Green Hydrogen Development

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21st APEC Workshop on Energy Statistics:
Data Collection on New Energy Product and Technologies

12-14 September 2023

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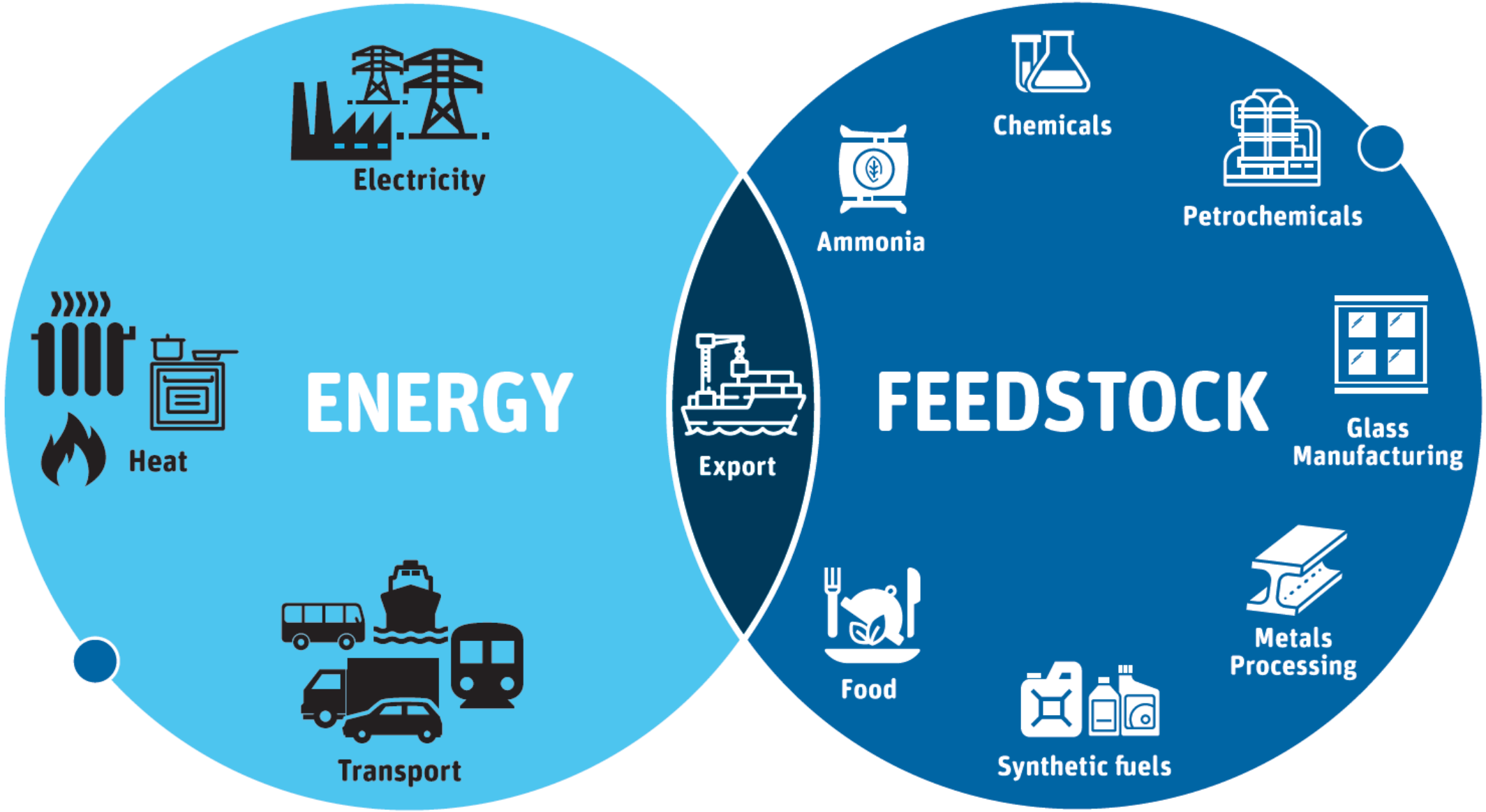
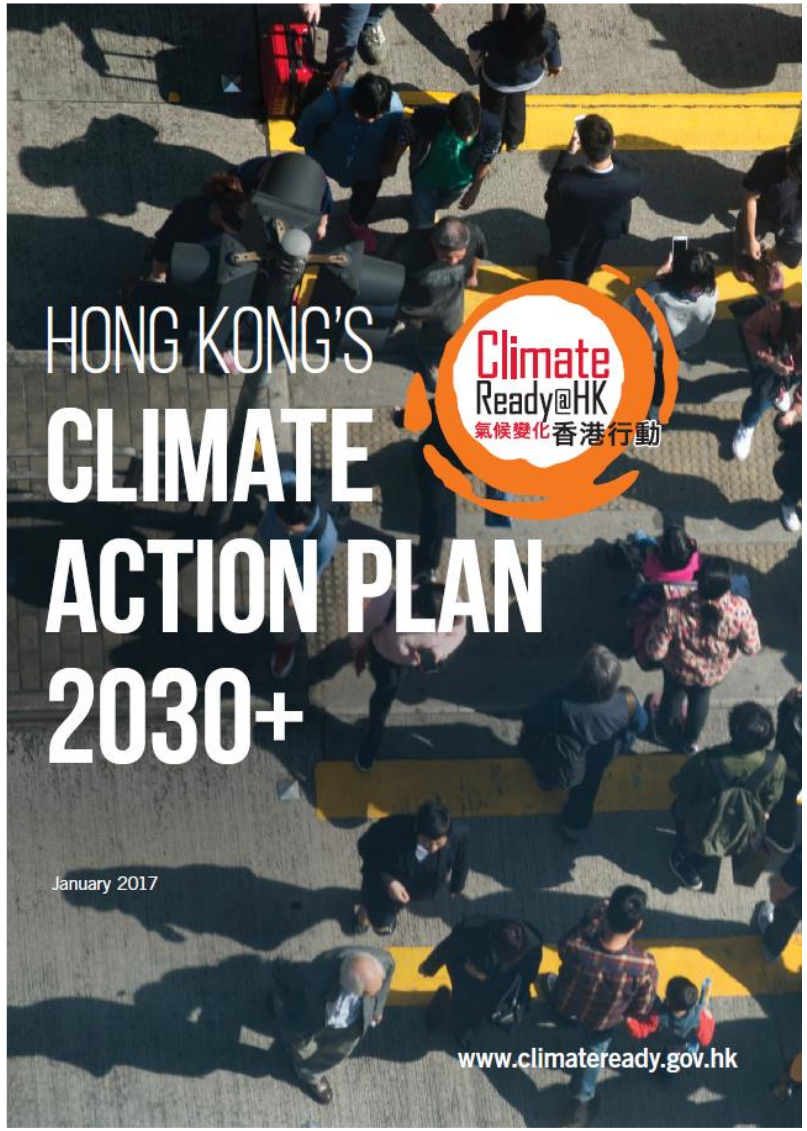
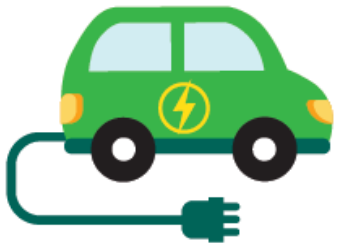

