Asia Wind Energy Association

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AWEA WEBINAR SERIES 2020
MARKET SESSION

Is Offshore Wind Getting Ready for Take-off in Japan and S. Korea?

SPEAKERS:

VINCE HEO
ASSOCIATE DIRECTOR
IHS Markit

KAORI TACHIBANA
ASSOCIATE DIRECTOR
IHS Markit

ANDREI UTKIN
SENIOR ANALYST
IHS Markit

TUESDAY, 30 JUNE 2020 - 3 PM SGT

Asia Wind Energy Association

The Asia Wind Energy Association was established in December 2016 to become the leading trade association for the wind energy sector in Asia Pacific.

The association acts as the regional platform for all wind power industry stakeholders to collectively promote the best interests of the wind power sector.

The Asia Wind Energy Association is supported by a wide variety of stakeholders from the offshore and onshore wind industry.

Information

Asia Wind Energy Association

www.asiawind.org

@asiawindenergy

Asia Wind Energy Association

(65) 6679 6071

membership@asiawind.org

CapitaGreen - Level 24
138 Market Street, Singapore 048946

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Global Trends and Outlook to 2050 for the Global Offshore Wind Industry

Andrei Utkin

Senior Analyst, Gas, Power, and Energy Futures
IHS Markit

Andrei Utkin, senior analyst with the Gas, Power, and Energy Futures team at IHS Markit, focuses on renewable power markets worldwide.
Mr. Utkin's responsibilities include global renewable market research, contribution to long-term forecasts, cost projections, and asset ownership worldwide. His interests encompass offshore wind and nonmainstream technologies including biomass, concentrating solar power, and ocean and geothermal energy. He assists with the global scenarios and with detailed Multiclient Studies. Mr. Utkin has more than eight years of project management experience in energy efficiency and renewable energy projects. Previously, he worked with Enertime SA, where he was a project manager of Organic Rankine Cycle cogeneration power plant projects based on renewable energy sources. Prior to that, he worked in Belarus as a project manager of energy efficiency projects and as an energy efficiency consultant. Mr. Utkin holds a bachelor's degree in construction engineering (Power Plant Construction and Engineering Services Faculty) from the Belarusian National Technical University in Minsk and a master's degree in international energy from Sciences Po in Paris, France.

Global Power and Renewables

Webinar

AWEA Webinar series 2020

Is offshore wind getting ready for take-off in Japan and South Korea?

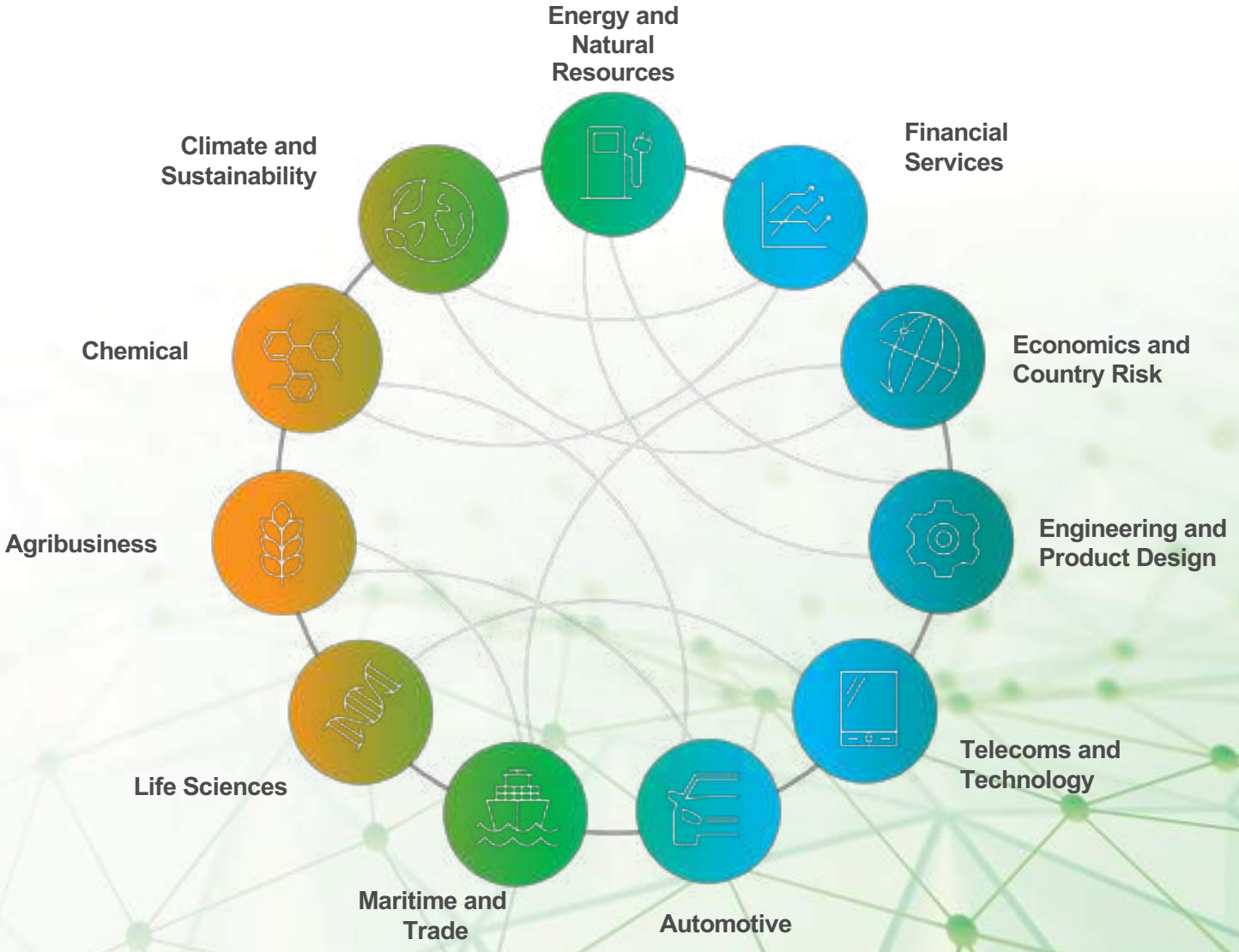
30 June 2020

Andrei Utkin, Senior Associate, +33 1 76 76 68 97, andrei.utkin@ihsmarkit.com
Vince Heo, Associate Director, +10 2637 7715, Vince.heo@ihsmarkit.com
Kaori Tachibana, Associate Director, +81 3 6262 1782, Kaori.Tachibana@ihsmarkit.com

About IHS Markit

Addressing strategic challenges with interconnected areas of expertise

IHS Markit empowers leaders from multiple industries. We deliver proprietary data, software and analytics, and analysis to help them make critical business decisions and stay ahead of their competition.



Our intelligence spans the entire value chain

From exploration and production, to processing and refining, through to end users and markets

Oil and gas | LNG and NGLs | Mining | Refining | Chemicals | Coal, metals, minerals | Power and renewables | Manufacturing and construction | Batteries and technology | Oil markets | Fertilizers | Agriculture and food processing | Biofuels

Exploration and extraction

Exploration and production requires technical know-how, geological insight, and professional expertise to properly assess potential and risks.

We cover all aspects of exploration and production across energy and natural resources and agriculture.

Our solutions cover

- Assets, operations, and companies involved
- Technical, geological, and engineering analysis
- Asset analysis, reserve studies, and forecasts
- Above- and belowground risk analysis
- Underground, surface, placer, and in situ mining
- Scenario planning
- Infrastructure, cost, and technologies
- Project economics and benchmarking
- Policy and fiscal terms
- Capital deployment

Processing and refining

Companies involved in refining and processing need to be aware of what is happening further upstream and downstream to react fast and plan ahead. Developments impacting feedstock, costs, or pricing could affect downstream activities.

We cover all aspects of oil refining as well as the full spectrum of base and specialty chemical processes, as well as processes for mined minerals.

Our solutions cover

- Operational technology and process benchmarking
- Asset analysis, operations, and efficiencies
- Cost, technologies, and margin optimization
- Project economics and benchmarking
- Distribution channels and partners
- Scenario planning and risk analysis
- Companies and organization structure
- Capital deployment

End users and markets

Market dynamics—trade flows, demand, supply, and price—are interconnected and affect commercial returns and business longevity.

We cover all related use cases including power, renewables, plastics manufacturing, electric vehicles, technology, fertilizers, biofuels, and even food manufacturing and consumption.

Our solutions cover

- Multicommodity sector demand, supply, and pricing from short to long term
- Geopolitics and macroeconomic trends and forecasts
- Policies and breaking news events
- Scenario analysis
- Company developments and M&A
- Marketing and distribution
- Oil products real-time pricing and analysis

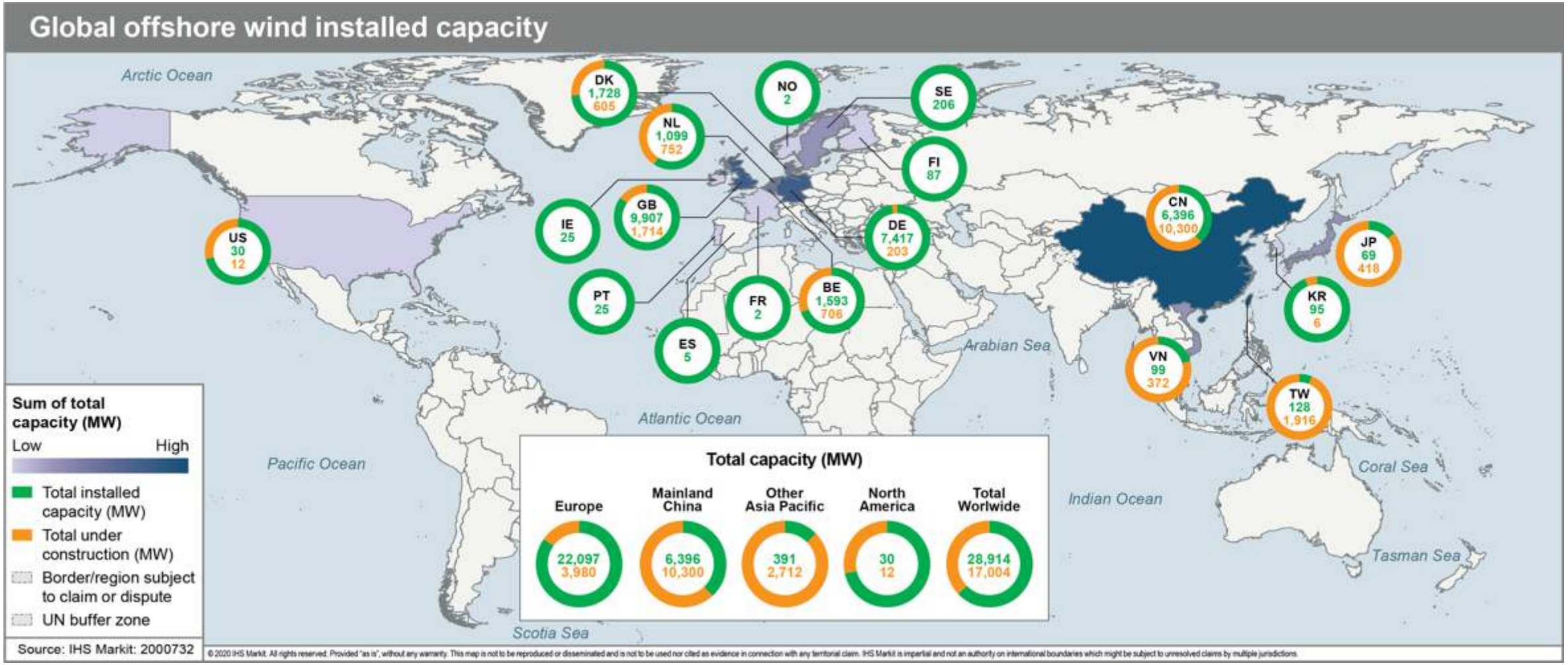
Agenda

- Global trends and outlook to 2050 of the offshore wind industry
- Japan offshore wind industry overview
- South Korean offshore wind industry overview

