RENEWABLE ENERGY MARKETS ASIA 2024 PANEL DISCUSSION

OFFSHORE WIND - OPPORTUNITIES AND CHALLENGES FOR CORPORATE OFFTAKERS

Orrin Cook
Managing Director
Apala Group

Irene Zha
Regional Category Manager Asia Pacific,
Electricity and Renewable Energy
BASF

Tuesday, 30 April 10:45–11:30 AM

Renewable Energy Markets™ Asia 2024

APALA GROUP

Clean Energy | Impact

Innovation. Implementation. Impact.

APALA GROUP

Clean Energy | Impact

Apala Group designs and supports high-impact projects to accelerate decarbonization in Asia and Latin America

Clean Energy Advisory

APALA GROUP
Clean Energy | Impact

Advisory & Market Intelligence

- RE Procurement Options
- Price and Policy Analysis
- Regional Strategy

Renewable Energy Procurement Support

- RFI/RFP Processes
- Onsite RE Analysis
- PPA Evaluation and Negotiation
- Virtual PPA
- RECs
- High-Impact Projects

Renewable Energy Investment Support

- Project Identification
- Partner Identification and Analysis
- Project Due Diligence

Innovation. Implementation. Impact.

APALA GROUP

Clean Energy | Impact

OFFSHORE WIND - OPPORTUNITIES AND CHALLENGES FOR CORPORATE OFFTAKERS

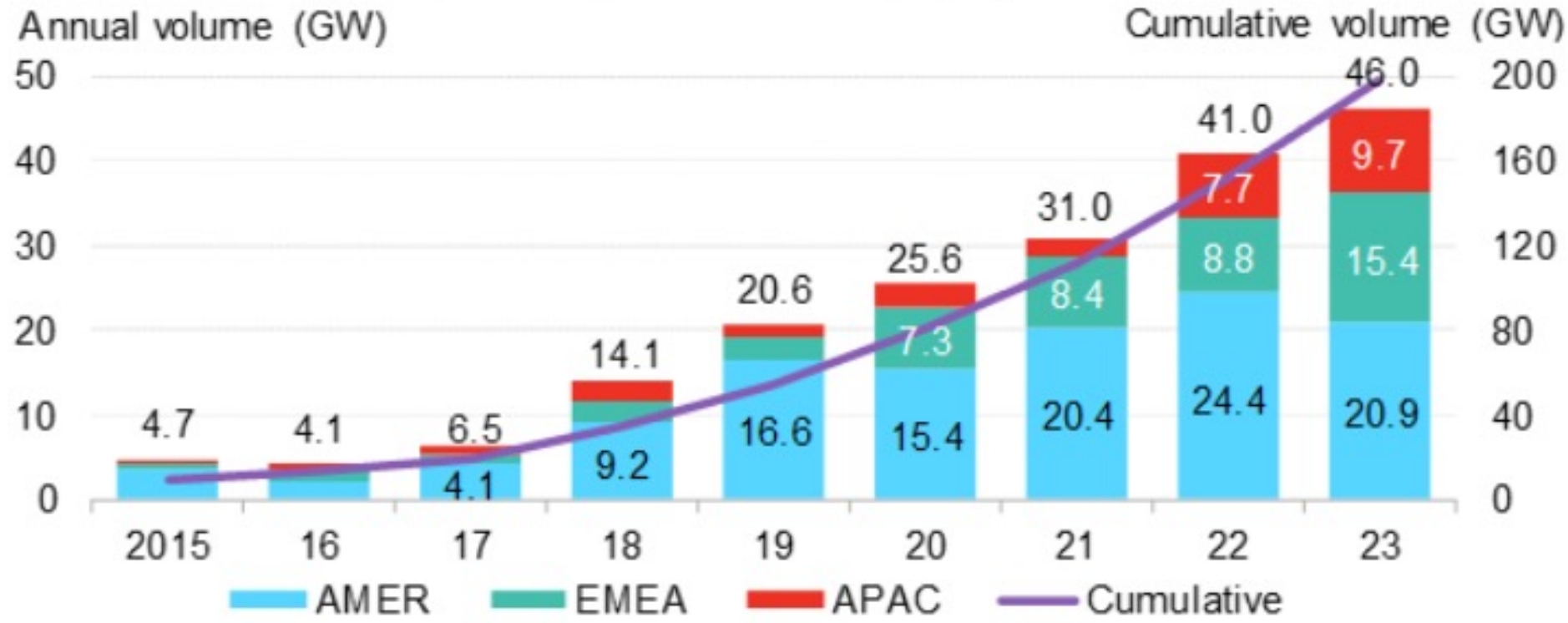
April 30, 2024

Singapore

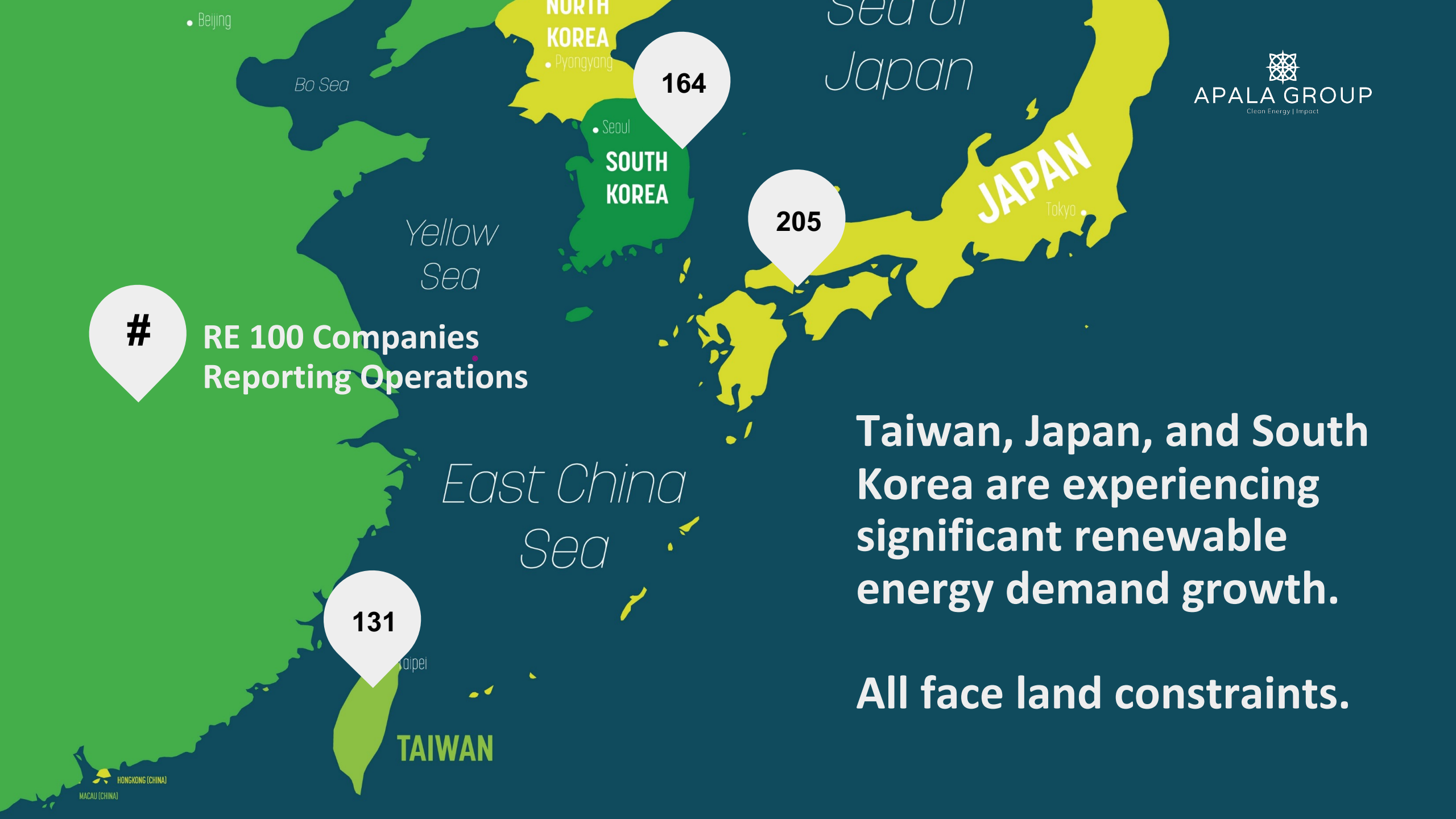
Corporate Demand

APALA GROUP
Clean Energy | Impact

Figure 1: Corporate power purchase agreement volumes, by region



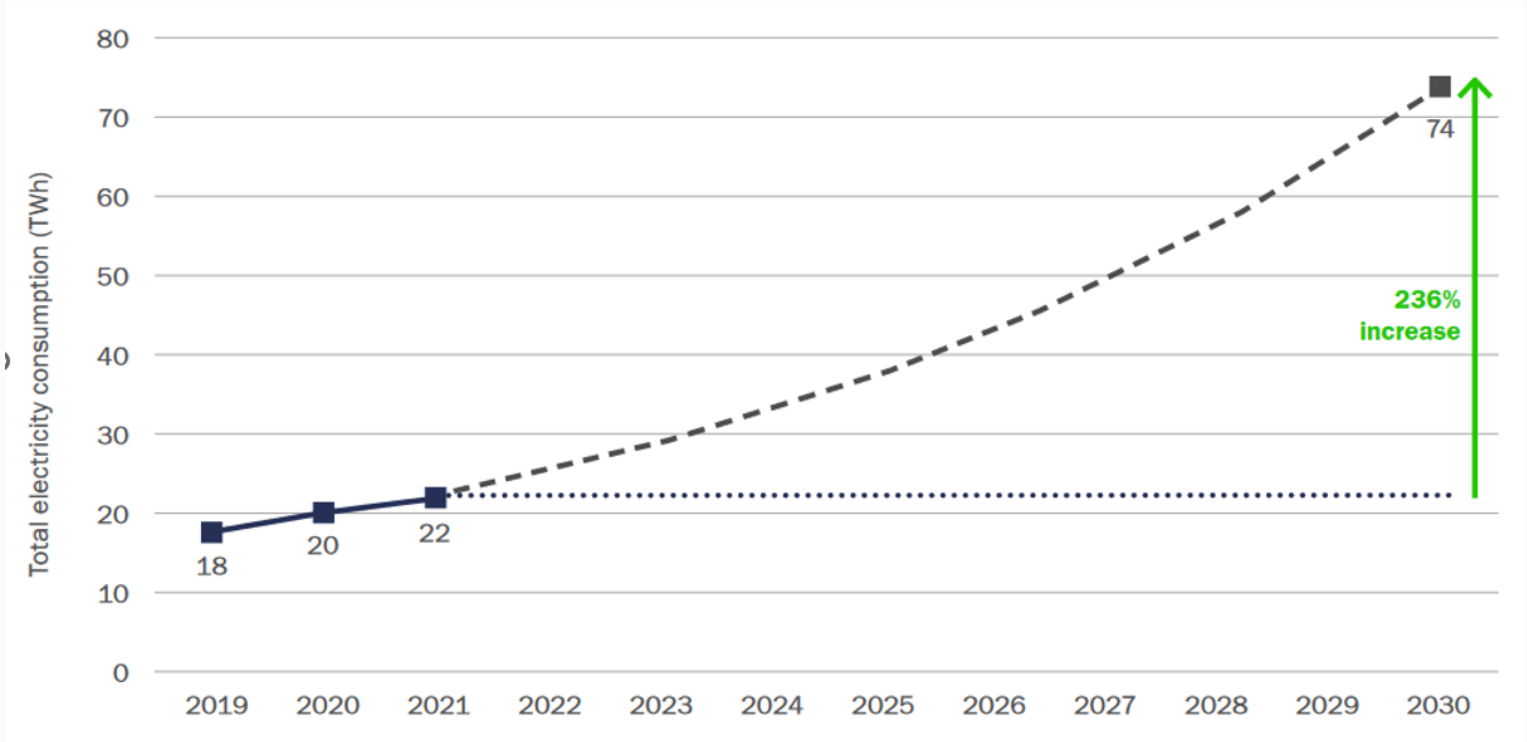
Source: BloombergNEF Note: Chart is for offsite, publicly disclosed deals only and may be subject to change as more information is made publicly available. Capacity is in GW DC.


Beijing
Bo Sea
NORTH KOREA
Pyongyang
Sea of Japan
164
Seoul
SOUTH KOREA
JAPAN
Tokyo
205
Yellow Sea
#
RE 100 Companies Reporting Operations
East China Sea
131
Taipei
TAIWAN
HONGKONG (CHINA)
MACAU (CHINA)
APALA GROUP
Clean Energy | Impact
Taiwan, Japan, and South Korea are experiencing significant renewable energy demand growth.
All face land constraints.

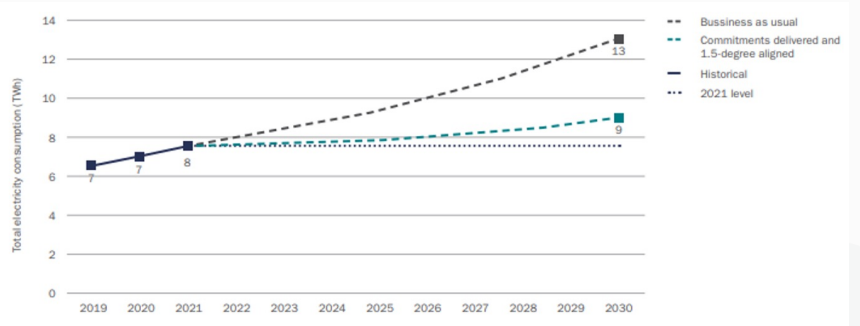
Semiconductor Manufacturing Electricity Demand

