JOGMEC

Country Report for CCOP P2W2:

Workshop on Natural Gas Field Development with High CO_2 and H_2S

Natural Gas Development/Utilization in Japan

September 2009

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1. Gas resources, production, and market in Japan
2. Research activities related to natural gas development
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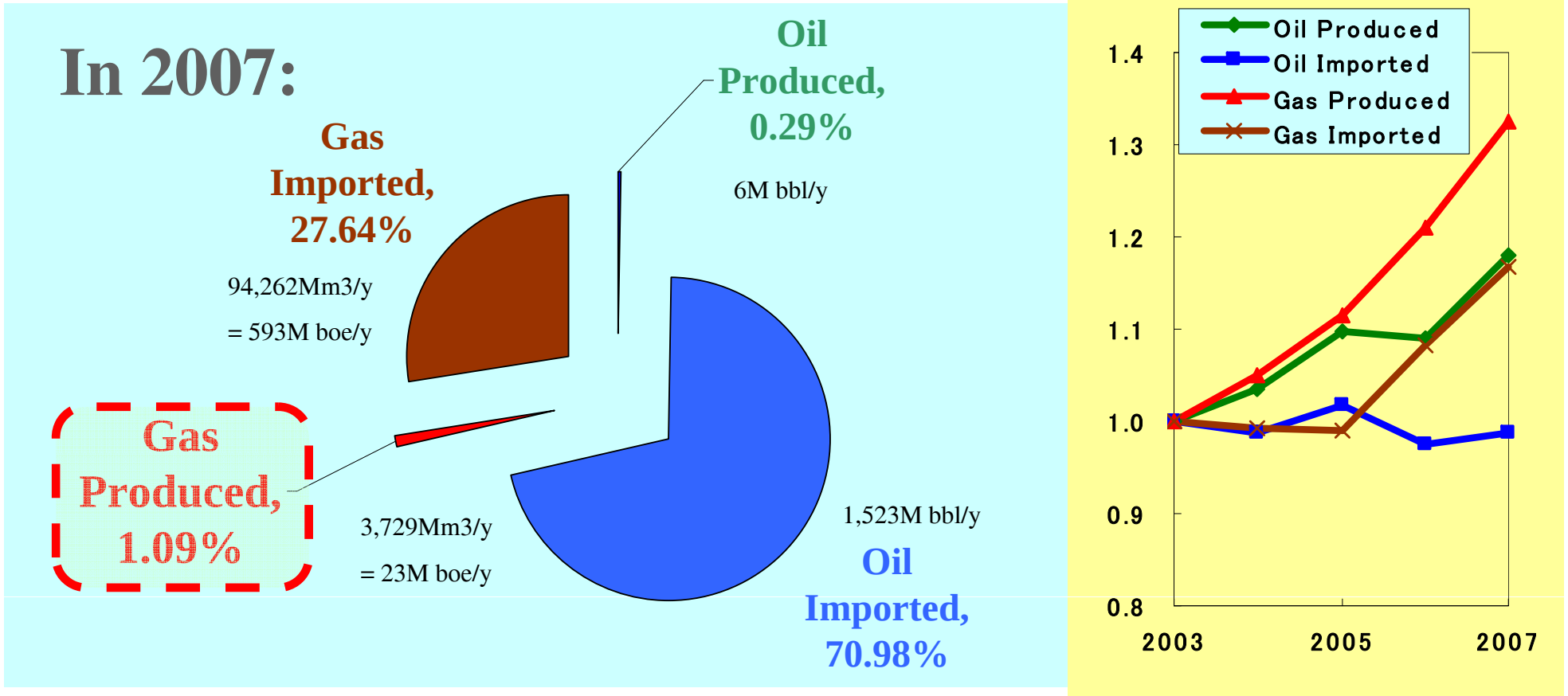
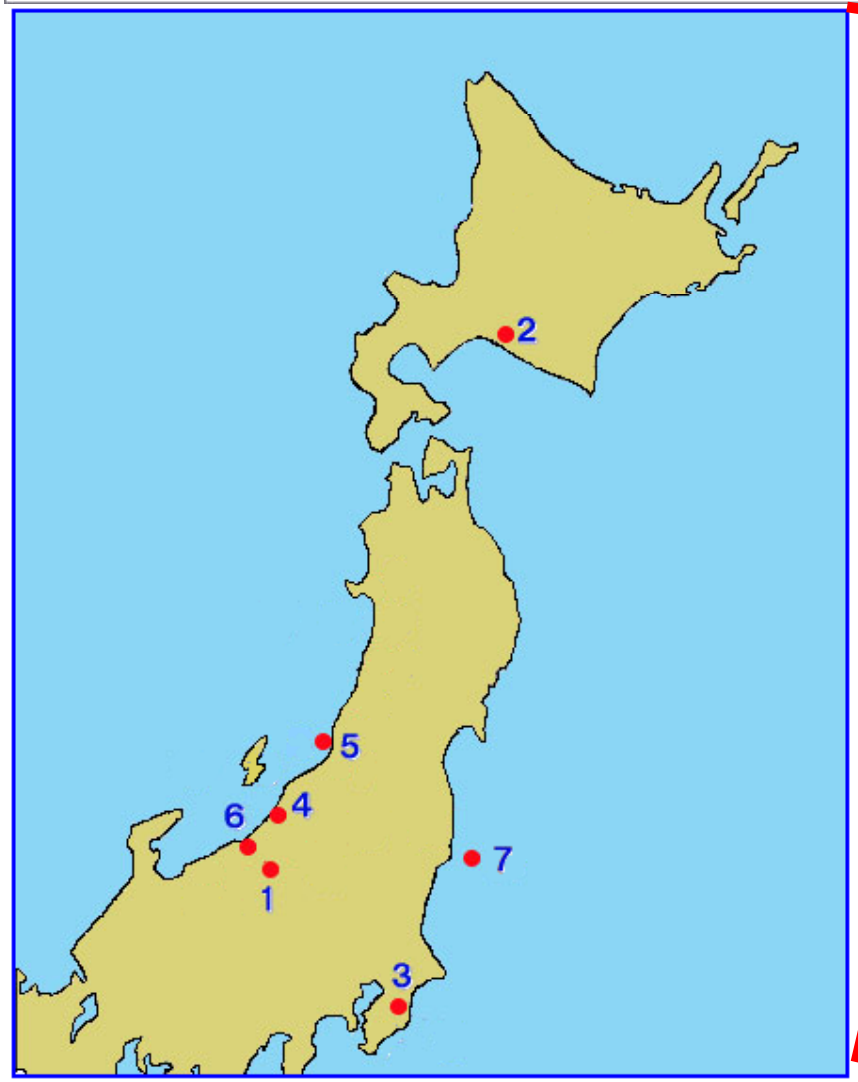
   (c) Anti-Corrosion Technology in Sour Environment: Material Selection
   (d) Non-conventional Hydrocarbon Exploitation : Methane Hydrate
3. JOGMEC/TRC Long-term R&D Strategy Toward 2030
4. Challenges to R&D for CCS and environmental issues
5. Conclusions

