

RENEWABLE ENERGY MARKETS ASIA 2024

KEYNOTE SPEAKER



Frank Phuan

Business CEO

EDP Renewables APAC

Tuesday, 30 April 10:30–10:45 AM



**Renewable Energy
Markets™ Asia 2024**

Innovation in Renewables: An APAC Perspective

Frank Phuan

Business CEO, EDP Renewables APAC



Renewables

April 30, 2024

Energias de Portugal (EDP) is a global utility integrating generation with client solutions and energy management as well as networks



A global energy company committed to lead the energy transition, having started its renewables journey over two decades ago

By 2023-26

€ 25 bn gross investment plan 2023-26

>4 GW/year gross renewables additions, avg. 2023-26

Double solar and wind capacity

Coal free by 2025

By 2030

> 50 GW additions of renewable energy

100% renewable energy generation

100% EBITDA of energy transition

Carbon neutral Scope 1 and 2 emissions in own activities

By 2040

Net Zero

By including

Scope 3
emissions

Global purpose
Our energy and heart drive
a better tomorrow

Key figures (FY2023)



28.9 GW
Installed capacity



> 20
Markets worldwide



5.0 Bn
EBITDA¹



>13,000
Employees



>9 M
Clients



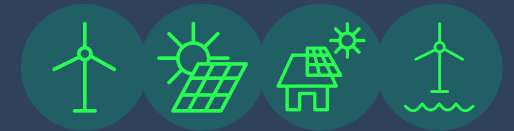
>40
Nationalities

Platforms

Renewables

Clean energy growth engine

Wind, solar, and hydro



Networks

Energy transition enabler

Distribution and transmission



Client Solutions & Energy Management

Decentralized growth

Clients, new solutions, trading



EDP Renewables (EDPR) is a top global renewables player with a portfolio of 16.6 GW installed capacity across multiple technologies

A global leader in the renewable energy sector



29
Markets worldwide



>3,000
Employees



16.6 GW
Installed capacity

€20 bn gross investment plan 2023-26 to consolidate presence across core technologies with differentiating value propositions



