



Green Energy

Export Day 2024

Green Energy

Export Day 2024



WORKSHOP WIND ENERGY #1

GLOBAL MARKET UPDATE



GLOBAL WIND MARKET UPDATE

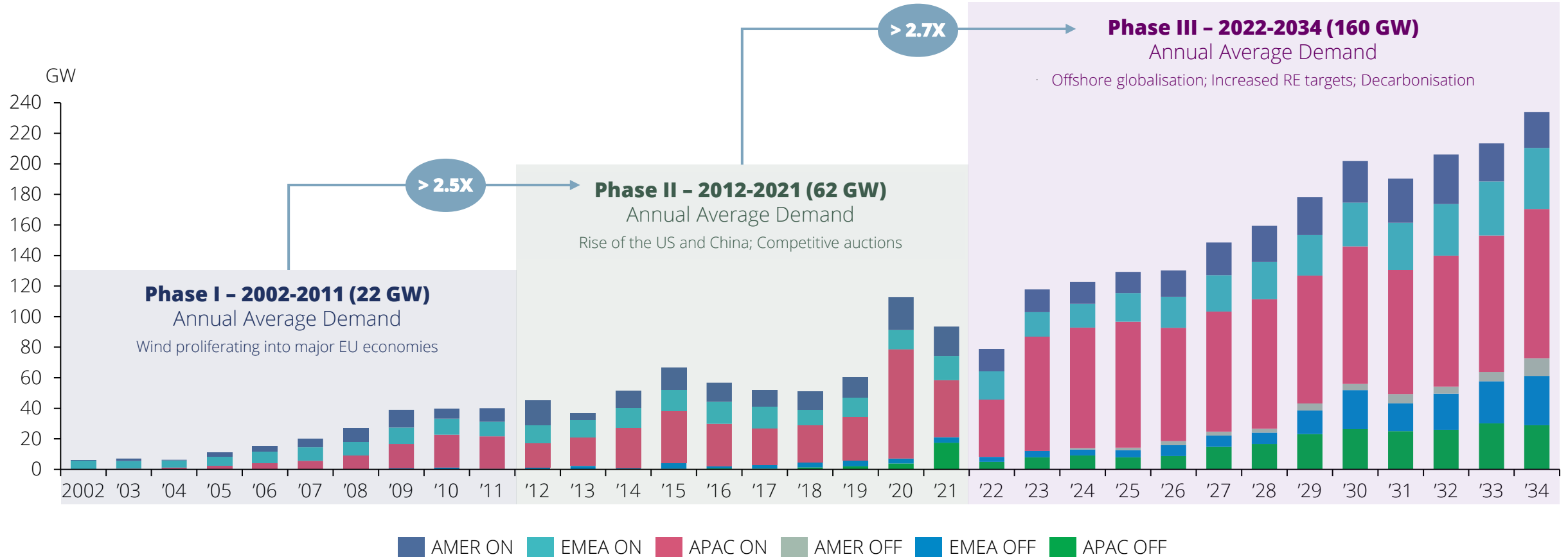
Green Energy Export Day | 23 August 2024

/Carsten Brinck

GLOBAL MARKET FORECAST

The global Wind industry is to attract USD two trillion in the next decade, delivering an average annual 160GW demand

Global Onshore and Offshore Wind Installed Capacity 2002 to 2034

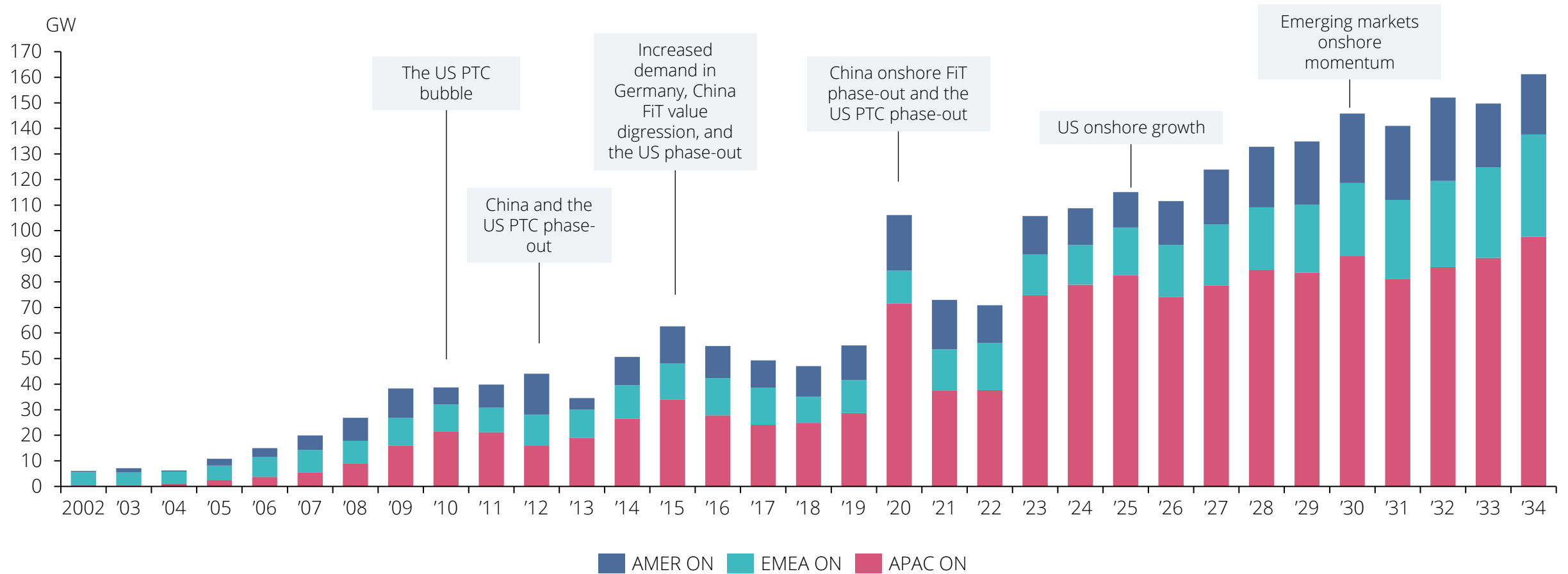


Note: ON-Onshore ; OFF - Offshore

Sources: Brinckmann; Historical data from GWEC, ACP and WindEurope

Regional policies in the biggest markets have driven historical Wind growth; cost, technology and value drive future demand

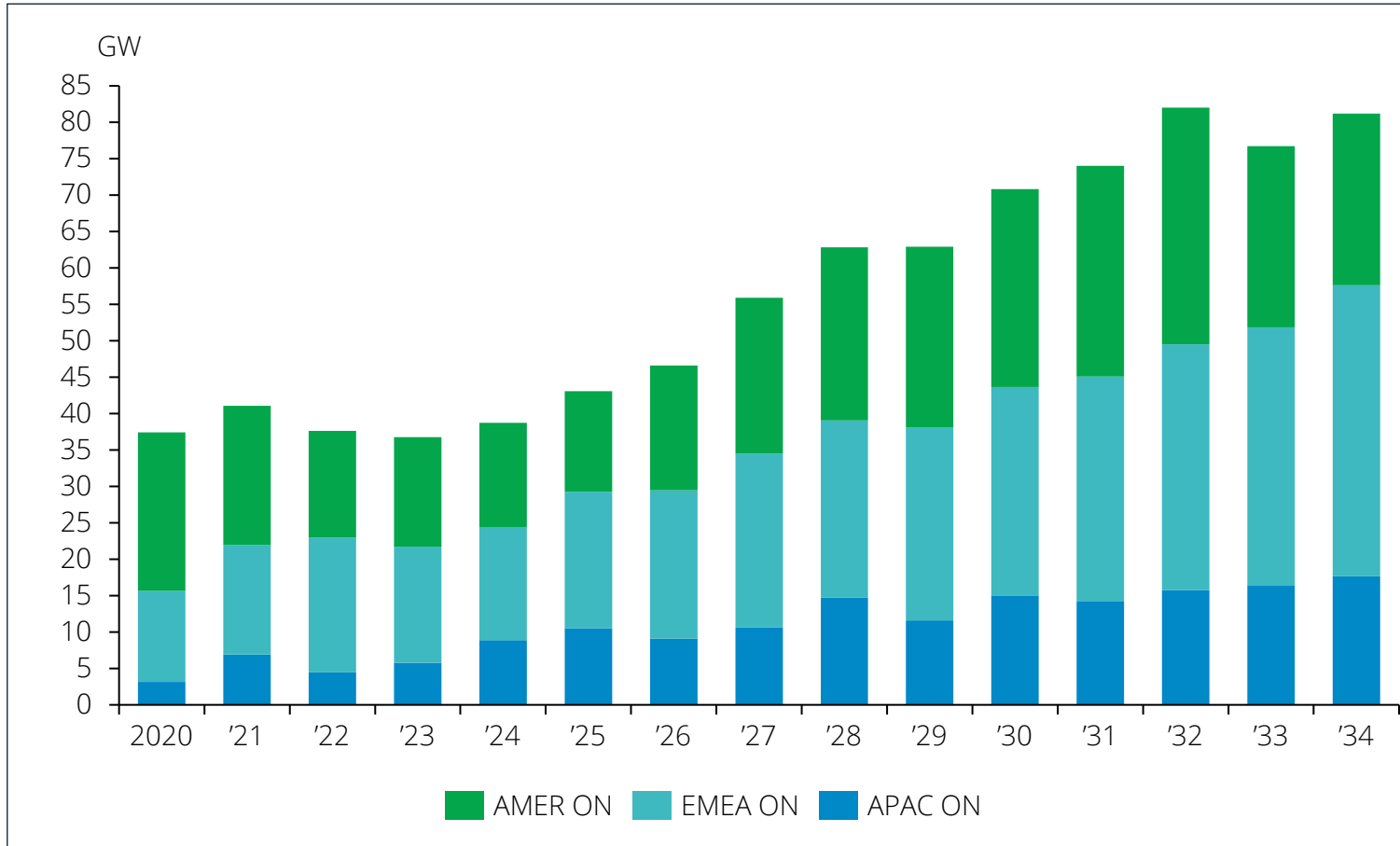
Global Onshore Wind Installed Capacity 2002 to 2034



Sources: Brinckmann; Historical data from GWEC, ACP and WindEurope

The Onshore market is to gain momentum starting in 2025 due to the US IRA and Germany bouncing back with record project approvals

Global Onshore Excluding China Market Forecasts 2020-2034



Key Takeaways

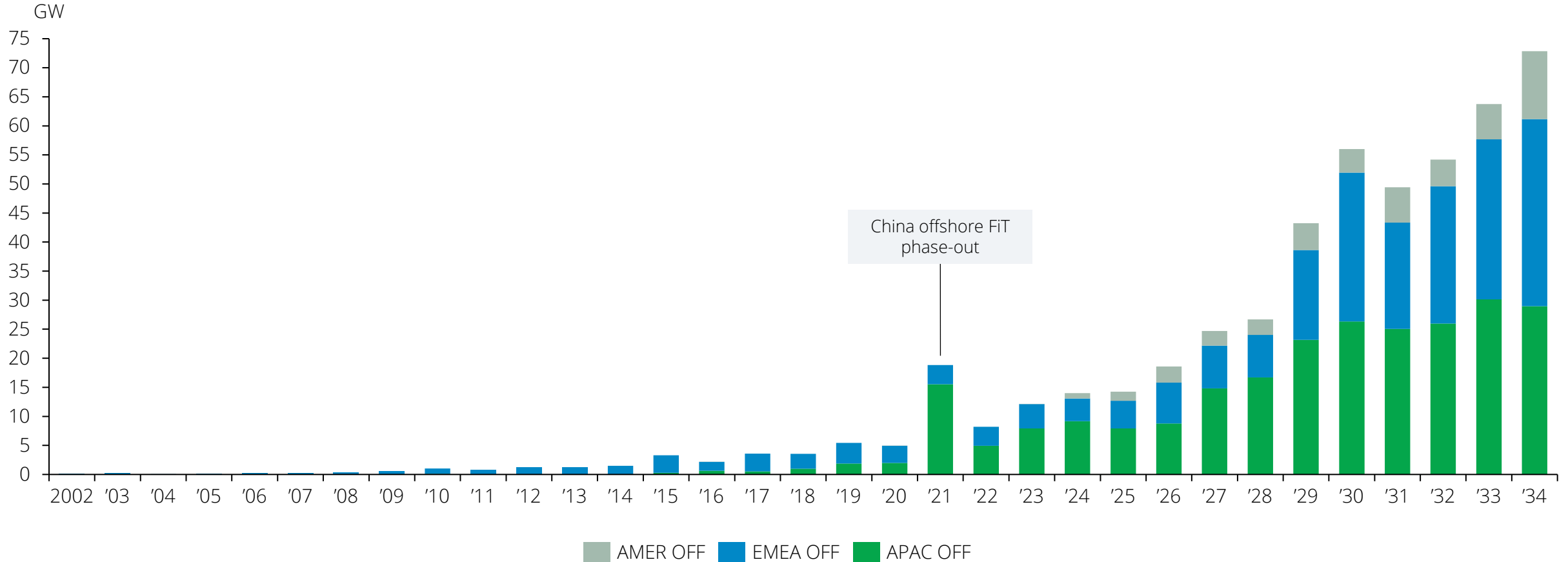
- The Global, excluding China, onshore market is expected to recover starting in 2025
- US IRA policy clarity has enabled developers to close the projects.
- Germany has approved 7+GW of wind projects in 2023
- Brazil grid-connected a record capacity of 5GW in 2023
- India's activity increased by 50% in 2023
- Countries in the Middle East, Africa and Central Asia emerge.