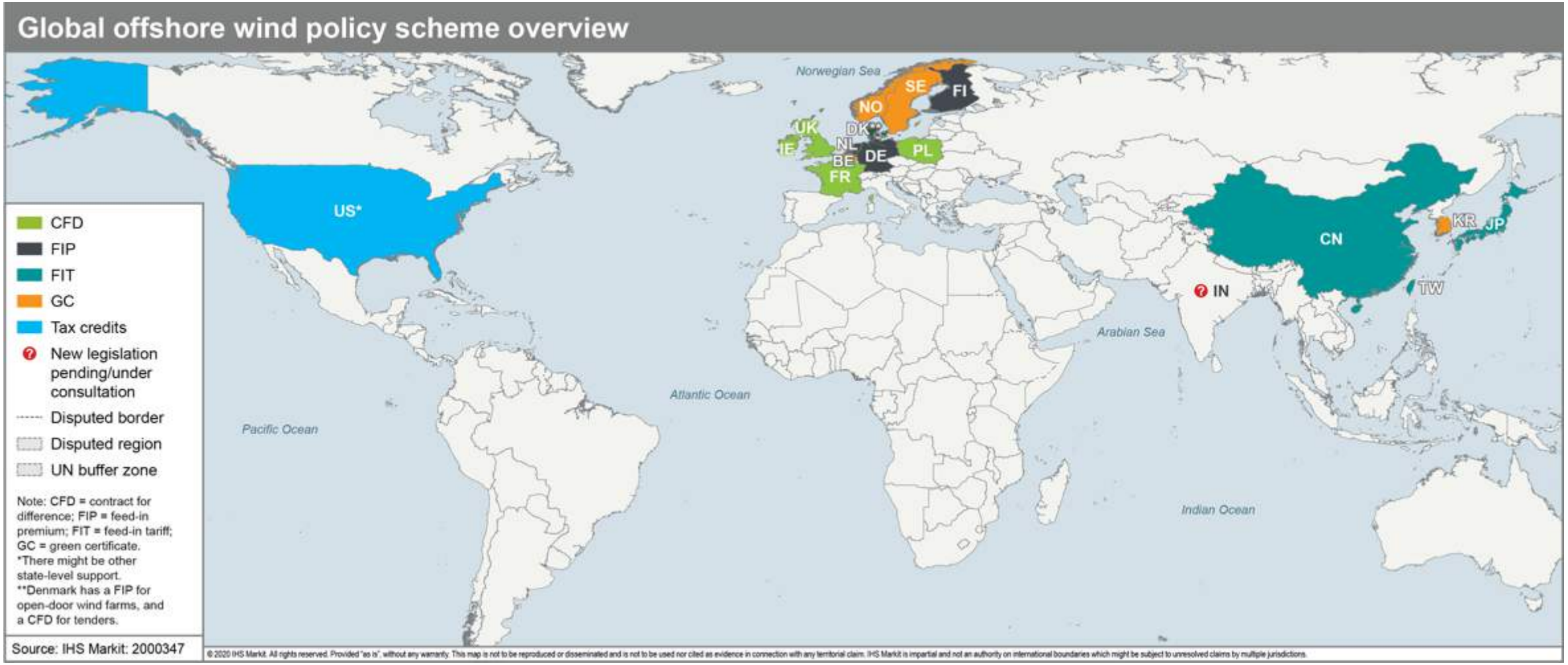
Global trends and outlook to 2050 of the offshore wind industry

Andrei Utkin, Senior Associate, +33 1767 66897, andrei.utkin@ihsmarkit.com

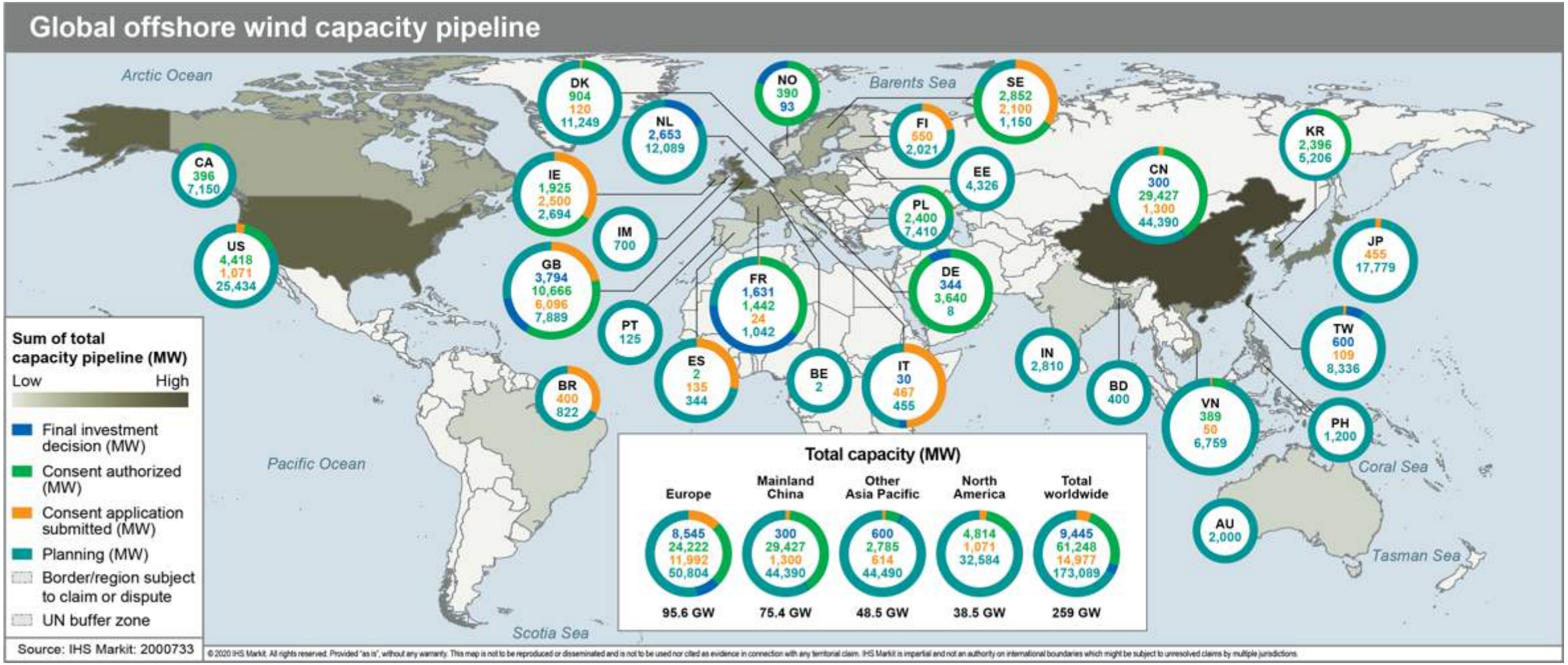
Three markets—the United Kingdom, Germany, and mainland China—account for more than 80% of total offshore wind installed capacity globally



Established support mechanisms will drive the growth in Northern Europe, the United States, mainland China, Taiwan, Japan, and South Korea

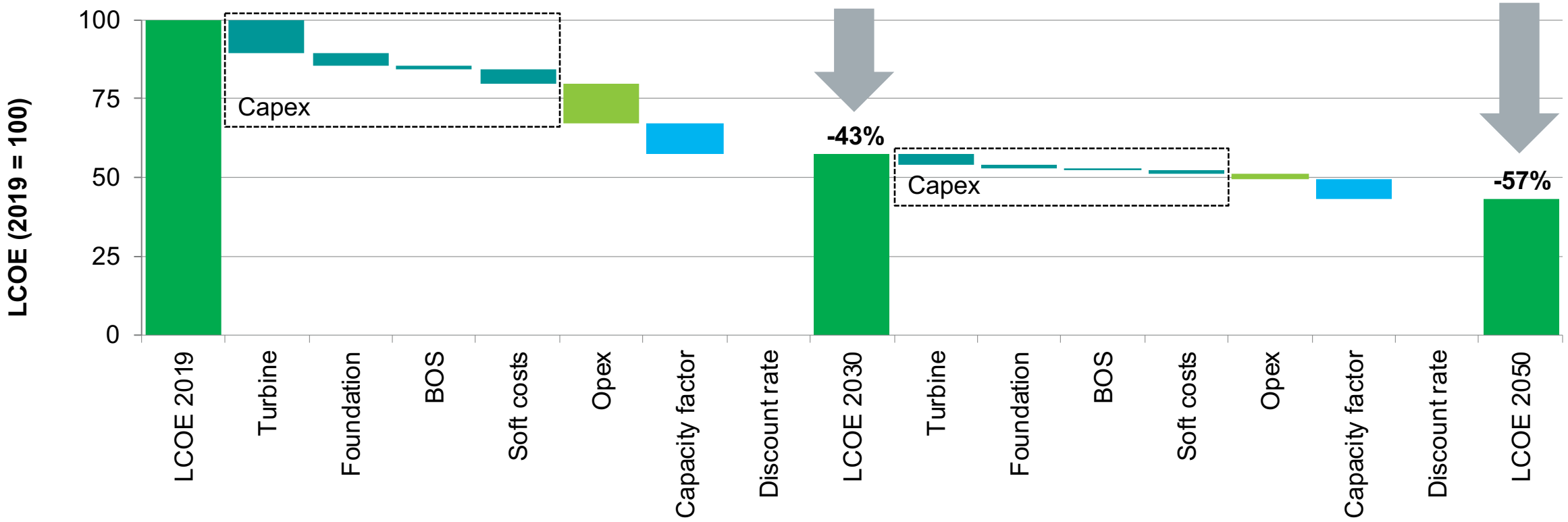


Mainland China and Europe account for 65% of the nearly 260 GW currently under development



Offshore wind cost will continue to decline, driven by technology and supply chain improvements

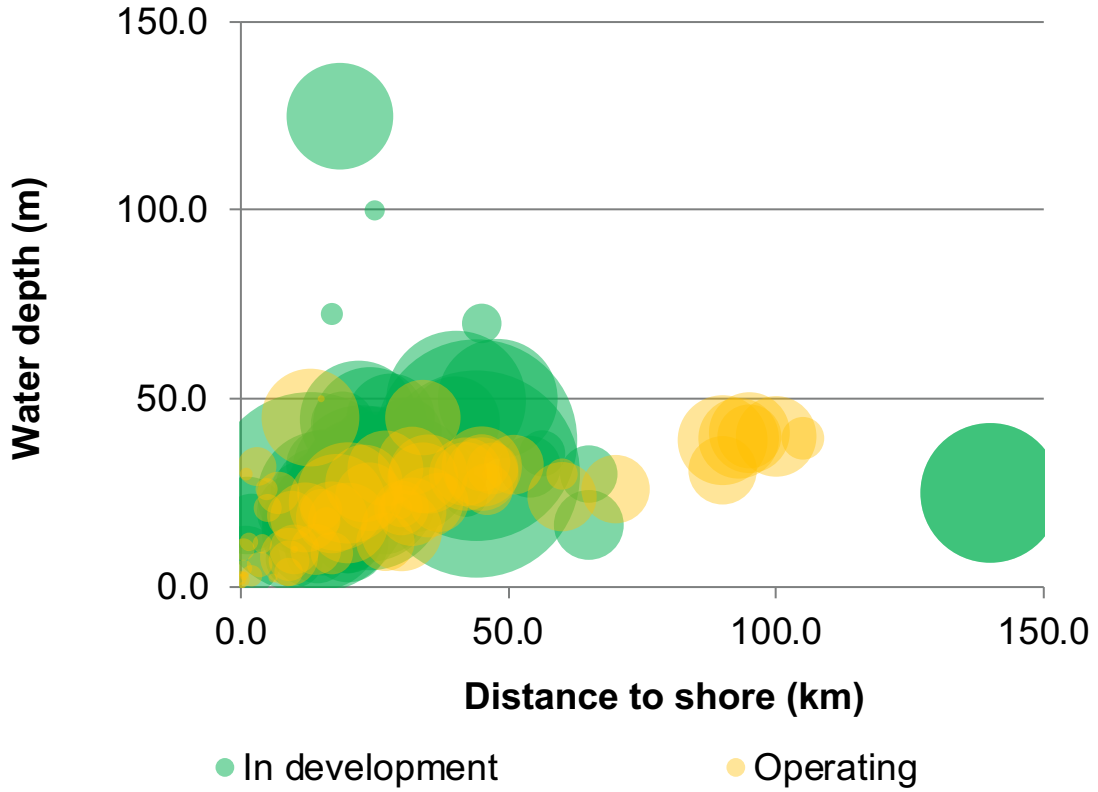
Offshore wind LCOE cost reductions, by component, 2019–50 (benchmark)



