshore Wind Award' in Oct '23



Countries Supported by WBG Since 2019

1. Algeria
2. Argentina
3. Azerbaijan
4. Barbados*
5. Brazil
6. Colombia
7. Costa Rica
8. Dominican Republic
9. Fiji
10. India
11. Indonesia
12. Morocco
13. Namibia
14. Papua New Guinea
15. Panama
16. Philippines
17. Poland*
18. Romania
19. Saint Lucia
20. South Africa
21. Sri Lanka
22. Tunisia
23. Türkiye
24. Ukraine
25. Uruguay*
26. Viet Nam

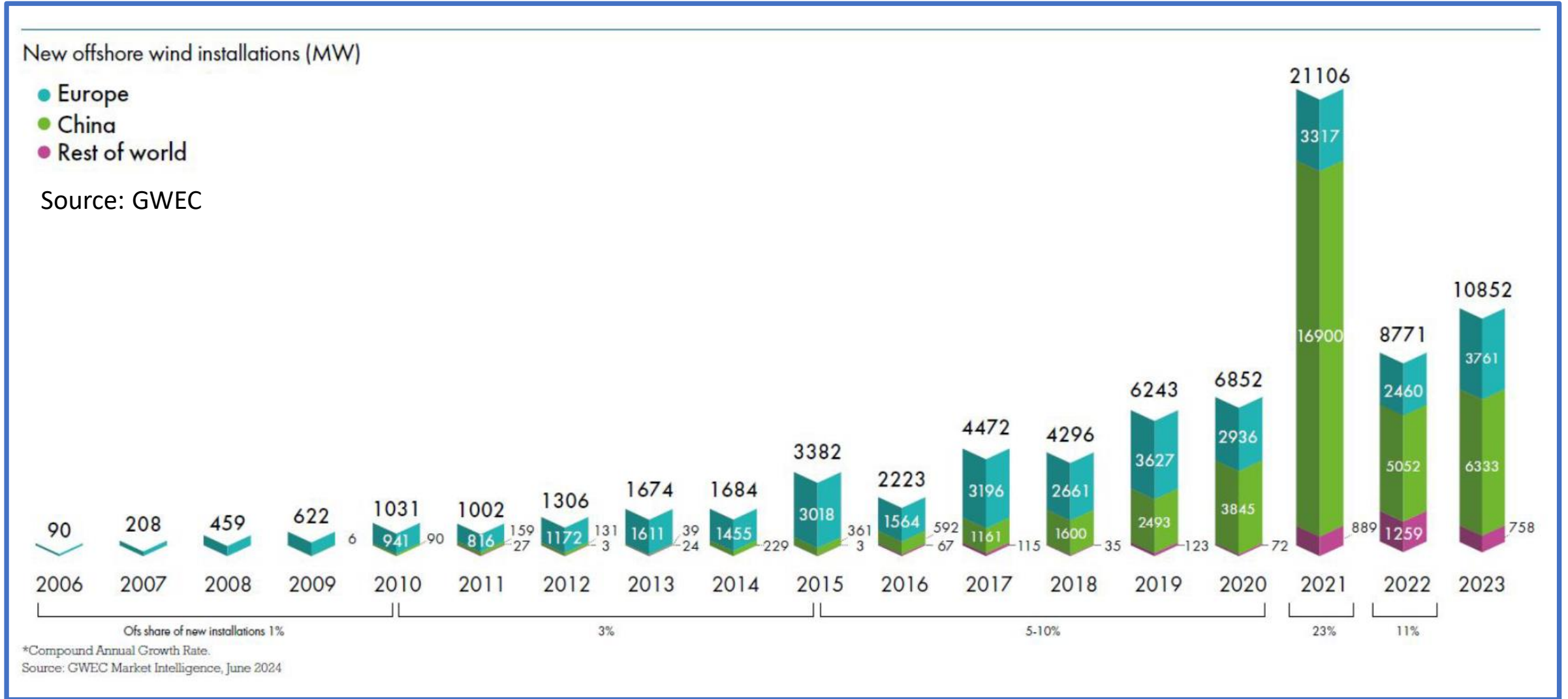
Green = Priority Country

*IFC led support



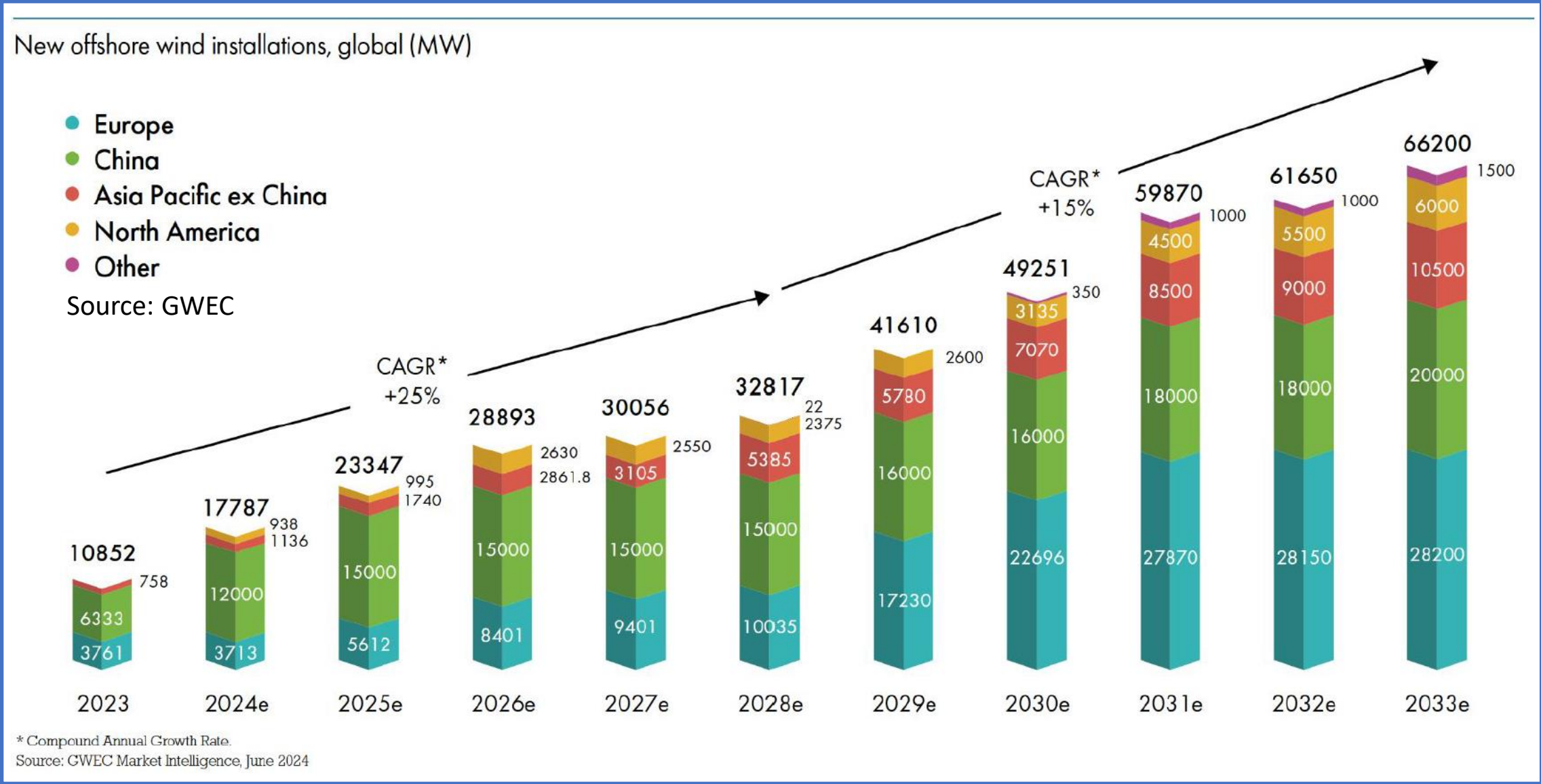
Rate of Annual Offshore Wind Installations

Offshore wind has grown rapidly ...