Note: APAC- Here Asia Pacific Excluding China; FiD – Financial Investment Decision

Source: Brinckmann

Offshore Wind is at the cusp of globalisation and will emerge as a central pillar to accelerate the global energy transition

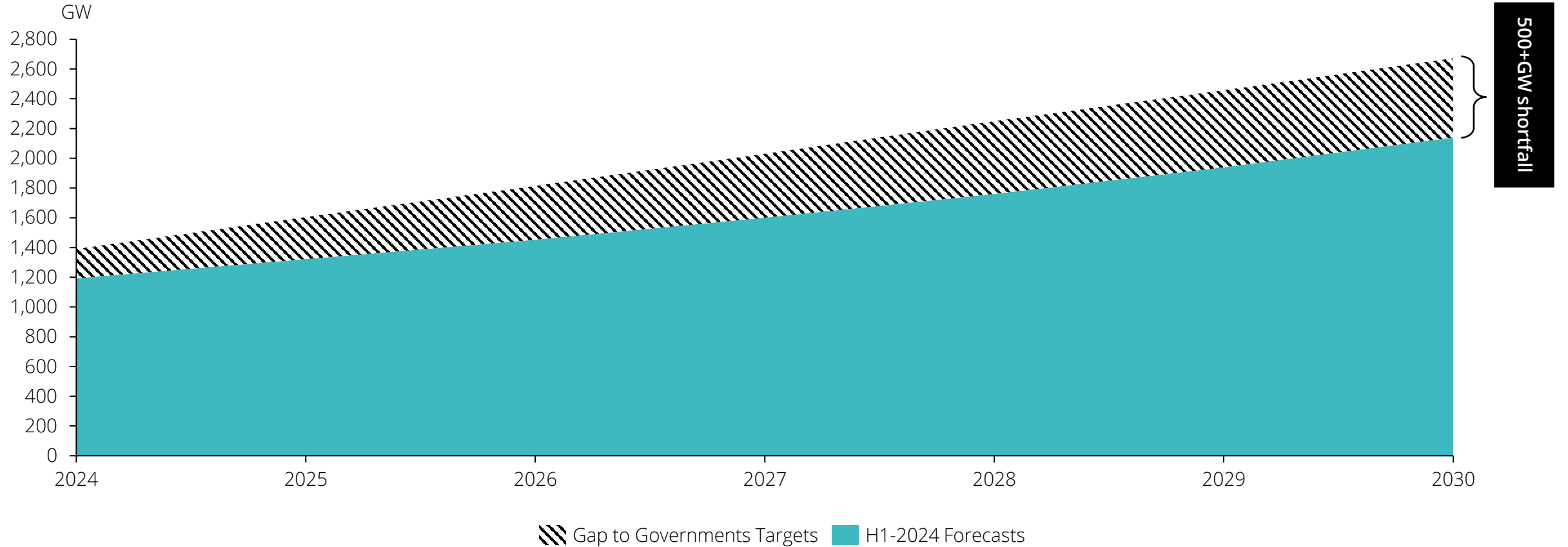
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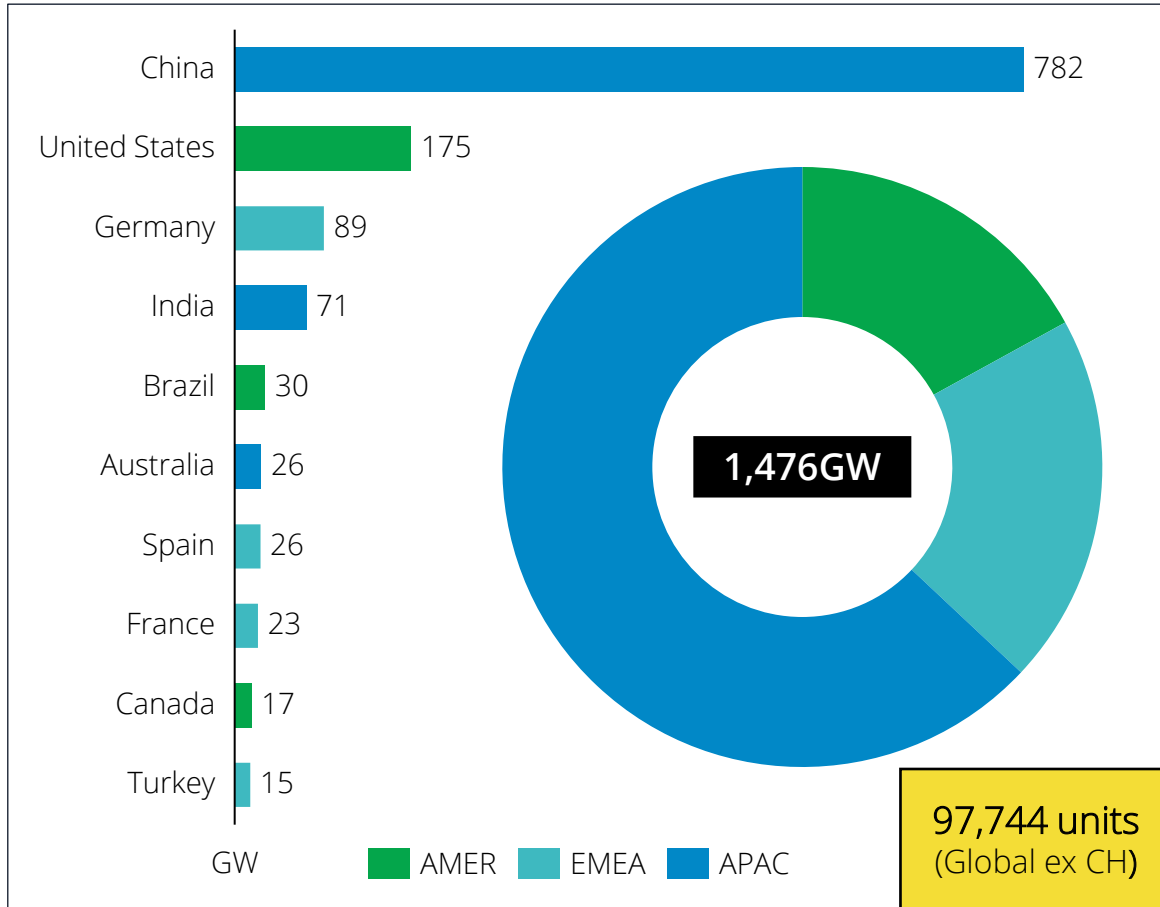
Despite doubling of annual average installations, the market is to witness more than 500GW of shortfall to the ambitious governmental targets

Global Wind Industry Cumulative Market Forecasts from 2024 to 2030 vs. Gap to Meet Governmental Targets

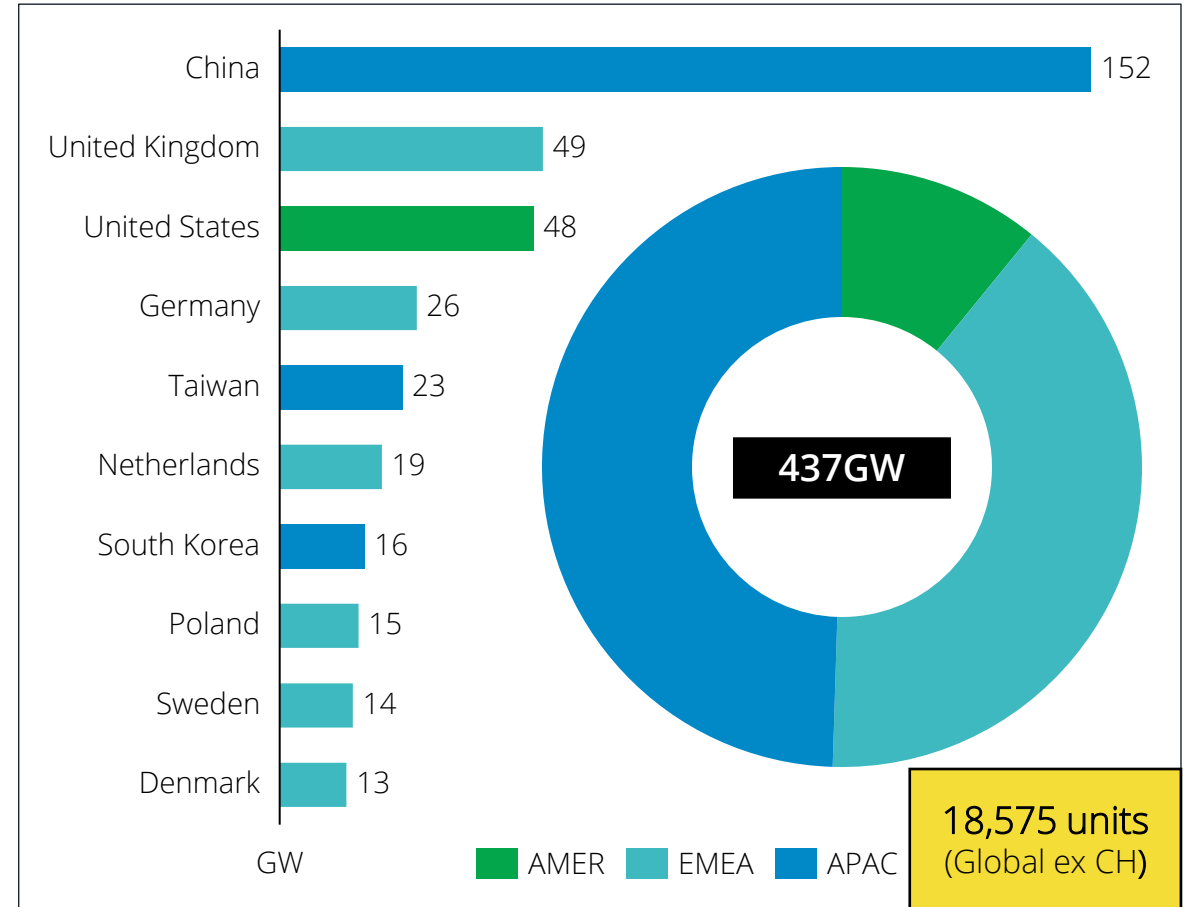


While the AMER region dominates the Global ex. China onshore segment, EMEA dominates the Offshore segment

Top 10 Onshore Wind Markets Cumulative New Capacity (2024 to 2034)



Top 10 Offshore Wind Markets Cumulative New Capacity (2024 to 2034)

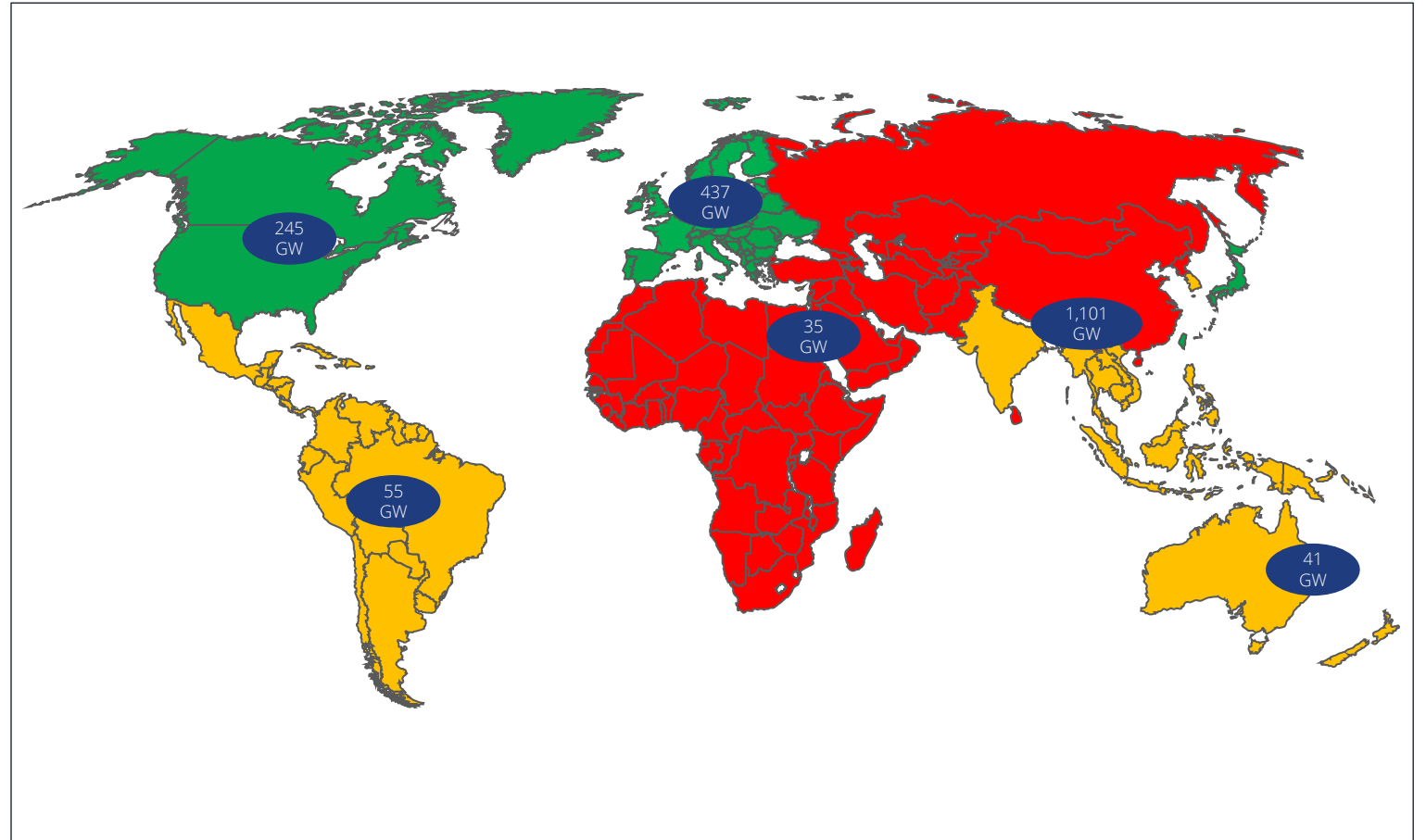


Western turbine OEMs' addressable market is shrinking rapidly due to aggressive Chinese peers' expansion into international markets