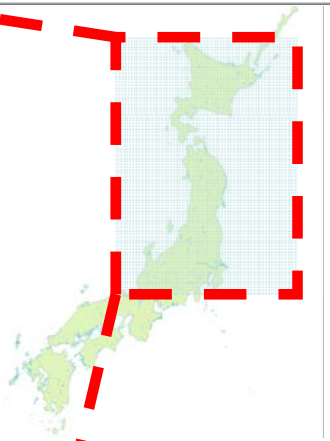
Hydrocarbon Resources Supply in Japan



＜Data from “Japan Petroleum Development Association” HP＞

Major Gas Fields in Japan

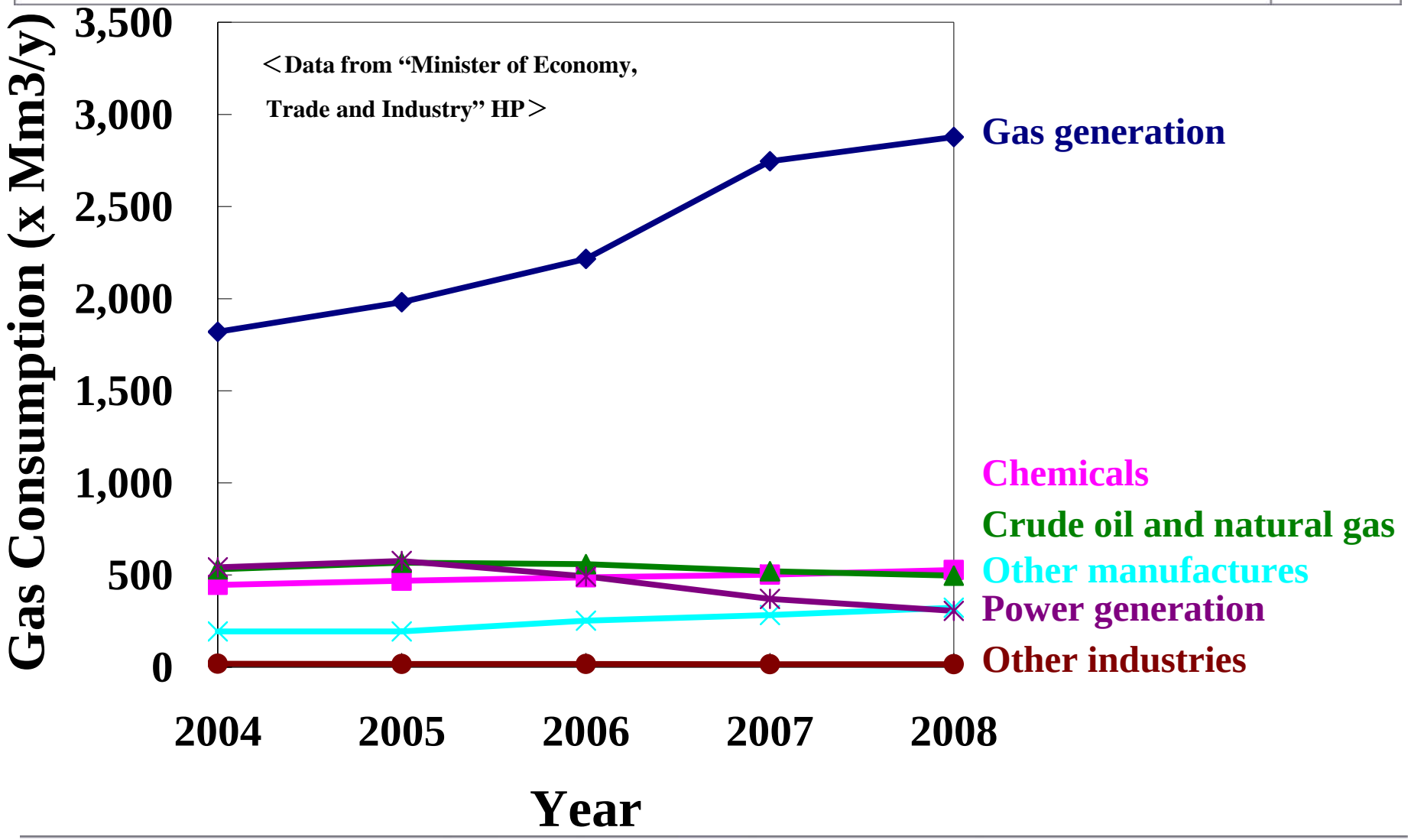




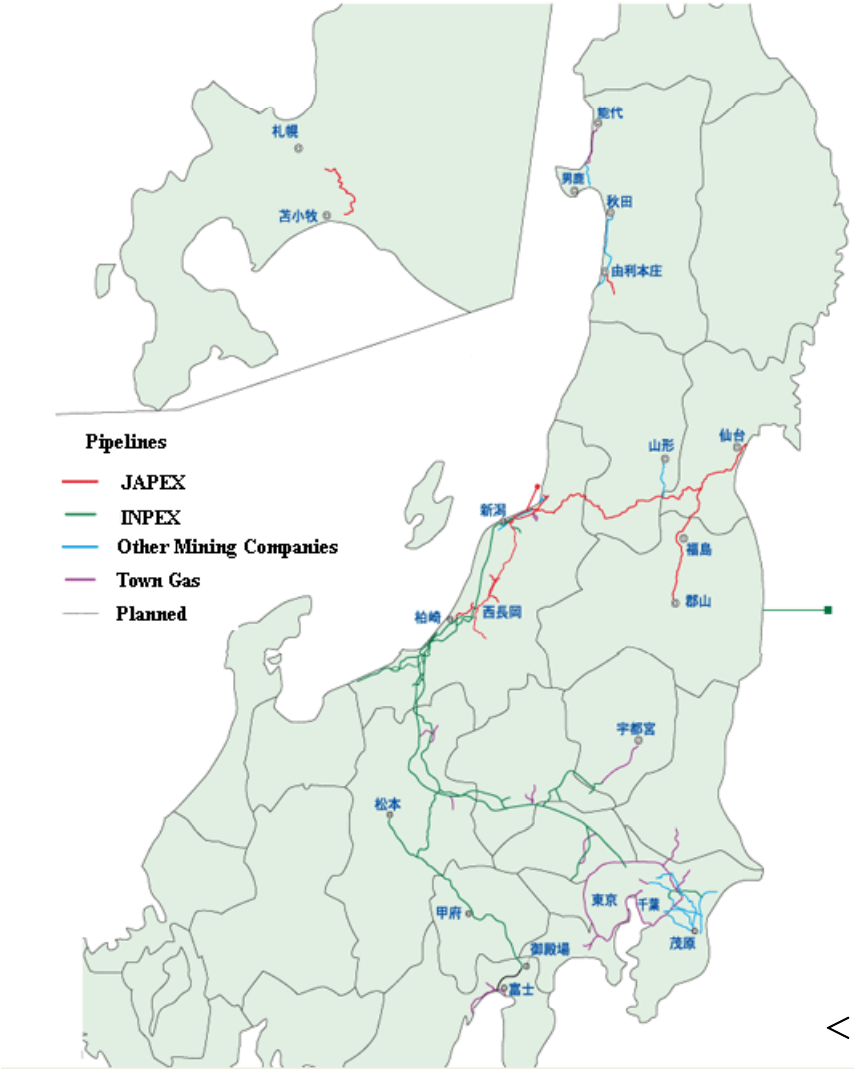
＜Data from “Japan Petroleum Development Association” HP＞

No.	Name of Gas Field	Production Rate (x $10^6 m^3/y$)
1	Minami-Nagaoka & Katagai	1,543
2	Yuufutsu	453
3	Minami-Kanto	353
4	Higashi-Niigata	234
5	Iwafune-oki	186
6	Yoshii	171
7	Iwaki-oki	169

Markets for Domestic (Produced) Gas



Natural Gas Pipelines in Japan



Total Length: 2,987km

Planned : 67km

(as of August 2008)

