

Activities of MHI Group and MCO for Energy Transition

Mitsubishi Heavy Industries Compressor Corporation

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YUTA OKUMURA

Compressor Engineer
Business Development Division

 **MITSUBISHI HEAVY INDUSTRIES COMPRESSOR**

- 1. MHI Group Mission**
- 2. MHI Group Overview & Activity**
- 3. MCO Overview & Activity**
- 4. Technology of MCO Compressor**
- 5. Summary**



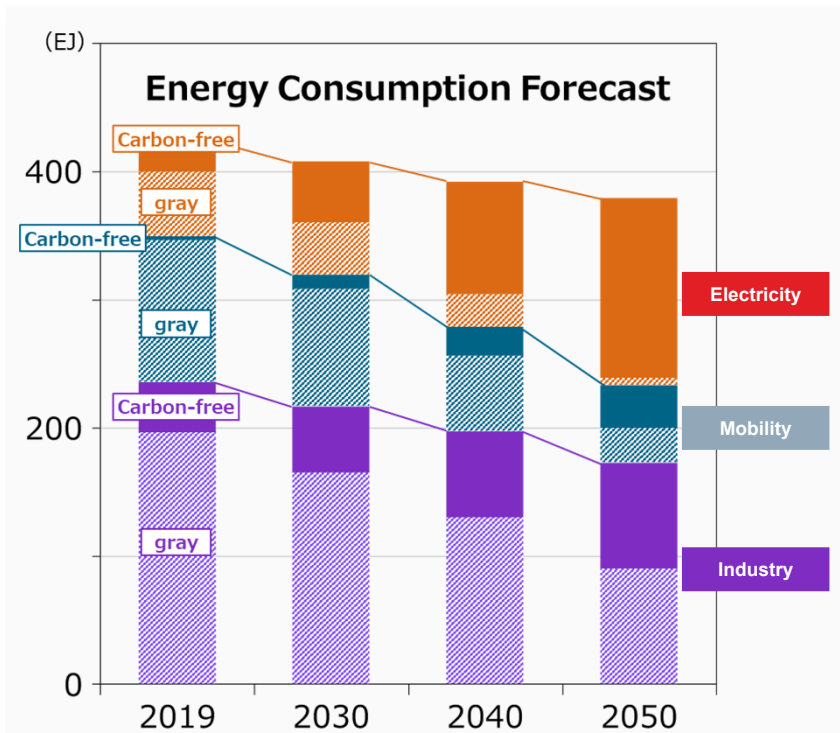
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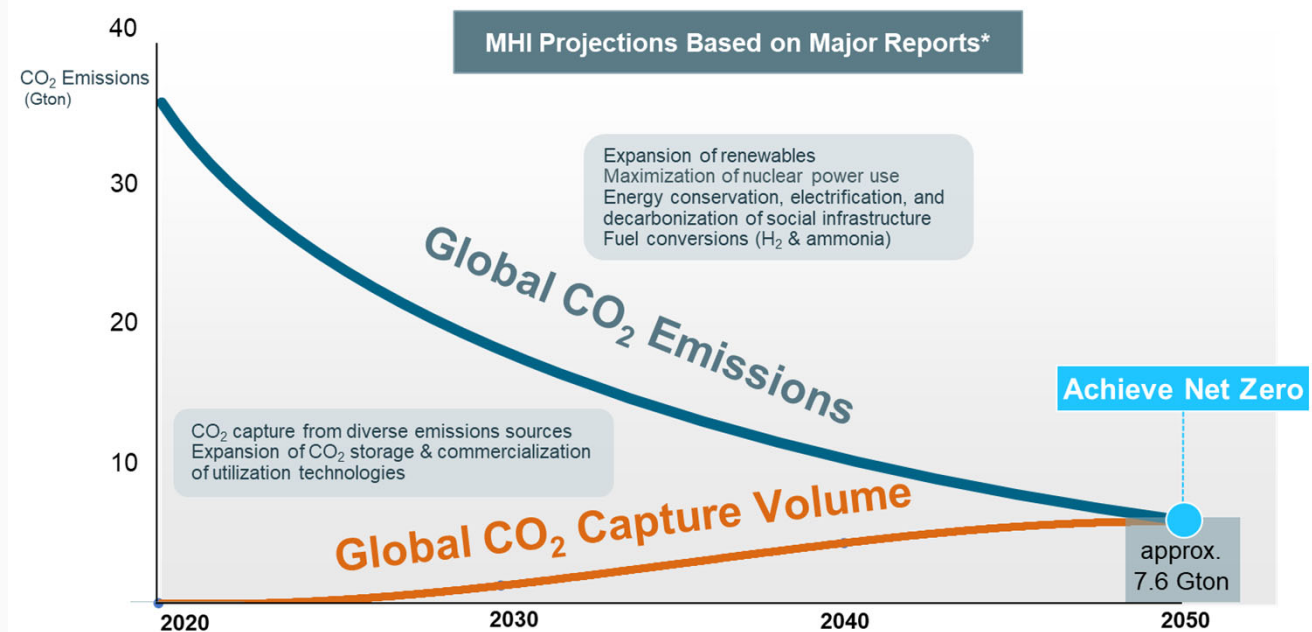
MHI Group Mission