Key Takeaways

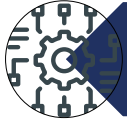
-  Western OEMs dominate conventional markets like North America and Mainland Europe. Very unlikely that Chinese OEMs can penetrate into these markets.
-  Due to Chinese expansion into these geographies, Western OEMs have to compromise market share in the next few years. Both these supplier segments co-exist in these markets.
-  Western OEMs will have an uphill battle in competing in these markets. As Chinese OEMs undercut the price by a significant margin combined with financing schemes. Western OEMs would need help to compete in these markets.

Addressable Market for Western Turbine OEMs



GLOBAL TECHNOLOGY TRENDS

Wind Turbine Technology Trends



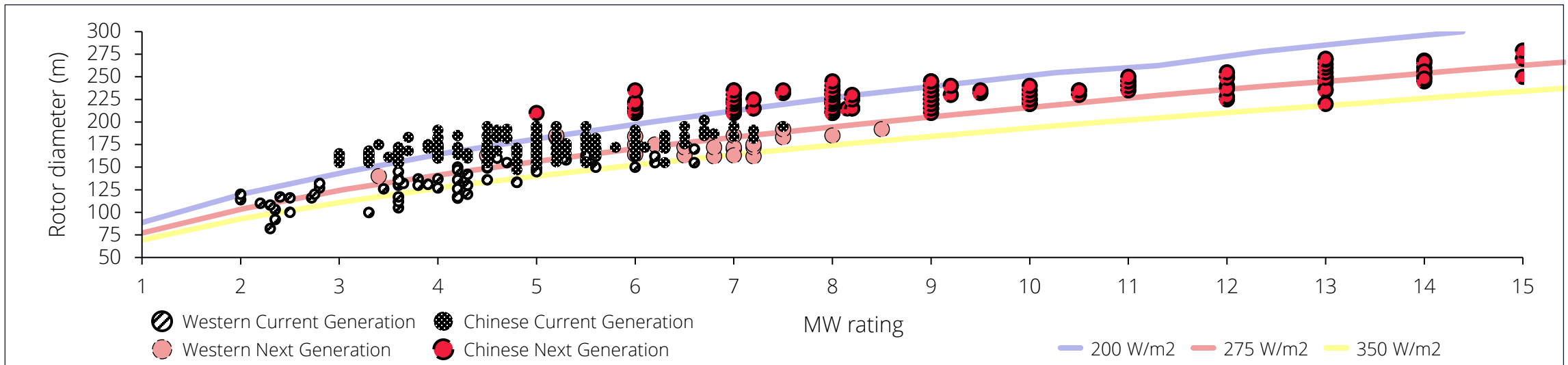
Offshore NPI strategy is contrasting among Western OEMs



Chinese firms' technology innovation poses a threat to Western suppliers

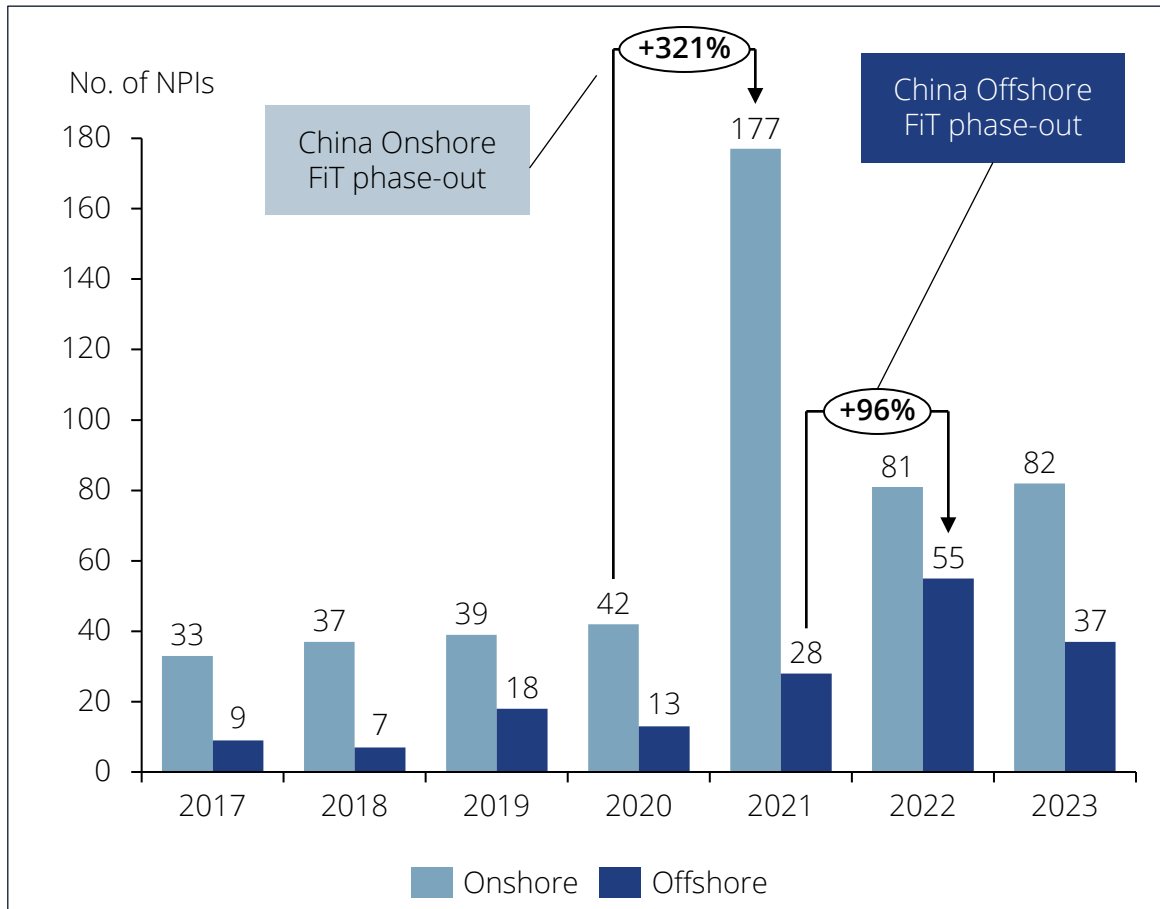


All Western OEMs decelerate onshore NPI and arrive at a common consensus

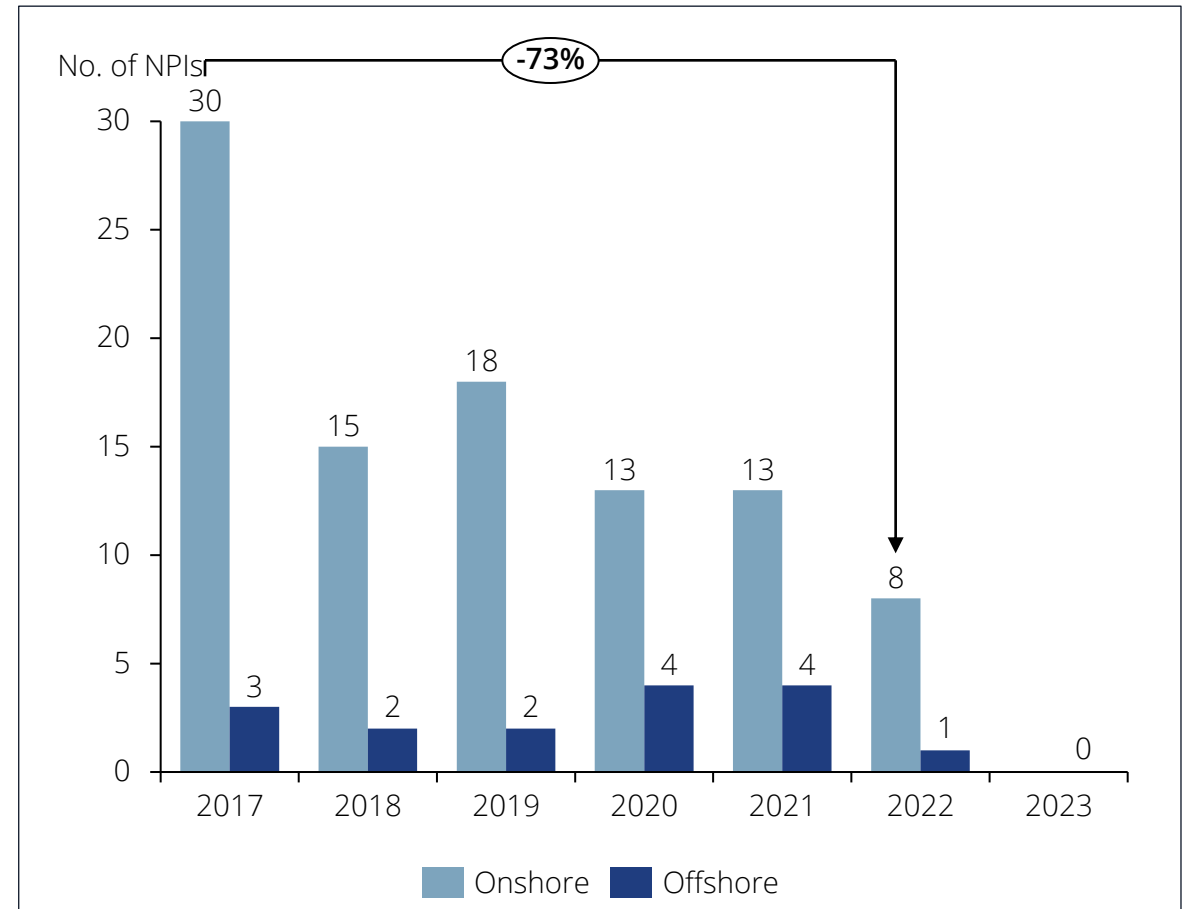


Western turbine OEMs decelerate NPI developments with no new turbines announced in 2023, and Chinese OEMs to partially slowdown in the offshore

