



Strategies to Bridge the Gap Between Ideals and Reality:

A Pragmatic Path for Energy Transition

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The Gold Standards of Our Energy System

Paris Agreement

**Limit global
warming
to 1.5°C**

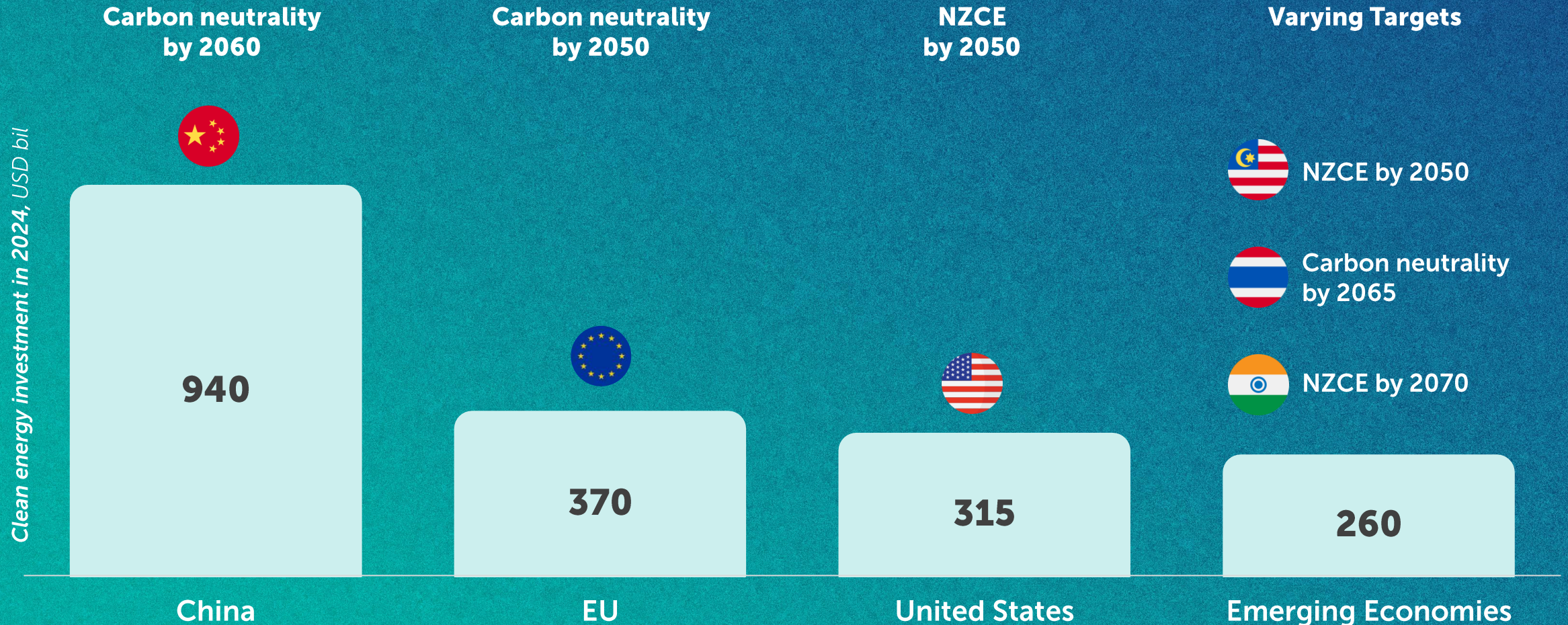
**Fossil fuel
phase out,
whilst meeting
growing energy
demands**

**Address
Energy
Trilemma**

3x
Renewable
energy by 2030
2x
Energy
Efficiency

Reality #01

Pace and maturity of energy varies across regions,
shaped by unique economic conditions and policy priorities



Source: BloombergNEF, IEA

Reality #02 | Criticality of energy security vs. aspiration to pursue energy sustainability presents an ongoing conflict for many, especially in Asia



Rising Energy Demand in Asia

Southeast Asia (SEA) one of the fastest growing regions in Asia-Pacific and the world, with a GDP of ~ USD 2.4 trillion

Fossil fuels projected to maintain dominant share in energy mix, accounting for ~80% by 2040

