



Environmental & Social Report **2014**



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### Editorial Policy

The purpose of this report is to present to our stakeholders the CSR efforts of the JGC Group, with a focus on environmental conservation.

This year's feature article covers our "Initiatives Aimed at Realizing a Sustainable Society." In this context, we report on our efforts to address environmental issues in China as well as details of global warming countermeasures.

In addition, we provide details of the Group's endeavors as they relate to three pillars of our business: "HSE—Becoming the Leading Global Health, Safety, and the Environment Contractor;" "the Environment—the JGC Group's Environmental Technologies and Environmental Conservation Activities;" and "Society—Activities as a Corporate Citizen."

### Guidelines Used as a Reference in Connection with the Disclosure of Non-Financial Information

- ISO 26000, an international guidance standard for social responsibility issued by the International Organization for Standardization
- The Sustainability Reporting Guidelines Version 3.0 (G3), an international guideline concerning corporate sustainability reporting issued by the Global Reporting Initiative (GRI)
- The Environmental Reporting Guidelines 2007 issued by Japan's Ministry of the Environment

### Scope of Reporting

In principle, this report covers consolidated subsidiaries and affiliates accounted for by the equity method. However, details of activities that fall outside the aforementioned scope of reporting are clearly identified in each case.

**Publication of This Issue**  
August 2014



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August 2015

### Reporting Period

This report is compiled principally on the basis of data for fiscal 2013 (from April 1, 2013 to March 31, 2014). Important matters (those regarded as highly significant) concerning activities outside the reporting period (up to July, 2014) are also included within the scope of this report.

### Publisher

**Corporate Administrative & Financial Affairs Division**  
Public Relations & Investor Relations Department/Corporate Administration Department

**Quality Assurance, Safety & Environment Office**  
**Contact telephone number:** +81-45-682-8026  
**JGC website URL:** <http://www.jgc.com>

## About JGC

### Name:

JGC Corporation

### Employees (approx.):

**10,000**  
persons (as of March 2014)

**JGC:** 2,200 persons

**Domestic EPC Affiliates:** 3,000 persons

**Overseas EPC Affiliates:** 4,800 persons

### Locations:

#### Yokohama World Operations Center

2-3-1 Minato Mirai, Nishi-ku, Yokohama-shi, Kanagawa

#### Tokyo Corporate Office

2-2-1 Otemachi, Chiyoda-ku, Tokyo

#### MM Park Building Office

3-6-3 Minato Mirai, Nishi-ku, Yokohama-shi, Kanagawa

#### Kamiooka Office

1-13-1 Saïdo, Konan-ku, Yokohama-shi, Kanagawa

#### Research and Development Center

2205 Narita-cho, Oaraimachi, Higashi-ibaraki-gun, Ibaraki

#### Domestic Office

Osaka

#### Overseas Offices

Beijing, Jakarta, Hanoi, Perth, Almaty, Abu Dhabi, Paris and others

#### Overseas Affiliates

Philippines, Vietnam, Saudi Arabia, Italy, U.S. and others

## The JGC Group

As an engineering contractor, the JGC Group's core business is providing planning, design engineering, equipment procurement, construction (EPC), and commissioning services for various industrial plants and facilities. The JGC Group is also involved in enterprise investment businesses, management services, the manufacture and sale of catalysts and fine chemicals, and others.

The scope of this report mainly includes the JGC Group companies listed at right.

### Total Engineering Business (EPC Business)

JGC  
JGC Plant Innovation  
JGC Philippines  
JGC Gulf International and others

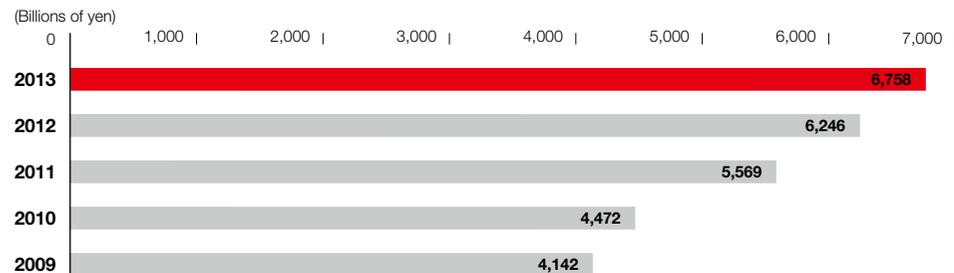
### Catalyst and Fine Chemicals Business

JGC Catalysts & Chemicals  
Nikki-Universal  
Japan Fine Ceramic

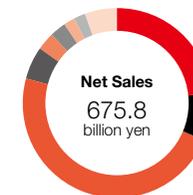
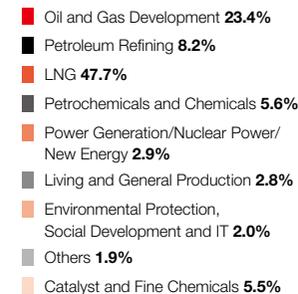
### Other Businesses (IT and Consulting Businesses)

JGC Information Systems  
Japan NUS  
JGC Energy Development and others

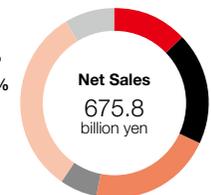
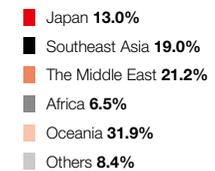
### Consolidated Net Sales (2009~2013)



### Net Sales by Industry (2013)



### Net Sales by Region (2013)



Message from the Chairman

Channeling our engineering capabilities, a sustainable society is well within our grasp.



## Message from the Chairman

### A world in need of greater energy reserves and resources

The world's population is rapidly increasing. In 2011, the number of people inhabiting the planet totaled seven billion. This figure is projected to surpass nine billion in 2050. Led by such nations as China and India, countries with substantial populations, the emerging markets that make up the Group of 20, including Southeast Asia, the Middle East and Latin America, are experiencing remarkable growth. As a consequence, demand for energy continues to expand at a robust pace. According to the International Energy Agency, investments aimed at increasing the supply of energy totaled US\$1.6 trillion (¥164 trillion) in 2013. This was twice the investment undertaken in 2000 after adjusting for inflation.

By geographic region, capital investment has extended across the full gamut of energy resources, from upstream fields including petroleum and natural gas to downstream fields in the Middle East. Conscious of export activity to the Asia region, which remains the world's most prominent destination for LNG, projects continue to progress throughout Southeast Asia. In North America, multiple projects are currently in the planning stage. These projects include gas chemicals and LNG, which adopt affordable shale gas as a primary feedstock.

While there are indications of light at the end of the tunnel for both the United States and the European economies, the global economy as a whole remains stagnant. Despite the uncertainty surrounding a significant number of industries, the energy field stands virtually alone in terms of its brisk capital investment.

### Is it possible to balance growth in energy consumption with efforts to secure a sustainable society?

Against the backdrop of a rapid increase in the world's population, the global economy, and in particular the economies of newly emerging nations, is experiencing robust growth. At the same time, greenhouse gases emissions, attributable to the consumption of fossil fuels, have resulted in a broad range of climate change issues which attract widespread concern. In its fifth assessment report, covering the period from 2013 to 2014, the United Nations' Intergovernmental Panel on Climate Change has issued a warning that a greenhouse gas-induced increase in the global temperature of two or more degrees will lead to a serious decline in food production. Despite these grave concerns, Japan's consumption of fossil fuels for thermal electric power generation use are on the rise, mainly the result of the suspension of operations at nuclear power plants. Greenhouse gas emissions have subsequently increased 14% compared to levels recorded in 1990, with this upward trend continuing unabated.

This raises the critical issue of our ability to balance the need for a sustainable society with energy consumption that increases with each passing year.

The JGC Group remains committed to ongoing steps aimed at resolving this issue by leveraging its engineering expertise. These efforts are consistent with the Group's core philosophy which emphasizes its mission to "contribute to the prosperity of the economy and society while protecting the global environment, and aim for sustainable development as a globally active company with its core business in engineering-based services."

For example, engineering is an essential process in the construction of facilities for the production of liquefied natural gas (LNG), a form of clean energy, the effective utilization of previously unused resources such as low-rank coal, development of renewable energy such as photovoltaic and solar thermal power, and the implementation of systems for water and soil purification, air pollution prevention, and energy conservation. Moreover, in developing countries with fast-growing economies, needs have rapidly emerged for the creation of sustainable cities that minimize impact on the environment through the deployment of renewable energy sources and highly efficient energy infrastructure. With engineering technologies and project management capabilities a necessity in these fields, the JGC Group has undertaken a variety of measures to address such needs.

## Message from the Chairman

### Fiscal 2013 results

The “shale gas revolution” that emerged throughout fiscal 2013, the fiscal year ended March 31, 2014, triggered the creation of a new market. As a result, natural gas field development projects sprang up, particularly in North America, but also across the rest of the world. With the growing awareness of environmental concerns, natural gas, which emits lower levels of greenhouse gases than other fossil fuels, has attracted considerable interest since the second half of the 1990s. JGC is a contractor for major LNG plant construction projects in Canada and Russia. JGC was also the first Japanese company to be awarded a contract for the construction of an offshore LNG plant in Malaysia. Through this project, we are taking up the extremely difficult challenge of extracting natural gas from depths of more than 1,000 meters below the ocean's surface.

From a greenhouse gas reduction perspective, carbon dioxide capture and storage, which is the topic of our special feature in this report, is drawing attention as a medium-to-long-term greenhouse gas countermeasure. JGC received an order for the construction of a Carbon Dioxide Capture and Storage (CCS) demonstration plant in Japan from Japan CCS Co., Ltd. Work is currently underway.

In addition, we received an order for the upgrade of large-scale oil refineries in Kuwait. As a part of the work to be undertaken, JGC will provide assistance in the construction of sophisticated treatment facilities that will help meet the automobile exhaust gas standards of Europe. As the oil refinery plan takes shape and efforts are channeled toward the production of environment-friendly fuel products, we will respond flexibly to all requirements.

In the enterprise investment business, JGC has entered into collaborative arrangements with two leading banks in Japan and China. Under this arrangement, we have provided financing to help establish a fund in support of the energy saving and environmental conservation activities of venture companies. (Please see our special feature for further details). Through this investment, JGC will draw on our expertise in energy-saving environmental technologies and offer our support in the development of businesses that will uncover technologies of the future. In this manner, we will contribute to solving China's environmental issues.

### The future to which engineering aspires

The energy industry is a core JGC business field. This industry is closely linked to such issues as greenhouse gas emissions and environmental conservation. It is for this very reason that JGC is committed to continuously taking up the challenge of realizing a sustainable society. Moving forward, JGC will work tirelessly to develop technologies that ensure the effective use of limited resources, promote the development and widespread use of renewable energy, and enhance social infrastructure. At the same time, we will look to resolve issues that confront the earth both today and tomorrow, and will address the variety of environmental issues associated with the growing demand for energy and the increase in the world's population.