Electricity
Heat
ENERGY
Transport
Export
Ammonia
Chemicals
Petrochemicals
FEEDSTOCK
Glass Manufacturing
Food
Metals Processing
Synthetic fuels

2017



June 2021

Six Major Areas of Action



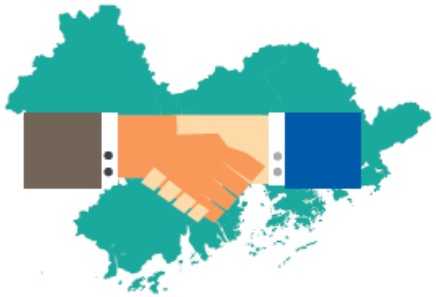
Green Transport

Liveable Environment

Comprehensive Emissions Reduction

Clean Energy

Scientific Management

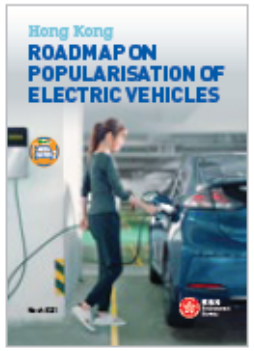


Regional Collaboration

Green Transport

EV Roadmap

Take forward measures set forth in the **Hong Kong Roadmap on Popularisation of Electric Vehicles** to attain zero vehicular emissions before 2050



Environmentally Friendly New Development Areas

Adopt environmentally friendly transport mode in new development areas

Green Transport Network

Expand railway network to meet development needs; and implement Free-flow Tolling System at government toll tunnels and Tsing Sha Control Area by 2022

New Energy Ferries

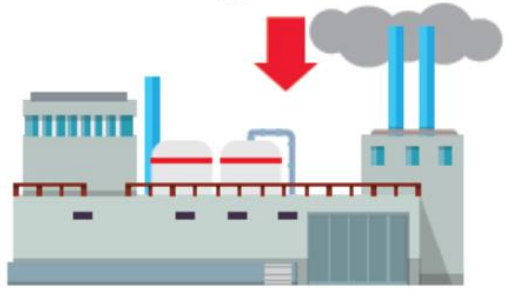
Conduct trials for electric and hybrid ferries, and explore with ferry operators to progressively adopt new energy ferries by 2035

Clean Energy

Power Plant Emissions Reduction

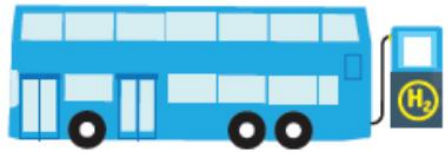
New low-carbon electricity generation strategy under **Hong Kong's Climate Action Plan**

Continue to formulate Technical Memorandums to tighten emission limits of power plants under the new low-carbon electricity generation strategy

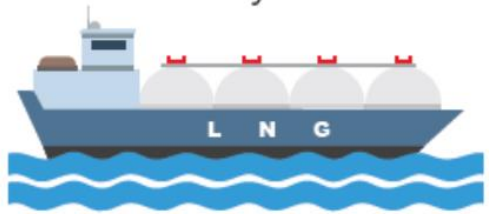


Green Energy

Inter-departmental working group to handle the work relating to the application of hydrogen energy in Hong Kong



Explore means to take forward the use of liquefied natural gas (LNG) in ocean-going vessels, and formulate technical requirements and related safety regulations and specifications for LNG bunkering in the next few years



Different “Shades” of Hydrogen

South China Morning Post

Hong Kong to get first electric double-decker bus designed to handle hilly terrain in move towards carbon neutrality

煤氣 Towngas

Towngas, Citybus parent Bravo Transport sign agreement for Hong Kong Island hydrogen refuelling station

- The two companies are 'paving the way for everyone to use hydrogen energy with ease in the future', Towngas managing director Peter Wong says
- Hong Kong's first hydrogen refuelling station, in Citybus's West Kowloon depot, is expected to be operational by October

The project is set to be completed within 12 months.

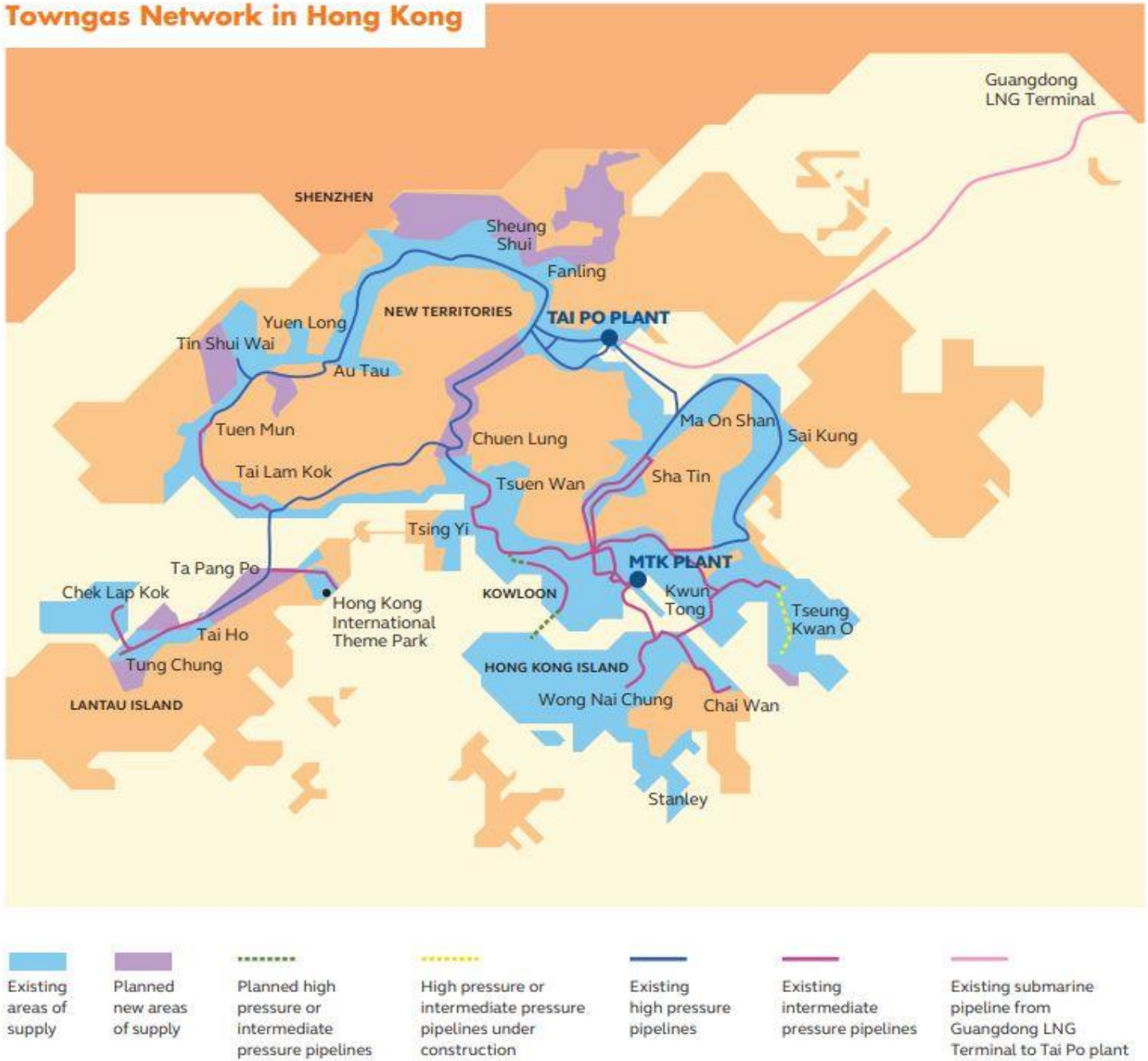
Once completed, the hydrogen facility will have the capacity to extract about 500 kilograms of hydrogen per day, which will be adequate for operating 10-12 buses a day.

