



ASEAN Centre for Energy
One Community for Sustainable Energy

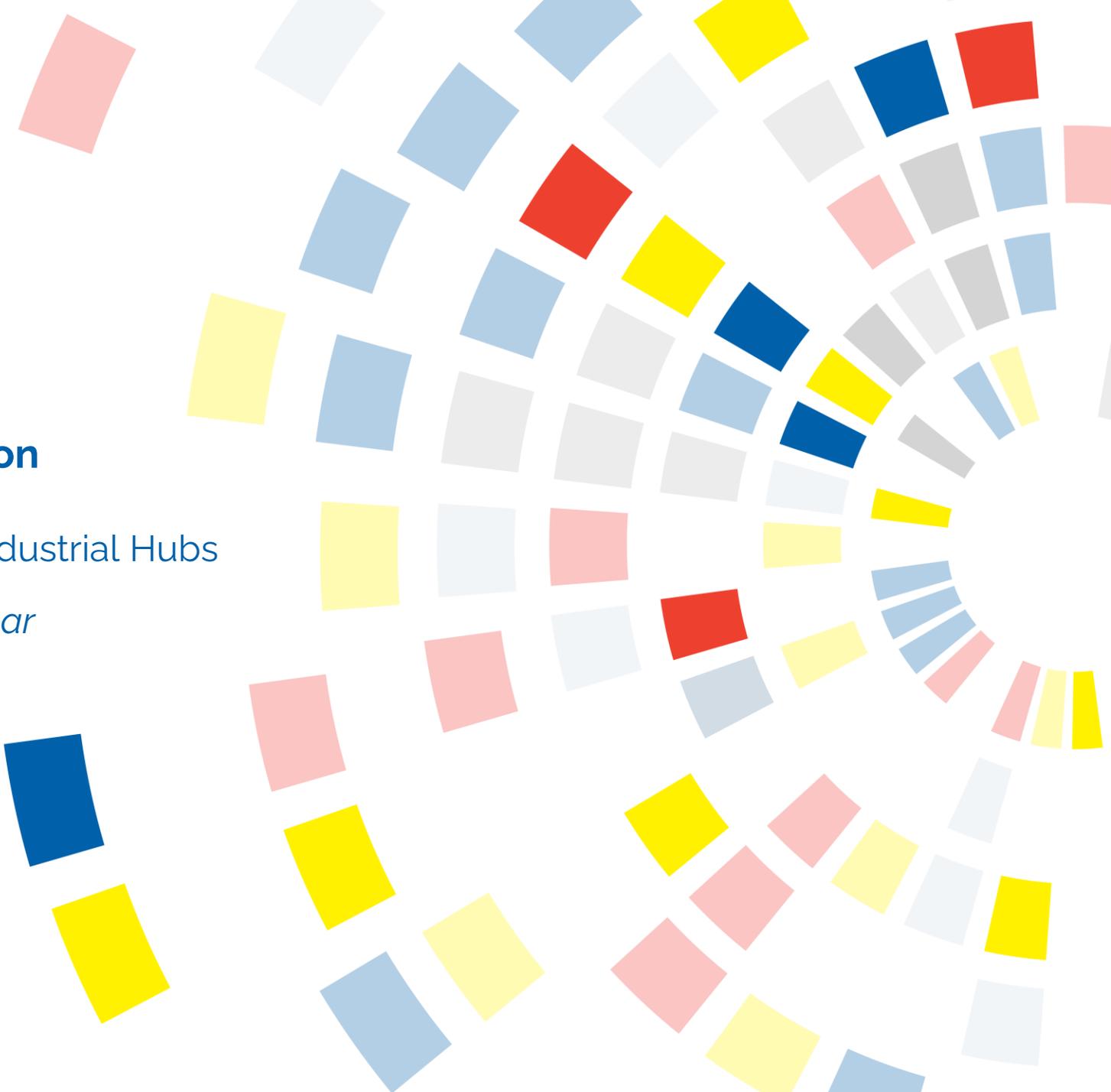
Exploring Opportunities for Low-Carbon Hydrogen and Ammonia in ASEAN: Current and Future Policies, Markets, and Industrial Hubs

CEFIA Flagship: Hydrogen & Ammonia Webinar
February 13th, 2026

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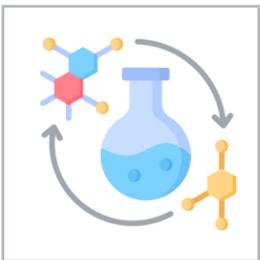




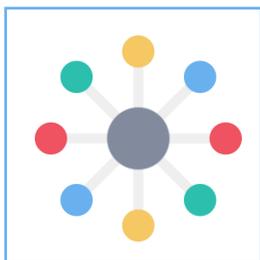
Introduction to ASEAN Centre for Energy (ACE)

Established on 1 January 1999, the **ASEAN Centre for Energy (ACE)** is an **intergovernmental organisation** within the ASEAN structure that represents the 10 ASEAN Member States' interests in the energy sector.

What we do?



Catalyst

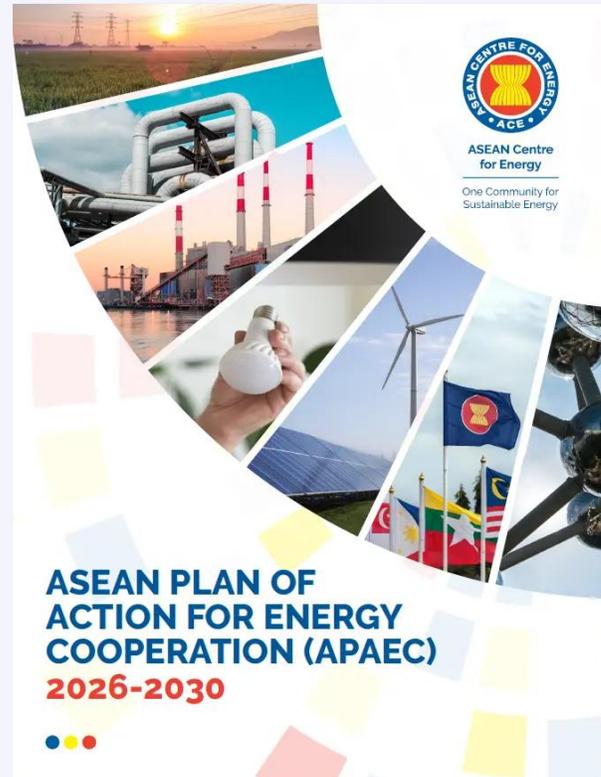


Knowledge Hub



Think Tank

Our regional energy cooperation blueprint, **ASEAN Plan of Action for Energy Cooperation (APAEC)**



APAEC is a series of guiding policy documents serve as the platform for cooperation within ASEAN as well as with dialogue partners and international organisations.

What does APAEC do?

Promoting multilateral cooperation and integration in the energy sector.

What is APAEC trying to achieve?

To attain the goals of the ASEAN Economic Community (AEC) by enhancing security, accessibility, affordability, and sustainability in the energy sector.



ASEAN Member States are exploring cleaner energy alternatives to reduce carbon emissions and reliance on fossil fuels.

Countries around the world, including ASEAN Member States have submitted their **Nationally Determined Contributions (NDCs) targets for greenhouse gas (GHG) reduction and net-zero/carbon neutrality**, to tackle the effect of climate change.

