

# La situación del mercado eólico mundial

Eólica y Mercado - AEE

Brian Gaylord – Febrero 2023

Wood  
Mackenzie



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- Acquisition of MAKE and Greentech Media (GTM)
- Leaders in renewables, EV demand and grid-connected storage
- Over 500 sector-dedicated analysts and consultants globally, including 75 specifically to power and renewables
- Located close to clients and industry contacts



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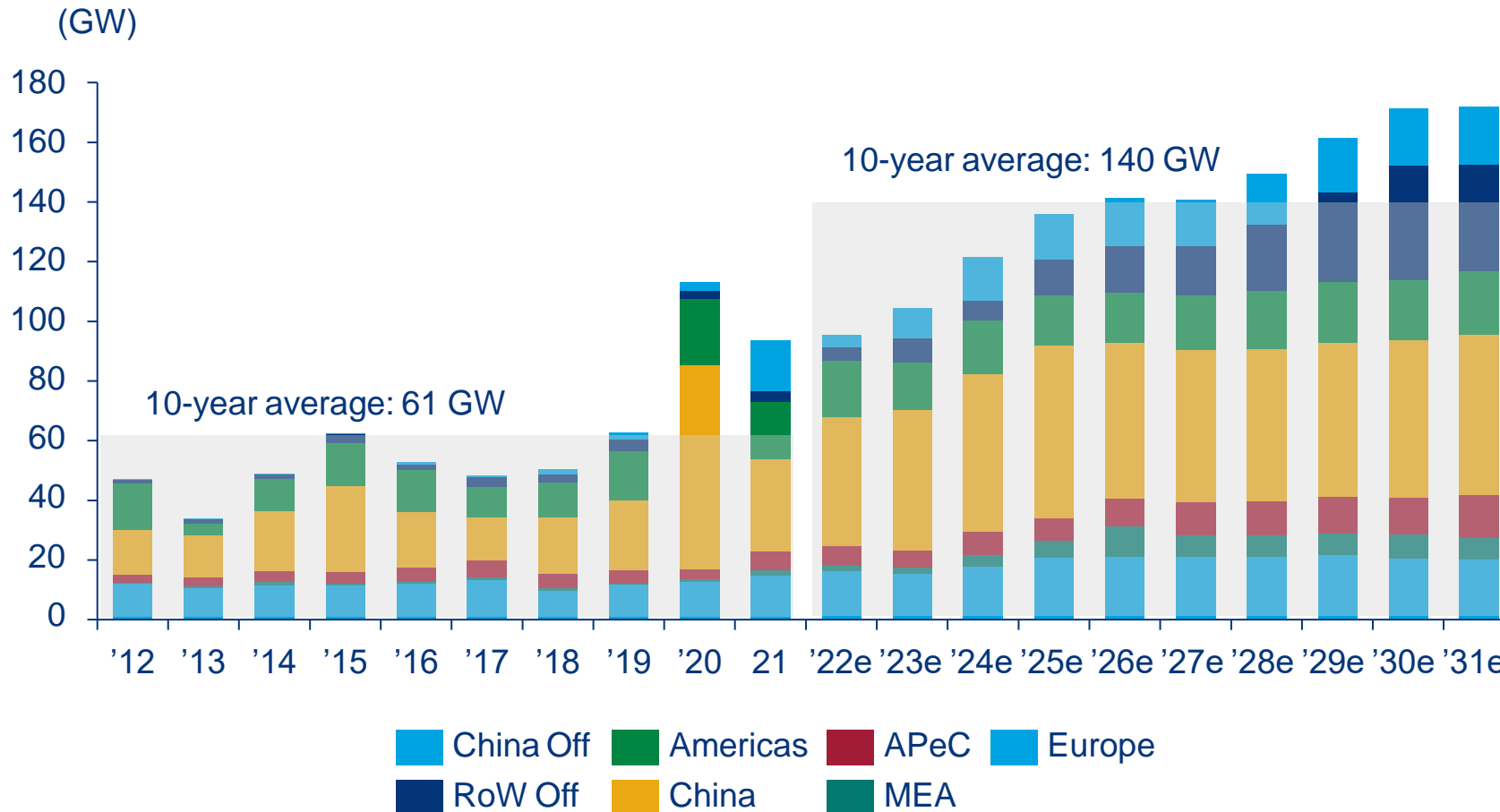
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**La Eólica**

# Wind industry paradox: short term turmoil followed by step-up in long-term demand

Despite recent headwinds, supply chain investment is needed to meet stable and growing demand outlook

## Global wind power demand outlook 2012-2031e



## Regional growth outlook

Sub-region	New capacity	AAGR
2022 to 2031		
N. America	179.6 GW	7.60%
L. America	43.8 GW	-1.90%
N. Europe	96.7 GW	8.30%
S. Europe	5.4 GW	7.50%
E. Europe	34.5 GW	10.40%
W. Europe	130.9 GW	17.70%
Middle East & Africa	61.1 GW	30.50%
China	662 GW	4.70%
APeC	130 GW	10.90%
Global	1,400 GW	6.40%

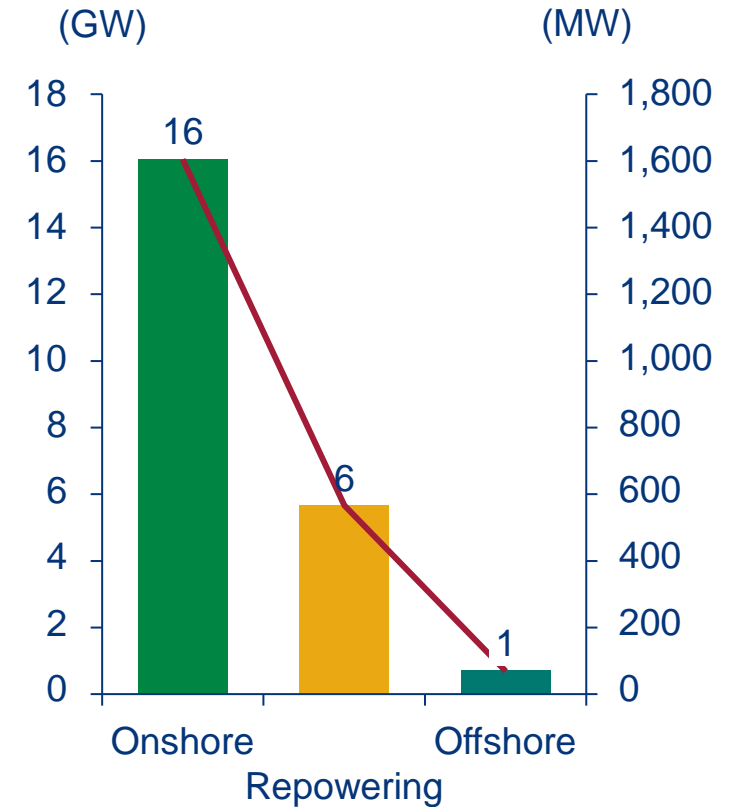
# Wind outlook growth in Europe is driven by offshore while onshore market is flat

Permitting difficulties contribute to limited pipeline onshore in many European markets necessitating offshore. Wood Mackenzie expects massive PV build in Spain and forecasts 23 GW of wind capacity through 2031.

European wind power demand outlook 2012-2031e



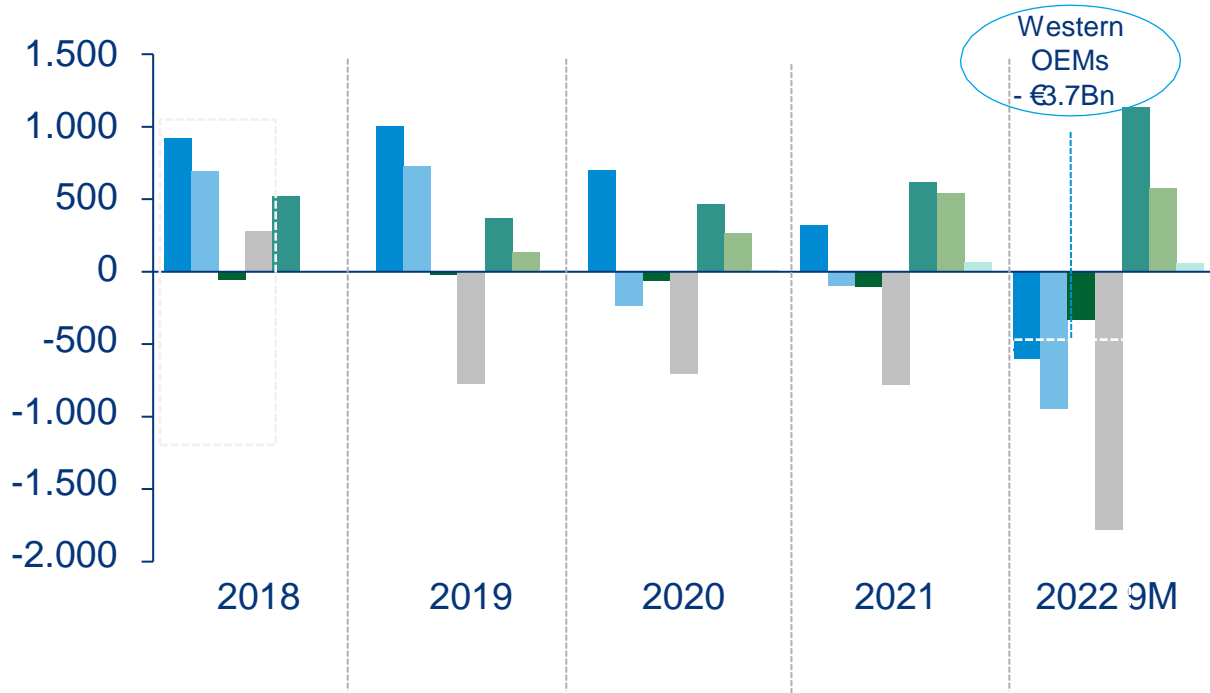
Spanish wind outlook



# Difficult times for western OEMs; Supply chain and Covid have eroded profitability

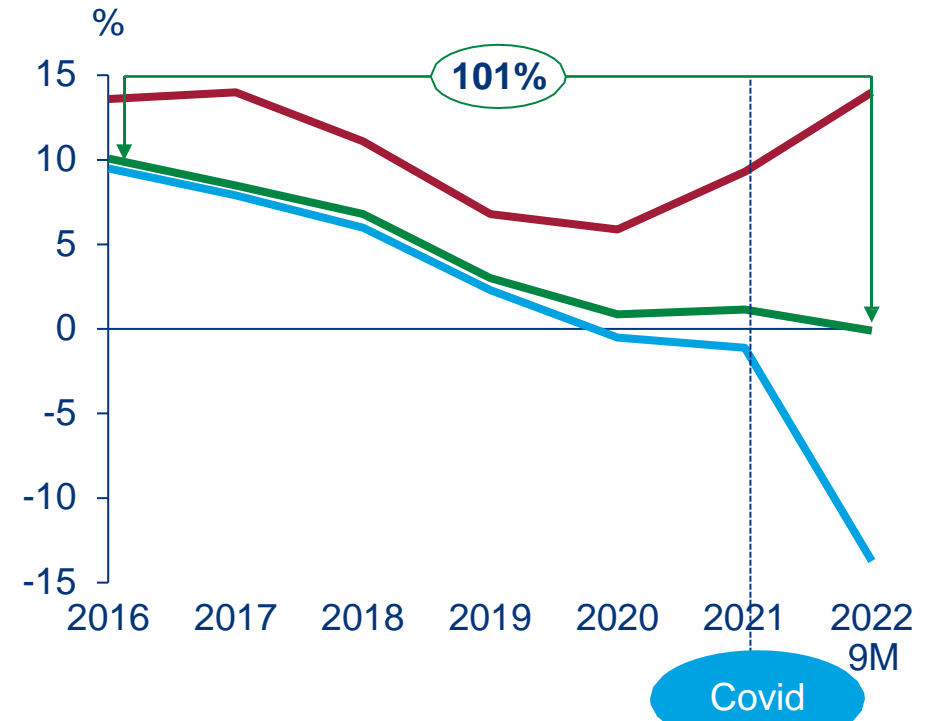
Despite wind market doubling the last 5 years, OEMs' margins have plummeted. Western OEMs are severely hit by supply chain disruptions, while Chinese OEMs have rebounded, thriving on domestic market

