Overview of the ASEAN Hydrogen Clusters Development

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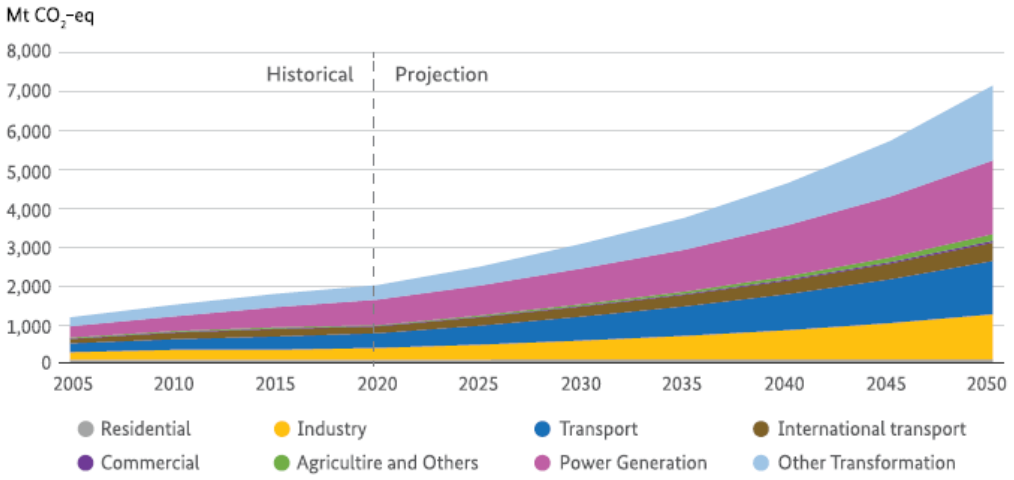
Why do the ASEAN Member States need to consider hydrogen and ammonia?



The latest emission reduction targets announced by ASEAN member states and submitted to the UNFCCC

Country	Official emission reduction target	Carbon neutrality or NZE target
Brunei Darussalam	Reduce GHG emissions by 20% by 2030 from the BAU scenario	NZE by 2050
Cambodia	Reduce GHG emissions by 42% by 2030 from the BAU scenario	Carbon neutrality by 2050
Indonesia	Reduce GHG emissions by 31.89% by 2030 (unconditionally) and 43.2% by 2030 (conditionally) from BAU scenario	NZE by 2060
Lao PDR	Reduce GHG emissions by 60% by 2030 (unconditionally) from the BAU scenario	NZE by 2050
Malaysia	Reduce carbon intensity by 45% from 2005 level by 2030 against GDP	NZE by 2050
Myanmar	Reduce GHG emissions by 244.5 Mt CO2e by 2030 (unconditionally) and by 414.75 Mt CO2e by 2030 (conditionally)	Partial NZE from LULUCF by 2040
Philippines	Reduce GHG emissions by 75% by 2030 from the BAU scenario, of which 2.71% is unconditional and 72.29% is conditional	N/A
Singapore	Reduce GHG emissions to around 60 MtCO2e in 2030 after peaking emissions earlier	NZE by 2050
Thailand	Reduce GHG emissions by 30% by 2030 from the BAU scenario	Carbon neutrality by 2050, NZE by 2065
Vietnam	Reduce GHG emissions by 15.8% by 2030 (unconditionally) and by 43.5% by 2030 (conditionally) from the BAU scenario	NZE by 2050