MHI Group must answer to large energy demand

➔ Involvement in many energy productions for decarbonization



IEA World Energy Outlook 2020 - Sustainable Development Scenario,
 IEA Energy Technology Perspective 2017/2020
 EJ:exajoule : 10¹⁸J



*Includes IEA Net Zero by 2050 and McKinsey 1.5C Scenario reports

MHI Group Mission

MHI Group's 2040 Carbon Neutrality Declaration --- **“MISSION NET ZERO”**



| Target Year | Reduce CO ₂ emissions across MHI Group (Scope 1&2) | Reduce CO ₂ emissions across MHI's value chain (Scope 3 + reductions from CCUS) |
|-------------|---|--|
| 2030 | -50% (compared to 2014) | -50% (compared to 2019) |
| 2040 | Net Zero | Net Zero |

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MHI Group Overview & Activity




Production Line-up

 **1884** Foundation
over 130 years history

 **¥3.9TN** Revenue
(FY2021, consolidated)

 **Diverse products**
On land, at sea, in the sky, in space

 **256** Group Companies
(Consolidated)

 **78,486** Employees
(Consolidated)



Gas turbines



Compressors



Aero engines



CO₂ capture plants



Metals machinery



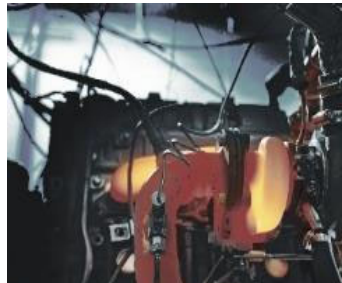
Chemical plants



Transportation



Waste-to-energy



Turbochargers



Aerospace



Rocket engines



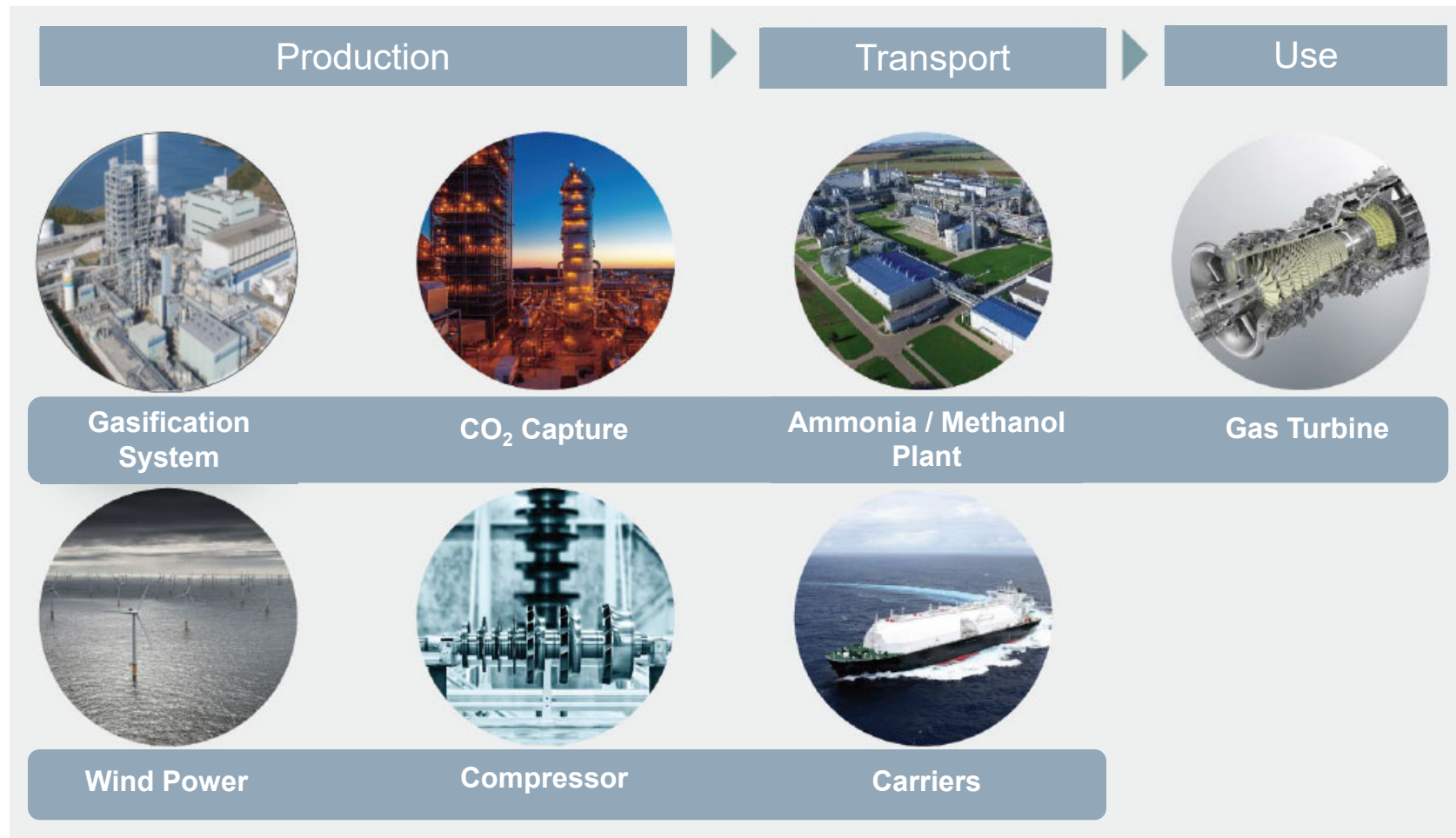
Defense

The Path to achieve Carbon Neutrality

Build an innovative solutions ecosystem

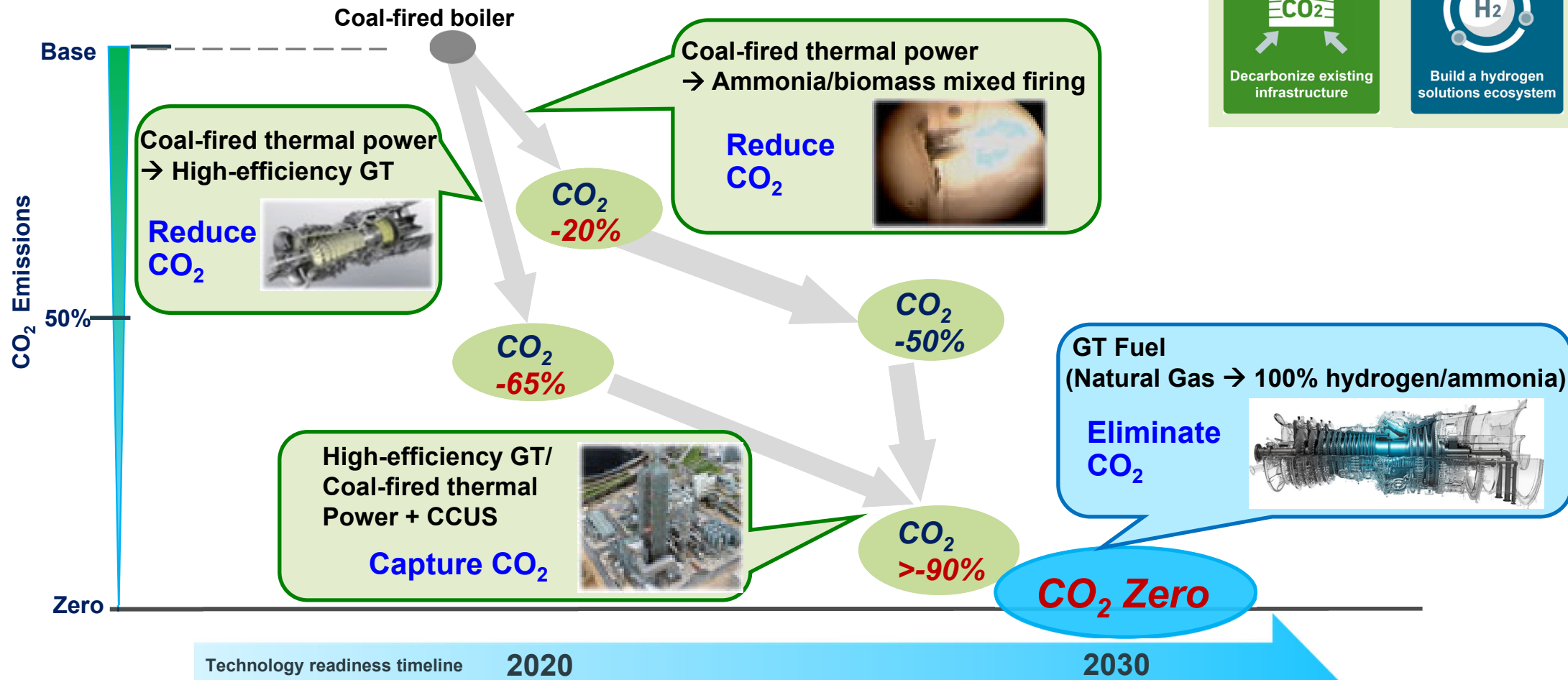


Wide range of core technology for Carbon Neutrality



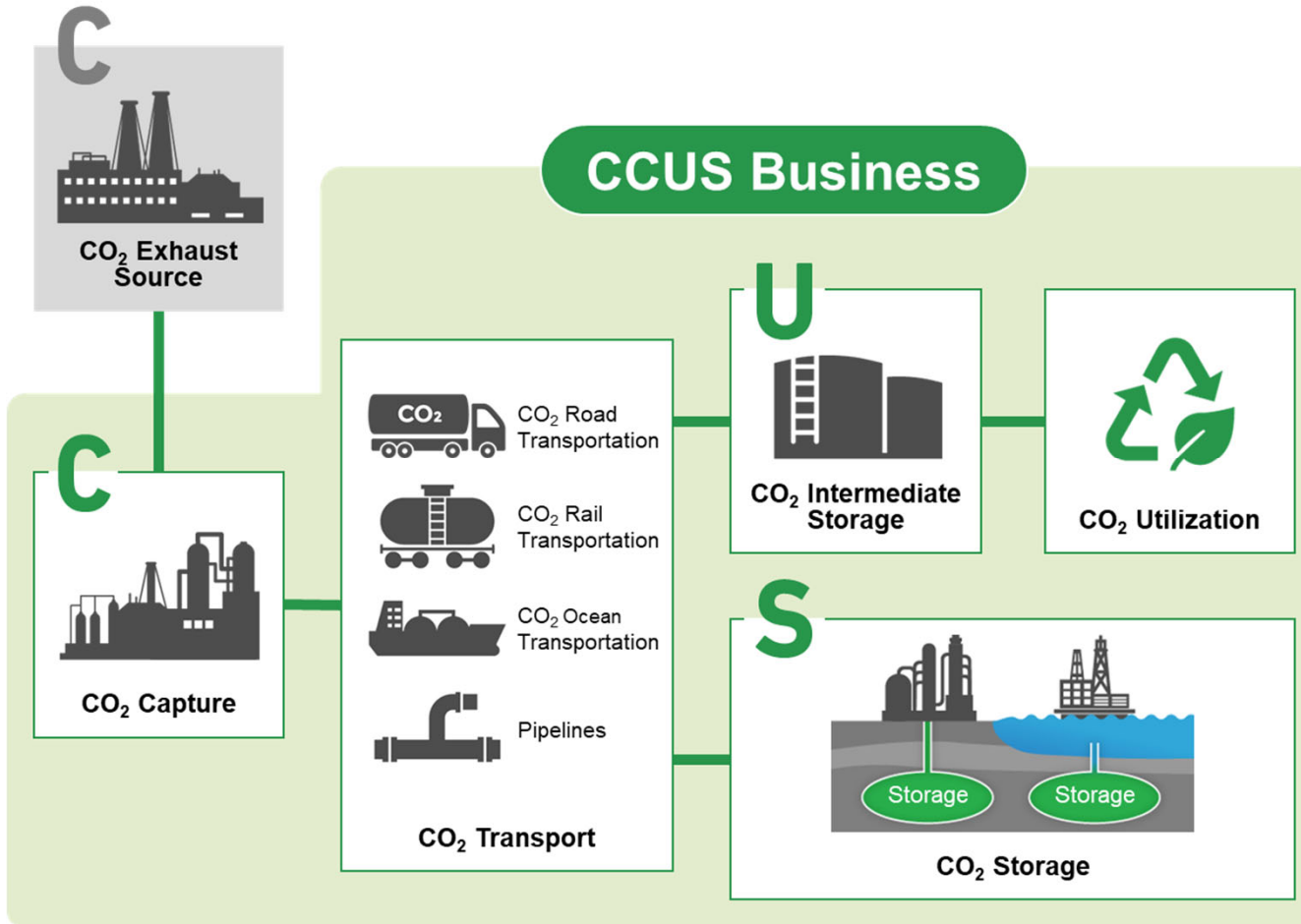
MHI Group Overview & Activity

Transition of Carbon-free power generation



MHI Group Overview & Activity

End-to-end CO₂ solutions ecosystem of CCUS business



Liquefied CO₂ carrier demonstration test ship



CO₂NNEX

CO₂NNEX is a digital platform
⇒ Accelerate carbon recycle ecosystem growth

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MCO Overview & Activity



MCO

(Mitsubishi Heavy Industries Compressor Corporation)

 **MITSUBISHI HEAVY INDUSTRIES COMPRESSOR**



【 Incorporation 】

2010

MHI fully-owned subsidiary



【 Office Location 】

Hiroshima (HQ), Tokyo

USA, UK, Brazil, Saudi Arabia, Korea
China, Singapore



【 Line of Business 】

Compressors / Steam Turbines, etc.



