



International Partnership
for Hydrogen and Fuel Cells
in the Economy

Singapore Update

41st IPHE Steering Committee Meeting

19 - 20 March 2024

New Delhi, India

Announcements / New Initiatives *Singapore*

• Investments/Funding/Policies/Initiatives

- Launch of the Request for Proposal (RFP) for the ammonia pathfinder project. We received strong industry interests during the Expression of Interest (EOI) stage and we have shortlisted 6 consortiums. Since then, we have launched a closed RFP for a small-scale pathfinder project to test and deploy a direct ammonia combustion power plant, alongside maritime bunkering.
- Establishment of a Future Energy Fund, with initial injection of \$5 billion. To fund the development of infrastructure needed to supply low-carbon energy electricity to Singapore. These projects may involve nascent technologies or require high upfront capital expenditures. The establishment of the FEF ensures that the government is ready to provide financial support to catalyse energy transition projects to secure low-carbon energy supplies to meet Singapore's decarbonisation ambitions.
- Singapore-Asia Taxonomy for Sustainable Finance. In December 2023, the Monetary Authority of Singapore (MAS) launched the Singapore-Asia Taxonomy to pioneer the concept of a "transition" category, with a traffic light system that defines green, transition and ineligible activities across eight focus sectors. It adopts a "measures-based approach" that seeks to encourage capital investments into decarbonisation measures and processes that will help reduce emissions intensity of activities and enable the activities to meet the green criteria over time.

• New Research & Development, Demonstration and/or Deployment Activities

- Phase 2 of Low-Energy Research Funding Initiative: Awarded around \$43 million to support 6 projects under the Directed Hydrogen Programme (DHP) and around \$12 million to support 10 projects under the Emerging Technologies Grant Call (ETGC). The DHP projects focus on 4 areas – safety and regulatory standards, ammonia cracking, ammonia utilisation and hydrogen transportation and distribution. The ETGC projects seeks to discover low-carbon technological pathways in lower TRLs, including hydrogen.

Announcements / New Initiatives *Singapore*

• Key Collaborations

- MOU between MTI and MOEI for cooperation in the fields of low-carbon solutions and energy efficiency. In October 2023, Singapore and the UAE signed an MOU, which facilitates potential collaboration and exchange of information on certification and standards development, joint R&D and innovation, etc.
- MOU between MTI and MOTIE for green economic cooperation. In December 2023, Singapore and Korea signed an MOU, which facilitates potential cooperation to establish mutual recognition in standards and certifications, etc.
- IEA Regional Cooperation Centre. In February 2024, IEA announced the partnership with Singapore for its first regional office, to deepen engagement in Southeast Asia. The Centre will focus on scaling-up the deployment of renewables and other clean energy technologies, increasing cross-border power-trade, improving access to finance for clean energy investments.
- Feasibility study by Changi Airport Group, Civil Aviation Authority of Singapore (CAAS), Airbus, Linde. The study concluded that in the 2050s, more than 100 flights departing Changi Airport each day could be powered by hydrogen. The study estimates that Singapore could consume 50 tonnes of LH2 a day from 2040, rising to 600 tonnes a day from 2050. These estimates were based on future hydrogen aircraft with capacities of about 100 to 200 passengers and operating ranges of about 1,000 to 2,000 nautical miles would enter service in Singapore from about 2035 to 2040.

Examples of Lessons Learnt and Impact *Singapore*

Program initiative, policy, regulation or mandate	Lessons Learnt/Outcomes
Ammonia Pathfinder Project for Power Generation and Maritime Bunkering	<ul style="list-style-type: none"> • Difficulty in determining the carbon intensity of ammonia as we looked at a well-to-gate system boundary. • Countries who have announced their carbon intensity standards are mostly focused on hydrogen. • Environmental, Health and Safety concerns relating to the use and transportation of hydrogen/ammonia, especially across densely populated areas. Ongoing discussions with regulatory agencies to address these issues. • Engaging industry players to co-lead the project to better understand project viability, in terms of technology, land, financing and skills needed.
Future Energy Fund	<ul style="list-style-type: none"> • The importance of Govt in committing capital at the early stage, to signal Singapore’s commitment to the energy transition and crowd-in further commercial capital to accelerate the transition.
Singapore-Asia Taxonomy	<ul style="list-style-type: none"> • Developing a transition category to cater to low-carbon technologies less economically viable. • Managing trade-offs – i.e. setting a strict enough standard for the green / transition category for decarbonisation vis supporting project financing.



Singapore – Profile March 2024

Status of Deployments

- Three 600MW hydrogen-ready CCGT power plant to be deployed by 2028, to take up to 30% H₂, namely Keppel Infrastructure, Sembcorp Industries, YTL PowerSeraya
- Korea’s Vinssen tested and delivered a hydrogen fuel cell system for a trial project to test hydrogen as a marine fuel
- In 2050s, more than 100 flights departing Changi Airport each day could be powered by hydrogen. The aviation sector to consume up to 50 tonnes of LH₂ from 2040s, and up to 600 tonnes of LH₂ from 2050

Leading Government Initiatives

- Ammonia pathfinder project
- Directed Hydrogen Programme for R&D, and international strategy for hydrogen R&D
- Singapore-Asia Taxonomy to guide transportation of hydrogen and op
- Methanol and ammonia bunkering standard planned for 2025 to help local maritime industry transition
- Singapore standard on hydrogen refuelling station and safety standards of refueling station

Goals or Focus Areas

- 5 Key Thrusts
 - Experiment with advanced hydrogen technologies with pathfinder project
 - Redouble R&D efforts
 - International cooperation
 - Long term land and infra planning
 - Workforce development

Funding

- Future Energy Fund – S\$5 billion

Thank you



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