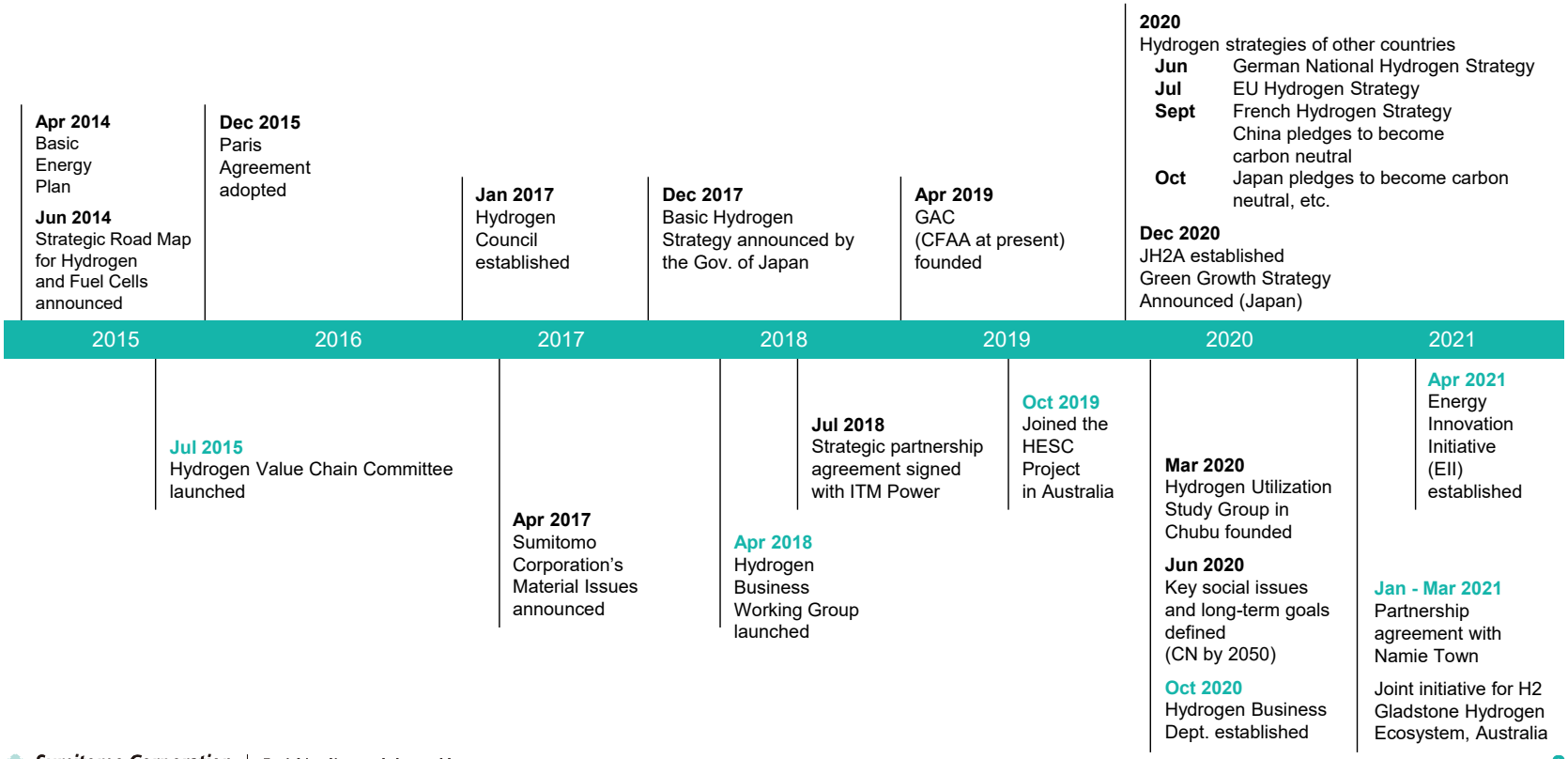
JP Morgan - Global Hydrogen Week

The Road to Decarbonization

Hydrogen Business Dept.
Energy Innovation Initiative
24th May 2022

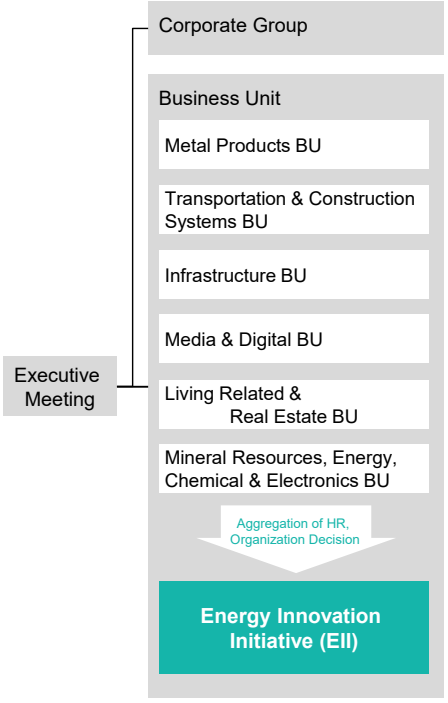
Contents

Sumitomo Corporation's Hydrogen Business Timeline



Establishment of Energy Innovation Initiative (EII)

New Business Organization = Energy Innovation Initiative (EII) has been established in order to create New Business to achieve Carbon Neutrality.