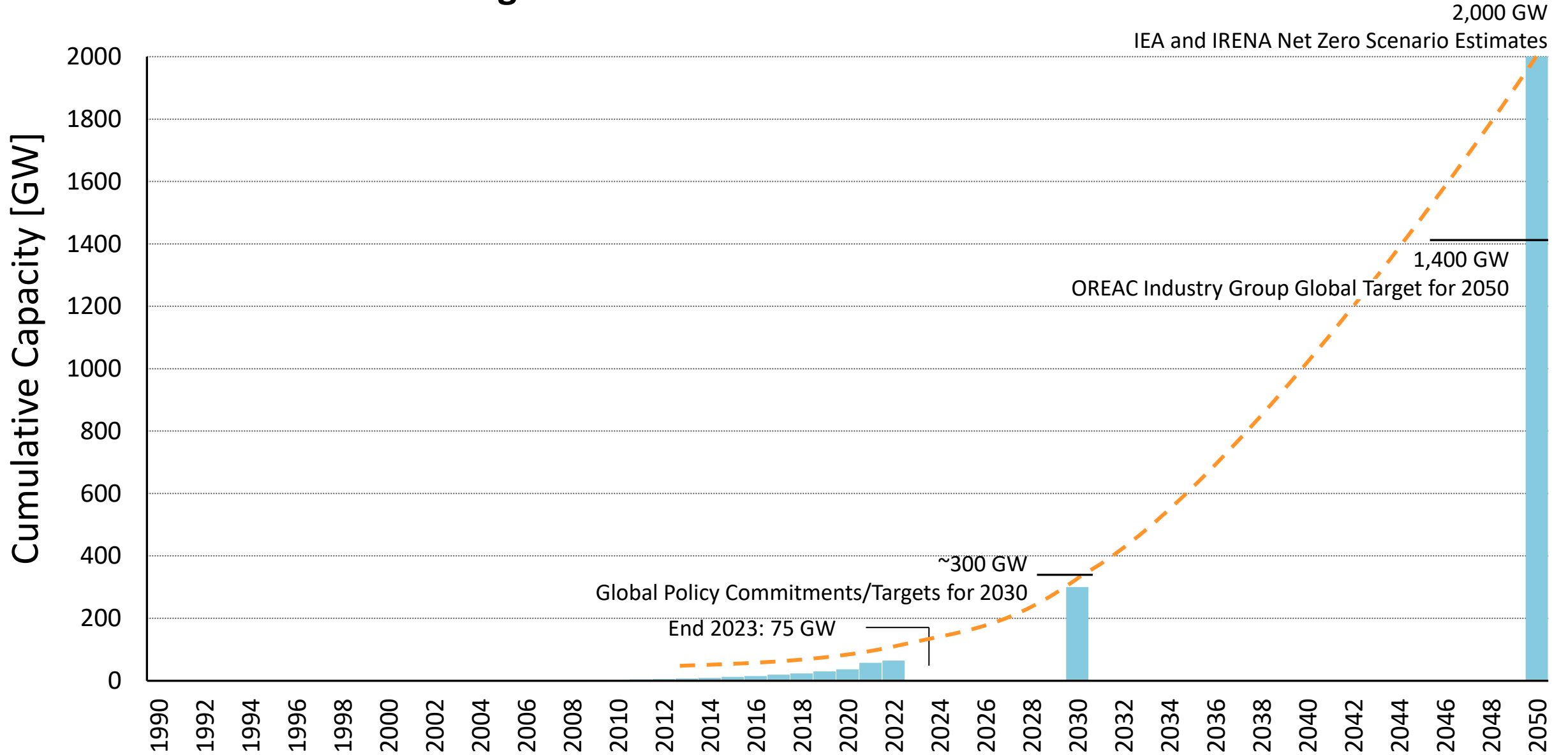
Rate of Annual Offshore Wind Installations

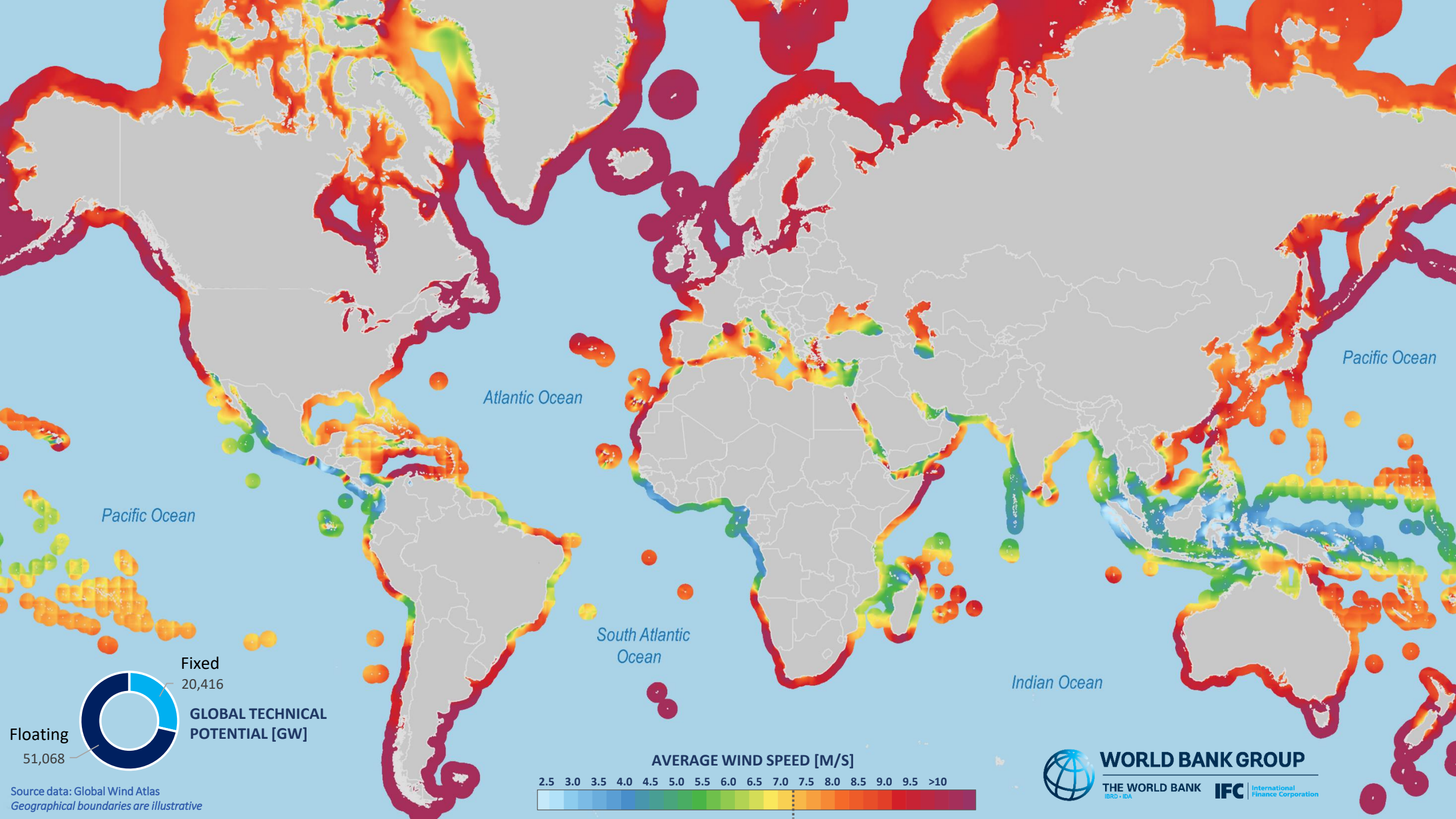
Offshore wind has grown rapidly... and is projected to diversify in the short term ...



Cumulative Growth of Offshore Wind Capacity

... and accelerate over the long term





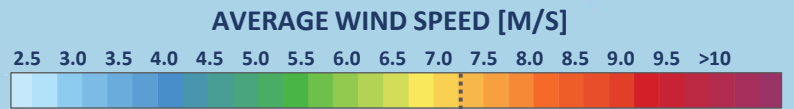
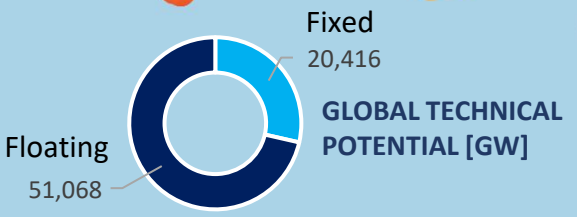
Pacific Ocean