Note: Soft cost = installation and development; LCOE = levelized cost of electricity; BOS = balance of system.
Source: IHS Markit

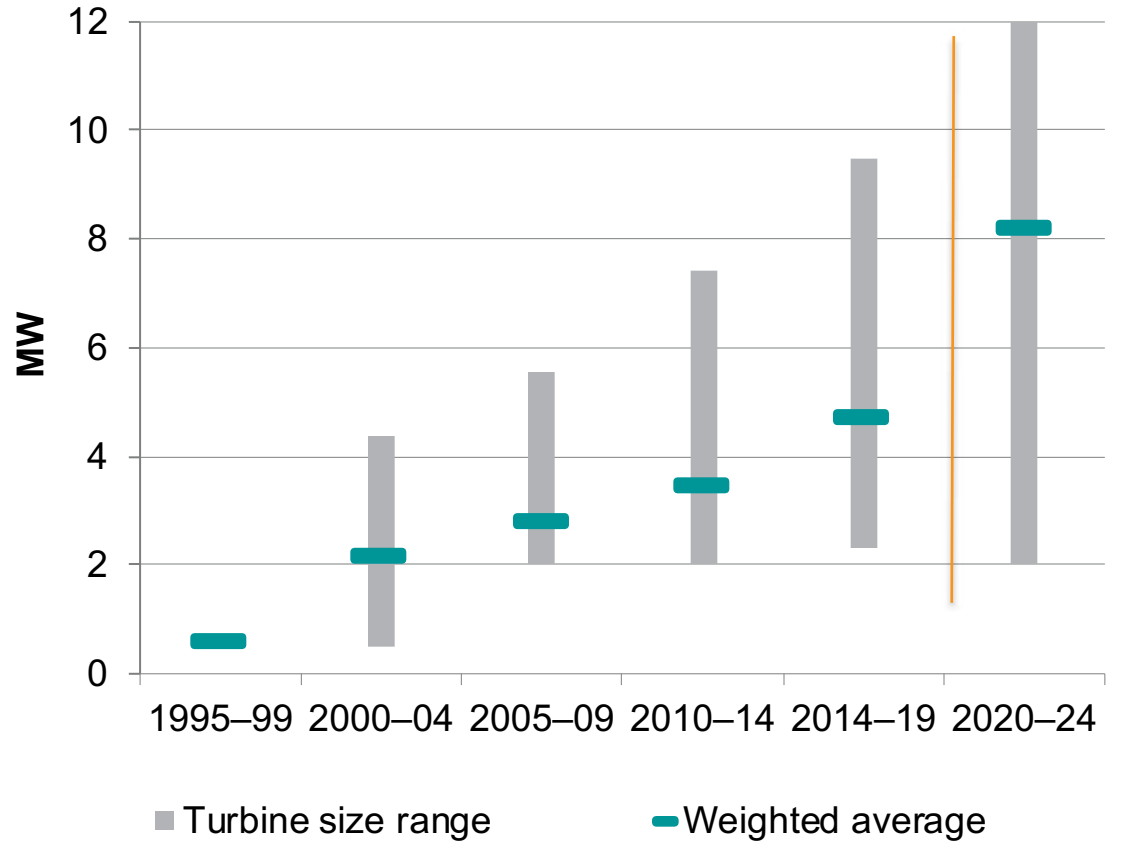
Increasing complexity will continue to put pressure on the supply chain, challenging the fast deployment of offshore wind

Water depth versus distance to shore, global



Note: Bubble size represents relative nameplate capacity (megawatts).
Source: IHS Markit

Global connected turbine size evolution



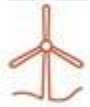
Source: IHS Markit

The offshore wind supply chain is undergoing significant consolidation, as larger players drive efficiency and put pressure on costs

Global offshore wind value chain

	Companies	Develop	Own	Operate
Project developers	PNE	■		
	RES	■		■
	wpd	■	■	■
Utilities and IPPs	China Guodian	■	■	■
	China Longyuan Power Group Corp.	■	■	■
	China Three Gorges	■	■	■
	E.ON	■	■	■
	EDF	■	■	■
	EnBW	■	■	■
	Equinor	■	■	■
	Iberdrola	■	■	■
	Innogy	■	■	■
	Northland Power	■	■	■
	Ørsted	■	■	■
	RWE	■	■	■
	Vattenfall	■	■	■
Financial players	CIP		■	
	Macquarie		■	
	Masdar		■	
	PKA		■	
	Siemens Financial Services		■	

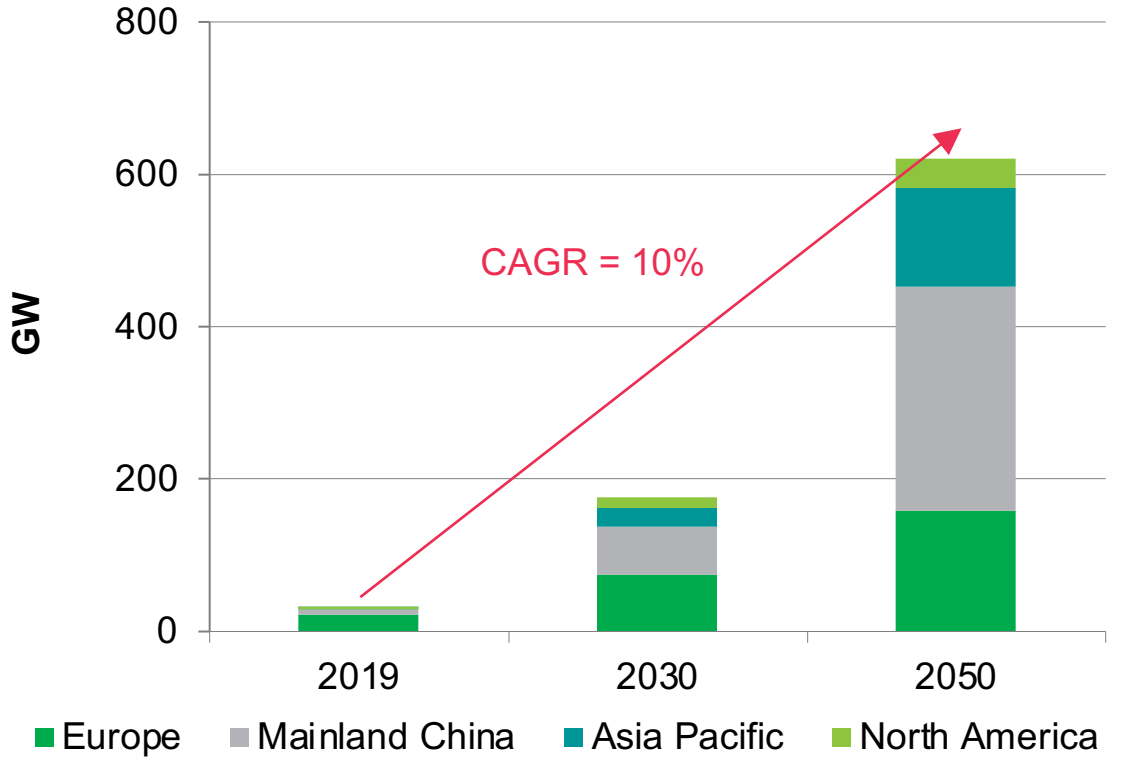
Technology providers / EPC contractors / specialized providers

	Companies	EPC	Turbine Supply	Turbine Install	Foundation Supply	Foundation Install	Cable* Supply	Cable* Install	Own	Operate
	A2Sea	■		■		■				
	DEME**	■		■		■		■	■	■
	Jan De Nul Group	■		■	■	■		■		
	Seaway 7	■		■		■		■		
	Van Oord	■		■		■		■		
	GE		■							
	Goldwind		■							
	MHI Vestas		■							
	Senvion		■							
	Siemens Gamesa		■							
	Bladt Industries				■					
	EEW SPC				■					
	Navantia (floating)				■					
	Principle Power (floating)				■					
	Sif Group				■					
	Smulders				■					
	Ballast Nedam					■				
	Boskalis					■				
	Fred. Olsen Windcarrier			■		■				
	GeoSea			■		■				
	Jumbo Offshore			■		■				
	Scaldis					■				
	ABB						■			
	JDR Cable Systems						■			
	Hellenic Cables						■			
	Nexans						■			
	NTK						■			
	Prysmian Group						■	■		
	Blue Offshore							■		
	JD-Contractor							■		
	Tideway							■		
	Woen Jinn Harbour Engineering							■		

Note: Companies are listed in alphabetical order. This list is not exclusive.
*Cables include both array cables and export cables.
**DEME Offshore encompasses subsidiaries GeoSea, Tideway, A2Sea, and EverSea.
Source: IHS Markit

Sustained outlook for offshore wind additions, with over $1.4 trillion to be directly invested in offshore wind assets globally

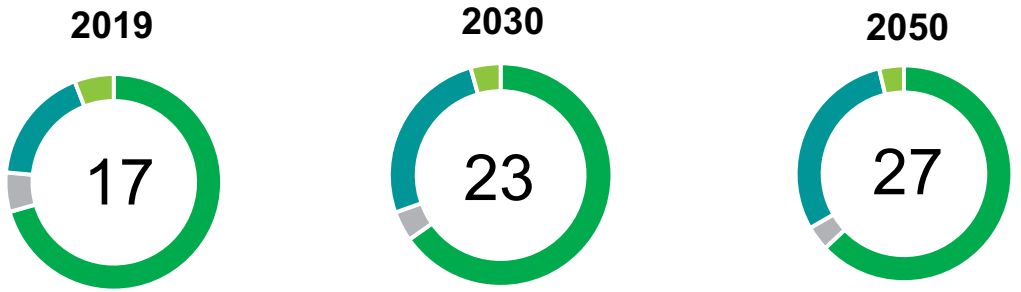
Offshore wind installed capacity by region, 2019–50



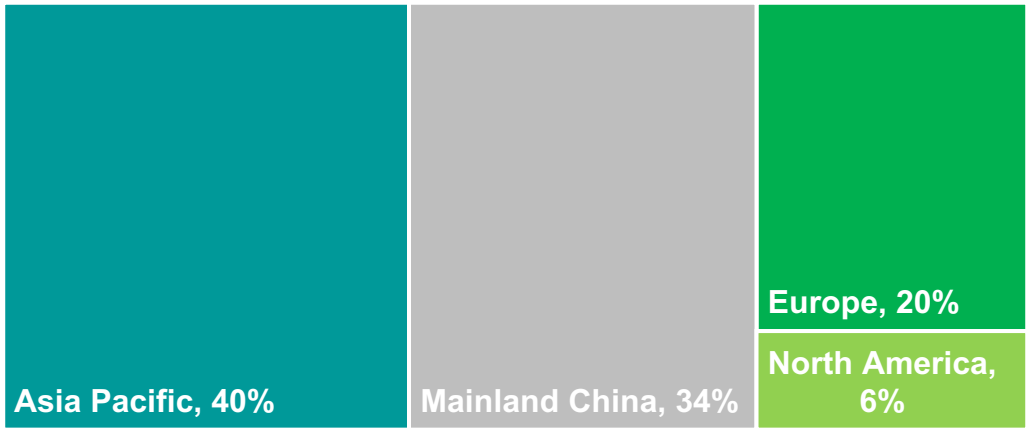
Note: CAGR = compound annual growth rate.
Source: IHS Markit

Global offshore wind market evolution and investments

Number of countries that develop offshore wind



Direct investments in projects to 2050 by region



Source: IHS Markit

Key messages for Japan and South Korea offshore wind industry

Japan

1. Renewables penetration has mainly been solar, however the new structure for offshore wind allows for projects to be built in areas were local communities and organizations are ready to accept new business and infrastructure.
2. FIT and subsidies are likely to continue for offshore wind, allowing operators to enjoy clarity on revenue.
3. Future expansion of intraregional connection capacity will be key in ensuring renewable energy supply meet demand.