Carbon-Free Energy Development (large value chain model)
- Hydrogen Large Scale Value Chain Development
- Carbon-Free Hydrogen・Ammonia Business
- Next Generation Bio Energy

New Power & Energy Service Development (distributed model)
- Large Scale / Reused Battery Business
- Green Electricity Platform Business
- Zero Emission Combined Energy Service Business

Carbon Management Business
- Methanation (Carbon Recycle)
- Forest development, CCUS, Emission Trading, etc.

EII Organization Chart and Areas of Initiatives

EII Management

Shingo Ueno
Head of EII
Executive Vice President

Seiji Kitajima
Director of EII
GM of EII Design & Strategy Dept.

Keiichi Mihara
Director of EII
Infrastructure Business Department GM

Koji Endo
EII Sub-Leader
Energy Division GM

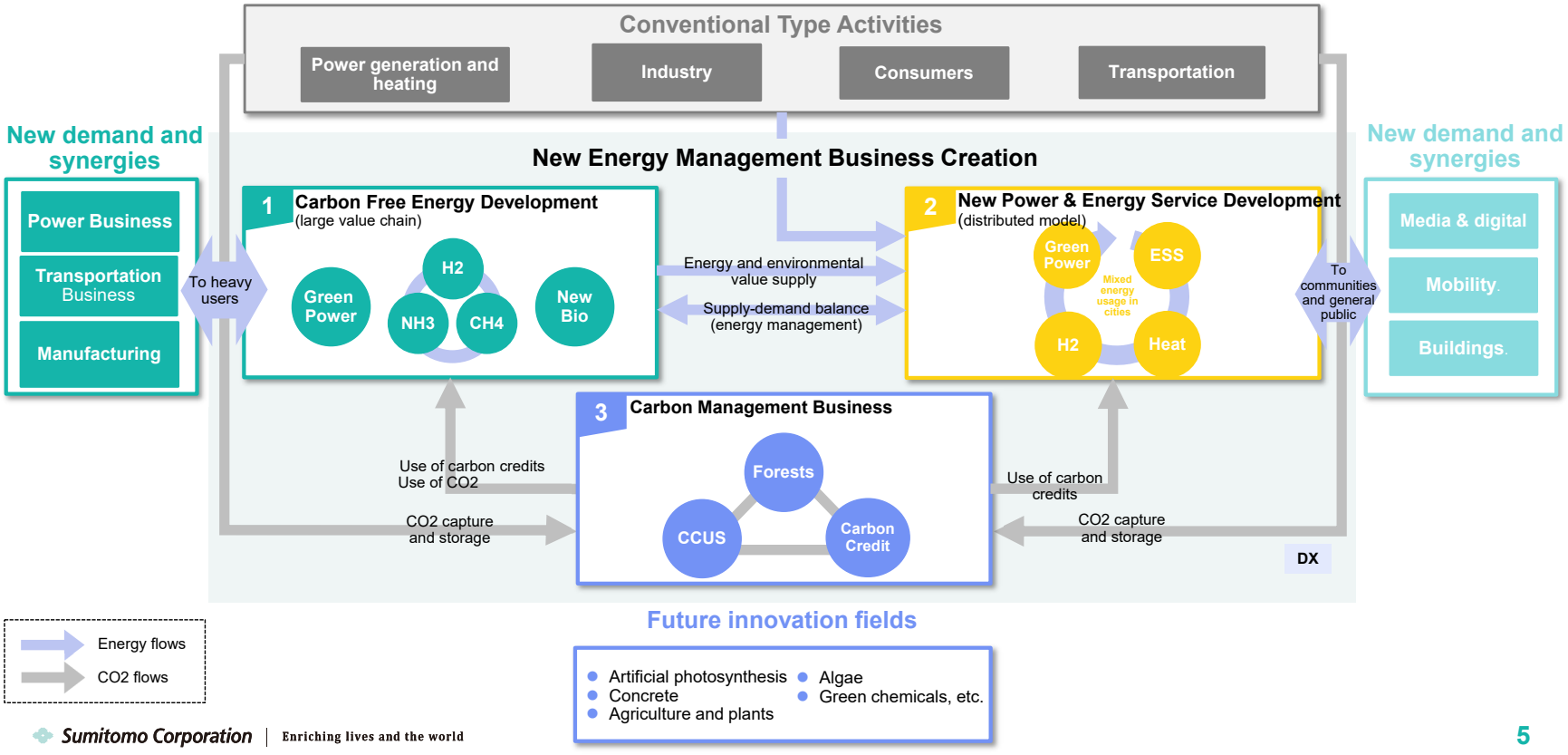
Takayuki Sumita
Assistant CSO
Sumitomo Corporation Global Research Co. Ltd
EII Strategy & Design Dept.