Wind Turbine OEMs EBIT, €mn



- Vestas
- Nordex
- Goldwind
- Windey
- SGRE
- GE
- MingYang

Turbine OEMs weighted EBIT margin (%), 2016-2022 9M, Nominal Values



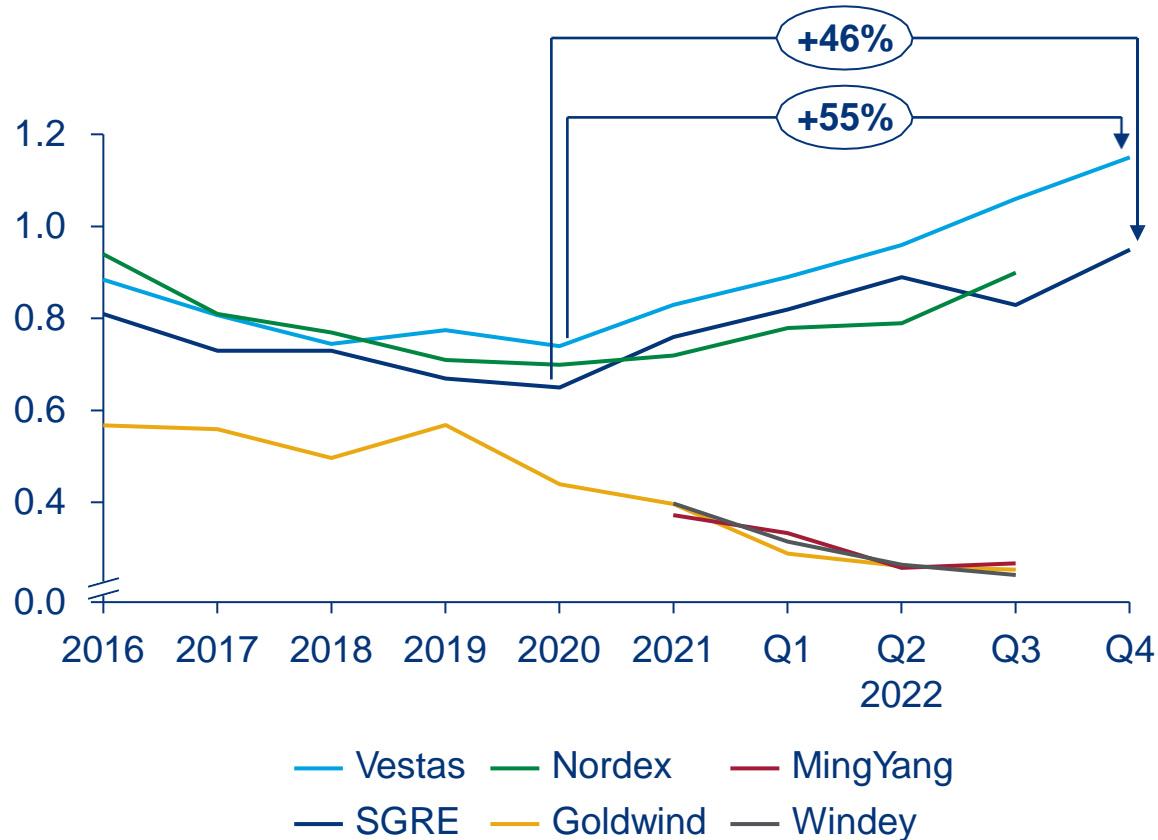
- Western OEMs
- Chinese OEMs
- All OEMs

Source: Wood Mackenzie, OEMs financial statements  
 Note: RMB to EUR = 0.142; USD to EUR = 0.98

# Supply chain financial turmoil underpins prolonged higher turbine prices

Western OEMs are raising price to prioritise margin, while Chinese are dropping price on record order volumes

Average Selling Price (ASP) per OEM, €mn/MW, Onshore



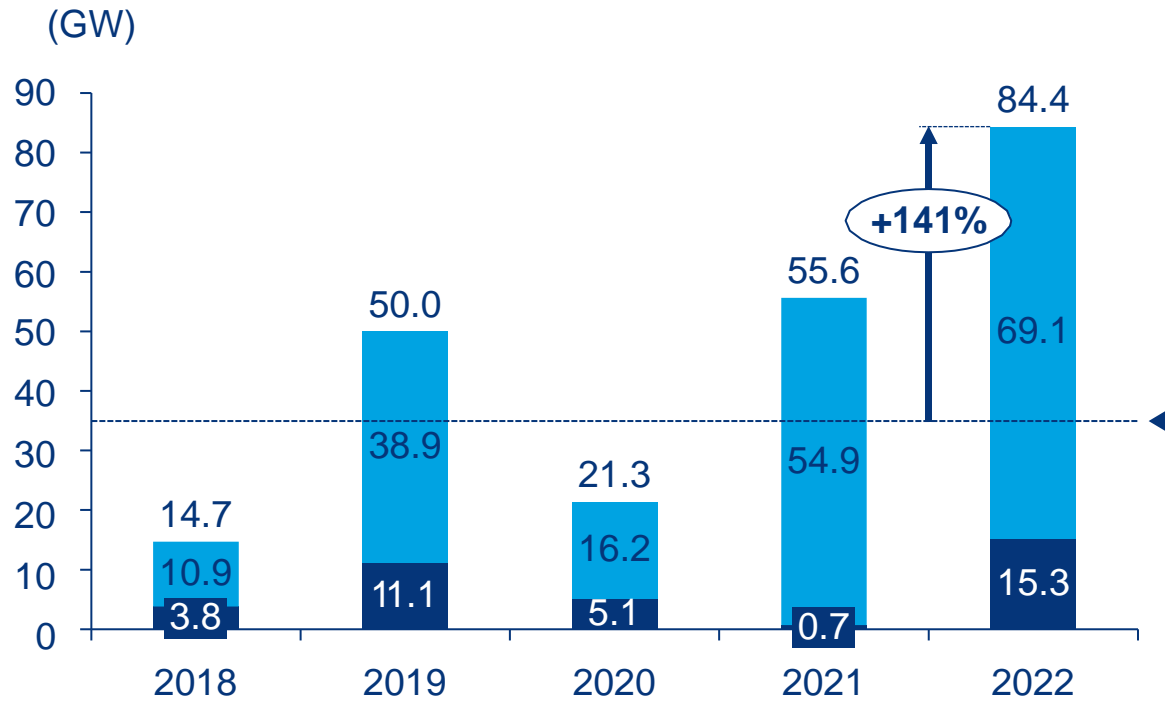
Key strategic implications for turbine pricing

- Western OEMs are prioritizing margins over market share by selectively approaching markets to focus on the projects that deliver improved profits.
- Higher prices have driven down order volumes, exacerbated by higher cost of capital and stalled markets in the US and Europe.
- Time lag between order placement and delivery is exposing vendors and OEMs to cost fluctuation.
- Western OEMs are seeking to reduce cost exposure via index-based pricing and shifting scope of supply by passing through logistics and EPC responsibilities.
- Chinese OEMs are dropping price on next-generation turbines which are 5MW+.

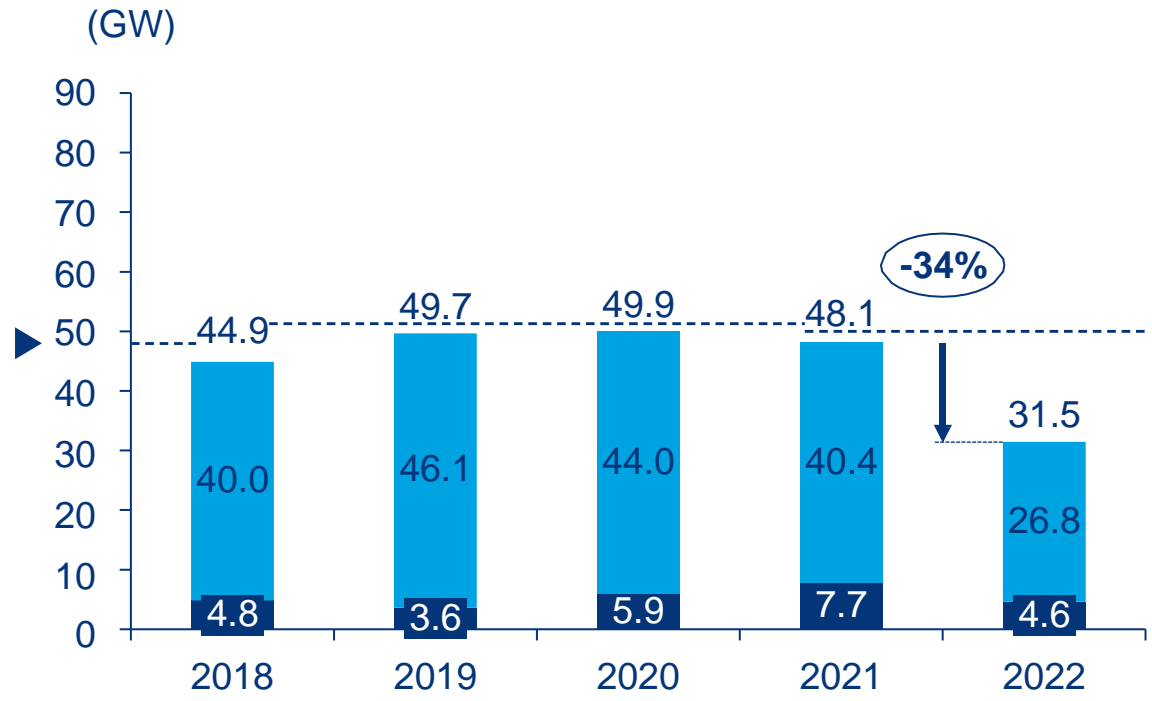
# China's low exposure to supply chain & inflationary pressures lifts wind orders

The West has registered a 5-year low in new turbine orders, while China has surged by over 140%

China firm orders by region, total, 2018-2022



Outside of China firm orders by region, total, 2018-2022



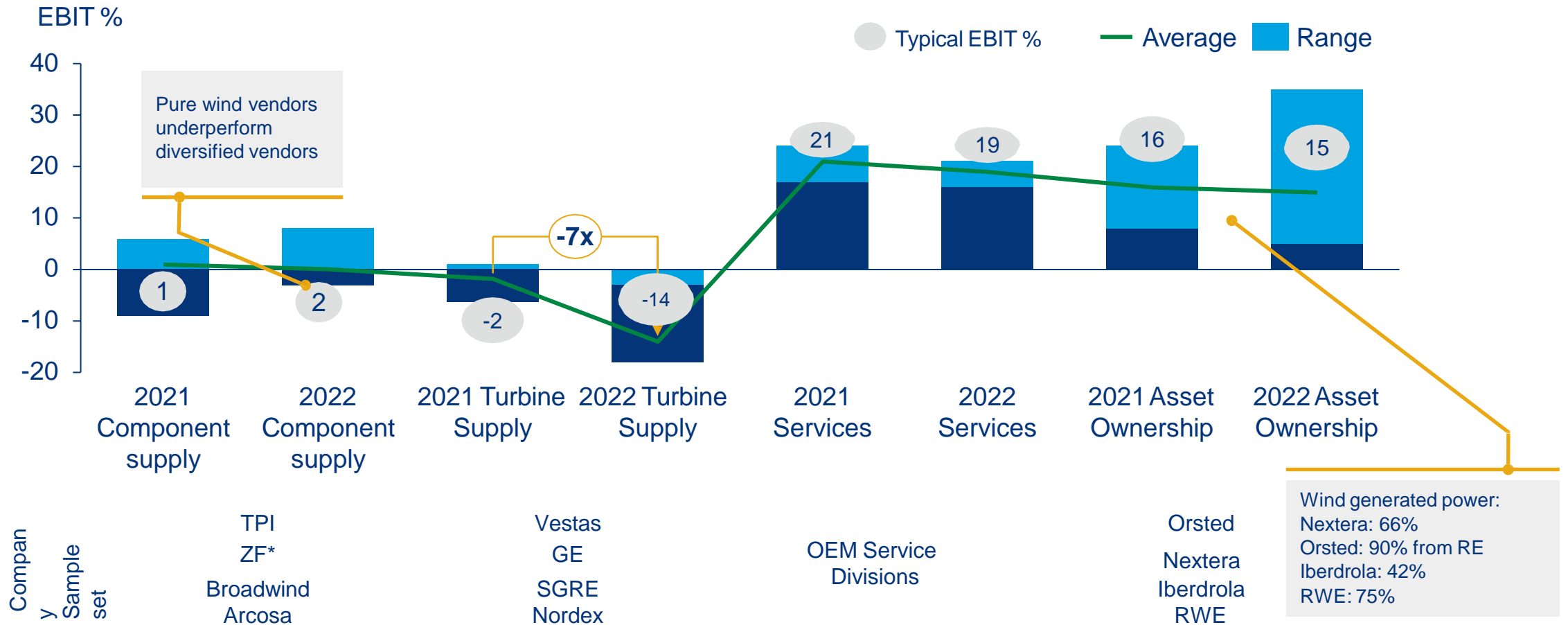
Onshore Offshore



# Profitability pressures vary substantially across the wind energy value chain

Profit pressures are most in the supply chain, while asset owners and service providers enjoy high margins