Chairman and Representative Director  
JGC Corporation

Masayuki Sato

# JGC's Basic CSR Policy

## Addressing International Standards

Basic CSR Policy		Core Social Responsibility Issues	Issues	Specific Initiatives	
1	<p><b>Maintain and enhance quality, safety, and the environment</b></p> <p>We shall conduct our business with a full understanding of the importance of quality, safety, and the environment.</p>	Consumer (Customer) Related Issues	<ul style="list-style-type: none"> <li>• Ensure fair marketing, information disclosure, and contractual business practice</li> <li>• Ensure consumer health and safety</li> <li>• Promote sustainable consumption</li> <li>• Provide services and support to consumers, address complaints, and resolve conflicts</li> <li>• Protect consumer data and privacy</li> <li>• Undertake education regarding access to essential services and enhance awareness</li> </ul>	<p>Become the leading global health, safety, and the environment (HSE) contractor</p> 	HSE P.23
2	<p><b>Contribute to society by drawing on the Group's experience and technologies</b></p> <p>We shall provide our social contributions by drawing on the strengths of the JGC Group</p>	Environment-Related Issues	<ul style="list-style-type: none"> <li>• Prevent pollution</li> <li>• Ensure the sustainable use of resources</li> <li>• Alleviate and adapt to issues relating to climate change</li> <li>• Protect the environment and biodiversity while restoring natural ecosystems</li> </ul>	<p>Engage in environmental technology development and environmental protection activities</p> 	The Environment P.30
3	<p><b>Engage in fair and honest business activities</b></p> <p>We shall comply with legal requirements inside and outside the country, and conduct our business in a fair and sincere manner following a proper governance system.</p>	Organizational governance and fair business practice-related issues	<ul style="list-style-type: none"> <li>• Promote organizational governance</li> <li>• Prevent corruption</li> <li>• Pursue responsible political involvement</li> <li>• Engage in fair competition</li> <li>• Promote social responsibility across the value chain</li> <li>• Respect property rights</li> </ul>	<p>Pursue sound relationships between the JGC Group's businesses, society, and the environment</p> 	Introduction P.01
4	<p><b>Ensure proper information disclosure to stakeholders</b></p> <p>We shall disclose necessary information to our stakeholders in a timely and appropriate manner.</p>				
5	<p><b>Implement human resource measures that develop the abilities and vitality of employees</b></p> <p>We shall endeavor to maintain and further improve fair human resource management to develop the ability and vitality of our employees based on mutual trust and responsibility.</p>	Respect human rights and engage in proper labor practices	<ul style="list-style-type: none"> <li>• Promote employment and engage in proper employment activities</li> <li>• Ensure fair labor conditions and social protection</li> <li>• Promote dialog with society</li> <li>• Ensure labor health and safety</li> <li>• Conduct workplace human resource education and training</li> </ul>	<p>Engage in activities as a corporate citizen</p> 	Society P.48
6	<p><b>Enhance CSR activities</b></p> <p>We shall promote awareness of CSR and further develop our CSR activities reflecting the voices of stakeholders.</p>	Participate in community events and contribute to the growth and development of local communities	<ul style="list-style-type: none"> <li>• Participate in community events</li> <li>• Engage in educational and cultural pursuits</li> <li>• Create employment opportunities and develop skills</li> <li>• Develop technologies and promote access</li> <li>• Create prosperity and income</li> <li>• Promote sound health</li> <li>• Undertake social investment</li> </ul>		

# ISO26000

ISO 26000 is an international guidance social responsibility standard for corporate and other organizations issued by the International Organization for Standardization in November 2010. Over and above the stringent eye being cast on organizations by a variety of stakeholders (vested interests), this standard is designed to help enhance an organization's performance with respect to its relationship with society.

## JGC's Basic CSR Policy

### Basic CSR Policy

### CSR Guidelines

- |   |   |
|---|---|
| <p>1 <b>Maintain and enhance quality, safety, and the environment</b></p> <p>We shall conduct our business with a full understanding of the importance of quality, safety, and the environment.</p>   | <p>“Quality, Safety, and the Environment” are the fundamental watchwords which will guide the JGC Group’s continued efforts to work toward the sustainable development of society. As we devote our maximum efforts to these concepts, we shall maintain awareness that providing safe, high quality, and environmentally friendly products and services contributes to ensuring our clients’ satisfaction.</p>   |
| <p>2 <b>Contribute to society by drawing on the Group’s experience and technologies</b></p> <p>We shall provide our social contributions by drawing on the strengths of the JGC Group</p>   | <p>The JGC Group’s diverse global business activities range from comprehensive engineering services to catalysts and fine chemicals, and we aim to put the unique technologies and experiences we have gained through our involvement in such business fields to full use in our social contribution activities. Details of JGC’s policy regarding our social contributions are described in the “JGC Social Contributions Policy.” The four target areas for our social contributions are Environment, Education, Science and Technology, and Community.</p> |
| <p>3 <b>Engage in fair and honest business activities</b></p> <p>We shall comply with legal requirements inside and outside the country, and conduct our business in a fair and sincere manner following a proper governance system.</p>  | <p>The JGC Group is profoundly conscious that the maintenance of compliance and an efficient internal governance system are essential for the sustained well-being of any organization. Hence, we shall continue to maintain these elements as we respond to the requirements from society and the trends of the times. All management and employees shall follow legal and social rules based on high ethical standards.</p>   |
| <p>4 <b>Ensure proper information disclosure to stakeholders</b></p> <p>We shall disclose necessary information to our stakeholders in a timely and appropriate manner.</p>   | <p>The JGC Group is a listed company, and we take it as our duty to disclose information to the market in a timely and appropriate manner. We shall proactively provide important information in terms of the business environment and social situation, information that may have an impact on stakeholders, helpful information to deepen the understanding of the JGC Group as well as fulfilling our duty of information disclosure required by laws and regulations such as the Companies Act and the Financial Instruments and Exchange Law.</p>        |
| <p>5 <b>Implement human resource measures that develop the abilities and vitality of employees</b></p> <p>We shall endeavor to maintain and further improve fair human resource management to develop the ability and vitality of our employees based on mutual trust and responsibility.</p> | <p>The JGC Group’s CSR Policy describes “fair human resource management to develop the ability and vitality of our employees.” We shall be fully guided by the principle that the growth and development of the company occurs reciprocally with the growth and development of its employees. Based on this sense of mutual trust and responsibility, each employee shall contribute to the company as a professional, and the company shall provide opportunities for the empowerment of employees and for them to show their ability and vitality.</p>      |
| <p>6 <b>Enhance CSR activities</b></p> <p>We shall promote awareness of CSR and further develop our CSR activities reflecting the voices of stakeholders.</p>   | <p>The JGC Group shall promote CSR awareness throughout its organization, from management to employees. We shall carefully listen to the voices of stakeholders and continue making optimal efforts to respond to social needs and trends in the business environment.</p>  |

## Relationships with Major Stakeholders

The JGC Group engages in business while cooperating with a variety of stakeholders. Here, we introduce the major stakeholders of the JGC Group, and describe our relationship with them.

Major Stakeholder	Core Relationship
<b>Suppliers and Business Partners</b>	<p>JGC strives for open and fair transactions with its business partners, which include vendors that supply materials and equipment, as well as subcontractors involved in plant construction work.</p> <p>All companies that desire to work with the JGC Group are given an equal opportunity to join as business partners. Daily procurement activities are done on an in-house custom web-based system called the JGC e-Procurement Solution System (J-PLUS), which reduces the amount of paper used in transactions and provides quick and efficient communications.</p> <p>Information regarding procurement is also available on JGC's website.</p>
<b>Customers</b>	<p>The purpose of our business is to contribute to the development of our clients' businesses.</p> <p>Sales managers are the main point of contact for communicating with our clients.</p> <p>In countries and regions where JGC operates, we communicate with our clients with due respect for the cultures and traditions of the country involved, while aiming to contribute to business development.</p> <p>JGC contributes to continuing development in the countries in which it does business, establishing local companies and hiring and training local people.</p>
<b>Shareholders and Investors</b>	<p>In addition to disclosing information to shareholders and investors in accordance with statutory disclosure systems based on the Financial Instruments and Exchange Act, JGC discloses without delay important corporate information via its Public Relations &amp; Investor Relations Department in accordance with rules for timely disclosure systems at financial instruments exchanges.</p> <p>JGC also provides opportunities for face-to-face discussion at shareholder meetings, results briefings and investor relations meetings.</p>
<b>Local Communities / NGO and NPO</b>	<p>As a corporate citizen, JGC aims to exist in harmony with local communities while being well aware of its social responsibilities.</p> <p>In business development, we value input from local communities where we plan to construct plants and invest in operations, and reflect this feedback in our projects.</p> <p>Our employees also engage in activities that give back to the community.</p>
<b>Employees</b>	<p>JGC provides employees with opportunities to enhance their skills to world-class levels as professionals in the engineering business.</p> <p>In our personnel evaluation system, we also create opportunities for dialogue between managers and their employees to clarify the expectations of both parties. The JGC Council, which represents employees, also periodically holds meetings with management.</p>

Presenting our results and expanding the scope of IR information disclosure!

### JGC's homepage

The Company undertakes steps to disclose a wide range of information for the benefit of stakeholders via its homepage. In addition to company information as well as details of the Group's business activities, background data on the lead-up to orders received, information regarding various episodes during the conduct of individual projects, and photographs in connection with the construction of plants and investments undertaken are posted on the Company's website. Visitors to our homepage can access information through a variety of categories including individual regions, fields, and businesses.

Every effort is made to provide investors with a wealth of IR information over more than 20 categories. This includes details of the Company's new medium-term management plan, financial information, and webcasts of briefings of JGC's financial results.

JGC's homepage brings together virtually all of the Company's published materials from a journal that provides an introduction to proprietary technologies through CSR and HSE-related materials to the Company brochure.

The homepage underwent a complete design renewal in 2013 further enhancing access as well as navigation. We look forward to stakeholders visiting our site and ask for their continued support and understanding.





# Corporate Governance

The basic policy of JGC's corporate governance is to continuously increase corporate value through efforts to enhance management efficiency and transparency.

Maintaining the trust of society and all our stakeholders, JGC will develop our business in line with societal needs, expectations, and norms.

## Corporate Governance

JGC is a company with both a board of directors and a board of auditors. The Company has also taken steps during the current year to upgrade and expand its executive officer system. Every effort is being made to further bolster the executive function and to ensure that operating decisions are made on a timely and flexible

basis. In order to reinforce the oversight function and to enhance management transparency, JGC has appointed an outside director and outside corporate auditors who meet all necessary requirements as independent officers. Details of the Company's current corporate governance framework are presented as follows.

### <Board of Directors>

- The Board of Directors is headed by the Chairperson of the Board of Directors and comprises 10 board members, including outside board members, and five corporate auditors, including three outside corporate auditors. In principle, the Board of Directors meets twice a month.

### <Board of Auditors>

- The Board of Auditors comprises five corporate auditors, including three outside corporate auditors. In principle, the Board of Auditors meets once a month.

### <Director and Executive Officer Committee>

- The Director and Executive Officer Committee in principle meets once a month for the purpose of sharing information regarding the status of management policies and reporting/confirming the status of operations.
- The Chairperson of the Board of Directors heads this committee, which is composed of directors, executive officers, and corporate auditors.

### <Management Strategy Committee>

- The Management Strategy Committee in principle meets once a month to deliberate on important matters for JGC and the JGC Group relating to management strategy.
- The Chairperson Emeritus of the JGC Group heads this committee, which is comprised of directors, corporate auditors, and other members.

### <Operations Steering Committee>

- The Operations Steering Committee in principle meets twice a month to deliberate on matters for JGC and the JGC Group relating to the execution of operations.
- Chaired by the president, this committee includes corporate auditors and other individuals elected by the president.

