KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI

HYDROGEN ECONOMY & TECHNOLOGY ROADMAP

ASIA PACIFIC GREEN HYDROGEN CONFERENCE & EXHIBITION

10 - 12 JUNE 2024

BORNEO CONVENTION CENTRE KUCHING, SARAWAK

KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI

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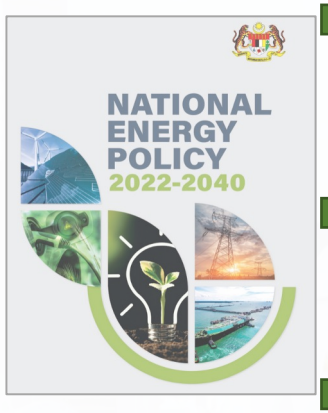
HYDROGEN ECONOMY: CASE FOR CHANGE IN MALAYSIA

HYDROGEN ECONOMY & TECHNOLOGY ROADMAP

Aligned to the targets of the 12th Malaysia Plan (RMK-12), National Energy Policy 2022-2040 (DTN) and the Malaysia MADANI aspirations



Factor 1

To increase the revenue & productivity in exports, mobility, power generation, industrial heating and non-energy

- Blue hydrogen as a **transition through CCUS** to reach the ultimate goal of **green hydrogen**.
- **Potential in POME biomass of** approximately **65 million tonnes** per year[1]
- **Hydropower** as the means to achieve **31% RE capacity mix**. Untapping **RM 7.7 billion** hydrogen potential in **2050** [2].

2050 Potential Economic Value of Hydrogen, in USD Billions[5][6]

Malaysia 8x, 24.80
Malaysia 4X, 12.40
Malaysia 2X, 6.20
Malaysia, 3.10 - BAU

Factor 2

To push for green growth aspirations in transportation sector (light vehicles, pickup trucks, buses, heavy vehicles)

- Transportation **constitutes 36.4% of the final energy use by sector** in Malaysia [3]
- Global trend to **phase out internal combustion engines** in major cities will be the underlying force for Malaysia to adopt cleaner transport fuels.
- Hydrogen demand from transportation sector is forecasted to reach **RM 3.7 billion in 2050** [2].

Outlook on the transportation sector

13.5 Mil vehicles (2040)
10.5 Mtoe (2040)
10.8 Mtoe (2040)
4.7 Mtoe (2040)

Factor 3

To cement Malaysia's position as the key hydrogen player in Asia Pacific

- Malaysia as a potential hydrogen exporter in South-East Asia to fulfil hydrogen demands from APAC.
- Japan, South Korea and China as the main importer of hydrogen.
- Opportunities of **USD 81.12 billion in 2050** equivalent to **249,271 ktoe**[2].

USD 81.12 billion opportunity in 2050

Factor 4

To strengthen the labour market by creating job opportunities from the hydrogen economy

- The COVID-19 pandemic has disrupted the economic growth of Malaysia to **-5.6% in 2020** and **increased unemployment up to 711,000 in 2020** compared to 508,200 in 2019 [4].
- Hydrogen economy provides opportunities to rejuvenate our economy as well as to create new jobs in the future.

GDP
2020 -5.6%
2019 4.4%

UNEMPLOYMENT
2020 711.0k
2019 508.2k

Factor 5

To increase national intellectual capabilities and capacities in hydrogen technologies

- **Since 2000, 1,561 hydrogen related publications** have been published, while research funding related to hydrogen stands at **121 projects since 2006** [7].
- The trends shows that Malaysia is actively building its national intellectual capabilities and capacities in hydrogen technologies, creating talents and intellectual property rights (IPRs).

1,561 Research Publications CAGR 7.0% (2015-2020)

121 Research Funding CAGR 25.0% (2015-2020)

[1]MPOB Palm Oil Development No. 72. 2020.
[2]Perspectives on Hydrogen in the APEC Region. Asia Pacific Energy Research Centre. 2018
[3]National Energy Balance 2018
[4] Department of Statistics Malaysia 2020.
[5] Global figures derived from 80 EJ projected hydrogen demand in 2050. Hydrogen Scaling Up. Hydrogen Council 2017.
[6] APAC, ASEAN and Malaysian figures derived from Table 2.8 Hydrogen Energy Demand in APEC Economies (in Nm3).
Based on 7% energy mix scenario, BAU, no intervention from the government. Perspectives on Hydrogen in the APEC Region. Asia Pacific Energy Research Centre (APERC). 2018.
[7] Refer to page 16

HETR FRAMEWORK

Hydrogen Economy and Technology Roadmap (HETR)

Vision

To be a leading Hydrogen Economy country by 2050 while achieving the world's decarbonisation targets

Mission

To develop a robust and competitive ecosystem across the hydrogen value chain through accelerated technological advancement