division and team / priority area

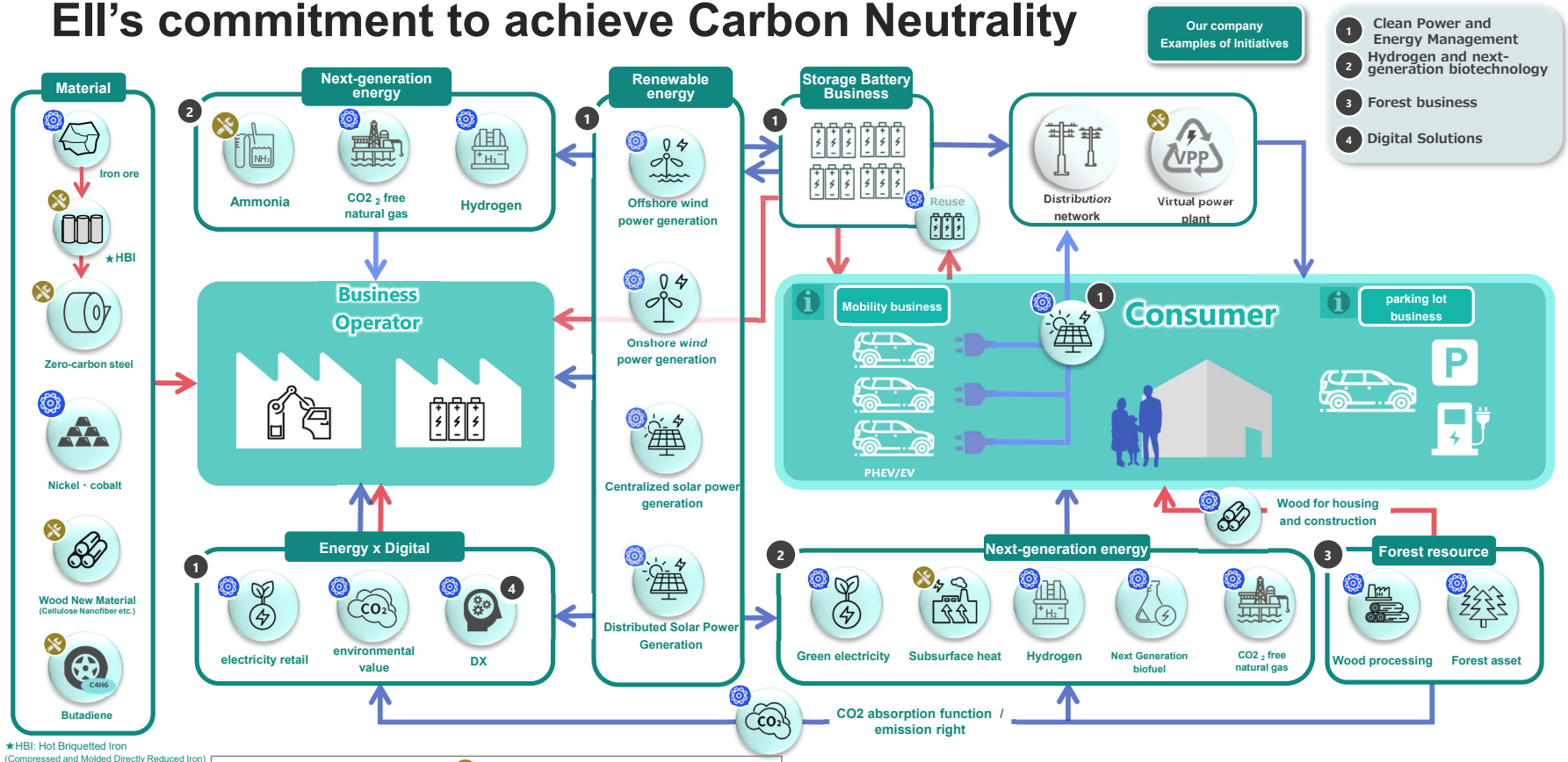
division and team	Carbon Free energetic development and development (Large Supply Origin Type)	New power, Energy Expanding Services (Local production for consumption)	Absorption of CO_2 Fixation and utilization	Business Description
Design & Strategy Dept. Interorganizational collaboration platform	☑	☑	☑	● Formulation of overall EII strategy ● Support for the formulation and implementation of strategies for each organizations (e.g. CCUS, VPP, Mobility x Energy)
Hydrogen business Dept.	☑	☑	☑	● Production and distribution of hydrogen and ammonia
Zero Emission Solution Business Dept.		☑		● Large-scale energy storage business ● EV Battery Reuse Business
Wood Resources Business Dept.			☑	● Forest Business (New Zealand, Russia) ● Wood product trade (including wood chips) ● wood-derived biochemicals
Biomass Energy & Materials Dept.	☑		☑	● Wood pellet trade ● E2G (ethanol), biogas, SAF, etc. ● Development of next-generation bioenergy ● Bagasse pellet business
Team Power Frontier	☑	☑		● Green power platform business based on centralized and distributed photovoltaic power generation
Subsurface Energy Team		☑		● Regional heat project
Carbon Solutions Team			☑	● Development, promotion and trading of carbon credit business