Town Gas Characteristics

Chemical Composition

Carbon Dioxide	16.3% – 19.9%
Carbon Monoxide	1.0% – 3.1%
Methane	28.2% – 30.7%
Hydrogen	46.3% – 51.8%
Nitrogen and Oxygen	0% – 3.3%

煤氣 Towngas

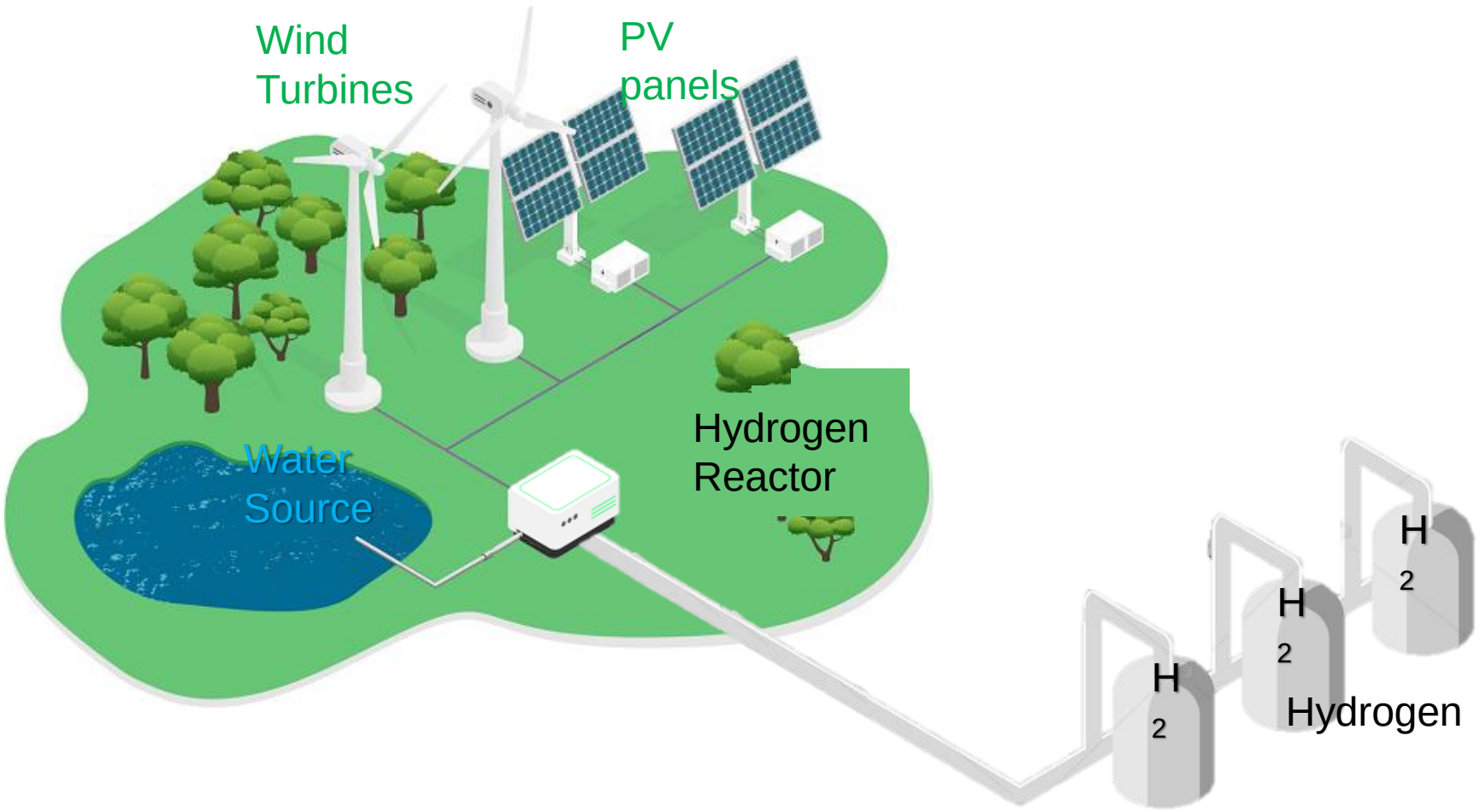


>3700 km of pipeline network

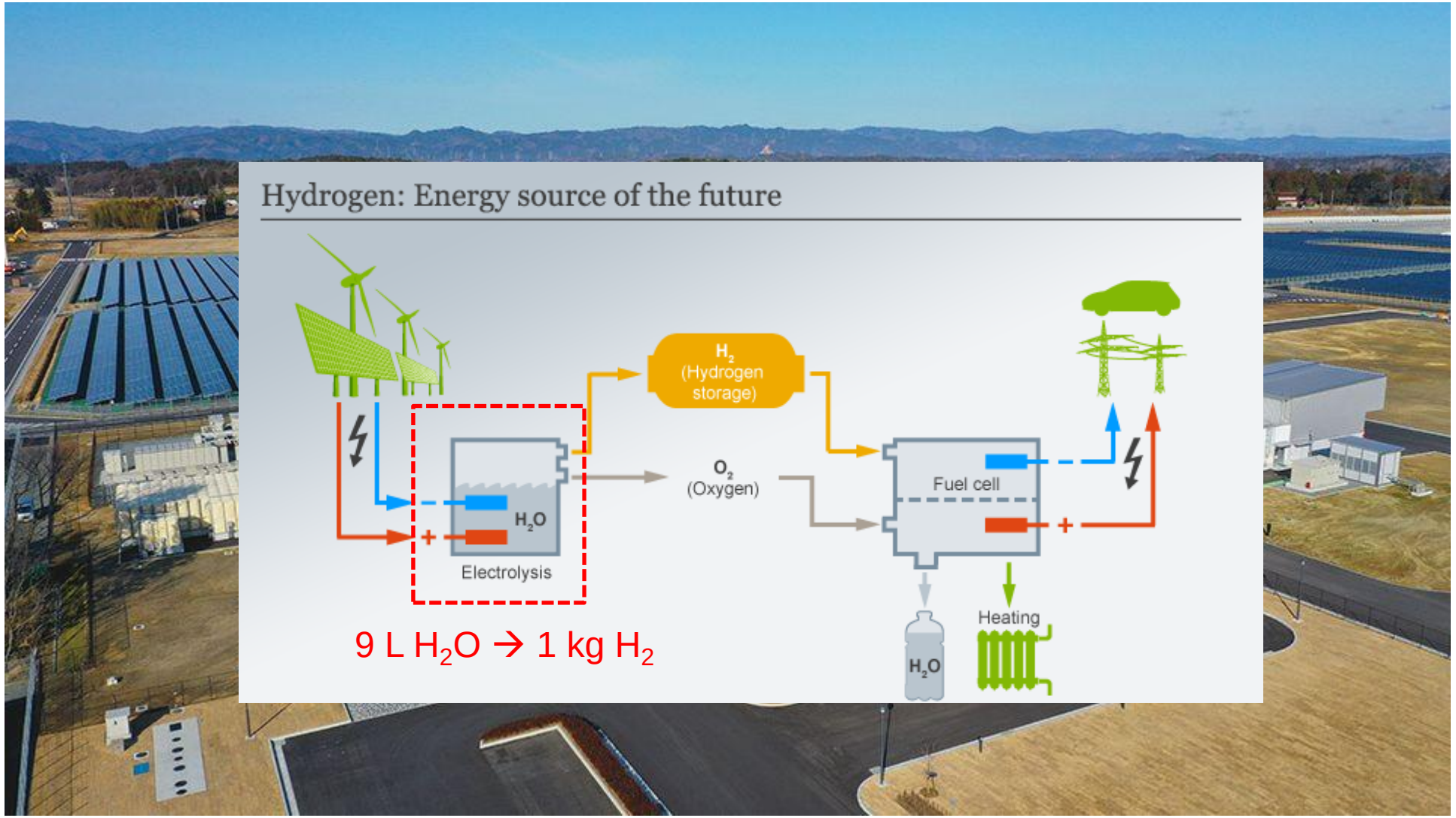
Different “Shades” of Hydrogen

Color	GREY HYDROGEN	BLUE HYDROGEN	TURQUOISE HYDROGEN*	GREEN HYDROGEN
Process	SMR or gasification	SMR or gasification with carbon capture (85-95%)	Pyrolysis	Electrolysis
Source	Methane or coal 	Methane or coal 	Methane 	Renewable electricity 

