



Looking into the Future with Carbon Management Technologies


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AGENDA

1 Oil and Gas Carbon Management



2 PTT Group Strategies and Initiatives



GO GREEN GO ELECTRIC TRENDS

GO GREEN



Cleaner Energy & Renewable Energy



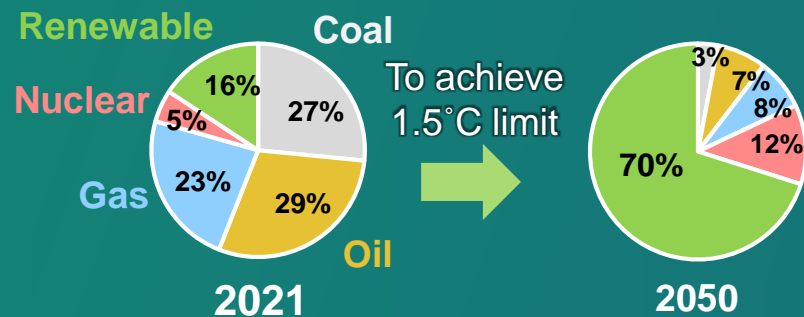
PROSUMER TREND

Climate Change

COP21 → COP27



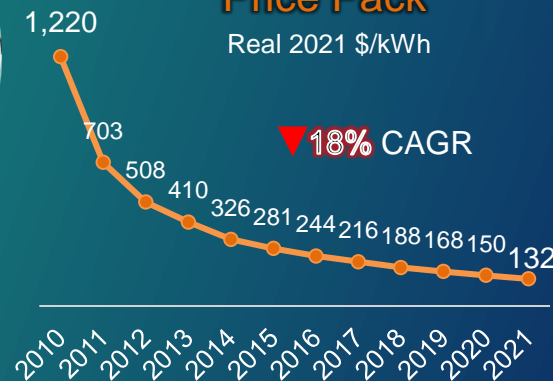
Increase of Renewable in Global Energy Mix



“RE as Foundation of Power System”