### <Nominating Committee and Assessment Committee>

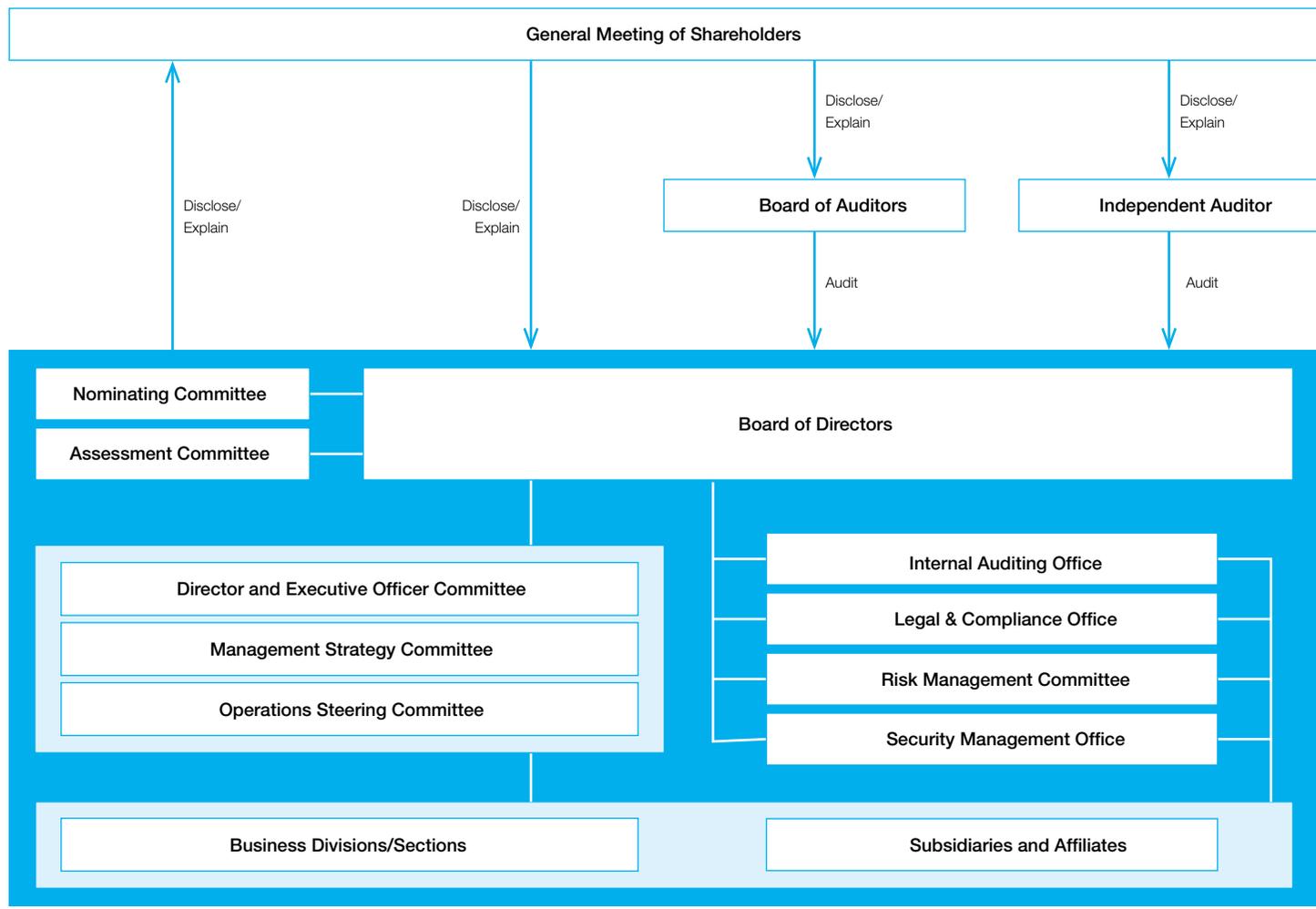
- The Nominating Committee and the Assessment Committee each meet in principle once a year for the purpose of enhancing fairness and transparency in the selection of executive personnel and in the determination of compensation issues.

### <Independent Auditor>

- The certified public accountants who audit JGC's accounts are Kazutoshi Isogai, Yoshihisa Uchida, and Yoshinori Saito of KPMG AZSA LLC. Five other CPAs and nine other individuals assist in carrying out these audits.

# Corporate Governance

## Corporate Governance System



## Internal Control System

The basic policy concerning JGC's internal control system was determined at the Board of Directors' meeting held on March 27, 2006. In the ensuing period, this policy has been updated and revised as appropriate.

For its internal control, JGC has established an Internal Auditing Office that verifies, evaluates, and enhances the efficiency of the internal control systems of JGC and the JGC Group. The Internal Auditing Office also conducts individual audits when appropriate. In addition, JGC's management and executive accountability system has been clarified, with Job Authority Regulations set forth to define the duties and authorities of each position. Group Management Regulations instituted for Group companies are also applied.

## Corporate Governance

### Compliance

In order to conduct sustainable business development as a member of the international community, JGC believes that it is essential for each and every employee to conduct business in conformity with corporate ethical standards, as well as to observe local laws and regulations not only in Japan but also overseas. To this end, JGC has formulated a Corporate Philosophy for the entire JGC Group, a document on Principles of Business Conduct, a Code of Conduct manual, regulations to prevent incidence of bribery, and related rules. JGC also educates and trains employees on various laws and regulations, as part of its efforts to raise employees' compliance awareness.

JGC recognizes that the bar is being raised even higher in terms of the level of compliance ex-

pected of global corporations. To respond to the demands of the international community, we have expanded our compliance division and strengthened our internal compliance system. To this end, we have put in place and continue to implement compliance programs which employ an ongoing monitoring and improvement process.

In addition, recognizing the importance of establishing a compliance system that encompasses Group companies inside and outside Japan, JGC maintains close coordination with the persons responsible for compliance in each company. Steps are taken to ensure Group-wide consistency and integrity by establishing and promoting compliance programs that continuously focus on monitoring and improvement.

### Disclosing Company Information

JGC discloses information in accordance with the statutory disclosure system, based on the Japanese Financial Instruments and Exchange Law. In addition, in accordance with the timely disclosure system at Japanese financial instruments exchanges, JGC promptly discloses important company information through its Public

Relations & Investor Relations Department. JGC also proactively discloses corporate information falling outside the scope of such regulations and system through news organizations and other media, in cases where it determines that disclosure is desirable.

### Business Continuity Plan (BCP)

JGC does not have production facilities such as manufacturing plants, and it conducts its business with employees, a sophisticated ICT infrastructure, and offices. Consequently, JGC's Business Continuity Plan (BCP) consists of three pillars: (1) Early confirmation of employee safety, (2) securing of ICT infrastructure, and (3) securing of office safety.

#### (1) Early confirmation of employee safety

In 2004, in advance of many other companies, JGC introduced a Safety Confirmation System for its employees. At present, the scope of the system has been extended to include not only regular employees, but also temporary staff and contract employees who work at JGC. In addition, for a quick confirmation of employee safety, an emergency liaison network has been established as a backup in each department.

#### (2) Securing of ICT infrastructure

JGC was the first company in the Japanese engineering industry to obtain ISO certification (ISO 27001) in 2006 for its information security management systems. Server operation and management, user authentication management, Internet operation and management including e-mail, management of communications infrastructure such as LAN/WAN, and other components of our IT infrastructure are tested through emergency drills every year, and they benefit from feedback to constantly evolve while supporting our business.

#### (3) Securing of office safety

In 1997, JGC transferred its office to its current location, a new building located in the Minato Mirai district of Yokohama. Designed to meet earthquake-resistant specifications exceeding the new earthquake resistance standards under the revised Building Standards Act, the building suffered almost no damage from the tremors of the Great East Japan Earthquake. Stockpiles of food and supplies are also kept on hand at all times, to provide additional support and security for workers at the Yokohama office in the event of an emergency.

#### Overseas Group Companies

### Group Compliance Conference

Working in unison, the JGC Group is endeavoring to put in place a sound compliance structure and systems. As a part of these endeavors, a Group Compliance Conference was held in Singapore in March 2014. This conference was attended by a total of 16 participants and comprised the persons responsible for compliance at the Company's Yokohama World Operations Center and each overseas Group company.

The Company's president, Koichi Kawana, kicked off the conference via a video message reconfirming the need to strengthen compliance. Persons responsible for compliance then gave presentations on the respective status of compliance programs over the past year as well as results of risk assessment as well as education and training activities. These presentations were followed by a Q&A session and vigorous debate. The conference was therefore an excellent opportunity for participants to gain an insight into where their programs could be improved as well as a wellspring for future initiatives.

Looking ahead, energies will be channeled toward building a robust compliance structure across the Group as a whole with the Group continuing to push forward measures aimed at ensuring thoroughgoing compliance.





### Security Management Office

Office

JGC employees and executives make approximately 5,100 overseas business trips per year, and approximately 650 JGC personnel are stationed overseas at any one time, in 30 different countries. Therefore, JGC has established Security Management Office available on a 24-7 basis to cope immediately with any risks employees stationed overseas might face,

including natural disasters, acts of terrorism, war, pandemics, crimes, riots, traffic accidents, and illness.

Security Management Office has two operating patterns: Crisis Management Operations and Preventive Operations, details of which are presented as follows.

#### (1) Crisis Management Operations

Security Management Office takes the lead in implementing a range of measures based on the risk level in a given area, according to the Basic Rules for Risk Management. \*Examples: business trip cancellation, temporary evacuation, etc.

#### (2) Preventive Operations

- |  |  |  |
|--|--|--|
| <p>1</p> <p>Collect, analyze and communicate risk information: issue situation-specific reminders and warnings</p> | <p>2</p> <p>Update standard documentation such as crisis response manuals and safety standards</p> | <p>3</p> <p>Survey, analyze and evaluate the levels of public safety, potential dangers and threats as well as risks and take steps to put in place countermeasures on an individual project basis</p> |
| <p>4</p> <p>Monitor each of the aforementioned items and provide guidance to ensure continuous improvement</p>     | <p>5</p> <p>Provide education and training on crisis management</p>                                | <p>6</p> <p>Make all necessary adjustment to ensure a point of contact with related organizations (government agencies, outside consultants, etc.)</p>   |

## Risk Management

### Information Security Management

Handling large volumes of information (specification documents, drawings and reports) is part and parcel of EPC operations. Much of this information contains confidential data received from customers and business partners as well as materials regarding proprietary know-how.

As an engineering contractor, it is a matter of course that we work to ensure that these information assets are properly protected.

Meanwhile, it is equally important that the Company's employees, customers and business partners have safe and ready access to essential information in order to ensure that projects scattered throughout the world are carried out smoothly.

To this end, we actively undertake information investments which include security countermeasures. These investments help to ensure that information security is maintained at an appropriate level that satisfies the needs of customer and business partners.

#### **Group-wide information security promotion structure**

The JGC Group looks closely at the ISO/IEC 27001 international standard when maintaining its information security management systems. We draw up rules and regulations for each project and put in place the necessary operating structures based on major differences in customer requirements, the operating environment and conditions confronting the Company. From both the technological and human resource perspectives, we take steps to improve the quality of the information security.