【 Advanced Strategy 】

MHI R&D support product development,
Production from material to testing and Shipping

MCO Overview & Activity



Ethylene Plants

- Charge Gas Compressor
- C₃ Refrigerant Compressor
- C₂ Refrigerant Compressor



Ammonia/ Methanol/ Urea

- Synthesis Gas Compressor
- NH₃ Refrigeration Compressor
- CO₂ Compressor



Refinery

- Hydrogen Rich Compressor
- FCC Compressor



CCS

- CO₂ Injection Compressor



Pipeline

- Natural Gas Pipeline Compressor



LNG

- Natural Gas Liquefaction Compressor
- End Flash Gas Compressor

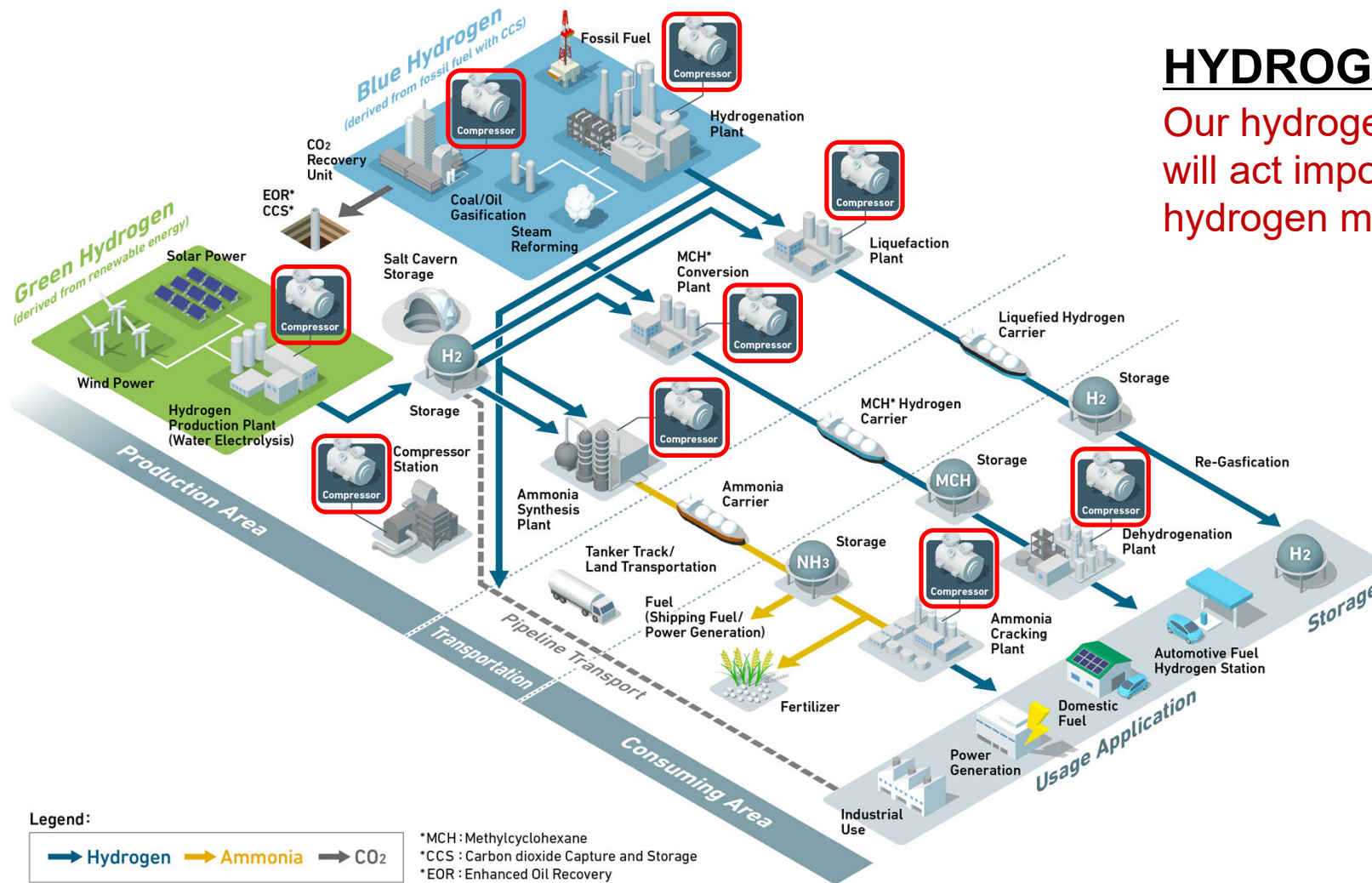
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Hydrogen Compressor Technologies