EII Division/Team lineup Overall: 129 in Japan/65 overseas (2022) As of 4/1, 2022

EII Internal and EII x Other Business Units



Ell's commitment to achieve Carbon Neutrality



Clean Power × Energy Management Concept

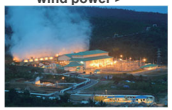
Renewable Energy Business

1.4GW+


< Offshore and onshore wind power >


< Centralized Solar Power >


< Distributed Solar Power>


< Geothermal >


< Hydro >


< Biomass >

Renewable Energy Fund

SPRING INFRASTRUCTURE CAPITAL

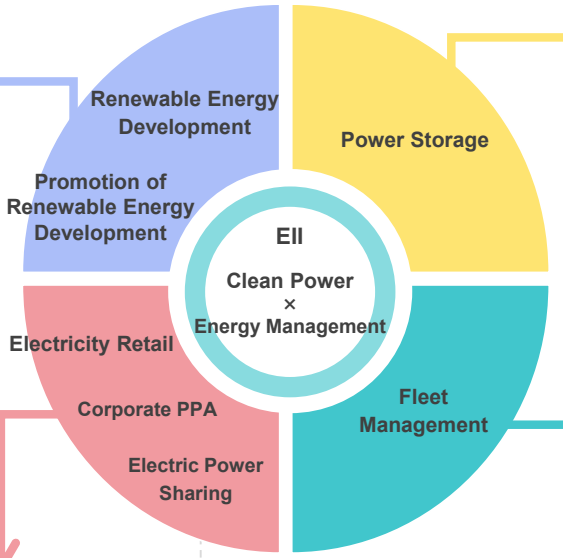
Japan's first offshore wind power Power Generation Investment Fund

No. 1 Fund < Generation Capacity >

- Lacebank Offshore Wind Power Project in the UK 573MW
- Galloper Offshore Wind Power Project in the UK 353MW

No.2 Fund ~

- Domestic operations Wind and solar power generation business
- Overseas operations Renewable Energy Power Business



Energy Storage Systems (ESS)

4R ENERGY

Fleet Management

人とクルマを笑顔でつなぐ 住友三井オートサービス (SMAS)

Number of vehicle management contract companies	53,000
Number of units held and managed	1.01 million
affiliated maintenance shop	22,000

サミットエナジー株式会社 Summit energy

Handling of both high and low tension fields

High Tension	For Corporates 40,000 houses
Low Tension	For home use 900,000 households

P2P

LO3 ENERGY

renewable energy sharing

Direction of Hydrogen Strategy

By 2025

- Local production/consumption projects in Japan, Europe, Australia and other hydrogen-advanced countries/regions
- Local production/consumption models utilizing Sumitomo Corporation's multiple function strengths

By 2030

Customize

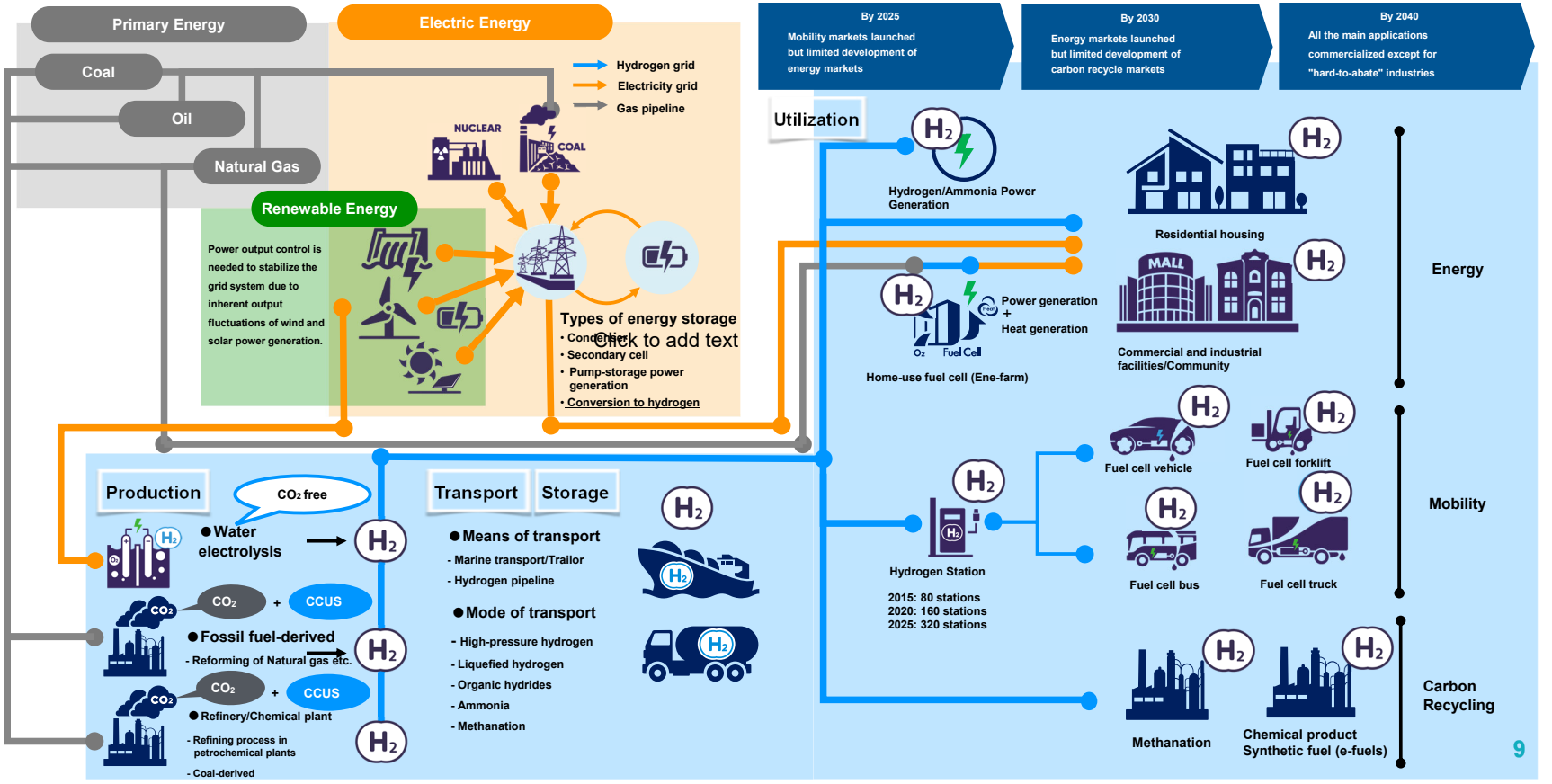
- Horizontal expansion of local production/consumption models to boost scale
- Develop service platform business
- Develop large-scale value chains in cost-competitive regions

