Perspectives on advancing green and low-carbon hydrogen strategies for sustainable development

Green and Low-Carbon Hydrogen as an Enabler of the Energy Transition Policy Dialogue

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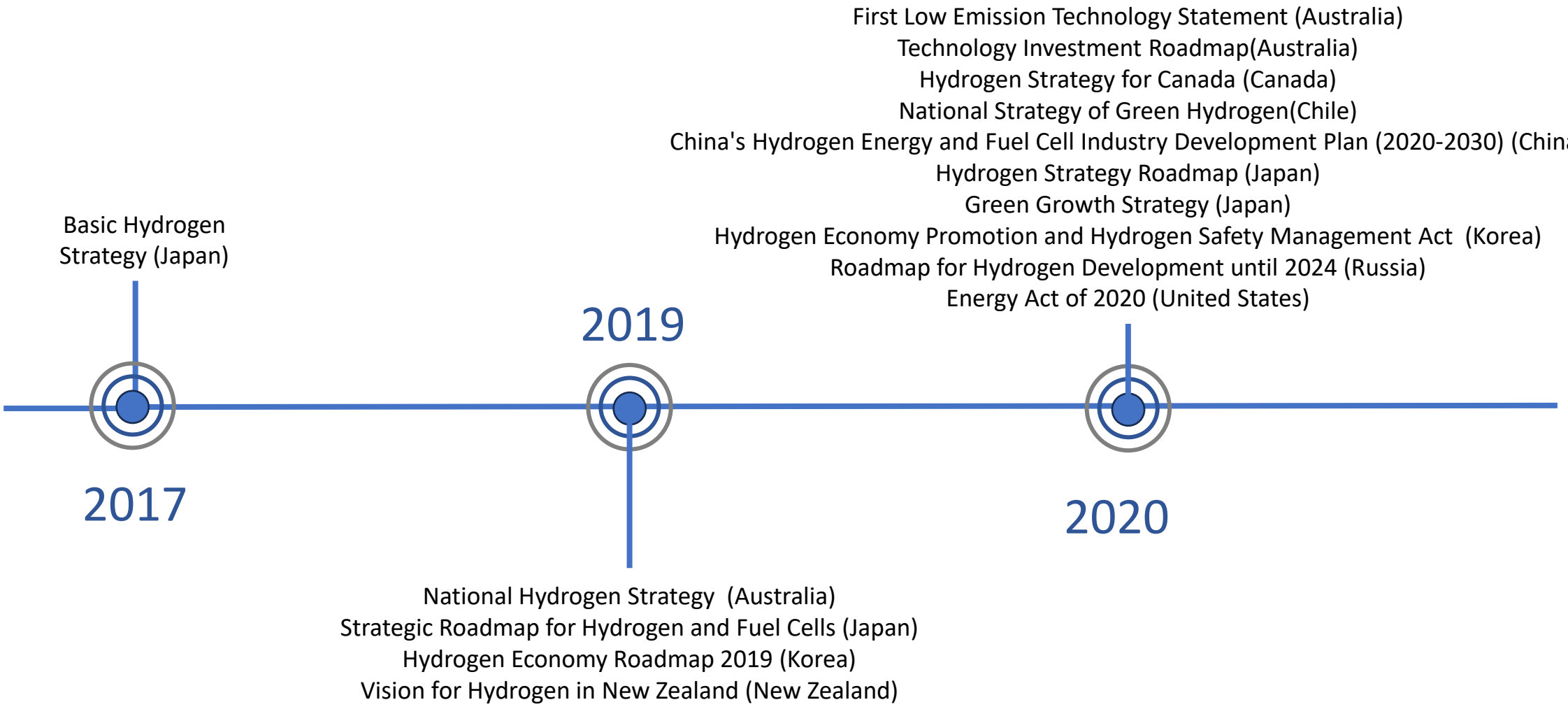
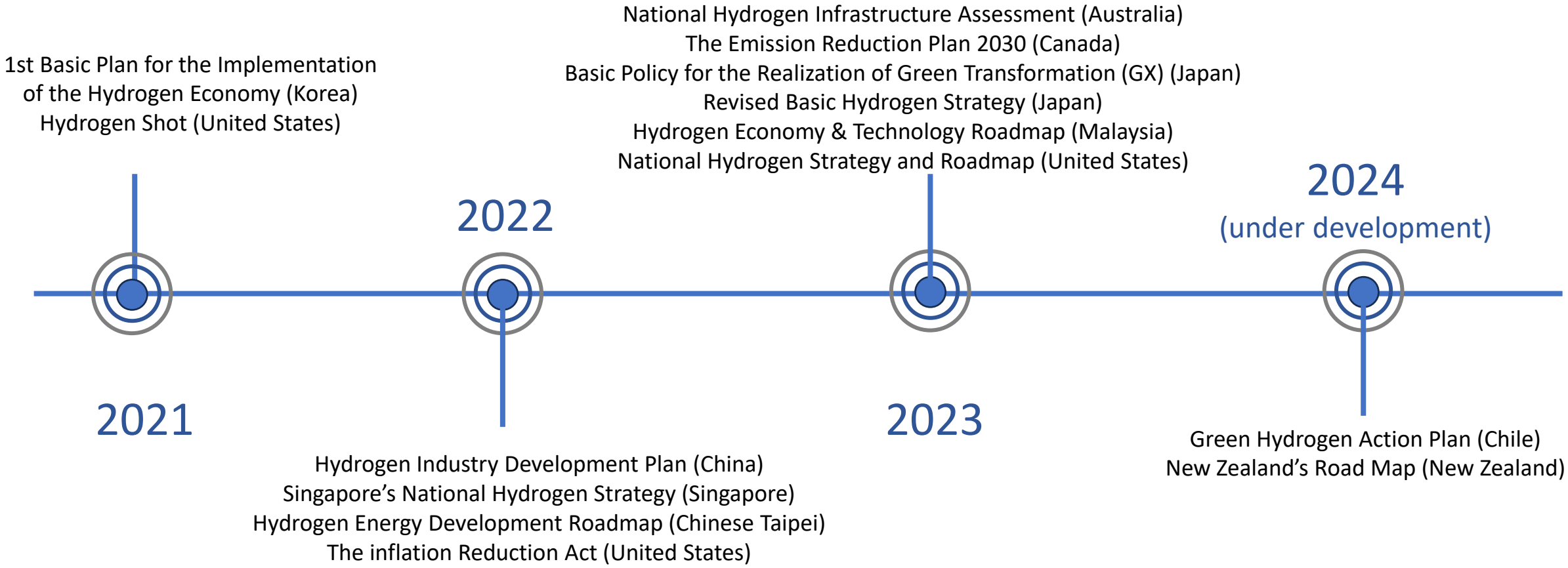
Outline