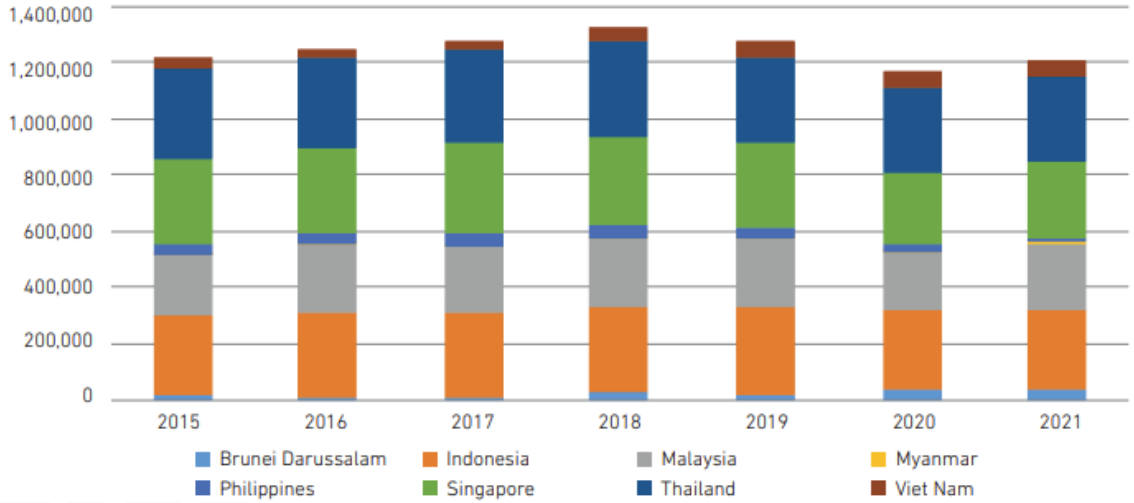
Data source: UNFCCC

Based on the 7th ASEAN Energy Outlook (2022), energy-related GHG emissions in the Baseline Scenario are **predicted to reach 2,471 Mt CO2eq by 2025**, around **120% of the 2020 GHG emissions**.

The ASEAN Member States' commitment to reducing carbon emissions push the need for the utilisation of cleaner alternative energy sources, such as hydrogen and ammonia.

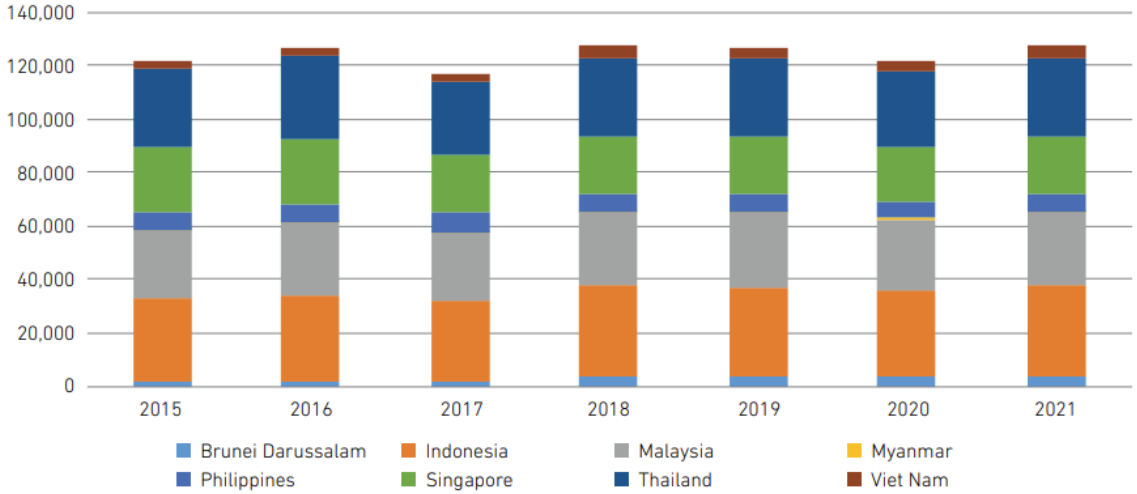
What are the current and potential roles of hydrogen and ammonia in ASEAN's industry?

Hydrogen Demand from Oil Refining (in tons per annum)



Source: ERIA (2024)

Hydrogen Demand of Chemicals by Country (in tons per annum)



Source: ERIA (2024)

The ASEAN Member States currently utilise hydrogen as **a feedstock for oil refining process and petrochemical processing**, mainly on fertilisers. **Indonesia, Thailand, Singapore, and Malaysia** lead the region's oil refinery, chemical, and manufacturing sector demand for hydrogen.

In meeting the **growing industrial demand** and in **compliance with the decarbonisation agenda**, hydrogen posed as a long-term low-carbon technology solution for the industrial sector, long-haul transport, and to some extent the power generation sector. It is also supported by the **abundant renewable energy resources** in ASEAN.

What is the current situation of hydrogen clusters development in ASEAN?