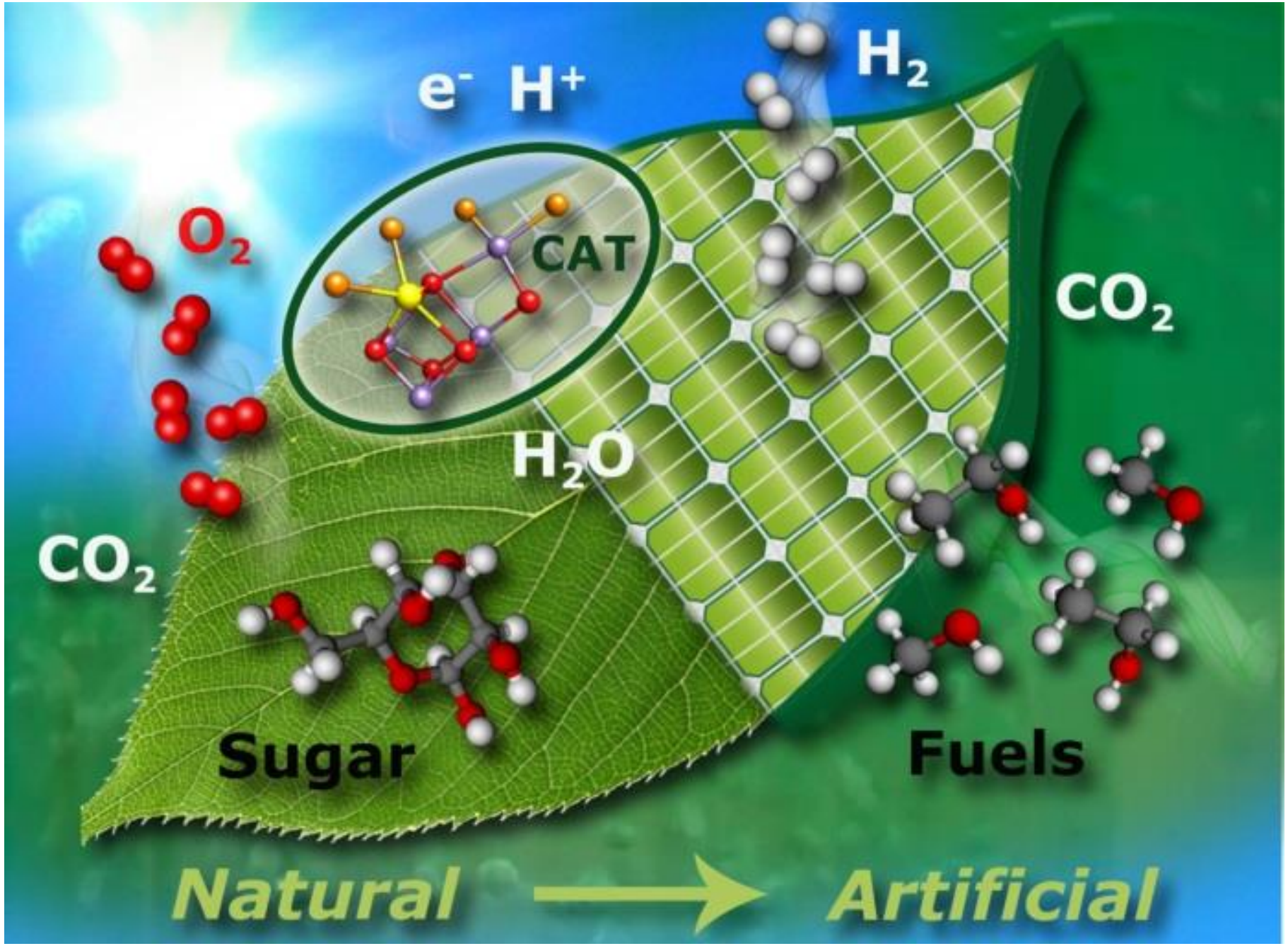
Green Hydrogen Technology

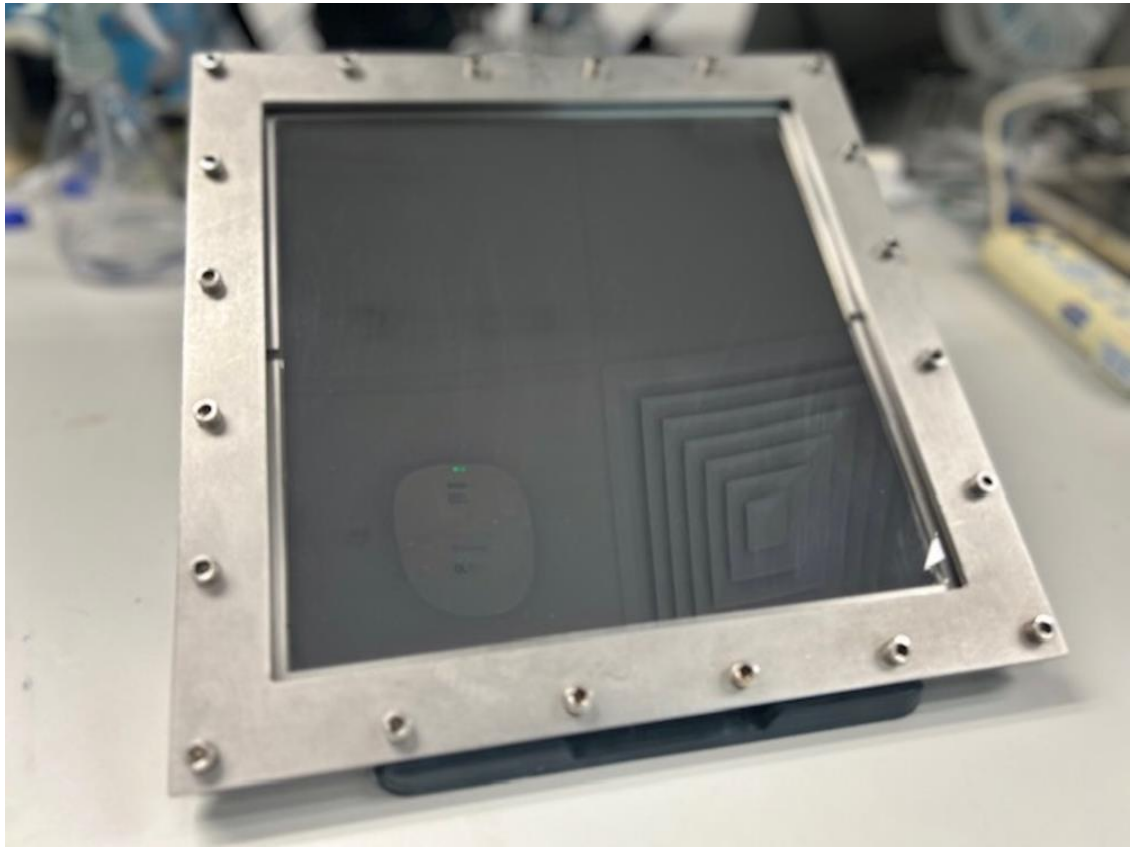


