

1-4. Draft APEC Hydrogen Report 2023

APERC Fossil Fuel Reports

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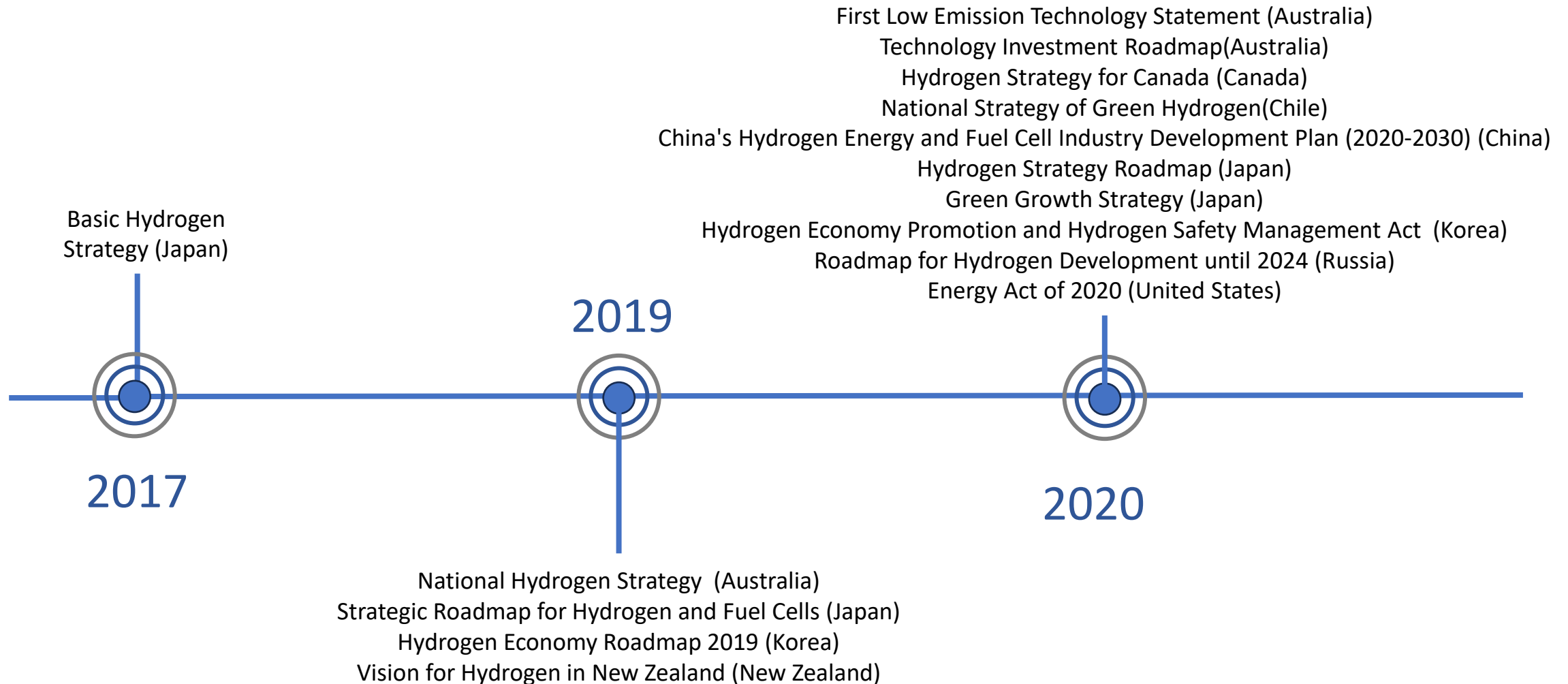
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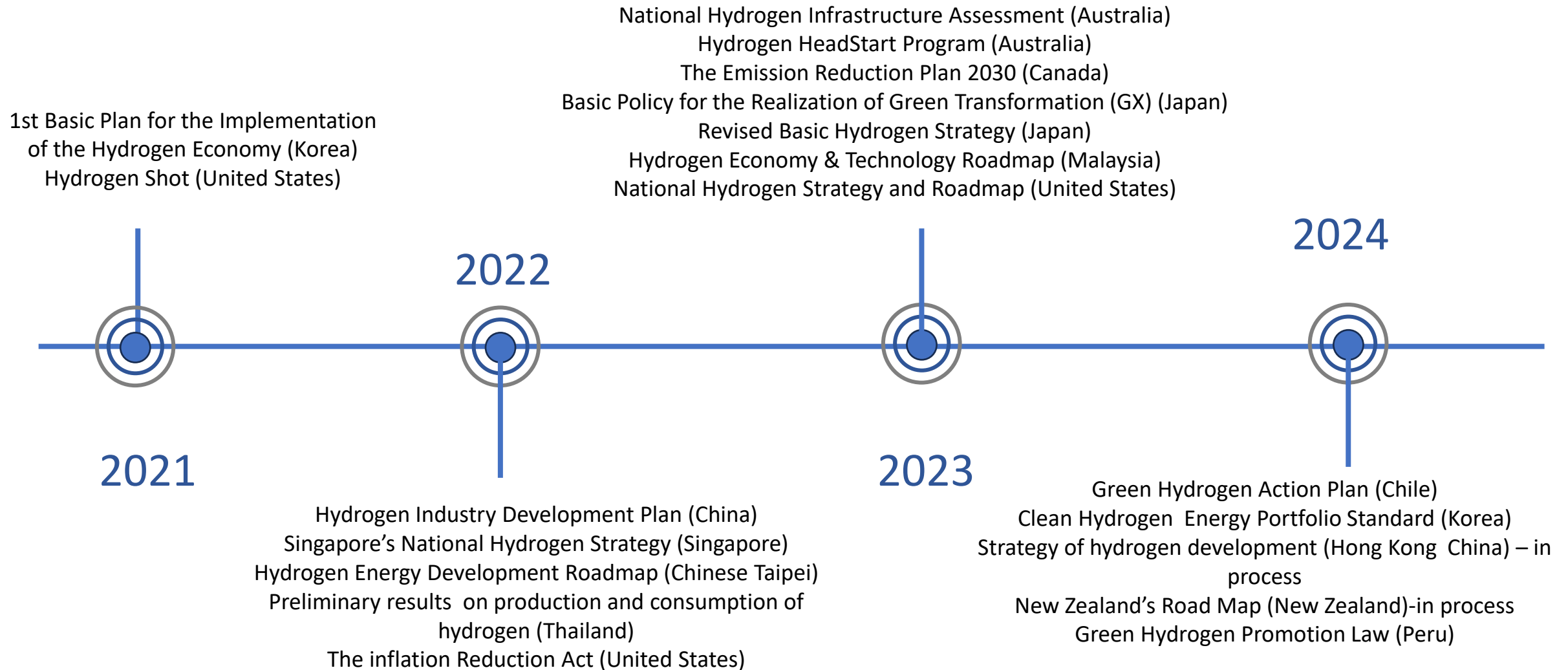
Outline