Profitability by value stream segment, 2021-9M 2022



Source: Wood Mackenzie, Companies financial releases  
 Notes: \*Included 2022 H1 results

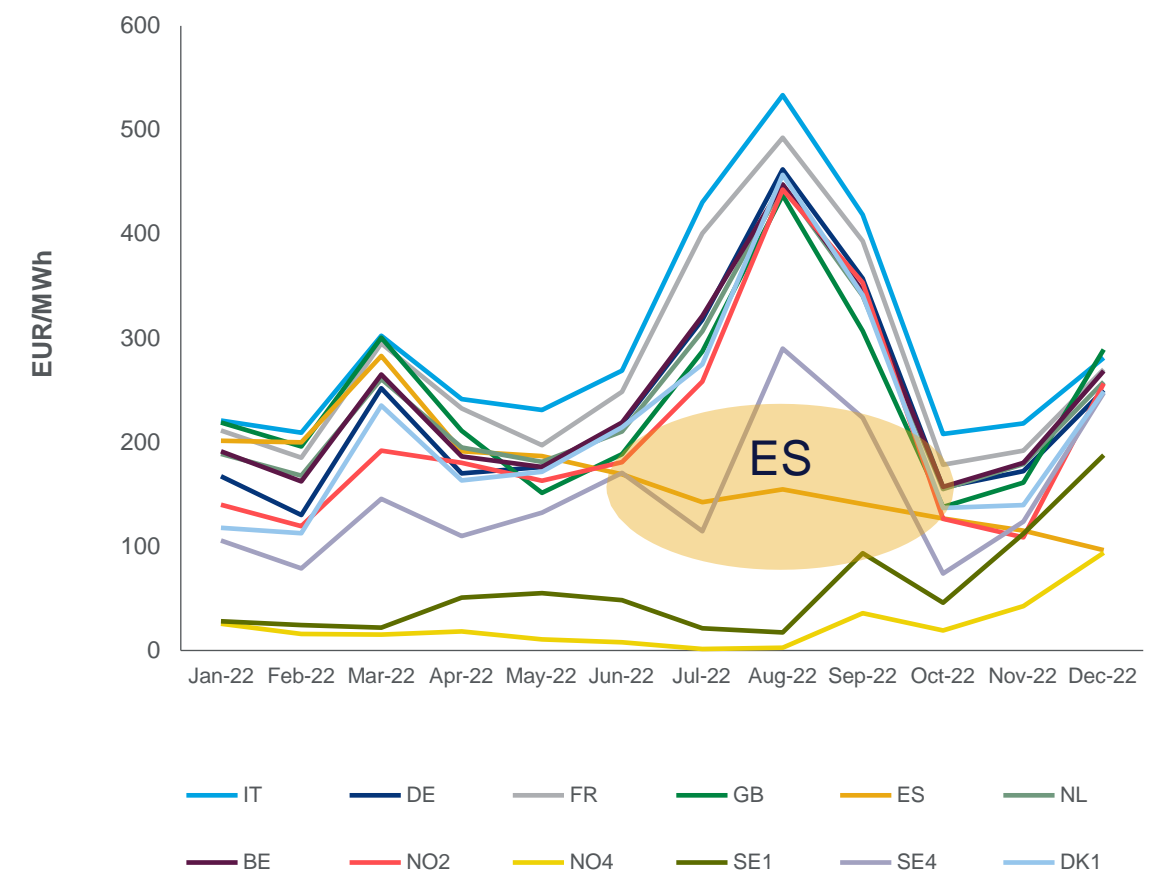
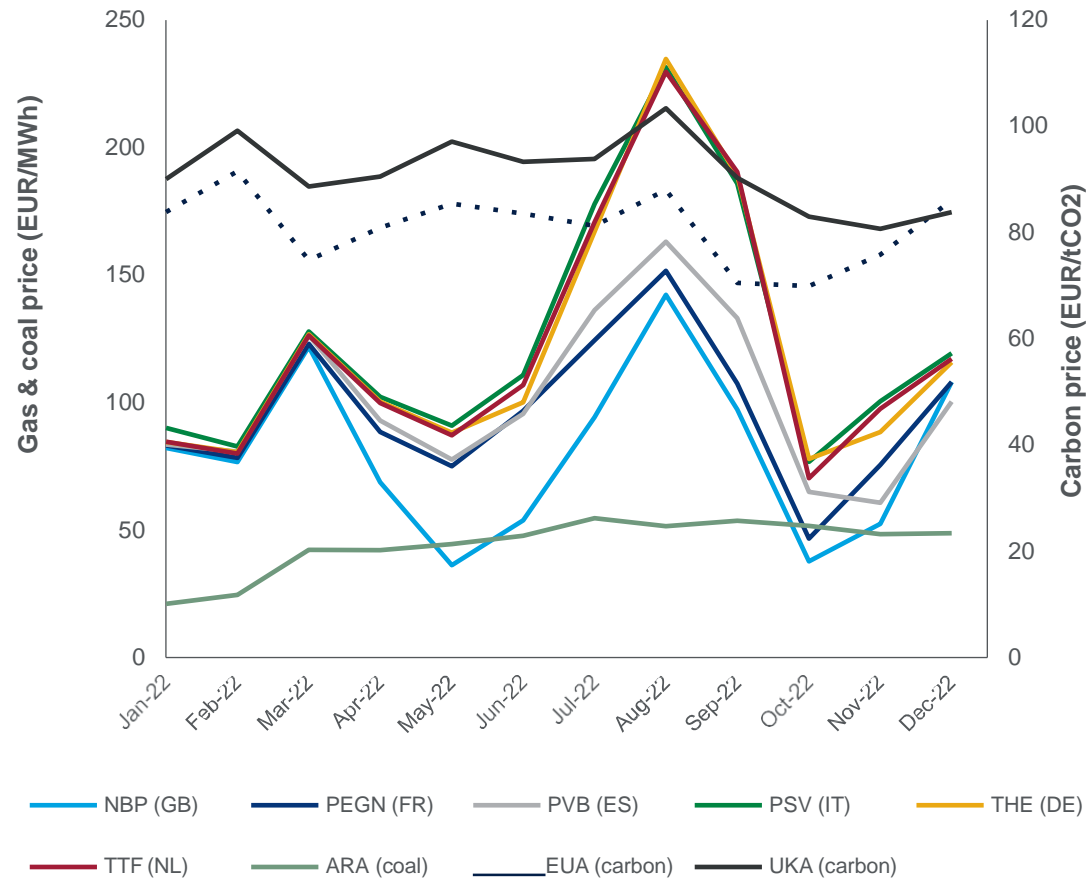
**y el Mercado**

# European commodity prices reached unprecedented levels in 2022, with the TTF hub averaging 122 EUR/MWh (it averaged just 16 EUR/MWh between 2015-2020)

Prices peaked in summer as Russia weaponised the gas market but fell (relatively) in autumn as domestic gas storage facilities were replenished and supply was secured internationally in the form of LNG

Commodity prices: gas, coal & carbon

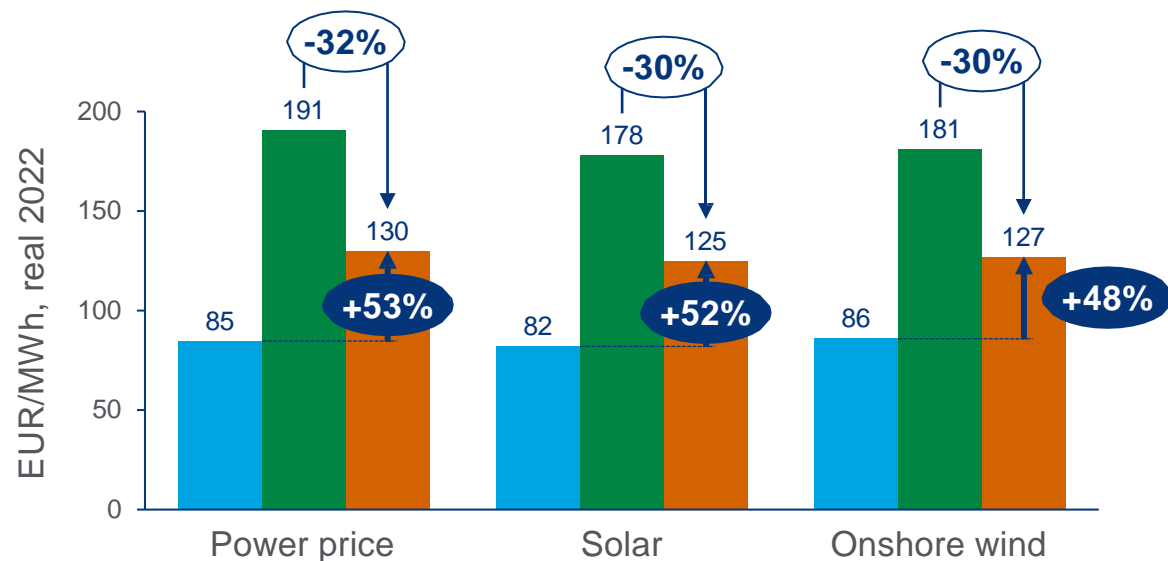
Day-ahead power prices: base load



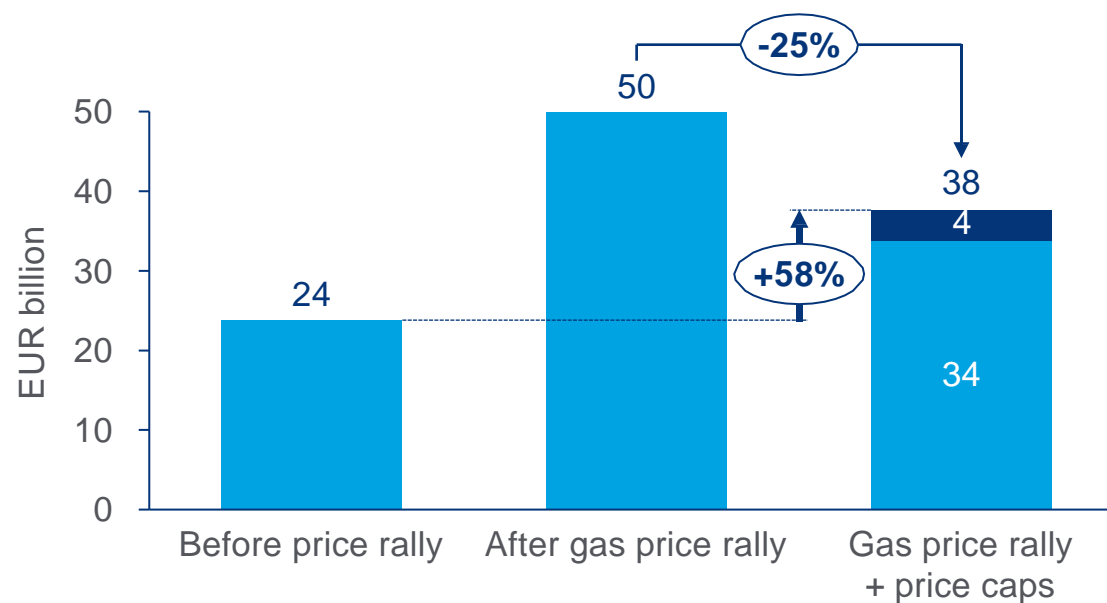
# Iberian exception: Renewable capture prices are around 50% higher even after price caps compared to prices before the gas price rally exacerbated by Russian war