APALA GROUP
Clean Energy | Impact

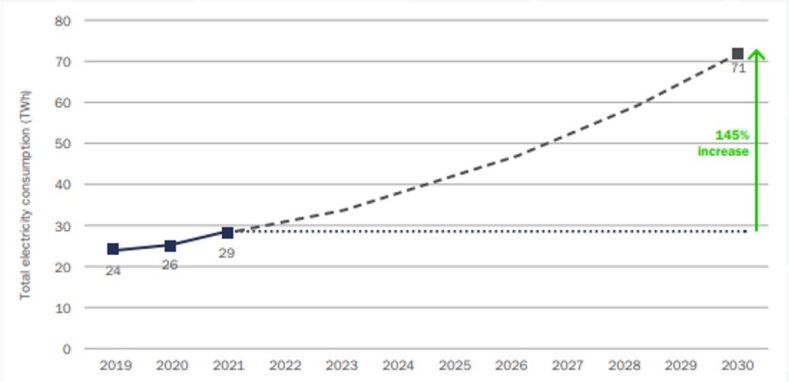
Taiwan



Japan



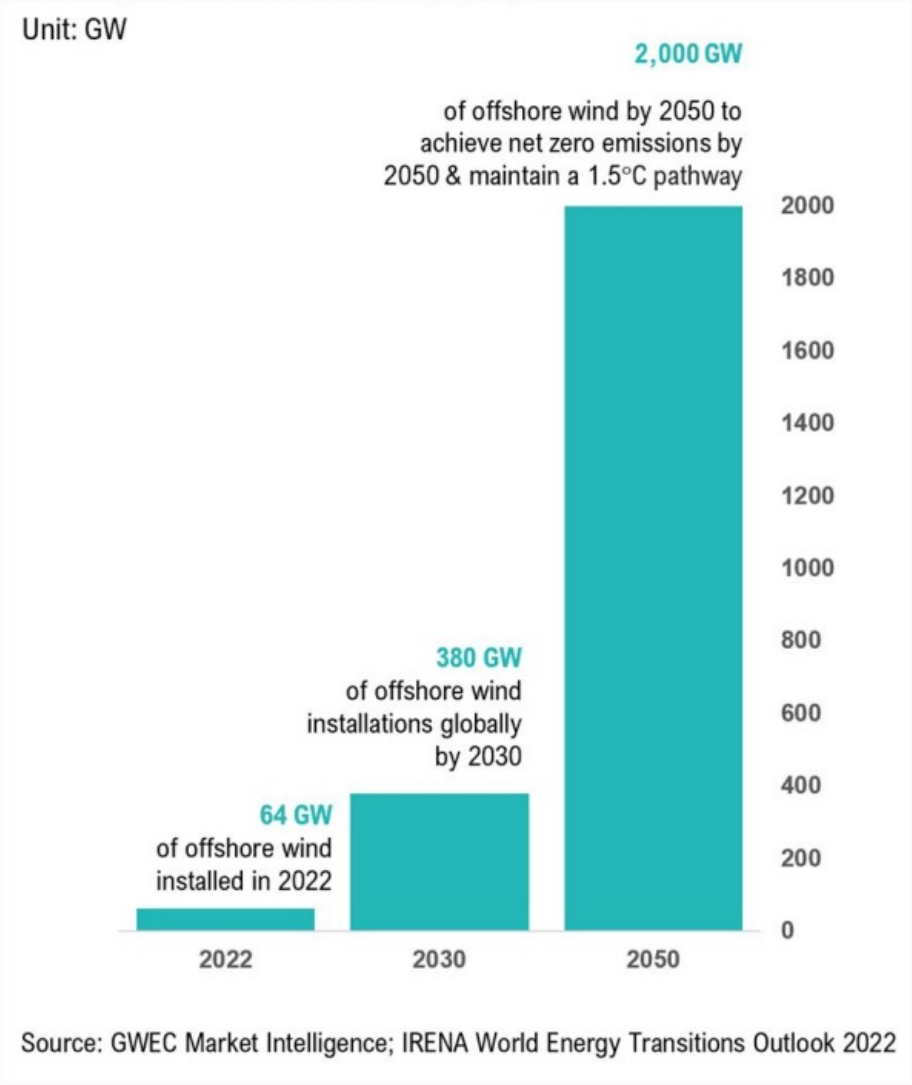
South Korea



Source: Greenpeace = 620390b7-greenpeace_energy_consumption_report.pdf

Offshore Wind to the Rescue?