South Korea

1. Nuclear and coal phase-out policy leaves a larger room for offshore wind to grow, mainly led by the state-owned companies
2. *Downward pressure in power price (SMP)* poses challenge in near-term FID
3. Complicated permit process and lack of community acceptance for near-shore projects will push more developers and financers toward *floating-offshore wind project development*

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Japan Offshore Wind Industry Overview

Kaori Tachibana

Associate Director, Power, Gas, Coal, and Renewables
IHS Markit

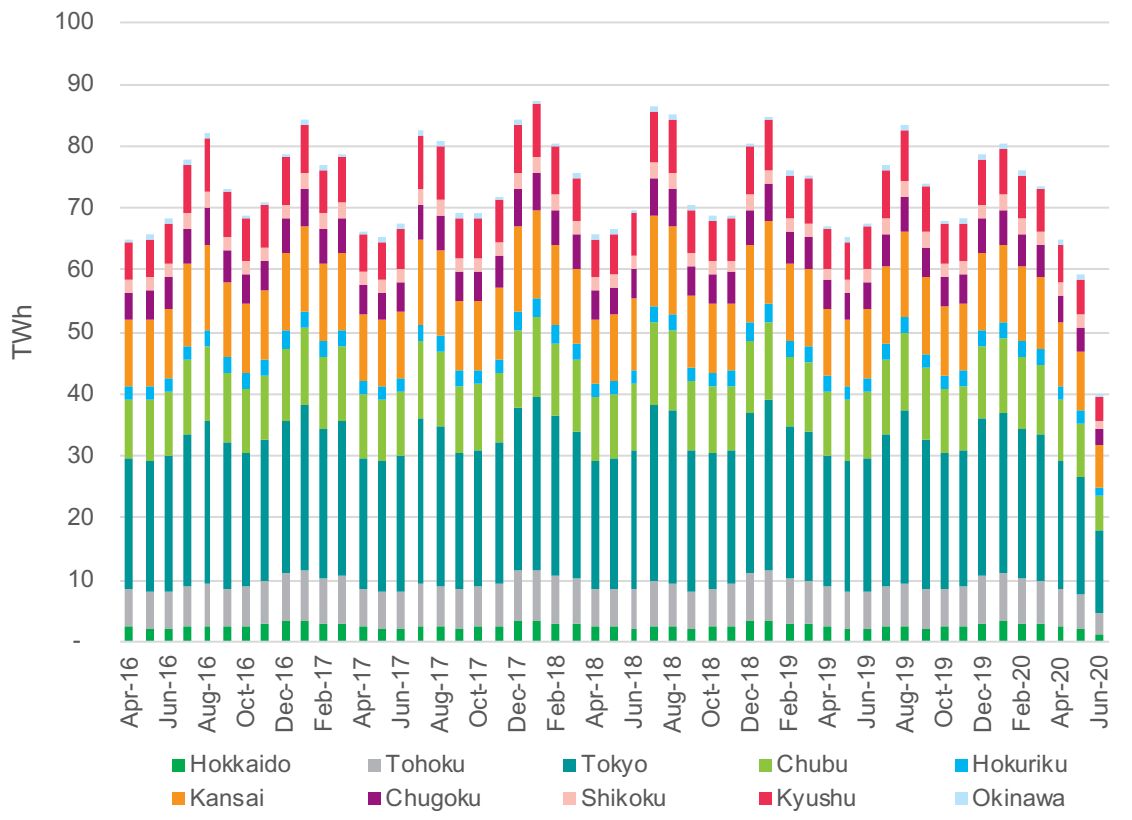
Kaori Tachibana covers the power, gas, and renewable markets in Japan, looking at supply/demand balances, infrastructure developments, policy developments, and pricing outlooks. Ms. Tachibana's expertise includes a deep understanding of the Japanese market. Previously, at Accenture, she advised Japanese utility, chemical, and exploration companies on their future strategy and their global business operations. Before that she was with Wood Mackenzie supporting upstream, coal, and metals commodity clients. Earlier in her career, she was a consultant at Environmental Resources Management, evaluating environmental impact assessments, overseeing soil and groundwater investigations, and designing groundwater remediation models in Japan. Fluent in Japanese and English, Ms. Tachibana holds a Master of Business Administration from McGill University, Canada.

Japan offshore wind industry overview

Kaori Tachibana, Associate Director, +81 3 6262 1782, Kaori.Tachibana@ihsmarkit.com

Impact of COVID-19 was highest in Tokyo, with a power demand decreased by nearly 10% in May

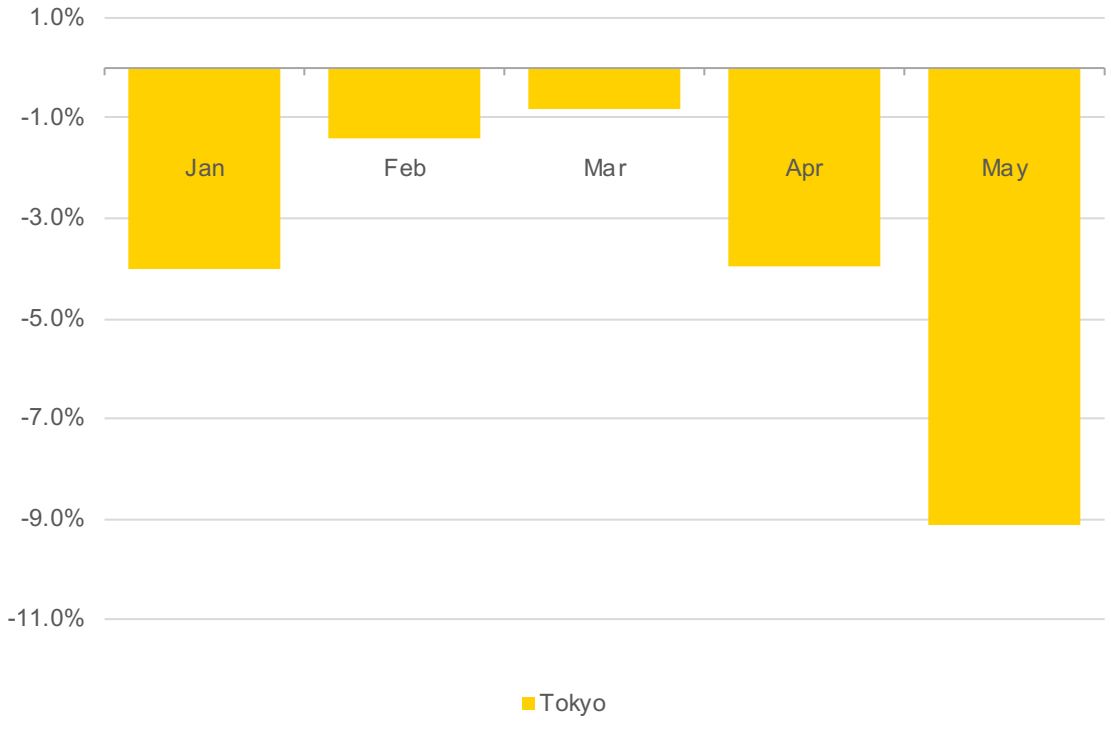
Japan: Power demand by region



Note: June only contains partial data

Source: IHS Markit, OCCTO

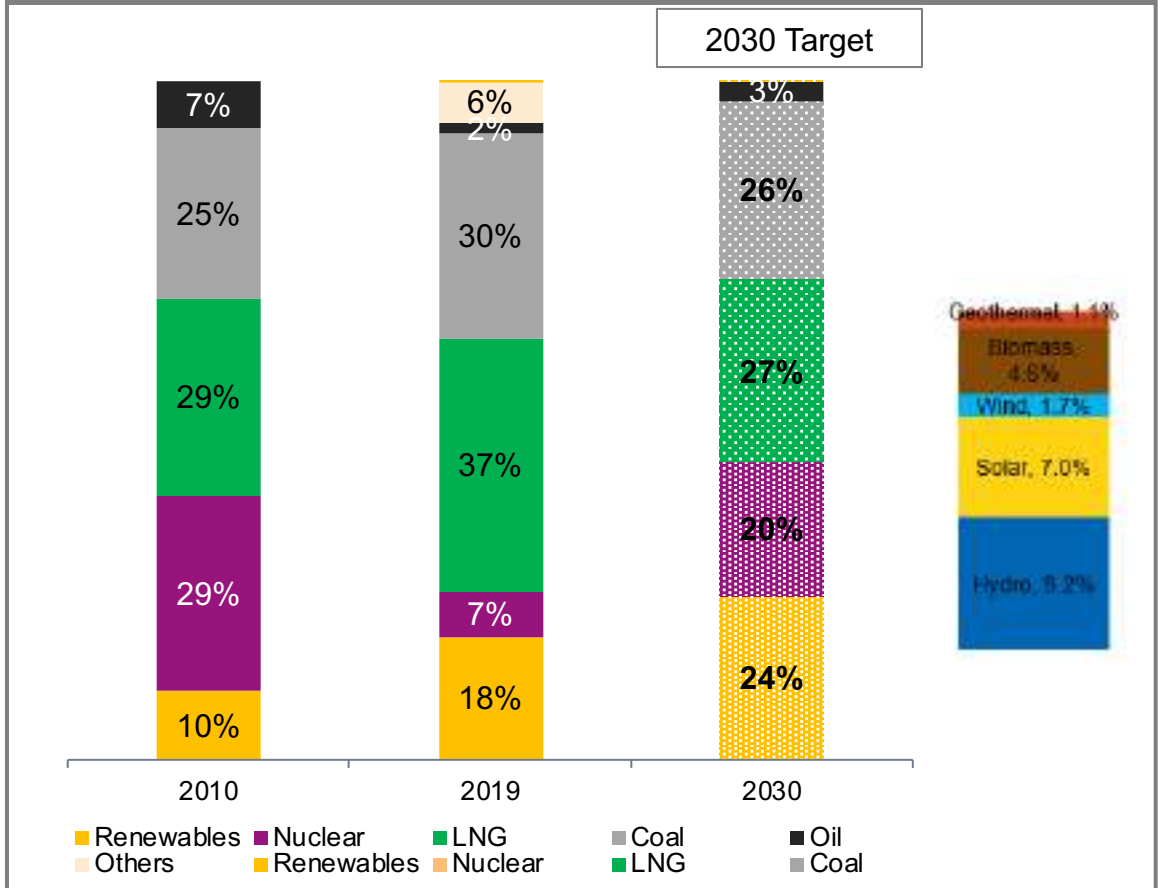
Tokyo area: YOY change in power demand



Source: IHS Markit, OCCTO

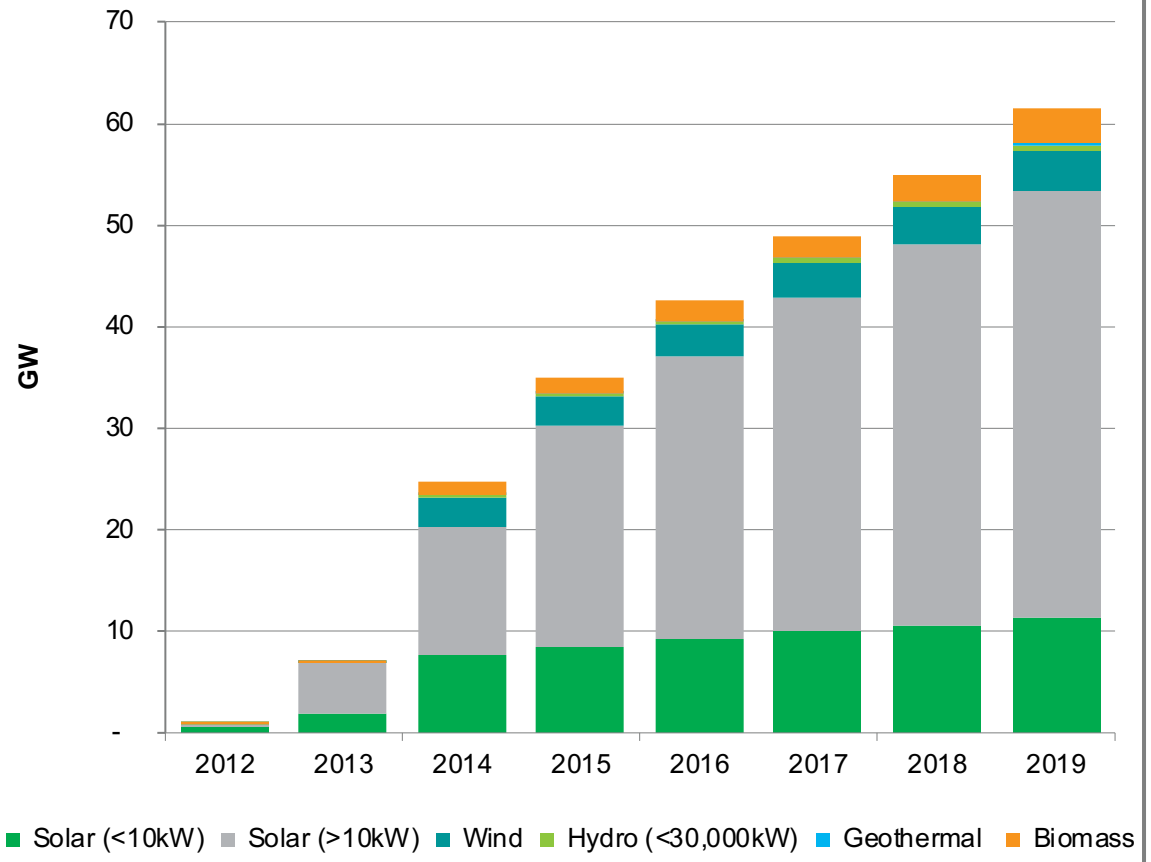
Japan is on-track to achieve its renewables target by 2030, with solar and wind leading the technology