Technology of MCO Compressor



HYDROGEN MARKET

Our hydrogen and CO2 compressor will act important roles in the hydrogen market

Legend:



*MCH : Methylcyclohexane
 *CCS : Carbon dioxide Capture and Storage
 *EOR : Enhanced Oil Recovery

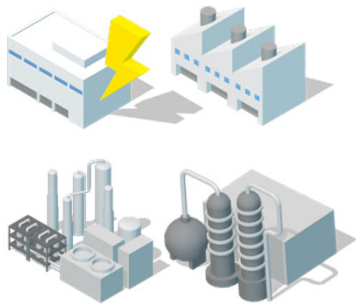
CO₂ Compressor Technologies



Technology of MCO Compressor

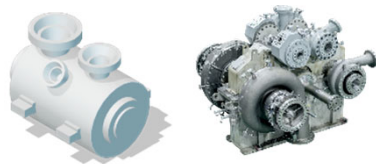
CO₂ Market

Capture



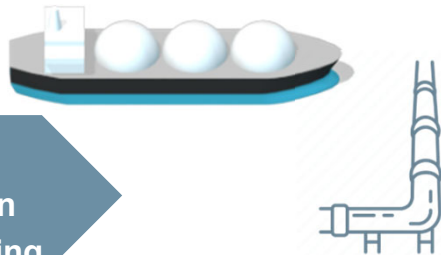
Emitter

Power Generation, Industrial,
Hydrogen, Chemicals,
Natural Gas Processing, Cement



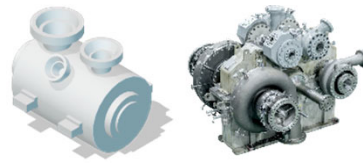
Compressor

Transport



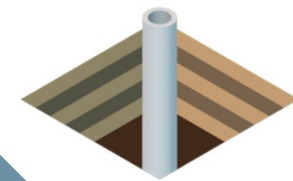
CO₂
Purification
& Conditioning

Liquefied CO₂ Ship Pipeline



Compressor

Store / Utilize



CO₂
Injection

EOR / Storage Site

Saline Formations
Depleted Oil/Gas Reservoirs
Petrochemical Plant (Urea Plant)



Compressor

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Summary

MHI Group Activity & Mission

• MHI Group's 2040 Carbon Neutrality Declaration

1. Decarbonize existing infrastructure ➡ Carbon-free power generation, Biomass, Green Steel...
2. Build a hydrogen solutions ecosystem ➡ Hydrogen Production Technology Development
3. Build a CO₂ solutions ecosystem ➡ CCUS technology, CO₂NNEX

MCO's Compressor Technologies for Decarbonization

• Hydrogen Compressor

- ➡ Develop the Hydrogen Compressor (MAC-S) to proceed business development for hydrogen value chain

• CO₂ Compressor

- ➡ Both Super high pressure injection compressor and Integrally Geared Compressor (MAC-G) technologies are important to build a carbon ecosystem and contributes to decarbonization.



To achieve a carbon-neutral society

MOVE THE WORLD FORWARD  **MITSUBISHI
HEAVY
INDUSTRIES
GROUP**



Mitsubishi Heavy Industries Compressor Corporation