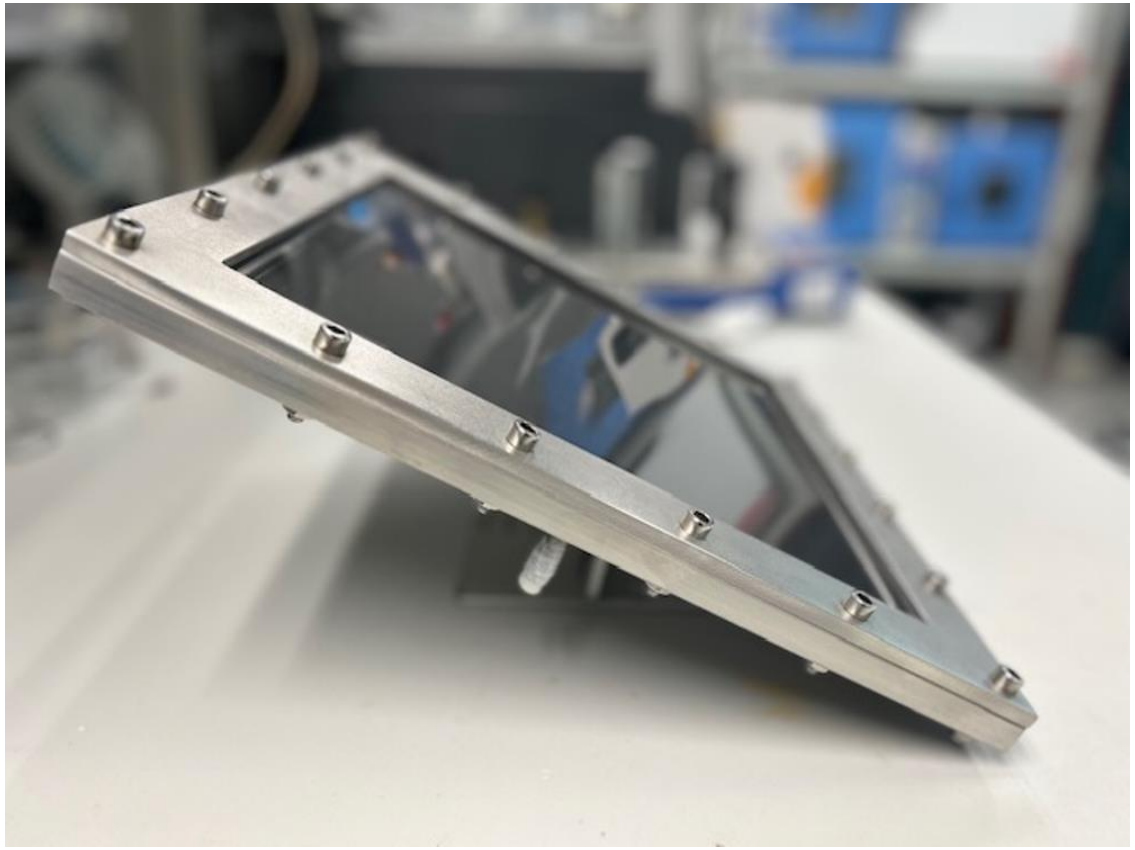
Sunlight-driven Water Splitting for Hydrogen Production