Japan: Power generation mix



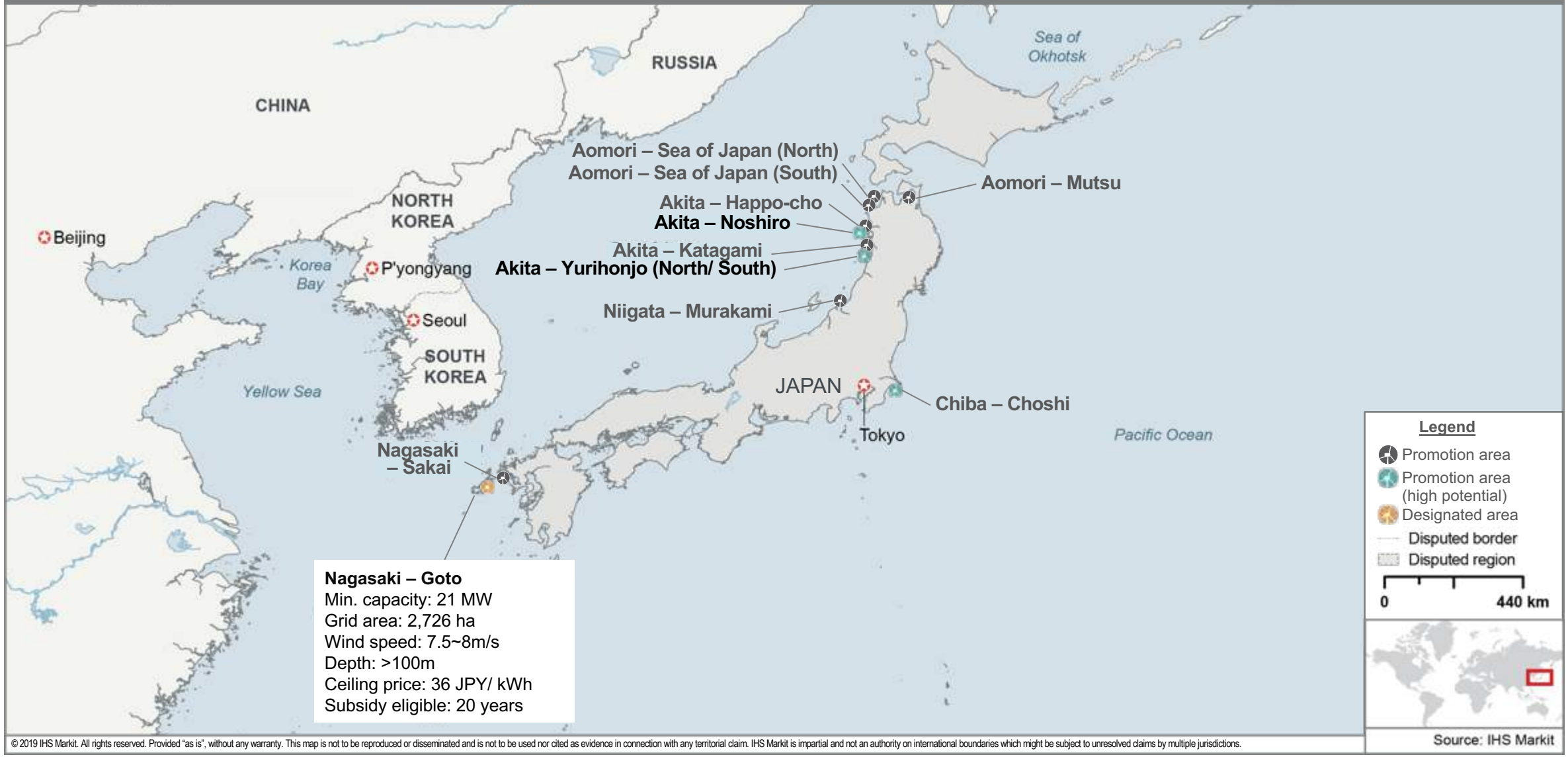
Source: IHS Markit, METI

Japan: FIT registered capacity



Source: IHS Markit, METI

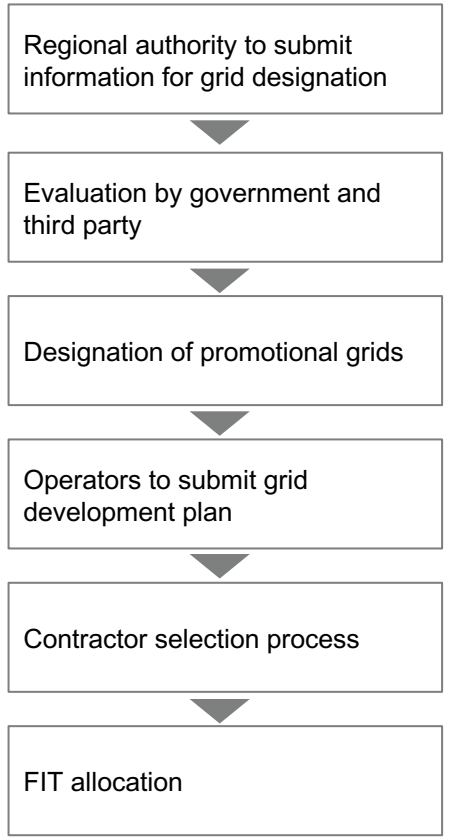
Japan offshore wind promotion grid location and status



Source: IHS Markit

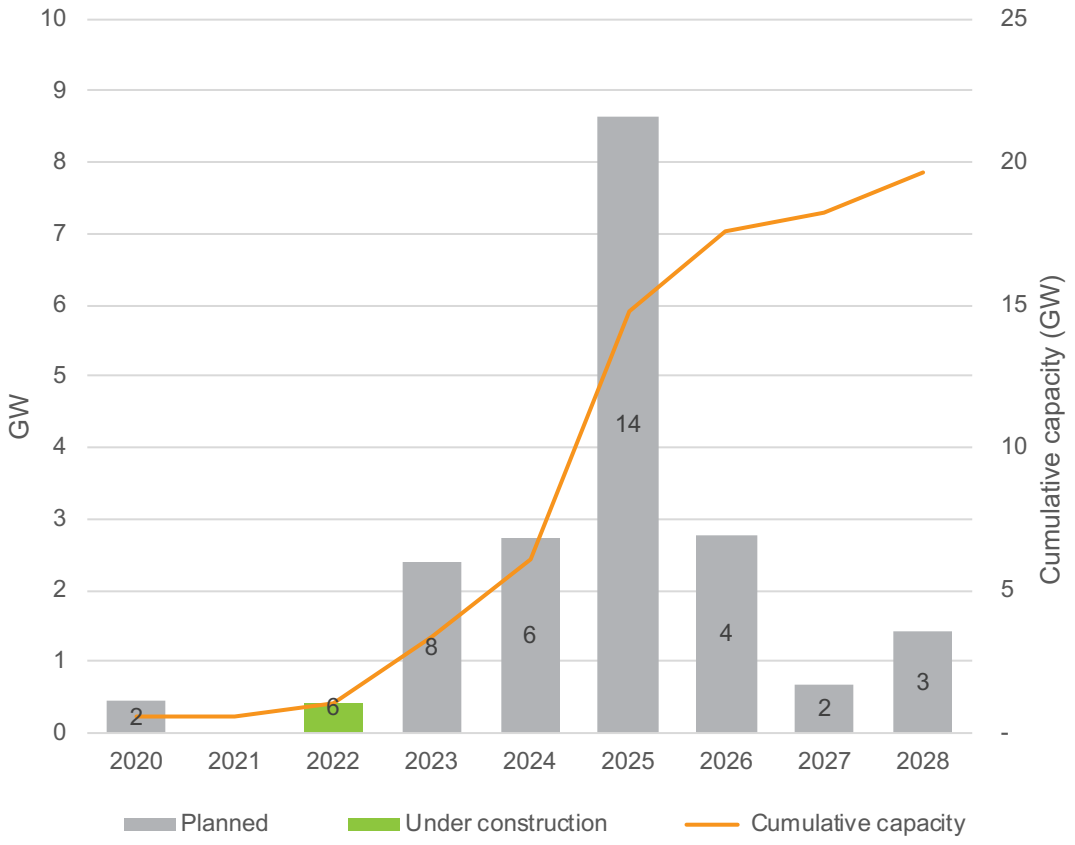
New structure for offshore wind will provide more structure for projects to move forward

Japan: Offshore wind grid allocation and contractor selection process



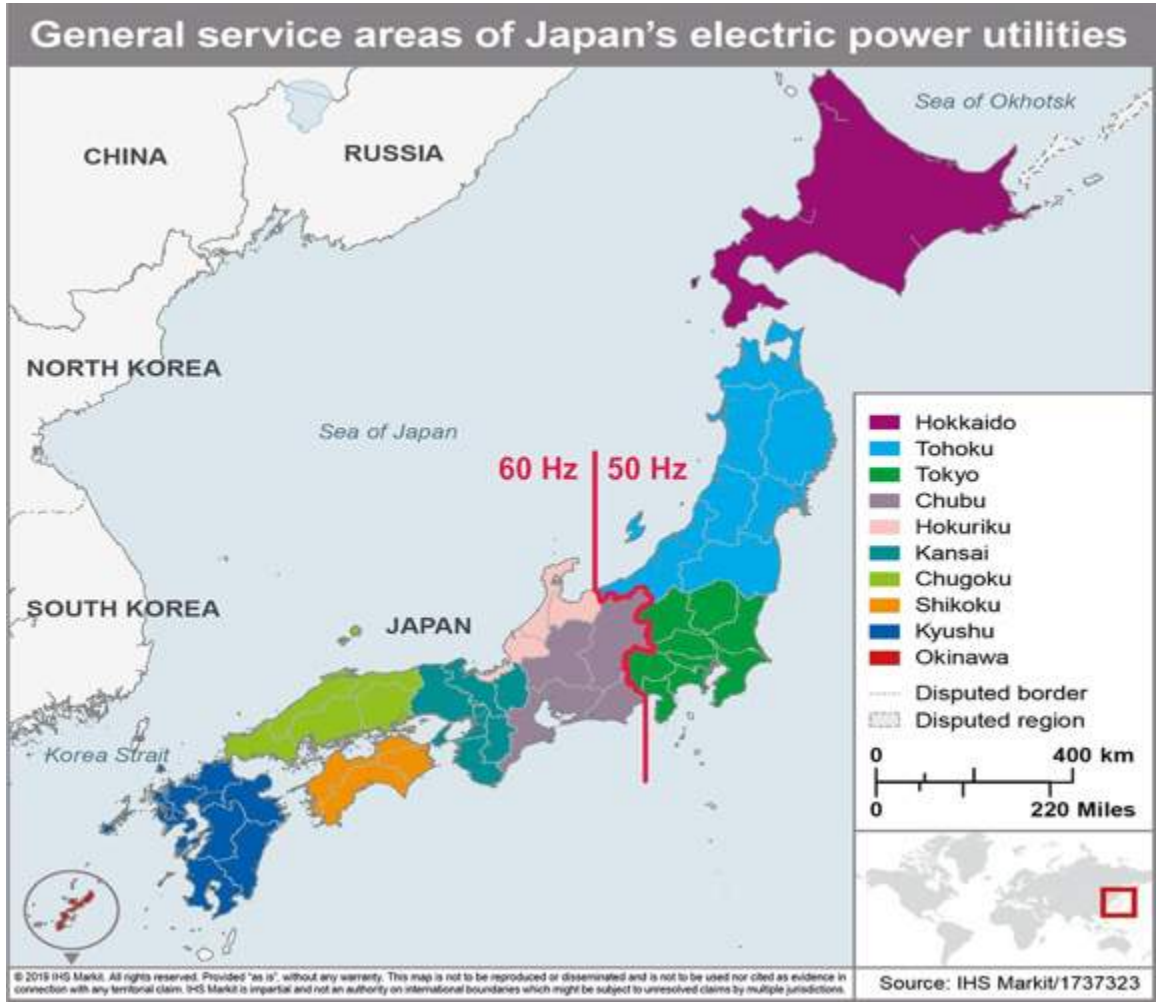
Source: IHS Markit, METI

Japan: Offshore wind power project pipeline



Source: IHS Markit, METI

Subsidies are likely to continue in the near-term. Connecting renewable power supply to demand centers will be key