Atlantic Ocean

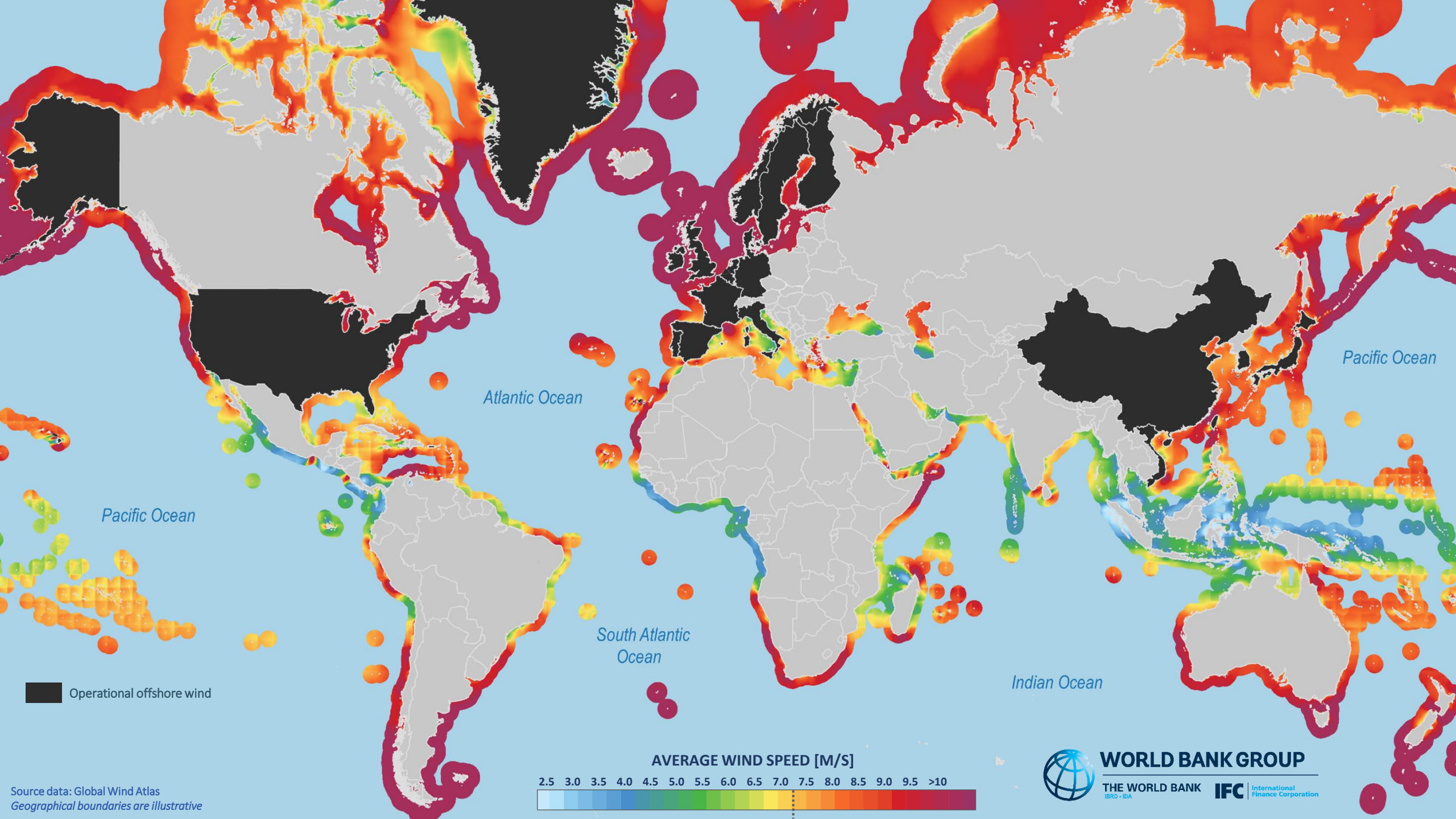
Pacific Ocean

South Atlantic Ocean

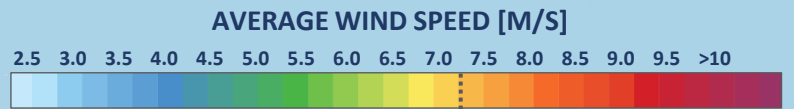
Indian Ocean



Source data: Global Wind Atlas
Geographical boundaries are illustrative

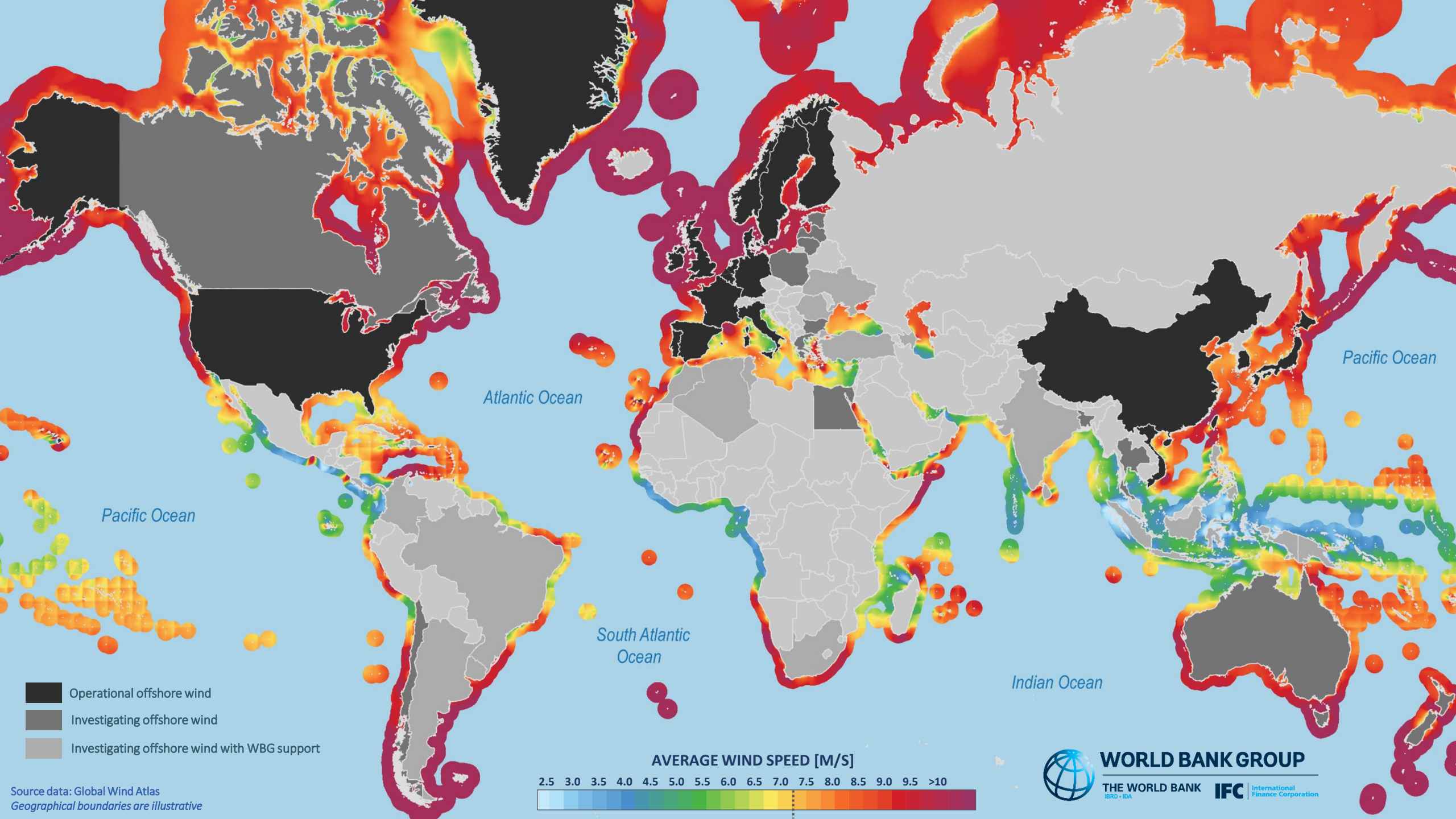


Operational offshore wind

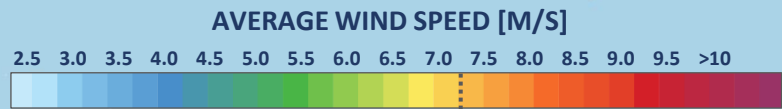


Source data: Global Wind Atlas
Geographical boundaries are illustrative



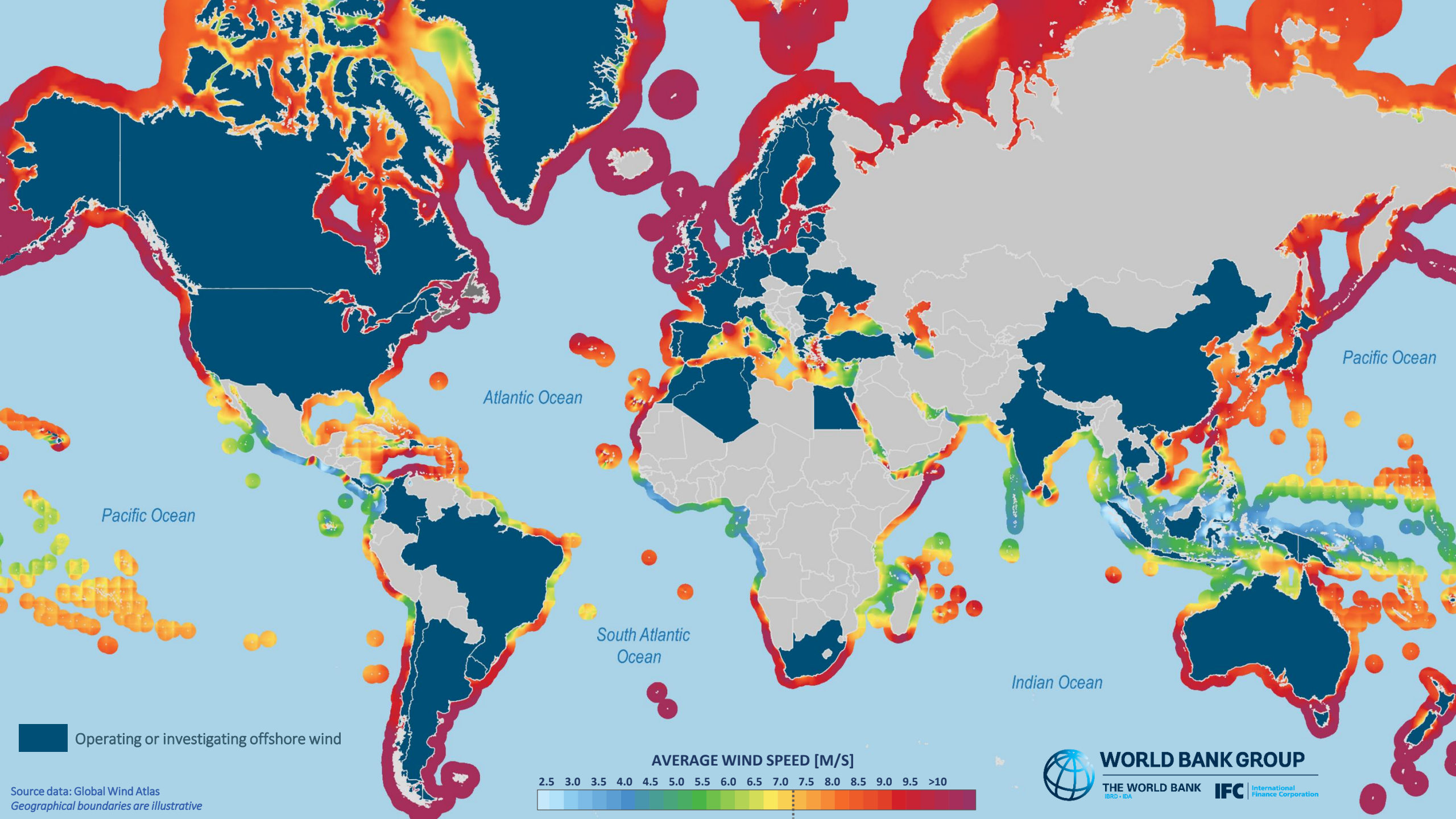


- Operational offshore wind
- Investigating offshore wind
- Investigating offshore wind with WBG support