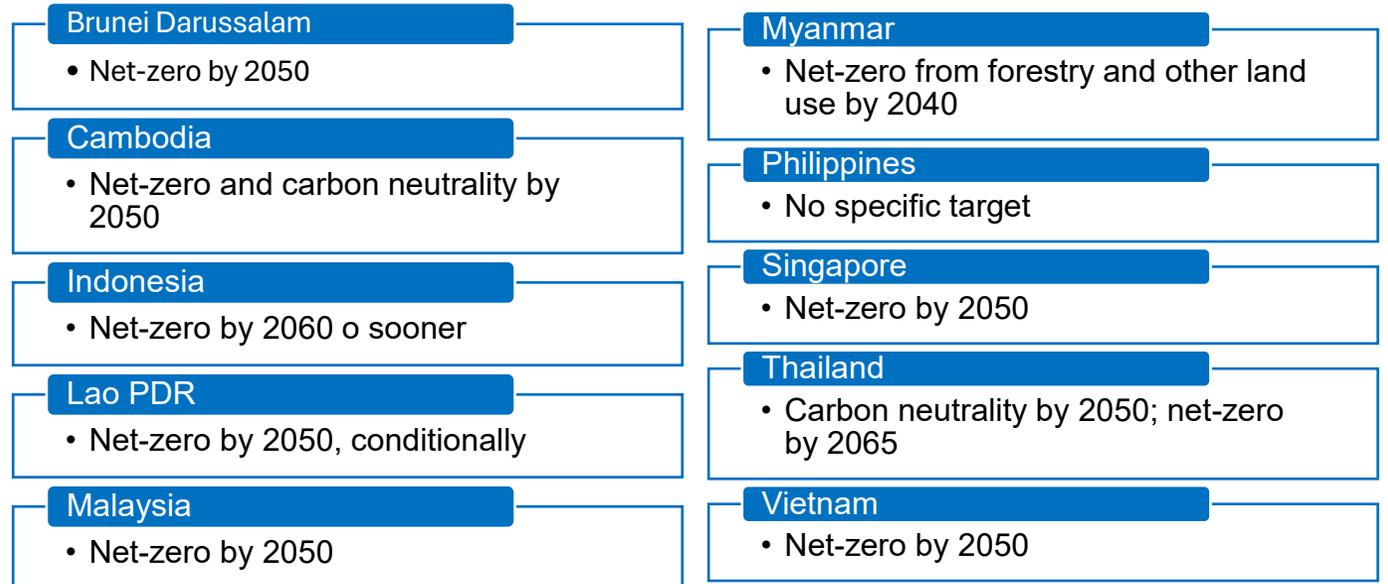
NDCs for GHG reduction targets



Reference: ACE (2024) – The 8th ASEAN Energy Outlook

- Almost 77% of the GHG in ASEAN are primarily generated from the energy sector, industrial process, and land use.
- To support the achievement of those targets, as well as to fulfil the rapid growth of energy demand, countries are **exploring cleaner alternative energy sources utilisation**, such as hydrogen and ammonia to decarbonise the energy and industrial sector.

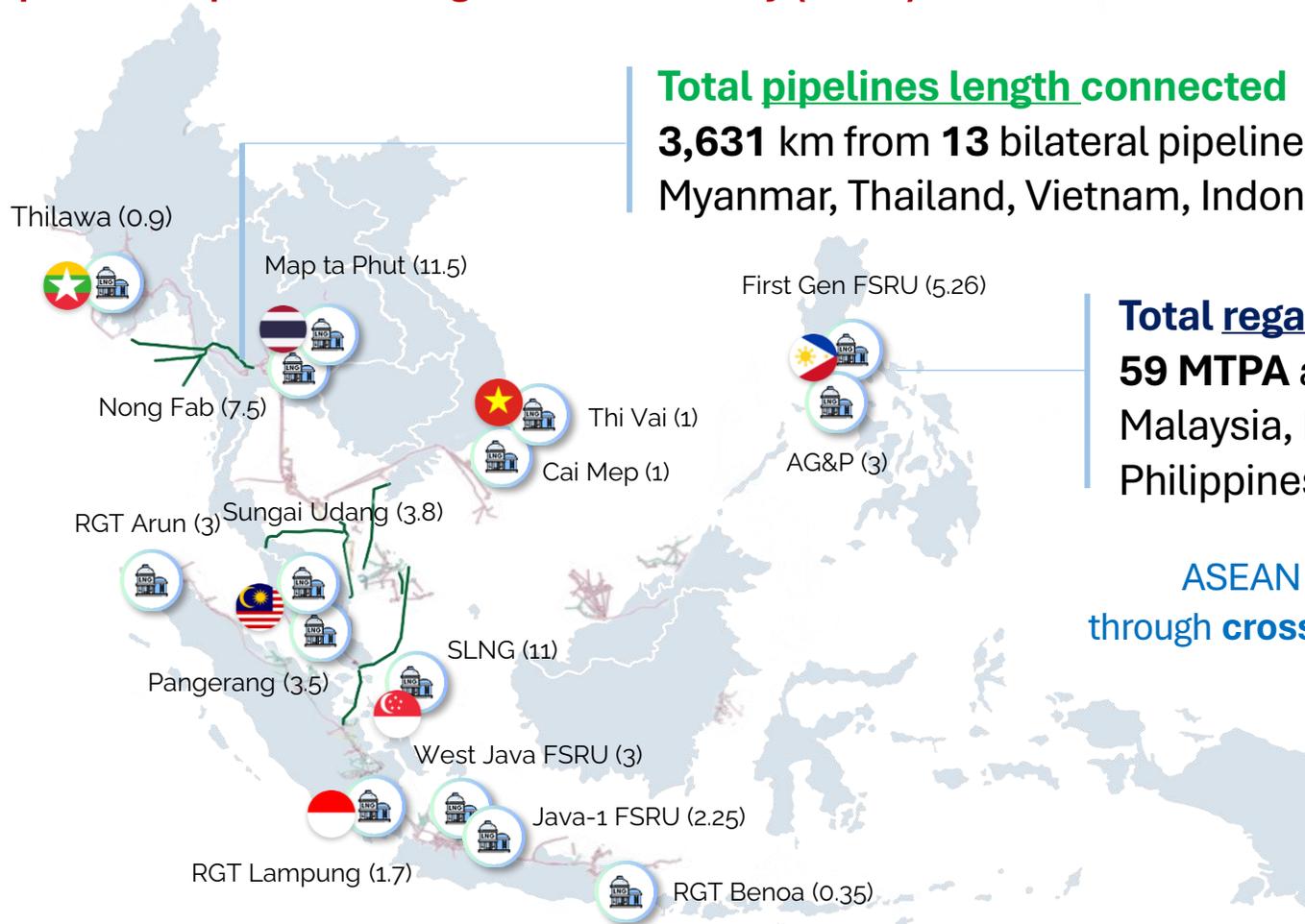
Net-zero targets





Industries are supported by a well-developed natural gas infrastructure

Map of LNG Pipeline and Regasification Facility (MTPA)



Total pipelines length connected

3,631 km from **13** bilateral pipelines connecting **6** countries: Singapore, Malaysia, Myanmar, Thailand, Vietnam, Indonesia

Total regasification capacity

59 MTPA across **14** terminals in **7** countries: Singapore, Malaysia, Myanmar, Thailand, Vietnam, Indonesia & Philippines

ASEAN has strengthened **regional energy security** through **cross-border gas pipelines**, enhancing physical connectivity across member states.