Revenue loss for generators amounts to ~20 billion EUR but is still ~60% higher than before the gas price rally

Iberian power price and renewable capture price during market intervention, June 2022 – May 2023



Generators revenue\* during intervention for all technologies, June 2022 – May 2023



Before gas price rally    After gas price rally    Gas price rally + price caps

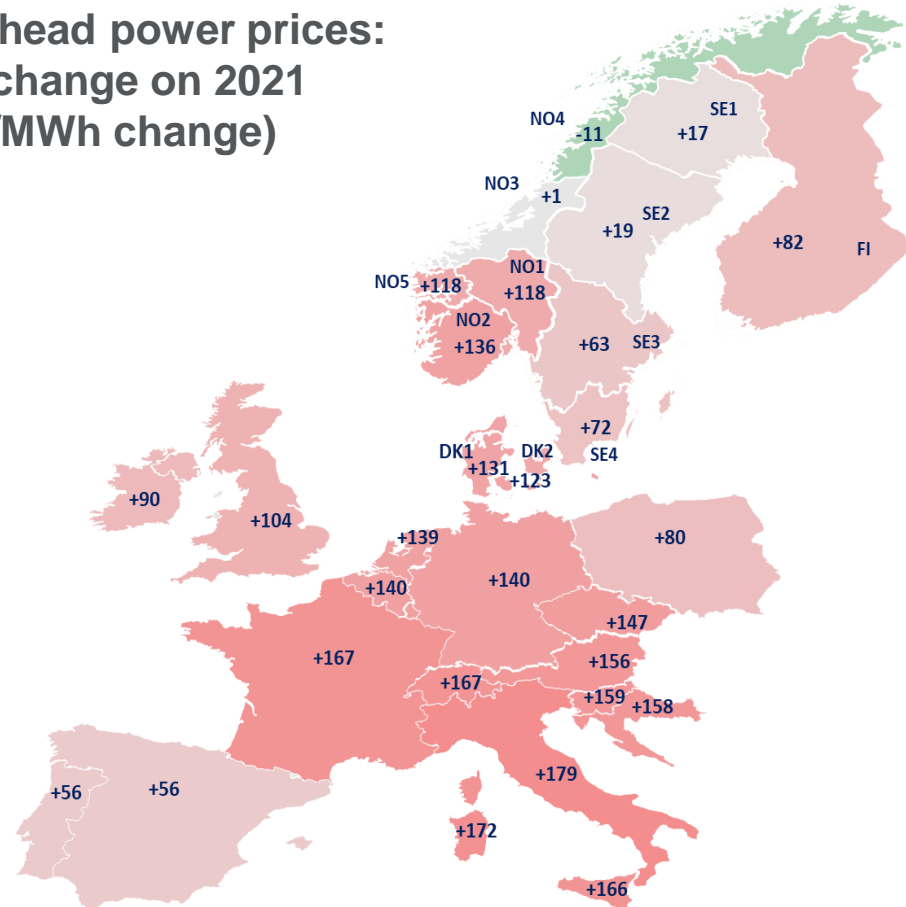
Whoelsale Revenue    From tax and rents

Note: Q3 2021 power price outlook used for "Before gas price rally" data, Q2 2022 power price outlook used for "After gas price rally". \* Revenue calculated on the basis that all generators sell power to wholesale market at the spot power price

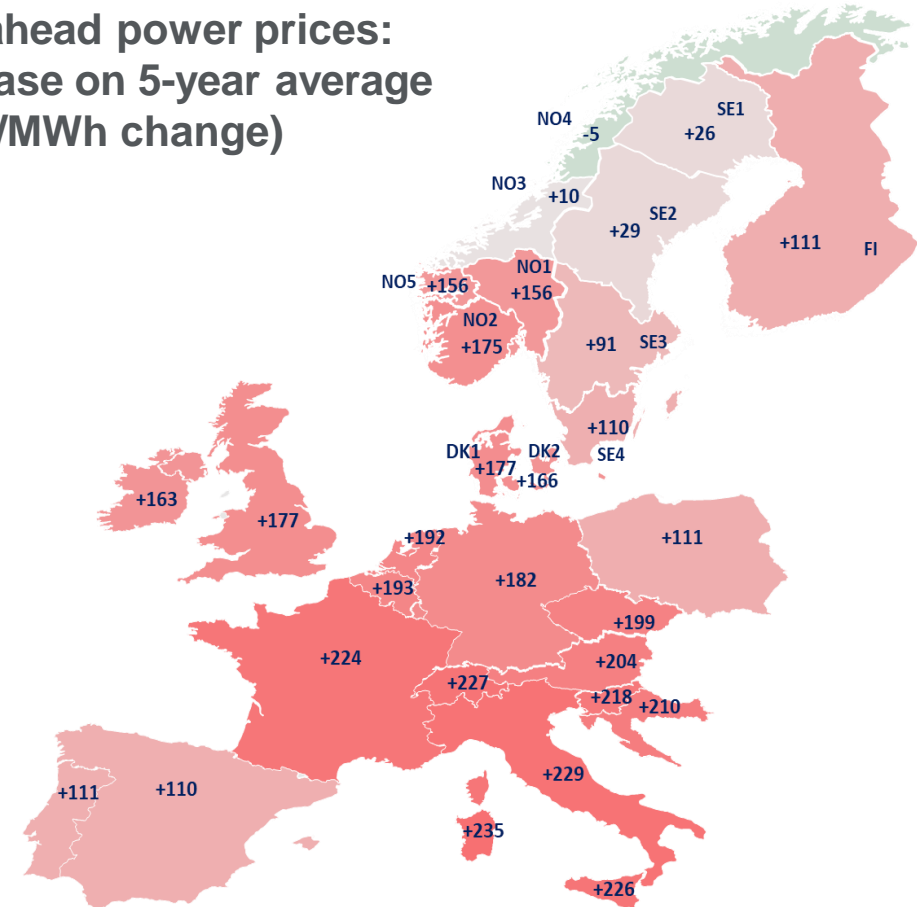
# Prices in Italy and France deviated most from 'normal', averaging 6 to 7 times higher than pre-crisis levels

With strong hydro inflows, northern Norway (NO4) was an outlier in 2022, experiencing prices below its five-year average

Day-ahead power prices:  
2022 change on 2021  
(EUR/MWh change)



Day-ahead power prices:  
increase on 5-year average  
(EUR/MWh change)

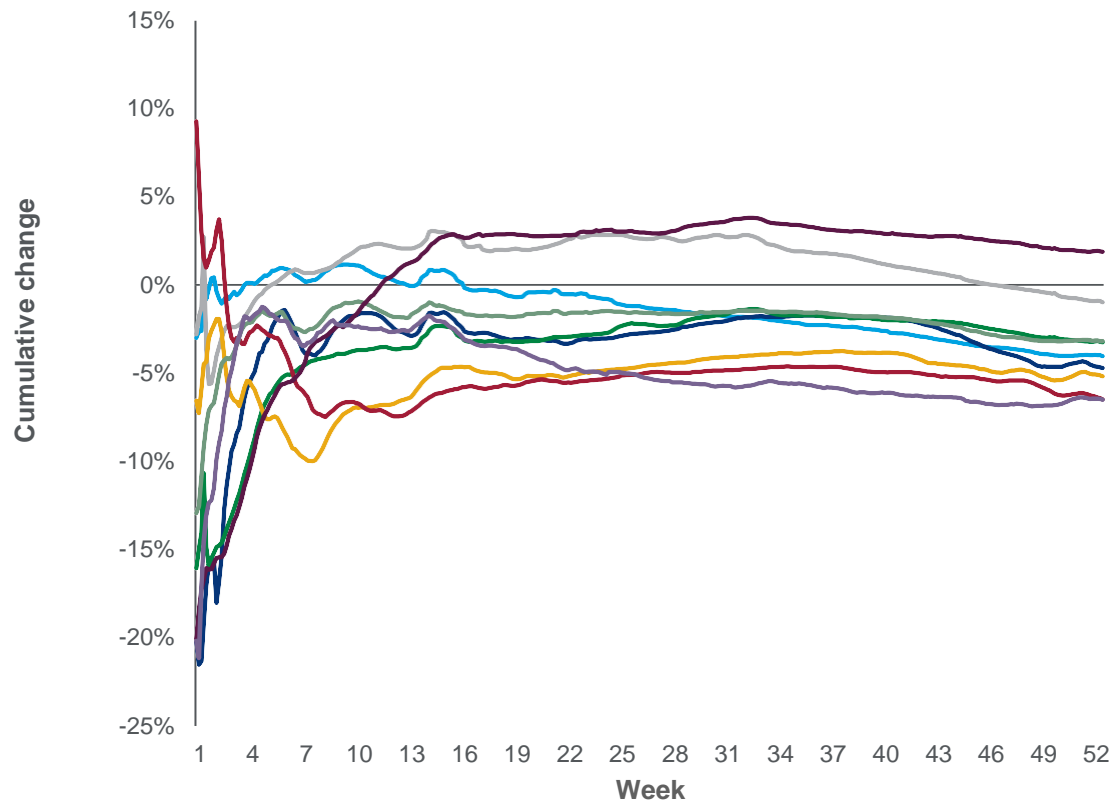


Note: The Italian mainland price is an average of the five bidding zones  
Source: ENTSO-E, EnergyMarketPrice & Wood Mackenzie

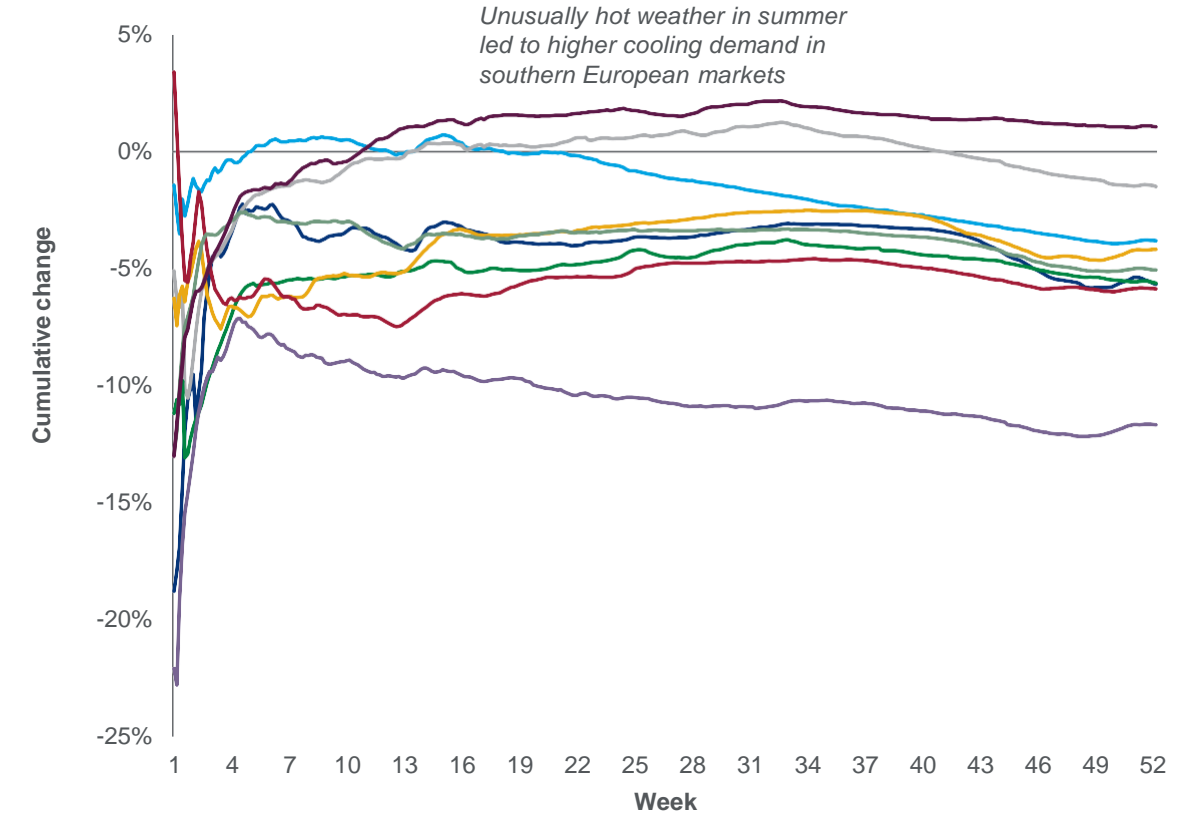
# Excessive prices had implications for demand, leading to reduced electricity consumption and government mandated rationing

