

18 MAR, 2024

# Exploring hydrogen as an energy source

The Edge, Malaysia



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Hydrogen is touted as the next alternative green energy solution. There are several projects and plants being developed in Malaysia as envisioned in the Hydrogen Economy and Technology Roadmap, and even more are under development globally.

Hydrogen is utilised across a range of industry sectors, either in its pure form or through conversion into ammonia. A comprehensive supply chain for production, transport and storage is also being built.



GREY HYDROGEN	BLUE HYDROGEN	GREEN HYDROGEN
Steam methane reforming is a common way to produce hydrogen from natural gas. It releases carbon dioxide into the air and uses non-renewable energy. It is called grey hydrogen because it adds to carbon emissions.	Blue hydrogen is regarded as clean although it relies on the same processes as grey hydrogen but the carbon dioxide is captured and stored through a process called carbon capture, utilisation and storage (CCUS).	Produced through the electrolysis of water using renewable energy sources. It is considered green because its production emits no greenhouse gases, making it an environmentally friendly and sustainable energy carrier.

## USES OF HYDROGEN

- Industrial processes for refining petroleum, treating metals, producing fertilisers and other chemicals, and processing food. These are the main uses of hydrogen currently.
- Hydrogen fuel cells combine hydrogen and oxygen atoms to produce electricity that powers spacecraft, computers, cellphones and vehicles
- Electric power generation through hydrogen combustion or in hydrogen-rich blends with natural gas
- Hydrogen storage as gas or liquid, which could be used to store energy produced by renewable energy sources and used when electricity demand is high

SOURCE: UNITED STATES ENERGY INFORMATION ADMINISTRATION

## Hydrogen use by sector and by region, historical and in the Net Zero Emissions by 2050 Scenario, 2020–2030



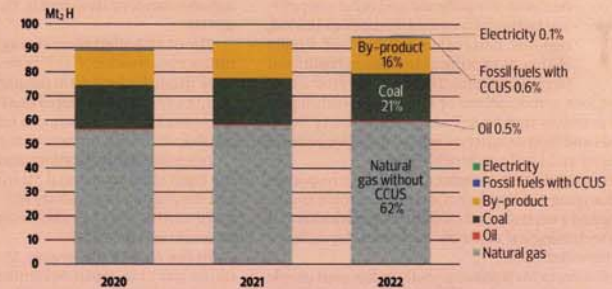
Notes: NZE = Net Zero Emissions by 2050 Scenario. "Other" includes buildings and biofuels upgrading.

SOURCE: INTERNATIONAL ENERGY AGENCY (IEA)

## GLOBAL HYDROGEN PROJECTS

- According to the International Energy Agency (IEA), **low-emission hydrogen production remained below 1% of global hydrogen production in 2022**, and dedicated hydrogen production today is still primarily based on fossil fuel technologies.
- To get to net zero emissions, a rapid scale-up of low-emission hydrogen – around 50 metric tons (Mt) of hydrogen production based on electrolysis and more than 30Mt from fossil fuels with CCUS by 2030 – is needed for a total of more than 50% hydrogen production.

### Hydrogen production by technology, 2020–2022



Note: CCUS = carbon capture, utilisation and storage

SOURCE: IEA

## DEVELOPMENTS IN MALAYSIA

### Industry players

- Sarawak Energy**  
Sarawak launched an integrated hydrogen production plant and refuelling station in Kuching in 2019. It also introduced the state's first hydrogen-powered vehicles around the same time.

### Southeast Asia's first integrated hydrogen production and refuelling station in Sarawak

Commissioned on May 27, 2019

- Production capacity: 130kg H<sub>2</sub> per day
- Hydrogen purity: 99.999%
- Supports up to 5 fuel cell buses and 10 fuel cell cars



SOURCE: HYDROGEN ECONOMY AND TECHNOLOGY ROADMAP

- Gentari**

Gentari Sdn Bhd, a clean energy solutions provider wholly owned by Petrolim Nasional Bhd, has signed a slew of memorandums of understanding to champion clean energy and develop hydrogen facilities in Malaysia.

Gentari's partnerships for hydrogen development in Malaysia include those with Sarawak Economic Development Corporation Energy (SEDC) Sdn Bhd, AM Green Ammonia Holdings BV, Asahi Kasei and JGC Holdings Corporation and City Energy Pte Ltd.

- SEDC**

- Sarawak is forming several partnerships for green hydrogen projects said to be worth a total of US\$4.2 billion (RM19.9 billion). They include the development of large-scale hydrogen plants at the Sarawak Hydrogen Hub in Bintulu and the Rembus Depot near Kuching.
- To develop the Sarawak Hydrogen Hub, SEDC has signed the first tripartite agreement, called Project H2ornbill, between SEDC Energy and two Japanese firms – oil firm Eneos and trading house Sumitomo Corp.
- SEDC has also signed agreements with three South Korean companies – Samsung Engineering, Posco and Lotte Chemical – to develop hydrogen derivative facilities under a second project, Project H2biscus.
- SEDC is forming a joint venture with Gentari to develop facilities for the Sarawak Hydrogen Hub