2030 and beyond

Cultivate

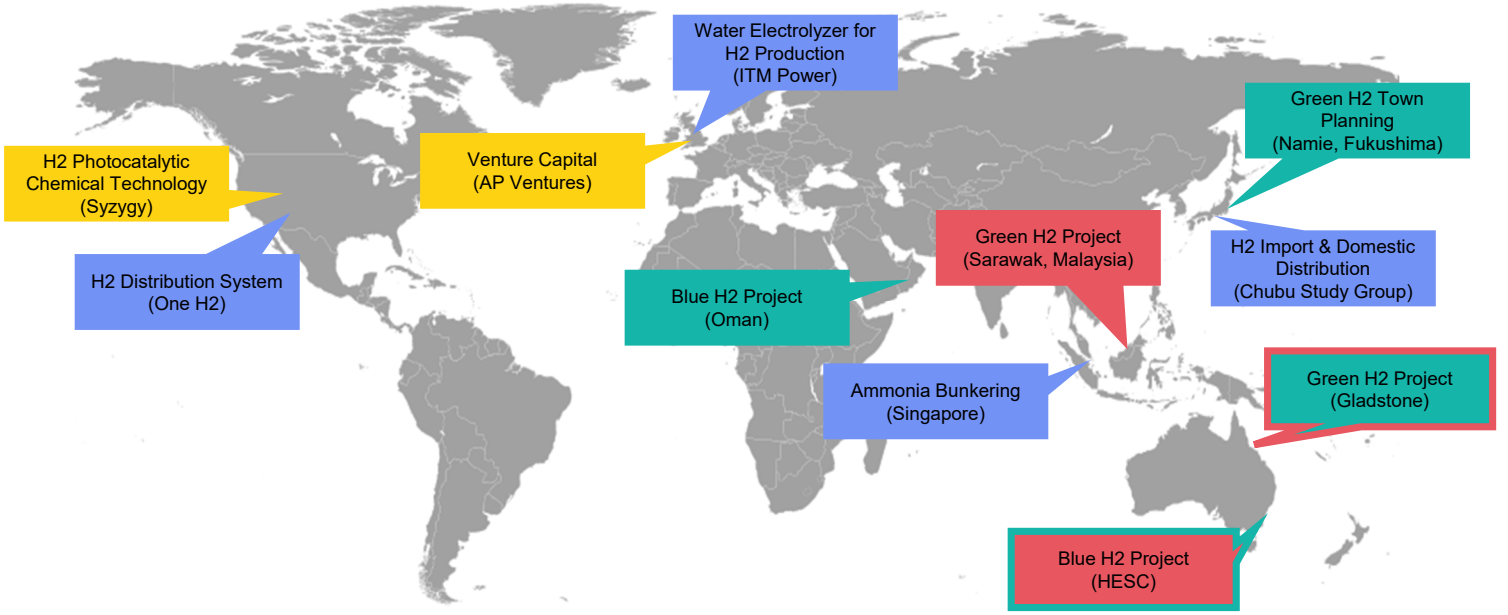
- Further expand the scale of local production/consumption models in peripheral sectors
- Extend service platform business horizontally in a wide range of sectors
- Build large-scale value chains in multiple regions

Hydrogen Value Chain (Hypothetical)



Major Hydrogen Projects of Sumitomo Corporation

Aim to build an optimal hydrogen/ammonia supply chain in response to the different demands of each region and application, combined with "investments in new technologies that will lead to cost breakthroughs" and "service platform businesses".