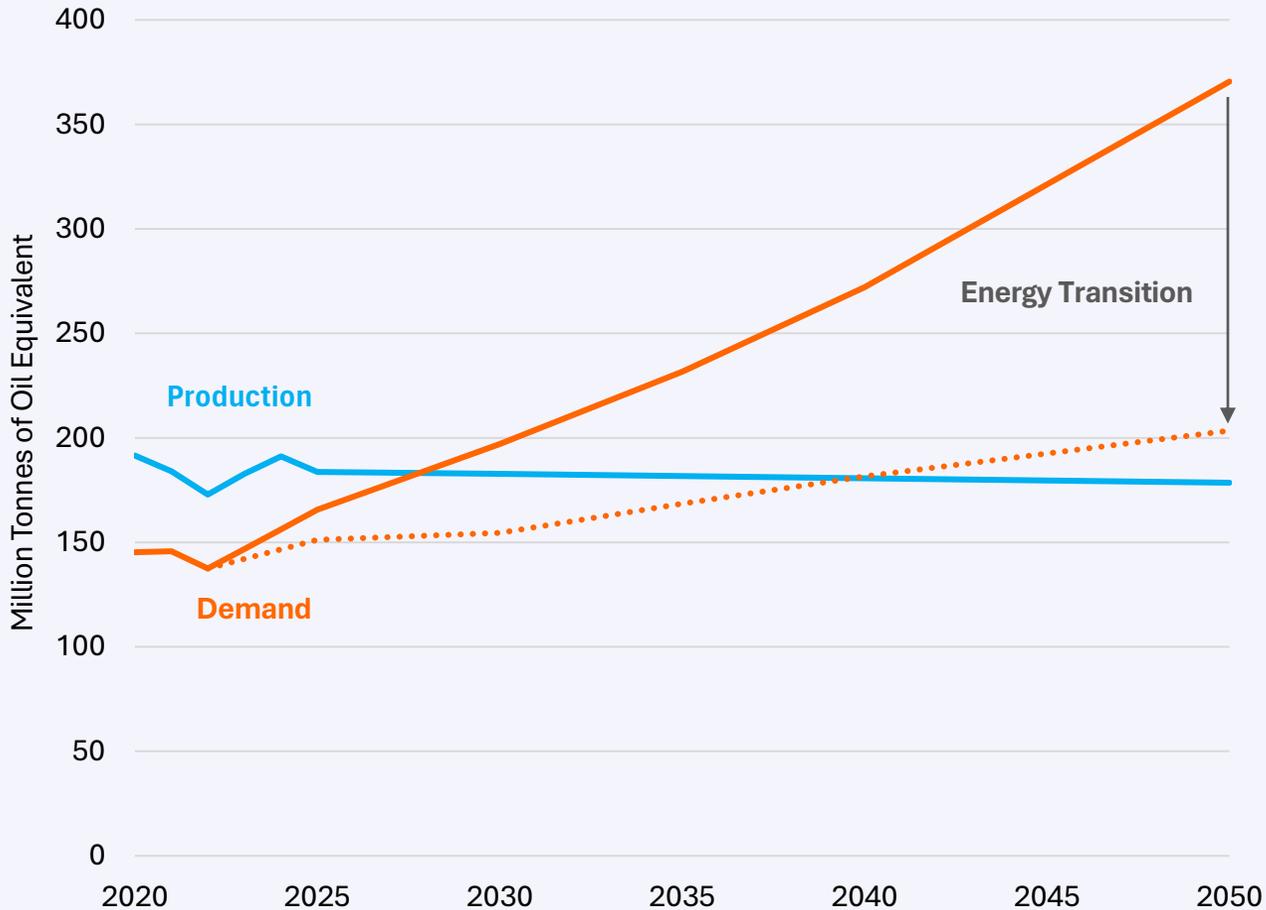
Expansion of **virtual pipeline** infrastructure via LNG regasification boosts flexibility and supports a low-carbon, resilient, and integrated regional energy future.

Source: ASEAN Oil & Gas Updates 2025



Natural gas demand as an industrial feedstock reaches 17 MTOE

Natural Gas Demand as an Industrial Feedstock in 2020-2050 (mtoe)



Total **natural gas demand as feedstock for industry in ASEAN is 17 million tonnes of oil equivalent (MTOE)**, with an additional 8 MTOE identified as potential for hydrogen blending in the future.

However, It is expected that the demand for power and industry will exceed 200 MTOE.

*) Important to note that this figure does not include natural gas use as fuel for other industries (e.g., cement).

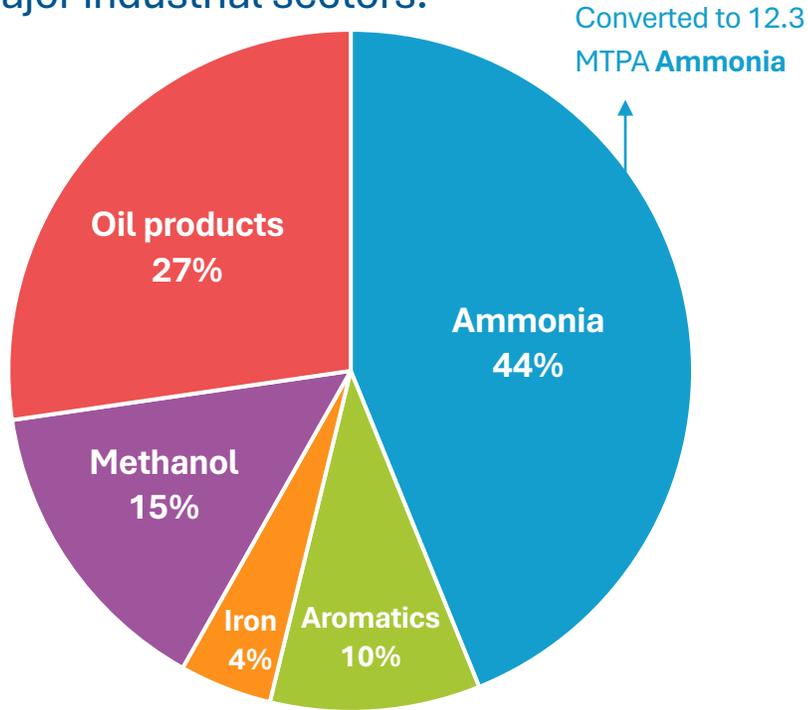
Notes:

- Energy transition reflects the gap between the business-as-usual (BAU) scenario and the carbon-neutrality scenario of the 8th ASEAN Energy Outlook.
- Future production is estimated using a decline rate of 2.2%.