APALA GROUP
Clean Energy | Impact



Source: GWEC Market Intelligence; IRENA World Energy Transitions Outlook 2022

90% CFE in Japan Requires Significant Offshore Wind Growth

APALA GROUP
Clean Energy | Impact

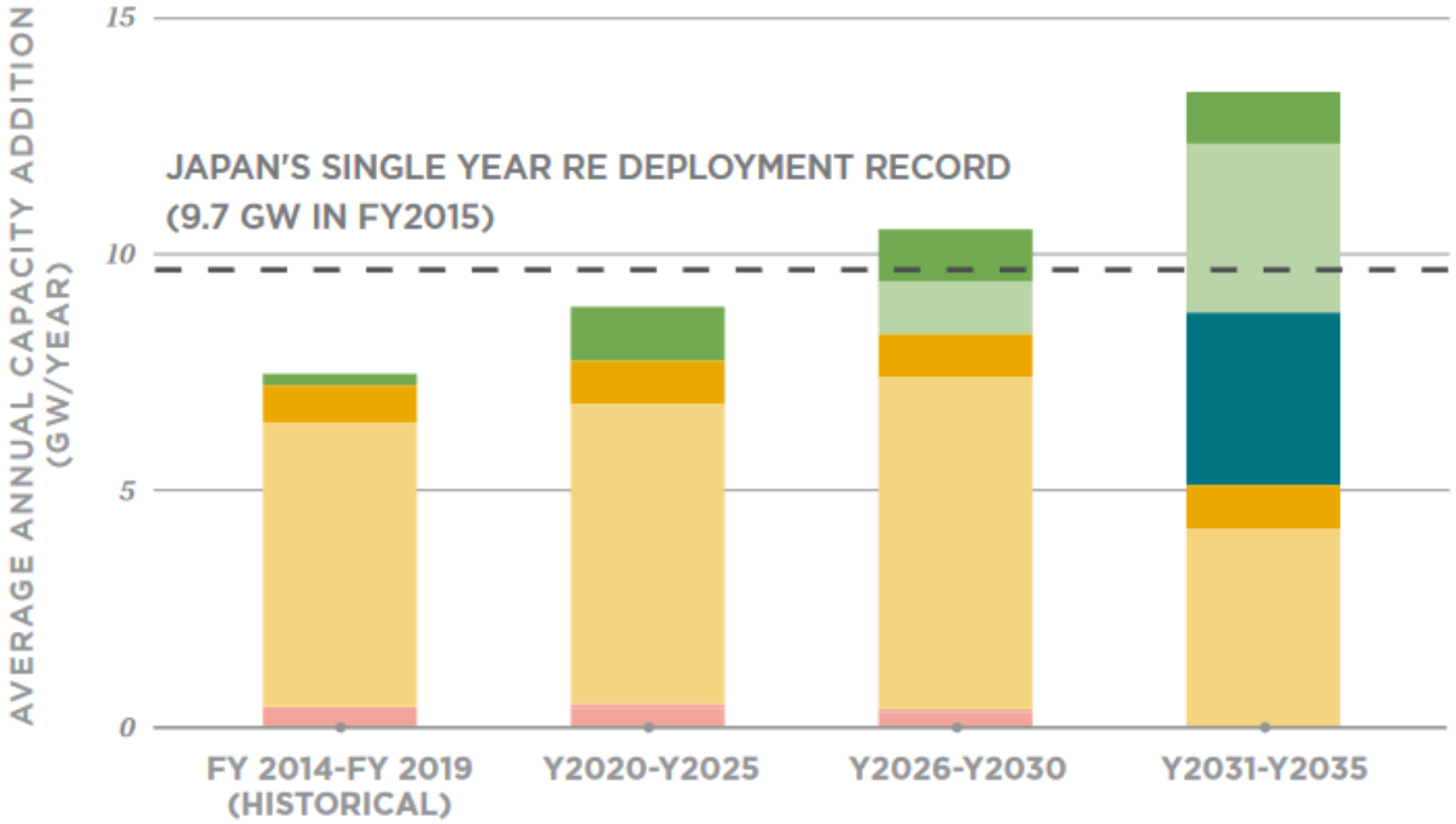


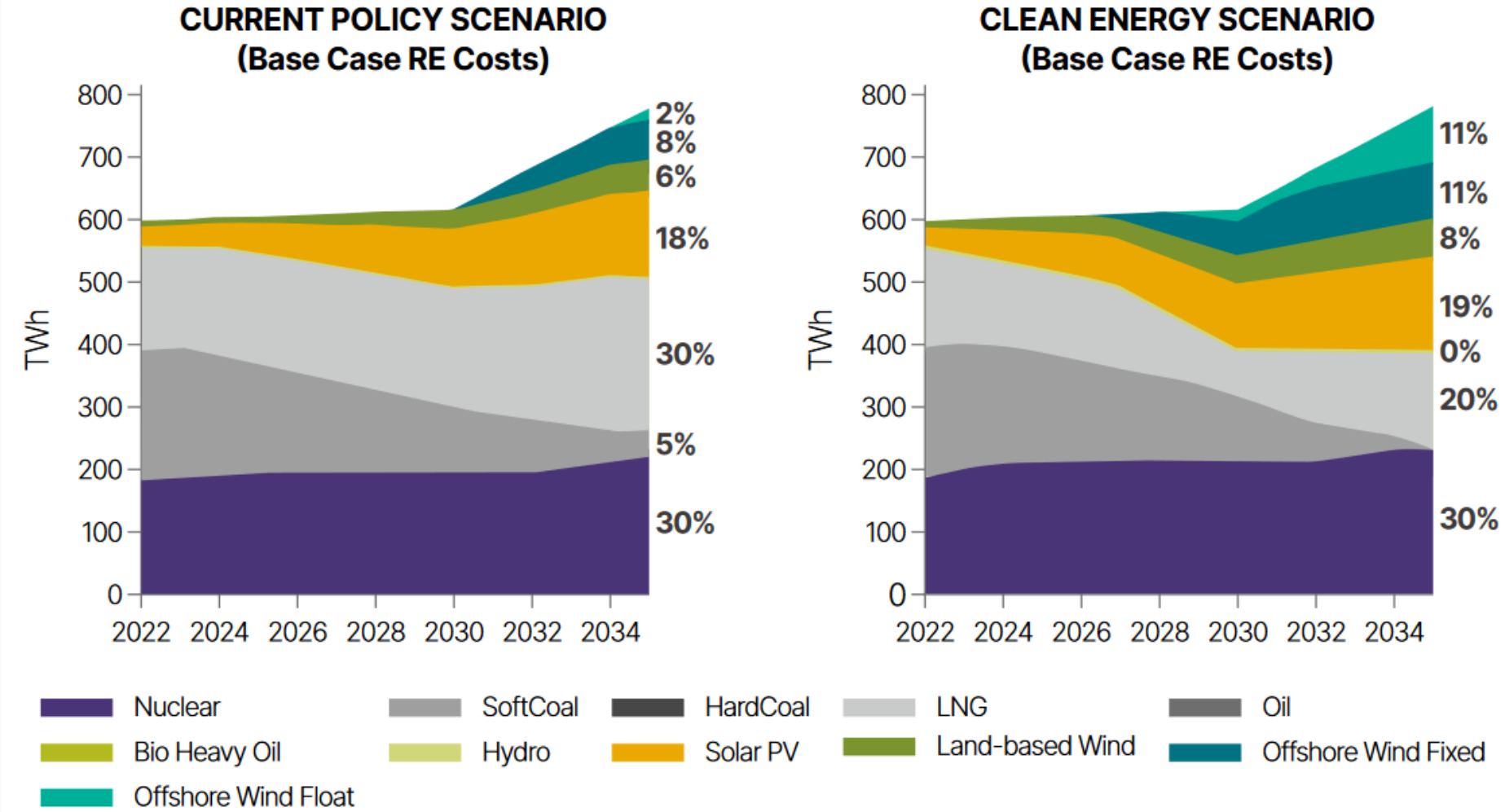
FIGURE 19.

Average Annual Renewable Capacity Additions by Periods, Clean Energy Scenario

- Wind
- Offshore Wind Fixed
- Offshore Wind Float
- Residential PV
- Utility/Commercial PV
- Other RE

Source: *The 2035 Japan Report*. https://eta-publications.lbl.gov/sites/default/files/lbnl_2035_japan_report_english_publish.pdf

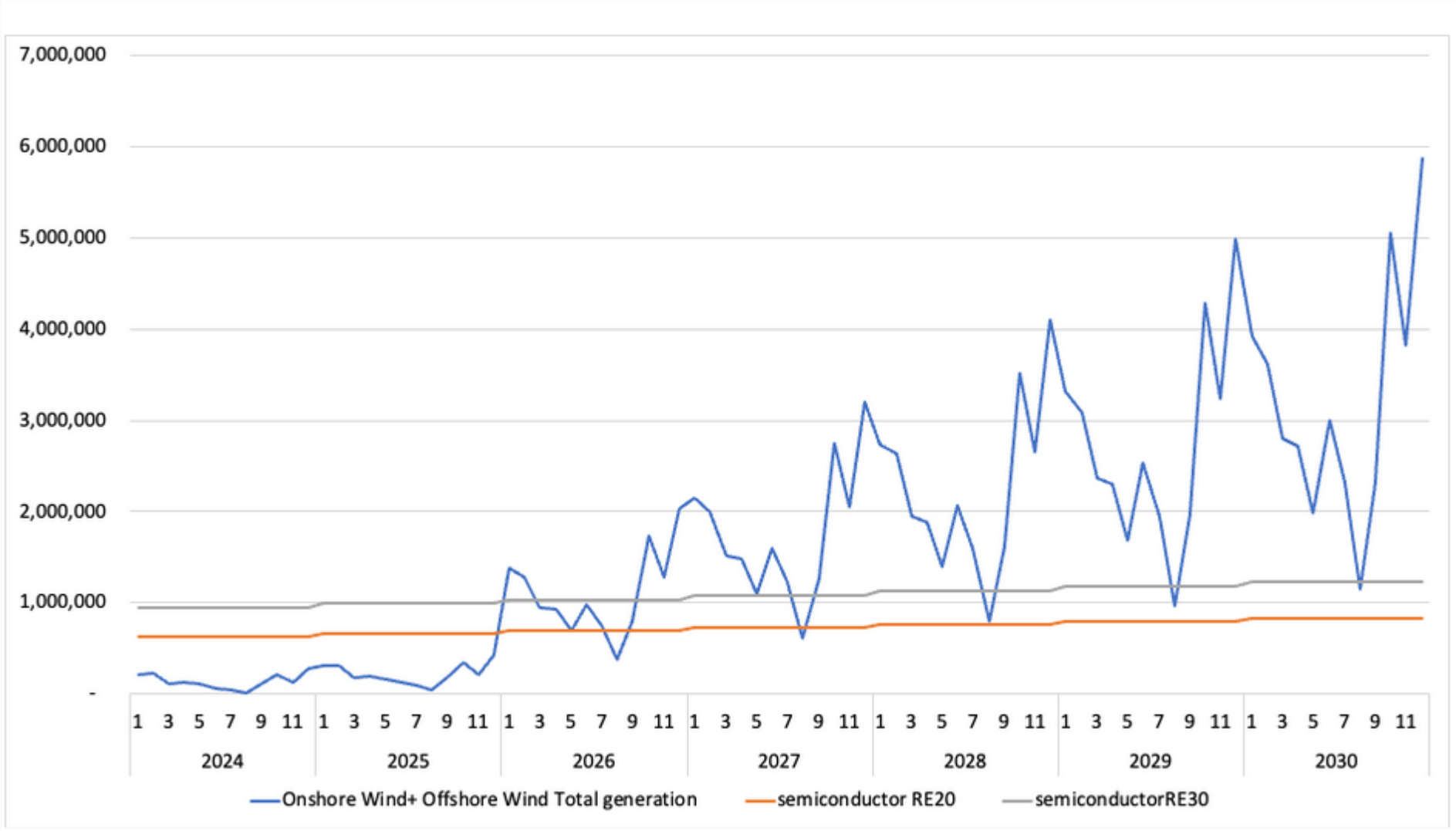
80% CFE in S. Korea Requires Significant Offshore Wind Growth