Local production and consumption | Large-scale value chain | Service platform business | Investment in new technologies

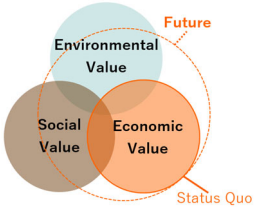
Reconstruction of Local Community Using Hydrogen Energy in Namie

Mission : Create new businesses that enrich people and society (Creating a system in which resolving societal challenges to be a viable business)

Vision : "Namie-initiated energy shift that the world will want to imitate" & "Paradigm shift in Corporate Value"

Hypothesis : Enhancement of "Social Value" and "Environmental Value" boosts up on "Corporate Value"

Challenge : **Evaluate and quantify the two values and verify the linkage to corporate value enhancement**

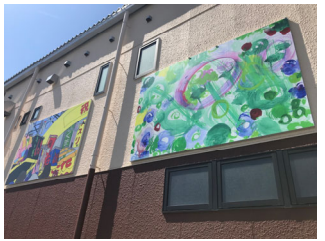


A Multifunctional Hydrogen Station suitable for the Namie lifestyles

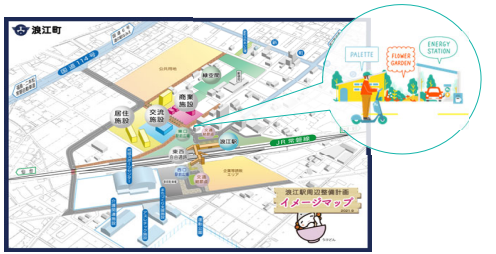
B Address Community & Regional Challenges

▲Hydrogen Festival in Namie

▼Art project for Hydrogen-based society



C Revitalization of the Namie Station Area & Micro Energy Management Concept

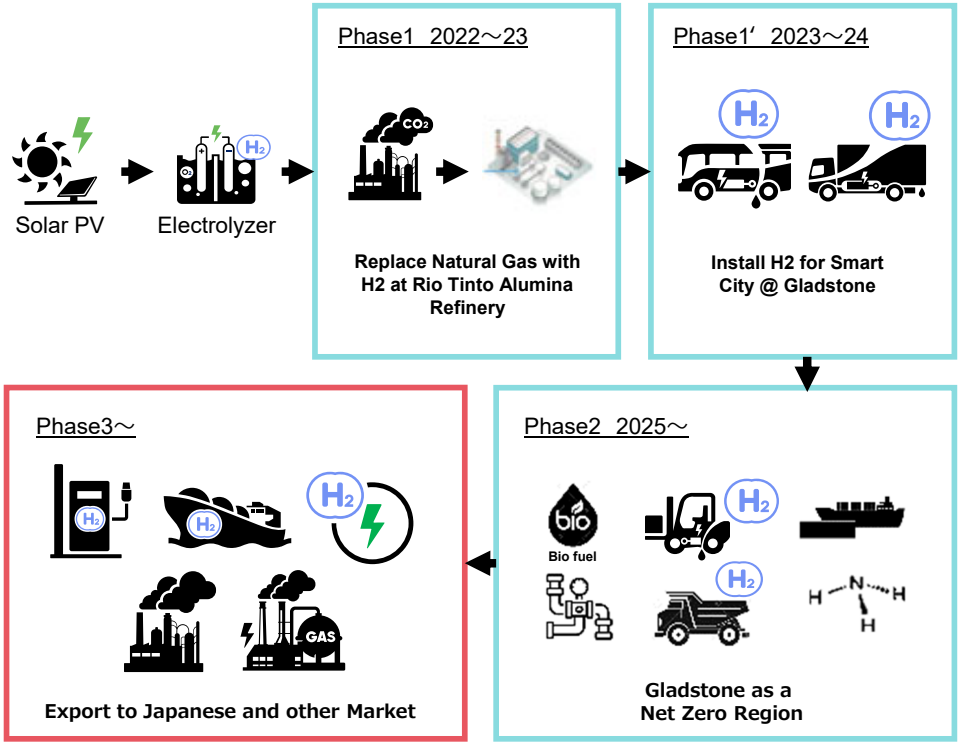


Hydrogen Production in Australia (Gladstone H2 Ecosystem)

- H2 Renewable-powered "green hydrogen" production and consumption in Queensland, Australia
- Produce hydrogen with abundant, low-cost solar power to help reduce local CO2 emissions
- Start with a small-scale hydrogen production, expand hydrogen use to mobility and beyond, aiming to create a zero-emission city through local hydrogen production/consumption.
- Phase 1; FS/FEED completed, and target FID in 2022