Wind
~40% Onshore
~5% Offshore



Centralised Generation
Solar ~40%



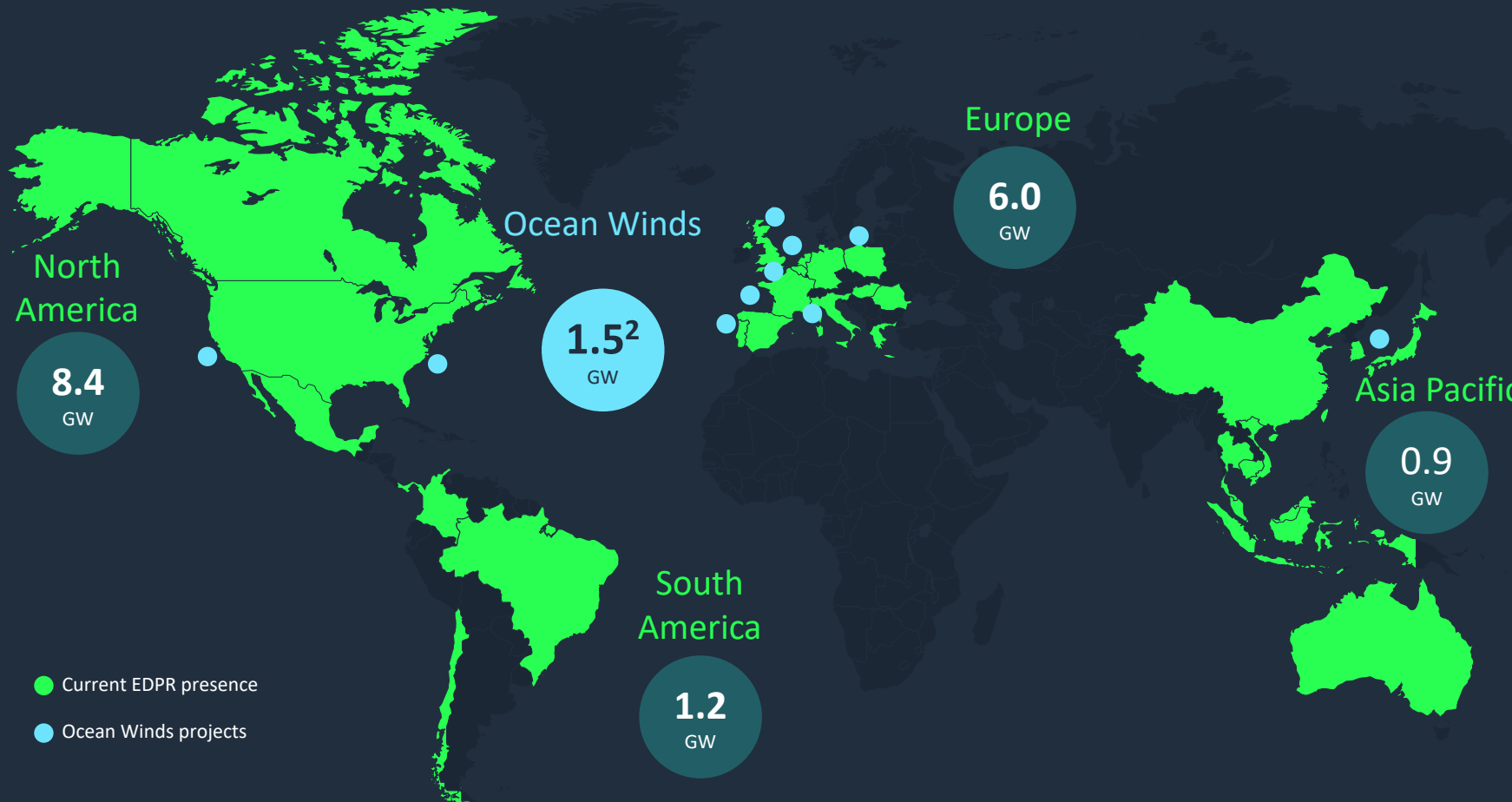
Distributed Generation
Solar ~10%



Storage ~ <5%



Hydrogen ~ <5%



EDP Renewables in Asia Pacific with pan-regional presence and focused accelerated renewables growth with Singapore as hub

Accelerating growth and ensuring delivery to more than double capacity and becoming leader in the region by decade end



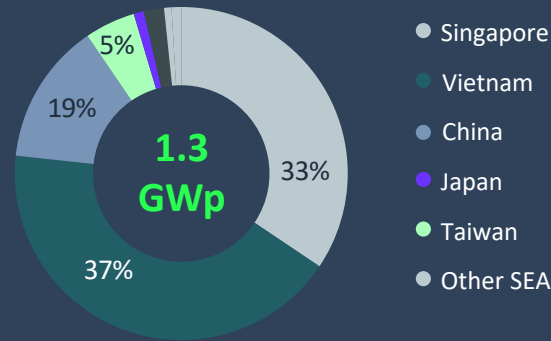
9 Markets regionally



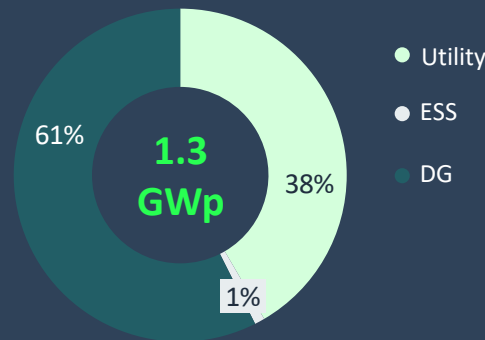
>400 Employees



2H23 Committed Capacity by Market



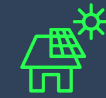
by Technology



Accelerating regional energy transition with dual track approach and optionality



Centralized Generation Solar PV and Wind Onshore



Distributed Generation Solar

Deliver at least 1GWp out of the target of 2GWp to be installed in Singapore by 2030