＜Data from "Japan Natural Gas Association" HP＞

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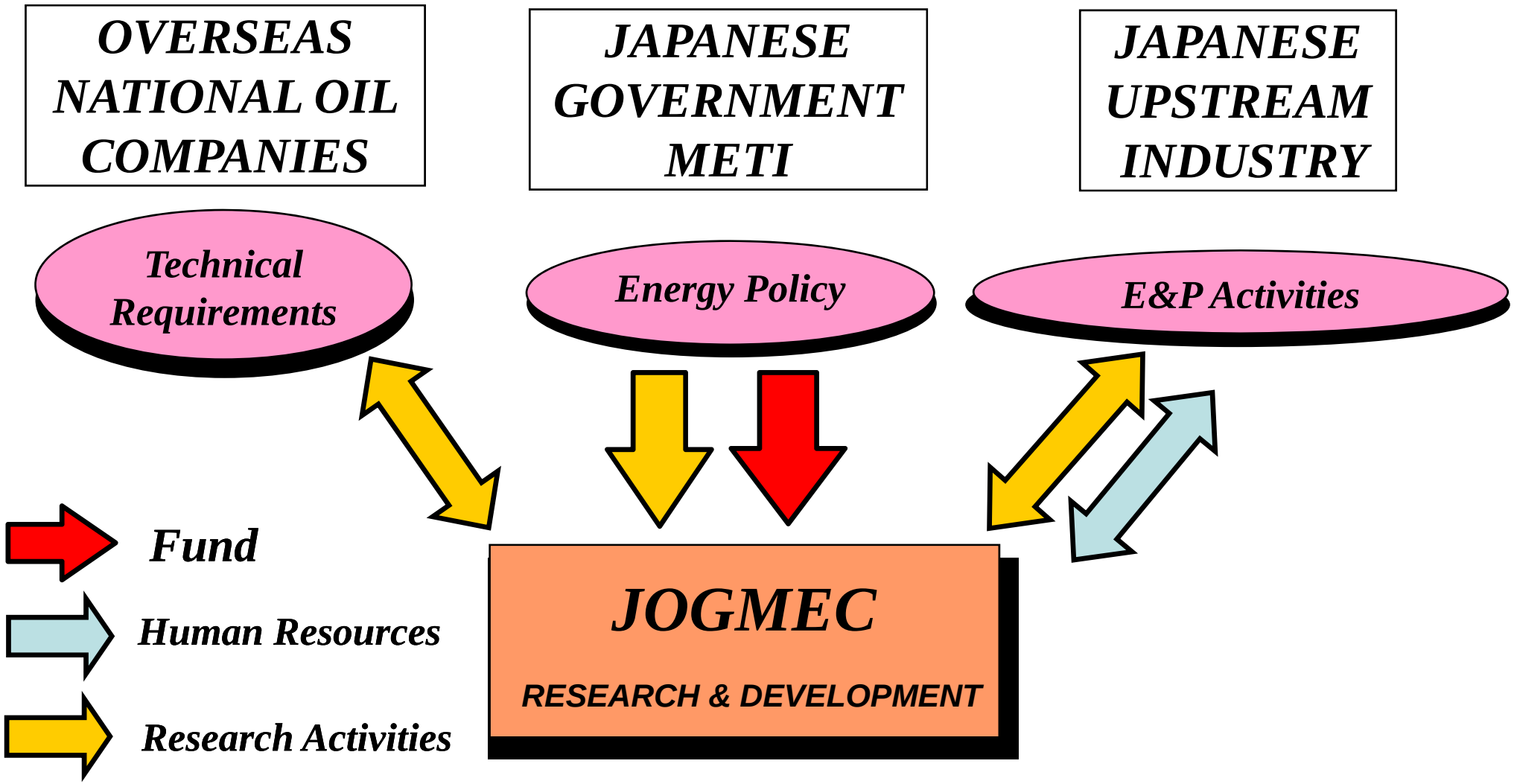
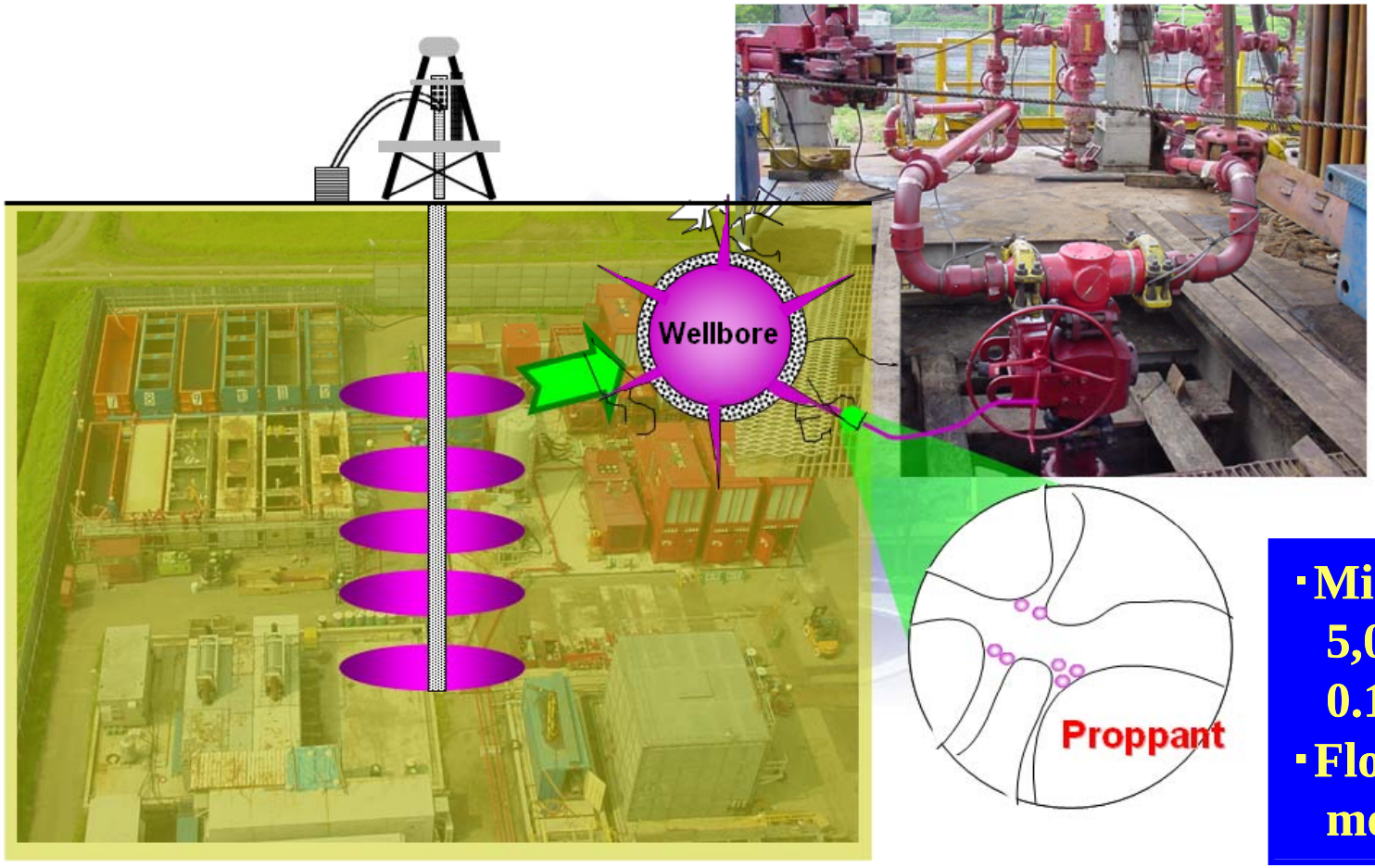
Upstream R&D Structure in Japan



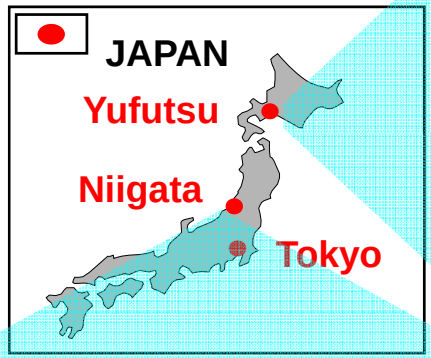
Improving Gas Recovery

Multi-stage Massive Hydraulic Fracturing



- Miocene Tuff at 5,000m with K_{matrix} 0.1md
- Flow rate improved more than 6 times