Source: ACE analysis



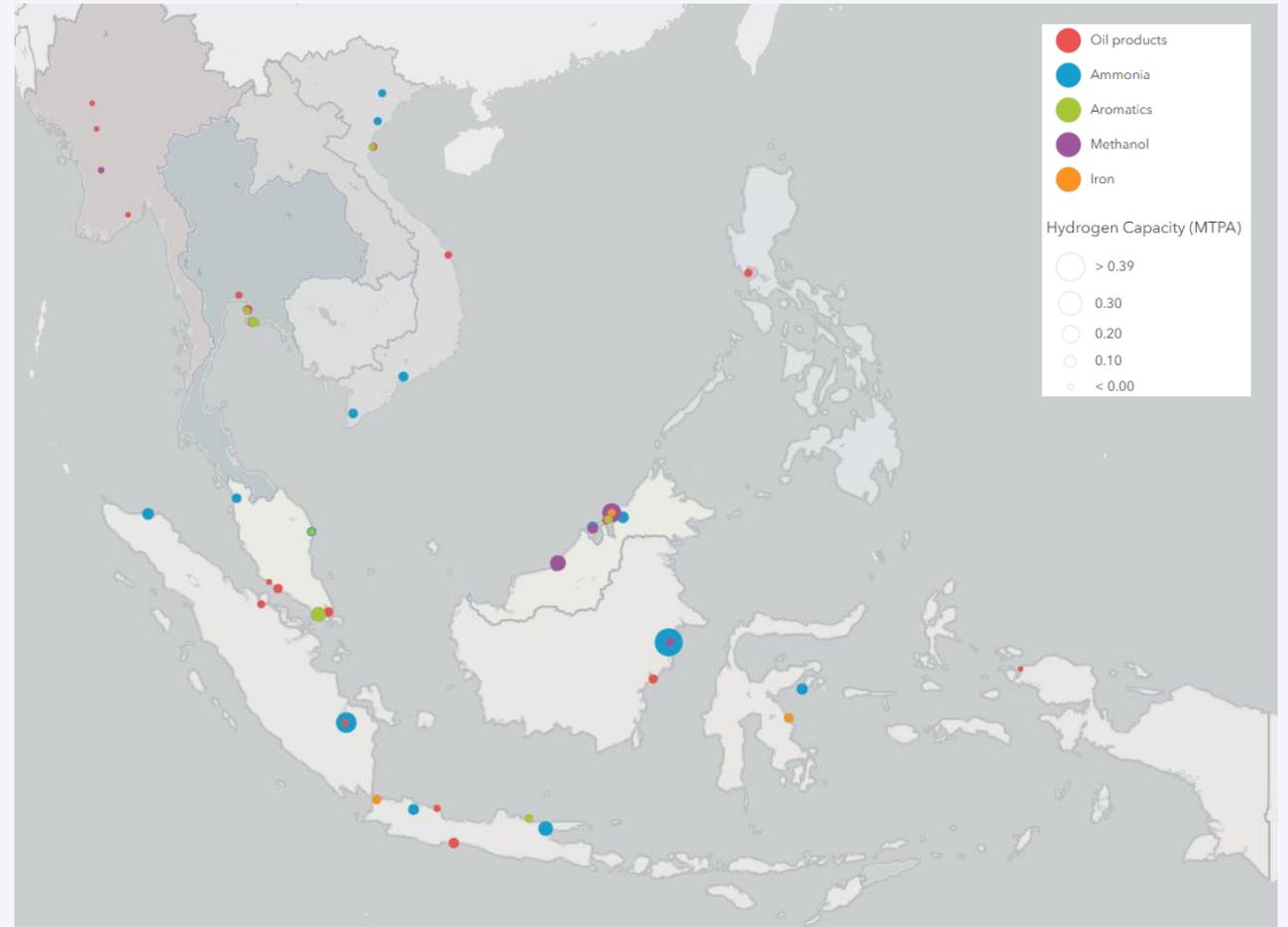
Currently, various industries use hydrogen that is produced from natural gas. Distribution of total hydrogen demand across major industrial sectors:



The smallest industrial facility **requires 240 tons per annum (tpa)** of hydrogen, while the largest needs up to **400,000 tpa**.

Source: ACE Analysis

The total demand for grey H₂ in industries across ASEAN is 4 MTPA

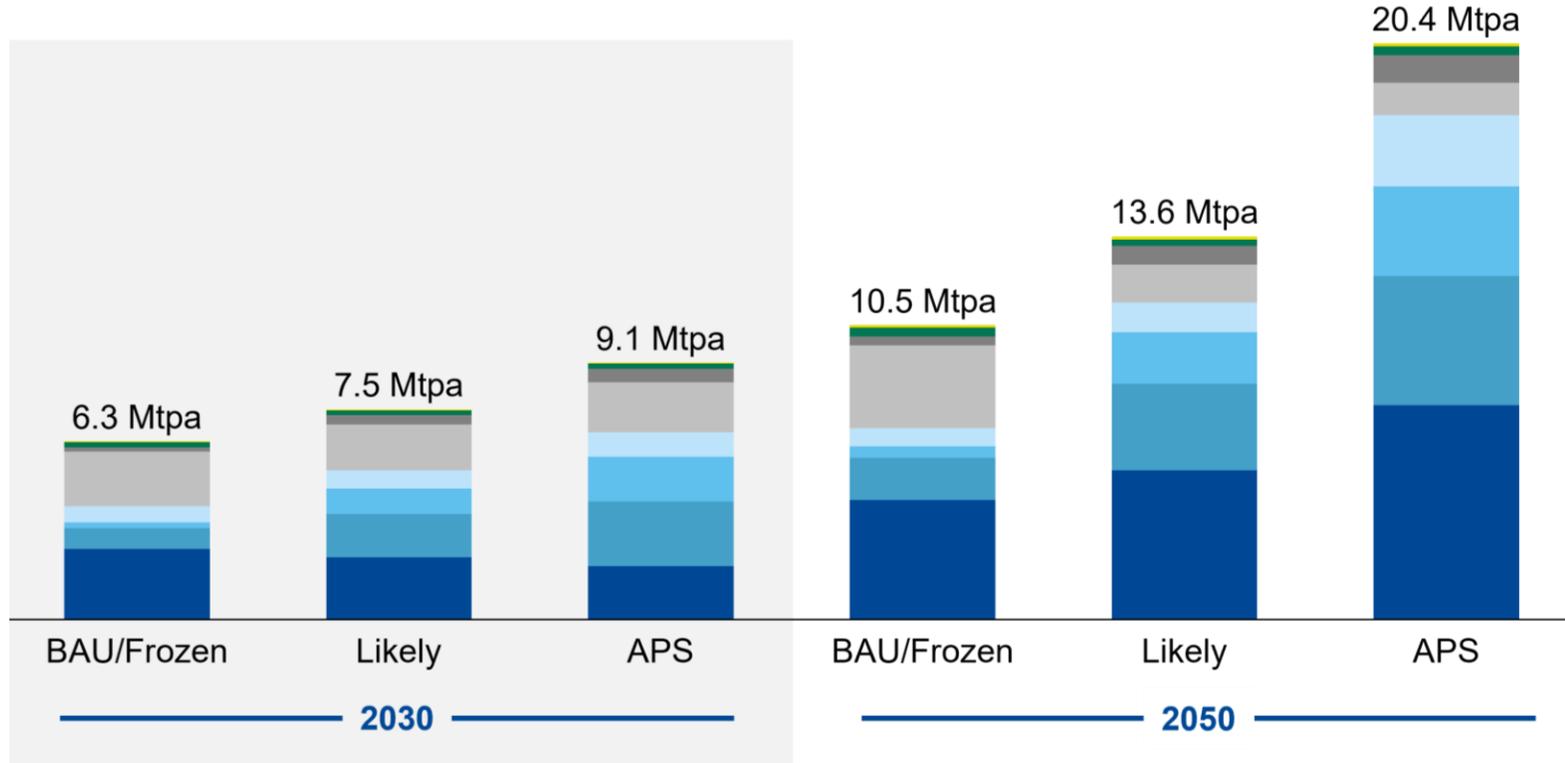


Source: ACE Analysis



Hydrogen (and ammonia) demand is expected to grow rapidly

Existing and future hydrogen demand in ASEAN



Hydrogen demand is expected to reach 9 MTPA by 2030 and 20 MTPA by 2050. Mainly driven by significant demand from methanol, mobility, power generation, and ammonia production facilities. **Ammonia is expected to be the largest** consumer of hydrogen, reaching 7.5 MTPA by 2050.