#### **Acquiring information system platform certification**

The Company's Corporate Administrative & Financial Affairs Division, which is responsible for the planning, construction, operation and management of IT infrastructure, Corporate IT Office and the responsible department of JGC Information Systems Co., Ltd. acquired ISO/IEC 27001 certification in 2006 as a part of effort to ensure the stable operation of information system platforms. Certification entails continuous screening on an annual basis and renewed certification every three years. Plans are in place for continuous screening to be undertaken in July 2014.

# Operations of the JGC Group

Through our engineering business, the JGC Group is involved in the construction of oil, natural gas and other energy-related plants, petrochemical plants, and infrastructure for pharmaceutical, medical and environmental-related facilities in more than 80 countries around the world.

In recent years, JGC has been developing enterprise investment and planning & management services businesses by leveraging our accumulated experience in plant construction.

In addition, mainly through our subsidiaries, JGC produces and sells catalysts used in fields related to oil refining, petrochemicals and the environment, as well as fine chemical products for use in the information and electronics materials fields.

The JGC Group is well aware of our responsibilities to society, and takes due consideration of these important responsibilities in our business development activities.

Below, we introduce the operations of the JGC Group and our relationship with society and the environment.



Oil, gas and resource development



Petroleum refining



LNG & GTL



Petrochemicals and gas chemicals



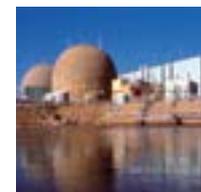
Pharmaceuticals and research facilities



Medical and welfare facilities



Non-ferrous metal refining



Nuclear energy and power generation

## EPC Business



Power generation and water



Renewable energy



Environment



Resource development

## Business Operations and Investments



Environmental catalysts      LCD materials

**Catalysts and Fine Products Business, etc.**

- Urban development
- Regional development

## Operations of the JGC Group

### Total Engineering Business (EPC Business)

Through the process of engineering, the JGC Group provides engineering, procurement and construction (EPC) services for industrial plants and social infrastructure commissioned by its clients.

To date, the JGC Group has participated in more than 20,000 such plant engineering projects in 80 countries worldwide.

After getting our start constructing oil refineries in Japan, JGC began to develop business overseas in the 1960s, and accumulated experience around the world in various fields ranging from the construction of oil refineries and petrochemical plants to

natural gas processing plants and the more environmentally friendly liquefied natural gas (LNG) plants. In the field of LNG in particular, JGC has been involved in plant construction projects that account for 30% of global LNG production volume.

Using the know-how and experience we have accumulated through the construction of these plants, JGC has also branched out into the construction of pharmaceutical plants, hospitals and other large-scale facilities.

The JGC Group's engineering business helps to shore up the foundation of society and the economy through the construction

of vital environmental and industrial facilities, including oil, gas and other energy-related plants, as well as plants for refining non-ferrous metals and producing chemical products and pharmaceuticals. Amid rising energy demand from a growing population and rapid economic development in emerging countries, we hope that the JGC Group will play an increasingly important role in society and the economy.

### Catalysts and Fine Products Business, etc.

Mainly through our subsidiaries, the JGC Group produces and sells catalysts used in fields related to oil refining, petrochemicals and the environment, as well as fine products such as hard disk abrasives and positive electrodes for lithium-ion rechargeable batteries.

JGC also offers environmental consulting services that propose measures to maintain, manage and improve the environmental sustainability of business activities likely to have an impact on the environment.

### Business Operations and Investments

The JGC Group's enterprise investment business, which is currently focused on power generation, water and renewable energy operations, relies on the relationships of trust we have built with clients around the world, as well as the technologies and expertise we have gained through our work in the EPC business.

The purpose of our EPC business is to construct plants commissioned by companies planning and launching new businesses, whereas the purpose of our enterprise investment business is to invest in companies that are owned or partially owned by JGC, and whose management we can direct on our own.

Take, for example, a business plan to construct a new renewable energy power plant. The JGC Group not only commits our own capital to the business plan, but also uses the expertise we have accumulated in the EPC business to manage the construction of the required facilities, and then takes total responsibility for operating and maintaining the business after construction is completed. Our involvement extends to feasibility studies and consulting services for tax, legal and financing issues.

In the enterprise investment business, JGC does not necessarily construct our

own plants, and instead chooses the best construction company based on our inside knowledge of the EPC business. JGC manages and advances construction as the business owner, and after construction finishes, takes full responsibility for the reliable supply of electricity in the required amount.

Going beyond pure business investment, the JGC Group takes control of all aspects of business administration, from the development and construction of businesses to plant maintenance and operations.

# Special Feature

## Initiatives at the JGC Group Aimed at Realizing a Sustainable Society

[17 Efforts to Address China's Environmental Problems ▶](#)

[20 Efforts to Mitigate the Effects Global Warming ▶](#)



The world population reached 7 billion people in 2011, and is projected to increase to 9 billion people by 2050.

Rapid growth in the populations of emerging countries alongside economic expansion will likely lead to a major increase in demand for food, water and energy. Meanwhile, global warming and environmental pollution as a result of the massive consumption of energy are becoming problems on a wide level. In order to address both growing demand for energy and the pressing need to reduce environmental impact, a variety of efforts have picked up momentum in countries around the world to promote the use of renewable energy and move toward a sustainable society.

JGC Group has taken initiatives to build up renewable energy businesses and help realize a sustainable society by drawing on our engineering technology and the project management expertise we have garnered through our involvement in numerous plant EPC projects spanning many decades. In this special feature, we introduce some of these initiatives.

# Efforts to Address China's Environmental Problems

**Air** Pollution, Water **Shortages**,  
Waste Disposal . . .

China's **environmental** problems are becoming more serious.

Saving energy and environmental protection were incorporated as the Chinese government's priority policy areas in its 12th Five-Year Plan from 2011. The 2007 announcement from both the Japanese and Chinese governments, "The Joint Statement from the Japanese Government and the Government of the People's Republic of China on the Further Enhancement of Cooperation for Environmental Protection," had confirmed a strengthening of cooperation in the fields of energy and environmental protection. Under such circumstances, JGC aimed to offer financial support to companies in China involved in energy saving or environmental protection and was involved in the establishment of the Japan-China Energy Efficiency and Environment Fund to that end. In partnership with JGC were the Japan Bank for International Cooperation (JIBC), Mizuho Bank, Ltd., Tsukishima Kikai Co., Ltd., The Export-Import Bank of China, Hangzhou City Industry Development Investment Co. Ltd., and Zhejiang Communications & Media Holdings Group Ltd.

Leveraging its engineering technologies in energy saving and the environment as well as its knowledge of those fields in China, JGC will contribute to the solving of the environmental problems in China by supporting the realization of high-quality projects that arise from cooperation between companies in both countries through the investments made in this fund.

## Establishment of Japan-China Energy Efficiency and Environment Fund: Pooling Business **Investments** to **Contribute** to Solving That Country's **Problems**

The fund memorandum of understanding was signed in the presence of the then Japanese Prime Minister Yoshihiko Noda and Chinese Premier Wen Jiabao after their summit meeting in Beijing in December 2011. The agreement was signed at the Seventh Japan-China Energy Conservation Forum that was held in Tokyo in August the following year. However, due to the subsequent heightened tensions between the respective governments triggered by the Senkaku Islands' nationalization issue, it was not until November 2013 that the fund was finally fully established. That same month, a ceremony was held in Hangzhou, the fund's place of incorporation. Those in attendance at the ceremony, where the high expectations for the fund could be felt, included not only people involved in the fund but also invited guests from China's National Development and Reform Commission, the Ministry of Commerce of the People's Republic of China and the Hangzhou Shangcheng District local government as well as Minister-Counselor Masaaki Kaizuka from the Embassy of Japan and media representatives. The fund's mission could be strongly felt in the words of one Chinese guest: "Japan's environmental technologies are like China's treasures. They will bring happiness to the Chinese people." Impressions from the forum were aired by the state-owned broadcaster Chinese Central TV (CCTV), resulting in JGC's Beijing office receiving a number of enquiries.

I would like to give an overview of the fund. The total amount of cash held in the fund amounts to one billion yuan (equivalent to approximately ¥16.4 billion), investors from the Japanese and Chinese sides each contributing 500 million yuan. The period of operation is eight years, the four-year first half being deemed to be the investment period, the second half the period in which investments are to be recovered. Investment targets are Chinese companies active in the fields of energy saving and the environment, but other targets are local subsidiaries of companies from outside China, including Japanese corporations, and energy-saving and environmental projects that are undertaken in China. The main concept behind the fund is the introduction of Japanese environmental technologies, for which investments in appropriate companies and businesses are positioned as "priority investment areas." It is prescribed in the fund's provisions that more than 20% of the investment amount will be retained, and that more than 50% is regarded as the target. Energy saving and the environment cover a wide variety of areas, but it was decided for the time being to narrow these areas down to three—namely, air pollution (PM2.5) measures, water treatment, and solid waste disposal—to respond to the most pressing issues facing China.

Group Leader  
New Business Group  
Business Development Department  
No.3 Business Division

Hiroaki Nakamura



## JGC is not a financial institution, so why are you injecting capital into a **fund** business?

With the exception of JGC and Tsukishima Kikai, the investors in the fund are financial institutions. The role expected of business corporations JGC and Tsukishima Kikai is to carry out technical assessments of candidates for investment and to introduce Japanese corporations that possess energy-saving or environmental technologies.

Last year, when a party of Chinese partners visited Japan, they were shown the JGC Group's catalyst technologies, including on a factory visit, and were presented with information on the environmental projects in which JGC is involved. The visitors expressed a great deal of interest in both, and we received requests that they be kept informed about technologies and projects on an ongoing basis. Furthermore, JGC is enterprisingly promoting business development in China. For example, we are fully leveraging the network assembled by the fund for such tasks as examining collaborations with companies that are potential recipients of investment, which we would like to lead to the creation of new business in China.

The development of investment recipients is primarily being conducted by partner fund management companies, and their information-gathering capabilities, network building, and investment project negotiation capabilities are a real eye-opener. We would like to actively exchange information and search for opportunities to create businesses with them.