Spain recorded less demand in 2022 than in pandemic-hit 2020

Power demand: 2022 year-to-date change on 2021



Power demand: 2022 year-to-date change on 5-year average



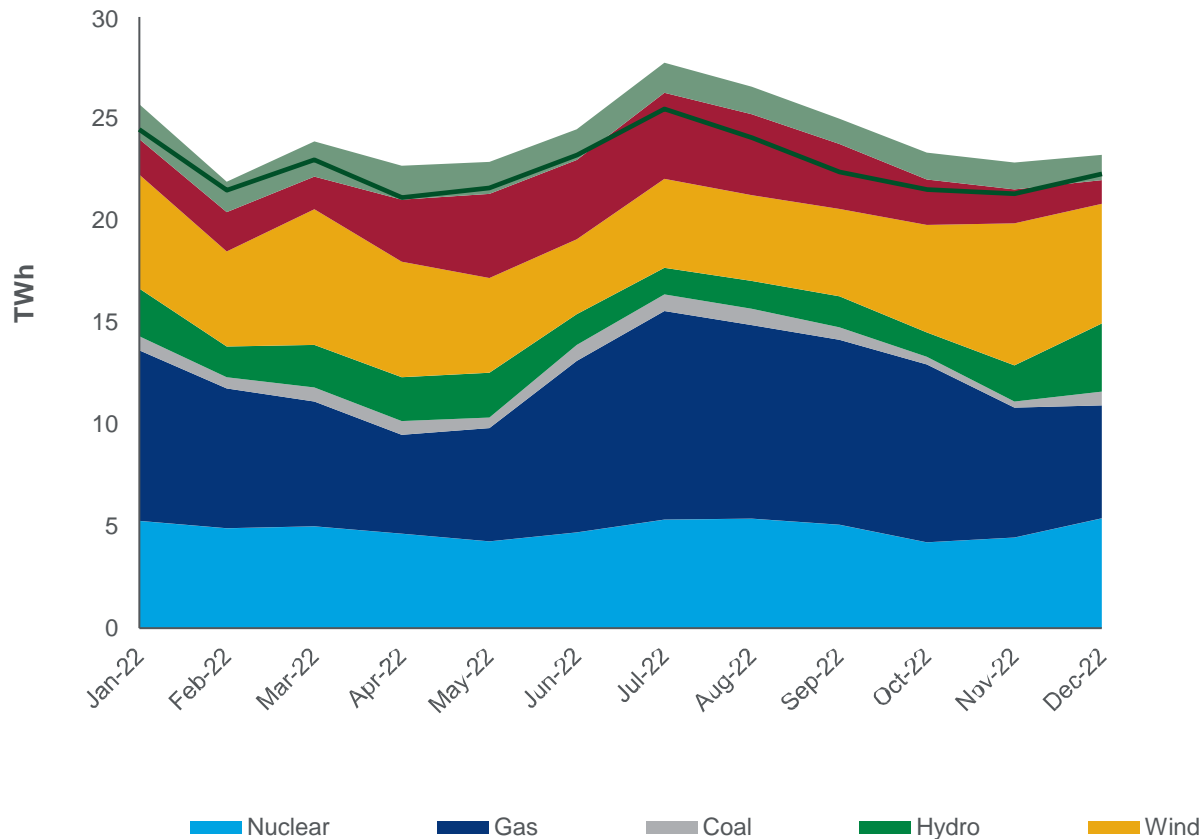
DE FR IT ES SE FI BE PT GB

Note: We refer to both 'GB' and 'UK' in this report. The former reflects raw Elexon data whereas the latter has been scaled up (using IEA country actuals) to account for Northern Irish volumes  
 Source: ENTSO-E, Elexon, Wood Mackenzie

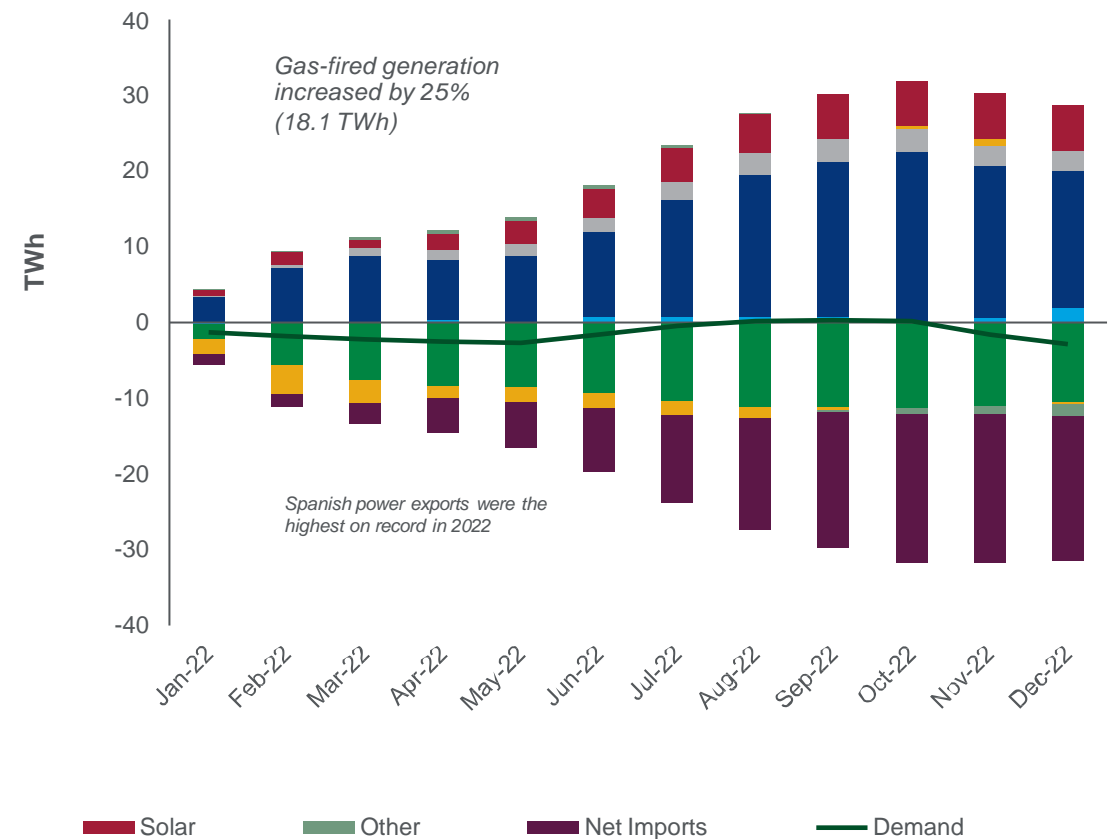
# Spain: the Iberian gas price cap was the defining feature of 2022, with power prices trading at a sizeable discount from mid-year and gas-fired supply up substantially

Cheaper power saw gas generation into exports rise; Spain flipped from a 0.8 TWh net importer in 2021 to 18.2 TWh net exports

Power supply mix: Spain



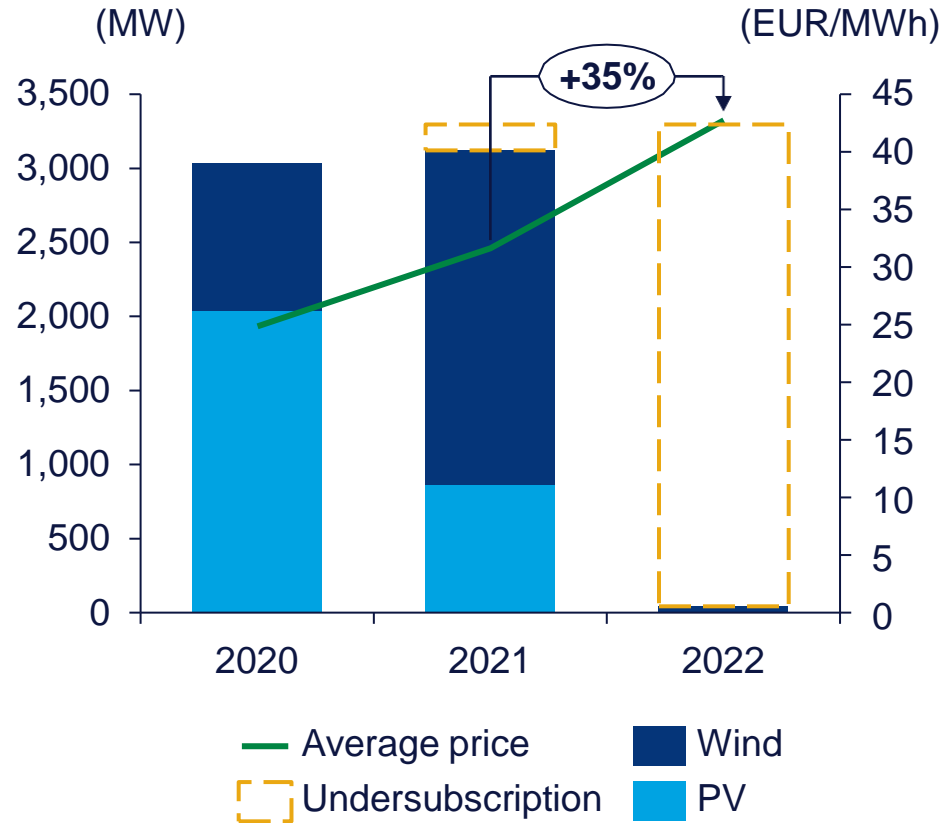
Cumulative year-on-year change: Spain



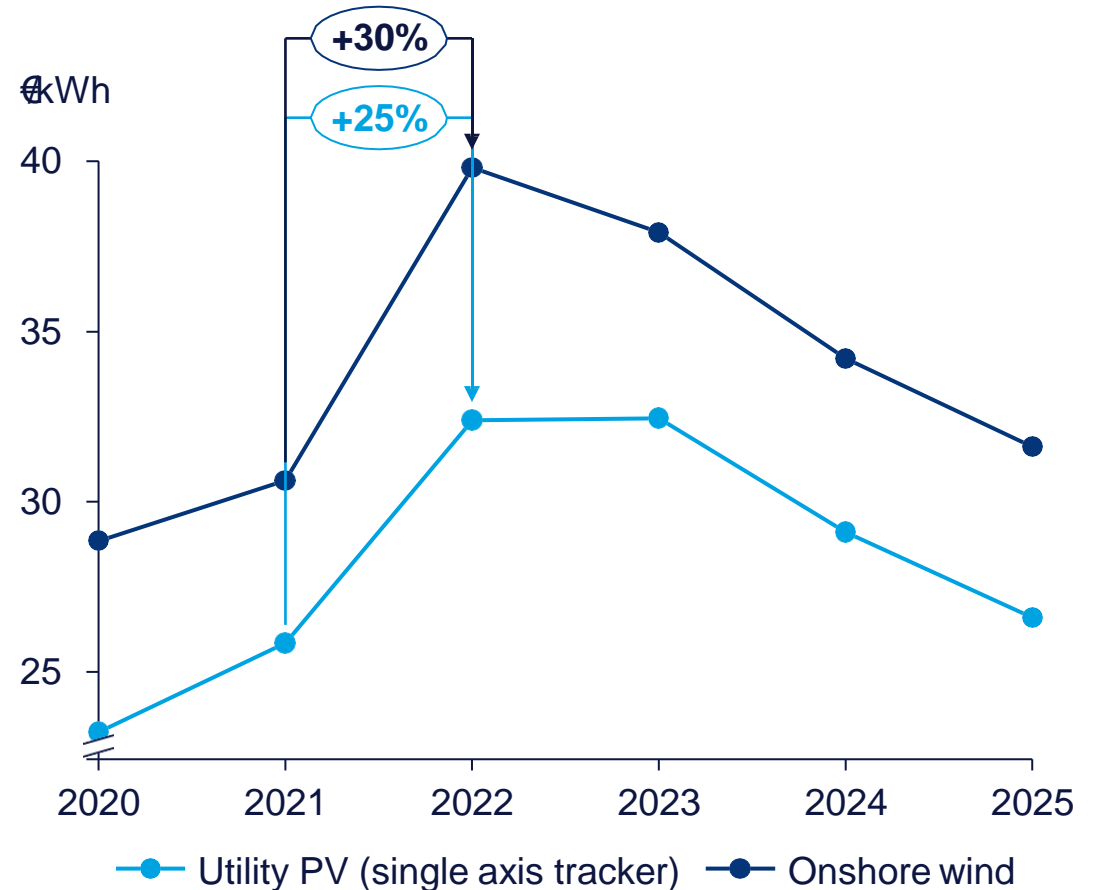
# Participation plummeted at the 2022 auction despite sufficient pipeline

The latest tender represents the first major undersubscription for a Spanish auction. Cost and market dynamics underpin the result as a massive grid queue indicates high project supply.