Profile of Gladstone City

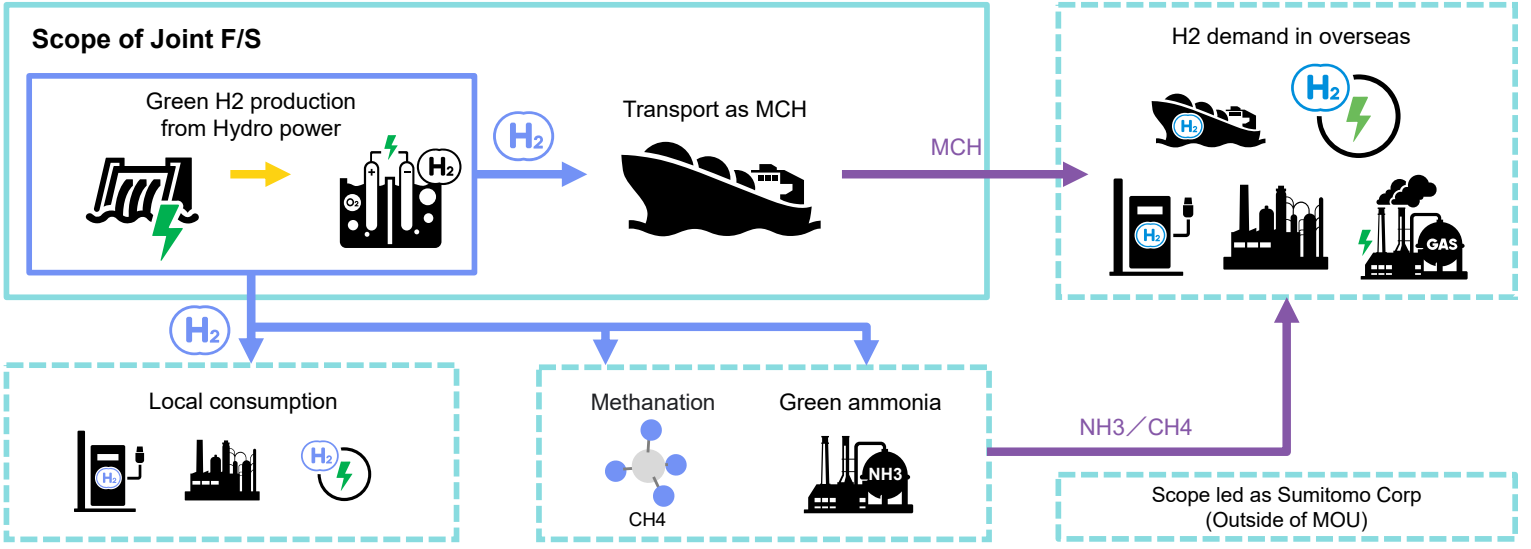
- Area: 250 km² (approx. 70% of Fukuoka City), Population: 70,000
- Suitable for solar power generation with average 314 sunny days/year
- Industrial City including Coal Terminal, LNG, Aluminium, Chemical etc
- Infrastrcture in place (water, roads, railways, and public transportation)
- 27,000 ha available for development (4× the area of Yamanote line)



Local production and consumption | Large-scale value chain | Service platform business | Investment in new technologies

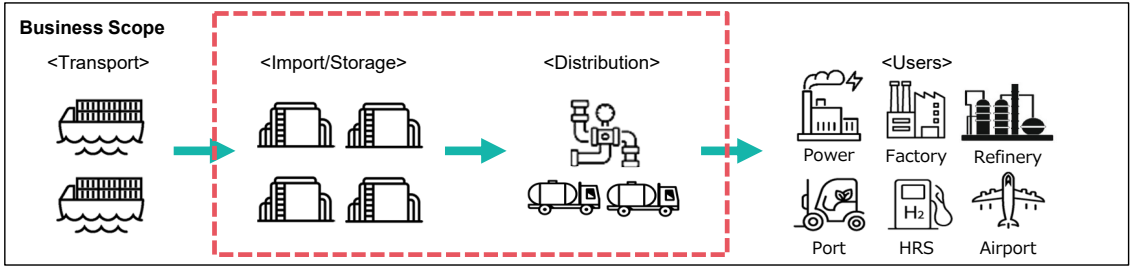
Hydrogen production in Sarawak State, Malaysia

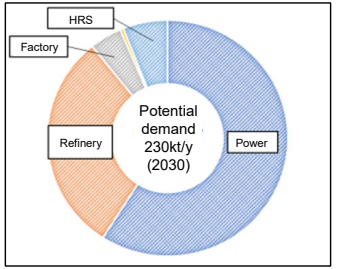
- Concluded MoU with Sarawak State government Agency, SEDC in Nov 2019 for Pre-Feasibility Study for Green H2 production.
- ENOES participated in MoU to study MCH as a carrier of Green H2 in Oct 2020.
- Target to start the production with 3KT/year for Local demand from 2023.
- Gradually increase the production and target 100KT/year for export by 2030.