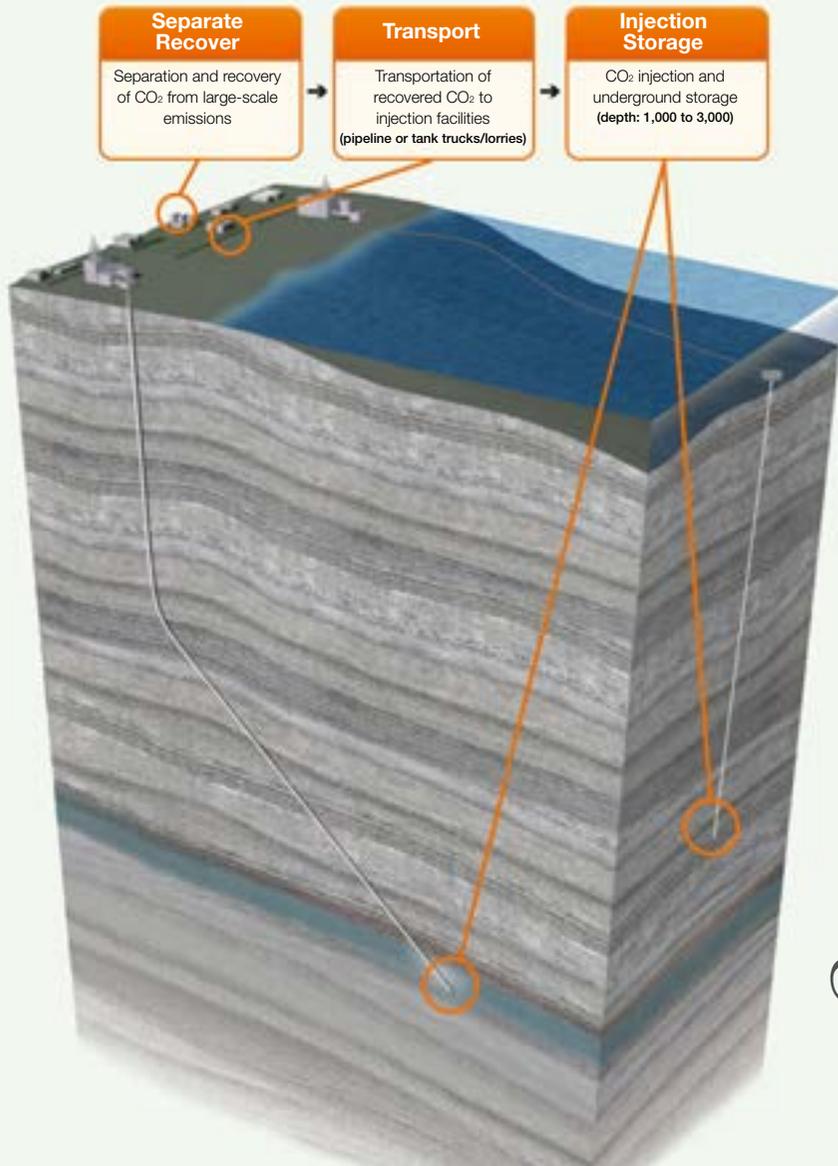
## In conclusion . . .

I consider JGC's project management capabilities, accumulated in the course of EPC contracts, to be indispensable in business creation and management.

More than an EPC contract, we take it as our mission to conduct business that will contribute to solving China's problems and would like to work toward business creation.



# Efforts to Mitigate the Effects Global Warming



In recent years, as global **warming** has become a serious problem due to the continuing increase in greenhouse gases in the atmosphere, carbon dioxide **capture** and storage (CCS) techniques have been attracting interest across the world as a **measure to mitigate the effects** of global warming over the medium to long term.

The International Energy Agency (IEA) is expecting to bring 100 CCS projects to fruition across the world by 2010 and 850 projects by 2030. Under these projects, CO<sub>2</sub> is prevented from being discharged into the atmosphere and stored in the ground. Expectations are high that CCS will prove to be a trump card in solving the problems of climate change and increasing energy demand. Amid such expectations, in Japan the Ministry of Economy, Trade and Industry (METI) is moving ahead with the country's first large-scale demonstration project of the total system under the Carbon Dioxide Reduction Technology Demonstration Project. The aim is for CCS technology to have been commercialized (at around the 1 million tons per annum level) under this demonstration project by around 2020. The city of Tomakomai in Hokkaido Prefecture has been selected as the demonstration project site, and plans call for the demonstration to be consistently carried out, separating and capturing the CO<sub>2</sub> (more than 100,000 tons per annum) from the gas in which it is contained, up to the monitoring of stages such as the injection and storage as well as of the behavior of the injected CO<sub>2</sub>. Japan CCS Co., Ltd. (JCCS) has been commissioned by METI to carry out oversight of the building of the facilities necessary for the demonstration project operation and the monitoring of the natural conditions prior to the injection of the CO<sub>2</sub>. Under an engineering, procurement, and construction (EPC) contract awarded by JCCS, JGC will be responsible for the design work, covering facilities to receive supplies of the gas containing the CO<sub>2</sub> from the hydrogen production unit at the Idemitsu Kosan Co., Ltd.'s Hokkaido oil refinery—located adjacent to the site of the demonstration project operation—for facilities to separate and capture the CO<sub>2</sub>, and for the above-ground facilities to transport the gas for injection into the wells. JGC will also be in charge of the procurement of materials, construction work, and the commissioning work for the facilities that will be injecting the gas underground.

**\*What is CCS?**  
 CCS stands for carbon dioxide capture and storage. To live more comfortably and more conveniently, humankind has developed and utilized the fossil fuels that have lain deep in the earth for millions of years. The consumption of fossil fuels generates carbon dioxide (CO<sub>2</sub>) as a by-product, resulting in rising CO<sub>2</sub> concentrations in the atmosphere. These are recognized as one of the main causes of global warming. CCS technology provides the means to capture the CO<sub>2</sub> from power stations or industry processes before its emission into the atmosphere. Transported through wells to sites suitable for geological sequestration that are scattered deep underground, the gas is stored stably for the long term. With its greater potential to lower CO<sub>2</sub> emissions, CCS is expected to be a key option in mitigating the effects of global warming.

The CO<sub>2</sub> will be injected into reservoirs (composed of highly porous rock, such as sandstone) located more than 1,000 meters beneath the earth's surface. The upper part of the reservoir needs to be formed of thick, CO<sub>2</sub>-impermeable layers of rock (known as the cap rock), to prevent any upward migration and thus ensure that the CO<sub>2</sub> remains stored safely and stably.

(Source: Japan CCS Co., Ltd. homepage)

## Large-Scale Demonstration Project of Complete CCS System:

To pass on the knowledge of our **ancestors**, to **develop** and **proliferate** CCS technology

For Japan's first large-scale CCS demonstration project, JGC received EPC and commissioning contracts covering the above-ground facilities to separate, capture, and inject the CO<sub>2</sub> contained in supplied gas. The project is currently being carried out with a view to delivery in 2016. Our proposal to reduce the amount of heat when separating and capturing CO<sub>2</sub> by using a two-stage chemical absorption method, thereby reducing operating costs, led to a new contract that recognized our track record in large-scale overseas contracts.

In Japan, we have been conducting an experiment involving the underground storage of around 10,000 tons of commercial (after separation and capture) CO<sub>2</sub> in the city of Nagaoka in Niigata Prefecture. However, this project in Hokkaido is the first demonstration project designed to verify the entire process, from the separation and capture of the CO<sub>2</sub> contained in the gas to when the CO<sub>2</sub> is stored beneath ground. What's more, the scale of the demonstration, at more than 100,000 tons per year, takes into account the need to verify commercial viability and is thus huge in comparison. In this case, the CO<sub>2</sub> feedstock is flammable gas, consisting mainly of hydrogen, from an adjacent oil refinery. After separating out the flammable gas and the CO<sub>2</sub> from the feedstock, the former is used to generate our own power for the CCS facilities, and the CO<sub>2</sub> is stored underground. We are thus building a mechanism that uses gas with no waste.

In the case of the large-scale projects in which JGC has been involved up to now, we have been working on CCS facilities in collaboration with joint-venture partners, but this is the first time for JGC to work on a CCS facility EPC single-handedly. As a result, as a project manager it is not uncommon for me to be faced with difficult decisions. Having said that, at JGC there is a good sense of openness between managers and other workers as well as between departments, and that culture enables consultation about problems, which leads to rapid resolutions. When time permits, I utilize that corporate culture to make judgments, after having gathered information and opinions from a number of different perspectives, and unhesitatingly endeavor to move forward once I have made my decision. Nine years have passed since I joined JGC. I feel that the rational way of thinking that flows throughout JGC—of entrusting project leaders with responsibilities irrespective of their age or experience—is one of our virtues.

A portrait of Masakazu Yoshimito, a man with dark hair, wearing a dark blue pinstriped suit, white shirt, and purple tie. He is smiling and looking slightly to his right. His hands are clasped in front of him.

Project Manager  
No.2 Project Department  
No.3 Business Division

Masakazu Yoshimito

The catalyst that led to JGC's efforts in CCS was the In Salah natural gas project in Algeria, which started in 1997. Our client, BP—then known as British Petroleum—was keenly interested in reducing CO<sub>2</sub> and built a CCS facility at the plant. Subsequently, JGC worked on the construction of a CCS plant for the Gorgon LNG project in Australia.

In 2003, when the In Salah natural gas project was under way, JGC created an internal organization called the Green House Gas (GHG) Initiative. That was just before the Kyoto Accord came into effect, and measures to mitigate the effects of global warming were being intensely debated. As JGC's core business is in the energy industry, we are inextricably linked to GHG emissions, but I believe that our technological expertise can make a significant contribution to reducing them. Of these technologies, in the case of CCS, JGC displays a very high affinity for CO<sub>2</sub> capture technologies at both LNG plants and natural gas production plants, the Company having proven from the outset to be very adept in the construction of both. Furthermore, at that time we thought the technologies could make a significant contribution to Japan, which needed to reduce GHG emissions within the framework of the Clean Development Mechanism (CDM), part of the Kyoto Accord.

One of the problems which prevent the proliferation of the CCS process is that CCS costs money but does not of itself generate new value. We had once studied if we could utilize CCS in the CDM with the case of an LNG plant in Malaysia which emitted the three million tons of CO<sub>2</sub> per year. Although the project did not reach the stage of actual construction, during the course of the examination, the methodology for utilizing CCS in the CDM was advocated through the world, which spiked the interest of those involved.

While taking over the findings about CCS that were made by our predecessors, I would like to contribute to the development and proliferation of CCS with the safe completion of facilities for the demonstration project. In addition to the contributions we are making from the technological standpoint, I believe JGC is taking on the social role that will be demanded of the Company in the years to come, conducting business planning and management that raises revenue by combining CO<sub>2</sub> utilization with CCS. This is already being seen in the application of this technology in petroleum advanced oil recovery (EOR) and in integrated gasification combined cycle (IGCC) technologies, which are attracting attention as the next generation of highly efficient coal-fired thermal power generation.

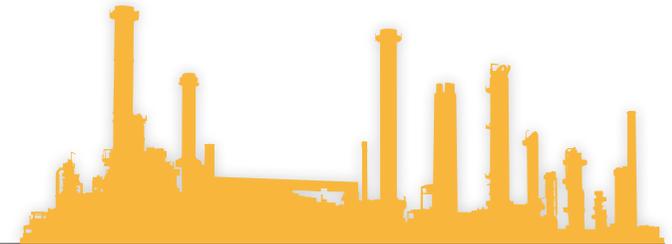


# HSE

## JGC aims to be the No. 1 contractor in HSE.

24 Close-up JGC Aims for Zero Incidents and Injuries ▶

27 Occupational Health and Safety ▶



We aim to faithfully fulfill our social responsibility by considering HSE in every aspect of our business.

### Aiming to Be a No. 1 HSE Contractor

In recent years, the interest of operators and society in HSE as it relates to the design, construction, and operation of large-scale facilities such as energy plants has risen. Requirements on contractors have become more stringent. JGC aims to maintain the trust of its clients and fulfill corporate social responsibility by becoming a No. 1 HSE contractor.

### Combining Economic Efficiency with HSE at a Higher Level

In large-scale plants, factors such as operating stability and ease of maintenance significantly affect economic efficiency during operation. JGC constantly strives to provide plants that combine economic efficiency with consideration for HSE. With the understanding and cooperation of our clients, who are also operators, we provide plants that meet our own high HSE standards as well as legal requirements and the needs of the client.

