Introduction of Technical Solutions Project

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Japan Oil, Gas and Metals National Corporation
Agenda

1. JOGMEC Overview
2. Technology Development
3. Technical Solutions Project
4. JOGMEC Training Course
5. Concluding Remarks
1. JOGMEC Overview
Mission and Functions

Mission
Securing Stable Supply of Oil, Natural Gas, Mineral Resources, Coal and Geothermal energy

Established: February 29, 2004 (succeeded the functions of MMAJ and JNOC)
President: Hirobumi Kawano
Capital: 748 Billion Yen (≒ 6 Billion US$, as of July, 2015)

Functions of Oil & Gas Upstream Unit
Financial Support (equity capital finance, guarantees for loans)
Geological Survey
Technology Development and Technical Support
2. Technology Development
Priority Technological Fields for 5 years (2013-2017)

- Exploration
  - Geological Evaluation
  - Seismic Survey
  - Exploratory Drilling
  - Reserves Evaluation

- Development
  - Development Planning
  - Development Drilling
  - Production Facility Construction

- Production/Operation
  - Production/Operation
  - Transportation

- Utilization
  - Liquefaction

Maximizing Oil Recovery
Unconventional Hydrocarbon Exploitation
Offshore Oil and Gas Development
Environment-conscious Oil and Gas Exploitation
Technical Solutions Project
2. Technology Development

Overseas Collaborations

- Shale exploration study in Canada
- Heavy oil study in Canada
- CCS monitoring in Canada
- Shale exploration study in USA
- EOR project for Rang-Dong filed in Vietnam
- Onshore methane hydrate production test at Alaska
- Wellbore stability study for offshore in UAE
- EOR projects for Offshore field in UAE
2. Technology Development

**CO2-EOR**

**Challenge**
Maximizing oil recovery

**Outcomes to date**
JOGMEC implements the subsurface/surface surveys and studies for offshore CO2-EOR pilot in offshore field, Abu-Dhabi. In Rang-Dong field, Vietnam, a CO2-EOR pilot test was carried out.

**R&D**
FEED of CO2-EOR Pilot test, Reservoir characterization, Monitoring, etc. in Abu Dhabi
Study on Low Salinity Water Flooding EOR in Vietnam

Schematic of CO2-EOR using anthropic CO2 emissions
2. Technology Development
Shale (Tight) Gas / Oil

Challenge
Optimization of Shale (Tight) Gas/Oil Development and Maximization of the production

Outcomes to date
Accumulation of core analyses technologies (Cores from Japan, Australia, North America)

coloring joint researches focusing on sweet spot detection and potential evaluation with overseas and domestic companies
2. Technology Development
Offshore: Mooring Rope for Deep Water

Challenge

To develop new mooring rope for the position-keeping of FPS, FPSO at ultra deep water fields (more than 2,000m)

Outcomes to date

Built new concept using super fiber rope cable as mooring line for ultra-deep water development

R&D

Conducting material selection for the mooring rope, trial manufacture and evaluation tests with a Japanese company

Figure 2. Technical challenges of deep water development
**2. Technology Development**

**Environment: Water Treatment**

**Challenge**
To minimize environmental impact and maximize oil and gas production

**Outcomes to date**
Build a concept for the practical use of small high-performance oil-water separator

**R&D**
System design and study on the reliability for the commercialization

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Offshore Water Treatment Plant

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Diagram of a water treatment system with a magnetic separation unit and floculation unit.
3. Technical Solutions Project

**Back Ground**

- Robotics
- New Materials
- Water Treatment
- Supercomputer
- Satellite
- Automobile
- Rocket
- Shinkansen (Bullet Train)
3. Technical Solutions Project

Concept

PARTNERSHIP

NOC/IOC

New Challenges, Environmental problems, etc.

Advantage

High-Tech, New-Tech

Needs

JOGMEC

Planning

Innovation

Solution

Seeds

Japanese Advanced Technology

Computer・IT・Network・Software

Robot・Precision Machine

Superconductivity

Nanotechnology・Material

Biotechnology

Environmental Technology

Sensor Technology
3. Technical Solutions Project

**Four Pillars & Flow**

- **Analysis of Needs & Seeds**
  - Collect and analyze needs & seeds
  - Needs/seeds matching and identify applicable technologies
  - Develop applicable technologies
  - Offer suitable technical solutions

- **Technology Development**

- **Solutions Development**

- **JOGMEC Techno Forum**

- **Technical Solutions Training Program**

**GOAL**

Japan Oil, Gas and Metals National Corporation
3. Technical Solutions Project

Technology Development: Three-phase Program

Phase 1:
Screening of proposals and Selection

Phase 2:
Technology Development
to apply Japanese advanced technologies
to NOC/IOCs’ upstream needs

Phase 3:
Preparation of Field Demonstration
Small scale tests in Japan and
Planning of large scale field demonstration etc.