Lithium-ion Battery Price Pack

Real 2021 \$/kWh



SMART GRID



BATTERIES & EV

ICE → HYBRID → EV



Charger



Solar Roof



Appliance



Electric Stove

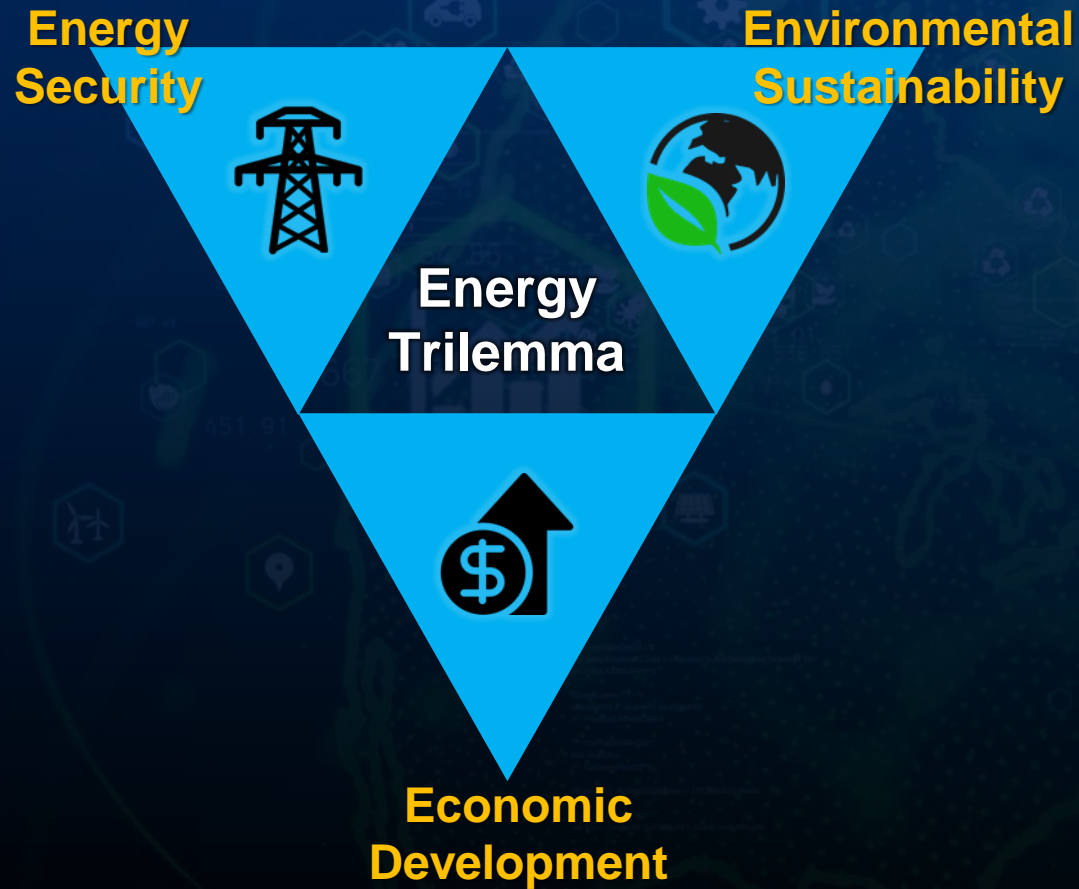
GO ELECTRIC

Electricity to be the primary energy source

CHALLENGES OF OIL AND GAS

Effective Energy Architecture

is timely, inclusive, sustainable, affordable and secure



Combination of Solutions needed

To achieve Net Zero & Solve Energy Transition Challenge

1

Increasing Energy Efficiency

67% of all primary energy losses due to inefficiencies in electricity generation, heavy industry & buildings



2

Developing Low Carbon Energy

Switching energy sources to renewable, but scalable solutions still being developed



3

Capturing Unavoidable Emission

Carbon capture playing a role through carbon capture and storage (CCS) facilities or with nature-based solutions