Goals

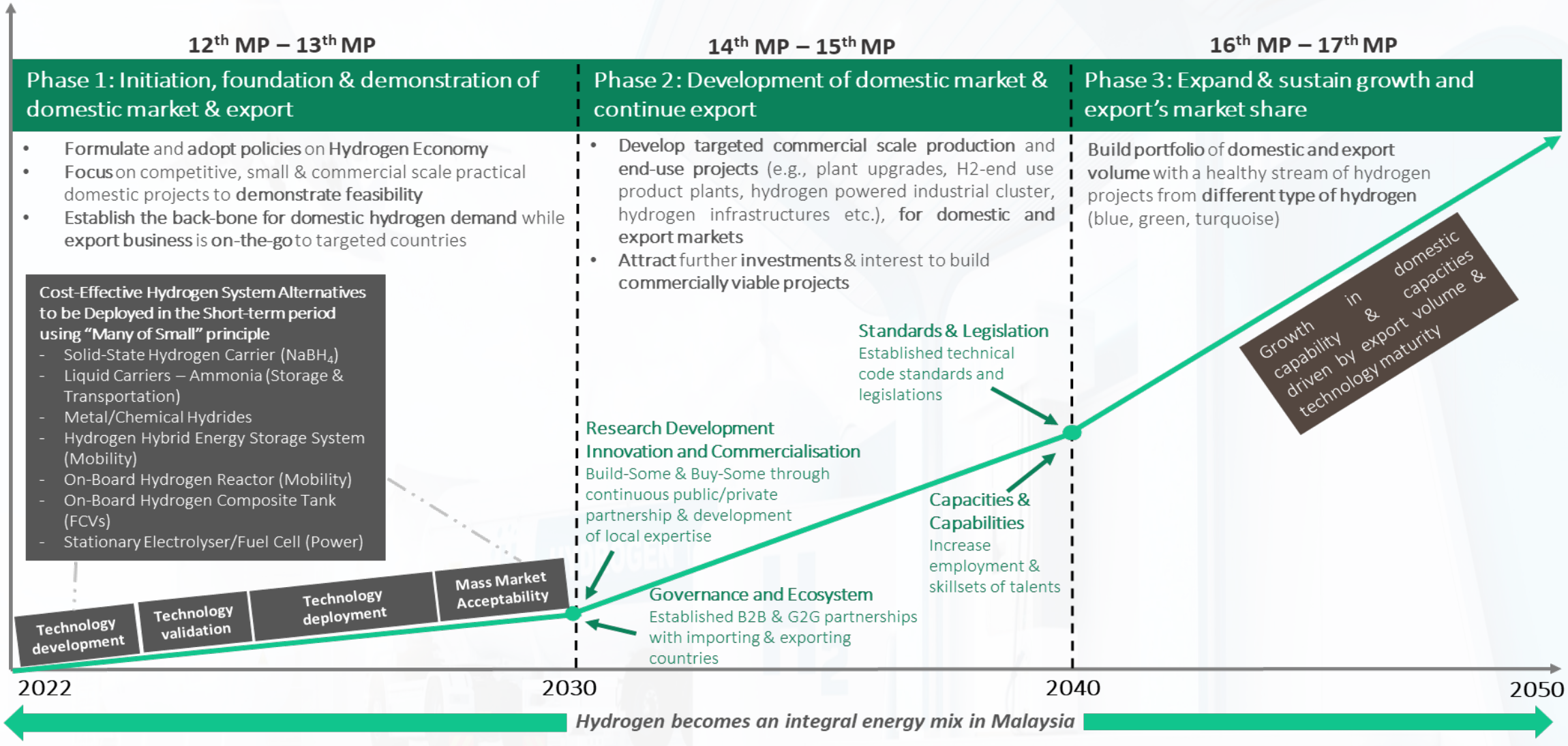
Hydrogen to be the cornerstone for new energy economy in Malaysia and take lead among ASEAN countries and establish a strong global presence on hydrogen supply chain and shift from moderate to high significant trade	Malaysia to achieve a sustainable energy mix through diversification of energy types or sources and increase cleaner energy shares in Malaysia's energy mix	Malaysia to invest in hydrogen technologies to address domestic consumption, stability, security of energy, sustaining international energy trading and decarbonise emissions

Strategic Thrusts

ST1	ST2	ST3	ST4	ST5
Strengthening governance system, Institutional framework and regulatory mechanism	Facilitating enabling environment and economic instruments	Accelerate commercialisation of technology to enable export and domestic uptake	Capacity development and capability enhancement	Communication, Education, Public and Awareness

5 Strategic Thrusts, 9 Strategies and 29 Action Plans

PHASES OF DEVELOPMENT



ACTIVITIES AND STATUS

5 Oct. 2023
HETR Launch by YAB Dato' Sri Haji Fadillah bin Haji Yusof, Deputy Prime Minister, Kuala Lumpur

14 Nov. 2023
IRENA Forum: *Towards Energy Transition in ASEAN*, Johor Bahru

30 Nov 2023
HETR Roundtable Series 1 2023, Kuala Lumpur

13-14 May 2024
ASEAN Green Hydrogen Conference, Kuala Lumpur

Jun/July 2024
National HETR Steering Committee Meeting

Oct. 2023
Visit to the Fukushima Hydrogen Energy Research Field (FH2R), Fukushima JAPAN

24 Nov. 2023
Malaysia Centre for 4IR – World Economic Forum (WEF) *Energy Transition Roundtable,* Putrajaya

Mar-Apr 2024
Demonstration MHRU dan Toyota MIRAI Ceremony, Putrajaya

10 June 2024
Asia Pacific Green Hydrogen Conference & Exhibition 2024, Kuching

Dec. 2024
MHRS Project Launch