Volume of renewable capacity contracted and average price at Spanish auctions, 2020 to 2022



LCOE for utility PV and onshore wind in Spain, 2020 to 2025

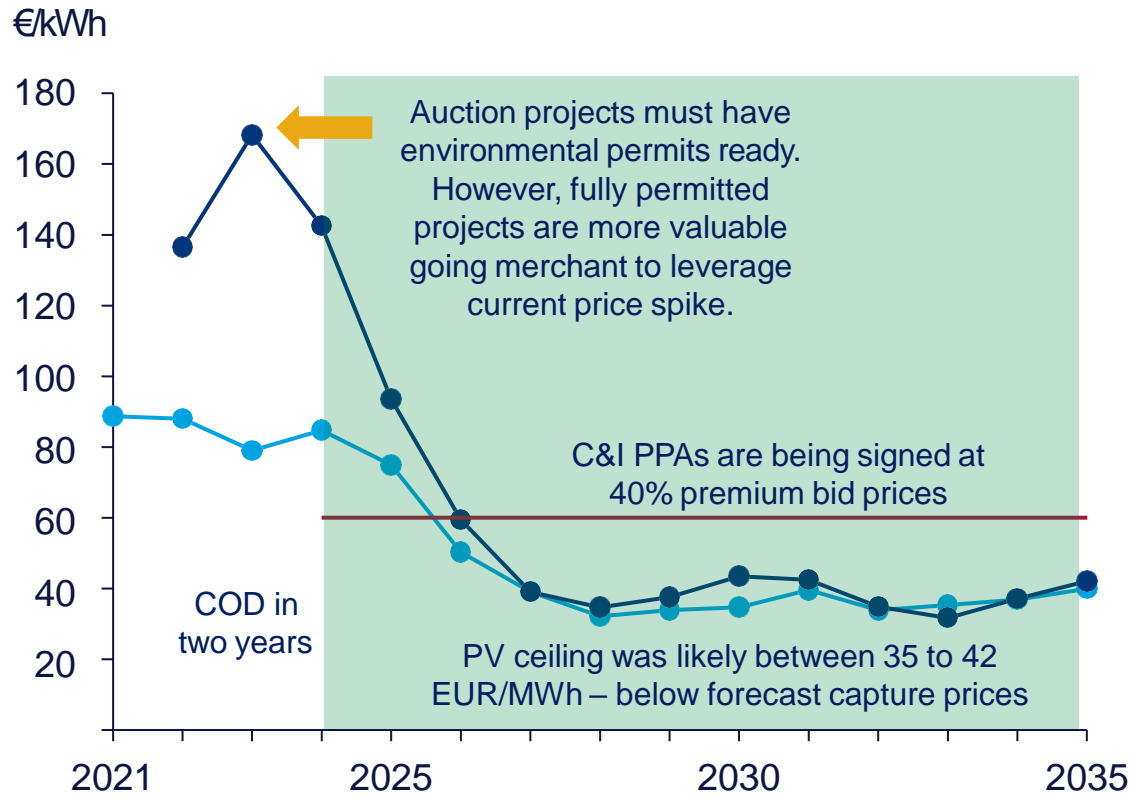




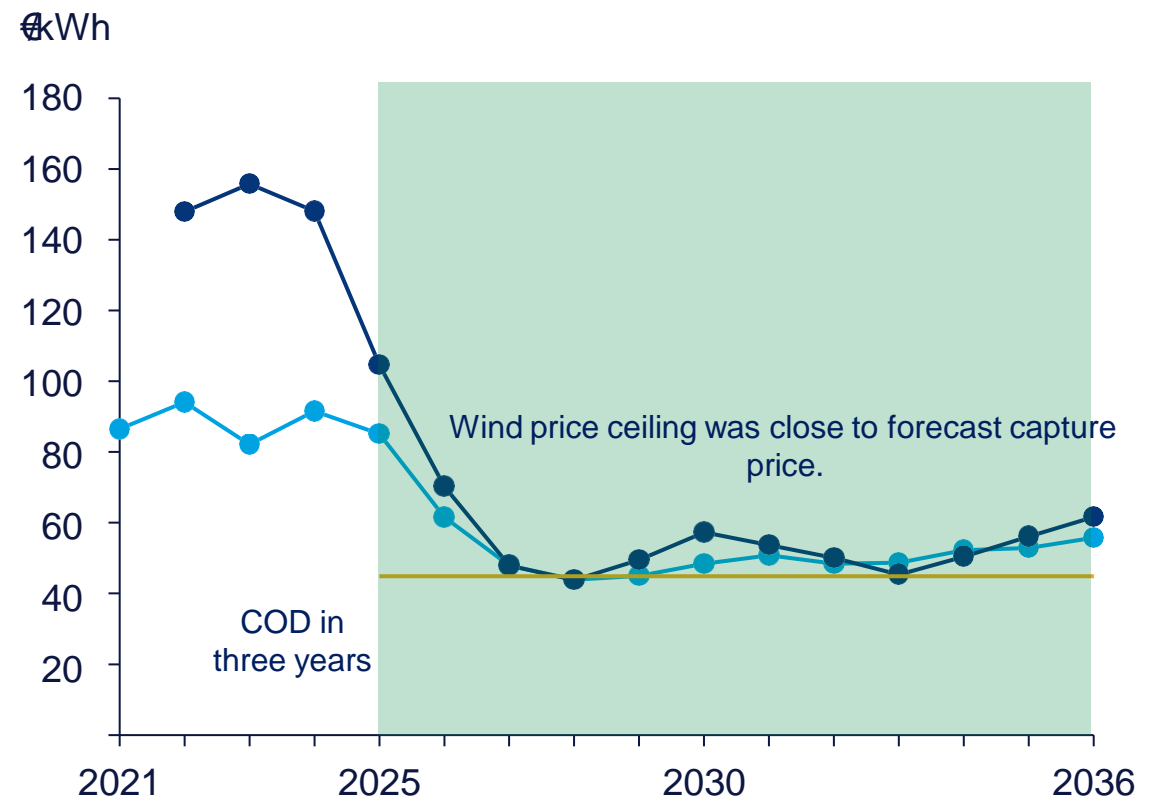
# Prevailing high market power prices made auction PPAs unattractive to developers

Auction rules prohibiting the sale of excess electricity merchant nor via concurrent C&I PPAs eliminates opportunity for developers with shovel-ready assets from benefitting from the upside of high electricity prices

Post-curtailment PV capture price forecast in Spain



Post-curtailment onshore wind capture price forecast in Spain



● Pre-Russia invasion outlook\* 
 — Prevailing PV C&I pricing (Oct. '22)
  Auction PPA period

● Current view\*\*

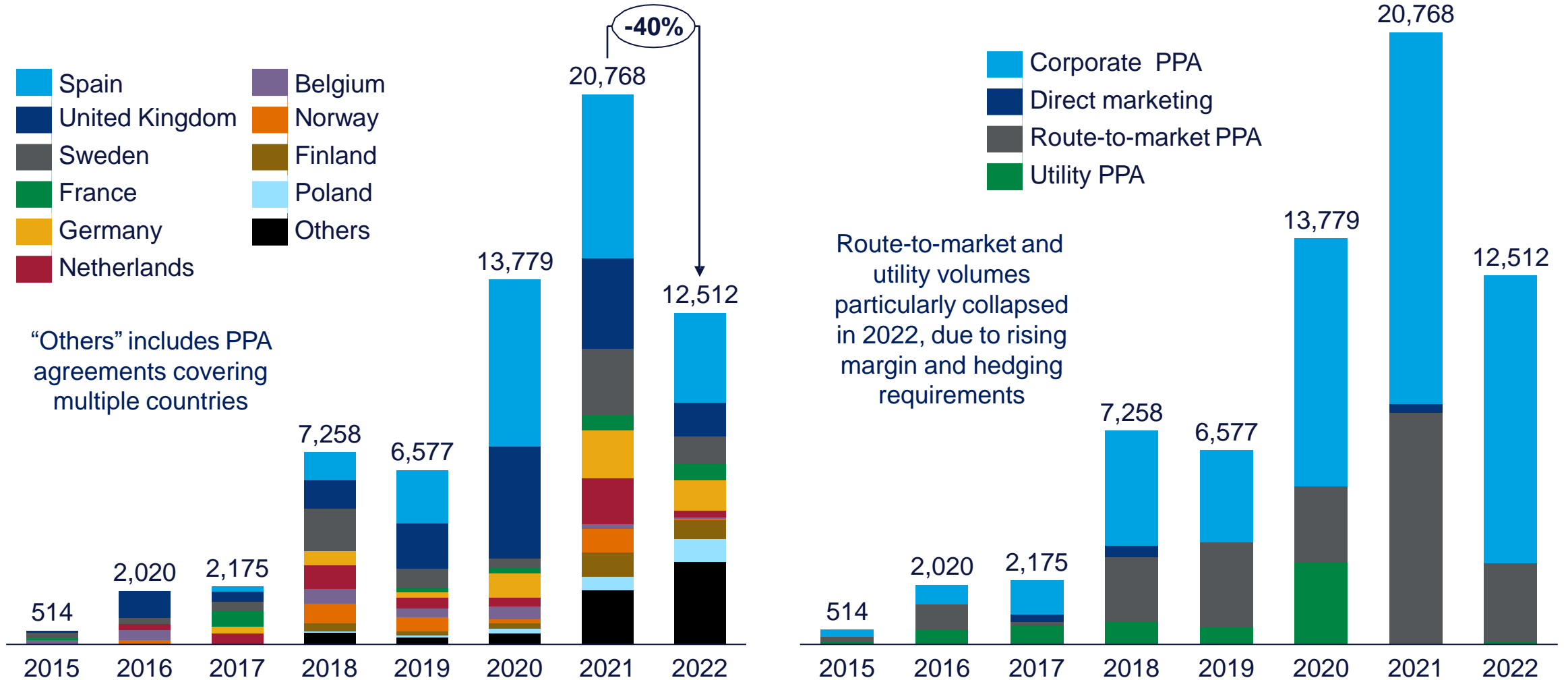
● Pre-Russia invasion outlook\* 
 — Ceiling price\*\*\*
  Auction PPA period

● Current view\*\*

# PPA capacity in 2022 fell 40% y-o-y due to the volatility in prices

Although ESG targets and the economic competitiveness of renewables will spur PPA demand in the coming years