Regional Interconnection

Support cross-border interconnection projects
Develop capabilities in Storage



Hydrogen

Leverage our H2 competencies for alternative solutions for Natural Gas

+1.5 GW

additions
2023-26

5-7 GW

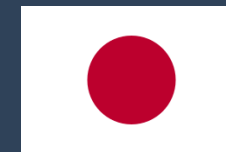
capacity
by 2030

Our Ambitious Growth Target in APAC



1.5GWp Targeted growth by 2025

5 Focus Markets



2 Markets with Cross Border Development



EDP Global Innovation Ecosystem

Innovation & Digitalisation

~€1 Bn
TOTEX in innovation until 2026

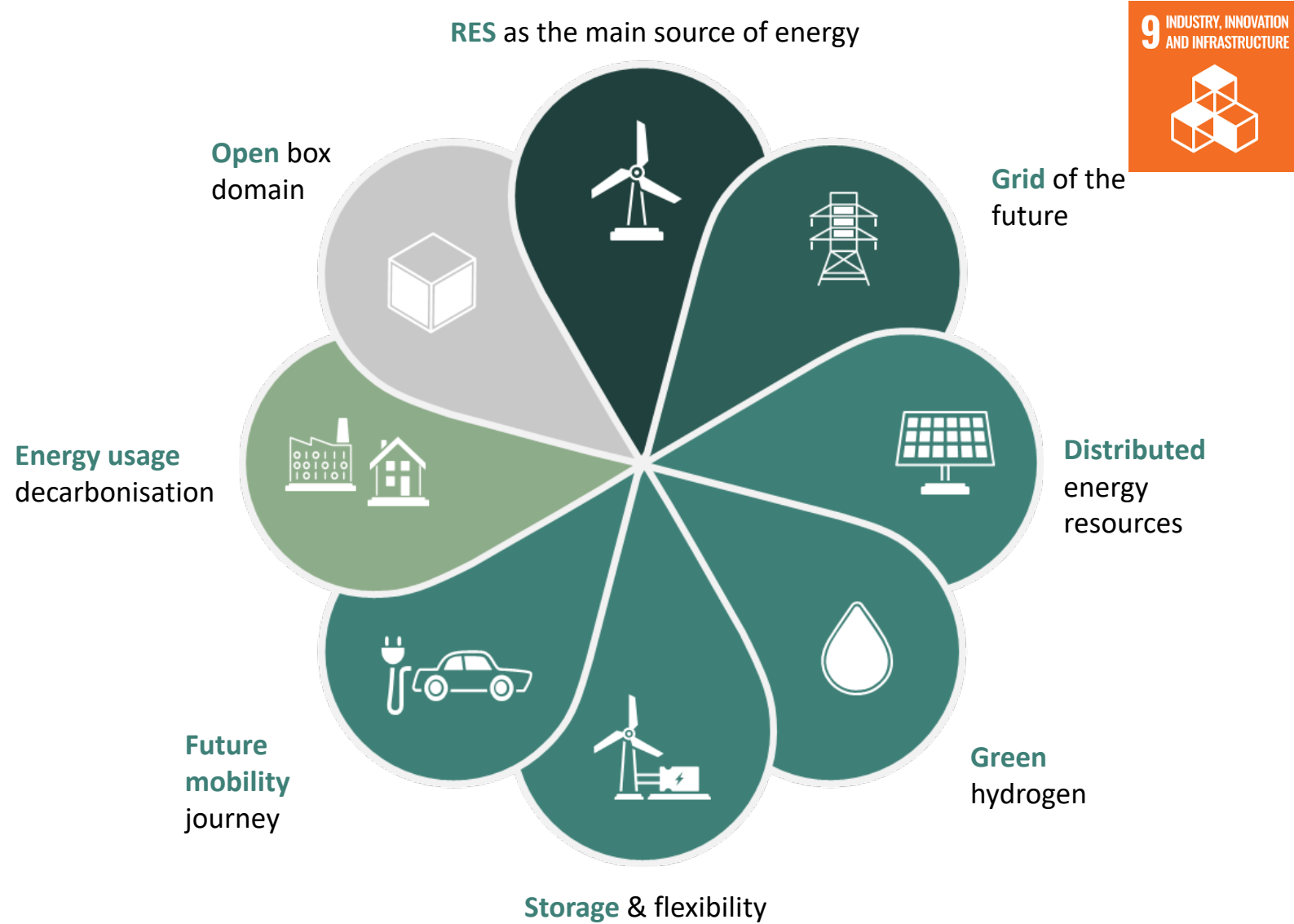
~€2 Bn
TOTEX in digitalisation until 2026