### Balance of Long-Term and Short-Term Perspectives

Energy and infrastructure facilities in operation around the world, even those which make full use of the latest technology, all have an impact on the environment over the long term. Parties responsible for the concepts, detail specifications, and construction of these facilities must make a prior assessment not only of short-term economic feasibility, but also long-term environmental impacts. By making sure all parties involved understand the essence of HSE and overall optimization, plants can be built that will meet with the approval of clients and society. JGC is keenly aware of the need for both short-term and long-term perspectives and aims to be a company that achieves a good balance between the two.

HSE encompasses..... **H**Health **S**afety **E**nvironment



## JGC Aims for Zero Incidents and Injuries

As a part of our occupational health and safety endeavors at construction sites inside and outside Japan, JGC makes every effort to improve Health, Safety and Environment (HSE) levels through “Incident and Injury Free” (IIF) initiatives.

Through IIF activities to foster a culture of safety and educate employees about safety, JGC fulfills our social responsibility while contributing to local communities as an engineering company.

IIF activities are based on the idea of workers watching out for each other and ensuring that everyone involved in a construction project is able to return home safely without incident. Safety is not something that is enforced, but a conscious decision made by each person involved in a project. By working to improve safety awareness, we foster a culture of safety throughout the whole corporate group. Everyone, from our managers in charge of a construction site to the workers at the site, play a vital role in ensuring the safety of all of those involved. IIF is not set in stone such as in a safety manual, but decided in accordance with conditions that vary from site to site, by the people working at the construction site. IIF also serves to increase the motivation of each individual worker, because constant communication is at the root of these initiatives.

In this close-up, we introduce some examples of IIF at JGC’s construction sites in Japan and around the world.

## At construction sites overseas

IIF activities are briskly underway as work continues night and day on the Barzan project involving more than 30,000 people from over 45 countries.

The project starts each and every morning with site managers from JGC making the rounds and greeting workers.

“Namashika, ap keyaisa?” (Good morning, how are you?) This greeting knows no boundaries whether corporate or profession. In broken Hindi, we do our best to convey our enthusiasm to workers, who bend their ear out of curiosity and friendly chat about matters unrelated to work. This mindless chit chat fosters a sense of camaraderie with deep roots, and cultivates a culture of caring for the safety of not just yourself but also the others you work with.

IIF Walk is held once a week in each area, where teams made up of a mix of people from JGC, clients and subcontractors patrol work areas to express their gratitude to the workers for working safely every day, and explain that the important work they do brings the plant one step closer to starting operations and producing products. If a worker requests an improvement at a work site or at their dormitory, the request is looked into right away to improve the morale of the workers and build relationships of mutual trust.

The Barzan project has had zero accidents causing work stoppage from July 2012 through April 2014, a combined total of 130 million man hours. In 2014, JGC will make every effort to keep the IIF Days (days with zero incidents and zero injuries) rolling by redoubling efforts to eliminate minor accidents and injuries. IFF signs have been placed at the main entrance gate of the worksite and in each area, and the number of IIF Days of zero incidents and zero injuries are displayed at the end of each day as a visual reminder to workers that another day has passed safely, sharing a sense of accomplishment and boosting their energy for the next day. Six straight months of IIF Days earns the area a Gold Award trophy, which is presented by JGC managers and customer representatives in a ceremony with their gratitude.

IIF sign



IIF Walk



### At sites in Japan

When introducing IIF activities at construction sites in Japan, IIF activities are first nicknamed “Ii Fureai undo” in Japanese, which means “good rapport campaign,” and workers at the construction site are asked to think about how safety can be improved, while site supervisors make an extra effort to greet and talk with each and every worker at the site. “Everyone” is the catchphrase we use to get site supervisors and site workers to come together to share their opinions and form bonds of trust. The circle of IIF activities broadens out among construction site workers and extends to customers as well. Through these efforts, construction site supervisors and workers are able to communicate more freely across corporate boundaries and throughout the ranks. If unsafe behavior is seen at the construction site, workers speak up and collaborate with each other at the work site to come up with a safer way of accomplishing the task at hand. As a consequence, our safety record has improved substantially.

As an occupational safety training material, JGC has produced DVDs describing actual incidents that have happened in the past with computer graphics to illustrate the incident. These DVDs have been made into a series. In Volume 4 “Nip an accident in the bud: actual close-call incidents,” there is an introduction of the IIF activity of “calling out each other’s names to prevent accidents” at worksites. The DVD series has received positive feedback internally as well as at customers and construction companies concerned about accidents. JGC is currently producing a DVD that explains IIF activities in more detail.

Greetings and handshakes to start the day  
(from DVD describing actual incidents)

# Occupational Health and Safety

## Occupational Health and Safety

In accordance with our Health and Safety Policy, JGC conducts health and safety management covering the JGC Group companies and business partners.

Above all, we focus on the prevention of occupational accidents at construction sites.

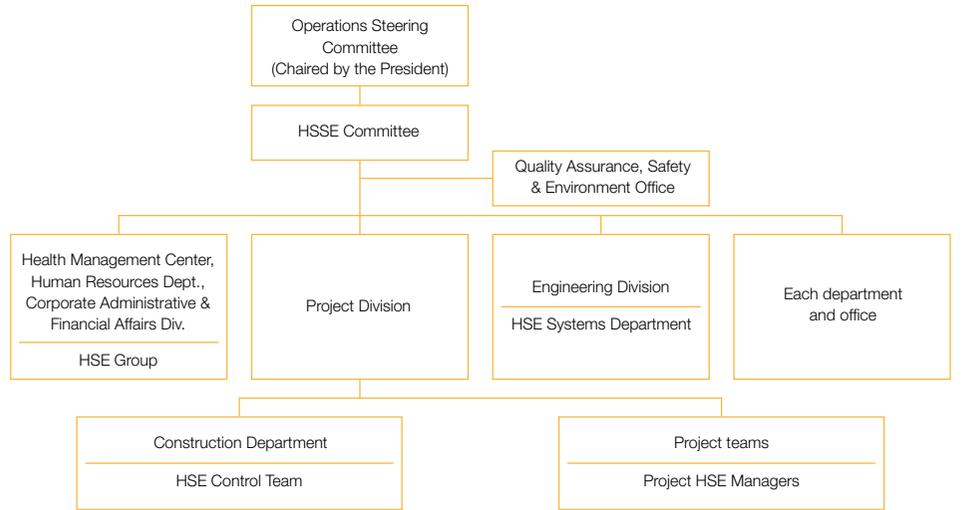
### HSSE Organization

The HSSE\* Committee deliberates on important safety matters for the entire group. It also reports to the Operations Steering Committee, which is chaired by the President. Matters decided by the HSSE Committee are promptly acted upon by the various company divisions.

An audit group appointed by the chairman of the HSSE Committee conducts health and safety audits at principal construction sites in Japan and overseas, and reports the audit results to the Operations Steering Committee.

\*The first letters of "Health," "Safety," "Security," and "Environment."

### HSSE Organization



# Occupational Health and Safety

## Safety Performance

As a result of continuous implementation of Group-wide health and safety improvement measures, our incident rate\*1 (ILO method) has remained at around 0.7 for the past ten years, a lower level than the average incident rate of 1.4 for the construction industry as a whole. In addition, specific internal annual Total Recordable Injury Rate\*2 (TRIR) targets have been set for domestic and overseas projects,

with monthly status of achievement circulated within the Company to raise the awareness of safety. The TRIR is a workplace safety indicator that includes the number of cases of accidents without first aid cases. For fiscal 2013, JGC's TRIR for domestic projects was 0.48 against a target of 0.60 or below, and 0.17 for overseas projects against a target of 0.15 or below.

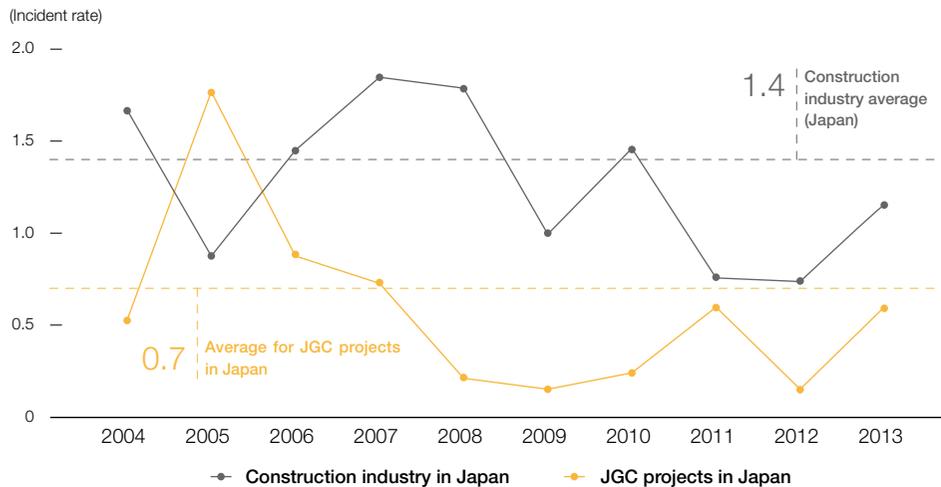
**Note:**

\*1 The incident rate expresses the occupational accident frequency as the toll of occupational accidents that result in a fatality or time off work of more than one day per million hours worked.

\*2 TRIR is a benchmark of the frequency of occupational injuries developed by OSHA in the United States.

It is calculated as the number of recordable injuries, which includes injuries not requiring time away from work, per 200,000 work hours.

### Comparison between the incident rate at JGC and the Japanese construction industry as a whole (ILO Method)



## HSSE Conference Hosted by the President

Every year in July since 2007, JGC has held an HSSE conference hosted by the President as a part of efforts to bolster HSSE initiatives. Approximately 140 corporate officers, project division heads, project department heads, project managers, and construction managers participate in the conference.

Following the President's opening speech and the Zero-Accident Award Ceremony, presentations are given on a variety of safety themes, and are followed by group discussions. Through the conference, JGC seeks to enhance the health and safety awareness of officers and employees and demonstrate the leadership of top management in HSSE matters.

The HSSE Conference



## Safety Day Campaign

Each year in July, JGC conducts a Group-wide campaign that focuses on traffic as well as construction safety. This campaign covers all of the Group's construction sites, offices, subsidiaries, and affiliates in Japan and overseas.

In 2013, the Group continued with efforts to lift awareness toward HSE. In addition to calling for safety posters and slogans, employees were asked to record and carry on their person Commitment Cards. These cards outline details of each individual's HSE initiatives. Moreover, safety committee meetings and other events were held on a team basis.



Fiscal 2013 safety poster award winner

## Occupational Health and Safety

### HSE Patrols by the President

At JGC, the president performs HSE patrols of major business sites overseas, and works to raise awareness of safety among all employees working at the site. The purpose of these patrols is to have the president visit the business sites in person, underscoring the importance of having a high awareness of HSE at JGC. During this campaign to foster a culture of safety and promote safety education, the president patrols the business sites in person, warmly greeting the

workers at the site, after a discussion to raise safety awareness with customers and business partners.

In recent years, the president paid a visit to the construction site of the Donggi-Senoro LNG Project in Indonesia, held a discussion to raise awareness of HSE with management at its customers and business partners, and patrolled the site to directly communicate to workers the importance of HSE.

President Kawana communicating to workers



### Introducing “HSE Moments”

Since September 2010, JGC has introduced “HSE Moments,” five-minute lectures given by a participant officer at the opening of meetings of the Operations Steering Committee, which are attended by officers and executives. The purpose is for management to take the lead in addressing HSE matters, in consideration of JGC’s aim to be a No. 1 HSE contractor.