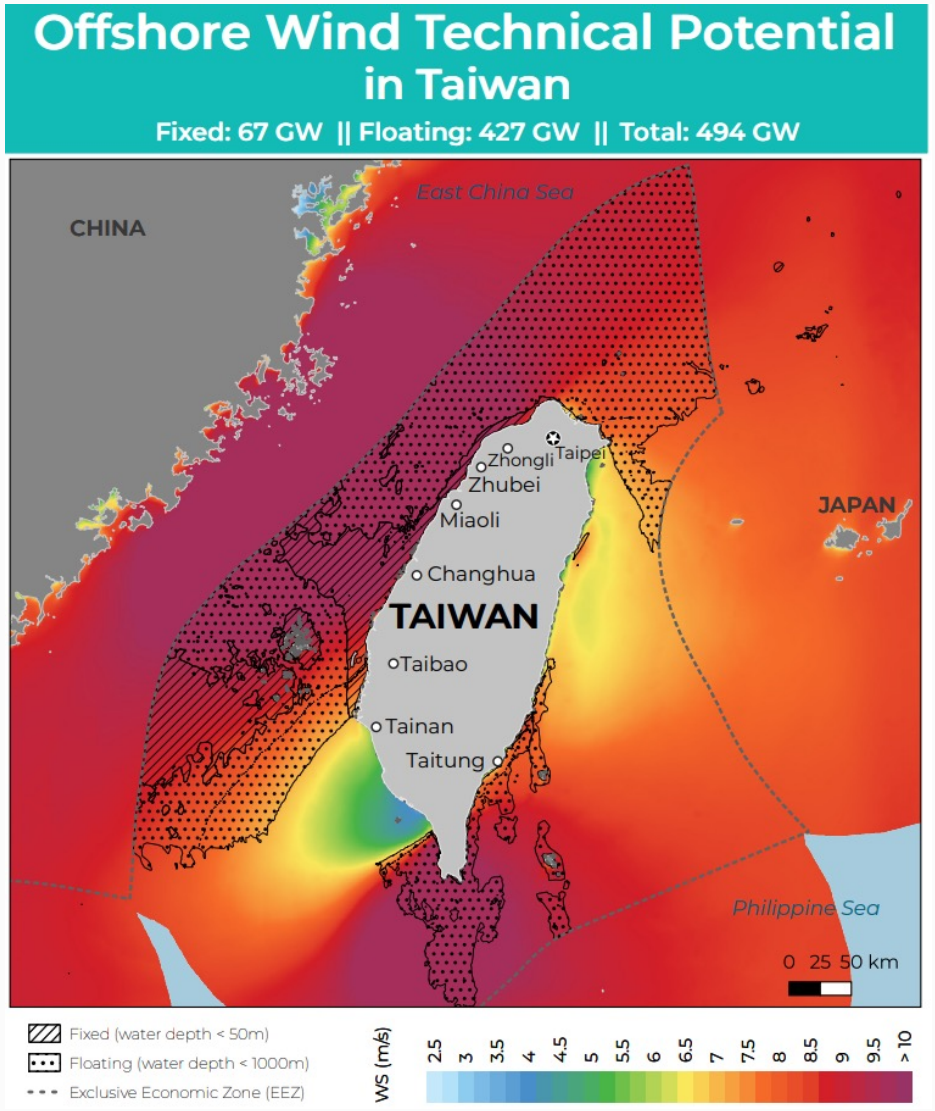
Source: *A Clean Energy Korea by 2035.* https://eta-publications.lbl.gov/sites/default/files/a_clean_energy_korea_by_2035.pdf

Semiconductor Demand: Taiwan

APALA GROUP
Clean Energy | Impact



TAIWAN OFFSHORE WIND



Source: Taiwan_Offshore-Wind-Technical-Potential_GWEC-OREAC.pdf

Government Targets

- Taiwan has a **Net Zero by 2050 goal** aims to produce at least **60% of its total energy from renewable sources by 2050**
- **Expects to reach 5.7 GW of offshore wind by 2025** and aiming to reach **40-55 GW** of offshore wind power by **2050**

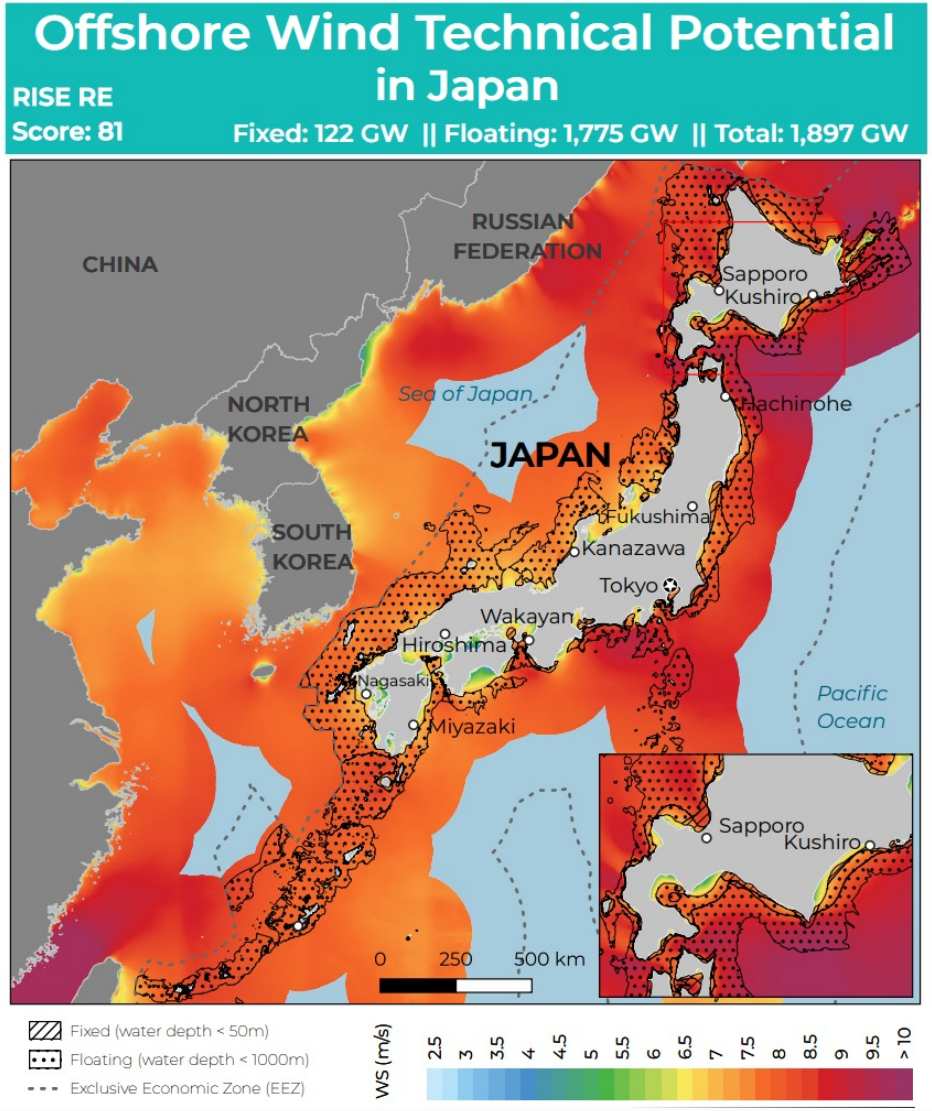
Current Installed Capacity (Offshore)

613 MW

Current Pipeline Capacity (Offshore)

~4,700 MW

JAPAN OFFSHORE WIND



Government Targets

- National objective for carbon neutrality by **2050**
- Japan wants to replace fossil fuels like coal and liquefied natural gas (LNG) in its energy mix with up to **45 GW of offshore wind power projects by 2040**.
- The country plans to have **10 GW of offshore wind power projects by 2030**.