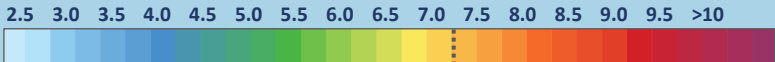
Source data: Global Wind Atlas
 Geographical boundaries are illustrative

WORLD BANK GROUP
 THE WORLD BANK International Finance Corporation
IBRD · IDA



Operating or investigating offshore wind

AVERAGE WIND SPEED [M/S]



WORLD BANK GROUP

THE WORLD BANK
IBRD · IDA

IFC
International
Finance Corporation

Source data: Global Wind Atlas
Geographical boundaries are illustrative

+7,700 GW POTENTIAL ACROSS LATIN AMERICA & CARIBBEAN

Mexico: 869 GW

Nicaragua: 60 GW

Costa Rica: 17 GW

Colombia: 109 GW

Peru: 347 GW

Brazil: 1,228 GW

Uruguay: 275 GW

Chile: 957 GW

Argentina: 1,870 GW

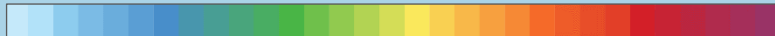
Pacific Ocean

South Atlantic Ocean

SOUTH AMERICA

AVERAGE WIND SPEED [M/S]

2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 >10

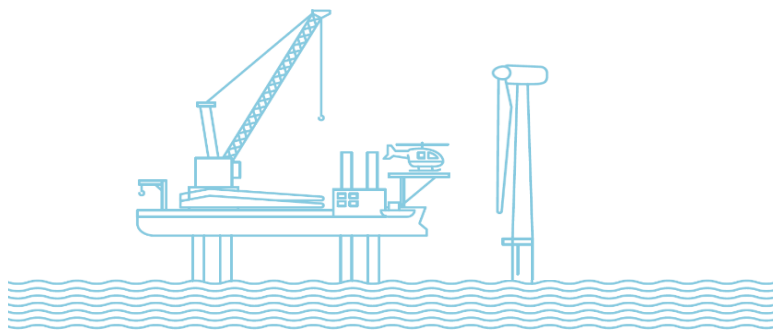


https://esmap.org/esmap_offshorewind_techpotential_analysis_maps

Source data: Global Wind Atlas and GEBCO

Key Factors for Offshore Wind (WB Study)

- **Objective:** to help government officials to answer the question “*what do we need to do to establish and grow a successful offshore wind market?*”
- Flagship knowledge report to provide lessons learnt and good practices but for a developing country setting
- Includes 39 case studies and 327 references to further reading material
- The report is accompanied by a series of online learning modules which present and discuss the essential key factors



Successful development in emerging markets

Strategy

What makes for a successful offshore wind strategy?

- Clear role for offshore wind in country's energy mix
- Clear role in economic development plans
- Focus on reduced risk to attract foreign investment

Policy

What policies are needed to make this strategy a reality?

- Long term, stable targets
- Strong supply chain development plans
- Policies to ensure meaningful stakeholder engagement
- Policies to drive competition and reduce costs

Frameworks

What frameworks are needed to enact policies?

- Marine Spatial Planning
- Clear leasing process
- Clear permitting process
- Bankable offtake agreements
- Grid integration planning
- Strong H&S framework

Delivery

What enabling elements are needed to deliver?

- Sector partnership with industry
- Skills development programs
- Proactive development of ports, grids and logistics
- Continual focus on lowering risk and attracting low cost finance



Why Offshore Wind?



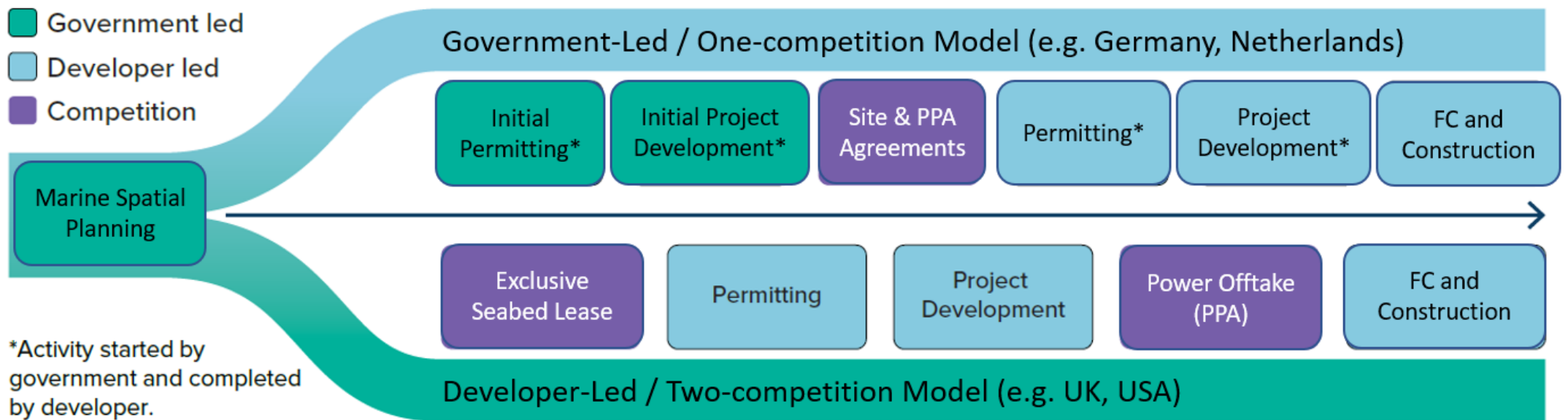
Fundamental question which underpins policy and the industry.

Wide range of drivers to pursue the development of offshore wind. Examples include:

- Capacity to meet growing demand
- Decarbonization
- Energy security
- Diversification of generation
- Proximity to demand centers
- Jobs and economic value
- Transition from offshore O&G
- Limited land availability
- Modern technology prestige
- Limited other energy resources

Models for Offshore Wind Development

- Two typical approaches for **competitively** awarding project sites and electricity tariffs
- Either approach can work, provided it is sufficiently resourced
- Developer-led is typically preferred in emerging markets as it is less demanding on the public sector