Field Demonstration with NOC/IOC

Commercialization
### Phase-1 Project (8)

- **Reservoir Monitoring**
  - SQUID (Super-Sensitive Magnetometer)
  - New Optical Interferometry Sensor System
  - Cross-hole Seismic by Stationary Multiple Sources for Fluid Monitoring

- **Drilling Materials**
  - Time-degradability LCM for HPHT Reservoirs

- **Offshore Frontier Development**
  - Carbon Fiber Cables for TLP Tendons
  - Ice Observation Technologies and Database for Arctic Development

- **Environment**
  - NORM Visualization for Low-Concentrated Sources
  - Produced Water Treatment with Self Assembled Nano Materials

### Phase-2 Project (3+1)

- **Heavy Oil Development**
  - Supercritical Water Cracking (SCWC) of Extra Heavy Oil

- **Environment**
  - CO2 Removal System Using Novel Zeolite Membrane
  - Ceramic Membrane-based Produced Water Treatment

- **EOR**
  - Micro-Bubble CO2-EOR (under preparation)
3. Technical Solutions Project
Phase-1: Arctic Technologies

**Challenge**
To develop accurate ice observation technologies for oil and gas development in arctic region

**Outcomes to date**
Built ice sensing tools and ice database to get meaningful information (e.g. ice thickness) for arctic development

**R&D**
Developing some sensors (EM-BIRD etc.) through demonstration tests in actual arctic fields

Arctic Technology
EM sensor for ice observation
3. Technical Solutions Project
Phase-2: Super Critical Water Cracking (SCWC)

Joint Research Company: JGC Corporation

Challenge
SCWC technology makes more economical and environmentally friendly heavy oil development possible

Outcomes to date
Conducted a Bench test (0.15BPD), collect the data necessary to scale up for the next device

R&D
Implement of the pilot plant test (5BPD) in Canada
JOGMEC Techno Forum: A place needs and seeds meet

- **Purpose:** to provide a place where needs (technical challenges) meets seeds (applicable Japanese cutting-edge technologies), and foster good relationships between all participants.

- **Technology Variety on Attention:** IT, Robotics, Super Conductivity, Nanotechnology, biotechnology, sensor technology

- **Techno Forum 2014 (in Tokyo, November 26 - 27, 2014):**
  - Over 1,000 attendants

- **Techno Forum 2015 (in Tokyo, October 28 - 29, 2015)**

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Mr. Ali Khalifa Al Shamsi, Director, Strategy & Coordination, Abu Dhabi National Oil Company
3. Technical Solutions Project

Technical Solutions Training Course

- **Purpose**: the final goal is technical transfer training of Japanese cutting edge technologies to engineers of oil and gas producing countries.

- **Zero Emission Course (FY2014)**
  - 8 Sept to 3 Oct 2014
  - Technologies contribute to productivity Improvement and environmental protection

- **HSE Management Course (FY2013)**
  - 17 Jan to 7 Feb 2014
  - Waste management / Sludge treatment
  - NORM management
  - Produced water / gas management
  - Site visit / Workshop
Training for NOC & host government experts

Contents

- Regular courses -
  - Exploration Geology
  - Geophysics
  - Drilling Management
  - Reservoir Engineering

Duration: 10 weeks

Number of participants: Max 28 per course
Custom courses

customized to incorporate NOC’s needs

Course Sample

- Instrumentation and Control for Oil & Gas Plants Course
- Drilling Engineering and Factory Tour Course
- LNG Course
- LNG/LPG Course

Duration : 3-4 weeks

Number of participants : 5-20 per course

Overseas Training Program Started in 1989,
more than 3,300 people from 47 countries
5. Concluding Remarks

JOGMEC will

• **continue to develop new oil and gas technologies**
  from exploration through development, production and utilization with environmental consideration.

• **facilitate the application of Japanese advanced technologies**
  to tackle with challenges faced by NOC/IOCs’ oil and gas fields.

• **strengthen collaborative partnerships with NOC/IOC**
  through technology and human resources development.
Thank you very much for your attention!

We will continue to be a reliable partner of oil producing countries.

Japan Oil, Gas and Metals National Corporation