~350
people dedicated to innovation globally

€100M
venture investments by 2026

+50 R&D projects

With over 600 partners and ~€600m investment



Building sustainable communities to create new green lifestyle and living standards



>20

Innovation Concepts

3

Themes of innovation across space efficiency, power generation & energy efficiency

Far-reaching applications for both private and public sectors

Urban Solar Farm - Collaboration with JTC on the SolarLand program: Optimising land use in land-scarce Singapore



What?

- SolarLand is a solution to better utilise interim vacant land by installing solar panels to generate clean energy to the national grid
- EDPR also has projects with the SolarLand initiative at Tuas, Ang Mo Kio and Benoi

Noteworthy Points

- EDPR has a total contracted capacity of about 62 MWp
- The panels are built on a module mounting structure, secured to the ground via ground screw pile

We delivered one of the world's offshore largest floating solar farms along the Straits of Johor in 2021



System Size

- 5 MWp, 13,312 Solar Panels, 40 Inverters & 30,000 Floaters

Challenges

- Unlike other floating solar which is in the reservoir, this is on the open sea
- Subjected to sea waves and biofouling

Innovations

- The floater platform is built to withstand 1.5m of sea waves through the mooring system and floaters used
- Floaters are designed to withstand barnacle growth and sea water corrosion

EDP Renewables innovation at the local island north-east of Singapore: Greenifying the Microgrid of Pulau Ubin



Why?

- Disconnected from the electrical grid of Singapore
- 100k litres of diesel to power the island

How?

- 328kWp solar PV system
- 1MWh Vanadium Flow Redox (VFR) Energy Storage System

Innovations

- Solar green roof to regulate temperature and increase efficiency up to 4%
- VFR offers longer lifespan of 25 years, lower degradation and non-flammable. Core Component is also Recyclable at end of life

Creative deployment of solar PV for space optimization in Taiwan



Pingtung Canal
– 3.3MWp

Challenges

- In Taiwan, developers are urged to adopt dual-use of space for solar, stimulating creative infrastructure development to maximize space utilization



Ziqiang Elementary School Basketball Court
– 200kWp

EDPR's largest single site distributed generation project located in Anhui, China



Project Details

- 19 MWp, >35,000 solar panels generating >22GWh electricity
- 5 months to COD since Award
- 20 Year PPA



Modular Containerised Solar PV Solution: Enabling agile and fast deployment anywhere



Innovations

- EDPR's Modular Containerised solar PV solution allows for extremely quick deployment (and dismantling) of solar panels
- The panels are linked up within the container and then rolled out via a roller system at site for deployment
- This greatly reduces the time and resources needed to deploy the solar PV system.