Chinese Turbine OEMs NPI Trends 2017 to 2023



Western Turbine OEMs NPI Trends 2017 to 2023

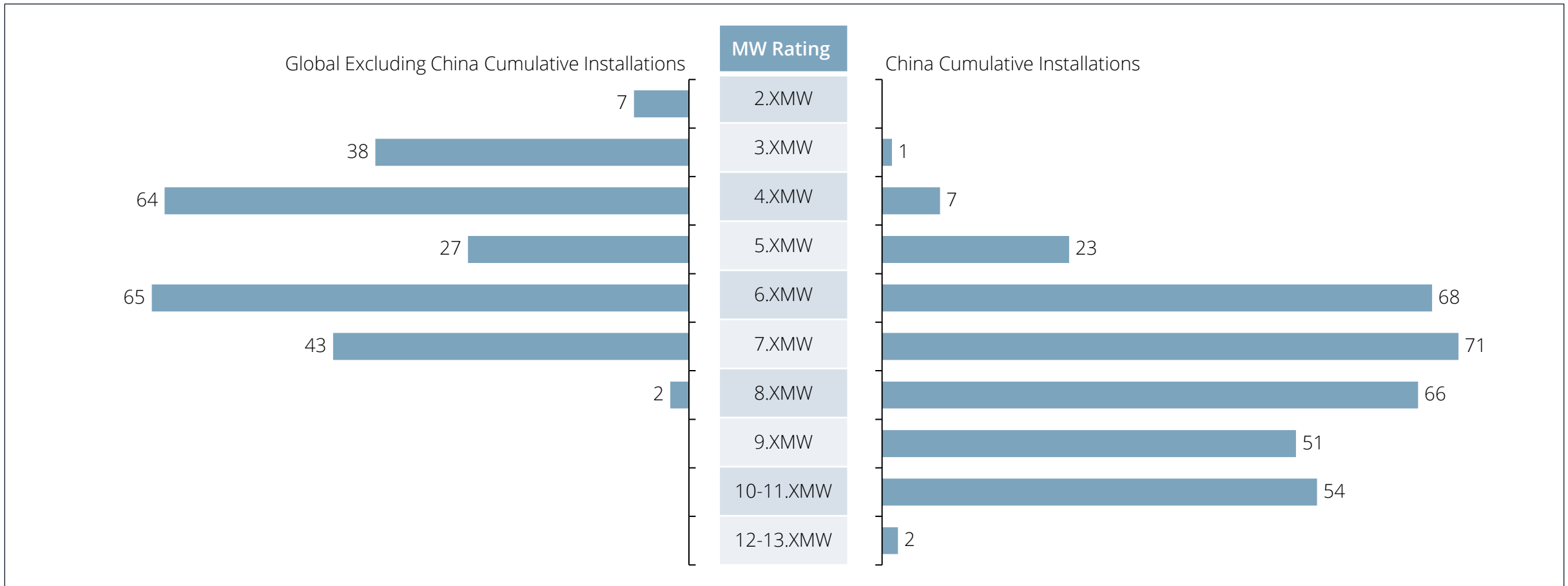


Note: NPI – New Product Introduction; FIT – Feed-In-Tariff; Western top five OEMs, Chinese top ten OEMs. NPIs include MW rating upgrades as well

Source: Brinckmann

As Western OEMs commercialise 6 to 7MW class machines, Chinese increasingly sell 7 to 12MW class technologies across provinces

Onshore Wind Turbine Technology Trends Global Excluding China vs. China Cumulative Installations 2024 to 2028 (GW)



GLOBAL SUPPLY CHAIN

Global Supply Chain Trends



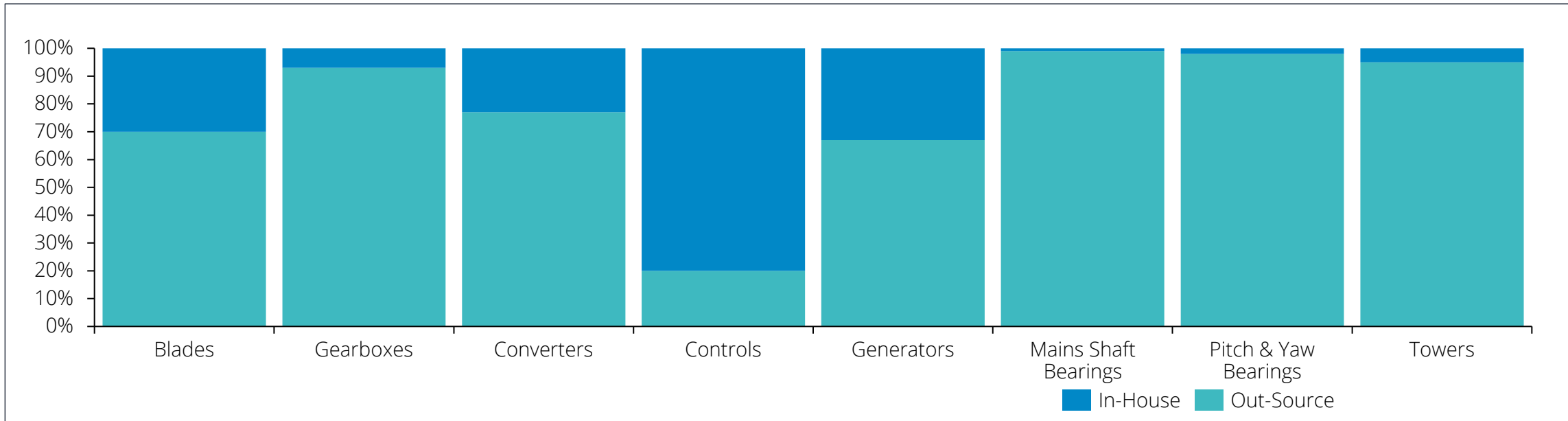
The addressable market for turbine supply to increase from USD 70bn to 160bn by 2033



Cost pressure force turbine OEMs to increase out-sourcing significantly in 2023 Vs 2022



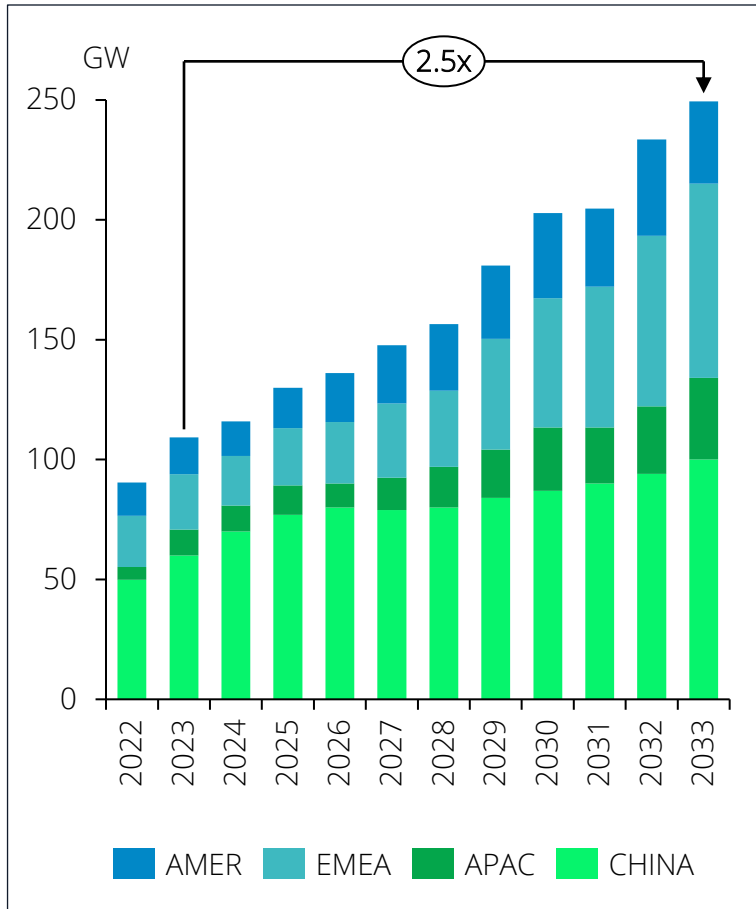
Despite near-term headwinds, Offshore wind growth offers immense investment potential



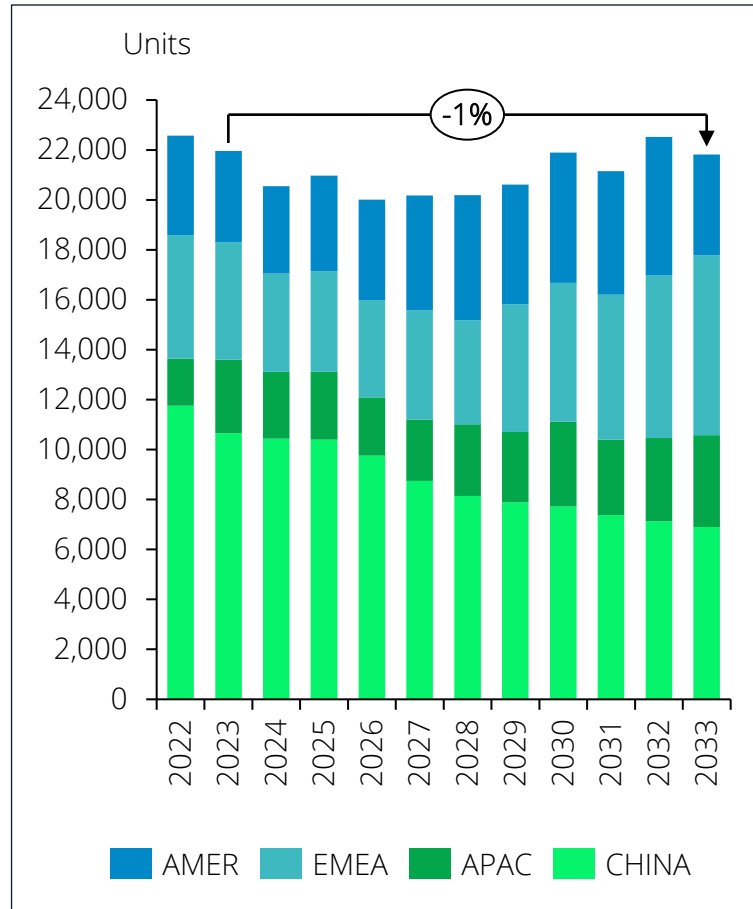
Source: Brinckmann

Despite a flat growth in turbine units deployed, as turbine sizes grow, the supply chain addressable market value will grow

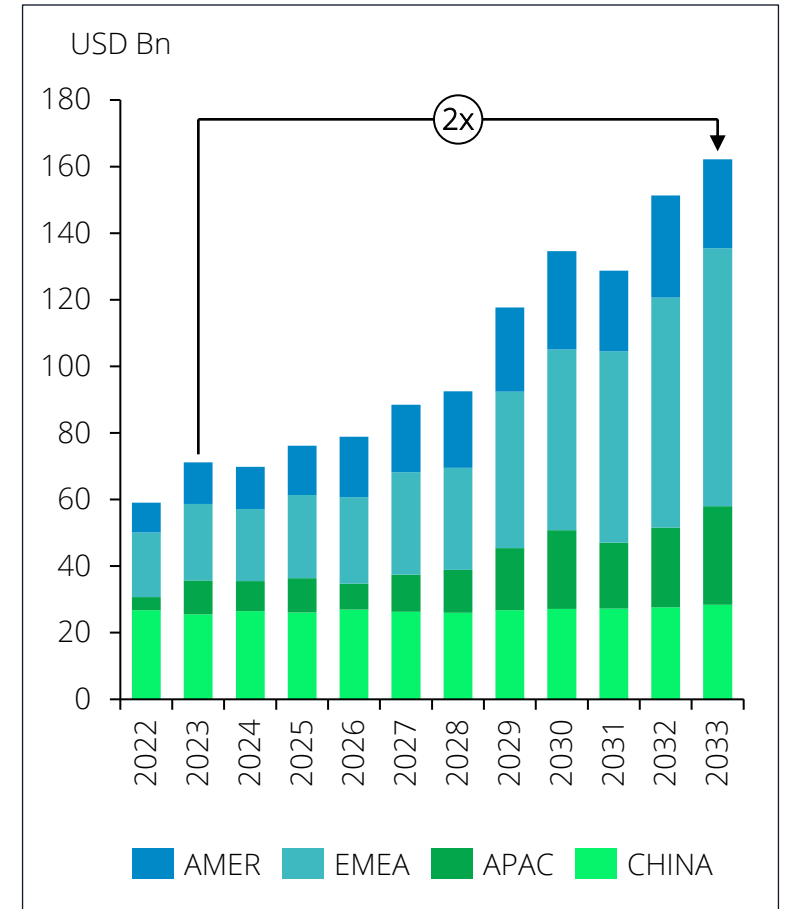
Global Wind Market Forecasts 2022 to 2033 (GW)



Global Wind Market Forecasts 2022 to 2033 (Units)



Global Wind Turbine Addressable Market (USD)

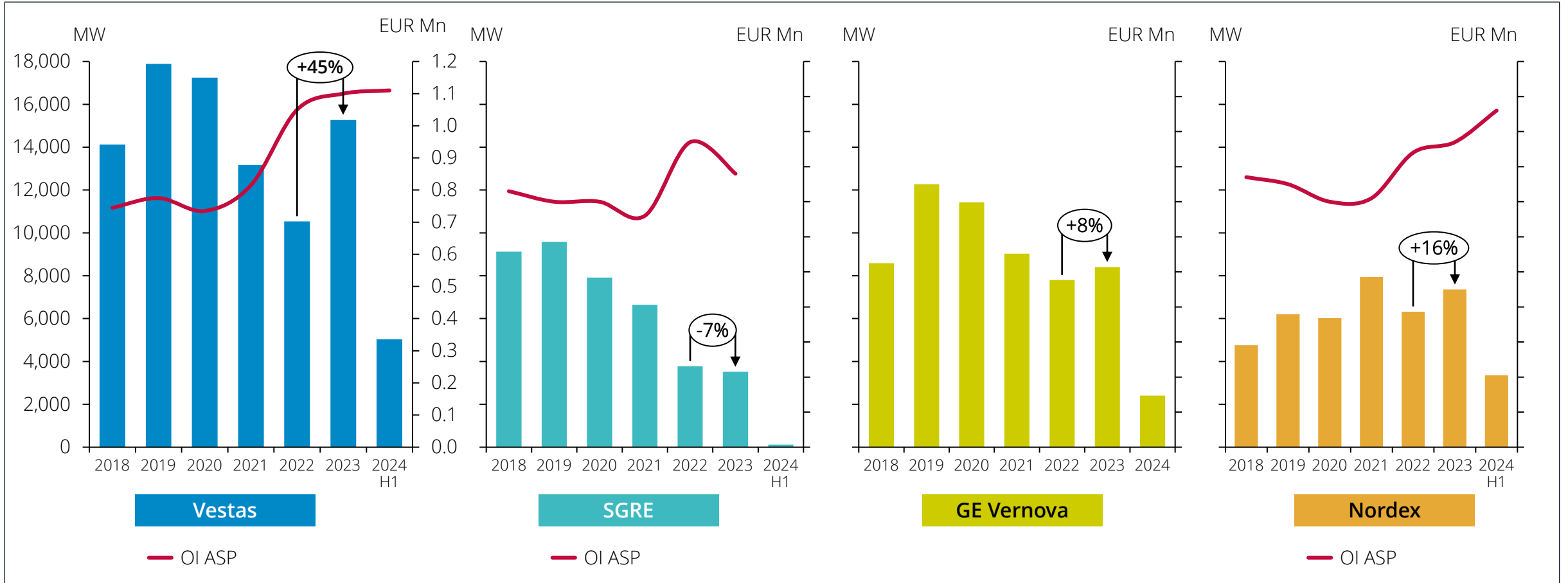


Note: APAC in the above graphics excludes China.

