Look into the future of resources and energy

Special Edition
Your Challenges, Our Solutions
Technical Solutions Project
~ with Japanese Cutting Edge Technologies ~
Your Challenges, Our Solutions
JOGMEC’s Technical Solutions Project

~ To provide technical solutions to oil and gas producing countries utilizing Japanese cutting edge technologies ~

In order to meet the technical needs and expectations of oil and gas producing countries, JOGMEC launched the "Technical Solutions Project" in 2013 as part of our efforts to provide technical solutions to oil and gas producing countries in collaboration with a wide range of Japanese industries. The four pillars of the Technical Solutions Project shown in the figure on the right comprise our basic strategy to match technical needs of oil and gas producing countries with the technical seeds of Japanese companies. This special edition presents details of this project as well as the latest related trends.

1. Analysis of Needs and Seeds
   - Analyze needs (technical problems facing oil and gas producing countries) and identify seeds (applicable Japanese cutting edge technologies)

2. Technology Development
   - Develop potential technologies (seeds) through collaborative research with a wide range of Japanese industries.

3. Technical Solutions Training Program
   - Provide training program in Japanese cutting edge technologies (seeds) to experts from oil and gas producing countries.

4. JOGMEC Techno Forum
   - Strengthen close relationships between oil and gas producing countries that have needs and Japanese companies that have seeds.
Collaborative projects with oil and gas producing countries and Japanese companies

Technical Solutions Project

The flow of this project and the four pillars work effectively to discover suitable technical solutions for oil and gas producing countries. View the flow of this project (page 4) and the four pillars (pages 5-7).

Currently, oil and gas producing countries are faced with expanding requirements for productivity improvements as well as for compliance with stricter environmental regulations. Innovative technologies are expected to provide solutions. Japan is home to a large number of companies and research institutions boasting advanced technologies in a wide range of fields. JOGMEC believes that Japan’s technical seeds have significant potential to solve a broad range of technical problems facing oil and gas producing countries. This concept, which involves matching the needs of oil and gas producing countries with Japanese technical seeds in order to create solutions, was the springboard behind the launching of JOGMEC’s “Technical Solutions Project”, which was established in June 2013.

What is the Technical Solutions Project?

- Concept of the Technical Solutions Project

![Diagram showing the flow of the Technical Solutions Project](Image)

- The Flow of the Technical Solutions Project

1. Needs and analysis of needs & seeds
2. Needs-seeds matching and identify the applicable technologies
3. Develop applicable technologies
4. Offer suitable technical solutions
5. Strengthen relationships with oil and gas producing countries

GOAL

Analyze needs (technical problems facing oil and gas producing countries) and identify seeds (applicable Japanese cutting edge technologies)

JOGMEC collects and analyzes both information concerning technical problems (needs) of oil and gas producing countries and applicable Japanese technologies (seeds), which is obtained through interviews or research studies. JOGMEC has developed relationships with a number of oil and gas producing countries through its various activities including project financing, joint R&D projects, and training programs. By utilizing such communication channels with oil and gas producing countries, updated information on the challenges facing these countries is collected. Information on Japanese technologies (seeds) is obtained through regular exchanges of information with Japanese companies including company interviews. In some cases, their technologies turn out to be readily applicable. Through communications with these companies, JOGMEC has been working to discover technologies that are capable of meeting the needs of oil and gas producing countries.

Results of interviews carried out up to June 2014

- Others 8%
- Plant and Process 16%
- Raw materials 52%
- Equipment 19%
- IT 2%
- Others 3%

Develop potential technologies (seeds) through collaborative research with a wide range of Japanese industries

Technology development is on-going in a three phased manner: Phase 1 is early stage technology development in a laboratory, Phase 2 involves preparation of field demonstrations including small scale pilot tests, and Phase 3 involves field demonstrations in oil and gas producing countries. Transition to Phases 2 and 3 requires the collaboration of oil and gas producing countries for testing.
3 Technical Solutions Training Program

Provide training programs about Japanese cutting edge technologies (seeds) to experts from oil and gas producing countries.

The final goal of the Technical Solutions Training Program is to provide technology transfer training to experts of oil and gas producing countries, especially after the Japanese technology (seeds) have turned into actual technical solutions for oil and gas producing countries. In order to achieve this goal, JOGMEC works to foster relationships of mutual trust with oil and gas producing countries. In the program aimed at helping participants learn applicable Japanese cutting edge technologies that can be technical solutions, JOGMEC enhances the quality of training programs with the cooperation of technical experts from Japanese companies boasting advanced technologies.

HSE Management Course
In addition to the world’s best practices of HSE Management, this course includes Japanese cutting edge technologies that contribute to productivity enhancement and environmental protection at oil and gas project sites.

Zero Emissions Course
Along with the technology required to effectively utilize CO2 and produced water to enhance productivity, this course introduces the world’s leading waste management processes – developed in Japan – to reduce waste from projects to near zero.

Number of participants: 11 from 4 countries
Number of participants: 8 from 3 countries

These courses welcomed experts from UAE, Qatar, Mexico, Libya, and Turkmenistan, and received positive feedback from participants.