Indonesia

1. Batam Bintan Green H2 Cluster (25-100 ktpa by 2027)
2. Ulubelu Green H2 Cluster (25-100 ktpa by 2027)
3. Aceh Green Industry Cluster (25 ktpa green H2, 180 ktpa green NH3)
4. Cilegon Blue H2 Cluster (by 2027)
5. North Sulawesi Green NH3 Cluster (500 ktpa by 2030)

Malaysia

6. H2ornbill Kuching H2 facilities (90 ktpa green H2 by 2030)
7. H2biscus Bintulu H2 facilities (150 ktpa green H2 by 2027)

Vietnam

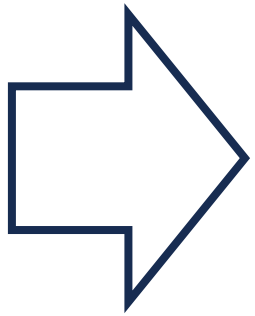
8. Dong Gio Linh Green Industrial Cluster (60 ktpa green H2)
9. Tra Vinh Green H2 Manufacturing Plant (182.5 ktpa green NH3 by 2026).

What are the challenges in developing hydrogen technology and clusters in ASEAN?

Main Challenge

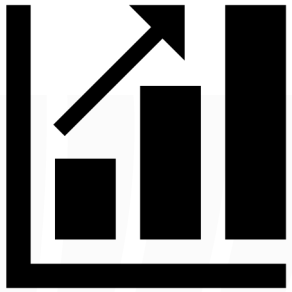
Economic

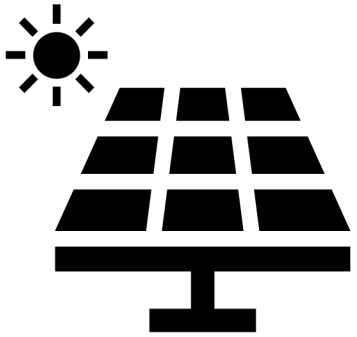
Technical



- Reducing the high cost of low-carbon hydrogen production
- Establishing an economic ecosystem for hydrogen energy
- Reducing the risks and costs of storage and transportation
- Reducing the costs of key equipment in hydrogen energy

What are the opportunities in developing hydrogen technology and clusters in ASEAN?





Steadily increasing industrial energy demand

Vast RE resources

Regional hydrogen trading

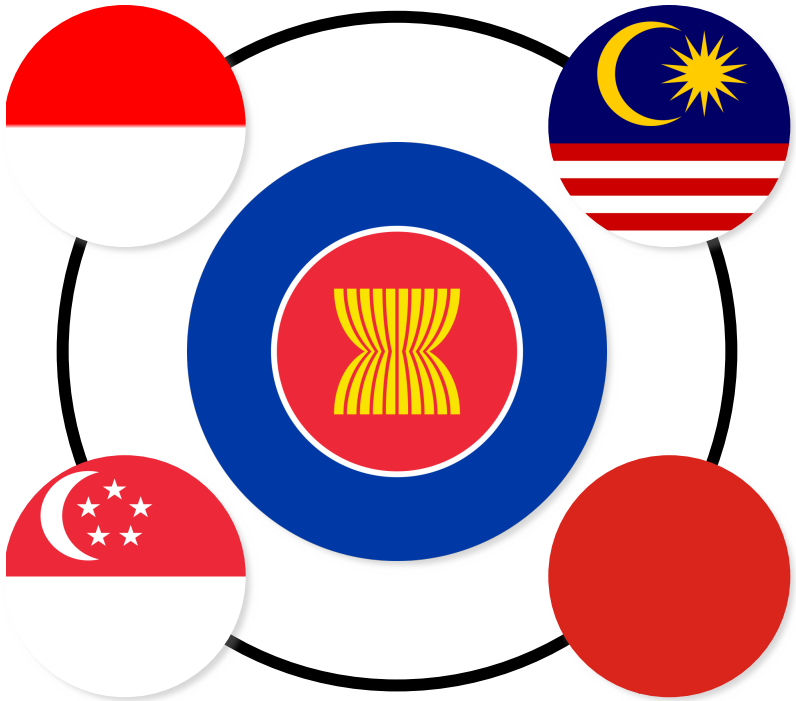
ASEAN Energy Cooperation

What policies and plans are in place for hydrogen development in the ASEAN region?

