JOGMEC's R&D

Makoto Ichikawa
Executive Director, Member of the Board,
JOGMEC
Japan Oil, Gas and Metals National Corporation (JOGMEC)

Established: February 29, 2004 succeeded the functions of MMAJ and JNOC
President: Hirobumi Kawano
Capital: 640 Billion Yen (As of March, 2014)
= around 5.6 Billion US$ (1US$=115Yen)

Mission
Securing Stable Supply of Oil, Natural Gas, Mineral Resources and Coal for Japan

Activities

- Oil & Gas Upstream Investment and Research & Development
- Metals Strategy & Exploration, and Technology Development
- Stockpiling
- Mine Pollution Control
- Coal Strategy & Exploration, and Technological Support
- Geothermal Resources Development
JOGMEC’s R&D

• JOGMEC’s Mid-term Target
• Situation of Oil and Gas Development
• Needs of Natural Resource Producing Countries / Industries
• JOGMEC’s Technologies
1. JOGMEC’s Mid-term Target

1. Technology Development & Training

2. Relationship Building

3. Securing Natural Resources
   • Financial Support
   • Geological Survey
   • Marine Resource Development: **Methane Hydrate**
JOGMEC’s Role

Oil- and gas-producing countries

Technology Development & Training

Relationship Building

Japanese companies

Securing Natural Resources
2. The Situation of Oil and Gas Development

Advanced technology and environmental measures are required.
Developing partnership with oil- and gas-producing countries is important for Japan to supply resources.
JOGMEC’s Mid-term Plan

1. Technology Development & Training
   - Priority 4 areas: Enhanced oil recovery
     - Non-conventional hydrocarbon exploitation
     - Offshore production
     - Environmental measures

2. Relationship Building
   - Technical solutions project

3. Securing Natural Resources
   - Methane Hydrate
## 3. Needs of Natural Resource Producing Countries / Industries

### 22+ companies & 15+ countries

- Trend survey of technologies
- Technological meetings
- Participation in exhibitions & academic conferences
- Technical mission

<table>
<thead>
<tr>
<th>Needs technologies</th>
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<tbody>
<tr>
<td>Geophysical exploration</td>
<td>Non-conventional recourses development</td>
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<tr>
<td>Deep water and Arctic development</td>
<td>Fracturing and Horizontal drilling technology</td>
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<tr>
<td>Enhanced oil recovery</td>
<td>FPSO</td>
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<td>Transportation system</td>
<td>Productioned Water Treatment</td>
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<tr>
<td>FLNG (Floating Liquefied Natural Gas)</td>
<td>Small oil-gas field development</td>
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<td>CO2 management</td>
<td>HSE</td>
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<td>Etc...</td>
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Enhanced oil recovery, offshore, heavy oil, environment measures are the key words of technological challenges
4. JOGMEC’s Technologies

1. Accumulated knowledge and skills
2. Leading runner in cutting edge-area
3. Laboratory technologies
4. Cross-sectional technologies
Technology developments

Enhanced oil recovery

- CO2-EOR
  - CO2 utilization and EOR
  - Accumulated knowledge and skills for EOR
    - 40-years’ experience.
  - Microbial-EOR (Bio)
    - Environmentally friendly-EOR
    - Applied Cross-sectional technologies to EOR
- SQUID (Superconducting Quantum Interference Device, Superconductivity)
  - Differentiate underground fluid type
  - Applied cross-sectional technologies to CO2 EOR Monitoring

Non-conventional hydrocarbon exploitation

- Shale Gas, Tight Oil, Coal Bed Methane
  - Shale gas development optimization
  - Accumulated knowledge and skills for improvement of productivity
  - The latest lab facilities and visualization technologies
Technology developments

Offshore production

- Carbon fiber composite cable (Material)
  - Improvement of productivity and Operability in the ultra-deep water
  - Cross-sectional technologies

- Ice Observation Technologies and Database for Arctic Development (Sensor & IT)
  - Safety development in arctic regions
  - Accumulated knowledge and skills for arctic development

Environmental measures

- Time-degradability Lost Circulation Materials (Material)
- Water Blocking new Polymer (Material)
- Water treatment with magnetic force (Material)
- Gas treatment with zeolite membrane (Material)
- NORM visualization (Sensor)
  - Eco-friendly, low cost, compact, easy handling
  - Applied cross-sectional technologies

Source: Ocean Engineering Handbook (JOGMEC)
Source: Chiyoda Corporation, Mitsubishi Chemical Corporation
Strengthening of the Relationship in Technology

Technical solutions project

• **Time-degradability Lost Circulation Materials** (Material) with KUREHA CORPRATION

• **Water Blocking new Polymer** (Material) with DAI-ICHI KOGYO SEIYAKU CO., LTD.(DKS)

• **Gas treatment with zeolite membrane** (Material) with Chiyoda Corporation, Mitsubishi Chemical Corporation

• **NORM visualization** (Sensor) with Mitsubishi Heavy Industries, Ltd.

• **Microbial-EOR** (Bio) with Japan Petroleum Exploration Co., Ltd. Chugai Technos corporation, Osaka Gas Co., Ltd.

• **SQUID** (Superconductivity) with International Superconductivity Technology Center, Mitsui Mineral Development Engineering Co., Ltd.

Broaden the possibilities of Japanese technology by collaboration with different industries with cross-sectional technologies
JOGMEC will

Continue to develop new oil and gas technologies including EOR, Non-conventional hydrocarbon, Offshore production, Environmental measures

Facilitate the application of advanced Japanese technologies to tackle with challenges faced by oil and gas producers

Build collaborative partnerships with oil and gas producers through technology.
Thank you for your attention!