Current Installed Capacity (Offshore)

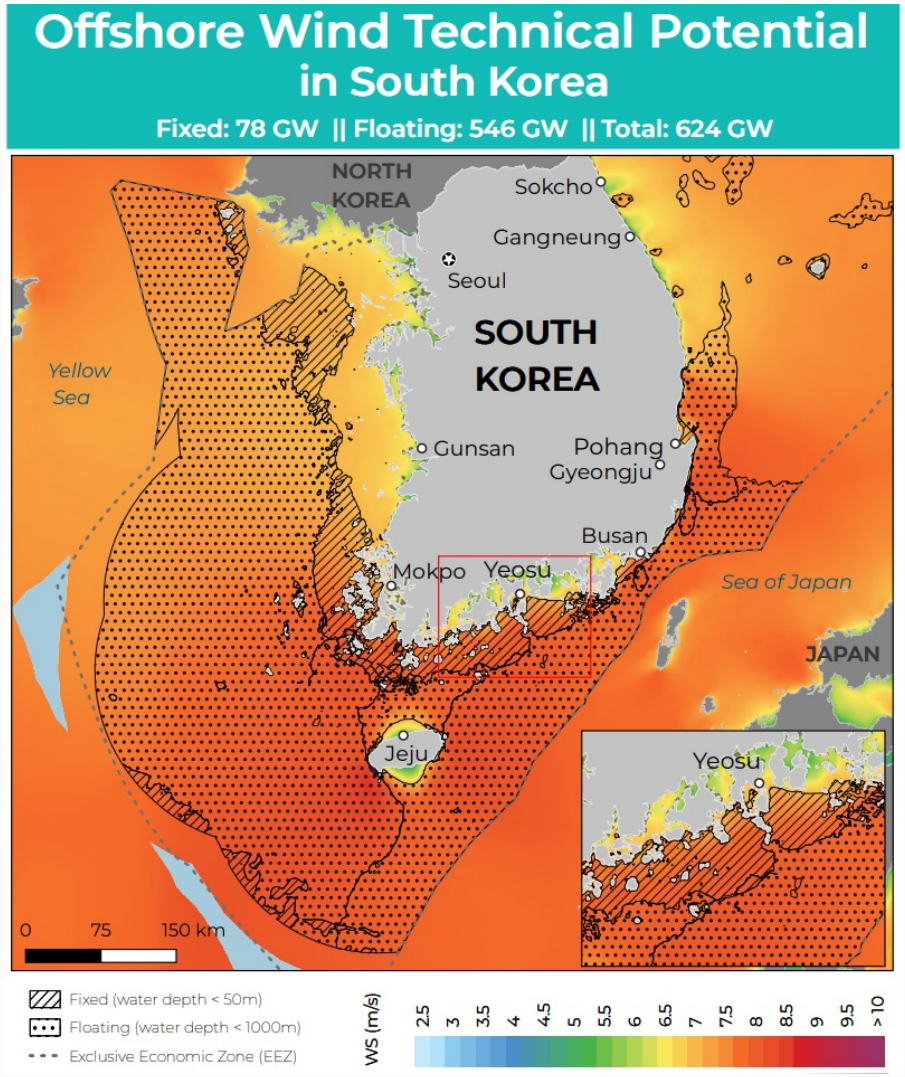
~800 MW

Current Pipeline Capacity (Offshore)

4,000 MW

Source: Taiwan_Offshore-Wind-Technical-Potential_GWEC-OREAC.pdf

SOUTH KOREA



Source: Taiwan_Offshore-Wind-Technical-Potential_GWEC-OREAC.pdf

Government Targets

- National target for carbon neutrality by **2050**
- Aiming to reach **14.3 GW** of offshore wind power by **2030**

Current Installed Capacity (Offshore)

~125 MW

Current Pipeline Capacity (Offshore)

20,800 MW

OFFSHORE WIND CHALLENGES

APALA GROUP
Clean Energy | Impact

Critical issues that must be addressed for the successful expansion of offshore wind power

1. Government-Led Zoning System
2. Permitting Issues
3. Stakeholder Engagement and Acceptance
4. Grid integration
5. Infrastructure and Supply Chain
6. Project Finance

Credit: Solutions for Our Climate (SFOC)

CURRENT OPPORTUNITIES

APALA GROUP
Clean Energy | Impact

Market	CPPA Available?	Current Capacity Available for CPPA	Contracting Method	Expected COD
Taiwan	✓	3.1: ~2.3 GW 3.2: ~3.6 GW	Directly with developer or through RE Retailer	3.1: 2028/2029 3.2: 2030/2031
Japan	✓	Unknown	Retailer	2028/2029
South Korea	✓	Unknown	Directly with developer	2028/2029

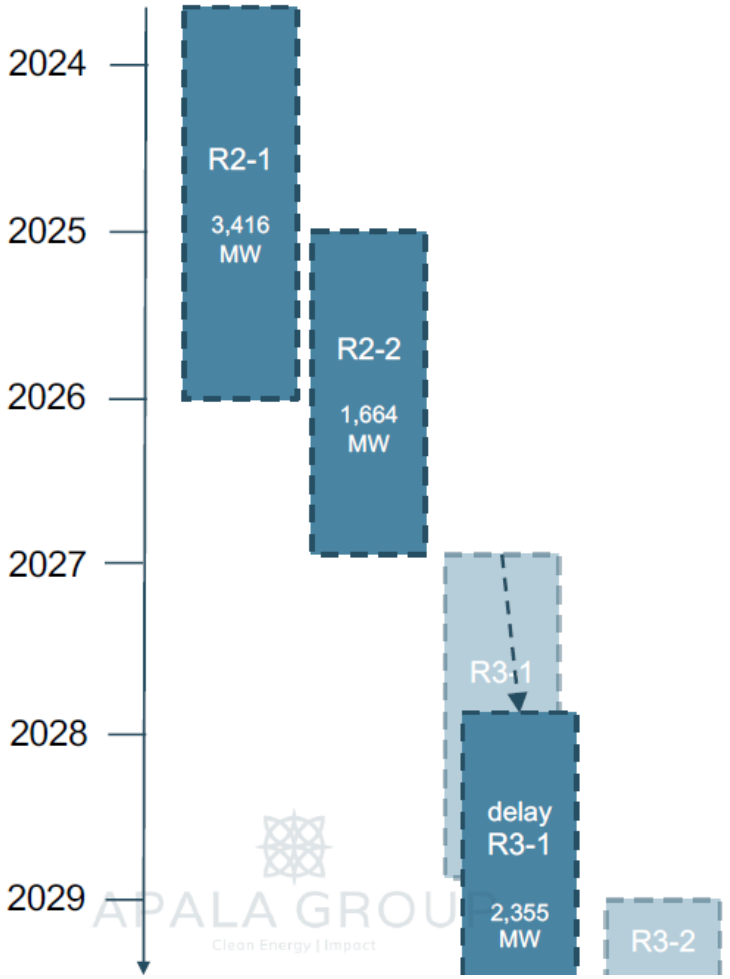
Additional Taiwan Offshore Wind Details

APALA GROUP
Clean Energy | Impact

Additional Taiwan Market Information

APALA GROUP
Clean Energy | Impact

Timeline of Offshore Wind Project Phases for Grid Connection



Overview

- In 2023, the accumulated offshore wind on-grid capacity reached 1.7 GW, which includes 237.5 MW from round 1 and the remainder from part of round 2.
- Round 2-2 involves four projects, all secured by TSMC. The entire R2-2 projects are anticipated to be on-grid between 2025 and 2026.
- Although Round 3-1 finally submitted their administrative agreement, they still haven't found the offtaker to sign a CPPA for financial closure yet.
- On April 10th, 2024, the Round 3-2 auction closed, with six developers bidding for eight projects. The results will be announced nearby at the end of May.