Carrying on from the previous year, various topics were again covered in fiscal 2013, including “measures to protect the eyes from blue light damage,” “emergency evacuation procedures from offshore facilities,” and “the need to be wary of theft when on a business trip.” A wide range of topics, such as issues closely related to work and subjects that arouse intellectual curiosity, are chosen to heighten HSE awareness at JGC.

HSE Moments



### Consideration for Worker Safety Measures for Traffic Accident Prevention

JGC is strengthening its measures to prevent traffic accidents at overseas sites and bases.

In fiscal 2010, we introduced a thorough set of guidelines for management of vehicle operation, including the Seven Golden Rules for accident prevention, a traffic safety management system, and the In-Vehicle Monitoring System (IVMS). We also revised the guidelines for the prevention of traffic accidents overseas. In addition, to continuously monitoring the status of traffic safety measure implementation at overseas sites and bases, JGC’s management conducts traffic safety audits and mandates the submission of Monthly Traffic Safety Reports and semiannual reports.

# The Environment

## The JGC Group's Environmental Technologies and Environmental Conservation Activities

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In the context of growing interest in regulations, environmental issues, and sustainable development, JGC has set forth the following policy regarding its environmental performance.

### Engineering is in Essence an Activity that Contributes to Environmental Conservation

JGC's engineering business, which involves providing engineering, procurement, and construction (EPC) services for oil, natural gas, and other energy-related production plants, is intrinsically related to environmental conservation.

Since the 1960's, JGC has been grappling with environmental issues in its capacity as an engineering company. We remain keenly aware that our business activities in and of themselves must contribute to environmental conservation, and we declare that awareness in the JGC corporate philosophy.

We have tested various innovations aimed at improving environmental efficiency over the course of the EPC process, and won accolades from clients for our efforts.

In enterprise investment, a new sector outside of the EPC business, JGC is further expanding the scope of our activities contributing to environmental conservation. We also continuously work to reduce environmental impacts, including CO<sub>2</sub> emissions, at our construction sites and at our head office.



## Environmental contributions in China

~Production of LNG from coke oven gas~

In Japan, gas generated during the coke production process (coke oven gas) is effectively used as a fuel by neighboring steel plants, for example. In China, however, coke ovens and steel plants are often not located next to each other, so many coke factories burn off any excess coke oven gas; this is said to be a cause of air pollution.

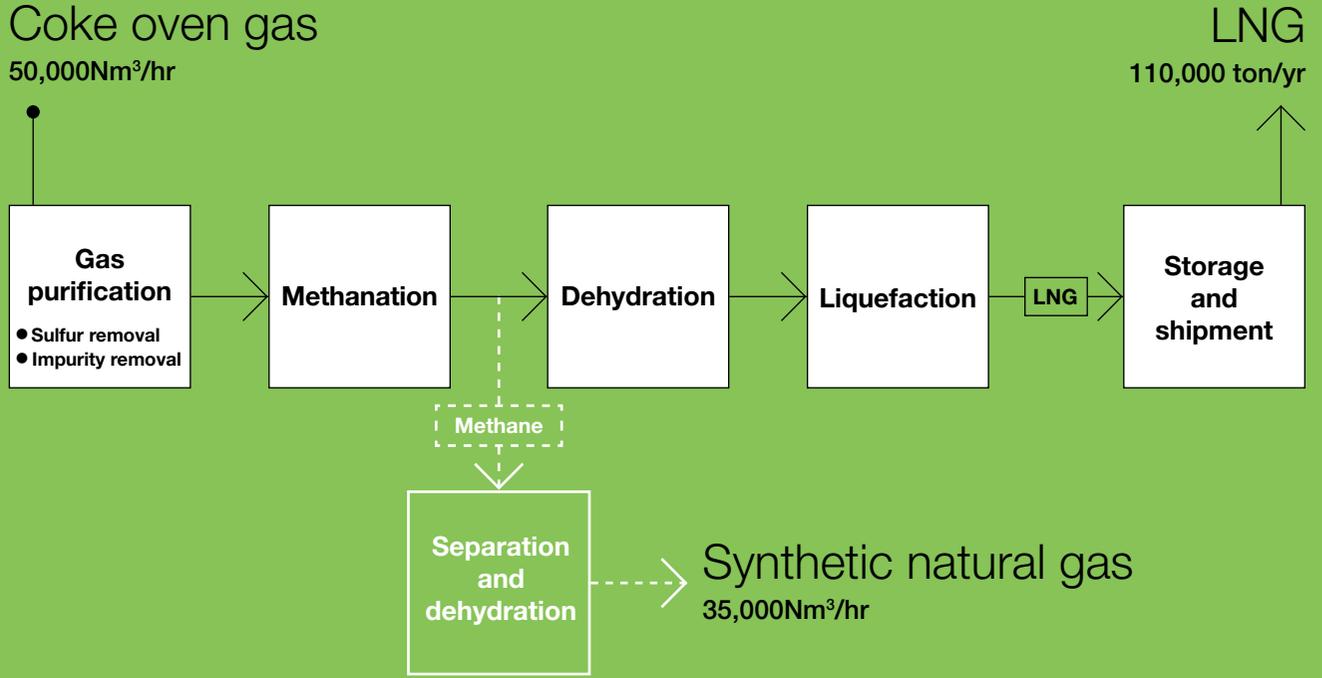
Coke oven gas contains carbon monoxide and hydrogen. Using these components as raw materials, it is possible to produce synthetic natural gas (methane). It is said that there is enough coke oven gas in China to produce synthetic natural gas equivalent to 5 million tons of LNG every year. If this could be done, it would contribute significantly to preserving the environment by helping to reduce emissions of greenhouse gases and air pollutants, in addition to being a source of clean natural gas.

If the various impurities in coke oven gas can be removed to produce refined carbon monoxide and hydrogen, already established technologies can be used to produce synthetic natural gas. If this purification process is insufficient, catalysts are damaged and piping is blocked, making it impossible to reliably produce synthetic natural gas. It is this purification process where JGC's technological strengths truly shine.

JGC has extensive technologies and experience in treating gases, and has built a coke oven gas purification plant before. After operating this purification plant stably for several years, JGC has refined its coke oven gas purification technologies.

JGC has partnered with ACRE Coking & Refractory Engineering Consulting Corporation, MCC, which deals with 80% of the largest coke factories in China, to provide it with the technologies to produce synthetic natural gas and LNG from coke oven gas. As the first endeavor, JGC and ACRE signed a contract with a coke producer in Shandong, and is currently drawing up engineering documents. JGC and ACRE plan to spread these technologies throughout China, contributing to effective energy use and the reduction of air pollution in China.

### Process of producing synthetic natural gas and LNG from coke oven gas



## The JGC Group's Environmental Management

# Environmental Policy

JGC, as a professional engineering contractor, is committed to achieving environmental excellence in both its corporate operations and the services it renders its clients. To meet this commitment, JGC has hereby established the following principles, which shall be applied throughout its operations.

1. We shall endeavor to preserve the natural environment through the prevention of pollution and the conservation of energy and natural resources.
2. We shall provide our clients with technical solutions that conserve energy and natural resources, and reduce pollution and other adverse environmental impacts.
3. We shall fully comply with both environmental laws and regulations, and the environmental requirements of our clients.
4. We shall reduce the production of waste through measures that emphasize reuse and recycling.
5. We shall apply the following specific principles to the execution of our EPC projects:

#### Engineering Phase:

We shall reduce the adverse environmental impacts of completed plants by minimizing the energy and resource consumption of each plant, and minimizing emissions and waste production.

#### Procurement Phase:

We shall give preference to vendors that adopt environmentally-friendly manufacturing practices.

#### Construction Phase:

During construction, we shall endeavor to minimize emissions, adverse impacts on the surrounding environment, energy and resource consumption, and waste production. Furthermore, we shall ensure that our subcontractors adopt work practices consistent with this principle.

## Environmental Considerations Associated with Business Activities

# Environmental Considerations Associated with Business Activities

In this section, we report on specific examples of the JGC Group's consideration for the environment at every stage of plant construction and other EPC services.

### In Marketing Activities

Ensuring a reliable supply of energy while preserving the environment is an issue shared by all of humanity.

The emergence of shale gas has changed the global landscape for energy in recent years.

A fundamental shift is underway, lessening our dependence on oil and coal as the use of natural gas, which is friendlier on the environment, expands. However, natural gas alone cannot fulfill all our energy needs amid growth in the global population. Oil and coal use is unavoidable. Fortunately, advances in technology have lessened the environmental impact of oil and coal.

As a company rooted in technology, the JGC Group is addressing these needs for various kinds of energy and the reduction of environmental impact.

Specifically, JGC's marketing activities have played a major role in the development and management of the electricity, water and renewable energy business as well as the urban development business, in addition to our traditional EPC business in gasoline and kerosene desulfurization systems, heavy oil countermeasures, LNG plants, gasification plants, and CCS plants.



LNG plant (Indonesia)

### In Feasibility Studies

We consider many matters at the feasibility study stage, including market analysis, potentially useful technology, systems capabilities, facilities configuration, construction and operation cost analysis and financial arrangement. When configuring facilities, we take environmental consideration into account, along with regional

characteristics and safety. We also consider secondary environmental impacts, such as whether waste disposal facilities are available in the region, or whether any transportation-related problems exist.

## Environmental Considerations Associated with Business Activities

### In Basic Planning (FEED)

Basic engineering specifications of plant construction are decided at the Front-End Engineering Design (FEED) stage. At this stage, the JGC Group draws up specifications reflecting comprehensive consideration of plant construction costs, safety, operation costs, environmental impact, and other factors. In these specifications, the JGC Group makes use of its own technology for energy conservation and effective energy use.

During FEED, we measure the overall thermal balance of the plant and propose energy conservation and efficiency improvement measures, including “pinch technology” for optimization of heat recovery and use, aero-derivative gas turbines for power generation facilities, and combined cycle power generation. We also work to actively mitigate damaging environmental impact by reducing CO<sub>2</sub> emissions, and considering measures such as waste heat recovery maximization and flare gas emissions reduction.

### In Basic Engineering and Detailed Engineering

This is an essential stage of the engineering process, during which the basic design concept is optimized based on consideration of the life cycle of the plant. At this stage, we analyze realistic, practical measures for minimizing impacts on health, safety, and the environment that could arise during construction and operation. These measures are then reflected in the basic and detailed engineering (equipment specification) decided at this stage. For example, plants must be designed so that gas and liquid emissions will meet legal standards, but we also consider means to further minimize minor emissions. Every possible source of emissions is identified and the volume of discharge estimated. This includes not only stacks, vents etc., but also possible leaks from valves, flanges, or gases discharged during maintenance operations. We also review the basic engineering from the standpoint of either avoiding or reducing emissions, for example by making the operation of the plant more efficient or reusing its exhaust heat and wastewater. In addition, we determine optimal engineering specifications for every source of emissions by selecting low-emission valves and other such equipment.

### In Equipment and Materials Procurement

The JGC Group also encourages the materials and equipment vendors with whom we do business to adopt a proactive stance on ensuring safety and environmental conservation, including the protection of biodiversity.

Though transactions with vendors previously required a large volume of paper documentation, we have now switched to digital documents with our in-house JGC e-Procurement Solution System (J-PLUS). This system is environmentally friendly and has improved work efficiency by reducing the use of paper forms. After purchase order finalization, interaction with vendors at the detailed engineering stage has been computerized using J-PLUS P for the same purpose, resulting in a virtually paper-free work environment.