Hydrogen Utilization Study Group in Chubu

- The Chubu Group was founded in March 2020 by 11 members => 18members as of May 2022. SC occupies consortium Leader position together with Toyota and SMBC. The vision is "To be the pioneer of large scale receiving & distribution of hydrogen and lead its social implementation in Japan"
- This Group takes its first effort in Japan to conduct cross-sectional studies in various industries such as energy (oil, gas and electricity), petrochemicals, automobiles, steel manufacturing, finance, etc.
- Key milestone: FS@2021 =>FEED&&DD @2022~





Ammonia Bunkering Project in Singapore

- Sumitomo built up a consortium to prepare for a bunkering supply chain of ammonia at the biggest bunkering hub, Singapore. Ammonia is considered one of the most promising alternative marine fuels.
- Blue ammonia could be an option at the beginning in terms of global availability and cost, but green ammonia should be the best option for an ultimate goal of zero carbon shipping.

Partners	Business
A.P. Moller – Maersk	Ship Owner/Operator
Fleet Management Limited	Ship Management
Keppel Offshore & Marine	Ship Building
Maersk Mc-Kinney MollerCenter forZero Carbon Shipping	Research Center
Sumitomo Corporation	Fuel Supplier
ABS	Class
K-Line	Ship Owner/Operator

Ammonia-Fueled Bulker Project

Together with Oshima Shipbuilding, we are developing "ammonia-fueled 81,000DWT type bulk carrier", which can run on both conventional fuel and ammonia to be dedicated to the clients who are environmentally conscious.

1 Specifications of the bulk carrier to be designed and developed*

LOA	229.0m	Laden Draft	14.47m
Beam	32.26m	Deadweight	abt.81,000
Depth	19.98m		

▲A dry bulk carrier of an equivalent size to that of the carrier to be built

2 Project Timeline

2022 - 2024

- Spec decided
- Negotiation with clients FID
- 1st Vessel ordered
- Detailed designing
- Construction

2025 / 2026

- **1st Vessel delivered**

3 Project Team / Key Partners

Sumitomo Corp.	● Ship & Marine Project Dept. (PJ Management) ● Energy Trading Dept (Bunkering) ● Energy Innovation Initiative (Off-Take)
Sumitomo Group	● Triton Navigation (Ship Owner) ● Oshima Shipbuilding (Shipyard)
External Partners	● Classification Society ● Technical Manager

*The particulars and design are only preliminary and subject to change.

New Tech Investment

For access to new innovative technology and for applying it to Sumitomo's Hydrogen Project in order to make significant cost reductions for Hydrogen Production.

APVentures
ADVANCE & PIONEER

- UK based venture capital specialized in Hydrogen
- Sumitomo invested into venture capital concentrate on investing into innovative Hydrogen Technology Oct 2020 as LP
- AP Ventures' portfolio:

altergy, HyET Hydrogen, ERGOSUP, Insplorion, hydrogenious LOHC TECHNOLOGIES, PLUG POWER, Starfire Energy, ZEG Power, GREYROCK ENERGY, Czero, BALLARD, HazerGroup, infintium

SYZYGY PLASMONICS

- Sumitomo invested in SYZYGY who has innovative technology in the US in Sep 2019
- Their technology is for H2 production from natural gas by using new photocatalyst

H_2PRO

- Electrolyzer start-up in Israel
- Sumitomo invested H2PRO who has next -generation technology of electrolyzer in Aug 2020

Strategic Partnership with ITM Power in the U.K.

- Alliance with the leading electrolyser manufacturer, which holds a key to cutting hydrogen production costs
- PEM electrolysers well-adapted to the fluctuating power output of renewable energy
- Container-shaped, compact system module (2 MW at present ⇒ 5 MW)
- Sumitomo partnered with ITM Power in 2018 (also becoming agent for the Japan market)

ITM POWER
Energy Storage | Clean Fuel

(Source: ITM Power)

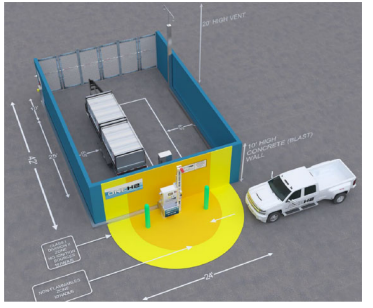
[Deployments]
10 MW system for Shell Germany's Rhineland refinery and many others (Significant market share among major PEM electrolyser manufacturers)

Hydrogen Service Platform of US-firm OneH2

- Equity participation in North Carolina-based firm OneH2 since 2021
- On-site hydrogen production using compact gas reformers, a unique transportation system, and simple dispensers achieve a low-cost, highly-adaptable hydrogen supply service platform
- Secured a market share in the U.S. centered on fuel cell forklifts used at mass distribution warehouses
- Aims to grow commercial vehicle-related business, where hydrogen demand is set to grow, with GM, Toyota, and other major clients

Hydrogen production using a compact gas reformer

Unique transportation using a compact, high-pressure tank trailer and pickup truck



Mobile hydrogen station equipped with a simple dispenser

(Source: OneH2)