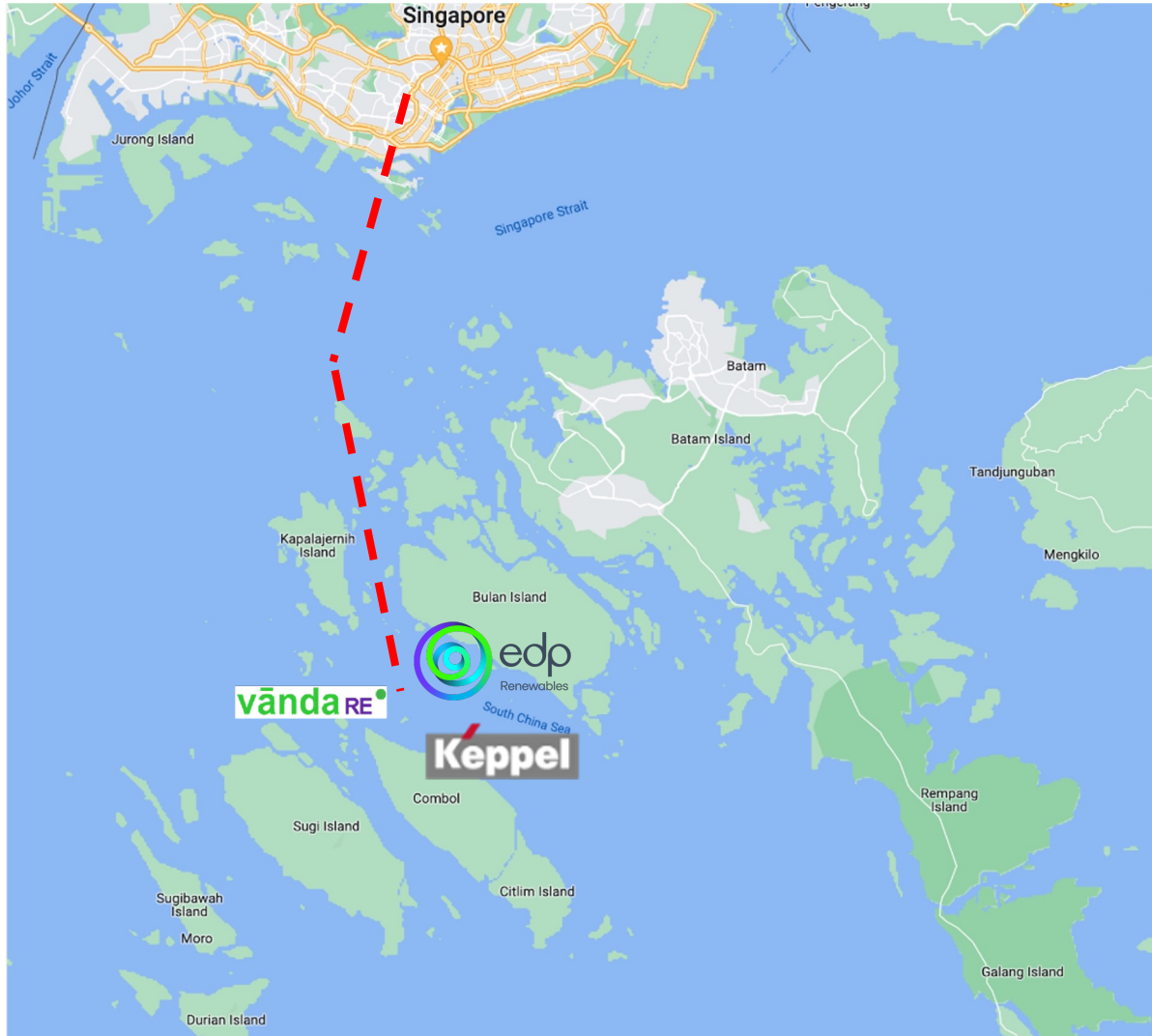


Energy Storage Systems (ESS)



- In 2020, EDP Renewables APAC led a consortium comprising Nanyang Technological University (NTU) and Wärtsilä, to participate in a test-bed for a utility-scale energy storage system (ESS).
- The consortium deployed a 2.4 MW / 2.4 MWh energy storage system at the substation using a lithium-ion battery system.
- EDP Renewables APAC was the principal investigator of this test-bed and was responsible for the management, installation and operation of the ESS.

EDP Renewables was awarded the Conditional Approval by EMA to import 400MW of green power from Indonesia



3 GWp	2 GWp	2 GWp
9 GWh	5 GWh	5 GWh



EDP Renewables as the first company to implement wind-solar hybrid projects in both Spain and Portugal



Portugal – Sabugal Municipality



8 Wind Turbines ,
11MW



17,000 Bifacial Solar Panels, 8.4MW



Spain – Santa María del Cubillo



22 Wind Turbines ,
14.5MW



25,000 Bifacial Solar Panels,
14.25MW

edp

We choose earth

SINGAPORE

29 - 30 APRIL 2024



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