# MALAYSIA'S NETZERO AN ENERGY

## **TRANSITIONJOURNEY**

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### The world needs maximum energy and minimum emissions.

#### Sultan Ahmed Al Jaber

Chief Executive, Abu Dhabi National Oil Company (ADNOC)

At ADIPEC 2022

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### How much Energy

By 2050, global demand for energy is expected to increase by 50%

By 2035, as electrification increases, demand for lithium and cobalt is expected to grow by as much as 600% By 2030, renewable energy, spending is expected to increase from \$320B today to more than \$740B



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By 2050, demand for chemicals is projected to rise 300%

## MALAYSIA'S GROWTH

S&P Global Market Intelligence

ECONOMICS COMMENTARY - May 19, 2023

#### Malaysian economy shows sustained expansion in early 2023



The Malaysian economy grew at a pace of 5.6% year-on-year (y/y) in the first quarter of 2023, showing continued rapid expansion after annual economic growth of 8.7% in 2022. The buoyant pace of economic growth in 2022 was the fastest annual GDP growth rate since 2000.

The pace of expansion of the Malaysian economy is expected to moderate during 2023 due to a number of headwinds, including the impact of high base year effects and slowing merchandise export growth. However, an important positive factor is expected to be the continued gradual recovery of international tourism visits from Asia, the Middle East and Europe.

#### Malaysia long-term GDP forecast



Source: S&P Global Market Intelligence

Overall, the medium to long-term growth outlook for Malaysia remains favourable, with total nominal GDP measured in USD terms forecast to rise from around USD 400 billion in 2022 to USD 680 billion by 2030 and USD 780 billion by 2032. Meanwhile per capita GDP is projected to rise from USD 12,000 in 2022 to USD 18,600 by 2030, which will help to drive the growth of the domestic consumer market.







## **CURRENT STATE OF AFFAIRS**

CO2 Concentration in the atmosphere

Global warming

2100	1000 PPM
2050	550 PPM
2022	421 PPM
1750	278 PPM



## HOW WILL IT AFFECT **INDUSTRIES?**



### **Carbon Budget**

maximum amount of cumulative net global anthropogenic carbon dioxide (CO2) emissions limiting global warming



#### **Carbon Tax**

government sets a price that emitters must pay for each ton of greenhouse gas emissions they emit

SRC Emits 2.1 Mmtpa = \$10 Mil Carbon tax @\$5/tn (will be \$63 Mil in 2030 at \$30/tn)





## **CARBON PRICING** IMPLEMENTATION GLOBALLY



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## ENERGY TRANSITION (ET)

The energy transition is a pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century.

At its heart is the need to reduce energy-related CO2 emissions to limit climate change.

Source : International Renewable Energy Agency (IRENA)



### **ENERGY TRANSITION** PATHWAYS

Hydrogen (H2)	<b>Biofuels</b> (Lignocellulosic & Lipids)	Efficien
Carbon Capture Storage (ccs)	<b>Pyolis</b> (Pyrolis Oil)	Cost of en
Carbon Capture Utilization	Carbon Markets	Volume

(CCU)



#### cy of process

#### tire value chain

#### of production

# HYDROGEN (H2)

Smallest diatomic molecule Lightest gas Low volumetric energy density Highly combustible CAUTION

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### THE HYDROGEN ECONOMY (BY 2050)





3 2.5tn annual sales (H<sub>2</sub> + equipment)





## H<sub>2</sub> LIFECYCLE





# CARBON CAPTURE STORAGE (CCS)

Definition

Capture and sequestration of CO2 underground for permanent storage

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## CO2 AND CCS

#### BASICS OF C02



Colourless, odourless, noncombustible (non-explosive) gas in ambient conditions

Capture



WHAT IS CCS?

Process



Heavier than air and can accumulate in depressions – danger of asphyxiation





### Fastest & Highest Carbon Abatement Route









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Petronas CCS Facility Stores 3.3Mt of Co2/yr

Targets stationary highconcentration stream emitters

# **COMMITMENT TO CCS**

#### **COMPANIES COMMITTED TO CCS**



Source: www.gulfoilandgas.com 6/6/2022, Location: Asia



🛨 f У in 🖾 PTTEP is planning to build Thailand's first Carbon Capture and Storage (CCS) facility at the Arthit offshore gas field, clearing the way for the business to achieve its Net Zero Greenhouse Gas (GHG) Emissions goal. To support Thailand's goal to lowering carbon emissions, the business has launched CCS feasibility studies in other parts of the country.

emissions at scale.

Launched in 2021, the feasibility study of PTTEP's pioneer CCS project at Arthit gas field has recently concluded, marking the first initiative of its kind in the country. The study covers several aspects including the preliminary assessment of carbon storage capacity of targeted geological storage formations and corresponding conceptual development plan. The project is currently in the process of preliminary front-end engineering and design (Pre-FEED) study and is expected to commence the CCS operations by 2026.

"Our knowledge and expertise in geoscience and petroleum engineering represent advantageous foundation for CCS development, leading us towards our carbon emissions reduction target. Apart from Thailand's first CCS initiative at the Arthit gas field, PTTEP has collaborated with partners who have experience in CCS technology in Japan to evaluate the potential of CCS development in other parts of Thailand that will eventually provide support to other domestic industries in decarbonization. Moreover, we have recently joined forces with companies in PTT Group to apply CCS under the concept of CCS Hub Model to reduce GHG emissions from PTT Group's operations and other industries in the adjacent operational areas. These ongoing projects are expected to effectively support the country's road to net zero GHG reduction goal.