Electricity demand in SEA anticipated to double by 2040



High Costs, Low Affordability

ASEAN requires USD 150 bil p.a. by 2030 for clean energy investments to achieve 1.5°C goal

Only one-fifth of global clean energy investments in EMDE, excluding China

Access to financing and investment risks deter investors

Elevated project costs due to supply chain limitations



Infrastructure and Ecosystem Readiness

Technical hurdles, including grid connectivity and capacity

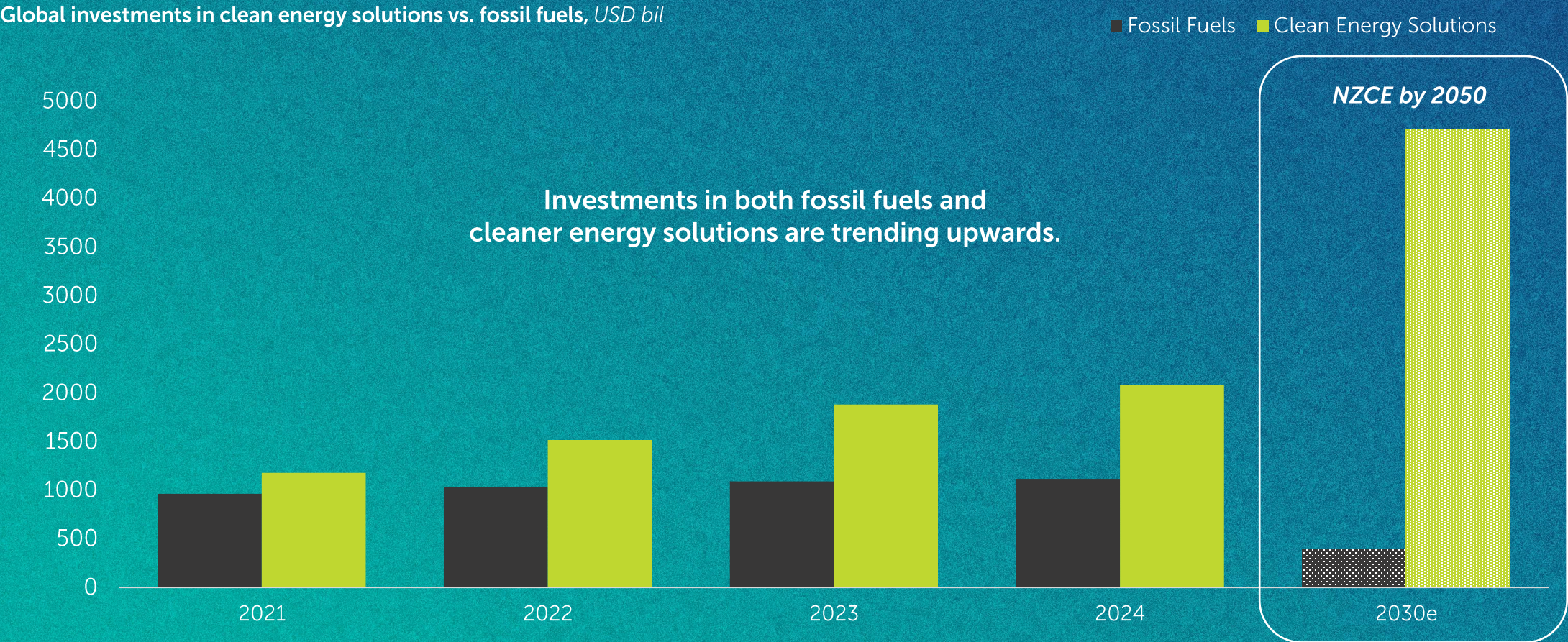
Differences in national regulations & institutional barriers

Role of gas as destination fuel: Infrastructure investments needs and gas market liberalisation

Reality
#03

The world now invests almost twice as much in clean energy as it does in fossil fuels, but not enough to achieve the 1.5°C goal

Global investments in clean energy solutions vs. fossil fuels, USD bil



Source: BloombergNEF, IEA

Reality #04

Cleaner energy solutions need to get to scale, but held back by commercial viability

Portfolio Course Corrections

"Peer A, B and C scrapped plans for Hydrogen projects due to lack of demand"