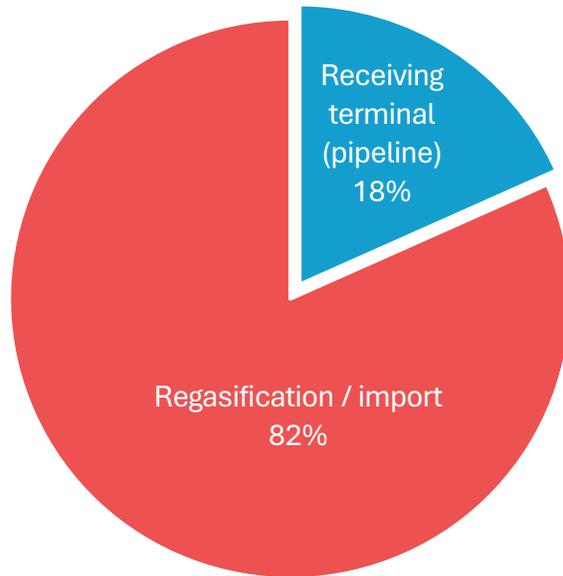
Source: ERIA, 2024



Note: alternative policy scenario (APS)



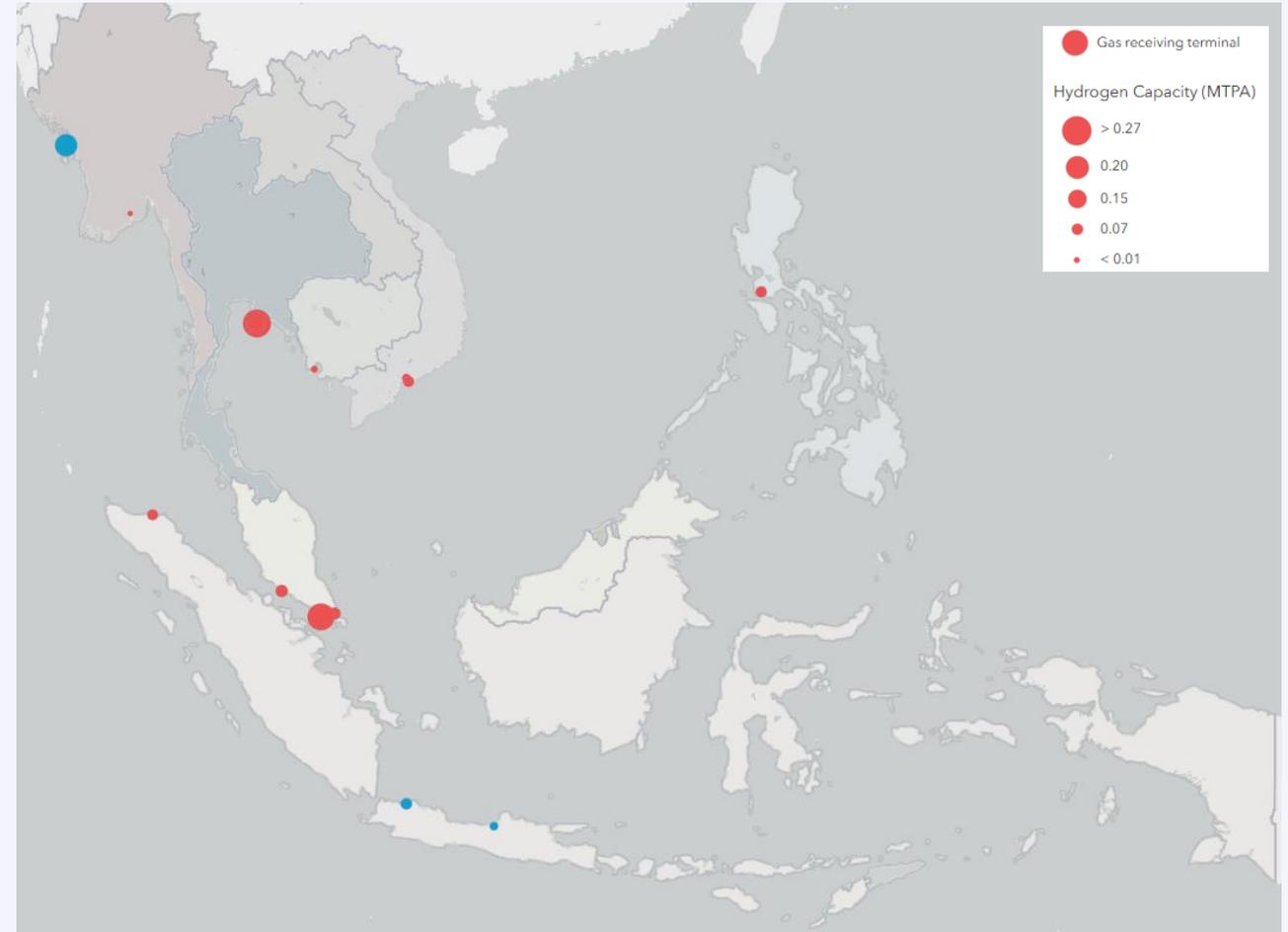
In addition, blending hydrogen with natural gas offers an opportunity to transport **hydrogen cost-effectively**. Distribution of potential hydrogen blending across natural gas infrastructure types:



Important to note that this figure **does not include** liquefaction facilities and Floating Storage and Regasification Unit (FSRU).

Source: ACE Analysis

The total potential of 20% low-carbon H₂ blending at receiving terminals is 1.8 MTPA