- Timeline of policies to support zero- and low-carbon hydrogen
- Key hydrogen projects in APEC
- Conclusions

Timeline of policies to support zero- and low-carbon hydrogen



Timeline of policies to support zero- and low-carbon hydrogen



Policies to support zero- and low-carbon hydrogen

- The APEC region has been a leader in developing and implementing policies to promote the nascent hydrogen industry. Each economy's hydrogen strategy reflects the economy-specific characteristics and priorities.
- Some economies emphasize their ability to produce low-carbon hydrogen, while others emphasize the role of hydrogen for decarbonization of energy end-use and power sectors.
- For example, the Inflation Reduction Act in USA and the proposed Clean Technology Investment Tax Credit in Canada aim to support investment on clean hydrogen production.
- Japan's Green Innovation Funds supports projects to establish large-scale hydrogen and ammonia fuel consumption. Additionally, Japan's Green Transformation (GX) promotes investments in key sectors including on the use of hydrogen and ammonia cofiring in power sector, expanding hydrogen stations, and the introduction of ammonia/hydrogen-fuelled ships.

Projects operating or under development

- Japan's Fukushima Hydrogen Energy Research Field (FH2R) was known in 2020 as the largest green hydrogen plant, featuring a 10MW electrolyser and a 20MW solar generation plant. It had the ability to produce enough hydrogen to power roughly 150 households or 560 fuel cell vehicles each day
- Air Products is developing a large blue hydrogen project in Louisiana, USA, which is expected to produce 21 million m^3 of hydrogen per day when completed by 2026. The goal of the project is to supply low-carbon hydrogen to refineries along the US Gulf Coast, with a CO_2 capture rate of 95%
- The Net-Zero Hydrogen Energy Complex in Canada consists of an Auto-Thermal Reformer hydrogen production facility, with carbon capture technology with CO_2 capture rate of 95%. Hydrogen-fueled gas turbines will provide electricity to the project and the grid.

Projects operating or under development

- Several green hydrogen projects are under development in China. The Kuqa Hydrogen project started operations in June 2023. Once it is fully operational, the Kuqa Hydrogen project will produce 20 000 tonnes of hydrogen per year. Additionally, the Ordos Project in Inner Mongolia, with a nominal capacity of 30 000 tonnes of hydrogen per year, will replace coal-based hydrogen in nearby chemical plants.
- Korea is building hydrogen pilot cities. The first selected cities were Ulsan, Ansan, and Jeonju/Wanju. The first phase installed 20 km of hydrogen pipelines, operated 72 hydrogen buses, among other actions that can reduced almost 1 ktonne CO_2-eq annually in these three cities. In 2023, the government announced a similar project in six additional cities: Pyeongtaek, Namyangju, Dangjin, Boryeong, Gwangyang, and Pohang. A hydrogen city must use hydrogen in major urban functions in buildings, transport, and industry.
- Advanced Clean Energy Storage, located in USA, will use a 200 MW electrolyser to produce 100 tonnes of hydrogen per day. The hydrogen will be stored in two salt caverns with a capacity of 5 500 tonnes.

Future hydrogen projects in APEC

Several other important projects have been announced that are under study:

- The Australian Renewable Energy Hub and the Eastern Green Energy Hub, both located in Australia with a combined capacity of 5 million tonnes of hydrogen per year.
- In its pilot phase, the HyEx Green Ammonia project in Chile aims to yield 3 200 tonnes of green hydrogen for ammonia production. The upscale would increase capacity to 130 000 tonnes per year and use 2000 MW of electrolysers.
- Verano Energy has recently announced the submission of the environmental impact study for a green hydrogen project in Arequipa, Peru. The nominal capacity of this project is 1.6 million tonnes of hydrogen per year.

Conclusions

- Most APEC economies are implementing policies designed to increase the production, transportation, and consumption of zero- and low-carbon hydrogen as a fuel.

- As a result of these new policies and expected future policies designed to encourage low-carbon hydrogen fuel use, many projects are being proposed in a number of APEC economies.

- As of now, very few of these projects have achieved final investment decision (FID). The primary reasons are
  - the current high costs of producing low-carbon hydrogen,
  - the lack of infrastructure and high cost of transporting low-carbon hydrogen, and
  - the uncertainty about future demand for zero- and low-carbon hydrogen.

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Thank you.

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