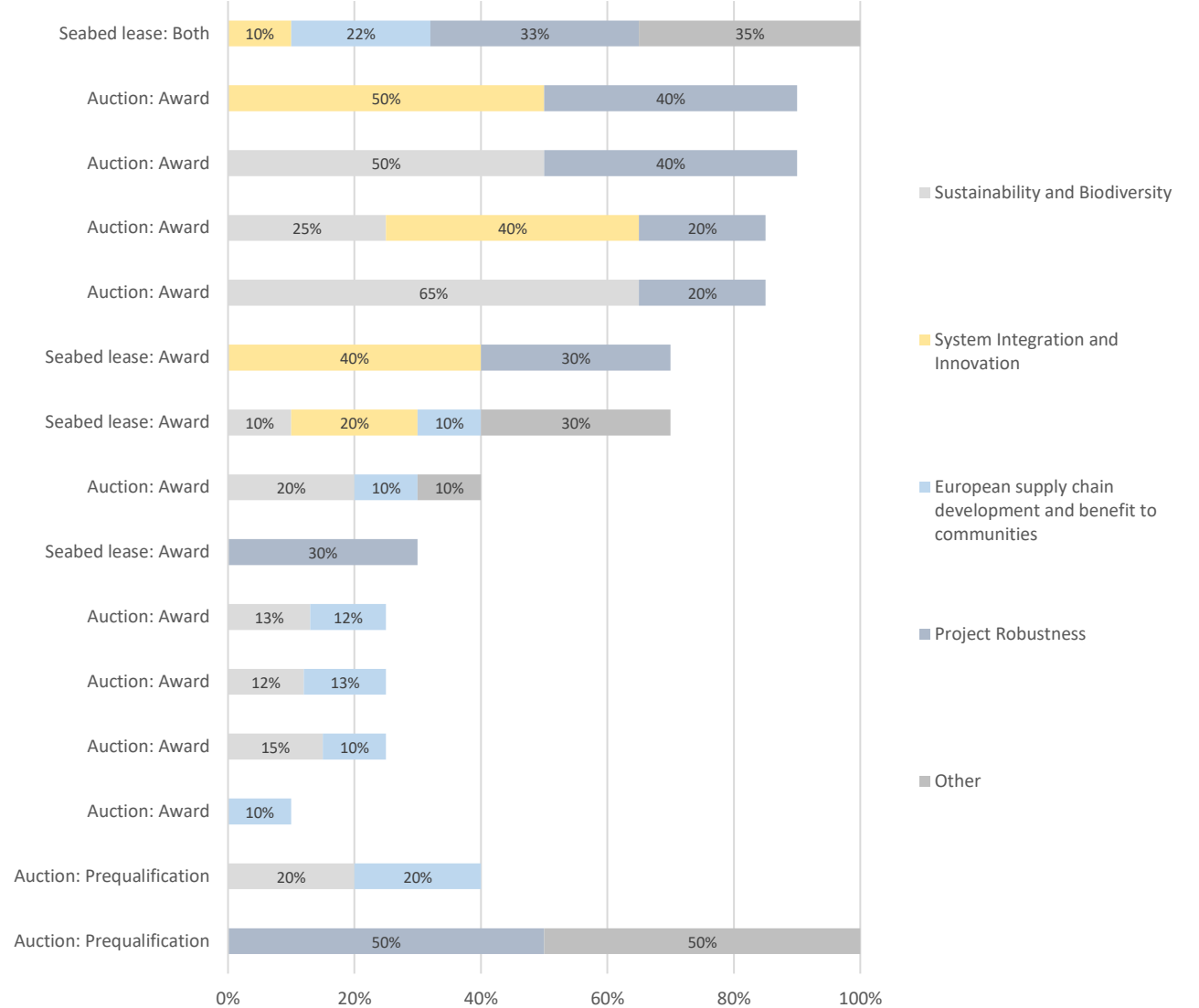
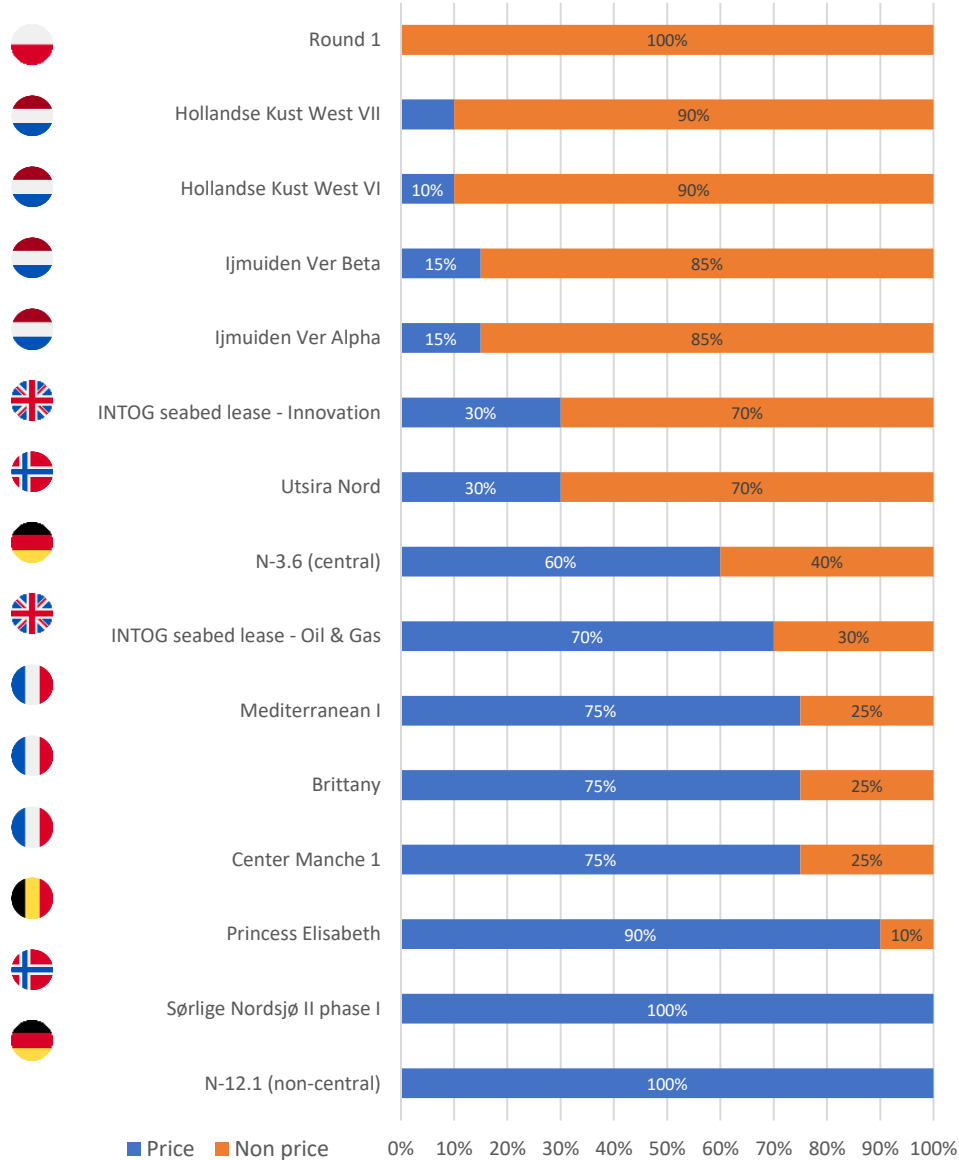


Note: FC = Financial Close

Trend: Non-Price Criteria in Auctions

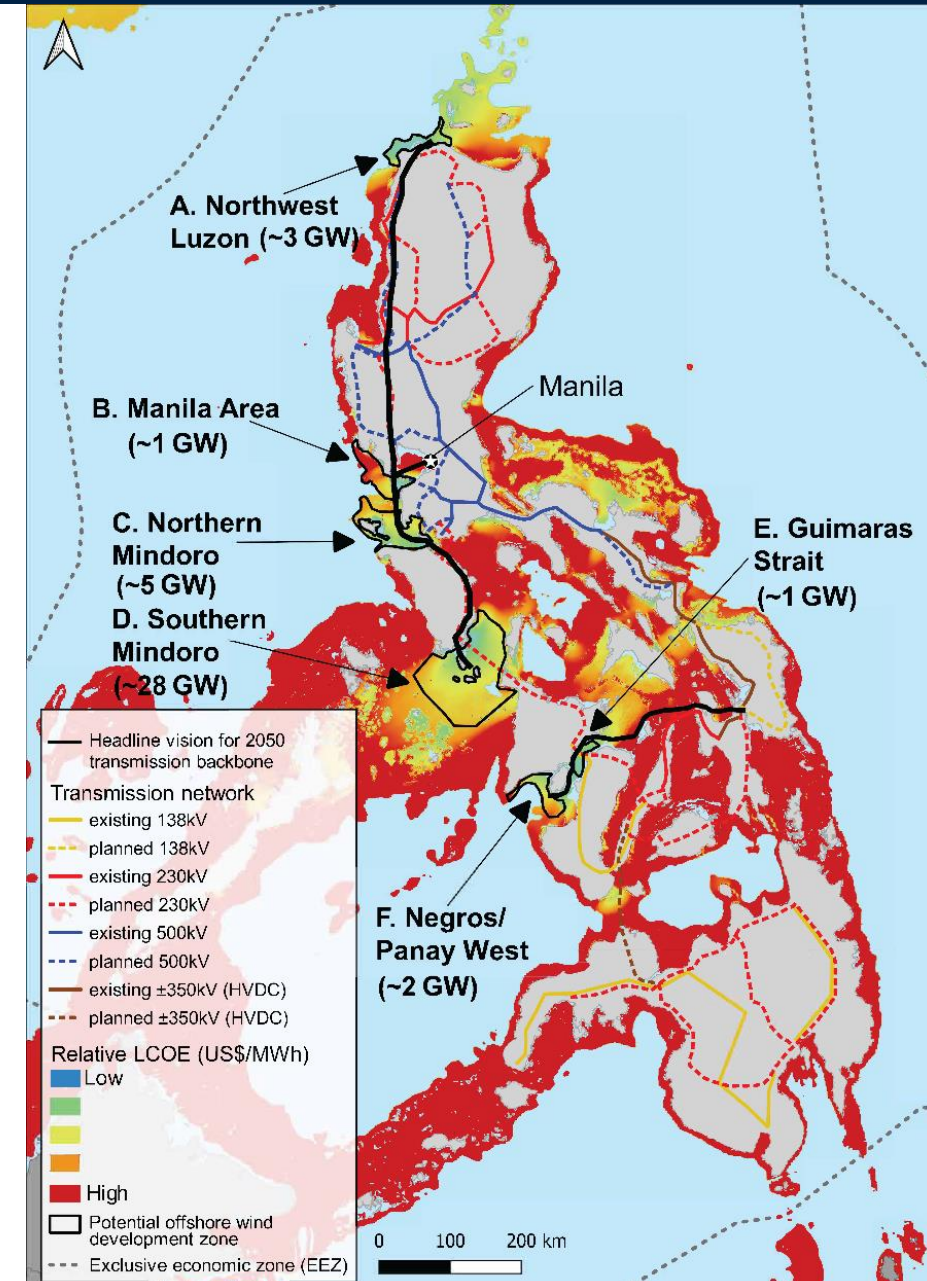
Most new markets cannot demand high up-front seabed lease payments