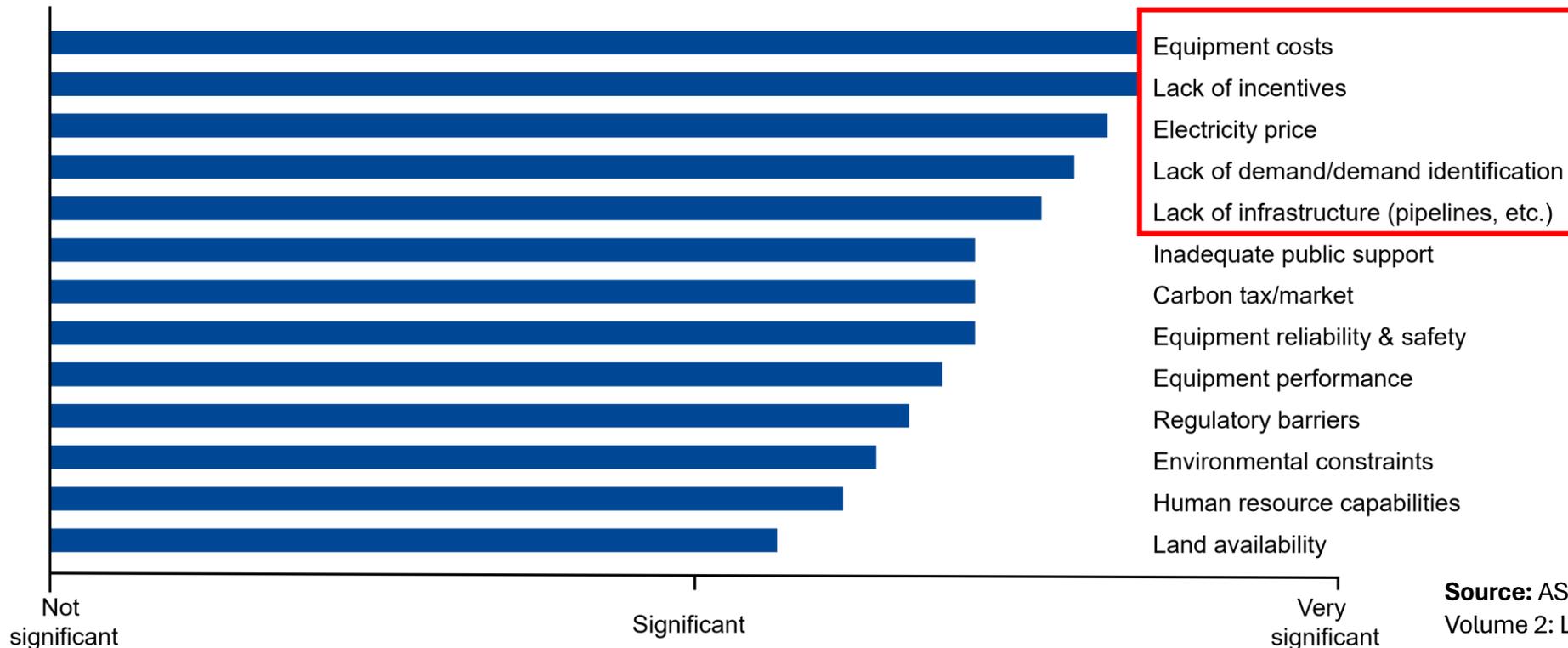


Source: ACE Analysis



What are the key challenges that the ASEAN Member States face in adopting low-carbon hydrogen?

Based on the survey that ACE conducted in 2024, the ASEAN Member States raised concerns over the following issues which inhibit the hydrogen adoption progress. The respondents were from the policymakers, regulators, power utilities, and oil and gas enterprises.



▶ Looking at the top obstacles, the ASEAN Member States need to **explore innovative supporting policies and facilitation mechanisms** to support the adoption of hydrogen in the region.

Source: ASEAN Energy Booklet 2025 - Volume 2: Low-Carbon Hydrogen in ASEAN



What supporting policies do the ASEAN Member States develop to help tackle the challenges?

The **four (4) AMS** that have developed their own national hydrogen strategy need to set tangible targets for hydrogen utilisation, while the **remaining AMS** need to identify the potential role of hydrogen in the nation’s energy mix and ultimately establish their national hydrogen strategies and plans.

AMS with national hydrogen strategy:



Indonesia

Staged adoption of low-carbon hydrogen (and ammonia) in various sectors, with production target of 198 ktpa of H2 by 2025 and 1.69 Mtpa of hydrogen and 9.5 Mtpa of ammonia by 2035.



Malaysia

Pursuing hydrogen economy, with a target income of RM 12 billion by 2030 through the hydrogen economy.



Singapore

Focus on technology leadership and workforce training with hydrogen playing a major role to decarbonise the national energy sector by 2050.



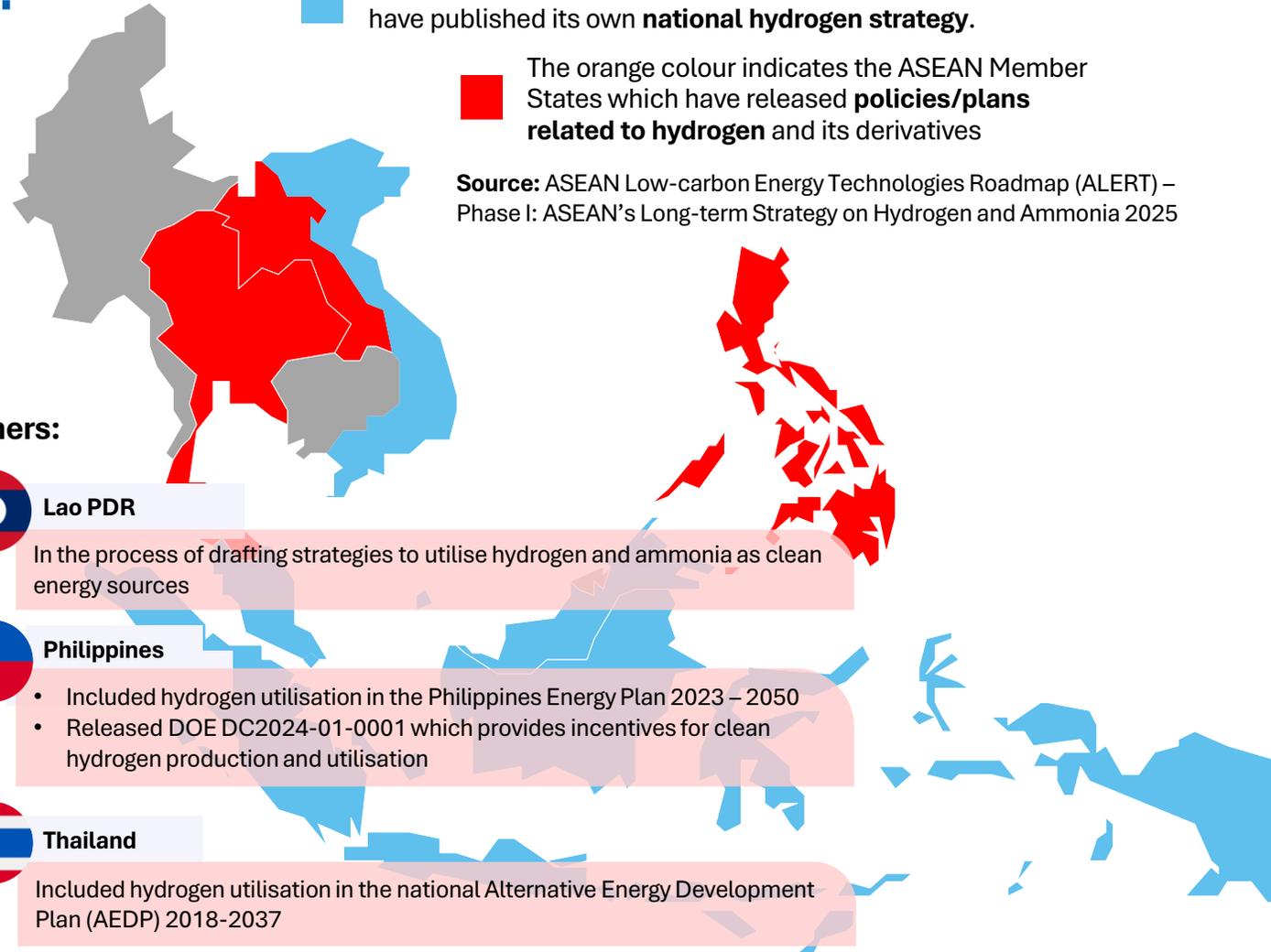
Viet Nam

Aims to produce 10 – 20 Mtpa of green and blue hydrogen by 2050; promote green hydrogen utilisation and its derivatives in all sectors.

 The blue colour indicates the ASEAN Member States which have published its own **national hydrogen strategy**.