Gas Utilization: GTL (Gas to Liquid) Project

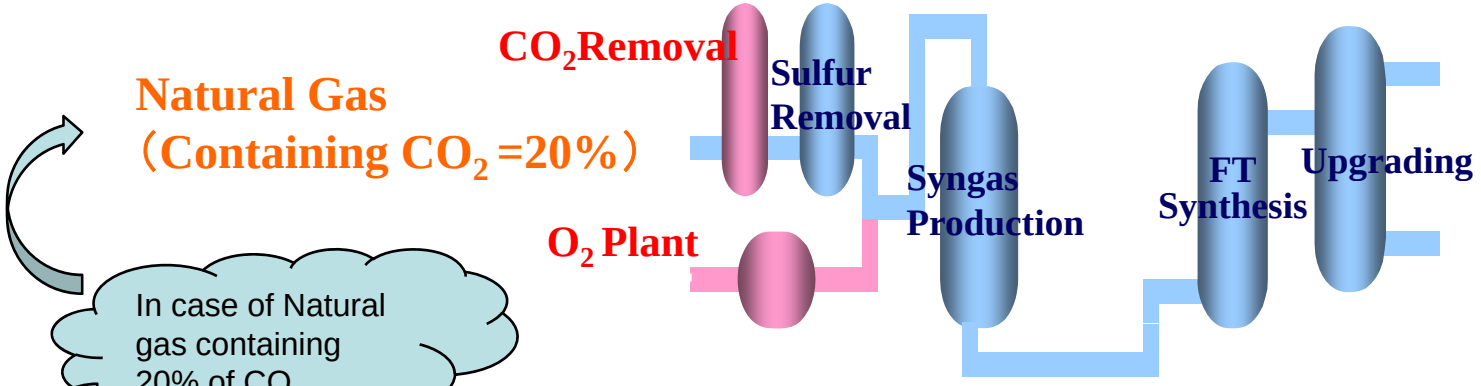


GTL Pilot Plant (7bbl/d)

GTL Demonstration Plant (500bbl/d)

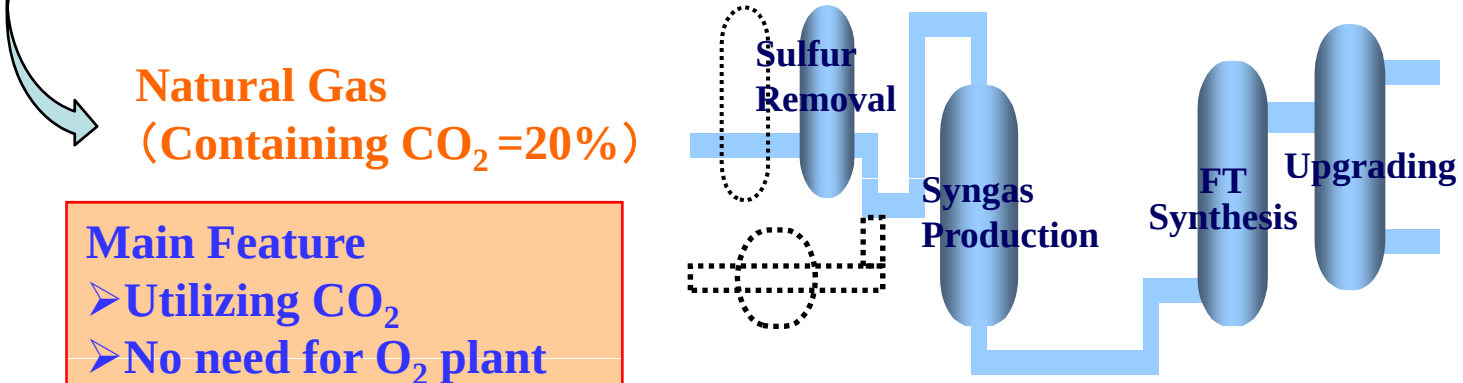
First Production FT Oil from Natural Gas in Japan