Source: Brinckmann

After four years of order intake decline, Western OEMs reported an increase in 2023, paving a recovery path in the Onshore markets

Wind Turbine OEMs Onshore Order Intake (OI) and Average Selling Price (ASP) Trends 2018 to 2023



Note: GE Order Intake (OI) ASP data is unavailable; SGRE data is based on calendar years and not its fiscal year reporting; SGRE OI ASP data for 2024 H1 is unavailable

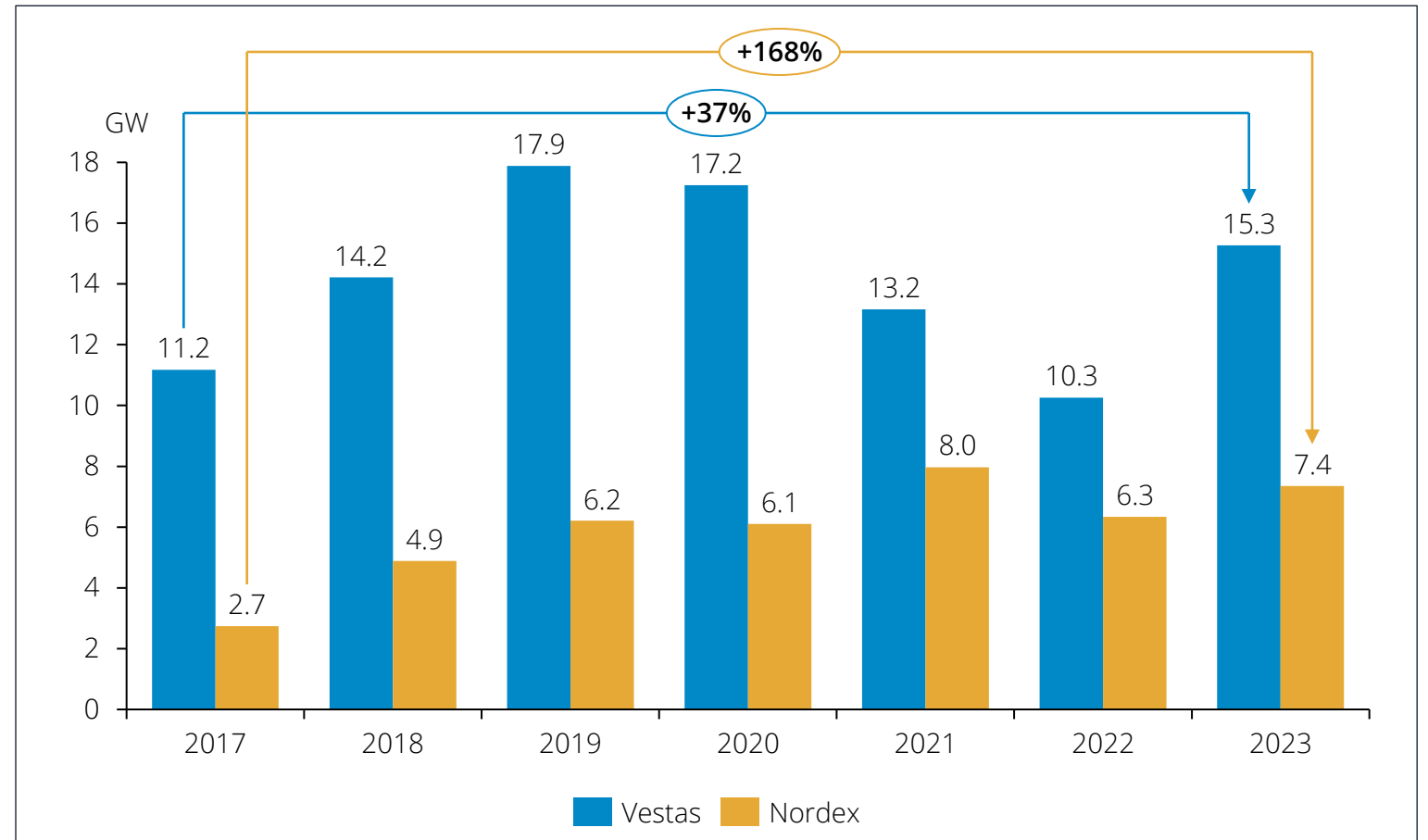
Source: Brinckmann

Competitive turbine technology enabled Nordex to gain a significant share over peers in the past few years

Key Takeaways

















































- Nordex outperformed peers in the industry in the past few years.
- This success is largely attributed to its focus on technology innovation, product strategy, market approach and client segment expansion.
- Nordex pioneered low-wind speed technologies more than a decade ago and has maintained a technology edge.

Nordex and Vestas Onshore Order Intake Trends 2017 to 2023



Offshore represents the biggest supply chain opportunity in the mid-long term; Onshore supply chain warrants new investments in five years

Global Onshore and Offshore Capital Components Supply Bottlenecks and Investment Potential Assessment

Component	2023 to 2026		2027 to 2030		2031 to 2033	
	Onshore	Offshore	Onshore	Offshore	Onshore	Offshore
Nacelles						
Blades						
Towers						
Gearboxes						
Converters						
Generators						
Main Bearings						
Pitch and Yaw Bearings						



No bottleneck



Potential Bottleneck

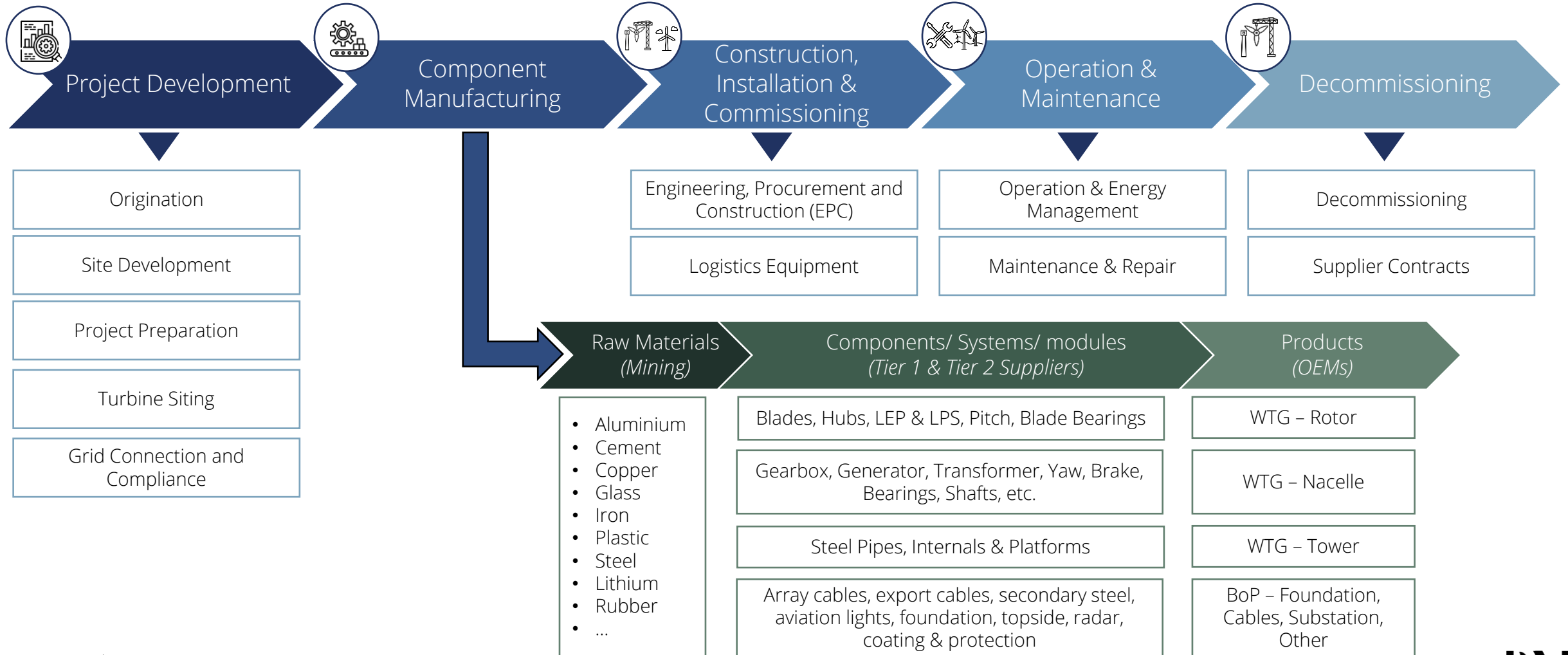


Bottleneck

THE DANISH VALUE CHAIN

Denmark has a strong presence across the entire Wind value chain, benefitting from over 30 years of experience and strong collaboration capabilities

The Wind Value Chain



Denmark is leveraging its robust knowledge, innovation and network capabilities to maintain a competitive position in an increasingly competitive global market

Strengths

- Made in Denmark is a quality stamp
- Full wind value chain coverage with a strong track record
- Ability to act as system suppliers
- Advanced national innovation system and close industry collaboration
- Agile Danish companies driving innovation and change
- Strong position in the after market

Weaknesses

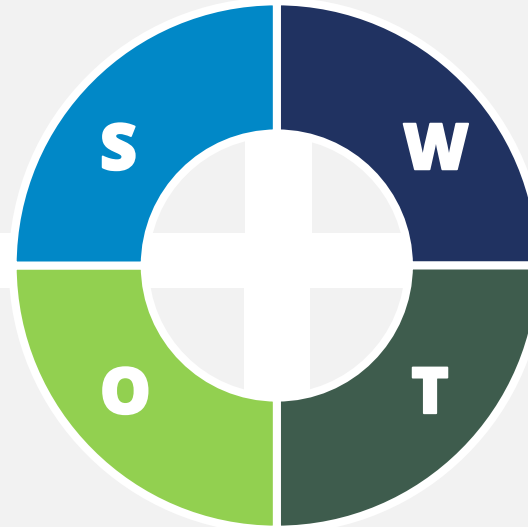
- High labor and tax costs are driving production abroad, posing a risk of losing innovation
- Reduced price competitiveness in a growing global wind market
- Financial pressure mounting due to reduced market activity in recent years
- Danish suppliers are only targeting the premium segment and may need to adjust their approach

Opportunities

- Growing consolidation provides Danish companies with the opportunity to expand using foreign investment
- Chinese competition in Europe may help Danish companies enter the Chinese market through collaboration
- Shift towards system supply allows for broader coverage of the value chain

Threats

- Increased international technology competition with Chinese companies entering the European market
- Global cost inflation narrowing focus on price
- Growing market volume and pressure on smaller companies financially
- Consolidation and change in ownership leading to sale of Danish industry knowledge to foreign investors



Key trends and opportunities for the Danish value chain

AMER

- The US IRA policy regime presents a compelling case for new investments.
- Take advantage of anticipated offshore growth, offering an opportunity to establish a first-mover advantage, coupled with potential onshore benefits.
- Explore the most cost-effective markets in South and Central America to meet the demand from the US.