 The orange colour indicates the ASEAN Member States which have released **policies/plans related to hydrogen** and its derivatives

Source: ASEAN Low-carbon Energy Technologies Roadmap (ALERT) – Phase I: ASEAN’s Long-term Strategy on Hydrogen and Ammonia 2025



Others:



Lao PDR

In the process of drafting strategies to utilise hydrogen and ammonia as clean energy sources



Philippines

- Included hydrogen utilisation in the Philippines Energy Plan 2023 – 2050
- Released DOE DC2024-01-0001 which provides incentives for clean hydrogen production and utilisation



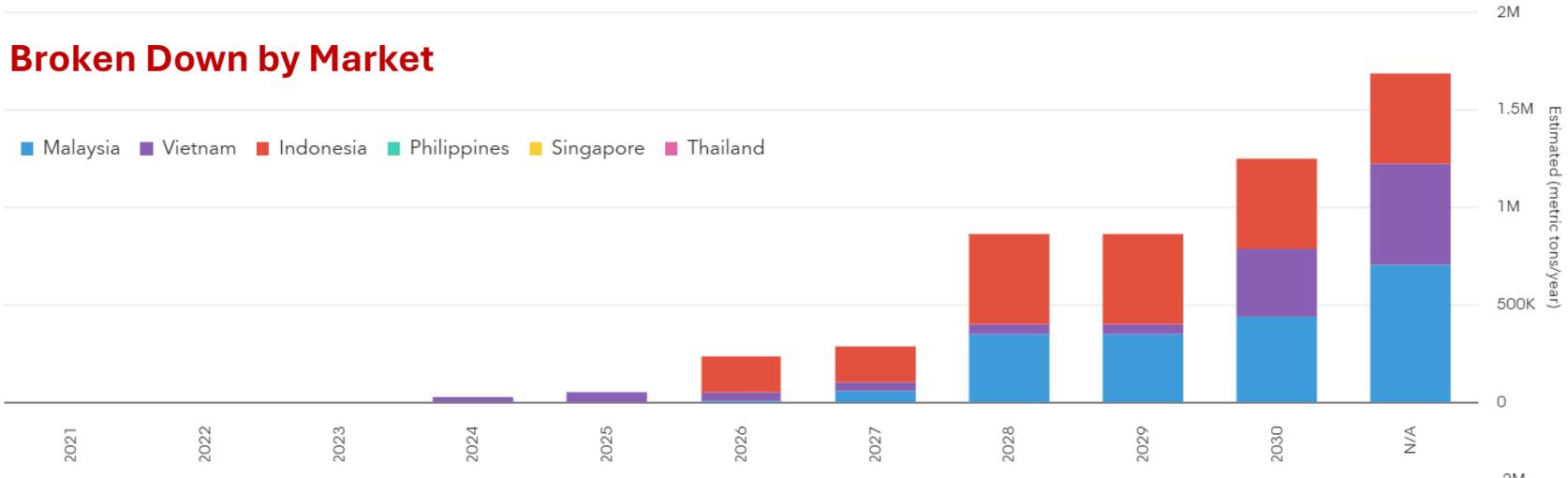
Thailand

Included hydrogen utilisation in the national Alternative Energy Development Plan (AEDP) 2018-2037

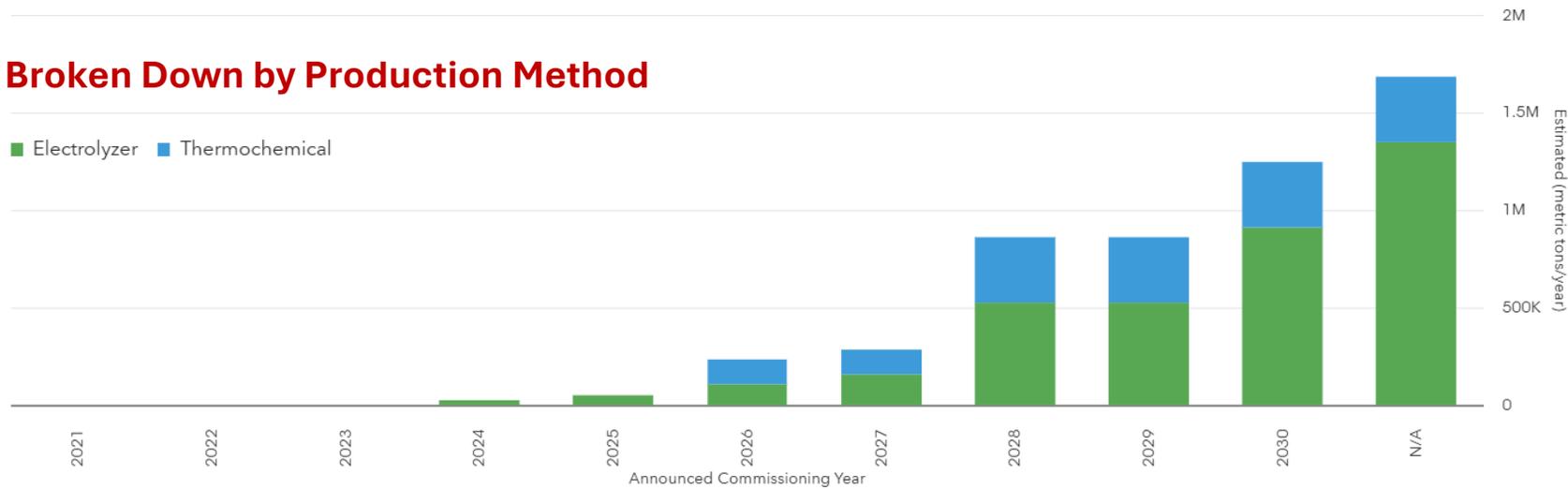


Through the supporting policies and plans, several pilot projects on hydrogen have been implemented within the region.

Broken Down by Market



Broken Down by Production Method



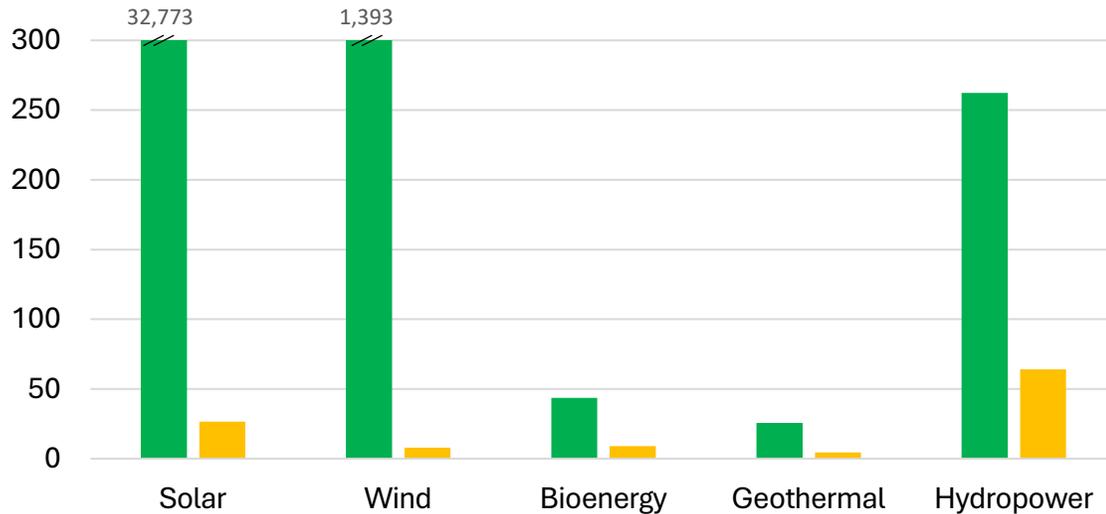
By 2025, projects announced across ASEAN are expected to achieve a total production capacity exceeding 1.5 MTPA, primarily led by Malaysia, Indonesia, and Vietnam, with most of the capacity sourced from renewables for green hydrogen generation. The largest project is a 0.2 MTPA of hydrogen for PT. Pupuk Indonesia.