Japan interregional transmission capacity: Existing and planned (GW)

Intraregional connection line	Direction	Current operating capacity* (GW)	Future capacity	Expansion by
Hokkaido-main island connection	Hokkaido - Tohoku	0.90	1.20	-
	Tohoku - Hokkaido	0.90	-	-
Tohoku - Tokyo connection	Tohoku - Tokyo	6.15	10.28	end FY 2027
	Tokyo - Tohoku	2.36		
Tokyo-Chubu connection	Tokyo - Chubu	1.20	2.10	end FY 2020
			3.00	end FY 2027
	Chubu -Tokyo	1.20		
Chubu Hokuriku connection	Chubu - Hokuriku	0.30	-	-
	Hokuriku-Chubu	0.30	-	-
Hokuriku-Kansai connection	Hokuriku - Kansai	1.90	-	-
	Kansai-Hokuriku	1.50	-	-
Kansai-Chubu connection	Chubu - Kansai	1.03	-	-
	Kansai-Chubu	2.50	-	-
Kansai-Chugoku connection	Kansai - Chugoku	2.78	-	-
	Chugoku - Kansai	4.21	-	-
Chugoku-Kyushu connection	Chugoku - Kyushu	0.27	-	-
	Kyushu - Chugoku	2.38	-	-

Source: IHS Markit, OCCTO, METI

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South Korea Offshore Wind Industry Overview

Vince Heo

Associate Director, Northeast Asia Gas, Power, and Renewables
IHS Markit

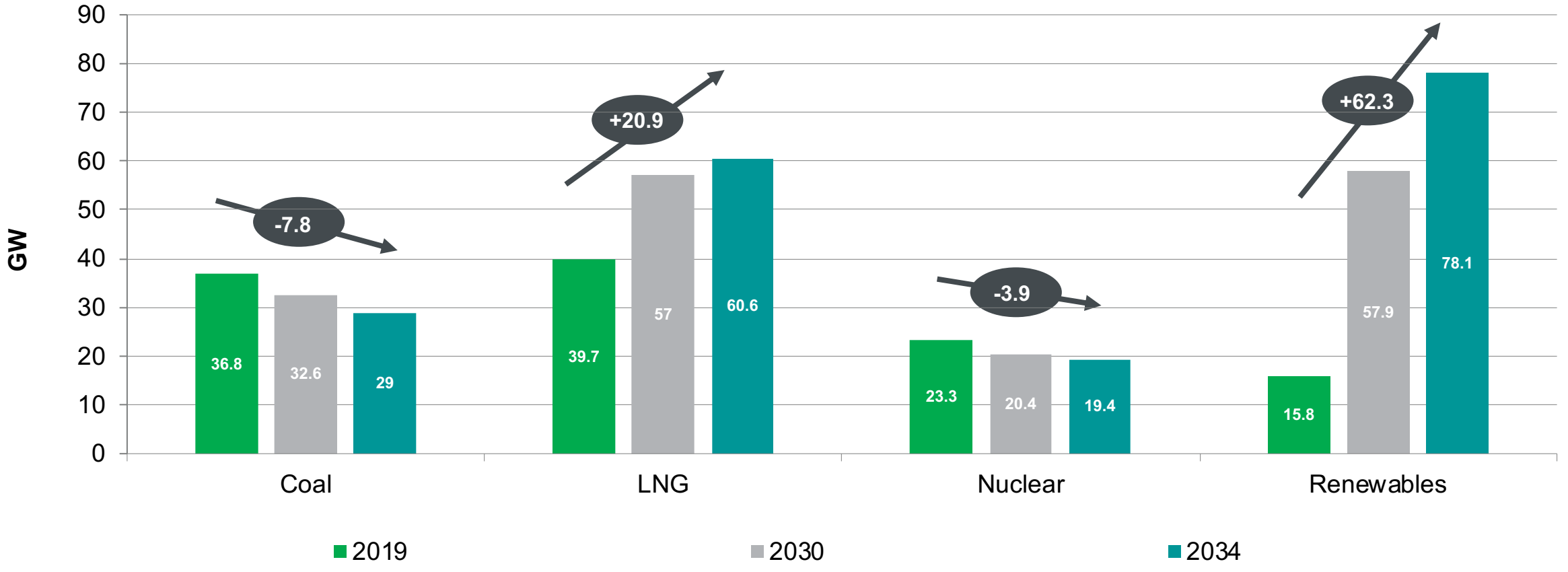
Vince Heo (Yoonjae Heo) is an associate director at IHS Markit, managing the Northeast Asia Gas, Power, and Renewables team in Seoul. At IHS Markit, Mr. Heo focuses on power and renewable market development and LNG demand analysis. He has more than 12 years of experience in consultancy and industry, with a strong background in policy research, strategy development, and financial analysis in the energy sector. Prior to joining IHS Markit, Mr. Heo was a senior manager at Ernst & Young, where he led the Power & Utilities consulting practice and assisted clients in the government, power and utilities, financial services, and technology companies in the areas of renewables, energy storage, and other emerging technologies. He also served as an advisor to South Korea's Ministry of Trade, Industry and Energy and the Korea Electric Power Corporation on new energy businesses. Prior to that, he held posts at the Global Green Growth Institute, Bloomberg, and Procter & Gamble. Mr. Heo holds a Bachelor of Arts in agricultural economics from Seoul National University, South Korea, and a Master of Science in environmental policy and regulation from the London School of Economics, United Kingdom.

South Korean offshore wind industry overview

Vince Heo, Associate Director, +10 2637 7715, Vince.heo@ihsmarkit.com

Renewables will become the largest generation source in the next 15 years according to the draft 9th Basic Plan for Electricity Demand and Supply (BPE)

South Korea: Long-term power supply plan based on the 9th BPE

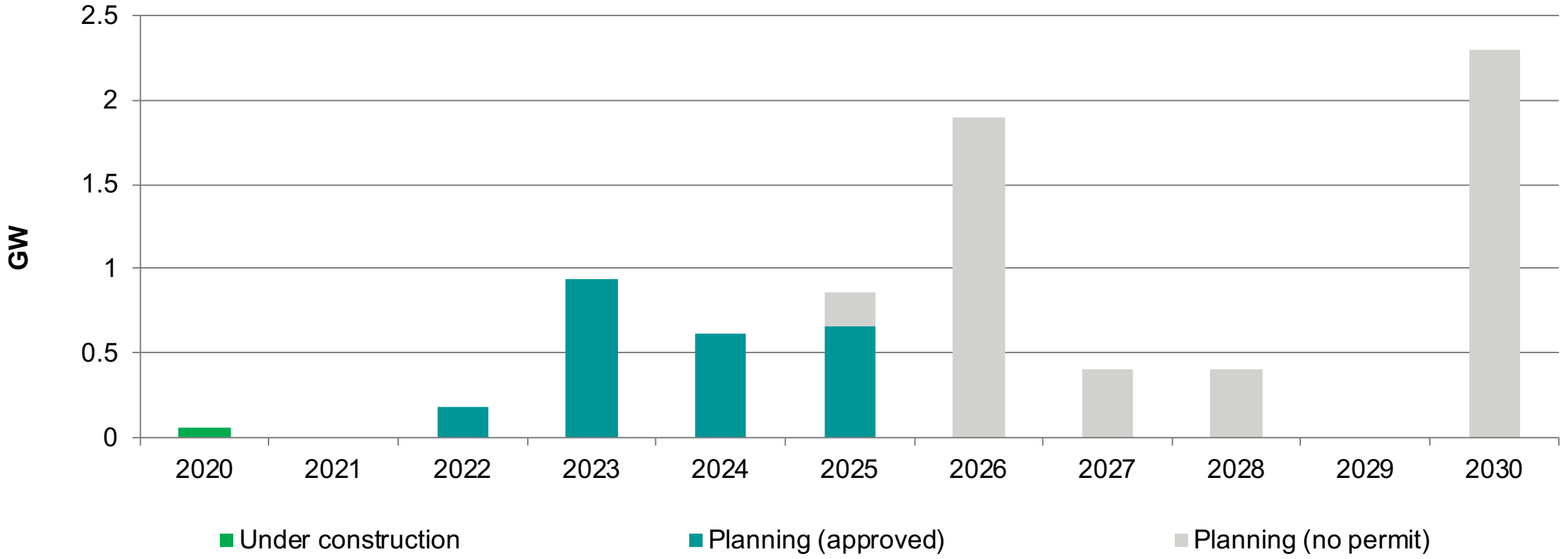


Source: Draft 9th Basic Plan on Electricity Demand and Supply; IHS Markit

See IHS Markit Insights report: South Korea reaffirms energy transition ambitions with a new draft electricity plan

Offshore wind capacity is expected to reach ~8GW by 2030, where 84% of total capacity is expected to be installed after 2023

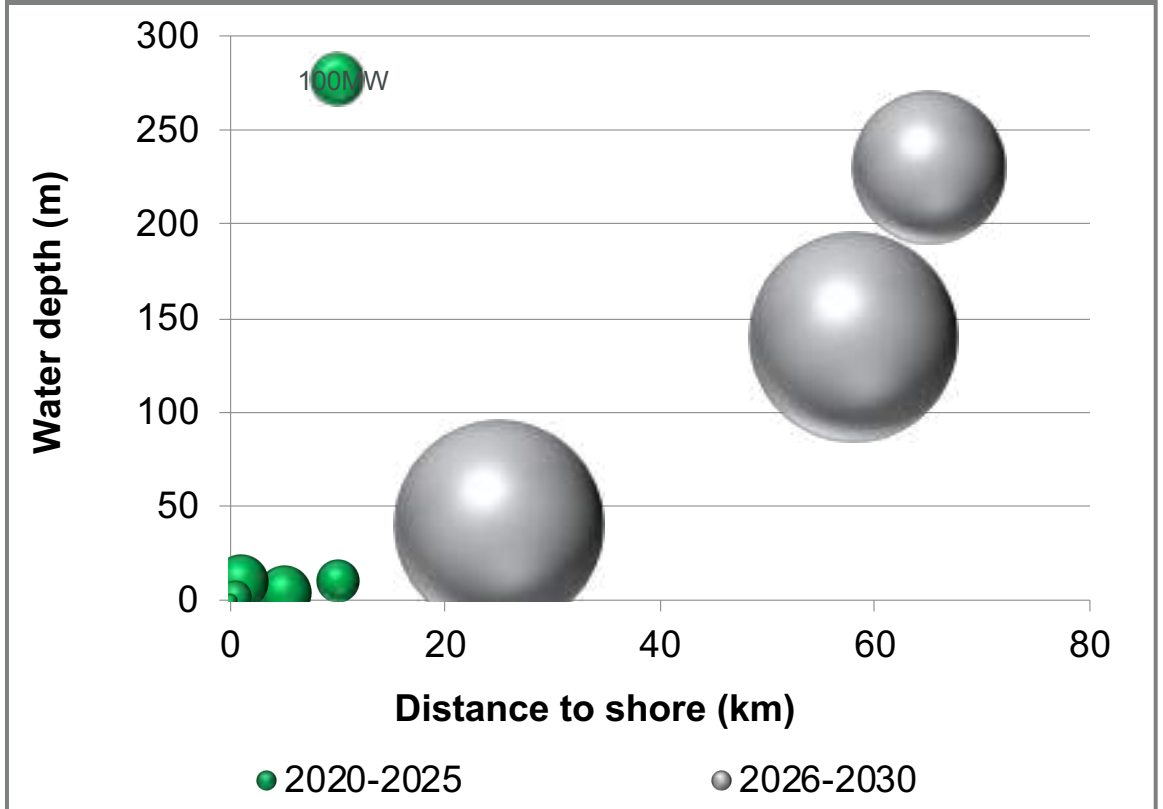
South Korea: Offshore wind capacpity additions