PPA capacity contracted per year\*, MW

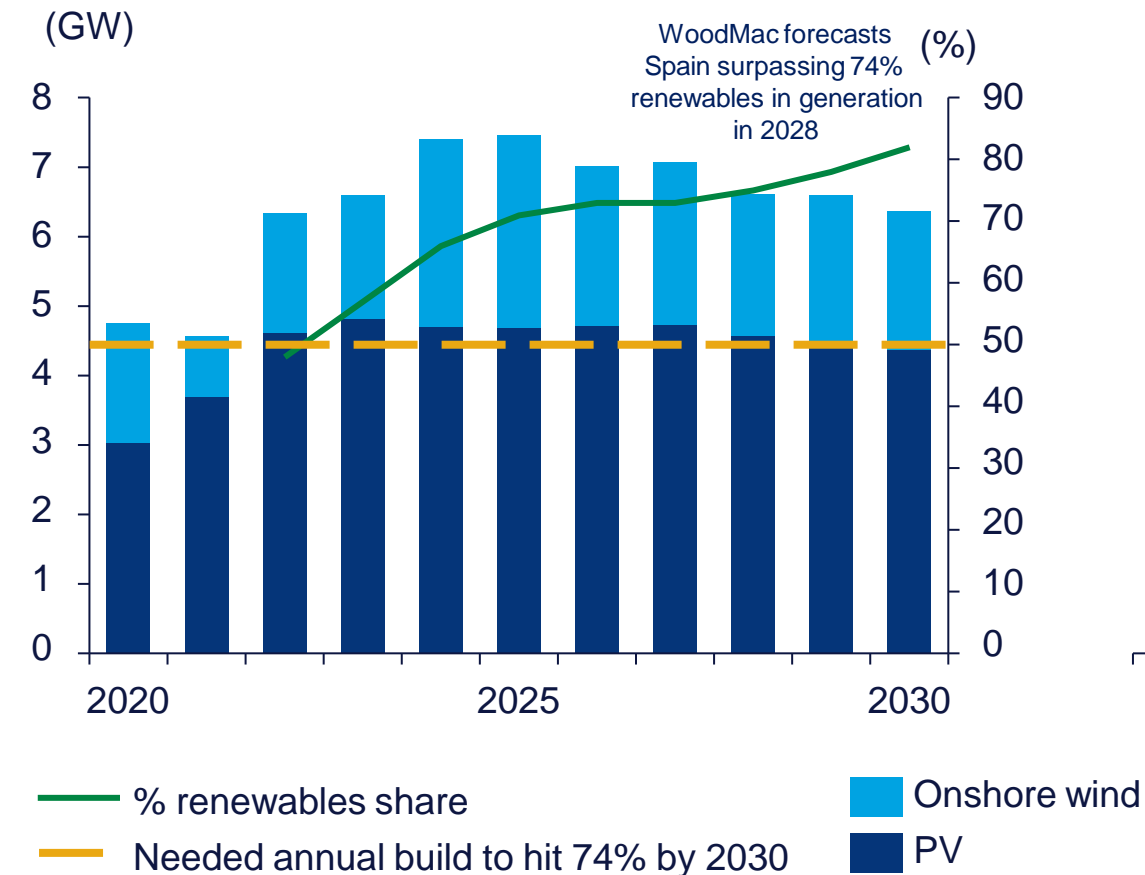


Source: Wood Mackenzie, \*when PPA capacity is not announced for a specific deal, an estimate is calculated based on the annual electricity offtake volume

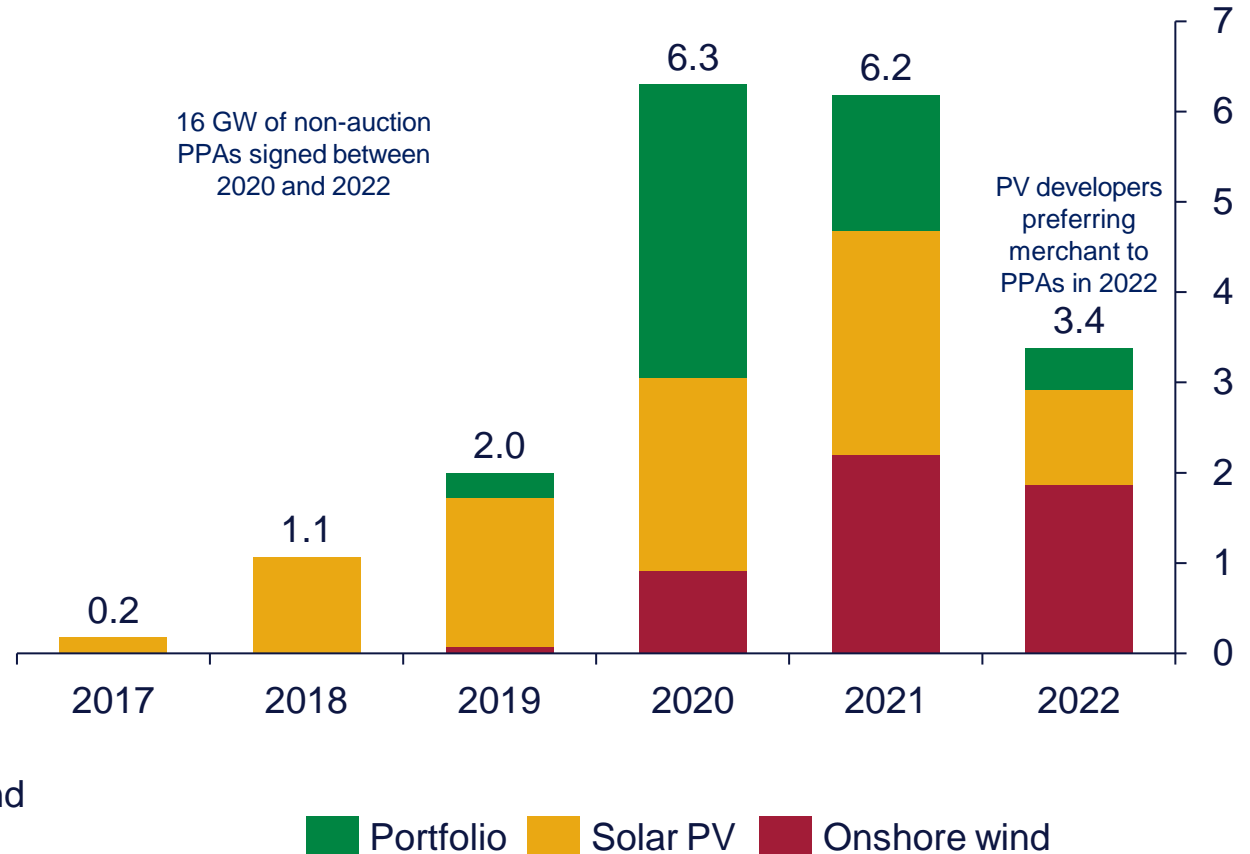
# Annual wind and PV build forecast to easily surpass the 4.7 GW needed to hit NECP

C&I and route-to-market PPAs signed between 2020 and 2022 indicate that auctions are probably not necessary to support annual build levels to reach the 2030 renewables target.

PV and wind power outlook in Spain vs. necessary capacity additions to reach NECP generation targets



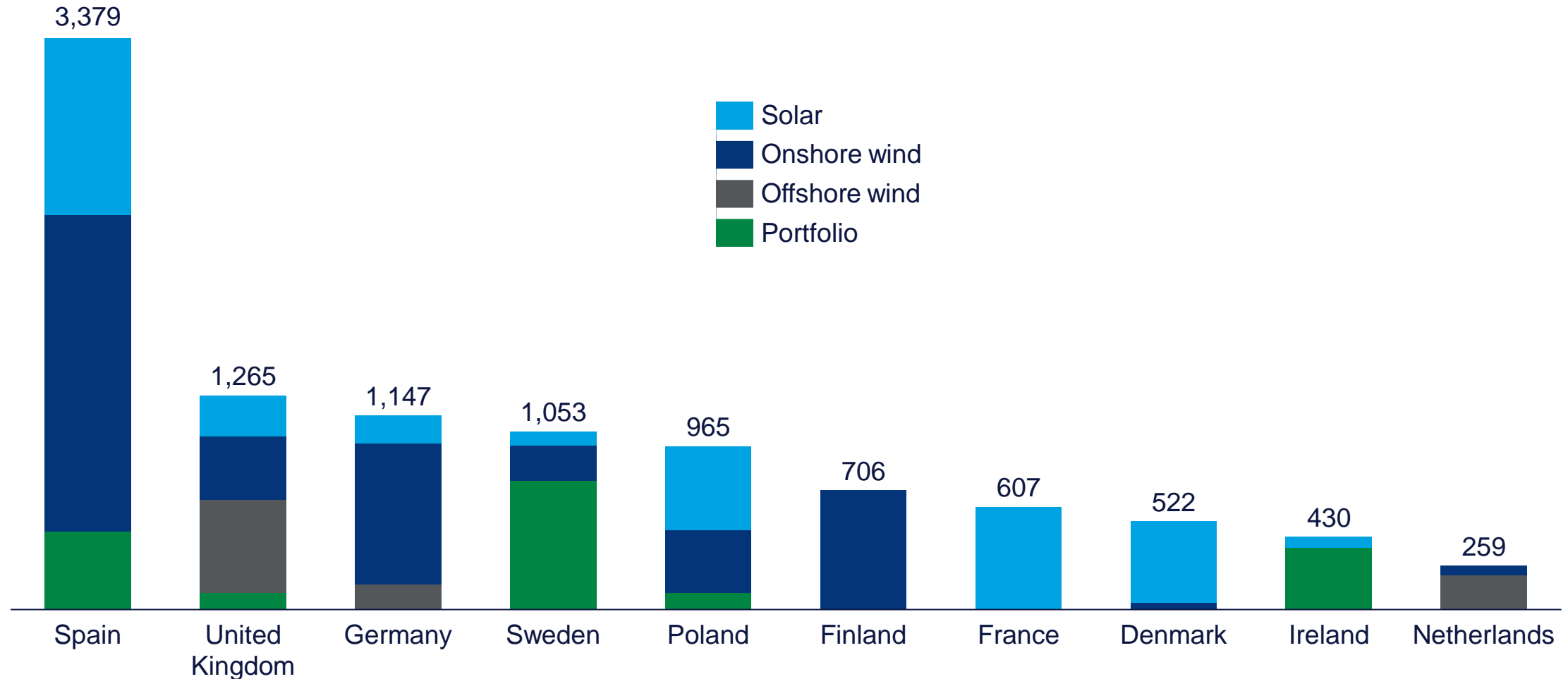
Contracted C&I and route-to-market PPA capacity by technology, Spain, MW\* (GW)



## Spain remains the largest PPA market in Europe due to competitiveness of renewables

PPAs have offered developers bigger remunerations compared to government auctions. The Spanish market remains resilient despite the overall reduction in volumes in 2022.