"Peer D paused Biofuel project to assess the most commercial way forward"

"Peer E and F exited Offshore Wind projects in selected regions"

"Peer G, H and J scaled back RE plans and focus on increasing oil and gas production"

"Peer K and L reduced low carbon business team as part of portfolio review"

Cost
inflation



High financing
costs



**Unattractive
Margins**



Supply chain
bottlenecks



Changing
regulatory regime

Perennial Debate



Crucial need for a pragmatic path – for a balanced energy mix to meet growing global energy demands, especially in Asia

PETRONAS Energy Transition Strategy



Core Business

*More Energy,
Less Emissions*



New Business

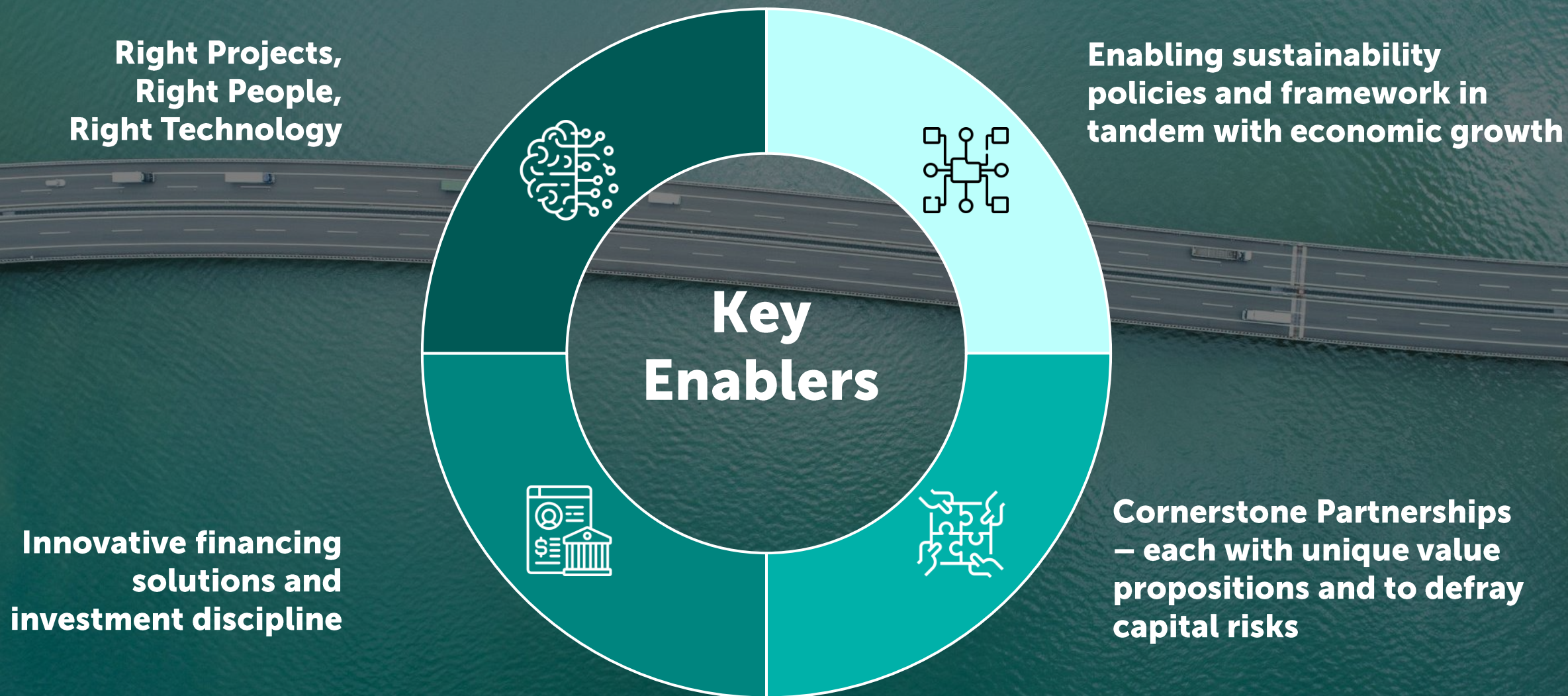
*Capturing New
Growth Opportunities*



Net Zero Carbon Emissions

*Pathway
to Net Zero*

Energy transition has its complexities, but we cannot afford any inaction - and it cannot progress in isolation



