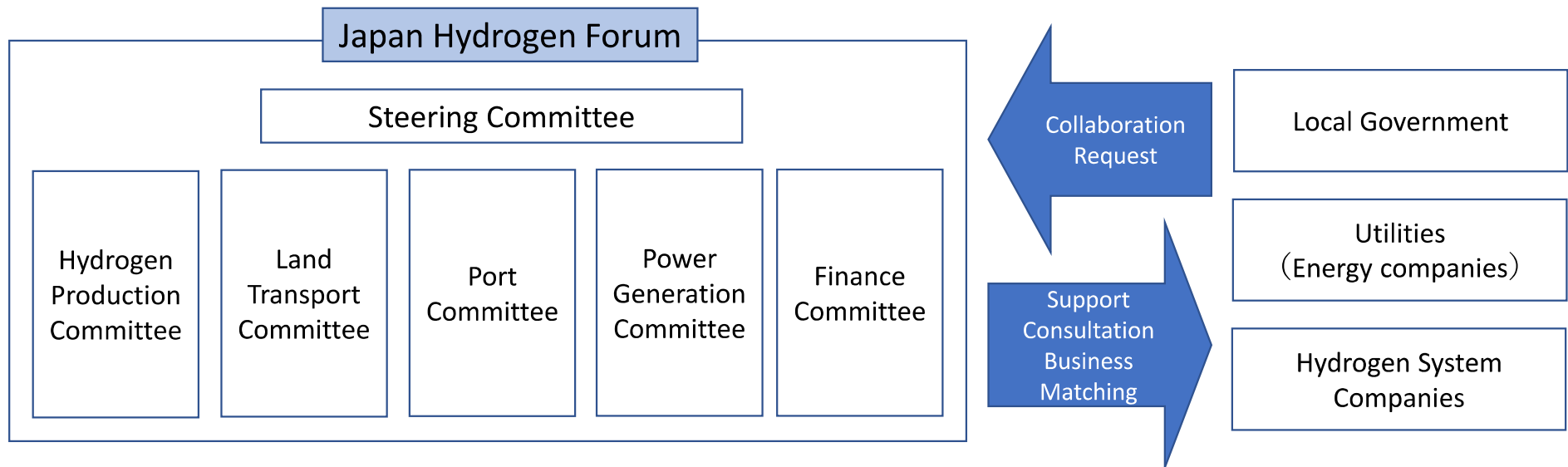


Japan Hydrogen Forum (JH2F)

Overview of Japan Hydrogen Forum (JH2F)

- In light of the fact that former Prime Minister Suga and President Biden have declared goals of carbon neutrality in year 2050, JH2F was established to support the decarbonization goals of US Federal, State and local governments.
- JH2F establish sectoral sub-committees, such as hydrogen production, land transportation, port decarbonization, power generation, and finance.
- The Japanese Government and affiliated governmental organizations such as the Japan External Trade Organization (JETRO); New Energy and Industrial Technology Development Organization (NEDO); Japan Oil, Gas and Metals National Corporation (JOGMEC); and Nippon Export and Investment Insurance (NEXI), also support the collaboration between JH2F and governments and companies in the US.



Background of the establishment of JH2F

- In October 2020, the former Prime Minister Suga declared that Japan aims to achieve carbon neutrality by 2050
- Against this backdrop, Japan formulated the “Green Growth Strategy”. The strategy specifies 14 promising fields that are expected to grow and directs all available policies to supporting positive efforts by companies toward this goal.
- President Biden rejoined the Paris Agreement and set a course for the United States to tackle the climate crisis, reaching net zero emissions economy-wide by no later than 2050.

- In April 2021, the former Prime Minister Suga announced a new target to reduce the greenhouse gas emissions by **46 percent** in fiscal year 2030 from the fiscal year 2013 levels while continuing to take on a challenge to aim at the goal of cutting our emissions by 50 percent



- In April 2021, President Biden announced a new target for the United States to achieve a **50-52 percent** reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030

⇒US and Japan set a common ambitious target for reducing greenhouse gas emissions by 2030 and the common goal to achieve carbon neutrality by 2050

The United States and Japan launched the U.S.-Japan Climate Partnership(4/16/2021)

- U.S.-Japan Summit Meeting between President Joseph R. Biden, Jr. and Prime Minister Suga Yoshihide, the United States and Japan launched the U.S.-Japan Climate Partnership
- The two sides will reinforce bilateral cooperation in the priority areas to achieve their 2050 net zero goals and the aligned 2030 targets, alongside a global trajectory consistent with the efforts to limit global temperature increase to 1.5 degrees Celsius.