OIL AND GAS CARBON MANAGEMENT TECHNOLOGIES

1 CO₂ Capturing

1.1 Carbon Capture and Storage (CCS)



1.2 Carbon Capture and Utilization (CCU)



2 Green Energy

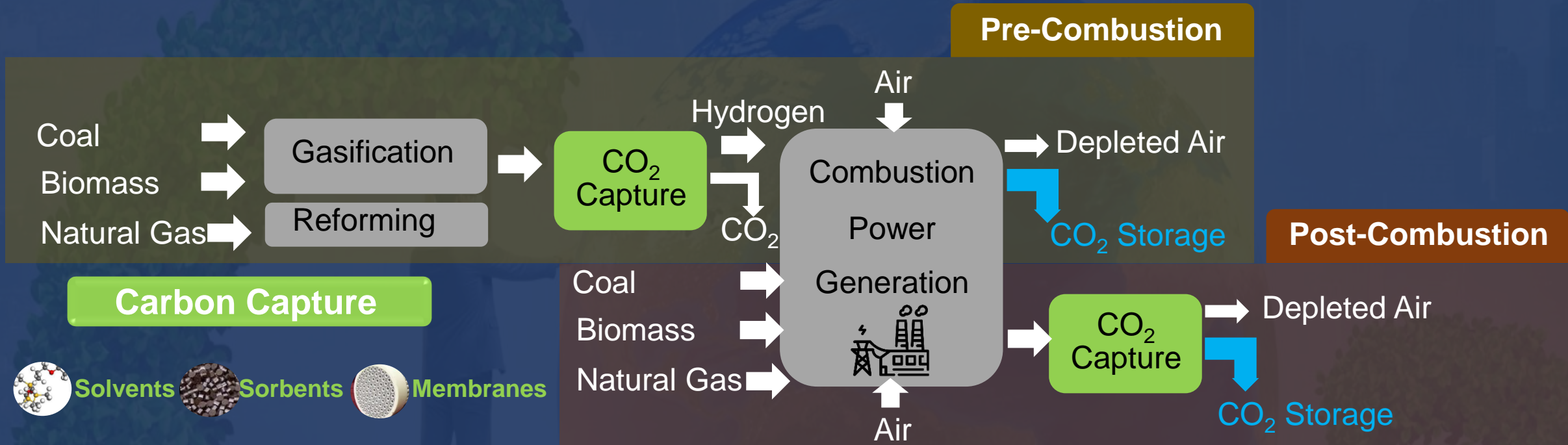
2.1 Renewable Energy



2.2 Green/ Blue Hydrogen



1.1 CARBON CAPTURE AND STORAGE



Carbon Capture



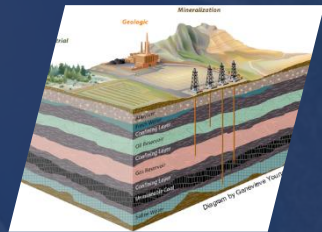
Carbon Storage



Oil & Gas Reservoir



Unmineable Coal



Saline Aquifer

Carbon Storage Evaluation

Capacity			Containment
Injectivity			MMV
			Measurement, Monitoring, Verification

