



Hydrogen: the Swiss Army Knife of the Circular Carbon Economy

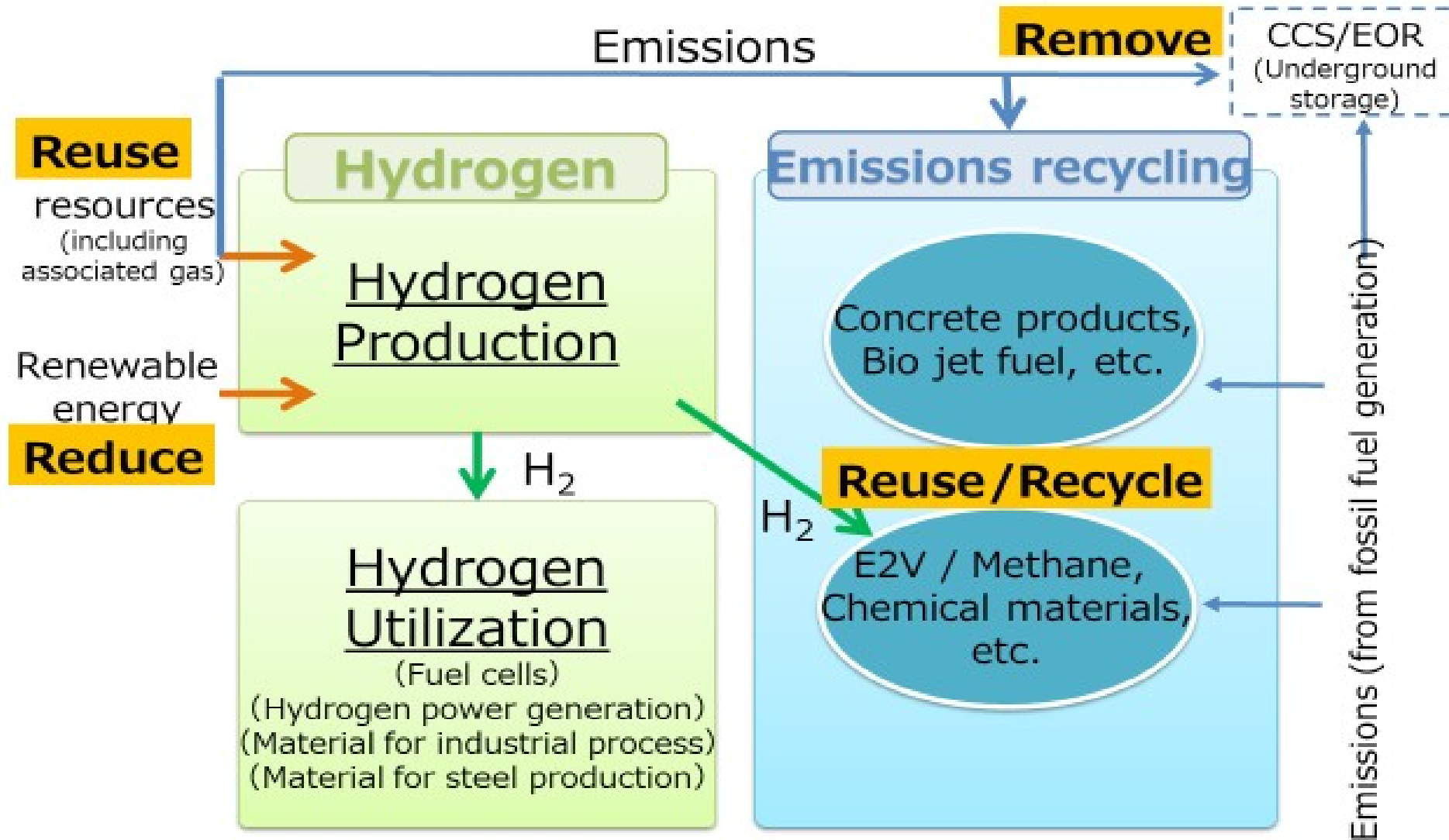
Outline

- Hydrogen potential as a key enabler for CCE
- Role of Hydrogen in the future energy systems
- Business models of Hydrogen
- Concluding remarks

Hydrogen potential

- ❖ Hydrogen is a cross cutting option and a key enabler for the Circular Carbon Economy (CCE) approach as:
 - ✓ Promising option integral part of the energy mix
 - ✓ Demand goes beyond energy and into array of industries
- ❖ Hydrogen faces number of challenges including emissions
- ❖ Emissions are sources of business opportunities by transforming Emissions to Value (E2V)
- ❖ Deployment and dissemination of technologies and innovations will monetize emissions that utilizes all sources and technologies
- ❖ Contribute to economic growth, job creation and sustainable development

The Role of Hydrogen and Emissions Recycling in the Circular Carbon Economy



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❖ Versatility of Hydrogen:

- Production: from renewables, nuclear, natural gas, coal and oil;
- Transportation: as a gas by pipelines or in liquid form by ships; &
- Transformation: into electricity and as feed stock to industry
- Utilization: as fuels for cars, trucks, ships and planes.

❖ Hydrogen versatility provides a full value chain in:

- Cleaner and more sustainable energy systems;

- Integrated and complementary way that is reliable, safe, secure, stable and cost-effective of:

- ✓ Power generation;

- ✓ Feed stock for industries; &

- ✓ Fuels for all mobility modes (cars, trucks, ships and planes).

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➤ Plurilateral:

- ✓ Clean Energy Ministerial: International Hydrogen Partnership
- ✓ Mission Innovation: International Challenge
- ✓ Hydrogen Energy Ministerial Meeting
- ✓ Hydrogen Energy Supply Chain (HESC)
- ✓ The Hydrogen Initiative

➤ Bilateral:

- ✓ Japan - Australia Hydrogen energy supply chain pilot project (PPP);

➤ Unilateral:

- ✓ Japan - Fukushima Renewable H2 Project (Power to Gas)

Saudi Arabia and Hydrogen

- Hydrogen piloting supply chain
- Hydrogen for mobility applications
- Hydrogen for heat and power
- Hydrogen for hard-to-abate Industries
- Optimal use of excess hydrogen for sustainable transport
- NEOM zone transportation, power & industry
- R&D:
 - ✓ Power to Gas and Power to Liquid Demonstration;
 - ✓ Development, construction and delivery of on-board plasma-based fuel reformer to produce hydrogen for higher internal combustion (IC) engine efficiency;
 - ✓ Water Electrolysis for Hydrogen Generation.

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- ❖ Hydrogen is a sustainable fuel in the energy mix and systems
- ❖ Hydrogen is a Swiss knife that is a cross-cutting fuel on the CCE platform
- ❖ Collaborative: plurilateral, bilateral and unilateral efforts can contribute to the success of CCE approach
- ❖ CCE is a valid approach in achieving international SDG and climate goals by transforming Emissions to Value (E2V)

Thank you