Top 10 PPA markets in 2022, MW

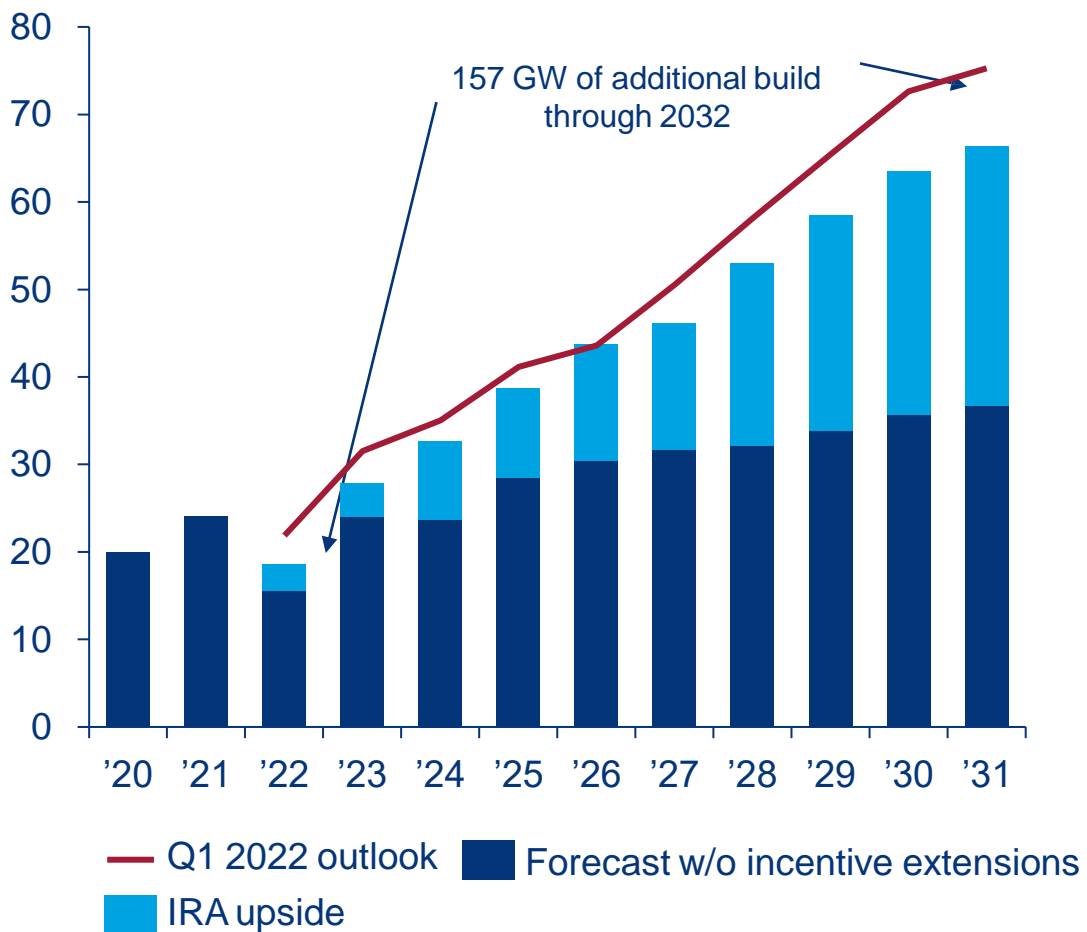


# Impacto de la IRA

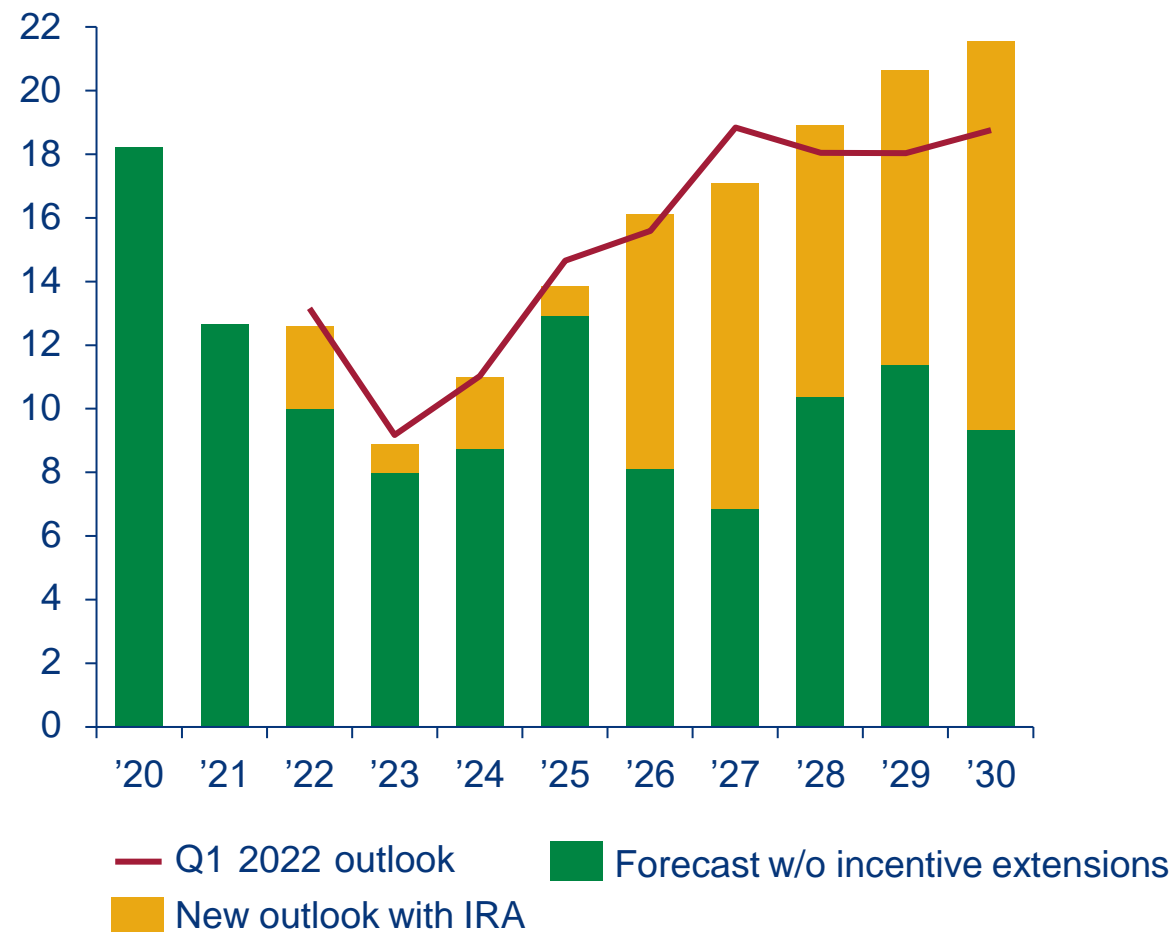
# Incentives in IRA are necessary to sustain annual growth but were largely expected

The wind and solar industries had already expected extension of the ITC and PTCs. Upside is limited by grid queue congestion. Local content incentives will be more impactful for solar supply chain investment than wind.

US solar forecast following passage of the IRA



US wind forecast with passage of IRA/PTC extension

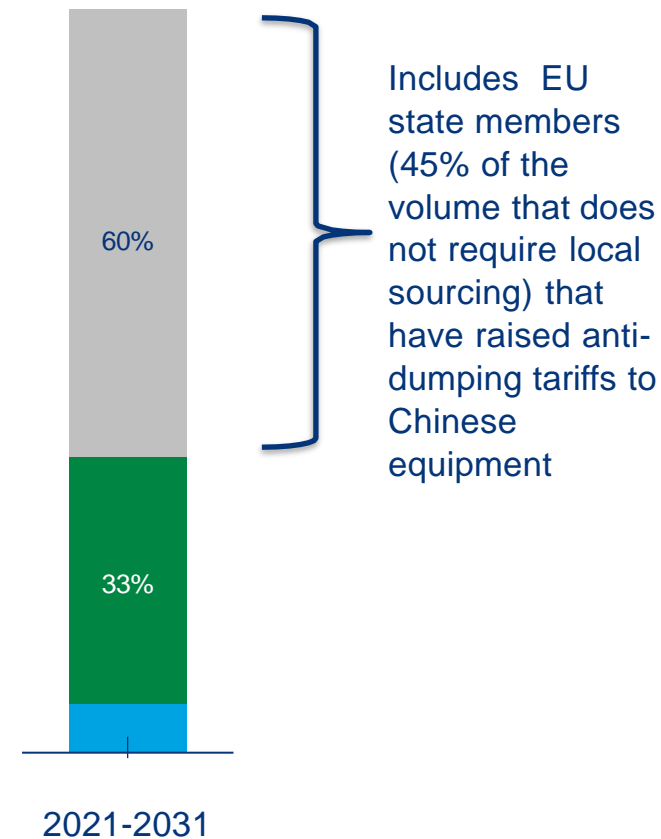
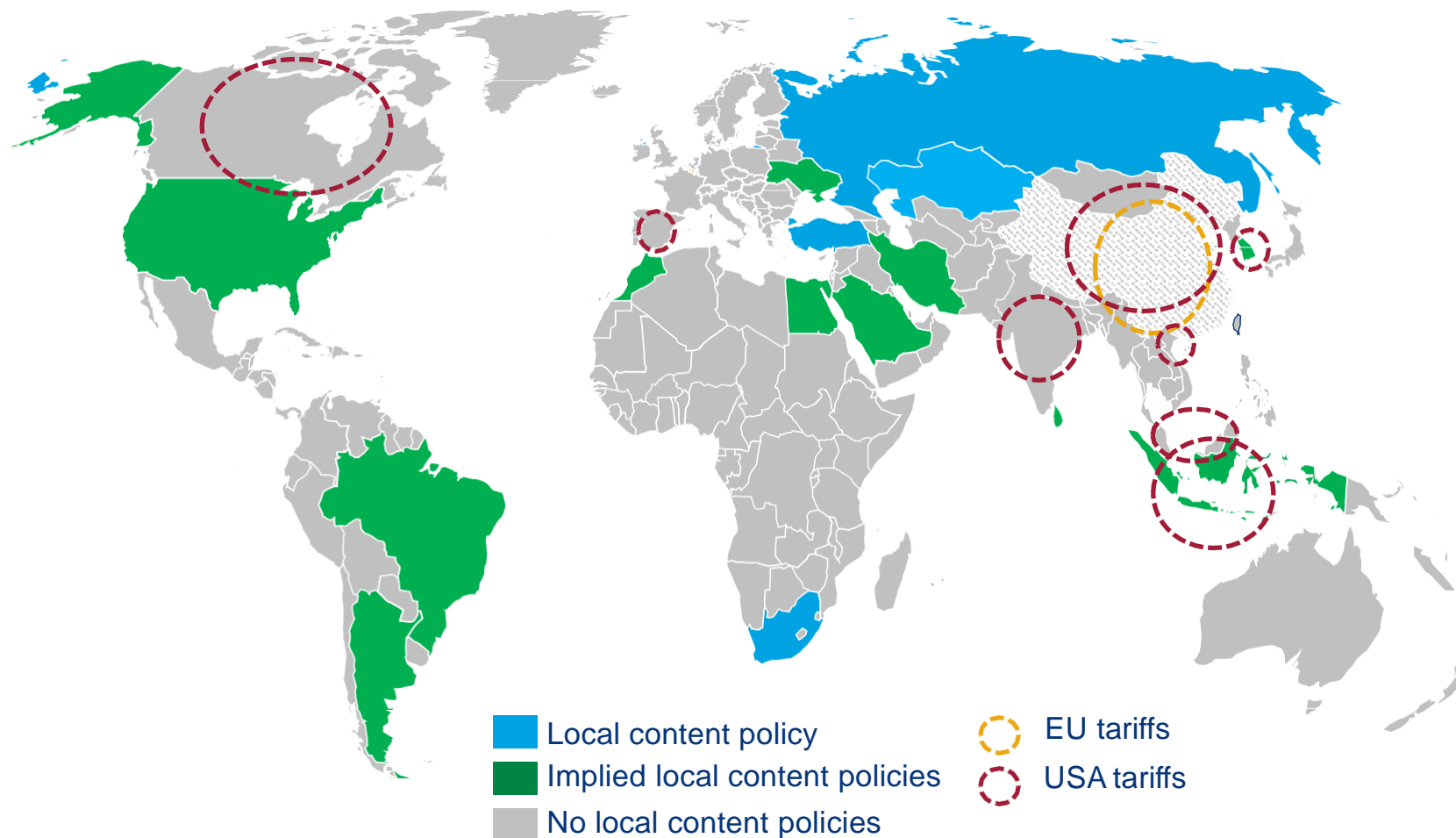


# Threat of Chinese entry will result in a rise in protectionist policies in onshore

New domestic content incentives in the US through the Inflation Reduction Act is expected to boost investment; EU member states looking to incentivize local supply to protect established wind manufacturing jobs

Onshore markets and local content policies

Onshore wind outlook by local content policy, excl. China



Source: Wood Mackenzie

Note: 'Local content policy' means that local content feature as competitive parameters in tenders or auctions in the respective markets. Implied local content means that local content is targeted by policy-makers but that it does not feature as competitive parameters in tenders or auctions in the market

## About the analyst:



**Brian Gaylord**  
Principal Analyst,  
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Brian produces analysis across various power and renewables technologies and regions, and coordinates publications that focus on strategic competitive dynamics. Previously, he led Wood Mackenzie's wind power analysis for Latin America and Southern Europe focusing on market analysis, policy evaluation, auction strategies and supply chain dynamics. During his time with the company he has led various publications across the value chain and has been a member of both the research and consulting organizations.

Brian joined MAKE Consulting, now Wood Mackenzie, in 2010 from the Trade Commission of Spain (ICEX), where he was a renewable power market analyst.

Brian holds a master's certificate from the Centro de Estudios Económicos y Comerciales. Brian completed his undergraduate degree at Indiana University, where he majored in business with a concentration in marketing and international studies, as well as studied political science, economics and Spanish.





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