Source: WindEurope



Power Where it's Needed

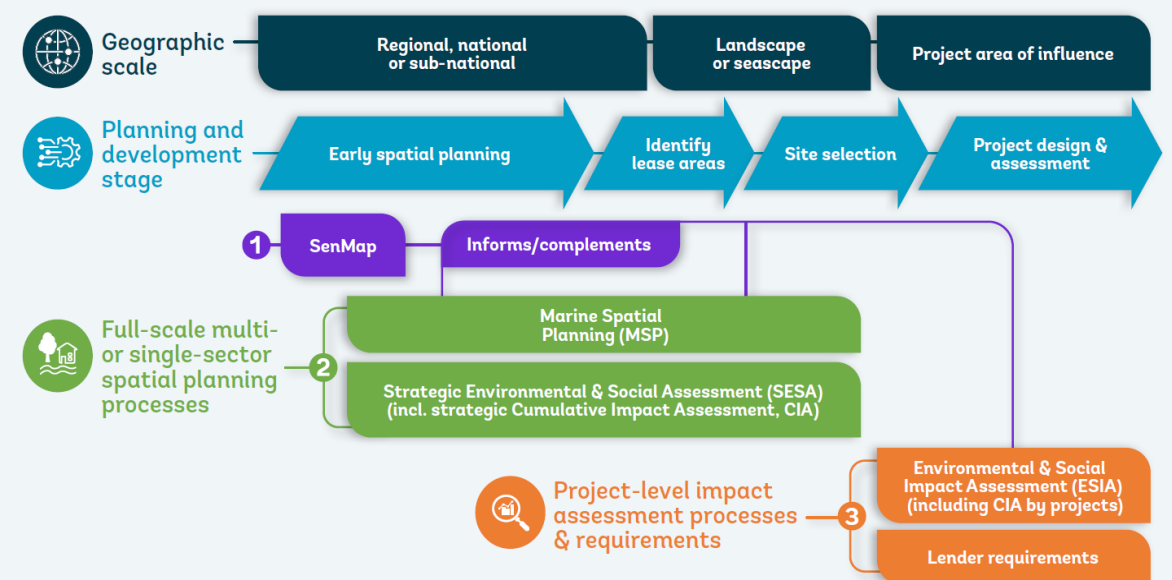
- Offshore wind can provide large volumes of RE generation close to demand centers
- BUT experience has shown the importance of planning
- **Market led approach** – In the Philippines, projects are planned around the best natural conditions. Grid connections will be challenging.
- **Retroactive plan led approach** – The UK Strategic Spatial Energy Plan is being implemented to provide a more holistic approach to planning
- **Proactive plan led** – Where a market is government-led from the outset (e.g. NL), the planning of sites and grid is undertaken together. New markets can combine site and grid (and infra) planning early on, even if a govt-led approach is not followed (e.g. Viet Nam)



Sustainable Use of Our Seas



- Critical that development is responsible, avoiding significant detrimental impacts on communities and biodiversity
- Ideally MSP would be implemented to inform siting [Belgium], but this is often retrospective
- Early spatial planning [SenMap] can be implemented proactively, to avoid most sensitive areas for environmental and social attributes [Romania & VietNam]
- ESIA standard must be to good international industry practices – can often be a discrepancy between local & international requirements [TW]



Revenue Certainty



Credit: MVOW – Aberdeen Bay OWF

- The crucial instrument to enable investment
- Has evolved substantially from administrative FiTs to auctions for CfDs
- Important to get the terms right [UK AR5, DK] and the timing in the project lifecycle [US]
- Long-term plan for timing and volume is helpful for investors and the supply chain [NL, Korea], and for grid planning [NL].
- Bankability of offtake agreements can be a particular issue in new markets [FX, creditworthiness, indexing, step-in, interconnection]
- Most developing countries do not have a wholesale electricity market so a PPA is likely [VN]. Some markets are planning CfD mechanisms [Colombia, Romania]

Financing Offshore Wind

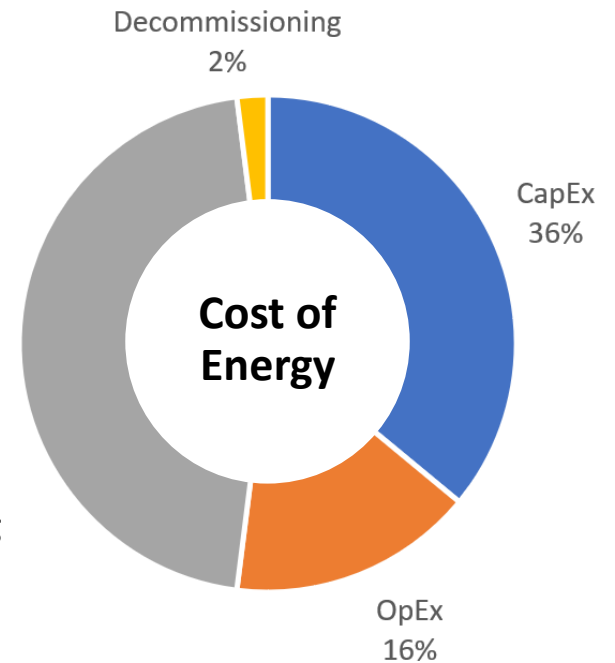
- Large volume per project; typically, limited recourse financing with multiple lenders
- Local lenders will not be familiar with offshore wind, and may have limited experience with project financing. Liquidity could also be an issue
- Many risks to manage to reduce financing costs and ensure bankability
- Key issues for emerging markets include:

- Foreign exchange
- Inflation
- Taxation changes
- Political risk
- Offtake agreement
- Grid curtailment
- Permits
- Supply chain and vessels



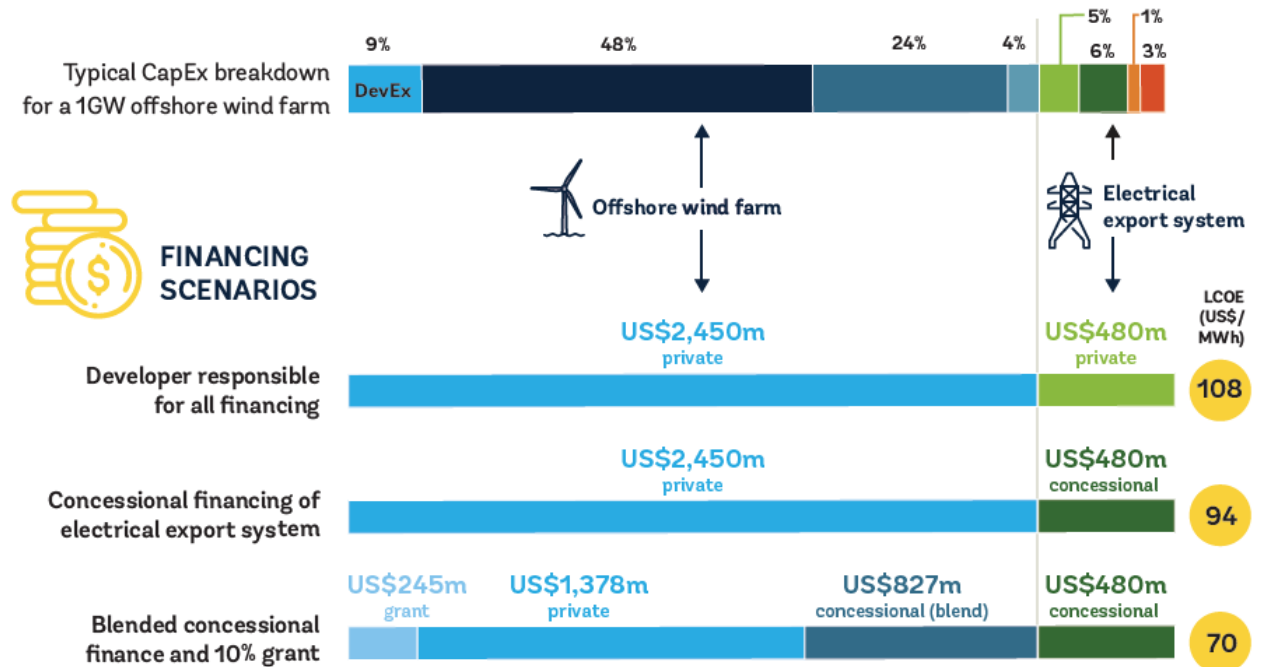
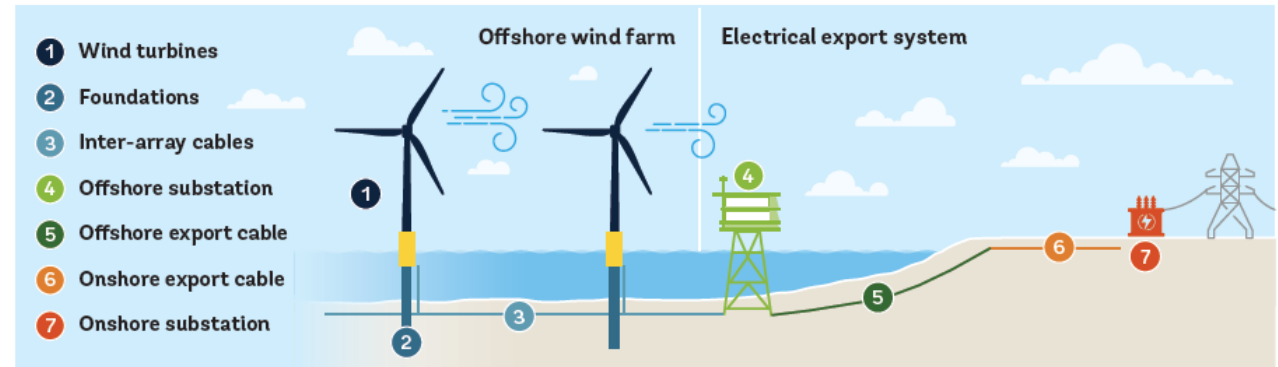
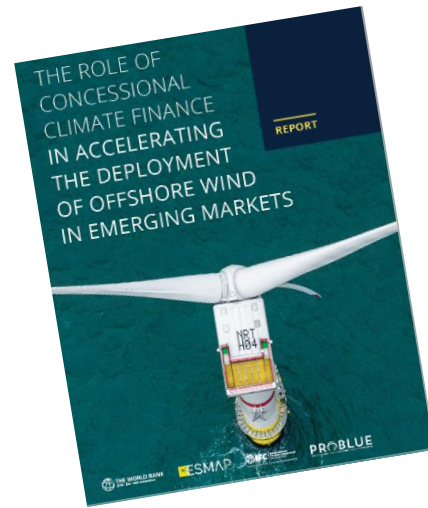
Financing costs
46%