Notes: Planning (approved) represents projects which obtained permit for power generation
Source: MOTIE; KPX; IHS Markit

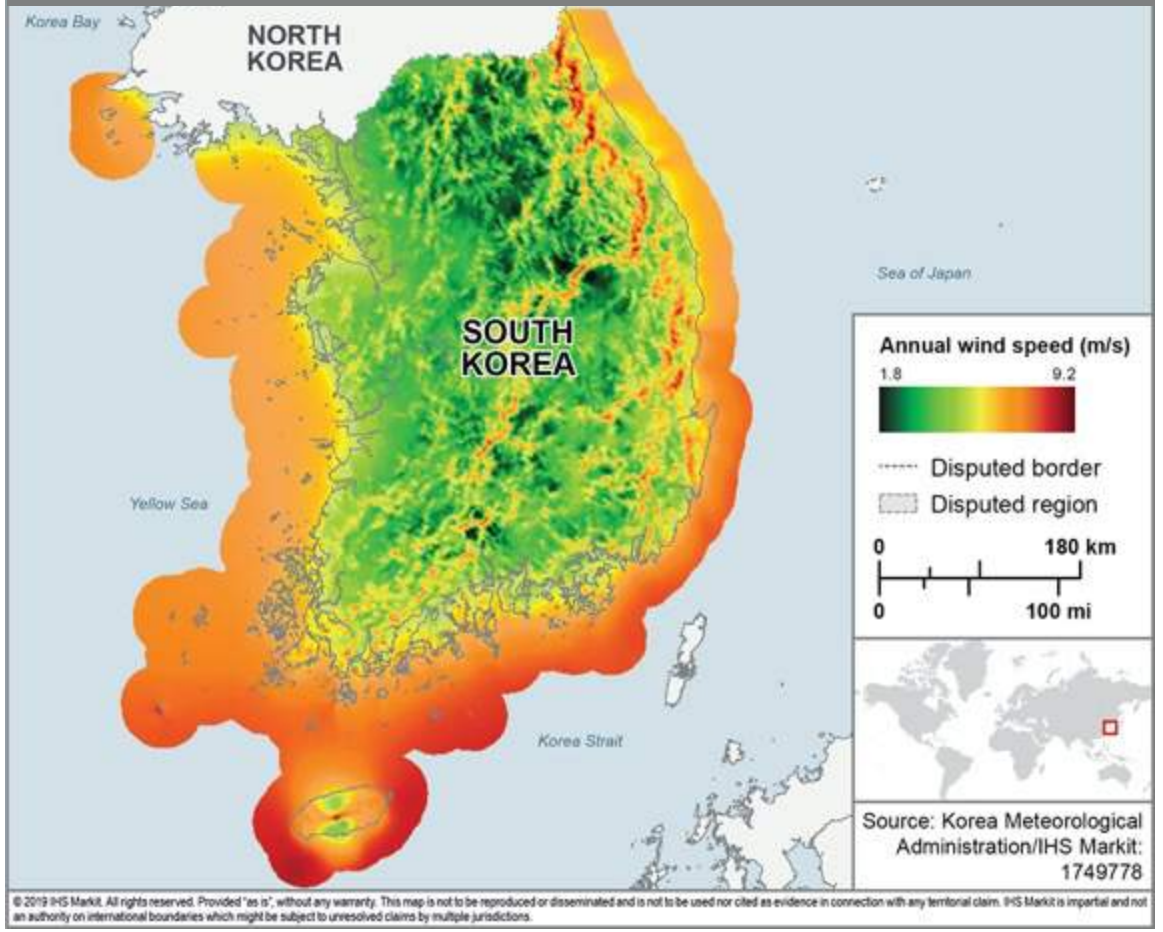
Large-scale floating offshore wind projects far from the shore are gaining traction owing to their advantages in wind resource

South Korea: Offshore wind project by target COD



Notes: Bubble size represents relative nameplate capacity (megawatts)
Source: IHS Markit

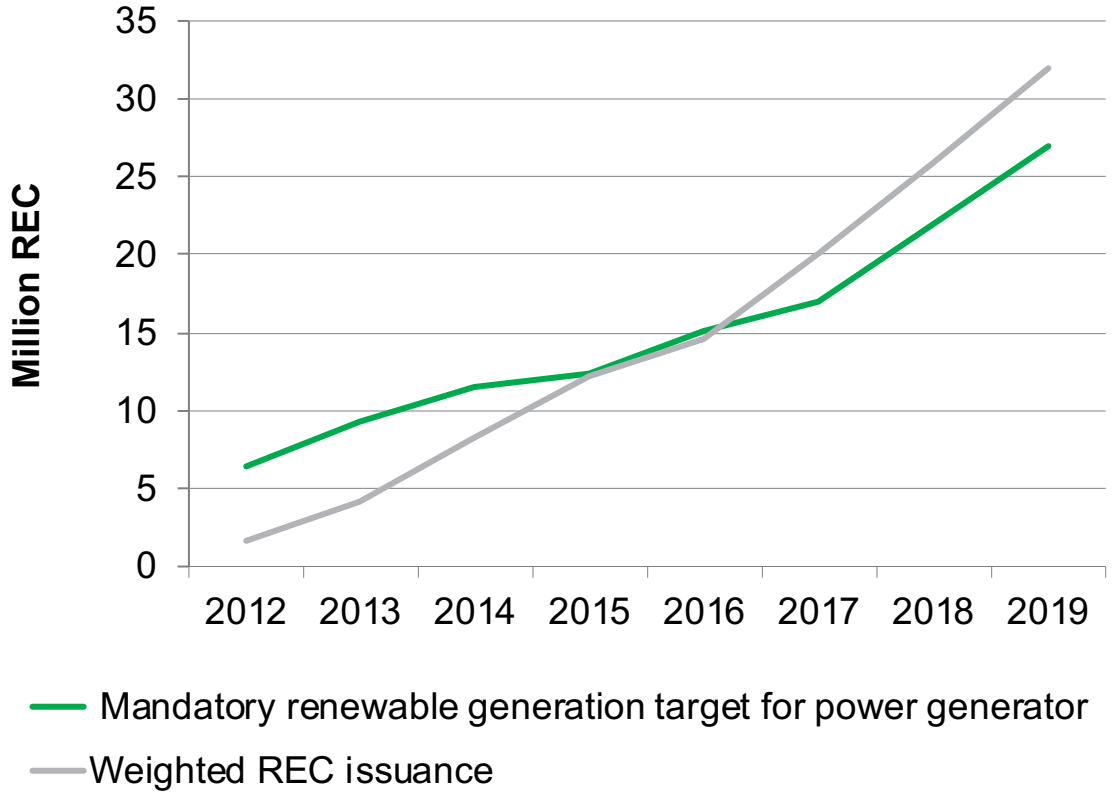
South Korea: Offshore wind resource map



See IHS Markit Insights report: **South Korea Power and Renewables Market Profile**

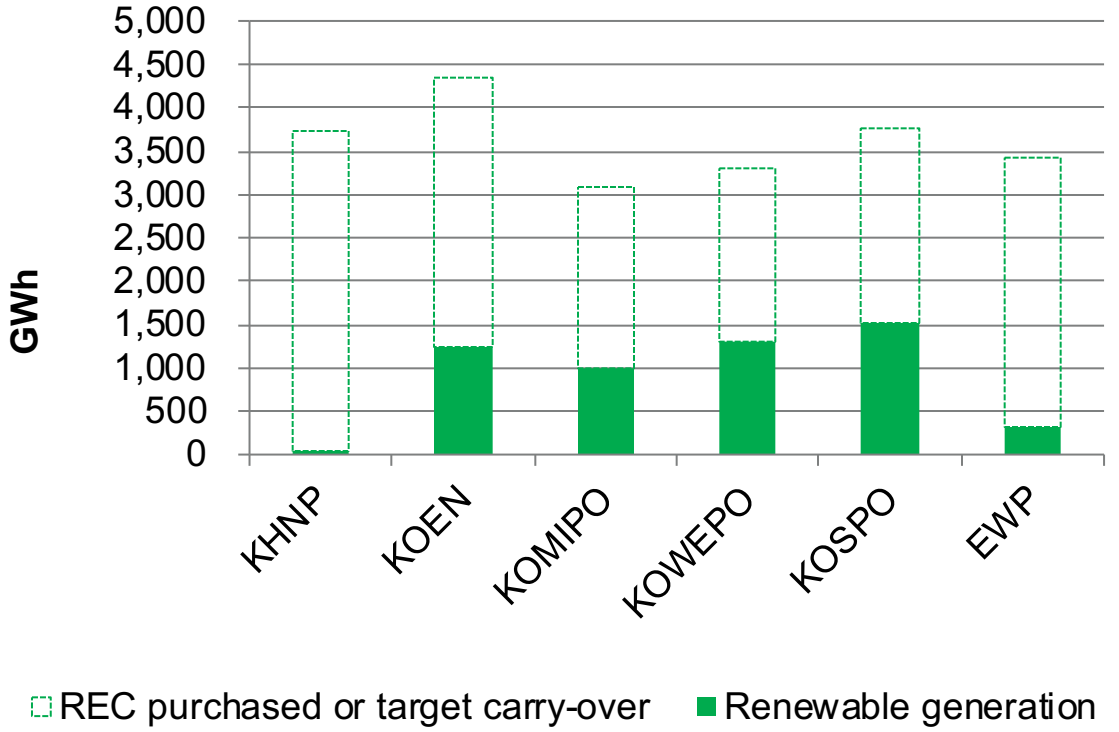
REC market is currently oversupplied as the pace of new renewable deployment exceeds the RPS target

South Korea: RPS compliance



Notes: 1 REC = 1 MWh; Weighted REC issuance indicates REC mutiplier weighted volume
Source: MOTIE, Korea Energy Agency, IHS Markit

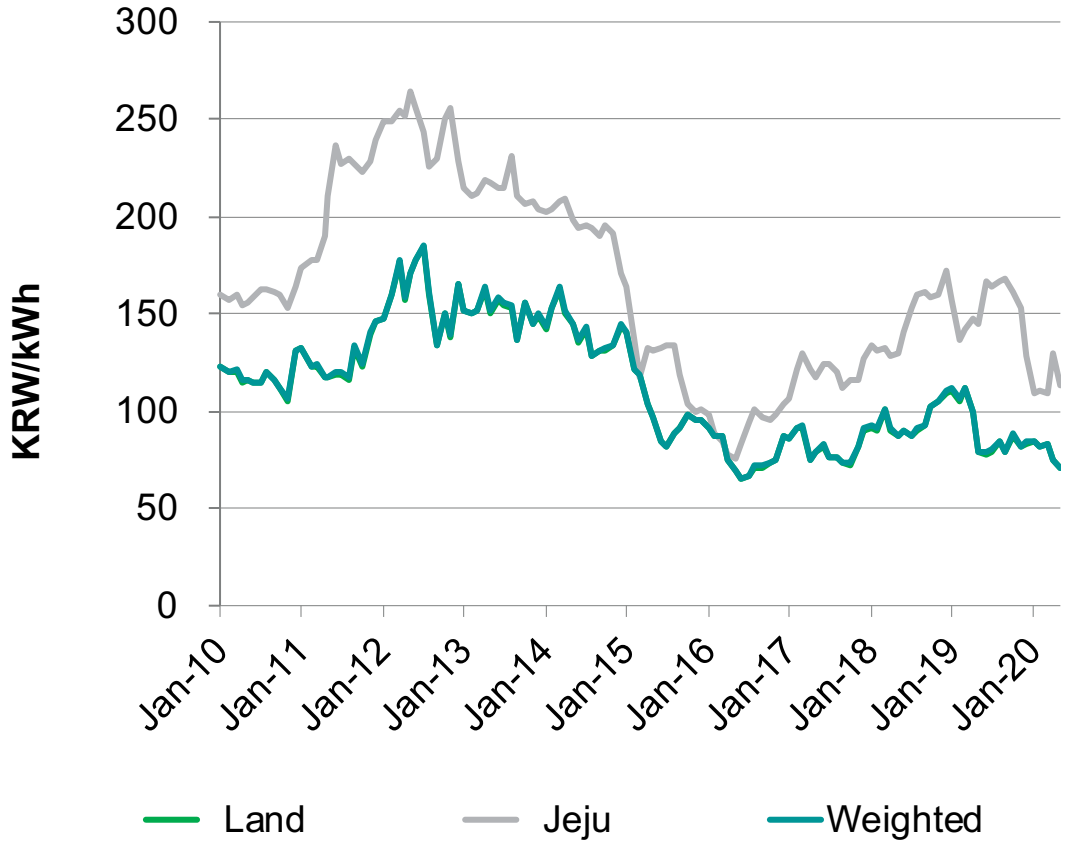
Renewable generation by Gencos in 2019



Notes:Korea Hydro & Nuclear Power (KHNP); Korea South-East Power (KOEN); Korea Midland Power (KOMIPO); Korea Western Power (KOWEPO); Korea Southern Power (KOSPO); Korea East-West Power (EWP)
Source: IHS Markit