Fukushima Hydrogen Energy Research Field (FH_2R)--- The world's largest facility for producing hydrogen using renewable energy

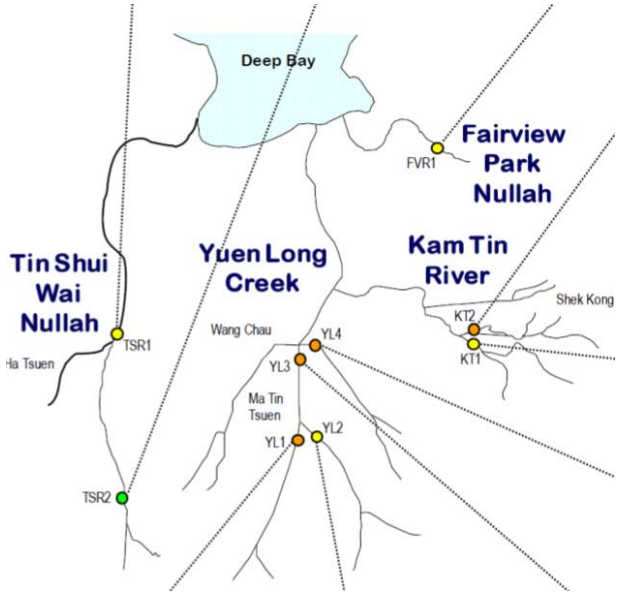

e⁻ H⁺
H2
O2
CAT
CO2
H2O
CO2
Sugar
Fuels
Natural
Artificial

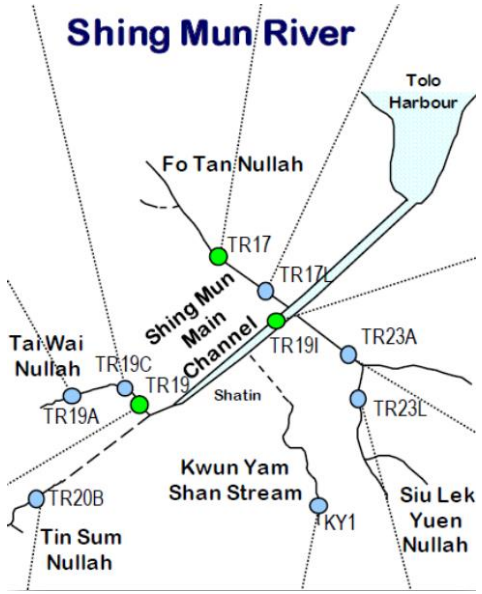


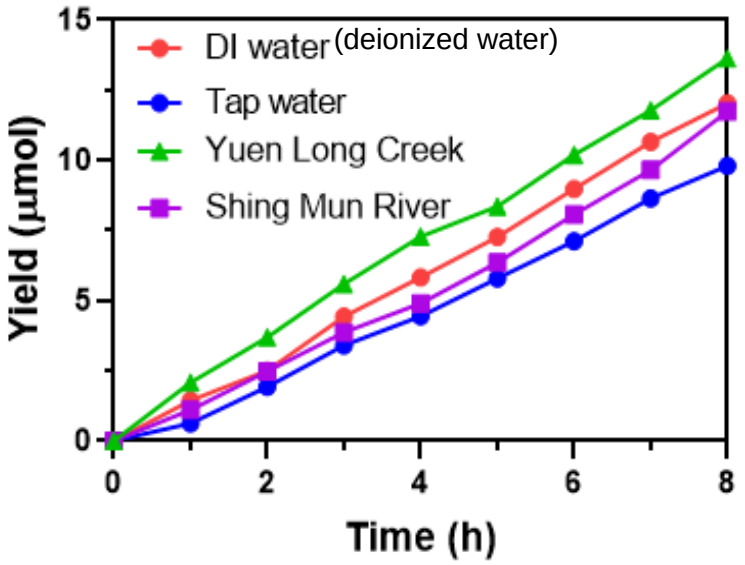


Feasibility Study on Generating Green Hydrogen in Hong Kong

-Electrical and Mechanical Services Department (EMSD)