GLOBAL

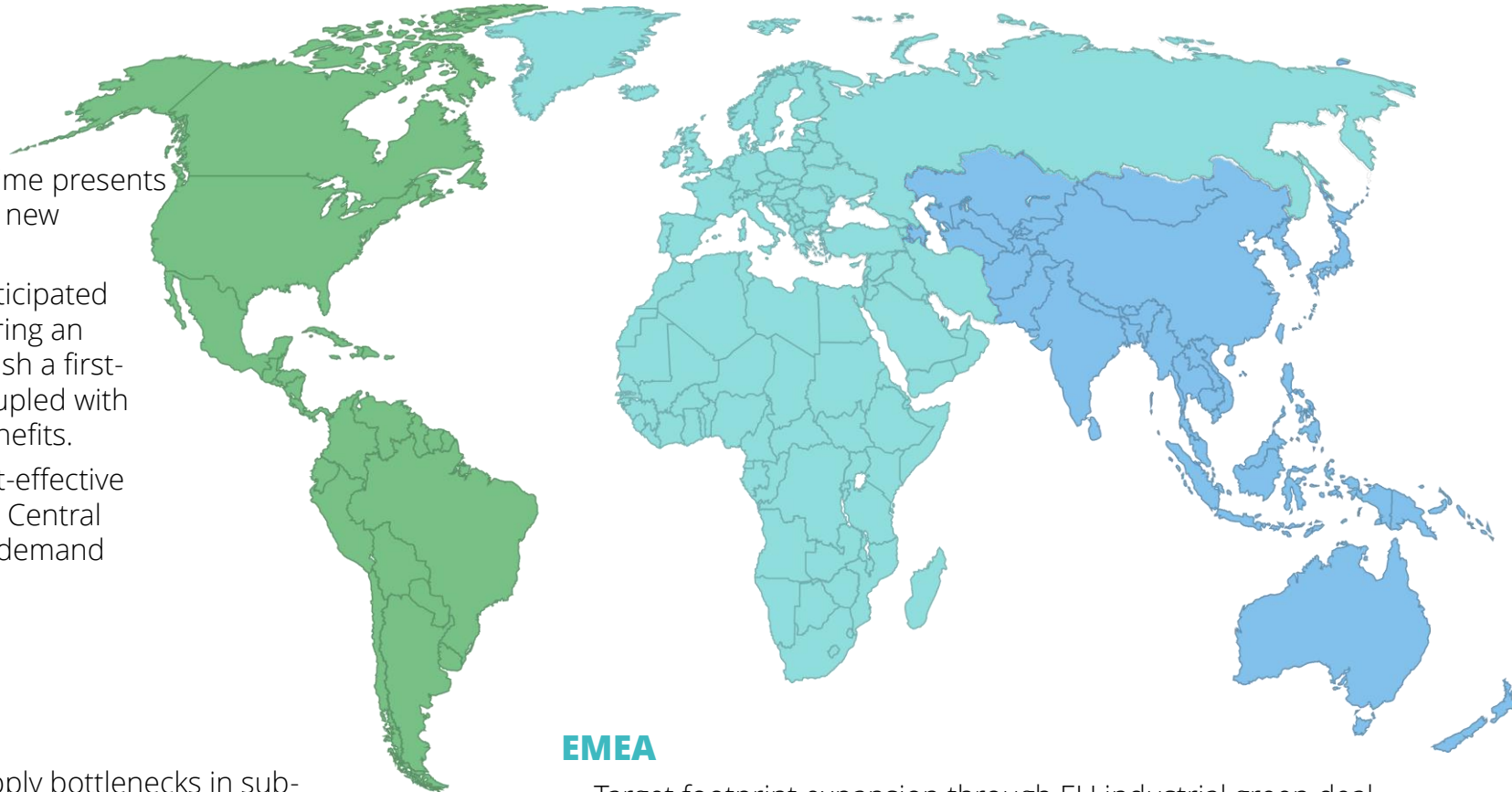
- Capitalise on supply bottlenecks in sub-components to make strategic investments
- Utilise expertise to provide asset management services
- Leverage experience to offer training services to address workforce bottlenecks

EMEA

- Target footprint expansion through EU industrial green deal
- Leverage the growing aftermarket of established wind markets, such as Spain and Germany
- Growth in the onshore segment in multiple markets including Germany, Finland, France, Spain, and Turkey
- Growth in the offshore segment in multiple markets including the UK, Germany, Denmark, the Netherlands, and Poland

APAC

- Best-cost manufacturing in key markets like China, India, and South Korea
- Growth opportunities in emerging offshore markets including Korea, Japan, Taiwan, and potentially Australia
- Minimal market activity required to attract suppliers, e.g. lack of offshore development in Vietnam is hindering interest
- Local content is crucial for attracting new production opportunities





CONTACT US

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Green Energy Export Day 2024



WORKSHOP WIND ENERGY #3

Questions?



GREEN ENERGY EXPORT DAY 2024 – PROGRAMME

	WIND ENERGY	DISTRICT ENERGY	ENERGY EFFICIENCY	GREEN HYDROGEN	COUNTRY SESSIONS
08.30	MARKET PLACE OPENS Room: 17				Room: 19
08.30	WIND ENERGY EGP KOREA/JAPAN				 AUSTRALIA
09.30	OPENING: GLOBAL GREEN BOOM - RELYING ON DANISH SOLUTIONS (Room: SALEN)				
10.15	MARKET PLACE – COFFEE Room: SALEN ↓	Room 13+15 ↓	Room 17 ↓	Room 19 ↓	House of Green ↓
10.45	WIND ENERGY Global Market Update	NEW REGULATION DE – NL – PL – UK	ENERGY EFFICIENCY GERMANY	GREEN HYDROGEN DK COMPETITIVENESS	 VIETNAM
11.30	MARKET PLACE - QUICK COFFEE – SWITCH WORKSHOPS				
11.45	WIND ENERGY Direction for Exports	DH HOT MARKETS NL – DE – FR	ENERGY EFFICIENCY 2.0 DANISH EXPORT CASE	GREEN HYDROGEN USA	 SOUTH AFRICA
12.30	MARKET PLACE – LUNCH				
13.15	WIND ENERGY US Wind Market	DISTRICT COOLING MENA, ASIA, EU	ENERGY EFFICIENCY USA	GREEN HYDROGEN GERMANY	 POLAND
14.00	AMBASSADOR'S ROUNDTABLE: SEIZE THE OPPORTUNITY (Room: SALEN)				
14.30	RECEPTION AT TOP TERRACE				

Green Energy Export Day 2024



WORKSHOP WIND ENERGY #1

Break & Market Place

See you back at 11.45 for:

What is the direction for Danish wind exports?



Green Energy

Export Day 2024



WORKSHOP WIND ENERGY #2

What is the direction for Danish wind exports?



WORKSHOP WIND ENERGY #2

What is the direction for Danish wind exports?



Green Energy
Export Day 2024

Panelists

- Kresten Ørnbjerg, Vice President & Head of Global Public Affairs, Vestas
- Per Fenger, CEO, Liftra
- Joachim Lind Koefoed, Head of Public Affairs, Copenhagen Infrastructure Partners
- Anne Hougaard Jensen, Director, Ministry of Foreign Affairs, The Trade Council

Moderator

- Jan Serup Hylleberg, Deputy CEO, Green Power Denmark

WORKSHOP WIND ENERGY #2

What is the direction for Danish wind exports?



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Export Day 2024

Where did the industry point to a year ago?