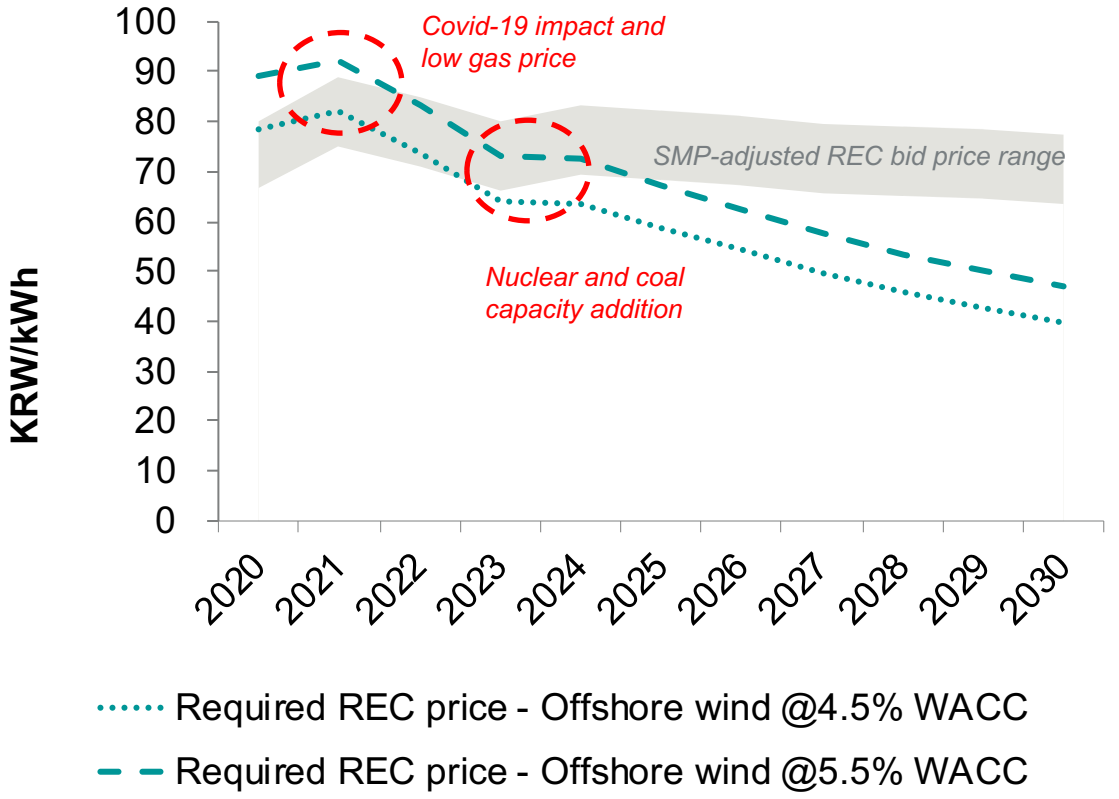
Required REC price could reach parity with the government's draft guidance on REC bid price in 2023-24, putting offshore wind projects in the money

South Korea: System Marginal Price (SMP)



Source: Korea Power Exchange, IHS Markit

South Korea: Required REC Price



Notes: REC price is calculated assuming 10km distance to shore and fixed-bottom projects

Source: IHS Markit

See IHS Markit Insights report: South Korea's wholesale power prices face uncertainties as policies force changes in energy markets

What are key opportunities & challenges of offshore wind market in South Korea?

Opportunities

- Large business potential in floating offshore wind in Southeast coast
  - Potential CAPEX savings from using existing gas infrastructure
  - T&D infrastructure in Southeast region
  - Local EPC experience in offshore engineering
- New compensation scheme for adjacent area
- Potential synergy with hydrogen industry

Challenges

- Complicated permit process and regulatory hurdles (e.g. Marine Spatial Planning)
- Opposition from fishery industry
- Adequate level of support
- Uncertainties in RPS implementation rules
- Quasi-local content requirement in procurement process by state-owned companies (e.g. turbine)

Integrated Offshore Wind research collaborations across IHS Markit

Gas, Power, and Renewables

- Extensive database tracking power and renewables sectors. Installed and future projects, stakeholder ownership, power generation, offtake contacts, and auctions
- Analysis on policy changes, market issues, and key drivers
- Fundamentals of power demand, installed capacity, generation mix, and wholesale power and capacity prices
- Markets/state renewable power profiles

Renewable power

Costs and Technology

- Indexes and cost outlooks in the service and equipment markets
- Market segments analysis covering turbines, towers, substation, foundations and structures, and installation vessels
- Market demand and concepts
- Supply capacity, capability, and technology
- Contracts, prices, costs, spending demand data
- Supplier profiles with projects, capacity, financials, and capability

Costs and supply chain

IHS Markit Petrodata

- Tracks active and planned projects, location, ownership, online year, water depth, capacity, and turbine count
- Notification of wind market tenders and contract awards for FEED, EPIC, maintenance, and removal work
- Searches projects with turbines, substations, and cables to assess the demand for fabrication and installation
- Parallel coverage with offshore oil and gas projects

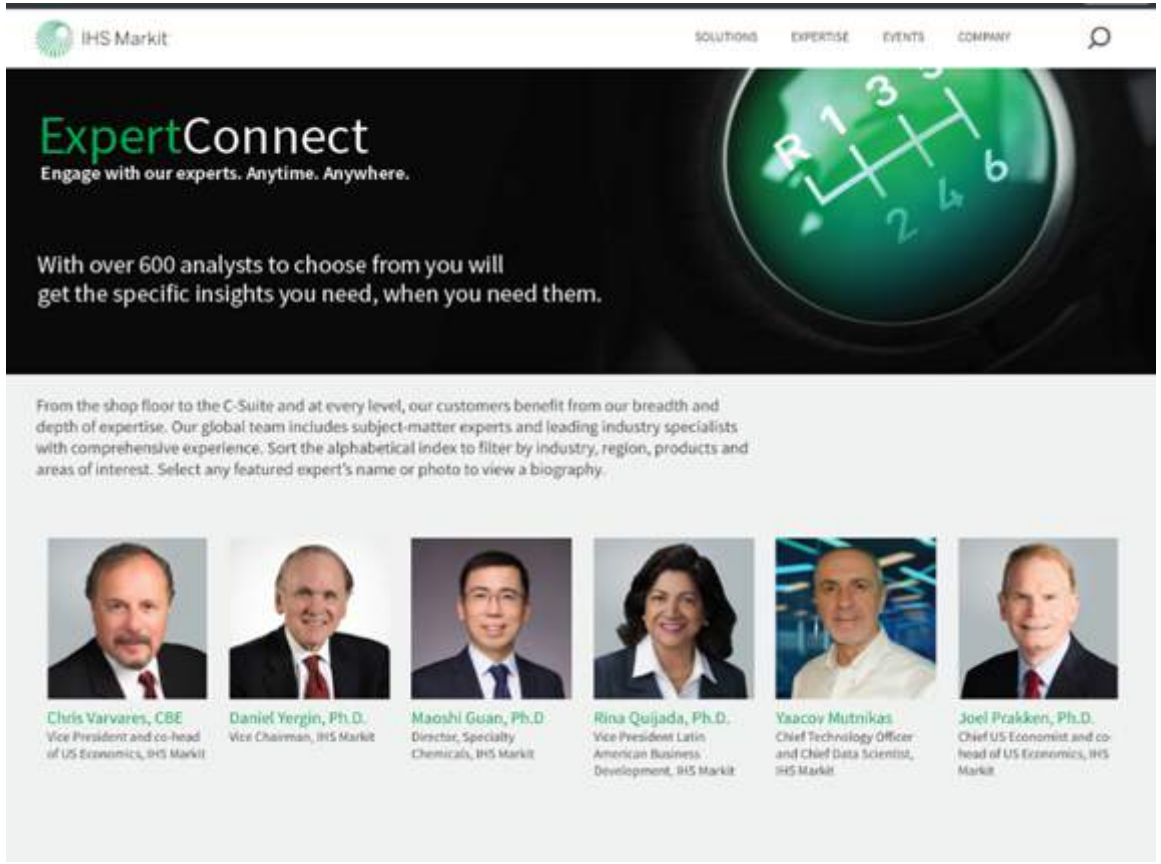
Project tracking

IHS Markit Kingdom

- Integrated geological and geophysical
- Allows for a good understanding of the seabed composition and the near surface
- Specialized workflows for site surveys, shallow gas hazards, boulders analysis, opacity control, and buffering
- Full ESRI GIS mapping capability
- Connections with internal and external GIS databases
- Project data management

Technical analytics software

IHS Markit has launched ExpertConnect



- *Engage with our experts*
  - *Over 600 analysts with expertise and experience across all aspects of the global economy*
- *Access online events*
  - *Participate in the numerous webinars, events, and learning sessions that IHS Markit has to offer with coverage spanning all the critical issues affecting financial, energy, and transportation markets today*

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Is Offshore Wind Getting Ready for Take-off in Japan and S. Korea?

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ASSOCIATE DIRECTOR
IHS Markit

KAORI TACHIBANA
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IHS Markit

ANDREI UTKIN
SENIOR ANALYST
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Q & A Session

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Question 1

Do you think the industry can achieve certain synergies with the markets being so widespread geographically?

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Question 2

Why is Japan so keen on floating wind while the technology is still in trial stage in Europe?

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Question 3

Would the South Korean government ever consider to put a dedicated FiT mechanism in place for offshore?

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Question 4

With the expected growth of the industry, what do you think about available vessel capacity?

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Question 5

How do you see the involvement of foreign developers and EPC companies in Japan?

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Question 6

South Korean has been trying to develop its own offshore turbines. Do you see this viable?

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Question 7

Will you mention how the turbines are prepared and protected against typhons. If they cannot demonstrate this it could be a show stopper for this WTG.

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Question 8

From the slides it appears that China is expecting to become the biggest players in both the world and Asia. How can the local supply chain in Japan and South Korea compete with those from mainland china?

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Question 9

Noticed that NTT has apparently said it will invest in offshore wind as part of major push into renewable energy. How significant is the backing of major Japanese corporates such as this for the sector?

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Question 10

The interest for Japan offshore wind is enormous. Is the auction not too small for investor appetite?

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Question 11

Can you comment on the time for development cycle for offshore wind farms in both Japan and South Korea?

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Question 12

What is the latest EIA situation of the promotion zones in Akita (Noshiro and Yurihonjo) and Choshi?

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Question 13

The farther windfarms from shore the greater the subsea cabling cost? What percentage of offshore wind farm development consists of subsea cabling?

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Question 14

Renewable LCOEs in Japan have always been higher than other markets because of rigid building codes and procurement structures. How much do you think offshore wind balance of system costs will fall as the market matures, relative to other geographies?

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Question 15

What do you see as the key challenges to achieve this very promising outlook?

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Closing

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Information

Asia Wind Energy Association

www.asiawind.org

@asiawindenergy

Asia Wind Energy Association

(65) 6679 6071

membership@asiawind.org

CapitaGreen - Level 24
138 Market Street, Singapore 048946

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Thank you!