Four (4) ASEAN Member States have released their own national hydrogen strategies, with different focus from each country depending on the countries' priorities and resources.

Development of blue and green hydrogen to replace fossil fuels in all industries, including power generation.

Focusing on hydrogen technology leadership and workforce training, with the aim to decarbonise energy and transportation sector

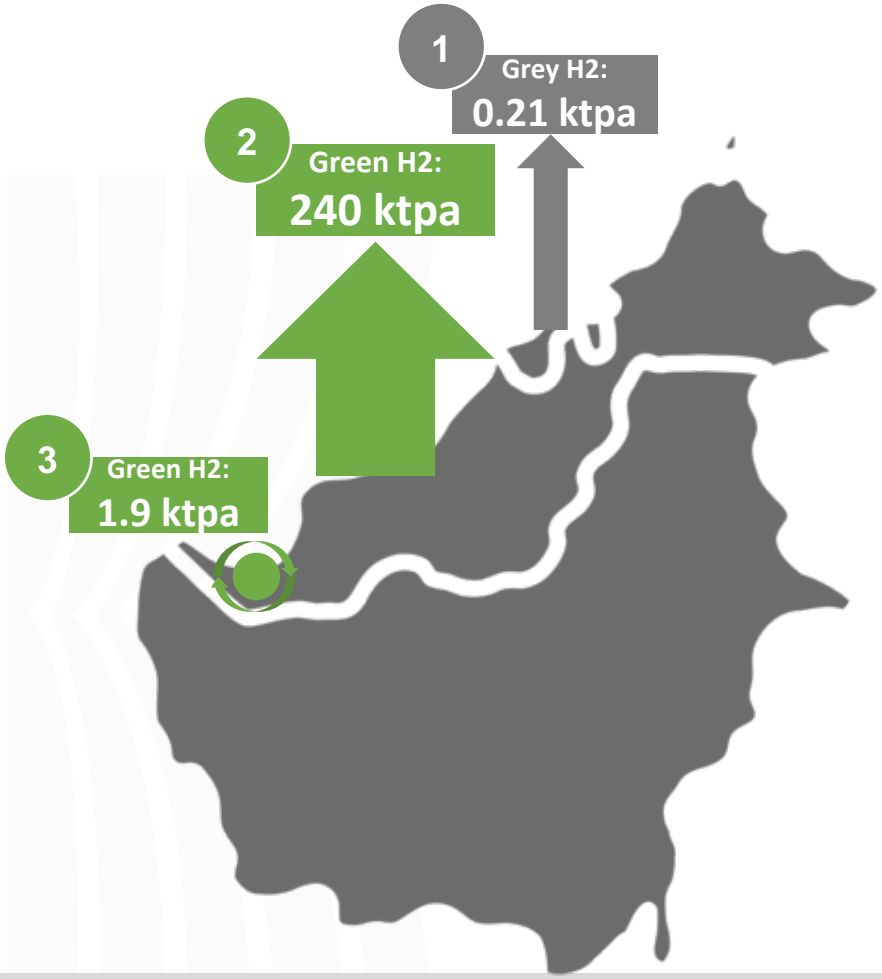


Pursuing hydrogen economy as part of its commitment to a blue and green future.

Promoting the application of green hydrogen energy and hydrogen-derived fuels in all energy sectors.

What are the existing projects on hydrogen and ammonia in ASEAN?

Borneo Island, which includes Sarawak (Malaysia) and Brunei Darussalam, leads the development of existing and planned hydrogen projects.



1 Advanced Hydrogen Energy Chain Association for Technology Development (AHEAD) Project

Exported around 0.21 ktpa of grey hydrogen in 2020	Grey hydrogen supply chain between Brunei Darussalam to Japan