2) Climate and clean energy technology and innovation

The United States and Japan commit to addressing climate change and working together towards the realization of green growth by enhancing cooperation on innovation, including in such areas as renewable energy, energy storage (such as batteries and long-duration energy storage technologies), smart grid, energy efficiency, **hydrogen**, Carbon Capture, Utilization and Storage/Carbon Recycling, industrial decarbonization, and advanced nuclear power. This cooperation will also promote the development, deployment, and utilization of climate friendly and adaptive infrastructure through collaboration in areas including renewable energy, grid optimization, demand response, and energy efficiency.

Source : U.S.-Japan Climate Partnership

The Quad established a clean-hydrogen partnership (9/24/2021)

- The Quad(United states, Japan, Australia, India) announced a clean-hydrogen partnership to strengthen and reduce costs across all elements of the clean-hydrogen value chain, leveraging existing bilateral and multilateral hydrogen initiatives in other fora.

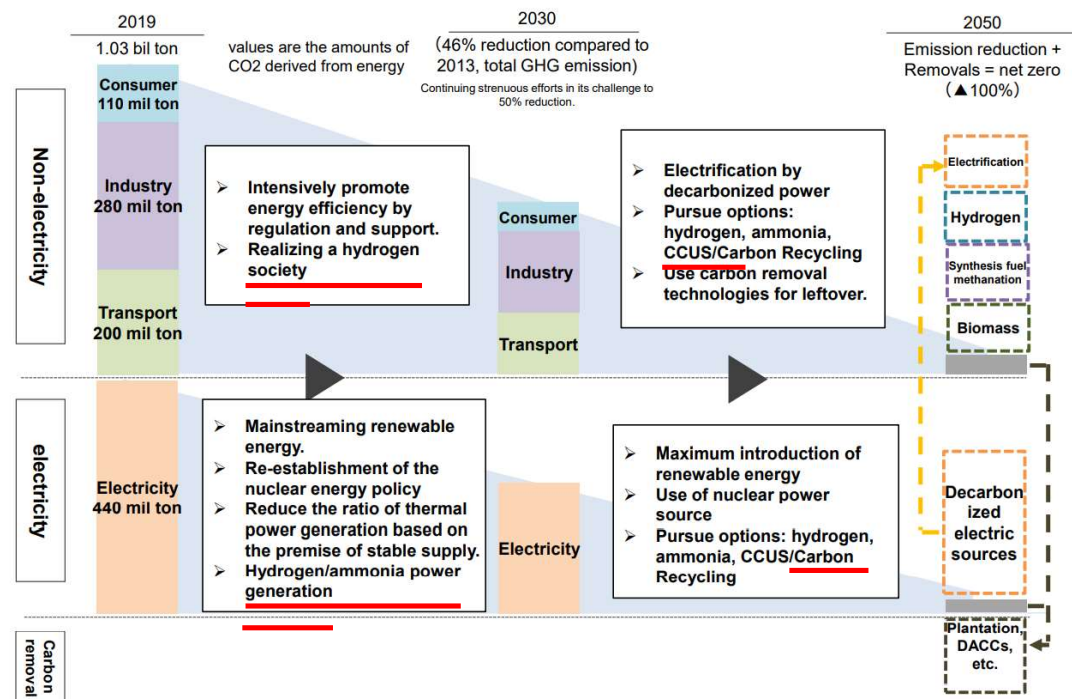
Key Benefits of Hydrogen

- ✓ Hydrogen have below benefits so it plays a significant role for achieving the ambitious goal for reducing greenhouse gas emissions
 1. Hydrogen can be produced from diverse domestic resources for use in multiple sectors, or for export.
 2. Hydrogen has the highest energy content by weight of all known fuels—3X higher than gasoline—and is a critical feedstock for the entire chemicals industry, including for liquid fuels.
 3. Hydrogen, along with fuel cells or combustion-based technologies, can enable zero or near-zero emissions in transportation, stationary or remote power, and portable power applications.
 4. Hydrogen can be used for gigawatt-hours of energy storage and as a “responsive load” on the grid to enable grid stability, increasing the utilization of power generators, including nuclear, coal, natural gas, and renewables.
 5. Hydrogen can be used in a variety of industries, such as the manufacturing of steel, cement, ammonia, and other chemicals.