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#### PTTEP Launches 1st CCS Project, Aiming for Net Zero Greenhouse Gas Emissions

Mr. Montri Rawanchaikul, Chief Executive Officer of PTT Exploration and Production Public Company Limited or PTTEP, revealed that regarding Thailand's commitment to the UN Climate Change Conference of the Parties (COP26) to achieve carbon neutrality in 2050 and Net Zero GHG Emissions in 2065, PTTEP is determined to take part in managing GHG emissions and tackling global warming issues. Therefore, the company has set forth an ambitious emissions reduction target - Net Zero GHG Emissions by 2050 via the EP Net Zero 2050 concept. One of PTTEP's key strategic enablers to reduce carbon dioxide emitted from the company's petroleum production process is the adoption of CCS technology, a preferable pathway that several countries have considered as the main approach to effectively reduce carbon dioxide

## CARBON TRADING

Market-based system designed to provide economic incentives for organizations to reduce their environmental footprint

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### **CARBON TRADING** EXPLAINED

#### **COMPLIANCE MARKETS**





Allowances are allocated or auctioned. Companies trade allowances in secondary markets.

Projects generate credits, which are sold to companies to meet emissions compliance obligations (ESG requirements/targets).



#### **VOLUNTARY CARBON MARKET**



## TYPES OF CARBON OFFSET PROJECTS

TYPE	EXAMPLES	PROS	CONS	
TECHNOLOGY BASED SOLUTIONS	<ul> <li>CCU (Carbon Concrete)</li> <li>CCS, DAC, LCH2</li> <li>Fuel Switching</li> <li>Energy Efficiency measures</li> <li>Renewable Energy</li> </ul>	<ul> <li>Abatement immediately and accurately calculated</li> </ul>	<ul> <li>Longer lead time for financing and construction</li> <li>Expensive technology prohibitive to smaller players</li> </ul>	
NATURE BASED SOLUTIONS	<ul> <li>Afforestation/Reforestation</li> <li>Wetland Restoration</li> <li>Regenerative Agriculture</li> <li>Avoided deforestation</li> <li>Forest Management</li> </ul>	<ul> <li>Cost effective</li> <li>Abundant supply</li> <li>Co-benefits – conserve biodiversity, flood/erosion prevention</li> </ul>	<ul> <li>Longer maturity period</li> <li>Unclear business case</li> <li>Abatement calculation less accurate</li> </ul>	
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### **REGIONAL/NATIONAL+ CARBON MARKETS**







China Fully launched its national power sector ETS in 2021 bringing the world's largest carbon market online after three years of Republic of Korea Third trading phase will commence in July 2021 extending the scope, increasing auctioning and introducing financial intermediaries to its market. A new legislative framework for the 2021-2025

As of 31 Jan 2021, there are 24 ETS in force and 8 under development and expected to be operational in few years.

Largest ETS regimes are in EU and China.

Source : ICAP Status Report 2021

### **VOLUNTARY CARBON +** MARKET SIZE







## FOR THOUGHT

What will the future Energy Mix look like to you?

- Full Electrification? •Hydrogen dominance? Majority Renewables w BESS?
- Proliferation of CCS/M?
- Biofuels & Pyroils?
- •The End of Fossil Fuels?









Cobalt Mining in Congo, 12 Oct 2022 (Circa 20,000 miners, in shifts of 5,000)

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### Boeing Unveils Hydrogen and Electric Concepts That Could Power the Future of Flight

By FuelCellsWorks July 19, 2022 4 min read (700 words)



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#### **Future Planet**

What is BBC Future? Future Planet Lost Index

- The new use for old coal mines
- Why environmental lawsuits are on the rise

In your average battery recycling plant, battery parts are shredded down into a powder, and then that powder is either melted (pyrometallurgy) or dissolved in acid (hydrometallurgy). But Li batteries are made up of lots of different parts that could explode if they're not disassembled carefully. And even when Li batteries are broken down this way, the products aren't easy to reuse.

"The current method of simply shredding everything and trying to purify a complex mixture results in expensive processes with low value products," says Andrew Abbott, a physical chemist at the University of Leicester. As a result, it costs more to recycle them than to mine more lithium to make new ones. Also, since large scale, cheap ways to recycle Li batteries are lagging behind, only **about 5%** of Li batteries are recycled globally, meaning the majority are simply going to waste.

But as demand for EVs escalates, as it's projected to, the impetus to recycle more of them is set to barrel through the battery and motor vehicle industry.



### Wind Turbine Blades Can't Be Recycled, So They're Piling Up in Landfills

Companies are searching for ways to deal with the tens of thousands of blades that have reached the end of their lives.

By Chris Martin February 5, 2020 at 6:00 PM GMT+8 Updated on February 8, 2020 at 12:54 AM GMT+8

### European nations for LNG procurement amid war in Ukraine



Pakistan says difficult to outbid

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#### THE SURPRISING PRODUCTS **WE GET FROM CRUDE OIL**











HOME HEATING

Home heating oil is basically the same as diesel, but it is taxed at a lower rate. Heating oil is dyed red show it has not been taxed as high and can't be used for vehicles.

FUEL FOR SHIPS

Because this fuel is much cheaper than other fuels, it's widely used as fuel for ships.

**POWER PLANTS** 

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## THANK YOU



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