Example of typical LCOE contributing components for initial projects in an emerging market



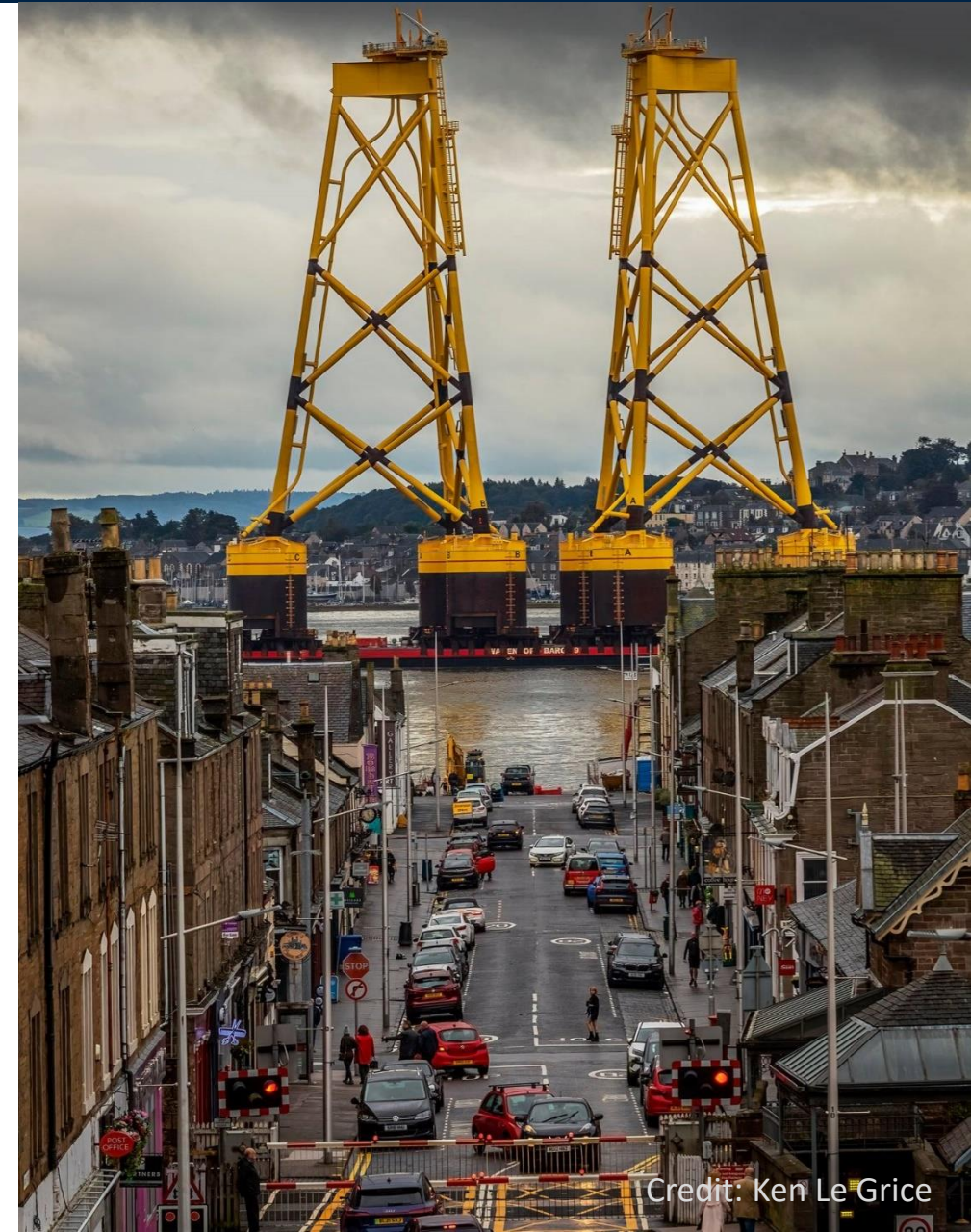
Role of Concessional Financing (WBG Study)

- First offshore wind projects in any new market are more expensive
- Needs to be 'affordable' for a developing economy
- Concessional finance (lower cost funding for development) could substantially reduce the cost of energy for the first offshore wind projects
- Helps to reduce the costs for subsequent projects
- Reducing need for public support as the market matures

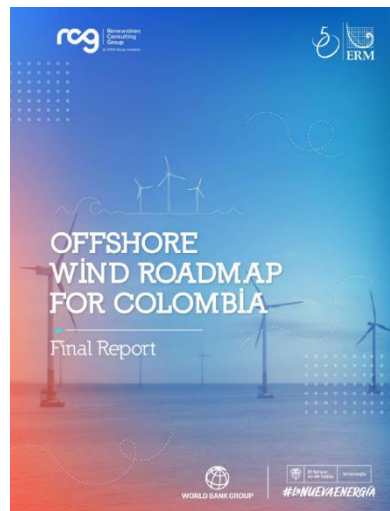
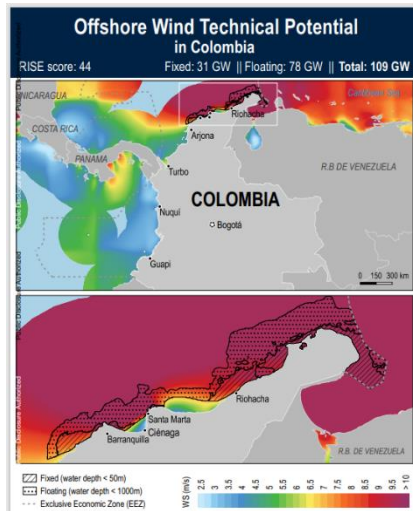
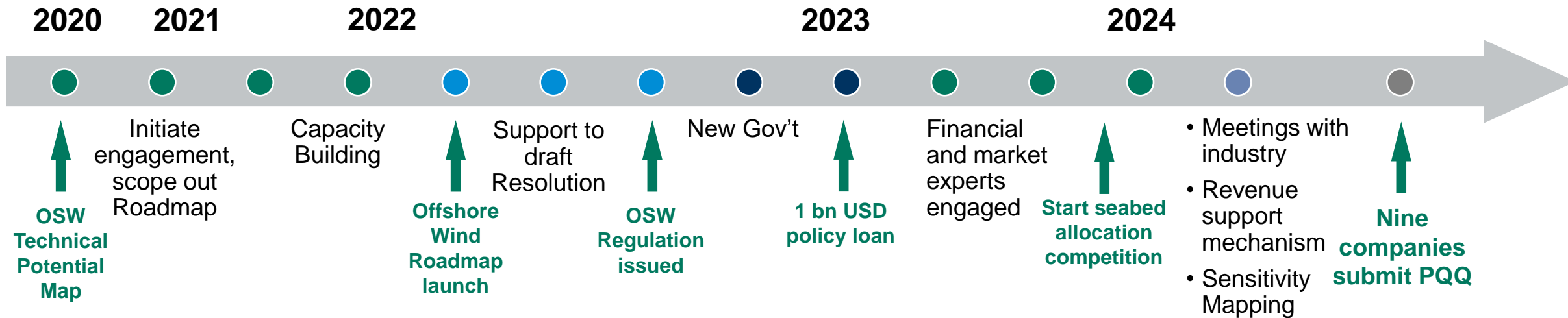


Localization

- **Denmark – infrastructure support**
 - No local content requirement
 - Government invested in harbour development
 - Supply chain attracted by good infrastructure
 - Large companies drew in others - clustering
- **UK – Soft local content requirements**
 - No formal local content requirement in bidding process, but supply chain plan needed for CfD
 - Clean industry bonus introduced for next round: extra CfD revenue support if projects choose to invest in more sustainable supply chains.
- **Taiwan – Strict local content requirements**
 - Mandatory list of components to be manufactured locally
 - Additional local content rewarded as part of auction scoring process
 - PPA penalties for non-compliance
 - Relaxed these rules in 2024