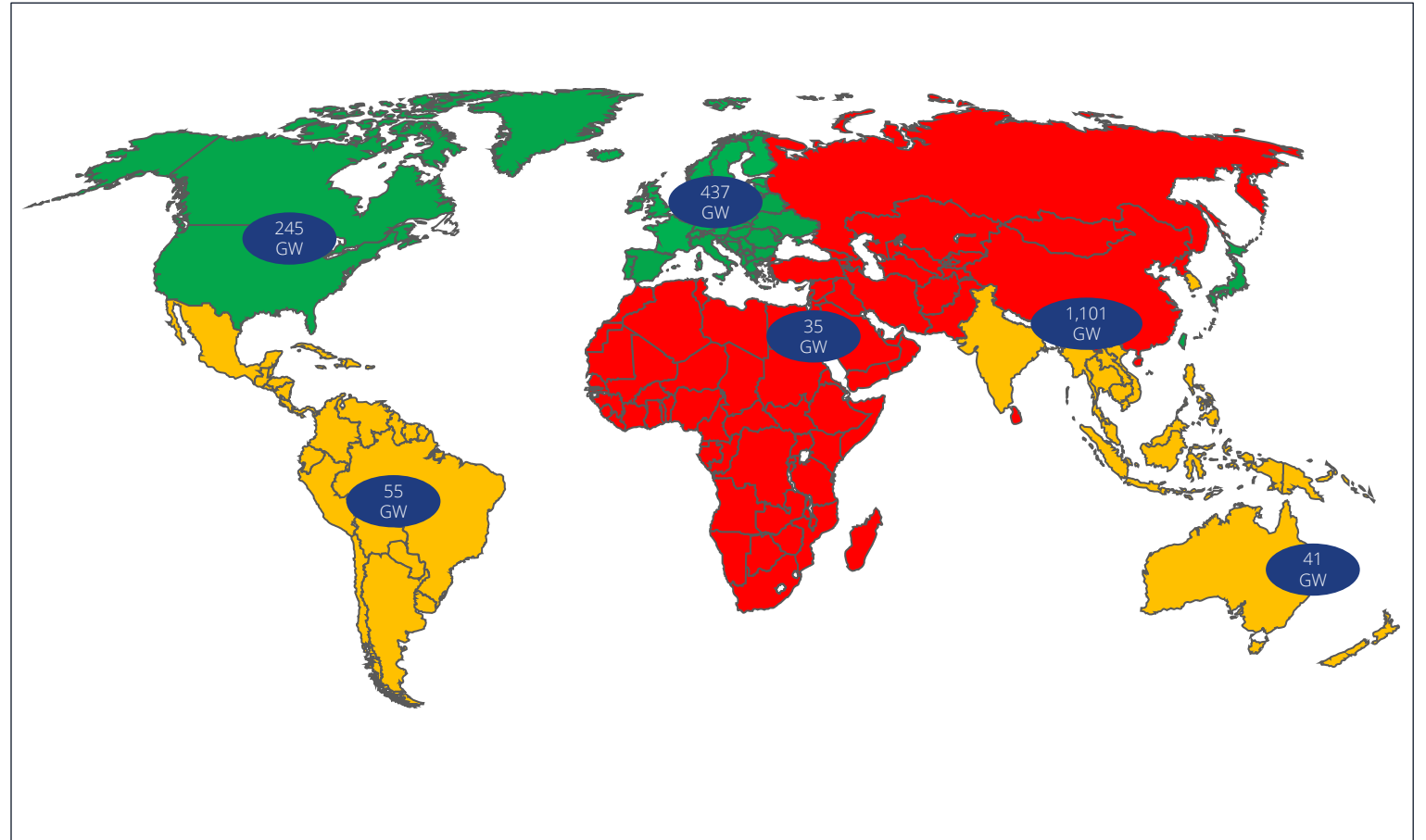


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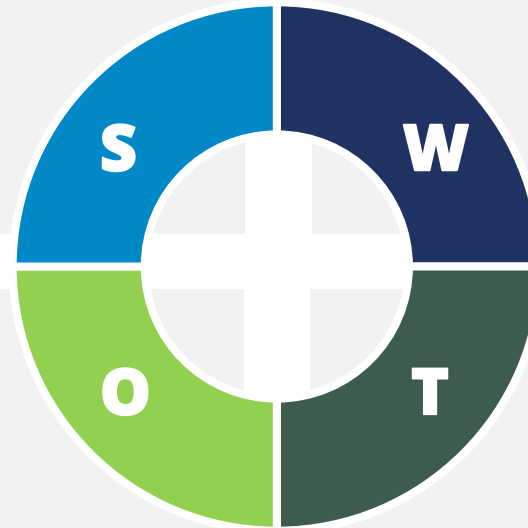
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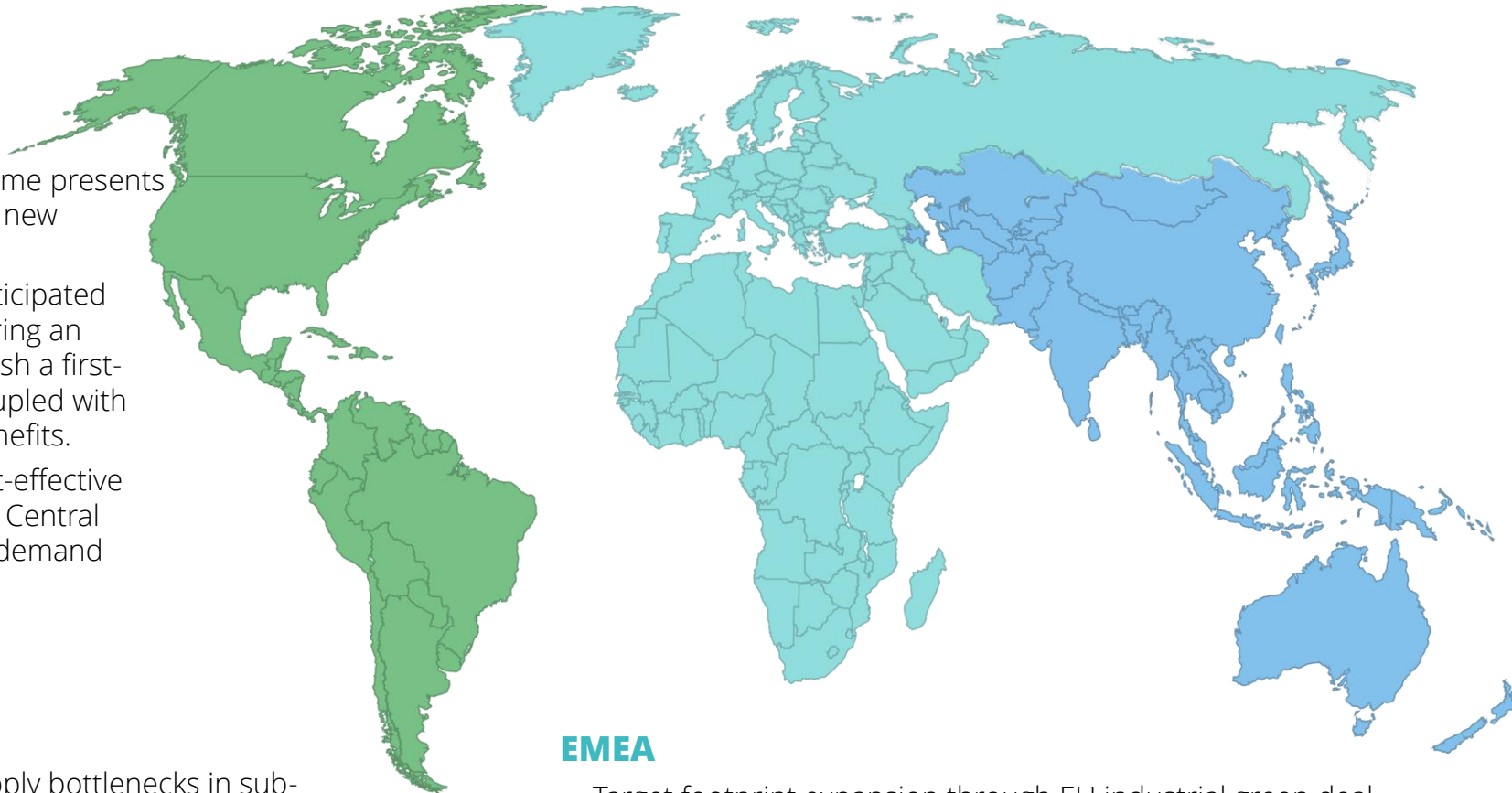
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Green Energy Export Day 2024



WORKSHOP WIND ENERGY #3

Market place & Lunch Break

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Deep Dive US Wind Market!



Green Energy Export Day 2024



WORKSHOP WIND ENERGY #3

Deep Dive US Wind Market!



WORKSHOP WIND ENERGY #2

Deep Dive US Wind Market!



Green Energy
Export Day 2024

Speakers and panelists

- Simon Maul Hansen, Advisor, Danish Energy Agency – Global Cooperation
- Nick Damgaard Jensen, Counselor - Energy & Climate, Embassy of Denmark, Washington D.C.
- Jens Guldborg, Sales Director, Dansk Gummi Industri
- Steen Lund, Head of Commercial - Solution (Global Wind), Maersk Training

Moderator

- Anders Dalegaard, Head of Department, Green Power Denmark



The direction of US Offshore Wind after a challenging year

Simon Maul Hansen, Project lead, US offshore wind

26. august 2024



Danish Energy Agency

A challenging year for US offshore wind



- 13 Offshore wind projects offshore the East Coast totaling around 14 GW were affected by this “storm”
- 10 of these projects totalling 9,8 GW had either their offtake agreement terminated or had the whole project development cancelled
- It has triggered multi-billion-dollar write-down by large developers

But we also see some bright spots

South Fork Wind Powers Up New Era for American Clean Energy

03.14.2024 05:00PM



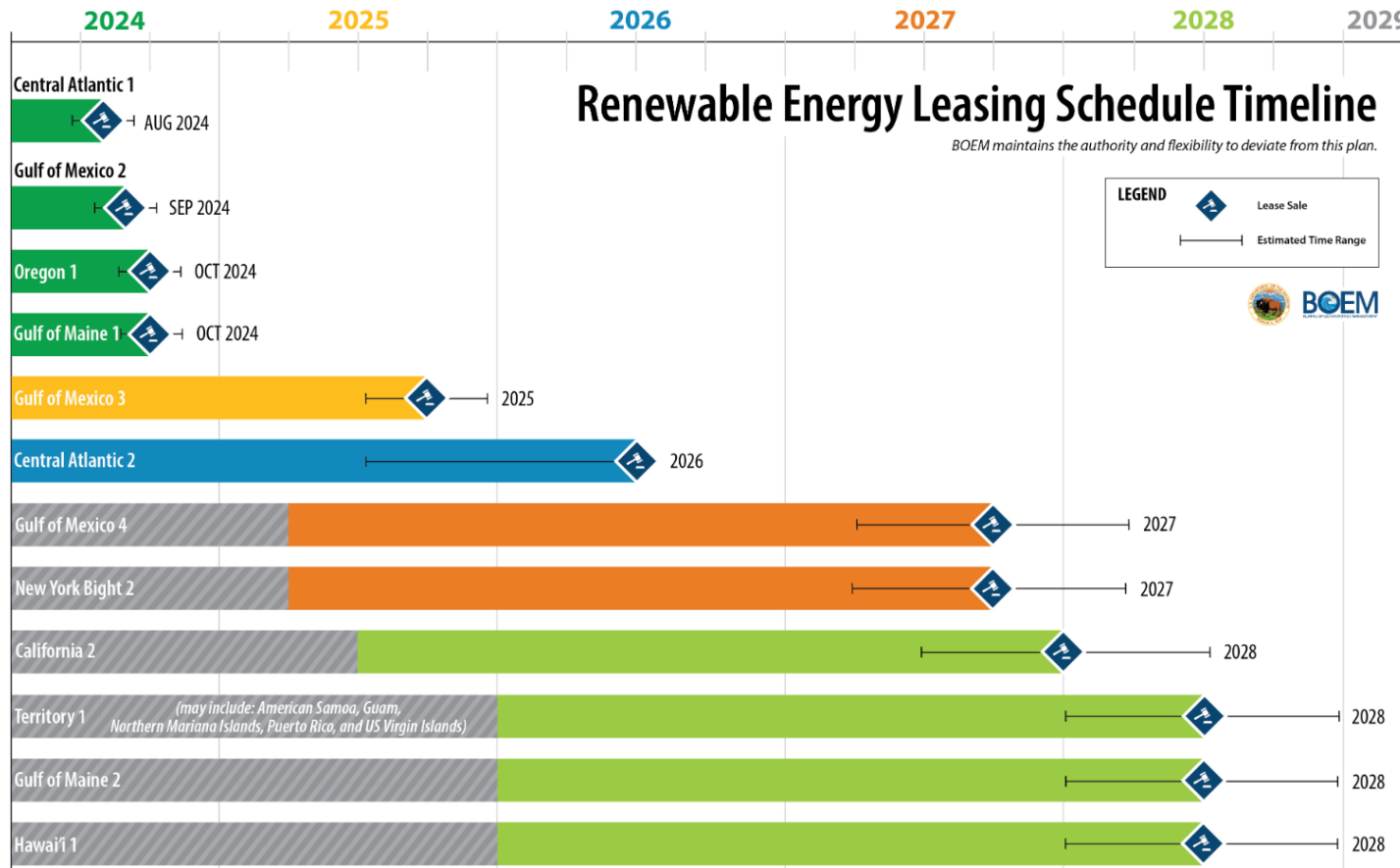
Construction Complete and all 12 Turbines Powered Up at First U.S. Commercial-Scale Offshore Wind Farm



Three projects under construction in federal waters:

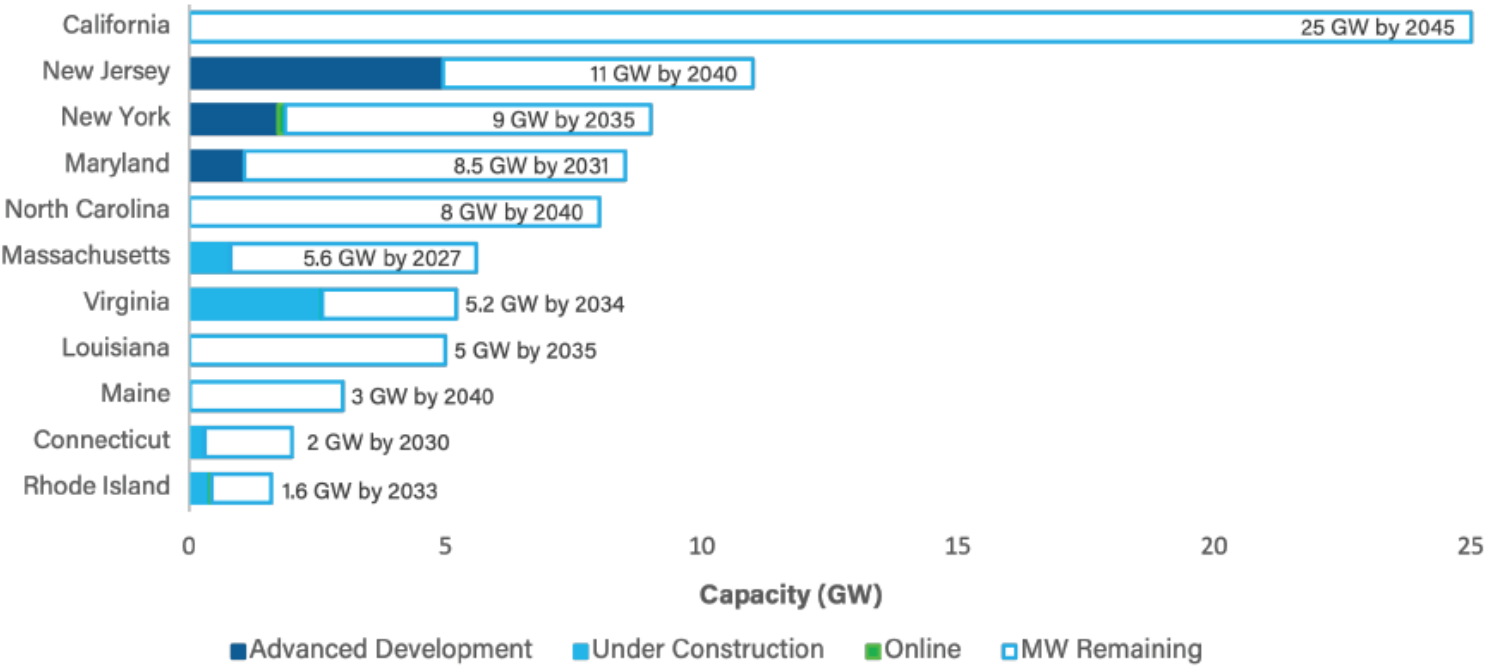
- 1) Vineyard Wind 1 (804 MW), Copenhagen Infrastructure Partners and Avangrid
 - 2) Revolution Wind (704 MW), Ørsted
 - 3) Coastal Virginia Offshore Wind (2,587 MW), Dominion Energy
- Sunrise Wind (924 MW) got the final approval by the federal authorities in June and can start construction
 - The US has over 12 GW of offshore wind capacity in Advanced Development or Under Construction

BOEM are busy with new sea bed leases



Source: Bureau of Ocean Energy Management (BOEM)