- **Conventional Process（Auto Thermal Reforming）**



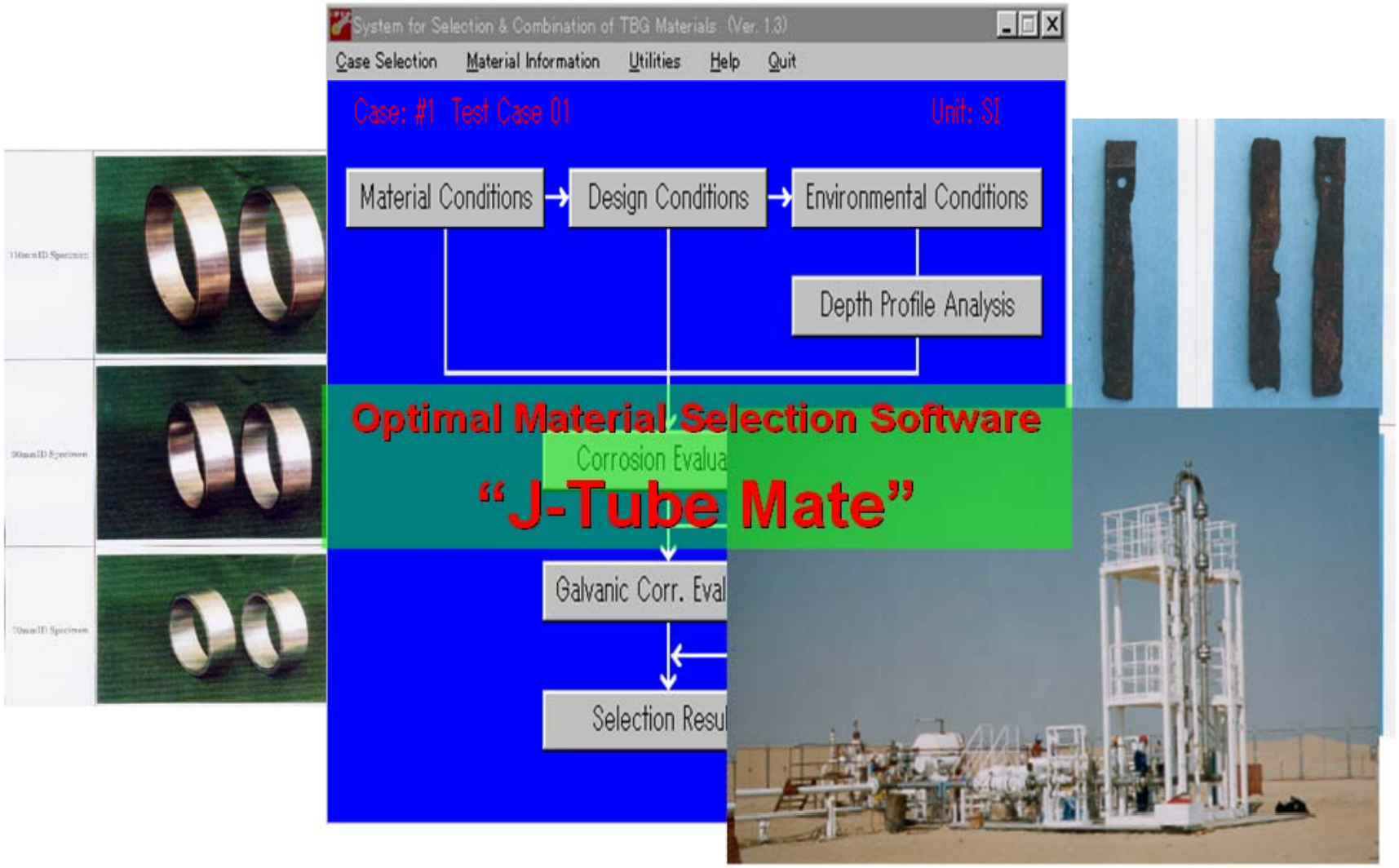
Utilizing CO_2

- **JAPAN-GTL Process**

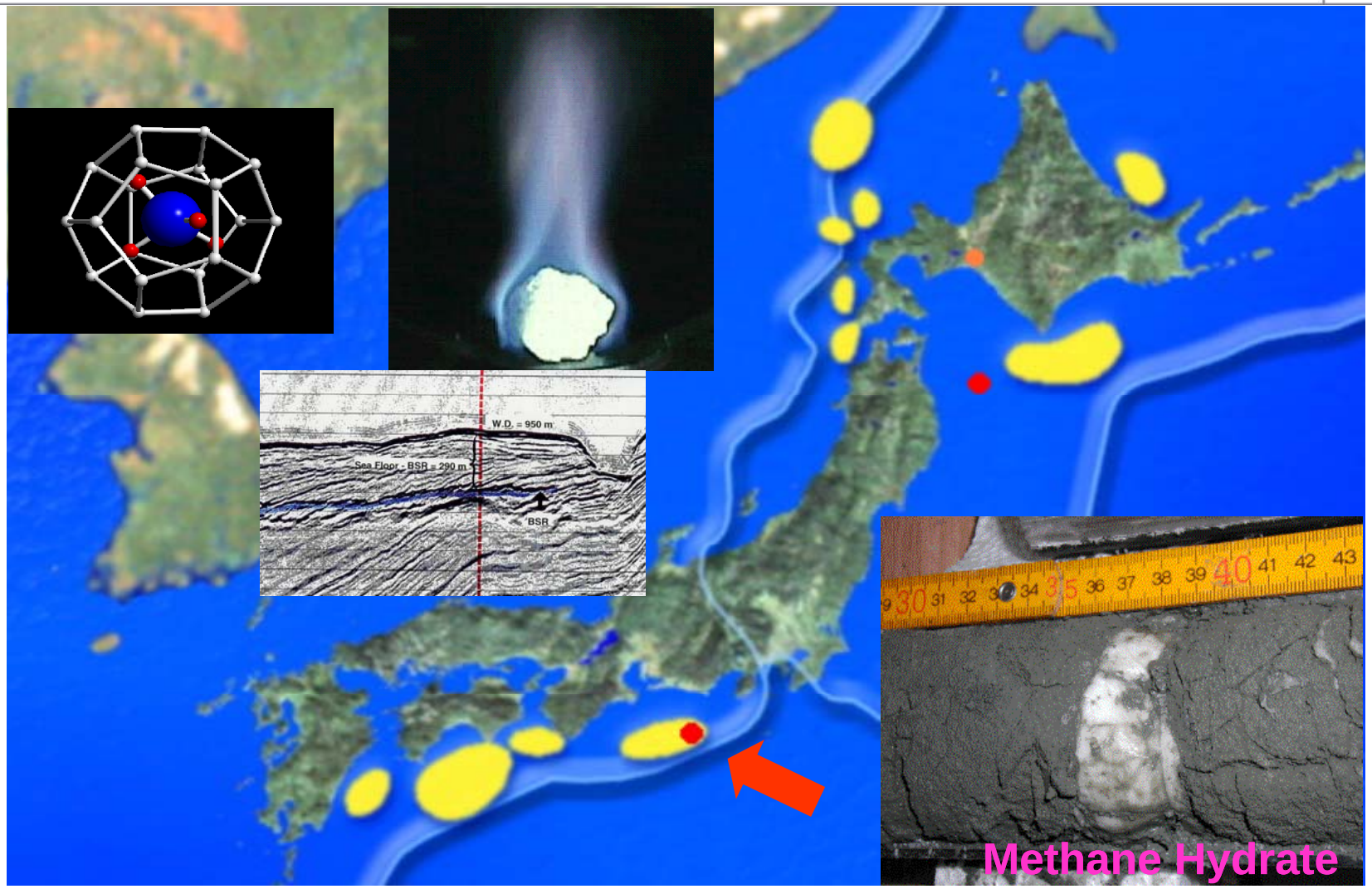


Main Feature
- Utilizing CO_2
- No need for O_2 plant

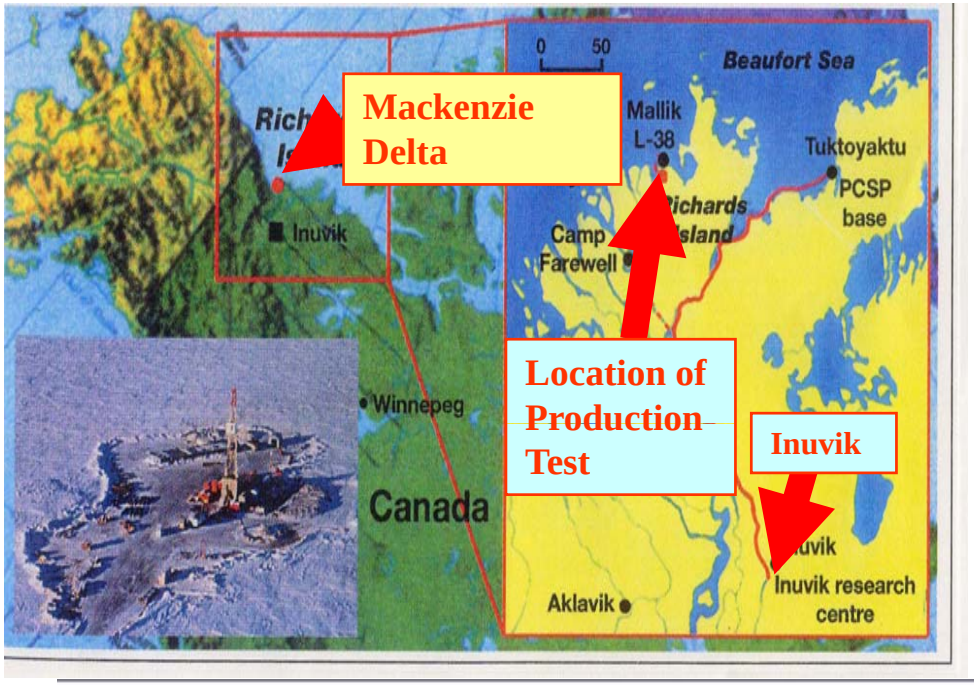
Anti-Corrosion Technology in Sour Environment

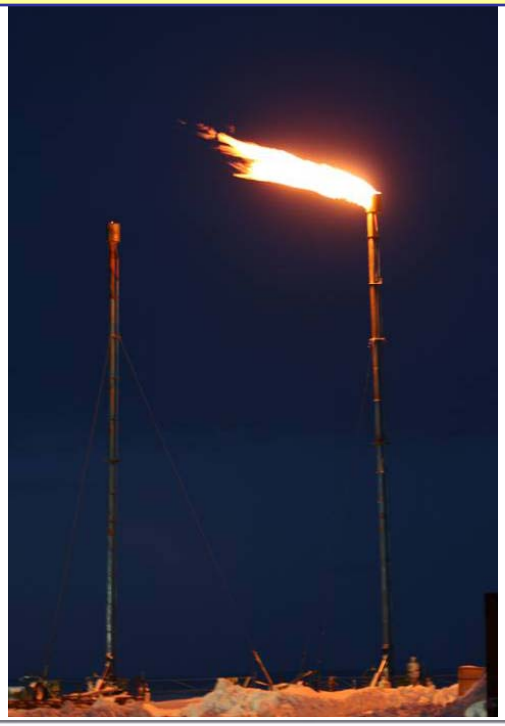


Non-conventional Hydrocarbon Exploitation



- March 2008 at Mallik, Mackenzie Delta, Canada
- Collaborative research between JOGMEC and NRCan with Aurora College
- Test was carried with depressurization method.
- Six days of continuous operation
- Stable gas flow at the surface (2,000 - 4,000 m^3/d)