Source: BloombergNEF. Hydrogen Production Assets. 2025.



ASEAN requires 31 GW electrolyser to supply renewable feedstock

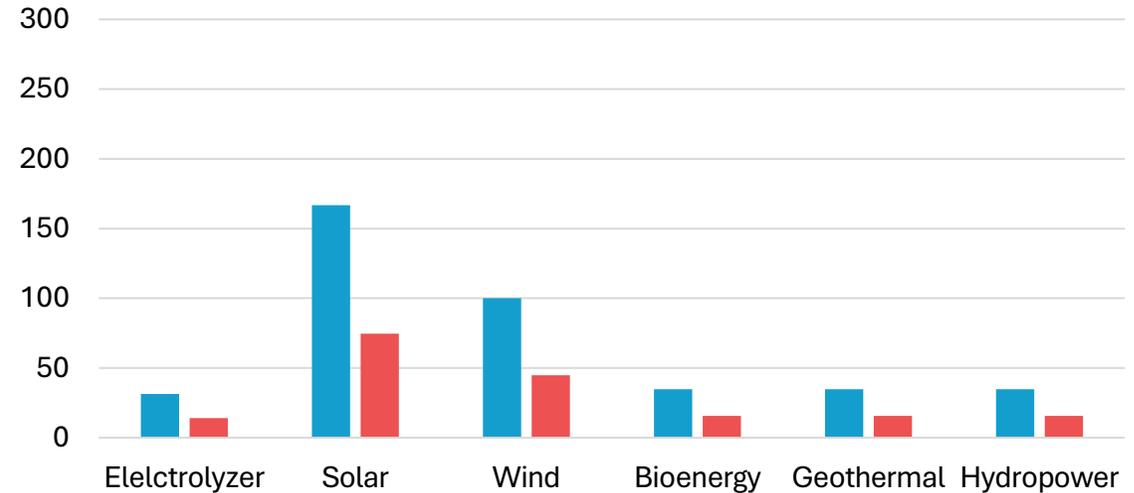
Potential & Utilised Renewables in ASEAN (GW)



Source: 8th ASEAN Energy Outlook

■ Potential (GW) ■ Utilised (GW)

Electrolyser Capacity & Required Renewables in ASEAN (GW)



Source: ACE Analysis

■ For industry (GW) ■ For blending (GW)

- To replace existing hydrogen with renewables, ASEAN will need 31 GW of electrolyser capacity. ASEAN has sufficient renewable potential to supply electrolyser units from a wide range of renewables, except geothermal.
- However, the renewable capacity needed to be built is **6 times** the current installed solar capacity, **12 times** the current wind capacity, **4 times** the current bioenergy capacity, or **half** the current hydropower capacity.



Hydrogen and ammonia under the new APAEC 2026-2030

Hydrogen and ammonia **connects with 6 (six) out of 7 (seven) Programme Areas** under the new energy cooperation blueprint **APAEC 2026-2030**:



Read more at go.aseanenergy.org/APAEC2026-2030

-   **ASEAN POWER GRID (APG)**
-   **OIL AND GAS CONNECTIVITY, SECURITY, AND SUSTAINABILITY (OGCSS)**
-   **CLEAN COAL TRANSFORMATION (CCTR)**
-   **ENERGY EFFICIENCY AND CONSERVATION (EE&C)**
-   **RENEWABLE ENERGY (RE)**
-   **REGIONAL ENERGY POLICY AND PLANNING (REPP)**
-  **CIVILIAN NUCLEAR ENERGY (CNE)**

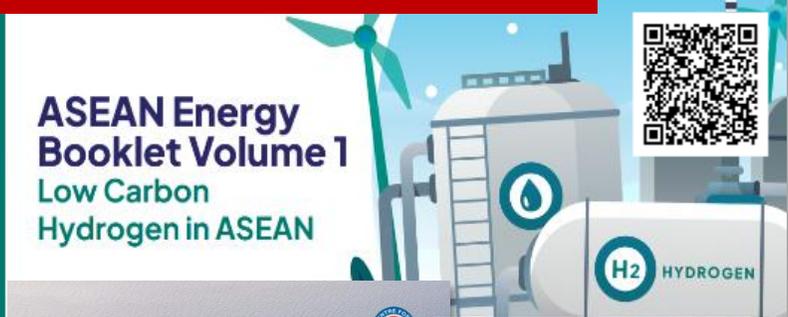


ACE is supporting the region's efforts towards low-carbon hydrogen adoption.

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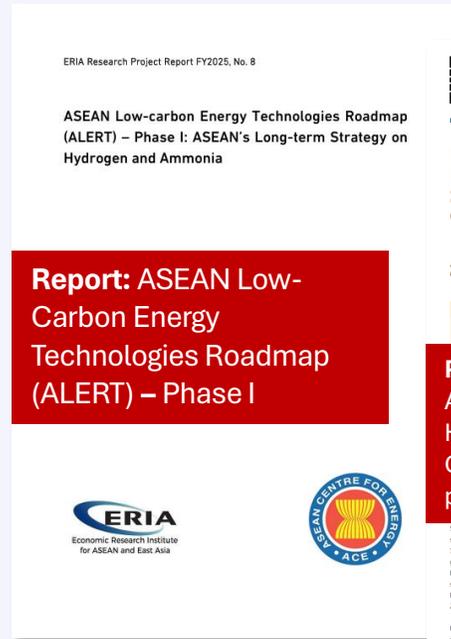
ASEAN Energy Booklet Vol.1: Low Carbon Hydrogen in ASEAN



Blog: Breaking the Cycle: Unlocking the Potential of Low-Carbon Hydrogen in ASEAN



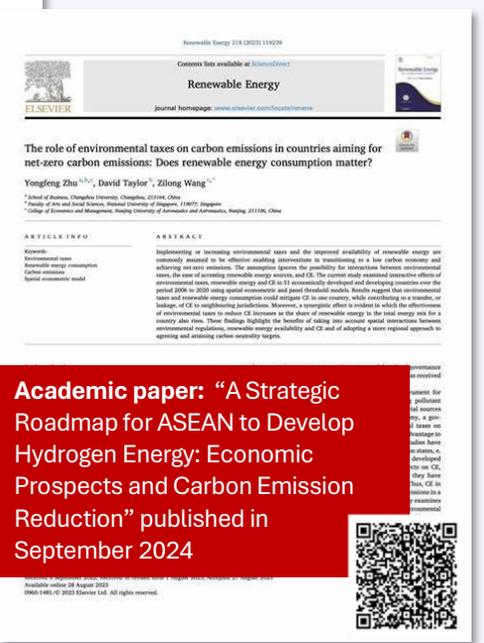
Blog: Addressing the Financing Gap for Hydrogen Development in ASEAN



Report: ASEAN Low-Carbon Energy Technologies Roadmap (ALERT) – Phase I



Policy Brief: How Southeast Asia Should Embrace Hydrogen: Energy Security and Climate Change Perspectives, published in April 2023



Academic paper: "A Strategic Roadmap for ASEAN to Develop Hydrogen Energy: Economic Prospects and Carbon Emission Reduction" published in September 2024

ACE collaborate with ERIA to study on the role of low-carbon hydrogen and ammonia in the ASEAN energy mix and develop strategies to further accelerate the adoption of hydrogen.

ACE co-authored the publication in the International Journal of Hydrogen



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