Source: PTTEP, Técnico Lisboa

1.2 CARBON CAPTURE AND UTILIZATION



2.1 RENEWABLE ENERGY

Solar

Solar Ground-mounted



Solar Rooftop



Floating Solar



Wind

Onshore Wind

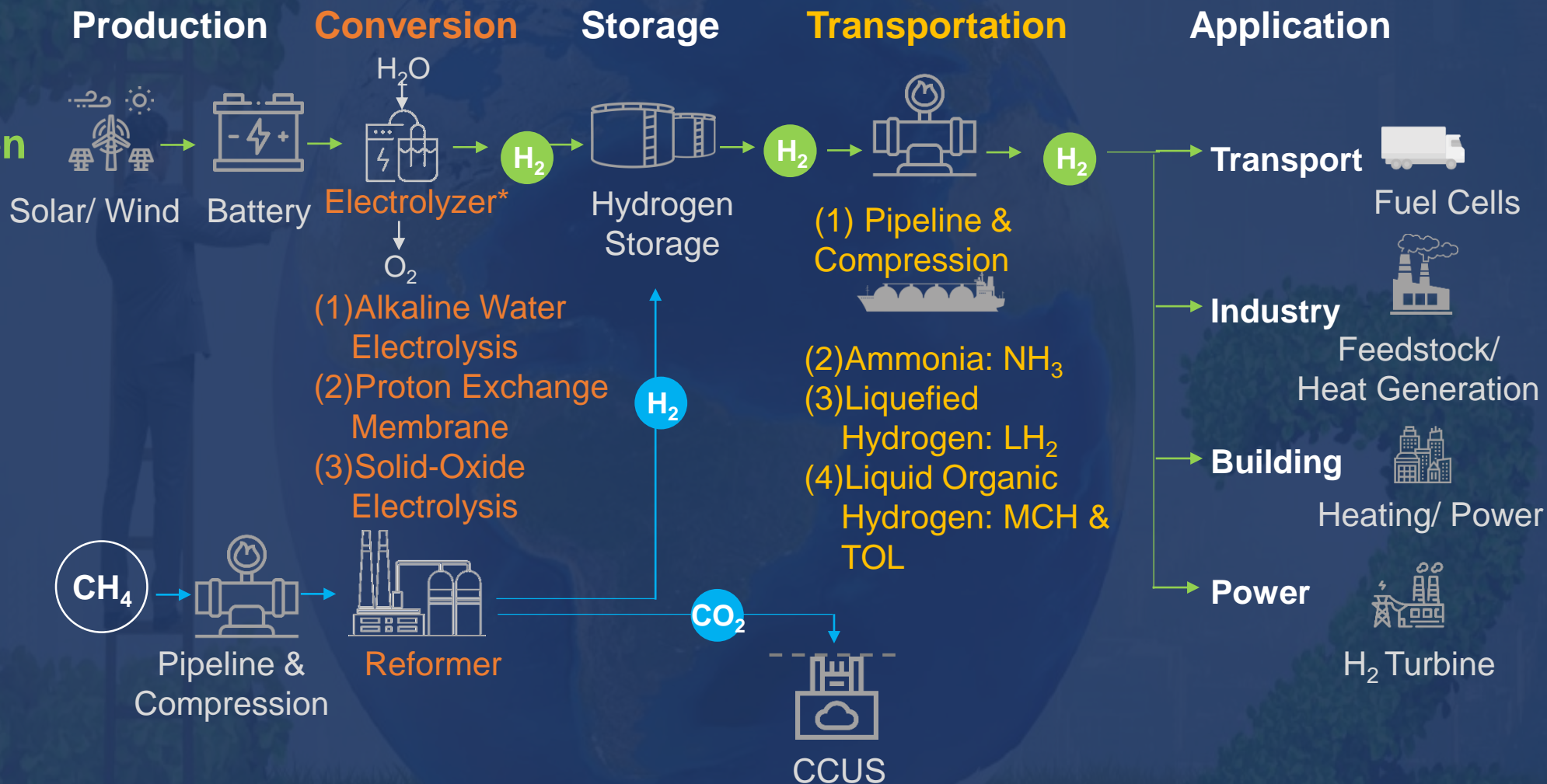


Offshore Wind




2.2 GREEN/ BLUE HYDROGEN

2.2.1 Green Hydrogen



AGENDA

1 Oil and Gas Carbon Management



2 PTT Group Strategies and Initiatives



PTT GROUP BUSINESSES IN ENERGY VALUE CHAIN AND BEYOND

CORE BUSINESS

Upward integration



E&P

- > 40 projects in 15 countries
- 1,350 mmboe proved reserved



LNG

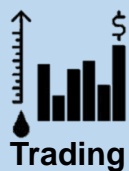
- LNG Value Chain
- LNG Receiving Facilities

PTT's Own Business (mid-stream)



Natural Gas

- 4 gas pipelines
- 6 Gas Separation Plants
- NGV Stations



Trading

- Crude Procurement
- Import/Export
- Commodity Hedging
- International Offices



New Business & Infrastructure

- Engineering and Project Mgmt.
- Asset Mgmt.
- Innovation and Digital

Downward Integration



Oil & Retails



Market share, 42%

- Oil: 2,080 station in TH
- Non-oil retail
- Lubricants
- Coffee business
- International Oil & Retail



Refineries



Market share > 50%

- Largest refinery group in Thailand, 3 of 6 refineries



Petrochemical



Market share > 50%

- Integrated Refineries & Petrochemical



Power



7,122 MW (equity portion)