World's first sustainable gas flare of MH

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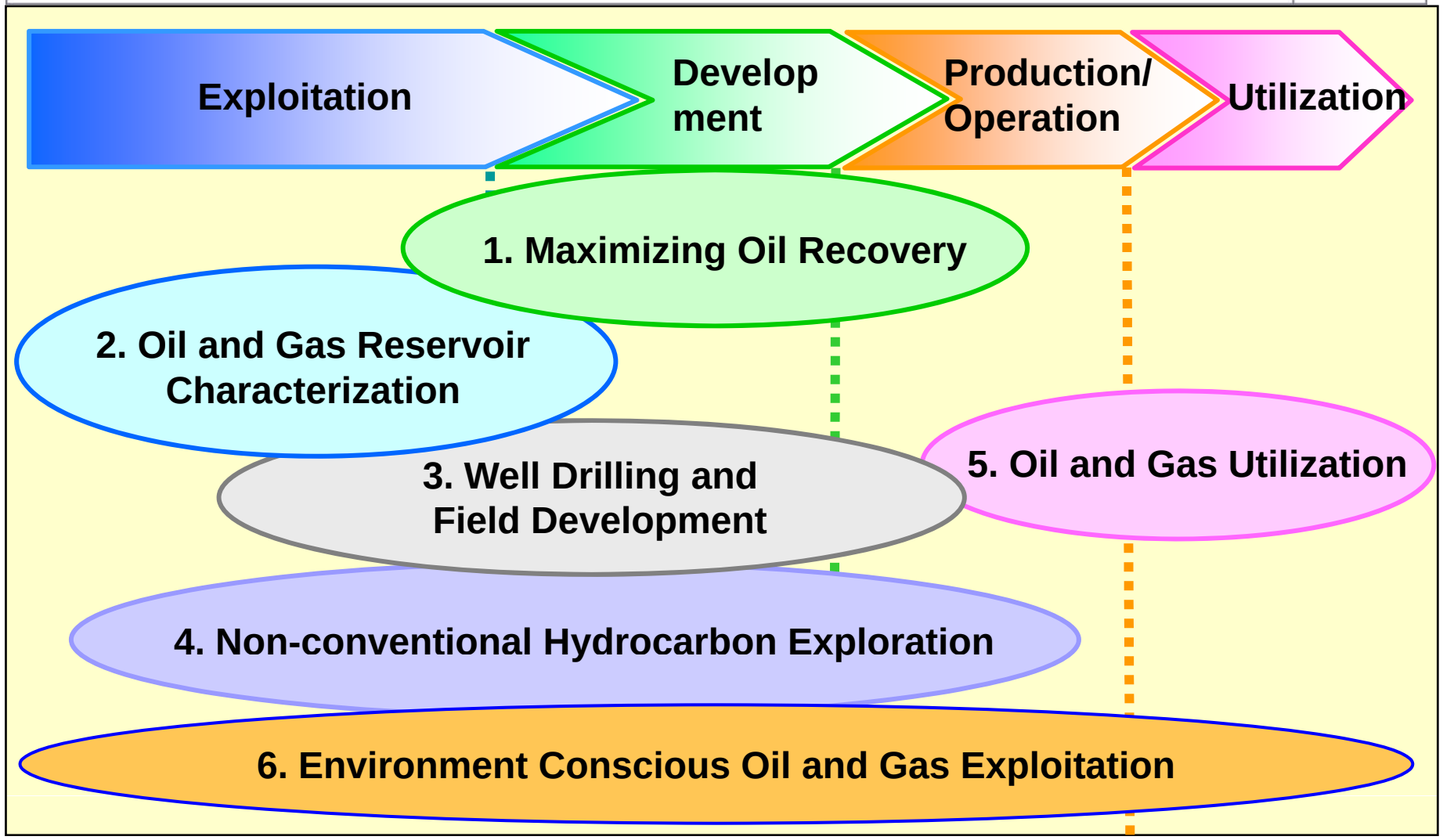
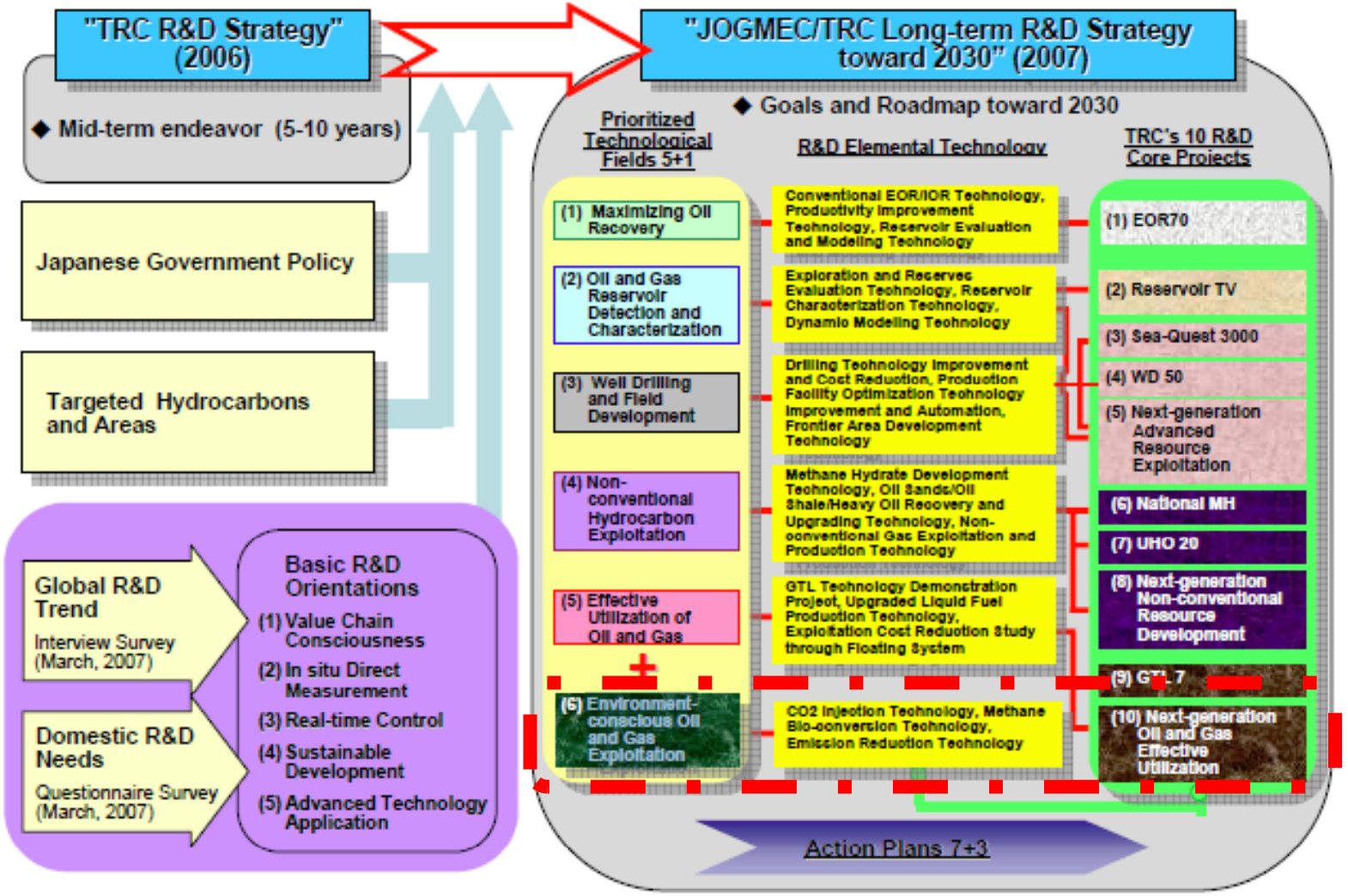
JOGMEC/TRC Long-term R&D Strategy Toward 2030 : Prioritized Technological Fields 5+1