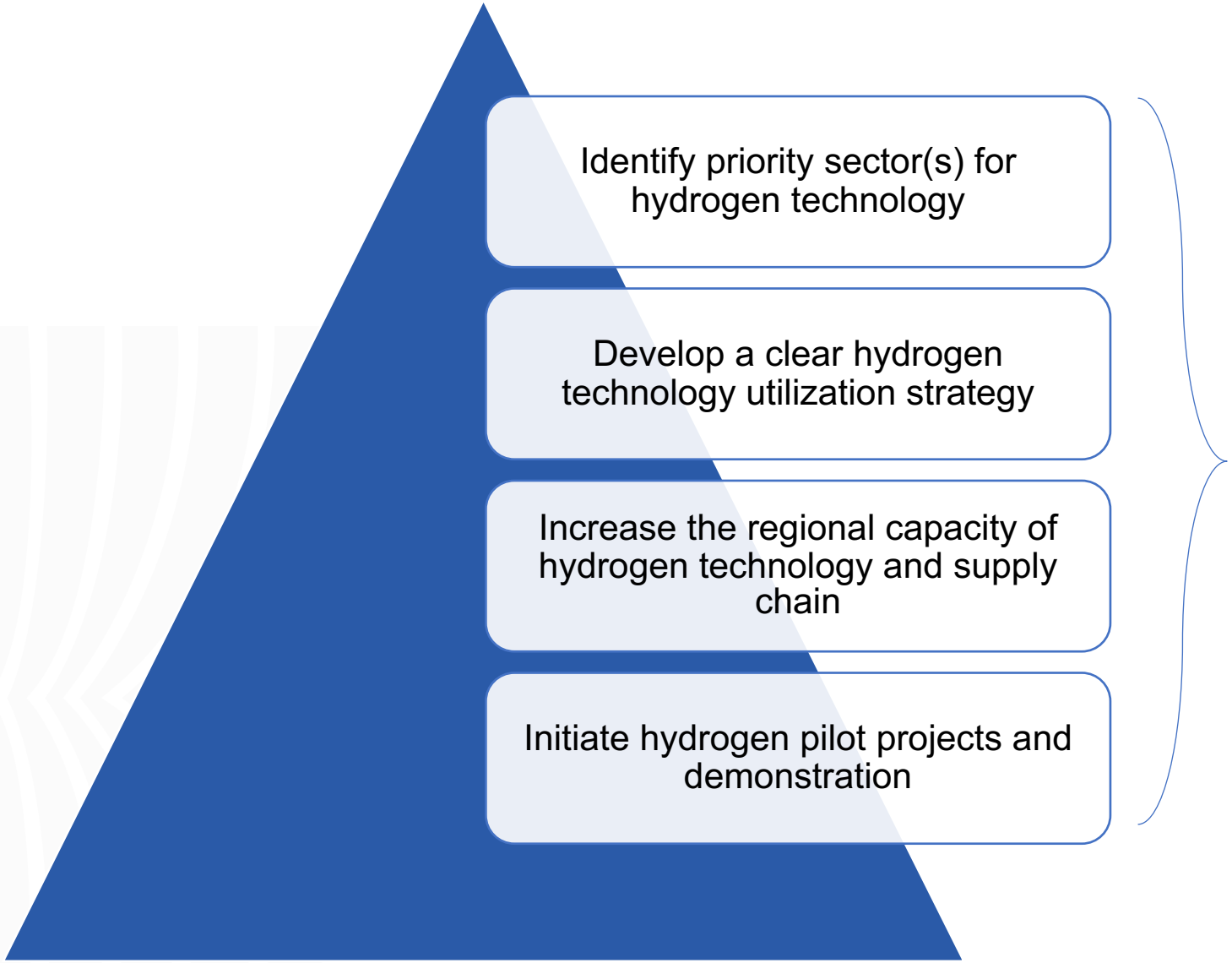
2 H2biscus & H2ornbill Project in Sarawak

Green hydrogen production with a total capacity of 240 ktpa by 2030, to be exported to Japan and South Korea	Total investment of USD 4.2 billion

3 Rembus Depot Hydrogen Production Plant and Refuelling Station

Green hydrogen production facilities with a total capacity of 1.9 ktpa for the transportation sector by 2025	Total investment of around RM 400 – 500 million

What's next for hydrogen in ASEAN?



- Identify priority sector(s) for hydrogen technology
- Develop a clear hydrogen technology utilization strategy
- Increase the regional capacity of hydrogen technology and supply chain
- Initiate hydrogen pilot projects and demonstration

Cooperation must be fostered among the ASEAN Member States to reduce renewable energy production costs through policies and regulations

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