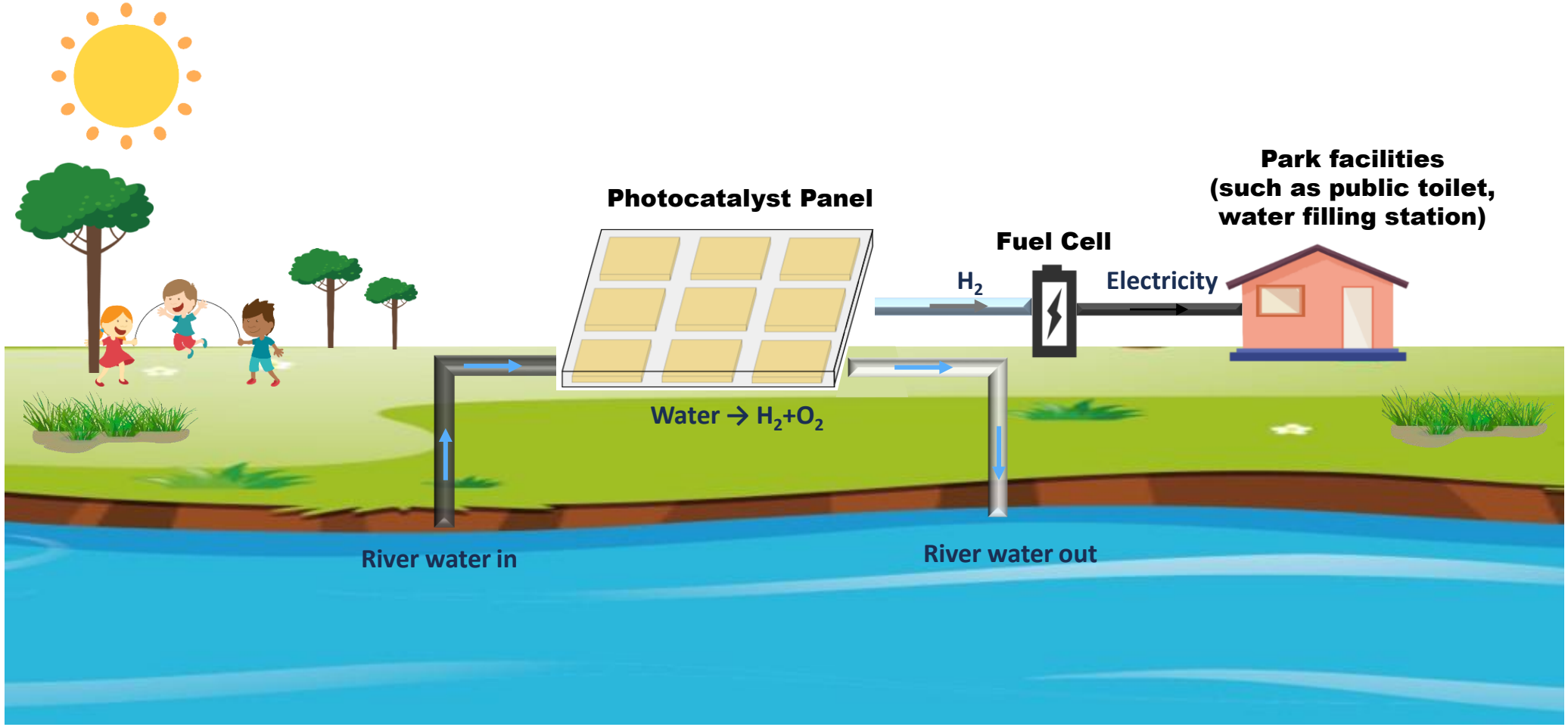






Turning Water into the Source of Solar Hydrogen via Photocatalyst Panel

Photocatalyst Panel System



Summary

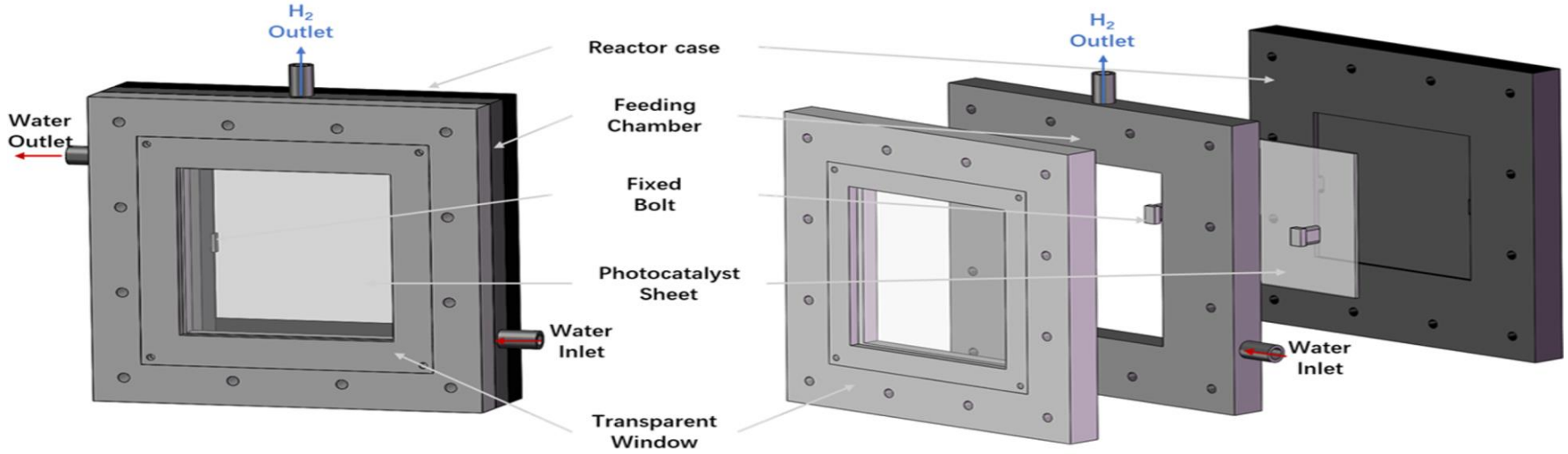
- **Green Hydrogen has potential for greater development while the technologies are not limited to electrolysis-basis.**

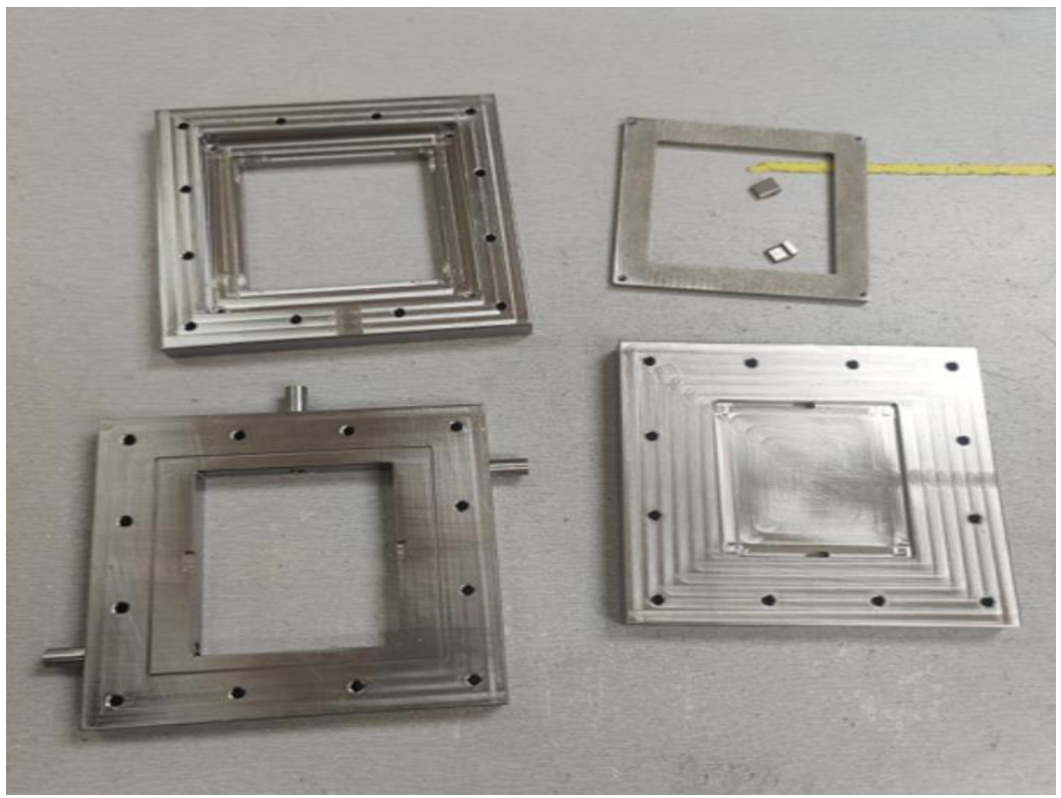
- **Blue hydrogen with carbon capture/storage should be developed.**