JOGMEC/TRC Long-term R&D Strategy Toward 2030



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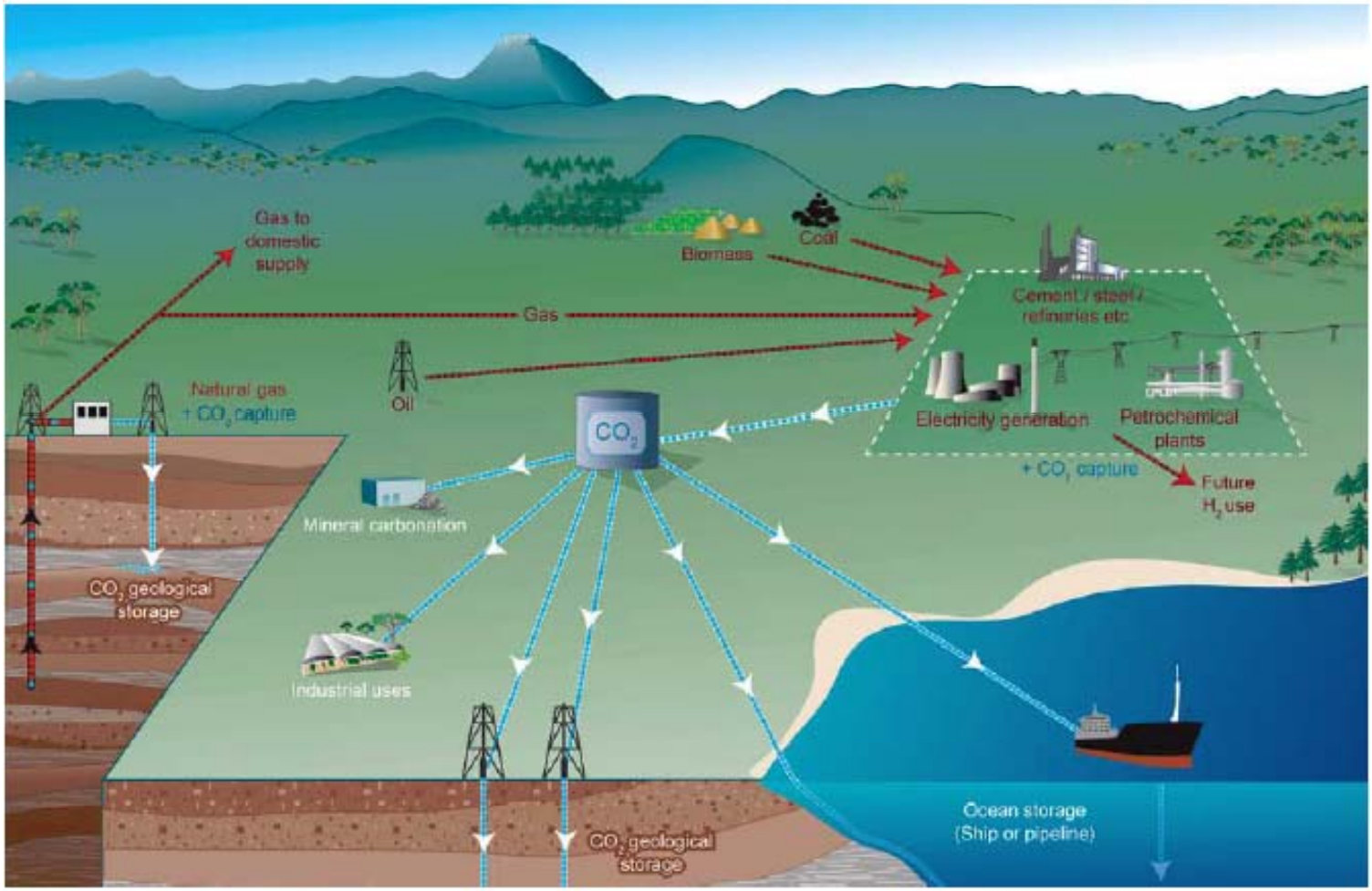
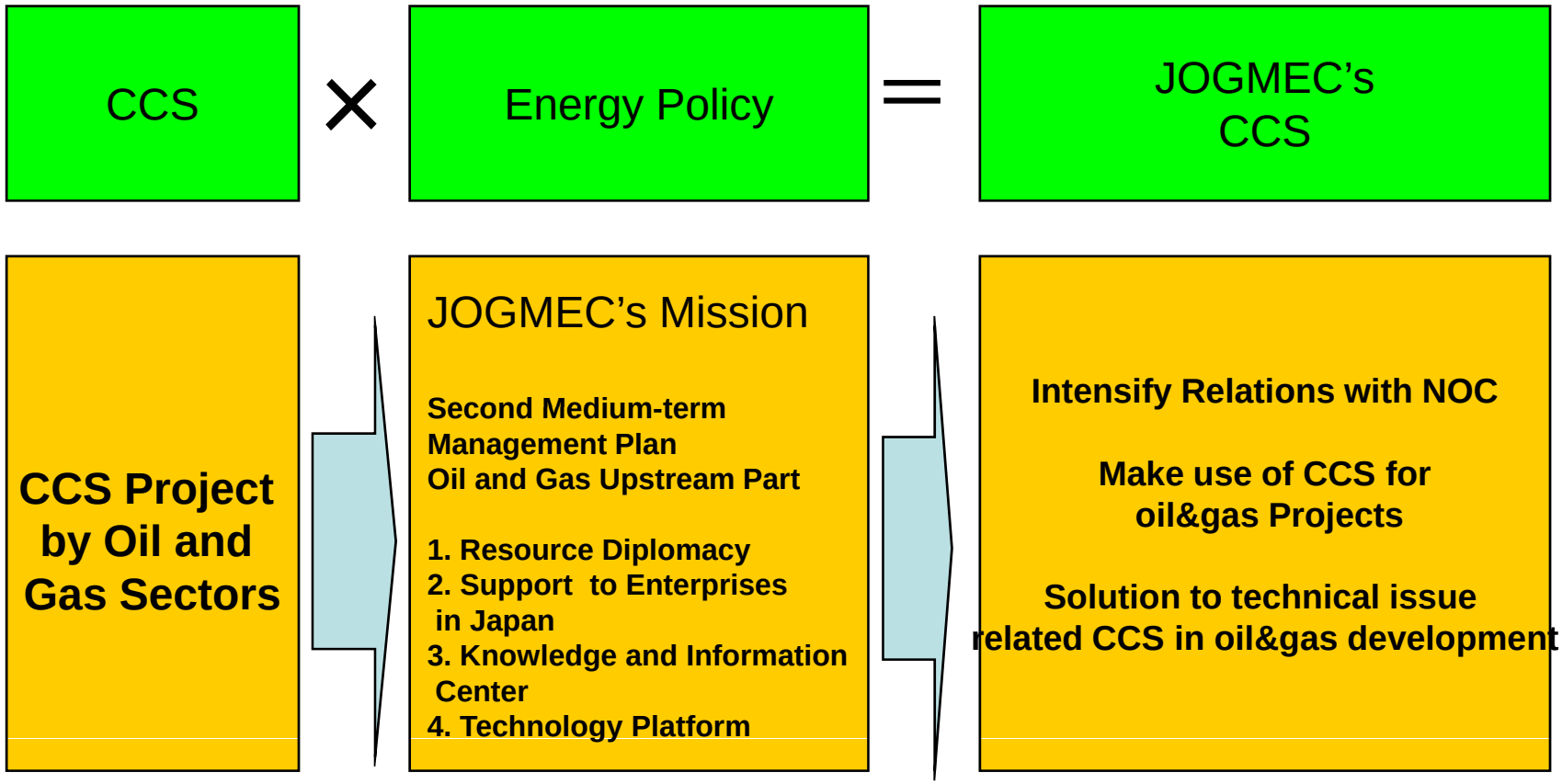
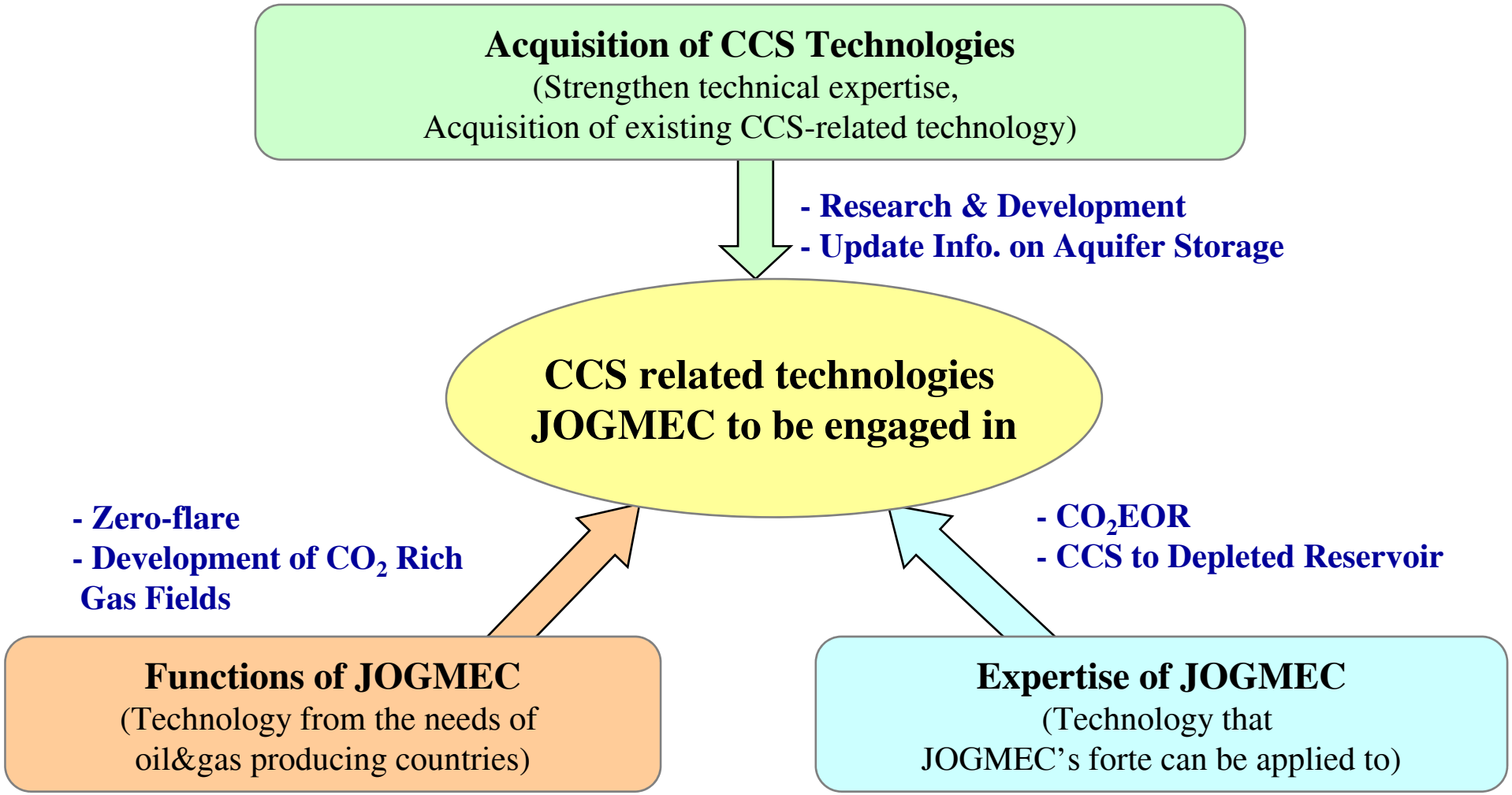
What's CCS?
: Carbon Dioxide Capture and Storage