Colombia



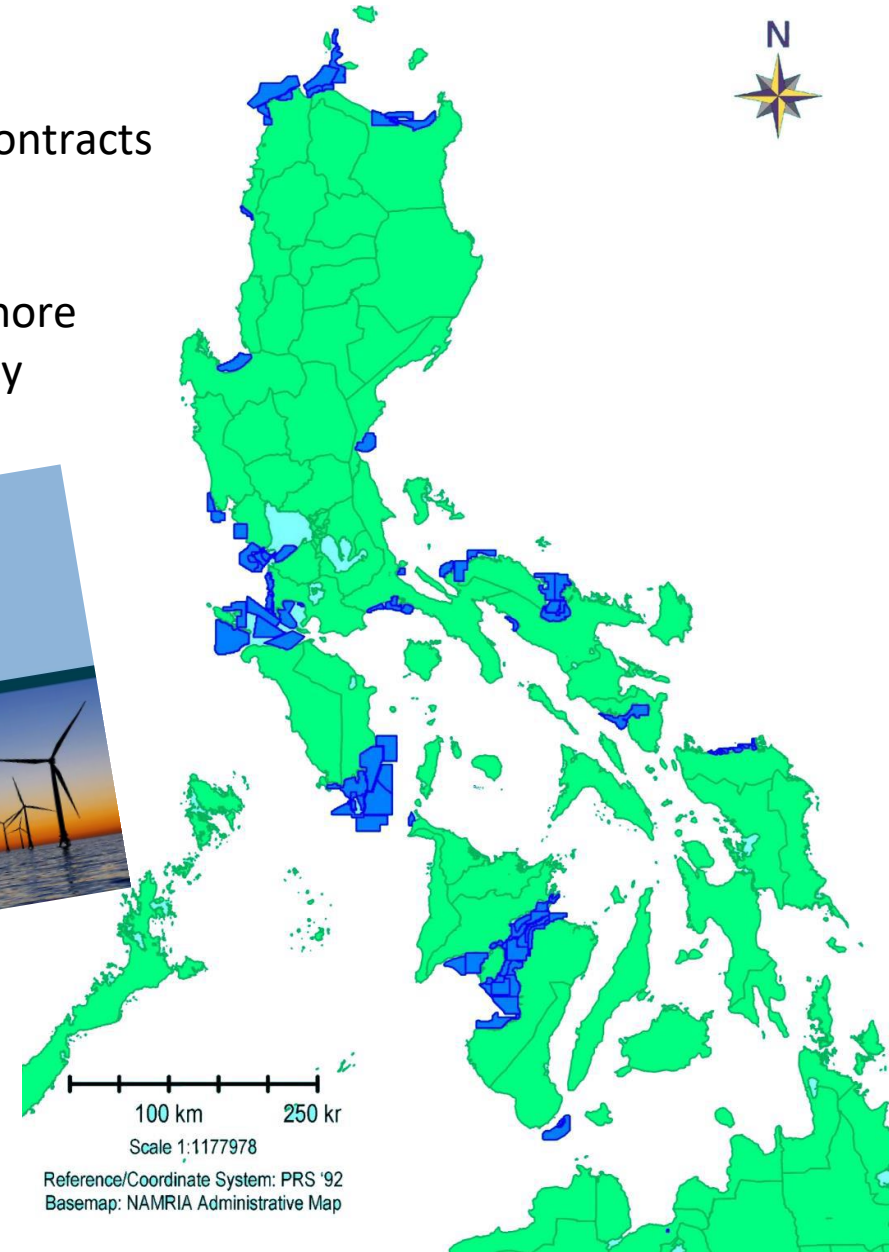
- Excellent wind conditions
- Desire to diversify power mix, transition offshore O&G
- Vision of up to 18GW by 2050
- Running first seabed allocation competition for +3GW
- Drafting regulations for CfD mechanism for offtake
- Developing permitting process, and planning infrastructure (grid & ports)

The Philippines

- Open door for seabed allocation, led to huge demand for sites
- Philippine Energy Plan (2023-2050) targets between 19GW – 50GW offshore wind by 2050
- First PPA (GEAP) auction in mid-2025
- Development of transmission grid is crucial to connect large capacity projects
- Investigating the port upgrades required to deliver first projects

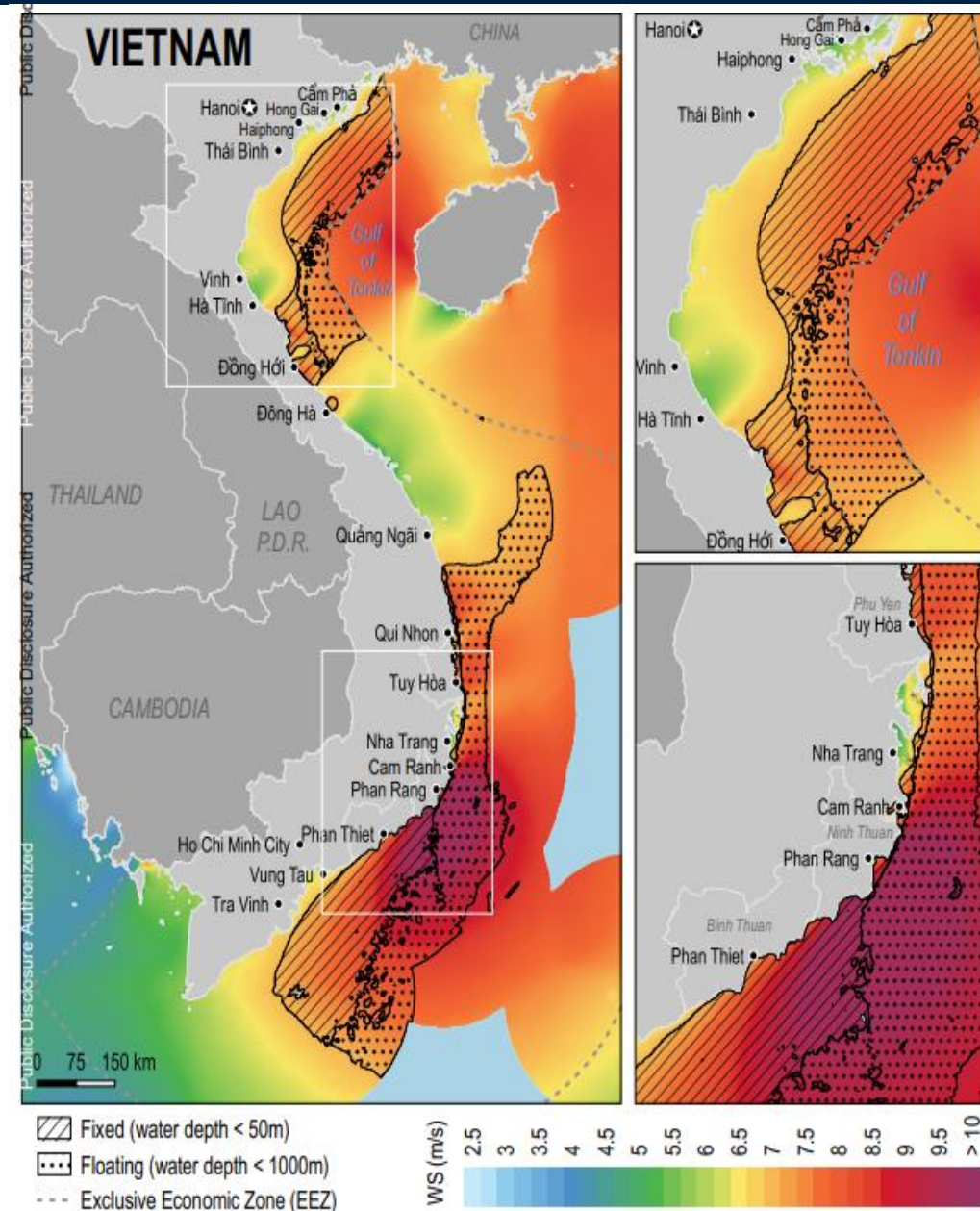
92 Service Contracts
(WESCs)

+67GW offshore
wind capacity



Vietnam

- Clear rationale for OSW in meeting demand and decarbonising energy
- Targeting 6GW by 2030 and between 70-90.5GW by 2050 (under PDP8)
- Regulatory framework under development, including amendments to Electricity Law proposed to enable investor selection for conducting site surveys and developing offshore wind projects
- Considering initial pilot projects, led by State Owned Enterprises
- WB supporting on Offshore Wind Sectoral Plan and the Procurement Framework for Offshore Wind



Some Interesting Observations from Emerging Markets

1. **Seabed rights** – high demand for exclusivity and to claim the best spots
2. **Costs** – there is a big gap between offshore wind in established and emerging markets – often this is not understood
3. **Local supply chain** – some countries are already supplying the global offshore wind industry
4. **Coal** – despite the advantages, it is difficult to displace incumbent generation like coal (especially state owned)
5. **Environmental and social impact** – lack of reliable data in the marine space and local assessment requirements are often far from good practice



Thank You!

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ESMAP-IFC OFFSHORE WIND DEVELOPMENT PROGRAM
WWW.ESMAP.ORG/ESMAP_OFFSHORE-WIND



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OSW & Domestic Energy Independence

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- Offshore Wind Turbine Design for Extreme Weather Events
- U.S. and European Research to Transform Our Energy Systems
- Innovations and Emerging Technologies in Offshore Wind

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