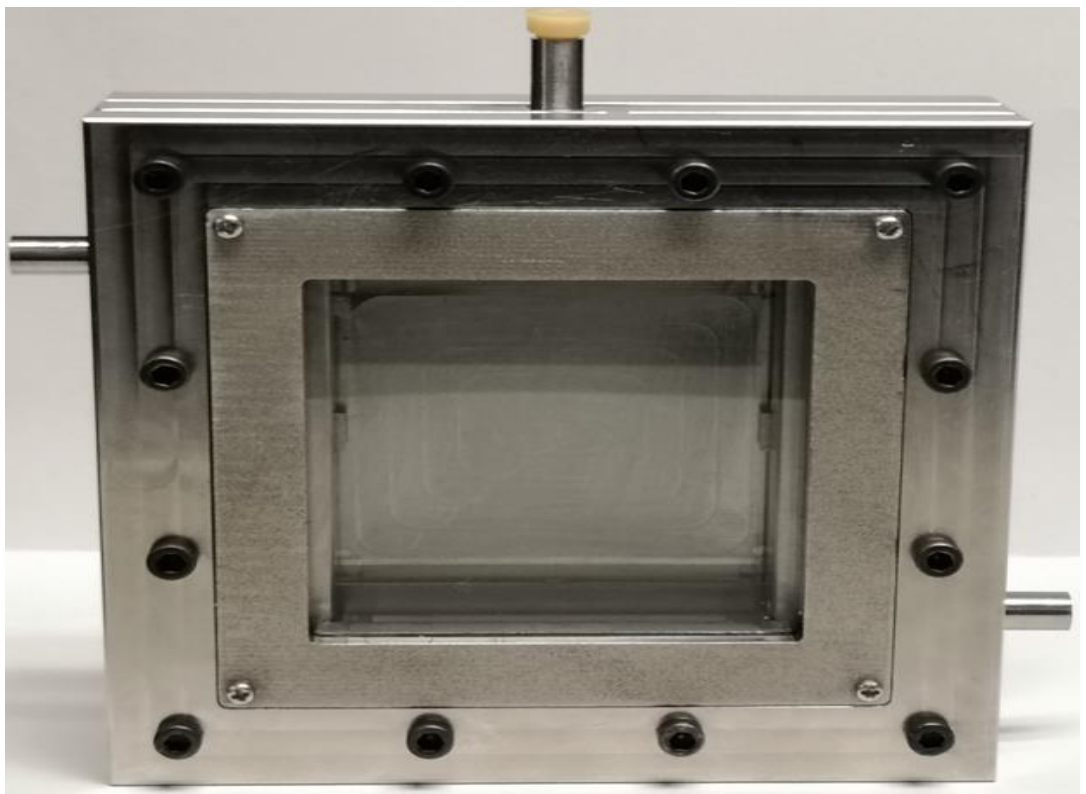
香港城市大學
City University of Hong Kong

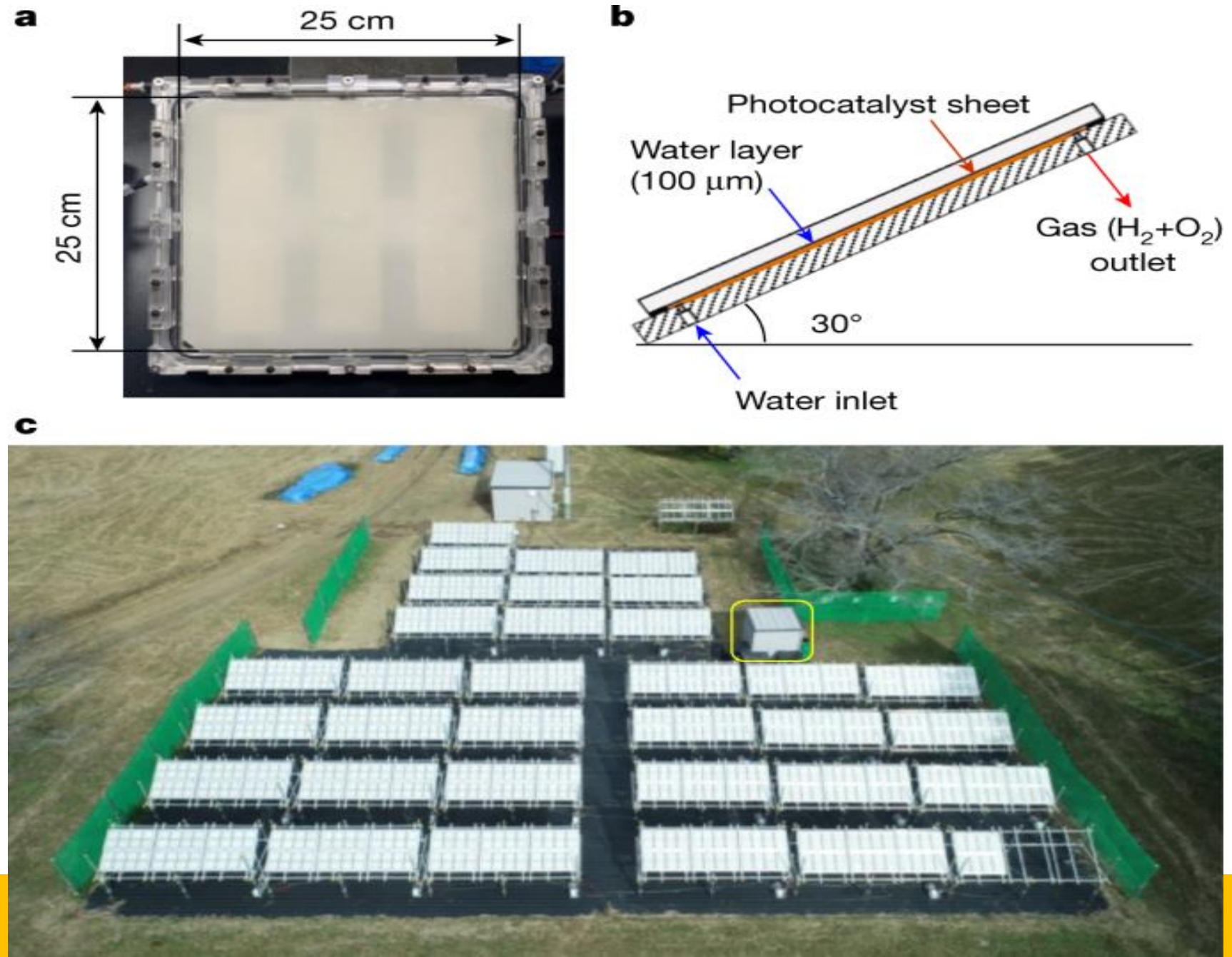
THANK YOU!

專業 創新 胸懷全球
Professional · Creative
For The World


H_2 Outlet
Water Outlet
Reactor case
Feeding Chamber
Fixed Bolt
Photocatalyst Sheet
Water Inlet
Transparent Window
H_2 Outlet
Water Inlet






a
25 cm
25 cm
b
Photocatalyst sheet
Water layer
(100 μm)
Gas (H_2+O_2)
outlet
30°
Water inlet
c

Photocatalyst Panel System