Source : U.S. Department of Energy

Position of Hydrogen for the Japanese Government

- In the “Green Growth Strategy”, Japan position hydrogen as one of the 14 promising fields that are expected to grow and Hydrogen and a key technology to achieve Carbon Neutrality which can be widely used in various sectors (power generation, industry, and transportation etc.)
- In the “Sixth Strategic Energy Plan”, hydrogen is positioned as a new resource and its societal implementation will be accelerated



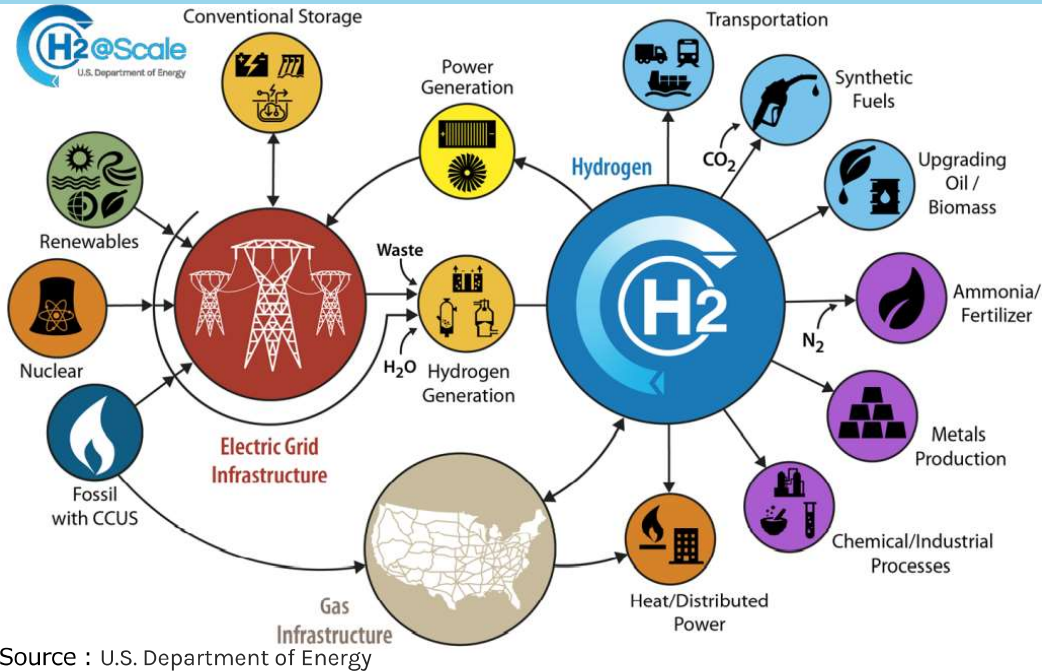
Source : Ministry of Economy, Trade and Industry “Green Growth Strategy”

Target :

- Supply cost: 30 yen/Nm³ (less than 1/3 of the current sales price) in 2030
- Hydrogen power generation cost: less than gas fired power generation (less than about 20 yen/Nm³) in 2050.
- Hydrogen introduction amount: up to 3 million tons in 2030 and 20 million tons in 2050
- Of these, the amount of clean hydrogen (hydrogen which is produced from fossil fuels plus CCUS/carbon recycling, renewable energy, etc.) to be supplied in 2030 is aimed at being more than the amount of hydrogen supplied from renewable energy sources (approximately 420,000 tons) as stated in Germany's National Hydrogen Strategy announced in June 2020.

Position of Hydrogen for the U.S. Government

- The Department of Energy(DOE) launched Hydrogen Program Plan in 2020
- Hydrogen is positioned as a part of a comprehensive energy portfolio that can enable energy security and resiliency and provide economic value and environmental benefits for diverse applications across multiple sectors
- The H2@Scale concept, shown in below, envisions how innovations to produce, store, transport, and utilize hydrogen can help realize that potential and achieve scale to drive revenue opportunities and reduce costs



1 Dollar



1 Kilogram



1 Decade

Source : U.S. Department of Energy

- The DOE's Energy Earthshots Initiative aims to accelerate breakthroughs of more abundant, affordable, and reliable clean energy solutions within the decade
- The first Energy Earthshot, launched June 7, 2021—Hydrogen Shot—seeks to reduce the cost of clean hydrogen by 80% to \$1 per 1 kilogram in 1 decade ("1 1 1").