- Timeline of policies to support zero- and low-carbon hydrogen
- Status of the hydrogen industry in APEC
- Key hydrogen projects in APEC
- Current challenges
- Conclusions

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



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



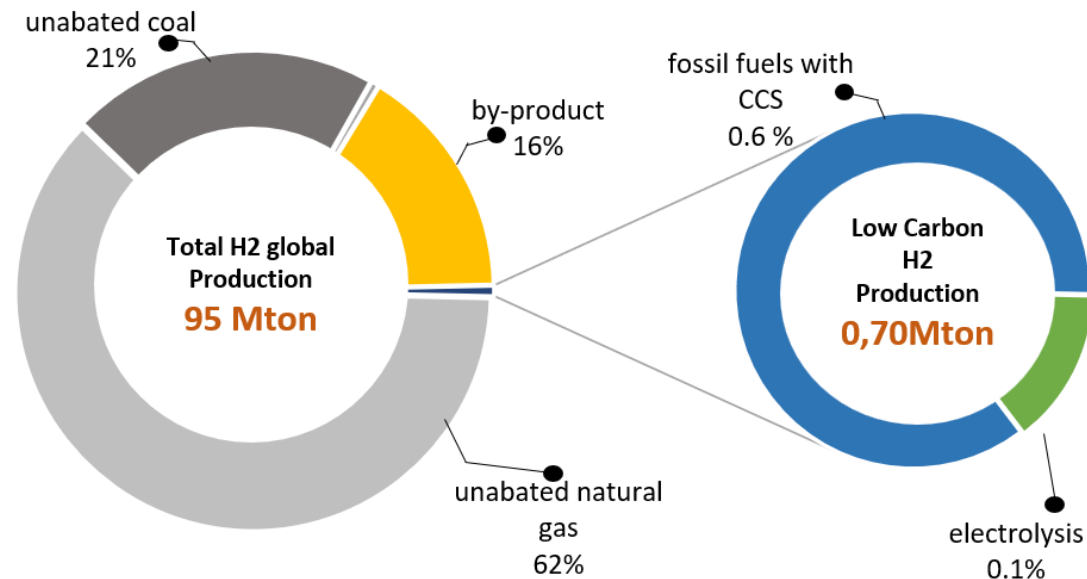
Policies to support zero- and low-carbon hydrogen

- 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 the use of hydrogen and ammonia cofiring in power sector, expanding hydrogen stations, and the introduction of ammonia/hydrogen-fuelled ships.