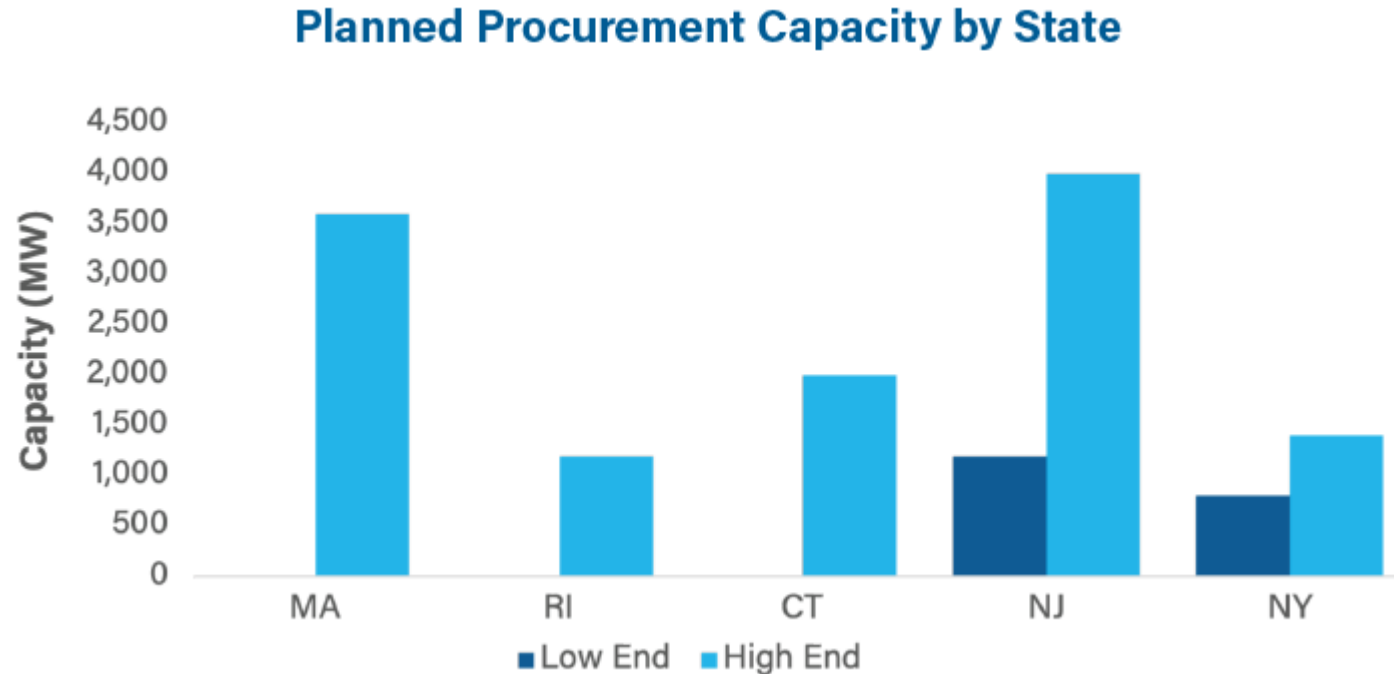
States have ambitions and targets



Source: American Clean Power, July 2024

- The states play a key role in the offtake of offshore wind
- 11 states with a combined targets of around 84 GW
- New offshore wind targets signed into law at state level
- New coastal states like Delaware and Oregon enters the game of offshore wind

State solicitations to be announced in 2024



Source: American Clean Power, July 2024

- 5 East Coast states expected to announce the procurement of 8,8 to 12,2 GW in 2024
- These states are Massachusetts, Rhode Island, Connecticut, New York State and New Jersey

Final remarks and observations

- We have seen a lot of bumps on the road in the US market the last year
- There are still a lot of challenges like lack of Jones Act compliant Wind Turbine Installation Vessels, Supply chain constraints, increased interest rates and cost etc.
- The US market is still a huge market with a big pipeline of projects
- The important “first wave” of projects are starting to come through, which is very important to build up the supply chain in the US
- We have seen a willingness in New York to increase the offtake price and thus offer more support to developers
- The price level have gone down in the last federal auctions on sea bed leases

Questions





EMBASSY OF DENMARK
Washington D.C.

The US Presidential election

And how it may impact wind energy

Green Energy Export Day – August 23rd, 2024

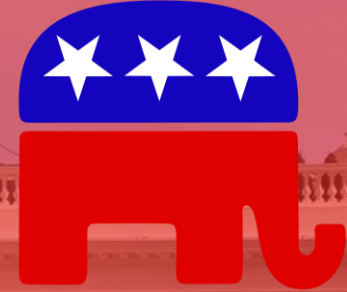
Nick Damgaard Jensen



**Vice President,
Kamala Harris**



**V
S**



**Former President,
Donald Trump**

Kamala Harris

- Limited news on energy and climate policy since nomination
- Expected in large to continue the Biden Administration energy and climate policy
- Offshore wind = 'Investing in America'
 - Creating good-paying and union jobs
 - Establishing and growing a new industry
 - Tackling the climate crisis and helping lower cost for families
- Put the IRA and other infrastructure packages to work



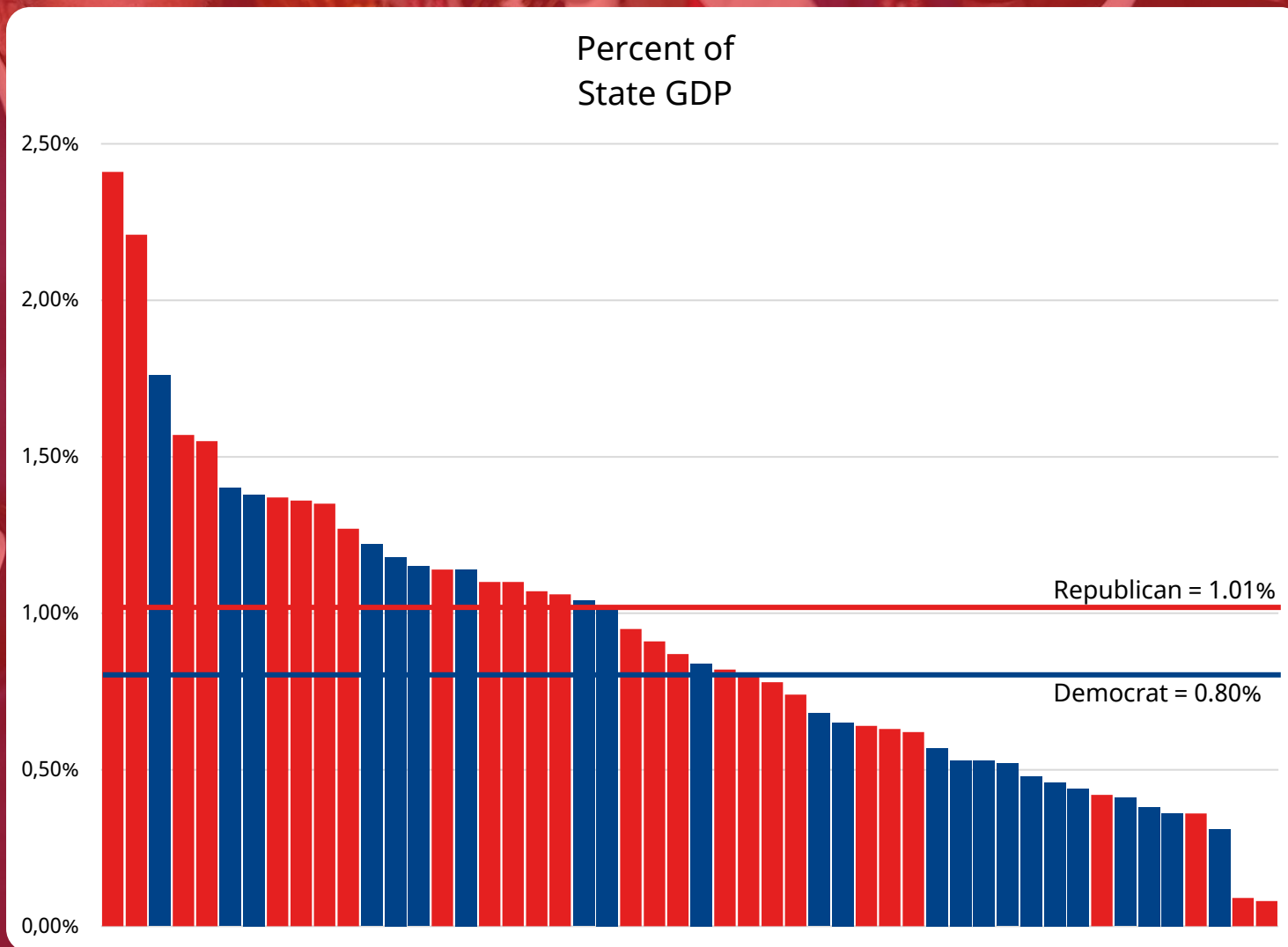
Donald Trump

- Day 1: Withdraw from Paris Accord and lift ban on LNG export
- Energy policy = “Drill-baby-drill”
 - Energy security and economic growth through oil and gas exploitation
- Offshore wind = Personal vendetta and promise to kill offshore wind projects on day 1
- The Trump toolbox
 - Funding mechanisms
 - Regulatory framework



Inflation reduction act

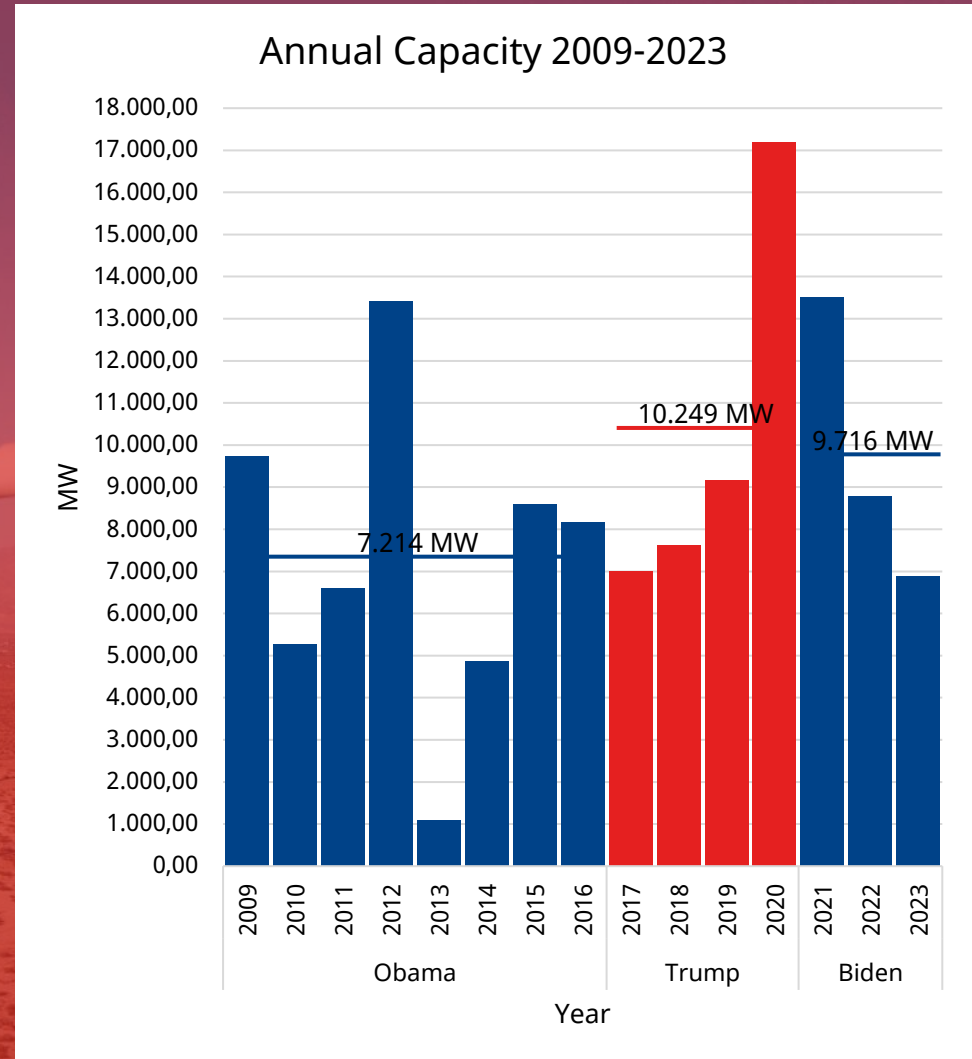
- Will it be repealed?
- A majority of investments from the IRA are going into red states
- Tax credits vs. funding programs
- Reform and Administrative changes



Project Stage	Toolbox	Description	At Risk
WEA Leasing Upcoming leases auctioned by BOEM	<ul style="list-style-type: none"> • Not auction more leases • Moratorium 	<ul style="list-style-type: none"> • Modernization rule ≠ Lease auctions • Done under Trump 1.0 	<ul style="list-style-type: none"> • BOEM leasing schedule (8 leases)
No permits Projects that has not begun permitting process or are underway	<ul style="list-style-type: none"> • Starve agency resources to permit • Executive order 	<ul style="list-style-type: none"> • Done under Trump 1.0 • Issue EO e.g. over concerns of whales 	<ul style="list-style-type: none"> • 38.5GW • 6.3GW w/ PPAs
Permitted Federally fully permitted projects	<ul style="list-style-type: none"> • TBD 	<ul style="list-style-type: none"> • Possibly 	<ul style="list-style-type: none"> • 5.2GW
Under Construction Projects that are under construction (steel in the water)	<ul style="list-style-type: none"> • TBD 	<ul style="list-style-type: none"> • Unlikely 	<ul style="list-style-type: none"> • 5GW
Operational Projects in operation	<ul style="list-style-type: none"> • TBD 	<ul style="list-style-type: none"> • Highly unlikely 	<ul style="list-style-type: none"> • 174MW

Onshore wind

- More onshore wind was installed on average per year under Trump 1.0 than both Obama and Biden
- Less impacted by Federal regulation
- Less dependent on subsidies
- Concerns for onshore should instead be
 - Lack of supporting infrastructure
 - Opposition from local lawmakers



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Questions?



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Panel conversation: Opportunities and challenges for Danish companies

- Jens Guldborg, Sales Director, Dansk Gummi Industri
- Steen Lund, Head of Commercial - Solution (Global Wind), Maersk Training



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Coming up next:

Ambassadors Round Table: Seize the opportunity

Please stay seated