- Electricity /
- Steam & Chill Water
- Energy Storage

NEW BUSINESS

Future Energy



Renewables



- PTT Group's renewable portfolio is 2.7 GW



EV



- EV service platform & EV / Batteries

Beyond Energy



Life Sciences



Pharmaceutical



Medical Devices



Nutrition



Digital Technology

AI / Robotics



Cloud service



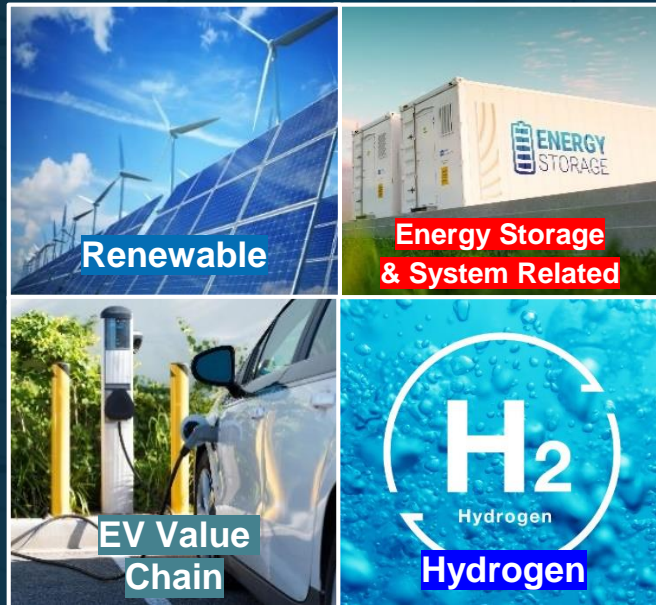
Digital Platform



PTT's VISION

Powering Life with **Future Energy and Beyond**

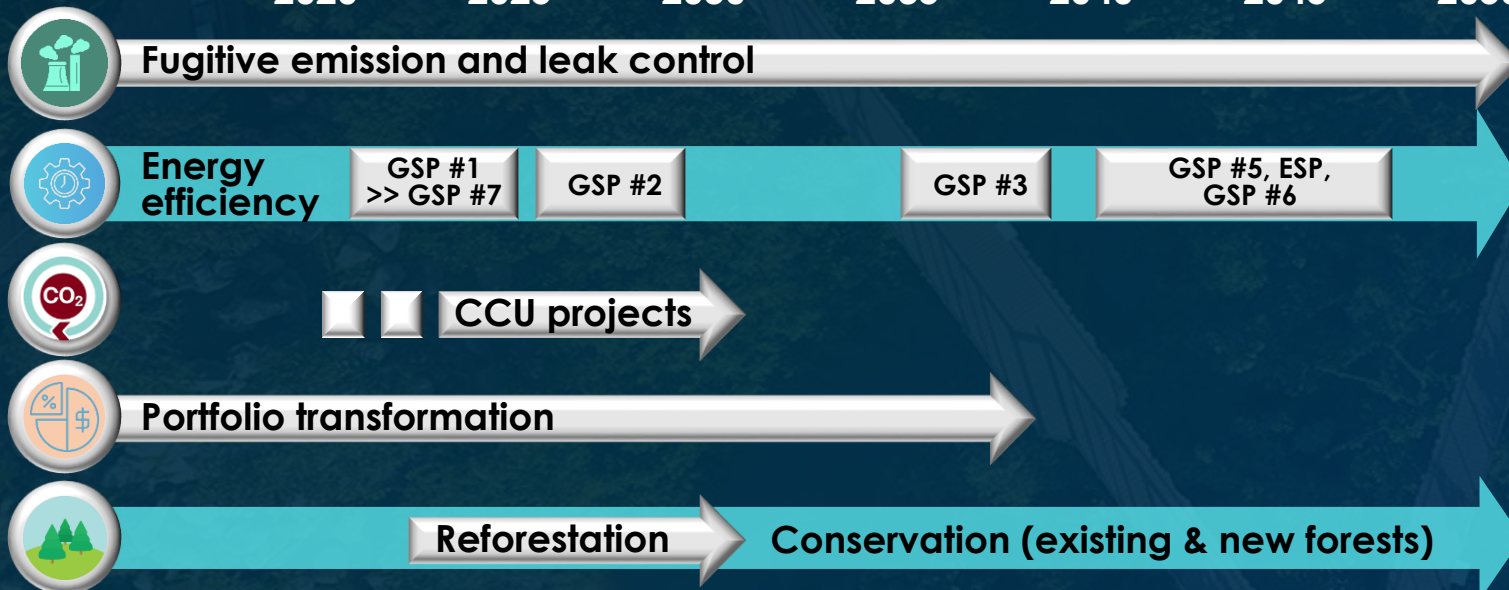
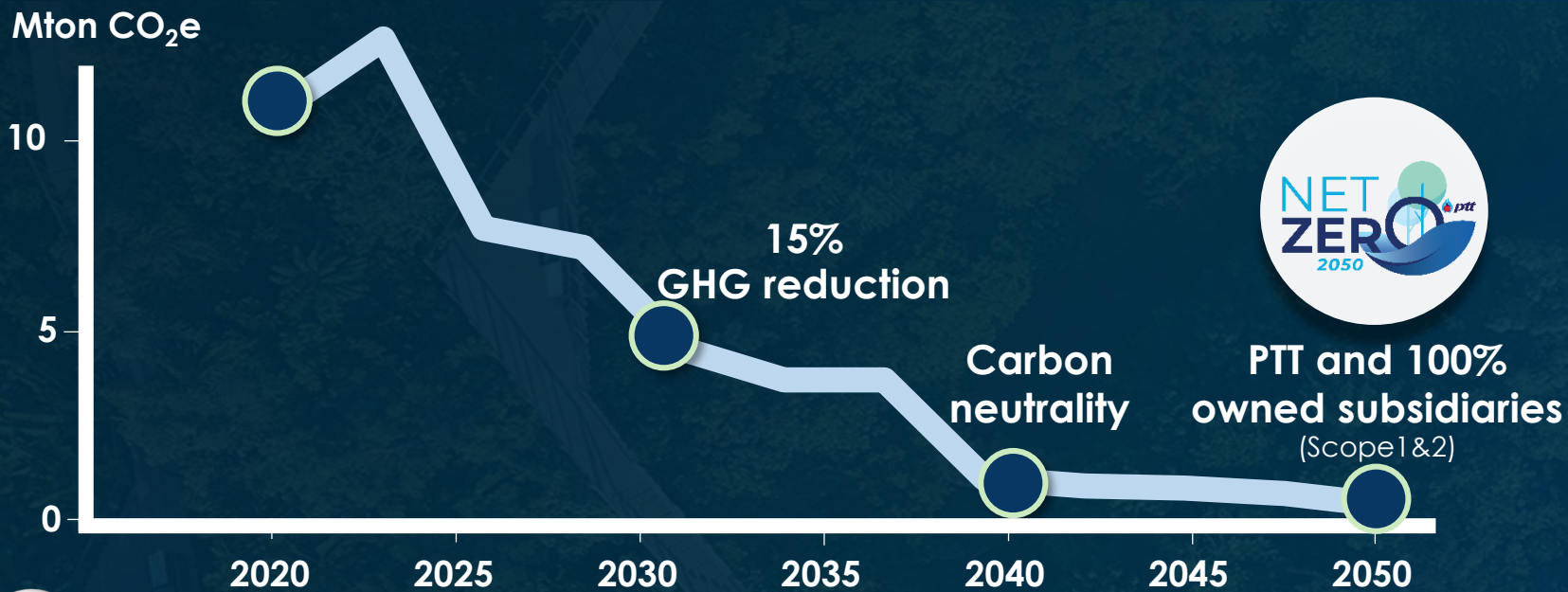
FUTURE ENERGY



BEYOND



PTT Moving Forward to Carbon Neutrality by 2040 and Net Zero Emissions by 2050



3P Decarbonization Pathways

Pursuit of Lower Emissions (Clean Growth) **~30 %**

15% GHG reduction from 2020 by 2030

Loss Control & EE Initiative
CCS Project

Portfolio Transformation **~50 %**

(Business Growth) RE 12 GW by 2030
(Green Portfolio) Future Energy and Beyond 32% of CAPEX 2021 - 2030

Partnership with Nature and Society **~20 %**

(Reforestation) PTT: 1,600 Sq. KM by 2030
(PTT's Existing): 1,784 Sq. KM



Thank you

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Group