Today, low-carbon hydrogen represents less than 1% of total production

- Hydrogen production reached 95 million tonnes in 2022. Nearly all the hydrogen was produced from unabated fossil fuels. The energy content in this hydrogen is approximately equivalent to 2% of global energy consumption and is responsible for around 2.5% of global CO₂ emissions.
- Most low carbon hydrogen production is fossil fuel-based with CCS.
- **Almost all hydrogen is currently used as feedstock in industry.**

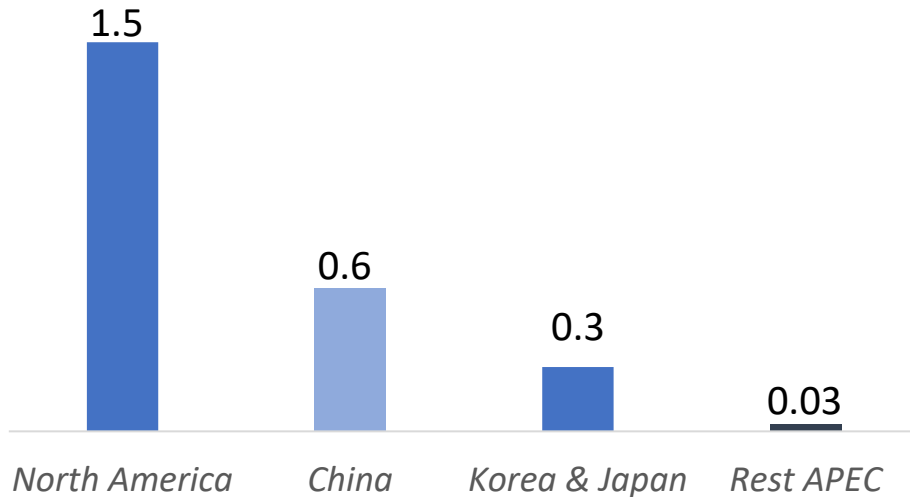
Global H₂ production in 2022



Data Source: Global Hydrogen Review 2023 (IEA)

Status of low-carbon hydrogen industry in APEC

Estimates of 2030 capacities for projects that have obtained financial commitments (Million tonnes of H₂)



Source: Estimation based on the Hydrogen Insights 2023 update report (Hydrogen Council & McKinsey & Company, 2023) and the draft of APERC H₂ report

- Only 7% of globally announced low-carbon hydrogen projects have reached final investment decision. Most of this committed capacity is in APEC.
- China and USA are the main global hydrogen consumers and are leading on committed investments in renewable and low-carbon hydrogen.
- Committed investment in North America, mainly Canada and USA, is primarily in natural gas-based hydrogen with CCS, while committed investment in China is in renewable energy-based hydrogen projects.
- Most of the recently announced hydrogen projects globally are renewable energy-based projects.

Challenges to the development of zero- and low-carbon hydrogen trade

- Hydrogen can be an effective tool to decarbonize hard-to-abate sectors.
- However, challenges remain:
 - High cost of zero- and low-carbon hydrogen. The main component of the cost is due to energy.
 - Increasing complexity of announced projects
 - Lack of adequate transportation and distribution systems
 - Lack of recognized international standards for zero and low-carbon hydrogen
 - Uncertain future demand

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 zero- and low-carbon hydrogen fuel use, many projects are being proposed in a number of APEC economies.
- Very few of these projects have achieved final investment decision (FID). The primary reasons are the current high costs of producing zero- and low-carbon hydrogen, the lack of infrastructure and high cost of transporting zero- and low-carbon hydrogen, and the uncertainty about future demand for zero- and low-carbon hydrogen.
- Reducing the cost of zero- and low-carbon hydrogen poses challenges because a significant portion of the production costs are tied to the cost of the energy used.
- Another uncertainty relates to future international standards for zero- and low-carbon hydrogen. The development and widespread adoption of international standards could remove a key uncertainty that slows the financing of zero- and low-carbon hydrogen projects.

Thank you.

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