Malaysia: National Energy Transition Roadmap (NETR)

Malaysia's Energy Landscape

2%
Annual energy demand growth until 2050

>70%
Total energy supply contributed by fossil fuels by 2050

Aims 70%
Installed electricity generation capacity from RE by 2050

>5GW
Data centre energy consumption expected by 2035

Energy Transition Levers

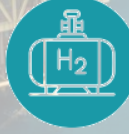
Optimise



Energy Efficiency



Renewable Energy



Hydrogen



Bioenergy



Green Mobility



Carbon Capture, Utilisation & Storage

Shift to Renewables

Abate

Flagship projects championed by PETRONAS



Biorefinery in Pengerang, Johor, to produce a range of bio-based products, incl. SAF, HVO, ASF and biochemicals.



Kasawari CCS where CO₂ will be captured from the gas production field and stored in the depleted fields

Realising Malaysia's CCS Hub

**Attractive
Incentives**

**Solid Line-up of
Partnerships**

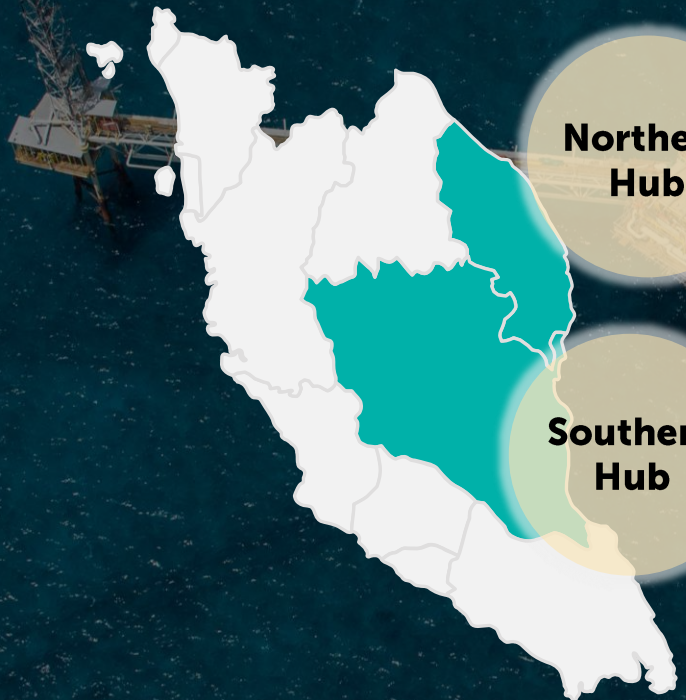
**Northern
Hub**

**Southern
Hub**

**Eastern
Hub**

**Technology &
Capability**

**Supportive Policies /
Regulatory Frameworks**



Cornerstone Partnerships: Japan – Regional Collaborator & Facilitator of Asia's Energy Transition

**>USD 150 bil
Total
expenditure on
R&D FY2023**

**Leader in clean
energy
technologies**

**Supportive
policy &
regulatory
frameworks**

**USD 1006 bil
in funding via
Japan's GX
Policy**



**Japan Organisation
for Metals and
Energy Security**



**PETRONAS JOGMEC MoC SC
Meeting (28 June 2023)** led by Vice
President, Technologies of Energy
Business Unit Dr Koji Yamamoto



Engagement with Japan METI (26th July 2023)
led by Director General Natural Resources and
Fuel Department Mr Yuki SADAMITSU. METI
had requested to sign MoU on Cross Border
Transportation of CO₂ during the 3rd Asia CCUS
Networks scheduled on 27th September 2023.

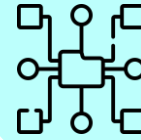


**Engagement with Japan JOGMEC (26th July
2023)** led by Director General Hydrogen &
CCS Project Department Mr MIYOSHI Keisuke.

**Right Projects,
Right People,
Right Technology**



**Enabling sustainability
policies and framework in
tandem with economic growth**



**Key
Enablers**

**Innovative financing
solutions and
investment discipline**



**Cornerstone Partnerships
– each with unique value
propositions and to defray
capital risks**



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Passionate About Progress