Challenges & Outlook

- R3-1 Developers are struggling to find suitable offtakers. Without FiT as a guaranteed mechanism (R3-1 bids at zero), they must locate high credit rating, large power users as their offtakers to satisfy international financial institution requirements. However, such users are uncommon in Taiwan.
- As for the latest project, costs are higher. Apart from the uncertainty of the offshore wind supply chain, the project sites are deeper as they're developed later and farther away from the shore. This necessitates more materials to build offshore wind turbines.

Taiwan OSW Phases

APALA GROUP
Clean Energy | Impact

Round (# of development projects)	R1 Pilot Project (2)	R2-1 Selection (10)	R2-2 Auction (4)	R3 Zonal Development		
				R3-1 (5)	R3-2	R3-3
Current Status	On-grid	Under construction	Under construction	Processing in CPPA negotiation, expected to close at the end of this year.	Auction closed, the results are expected to be announced in June.	This phase hasn't been kicked off; it's expected to open the auction in 2025.
Installed Capacity (MW)	237.5	3,416 (expected)	1,664 (expected)	2,335 (expected)	the government has allocated 3,600MW for this round of auction.	n/a
(expected) On-grid Year	2021	2022 - 2025 (expected)	2025 - 2026 (expected)	~~2027 - 2028~~ delayed 2028 - 2029 (expected)	n/a	n/a
Engaged Developers	Orsted, JRE, Maquarie, SRE, Taipower	SRE, JERA, wpd, Orsted, CIP, China Steel, Taipower, Northland, Yushan	Northland, Yushan, Orsted	Corio, TotalEnergy, Lealea, Skyborn, CIP, SRE, EDF Renewable, Taiya	n/a	n/a
Project Offtaker(s)	Taipower (projects have been adopted under the FiT scheme)	Taipower (projects have been adopted under the FiT scheme)	TSMC	n/a	n/a	n/a
CPPA Availability and Timeline	closed	closed	closed	available, anticipated to be closed until the end of this year.	not available until the auction results are announced, which is expected in the middle of this year.	not available until 2025

Moving the Market Forward: Key Questions

APALA GROUP
Clean Energy | Impact

Corporates face risks of not hitting their 2030 targets.

- What are the levers that can be pulled to expedite more renewable energy supply sooner?

Financing is a major hurdle for project developers using CPPA.

- Could utility green tariff programs be created through creditworthy counterparties (e.g.TaiPower and KEPCO) that can adequately serve the needs of corporates?
- Are more aggressive National Credit Guarantee programs possible?

Surplus Power under Take-or-Pay scenarios become quite challenging for CPPAs

- Are surplus power markets, or wholesale markets, necessary to mitigating corporate risk?

BASF in Asia Pacific Renewable Market

BASF
We create chemistry

BASF – We create chemistry

- Our chemistry is used in almost all industries
- We combine economic success, social responsibility and environmental protection
- Sales 2023: €68.9 billion
- EBIT before special items 2023: €3.8 billion
- Employees (as of December 31, 2023): 111,991
- 234 production sites including 6 Verbund sites
- Over 78,000 customers from various sectors in almost every country in the world

BASF
We create chemistry

BASF’s segments

Chemicals

Petrochemicals

Intermediates

Materials

Performance Materials

Monomers

Industrial Solutions

Dispersions & Resins

Performance Chemicals

Surface Technologies

Catalysts

Coatings

Nutrition & Care

Care Chemicals

Nutrition & Health

Agricultural Solutions

BASF
We create chemistry

BASF Asia Pacific
At a glance

Present in **19** markets

~70 production sites*

21,193 employees**

~€17.5 billion sales in 2023 ***

* Some sites are not shown due to scale. Site and office numbers refer to companies of significant size where BASF holds a stake greater than 50%.

** Employee number as of December 31, 2023

*** Sales by location of customer as of December 31, 2023

We create chemistry for a sustainable future – BASF's emission targets

2030

25%

Scope 1 and **Scope 2**

CO_2 emission reduction

(compared with 2018)

15%

specific **Scope 3.1**

CO_2 emission reduction

(compared with 2022)[1]

2050

net zero

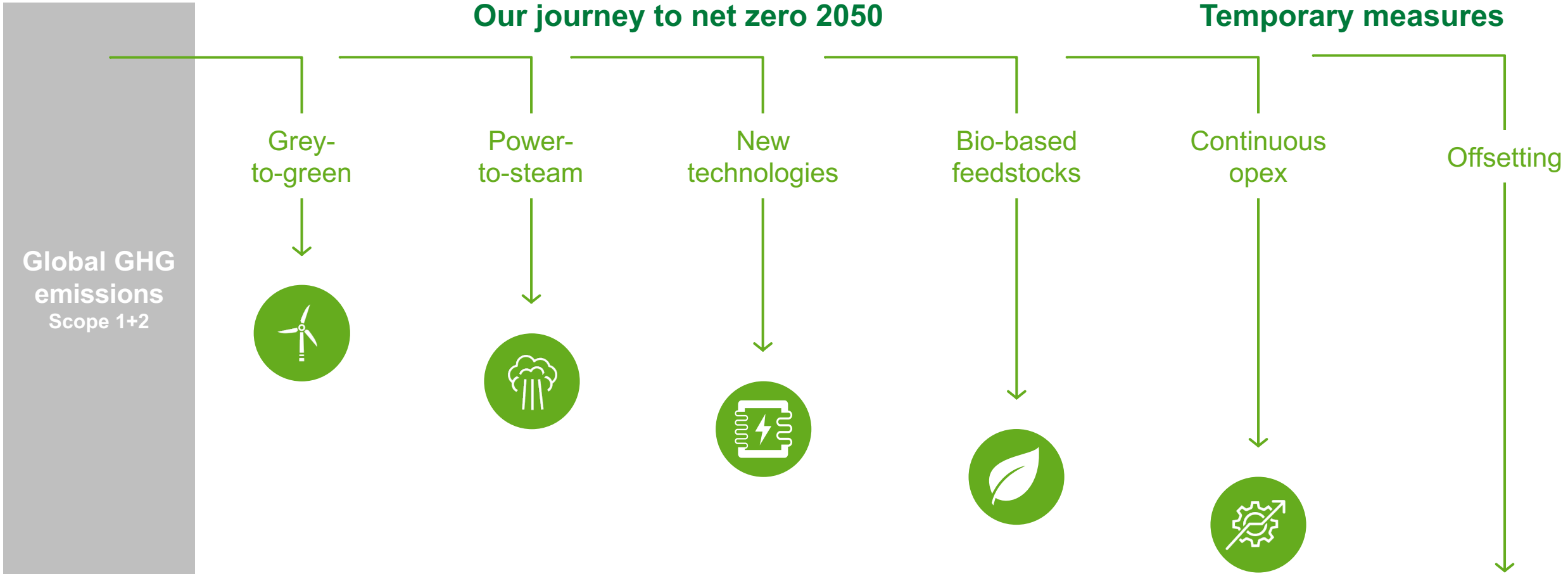
Scope 1, Scope 2 and **Scope 3.1**

CO_2 emissions

[1] Corresponds to a reduction from 1.57 to 1.34 kilograms of CO2e per kilogram of raw material bought; calculated on the basis of relevant Scope 3.1 emissions of 48 million metric tons