4 JOGMEC Techno Forum

Strengthen close relationships between oil and gas producing countries and Japanese companies

The purpose of the JOGMEC Techno Forum is to comprehensively introduce the potential of Japanese companies and their cutting edge technologies to oil and gas producing countries and to provide a place where needs meet seeds, which will enhance the relationships between Japanese companies and oil and gas producing countries. In this forum, JOGMEC invites many presenters who are active on the front lines from oil and gas producing countries as well as leading Japanese companies. In parallel, the exhibition of Japanese technologies is also held to introduce Japanese cutting edge technologies.

Many presenters from oil and gas producing countries gave speeches outlining their technical needs.

Twenty three Japanese companies participated in the exhibition as exhibitors to introduce their technical seeds.

Comment from Japanese company staff member:
I got a hint about connecting the technical seeds of my company with the needs of oil and gas producing countries through a presentation that was given on actual technical problems.

Comment from participant from an oil and gas producing country:
Continue with this type of forum; it is both educational and interactive.
Towards solving technical problems in oil and gas producing countries

Ongoing Technology Development Projects

Three environment-related technologies seeing growing interest

"Environment-conscious technology" in oil and gas development has been attracting attention in recent years in line with the needs and related regulations in oil and gas producing countries. A typical example of this technology is the process of treating produced water and carbon dioxide (CO₂) that are by-products of oil and gas production. The supercritical water cracking process used in extra-heavy oil development is also considered environmentally friendly. JGMEC has been developing these related technologies jointly with Japanese companies.

1. Produced Water Treatment Technology Using Self-Assembled Nano-Materials

Materials that remove almost all chemical components - higher functionalization of FMS

AIST has been developing produced water treatment technology using "self-assembled nano-materials". The self-assembled nano-materials are nano-meter-sized structures such as nanotubes that are produced by a self-assembly of low-molecular-weight molecules. AIST focused on the adsorbing abilities of this material toward various chemical components, and expects it to adsorb and remove chemical components from produced water. Removing almost all chemical components using a single material leads to system miniaturization and cost reduction. By applying this material to Flocculation and Magnetic-Separation for the produced water treatment system (FMS) jointly developed with Hitachi, Ltd., JGMEC expects to improve the performance of FMS.

Typical produced water treatment process

2. Enhancing the development/production of oil sand and extra-heavy oil in a simple, economical and environmentally-friendly way

JGC Corporation and JGMEC are working collaboratively to develop a partial upgrading technology (Supercritical Water Cracking: SCWC) that enables easy processing of oilsands and extra-heavy oils of high viscosity and specific gravity into synthetic crude oil using supercritical water. Conventional methods generally use a process called dilution and distillation at high temperatures and pressures, which require a lot of energy and cause environmental issues. SCWC technology does not use light oils or condensate, which results in a simple and economical treatment process.

Conceptual diagram of SCWC

3. World-beating performance to significantly reduce costs

Chiyoda Corporation, Mitsubishi Chemical Corporation and JGMEC are jointly developing a CO₂ removal system using a zeolite membrane (ZEBREX™). This membrane contains a huge number of micro pores that allow CO₂ to pass through but not CH₄ (methane), so the natural gas can be separated into CO₂ and CH₄ after passing through this membrane. Combining a method to absorb CO₂ using amine solutions with this separation membrane results in more compact facilities as well as significant reductions in costs and energy consumption. We are now implementing various approaches in Southeast Asian countries to seek cooperation in conducting pilot plant tests.

Image of CO₂ separation

Source: International Zeolite Association (IZA)

Schematic diagram of zeolite crystal structure. This structure does not allow CH₄ molecules that are larger than CO₂ molecules to pass through the micro pores.
JOGMEC’s Corporate Profile

One of JOGMEC’s important functions is to provide financial support, including equity capital and liability guarantees, for E&P projects involving oil and gas, metals, and coal. In addition, JOGMEC provides technical support, including technology development and various technical surveys, to develop these natural resources. Also, as a governmental agency, JOGMEC has a responsibility to stockpile resources such as petroleum, LP gas, and rare metals.

History
On February 29, 2004, JOGMEC was established through the merger of the Japan National Oil Corporation (JNOC) responsible for securing supplies of oil and natural gas and the Metal Mining Agency of Japan (MMA) responsible for securing supplies of non-ferrous metal and mineral resources. In addition, the business of assisting coal and geothermal development was added on September 15, 2012.

Organization

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Offices in the World

JOGMEC has offices in various countries around the world, including Japan, China, and the United States. These offices serve as bases for conducting E&P projects and technical surveys, as well as providing support and assistance to local governments and industries.

Offices in Japan

JOGMEC has offices in Tokyo, Osaka, and other major cities in Japan. These offices are responsible for coordinating projects, conducting surveys, and providing support to local governments and industries.

Technology and Research Center

JOGMEC’s Technology and Research Center is located in Chiba, Japan. The center conducts research and development related to E&P projects, as well as providing support to local governments and industries.

Metals Technology Center

JOGMEC’s Metals Technology Center is located in Chiba, Japan. The center conducts research and development related to the production and recovery of metals, as well as providing support to local governments and industries.