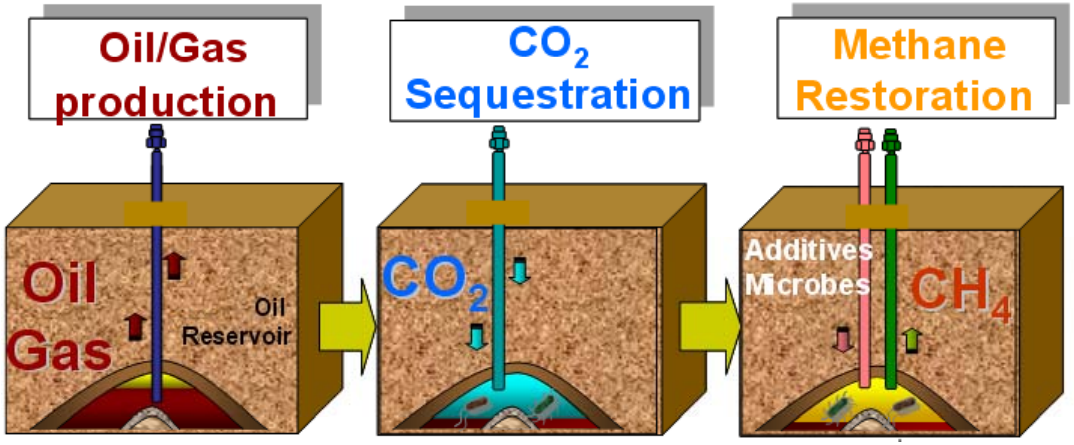
<IPCC-CCS Special Report, 2005>

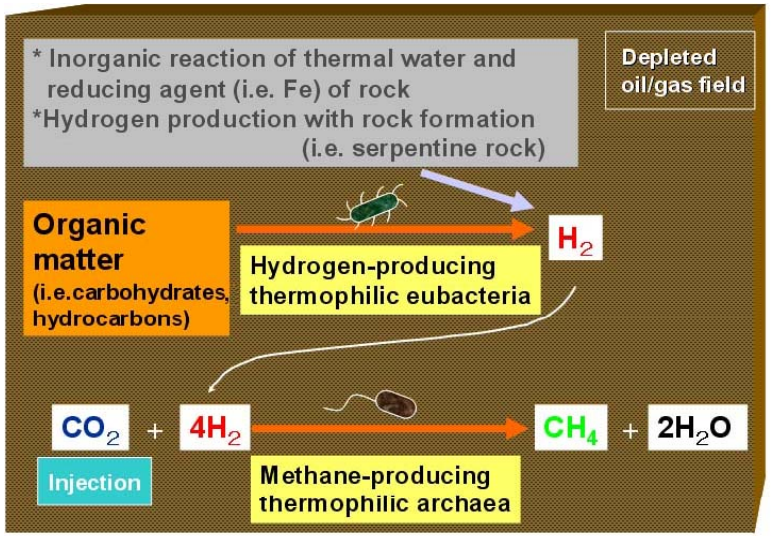
Needs for CCS may be increased for oil and gas industries.
What JOGMEC should do, from the viewpoint of JOGMEC's mission?




Acquisition of CCS Technologies
(Strengthen technical expertise,
Acquisition of existing CCS-related technology)
- Research & Development
- Update Info. on Aquifer Storage
CCS related technologies
JOGMEC to be engaged in
- Zero-flare
- Development of CO_2 Rich Gas Fields
- CO_2EOR
- CCS to Depleted Reservoir
Functions of JOGMEC
(Technology from the needs of oil&gas producing countries)
Expertise of JOGMEC
(Technology that JOGMEC's forte can be applied to)

- Emerging technology providing the twin dividend of reducing GHG emissions and restoration of deleted gas/oil field.
- Microbial restoration of methane deposit with subsurface CO_2 sequestration into depleted gas/oil field.





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Conclusions

1. Japan accounts for more than 98% of hydrocarbons (gas, oil) demand to the import.
2. The purpose of research projects in Japan is not only increasing domestic gas production, but also creating better relationship with national oil/gas companies in the world through the collaboration and new technology.
3. JOGMEC set up the long-term R&D strategy toward 2030. It is summarized in 6 "Prioritized Technological Fields".
4. New team was recently established in JOGMEC to cover one of the prioritized technological fields, “Environment Conscious Oil and Gas Exploitation”. This team respects the CCS (Carbon dioxide Capture and Storage) and other environmentally conscious oil and gas exploitation technologies.

Thank you!

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