BASF
We create chemistry

Grey-to-green is the most flexible and economically viable lever for BASF decarbonization

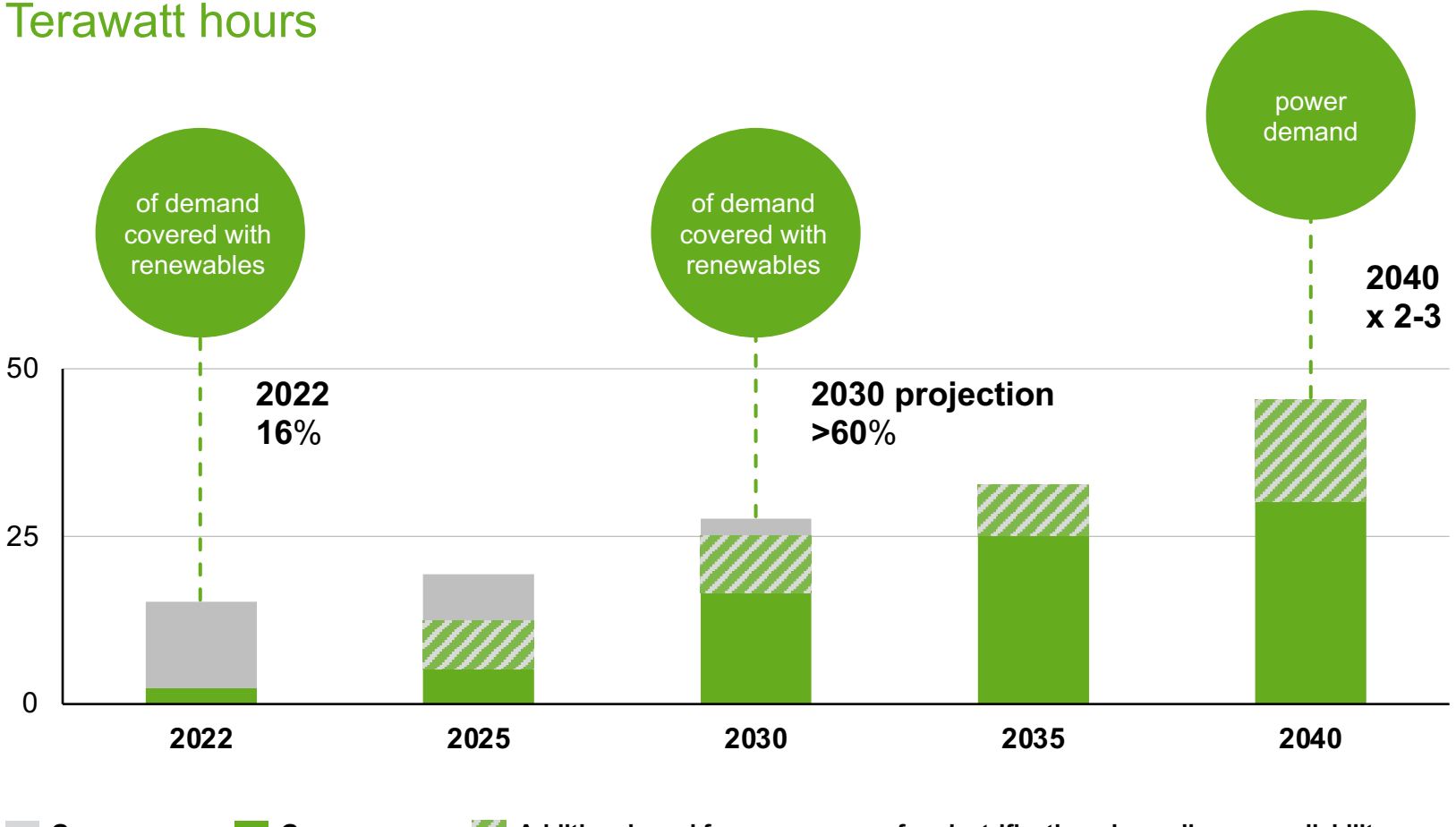


BASF
We create chemistry

Switching our power to renewable energy will be the main driver of emission reduction until 2025

BASF power demand and renewable supply projection global

Terawatt hours



- BASF aims to source **more than 60%** of its power needs from **renewable sources** by **2030**
- BASF **power consumption** expected to **increase strongly** due to electrification on our journey to net zero
- BASF pursues a **make-and-buy strategy** to secure access to renewable power
- Early investments in renewable power assets expected to offer **advantageous economics in the future**

BASF
We create chemistry

BASF APAC renewables progress

Success journey with teamwork and management support

June

FIRST renewable deal in China with CR Power, after long and active promotion since 2019 of renewable PPA concept with Guangdong province in the development of the Renewable Electricity Marketization Policy

2023 China/Korea

July

FIRST Sino-German offshore wind farm project -- BASF and Mingyang, 20-year power purchase agreement

Sep

On 6th, **FIRST** 25-year PPA in China with SPIC final definitive agreements concluded.

2024 China/India

April

1st April. 2nd 25-year solar contract signed for Mangalore site in India.

11th April. 25-year contract signed with GEDI. For Zhanjiang Verbund site.

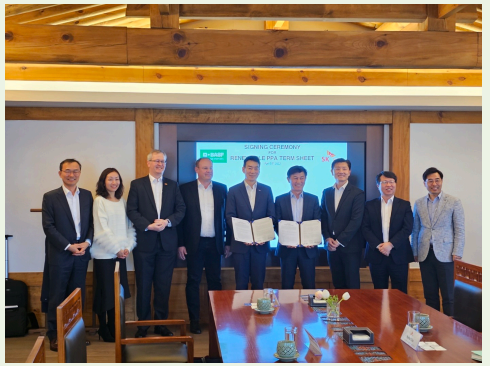
2021 China

Sep

RE trade national-wide pilot, BASF sites in Shanghai were the **FIRST** few to join inter-provincial RE transaction, and **LARGEST** renewable purchaser in the Yangtze River Delta region

Oct

FIRST 20-year solar PPA signed with SK E&S, largest announced renewable PPA deal in Korea so far



Continue and beyond

South Korea, Malaysia, Japan, India, Singapore, Thailand, Indonesia, etc.

BASF
We create chemistry

Offshore wind market in South Korea
- difficulty and challenges for corporate off-takers

Limited supply is the biggest obstacle to renewables procurement

Limited growth in the supply of renewable power, gives renewable energy generators a strong bargaining position. Generators have less incentive to sell power cheaply to the corporate energy market

Enabling policy environment for renewable investment

REC multiplier as a government (KEPCO) subsidy for auctioned projects excludes projects that are not contracted via GENCO auction.

A percentage should be set-aside for voluntary RE procurement for off-takers to access and co-fund new projects in auctions

More liberalized power market is called for to support renewable PPA development

- More flexibility of electricity settling rules, renewable retail, banking from the grid
- More transparency in cost build-up on additional charges, network usage, wheeling and balancing services etc.

Build out of a stronger grid

Transmission expansion and upgrade for a higher percentage of renewable penetration should be planned early

We create chemistry

RENEWABLE ENERGY MARKETS ASIA 2024 PANEL DISCUSSION

OFFSHORE WIND - OPPORTUNITIES AND CHALLENGES FOR CORPORATE OFFTAKERS

Orrin Cook
Managing Director
Apala Group

Irene Zha
Regional Category Manager Asia Pacific,
Electricity and Renewable Energy
BASF

Tuesday, 30 April 10:45–11:30 AM

Renewable Energy Markets™ Asia 2024

SINGAPORE

29–30 APRIL 2024