For JGC, reinforcing the initiatives taken by vendors to improve safety practices is not only essential for human safety, but also for quality control and on-time delivery of equipment and materials. Consequently, JGC encourages vendors on a regular basis to implement Safety Moments\* and reinforce traffic safety initiatives.

\* Safety Moments refer to the practice of discussing safety-related topics at the opening of business meetings before bringing up the main subject. The objective is to raise safety awareness among participants by giving them an opportunity to think about such topics in a group.

### Consideration at Engineering Stages

## Example: minimizing emissions of gas

Last year, JGC constructed a new gas plant in the Middle East designed to minimize emissions of gas. Since gas emissions are greater when operations start or enter emergency shutdown compared with normal operations, it is necessary to take a design approach that considers the operational cycle of the plant in order to reduce its total gas emissions. While envisioning various operating conditions at the plant, JGC reassessed systems from the standpoint of reducing gas emissions. We successfully delivered to our customer a plant that achieved minimal gas emissions.

## Environmental Considerations Associated with Business Activities

### In Construction Planning

Meticulous concern for sustainability at plant construction sites is essential.

In many countries, construction of new plants requires submission of an environmental impact assessment (EIA) report for the purpose of understanding what impacts the construction has on the environment of the construction site and minimizing those impacts as much as possible. The EIA report describes in detail impacts that construction work will have on the air, water, soil, flora, fauna, and marine life, and it also details measures that can be taken to counter them.

JGC applies environmental management systems to construction work to ensure that we demonstrate environmental consideration in compliance with EIA reports, emphasizing the following points.

1. We practice strict legal compliance and environmental risk management by identifying environmental laws and regulations and environmental considerations that have bearing on construction work.
2. We endeavor to increase client satisfaction and reinforce communication with stakeholders.
3. We manage environmental risks and endeavor to minimize the possibility of incidents which may have a negative impact on the environment by anticipating, preparing for, and speedily responding to emergencies.

Before starting construction work, we consider the above matters and unflinchingly perform the following preliminary work:

- 1 Identifying environmental impacts of the construction work
- 2 Setting environmental objectives and targets for the construction work
- 3 Preparing a Construction Environmental Management Plan for the construction work
- 4 Providing new workers with environmental education and training

We incorporate the Zero Emissions Initiative 2015, a JGC Group independent environmental conservation initiative, into this preliminary work, and thoroughly confirm environmental conservation measures before starting construction.

### In Construction

Construction work by JGC is preceded by thorough environmental consideration at the planning stage.

Matters laid out in the Construction Environmental Management Plan include project environmental policy, the organizations and persons responsible for environment-related work, environmental protection measures, environmental performance monitoring and measurement, regular testing of emergency pre-

vention and relief procedures, monthly reporting, etc. Following the start of construction, a review of environmental aspects of the project (the relationship between construction work and the environment) is conducted to confirm whether the construction work differs from the plan. If any differences are found, the plan is revised to ensure that there are no omissions in environmental consideration in the environmental management framework.

### In Maintenance

Rigorous HSE risk assessments by specialists are conducted in the engineering phase for various industrial plants, and risk mitigation measures determined to be necessary are borne out in the engineering and construction work.

However, over years of plant operation, facilities age and operating conditions or feedstock composition may change. In some cases, chemical substances not assessed as risks at the time of construction become recognized as health risks. In recent years, the necessity of the regular and timely reassessment of HSE risks that may potentially increase over the course of long-term plant operation has long been advocated and plant operators recognize the need for this as well.

Utilizing its ability to act as a third party with the latest technology, knowledge, and ability to supply needed resources to plant operators, the JGC Group actively supports plant operators in conducting HSE risk assessments at operating plants, recognizing the importance of thorough maintenance operations. Accidents at energy industry facilities obviously carry an inherent risk of becoming worst-case scenarios. The JGC Group offers maintenance services with full consideration of these needs and risks.

### Considerations for Maintenance

## HSE Risk Assessment in Existing Plants

When plants have to undergo successive upgrades because of their age, environmental and health standards initially set as requirements when the plants were built become often difficult to maintain. Aiming at improving the environmental performance and safety of aging plants, JGC offers HSE risk assessments and support services. We conduct surveys during plant operation and identify problems through HSE-specific examinations. Taking advantage of the experience we have gained from numerous plant construction and maintenance service contracts, we offer realistic propositions that bring significant improvements.

## Environmental Considerations Associated with Business Activities

### In Facilities Decommissioning

JGC also strives to minimize environmental impacts in dismantling work.

For example, in the course of several hospital construction projects and pharmaceutical laboratory renewal projects, we use construction drawings and sample analysis to confirm the presence or absence of harmful materials that include asbestos dust, PCBs, chlorofluorocarbons, mercury, lead, and other substances before dismantling facilities or existing buildings. We seek to minimize environmental impact by preventing asbestos contamination, as well as recovering and decomposing chlorofluorocarbons etc.

We measure asbestos particle concentration in the air before, during, and after construction and confirm that asbestos had not been dispersed outside the work area. In addition, we work on preventing occupational accidents and diseases by giving every consideration to the

health and safety of workers. Measures taken include risk assessments, special health checks, wearing of personal protective equipment such as fully protective masks, and use of adequate dust control in working environments.

When dismantling structures, we also strive to minimize the impact on nearby residents by using low-vibration and low-noise construction machinery, and constantly monitoring operations through vibration meters and noise meters.

In an effort to reduce the processing volume of industrial waste generated during decommissioning, we dismantle each type of waste separately and promote waste recycling and reuse. In this way, we have achieved a recycling rate of 100% for concrete and asphalt. We use industrial waste control manifests to ensure appropriate treatment for industrial waste at every stage up to final disposal.

## Management and Control of Hazardous Chemical Substances

In overseas construction sites, we use the management system Control of Substances Hazardous to Health (COSHH) as part of our HSE efforts. COSHH is a framework of safety practices that include obtaining in advance the Material Safety Data Sheets (MSDS) of materials to be used, creating registers of harmful substances, and working to prevent the potential hazards posed by these substances. An MSDS contains safety guidelines for a given chemical substance, including information on hazards, storage methods, handling methods, which personal protective equipment should be worn when handling the substance, warnings regarding routine or non-routine use, recommended first aid measures in case of direct contact, emergency measures in case of soil contamination after accidental spillage, disposal of waste products after use, and so on. Before any operation, JGC conducts a special training session based on MSDS data for supervising staff and all workers involved, to ensure a comprehensive safety management system.



Hazardous substance storage area



Handling of chemical substances

## Safety and Environmental Consideration in Investment Projects and Research & Development

# Safety and Environmental Consideration in Investment Projects and Research & Development

In this section, we report on the safety and environmental conservation measures we take regarding our investment projects, and regarding the research and development that supports our engineering business.

### Enterprise Investment Business

The JGC Group, in addition to being involved in the EPC business, is also involved in numerous investment projects as a strategic equity partner. Investments include infrastructure projects (desalination and power generation), renewable energy projects (solar thermal and solar photovoltaic power generation), resource development projects (for oil, gas, and other resources), CDM projects, new energy development projects, environmental catalyst and fine chemicals manufacturing projects as well as urban development and other projects.

As a general rule, in the enterprise investment business, we keep the following objectives in mind:

- Development of social infrastructure
- Environmental improvement on a local or global scale
- Improvement in energy use efficiency
- CO<sub>2</sub> reduction and utilization of natural energy

In investment projects, from the feasibility study stage onward, we abide by the environmental

regulations of the country or region, as well as the environmental guidelines set down by the World Bank Group. In our current desalination and power generation projects, we are performing detailed environmental impact assessments, and are working in compliance with the aforementioned environmental guidelines and regulations. Moreover, we are taking the lead in promoting safety management in collaboration with project partners including EPC contractors and operation maintenance companies.

The JGC Group has taken steps to promote an IIF campaign at a solar photovoltaic power generation project in Oita in similar fashion to its EPC activities. The group was successful in completing construction without incident or accident. In this manner, the JGC Group makes investments with the belief that safe and environmentally considerate projects increase corporate value for the JGC Group and for its business partners.

The IIF campaign at a solar photovoltaic power generation project in Oita



## Safety and Environmental Consideration in Investment Projects and Research & Development

### Research and Development

JGC conducts research and development, principally testing, at our Research and Development Center in Oarai, Ibaraki Prefecture.

At the Research and Development Center, we treat wastewater generated as a by-product of the tests we conduct by filtering, adsorption, and neutralization, in strict compliance with voluntary management criteria as well as relevant laws, ordinances and regulations. We dispose of treated water in accordance with environmental standards. In controlled areas where we use radioactive isotopes, we strive to reduce the amount of test waste liquid and hand washing wastewater generated. We treat these liquids and wastewater by ion exchange, filtering, adsorption, and concentration, and recycle them within the controlled area. Under no circumstances do we discharge this water outside the controlled area.

Furthermore, we release exhaust from the controlled area after filtering it through a high-performance HEPA filter, with continuous monitoring to confirm that it complies with emission control standards.

We aim to reduce the amount of industrial waste generated within the Research and Development Center, and we separate and dispose of waste in compliance with industrial waste disposal standards.

In addition, to support safety management and help prevent accidents, the Research and Development Center's Safety Committee conducts monthly patrols to identify hazards and provide guidance for improvement of safety protocols. Moreover, written plans must be submitted to the committee before the beginning of new research operations. The committee then deliberates on the contents of the operations from the standpoint of safety, to provide sufficient accident prevention measures.



Research and Development Center  
(Oarai, Ibaraki Prefecture)

## Continuous Improvement of Management Systems

# Continuous Improvement of Management Systems

In December 2003, JGC obtained the ISO 14001 certification from Lloyds Register Quality Assurance (LRQA). ISO 14001 is the international standard for environmental management systems.

Since then, the certification has been renewed three times, and the audit required for maintaining it in fiscal 2013 was completed in October 2013, including at overseas sites.

### Environmental Improvement Activities in Line with Our Business

As environmental improvement activities at JGC's Headquarters tended to center on reducing waste, paper, and electricity consumption, our task was to shift this focus to activities that fall in line with our actual business. To accomplish this, with the participation of the heads of all divisions, we reviewed our methods for identifying opportunities for environmental conservation and our procedures for target setting. We reached a common recognition of the following points.

- While we solve environmental issues through our original business and aim for sustainable development in society, it is important to link these processes to the creation of corporate value and improvements in competitiveness.
- While concerns over environmental issues are rising worldwide, JGC is contributing directly and indirectly to solutions through its original core business. JGC recognizes sustainability as an issue it has to address in this particular business.
- Important points that JGC must consider to develop itself sustainably are as follows:
  - 1.Implementing adequate operation and maintenance to prevent environmental problems from arising in the future.
  - 2.Continuing to implement improvements to increase corporate profits, while giving consideration to environmental matters.

With this common recognition, JGC continuously makes a concrete review of the significance of environmental objectives and targets, and implements environmental management activities from the following perspectives.

- Environmental management activities conducted with environmental objectives and targets are not separate from business, they are business.
- The operational policies of divisions and departments are determined for substantial performance improvements of the organization and its operations.
- Environmental targets and quality targets can be matched together.

In this way, JGC conducts environmental improvement activities in line with its original business, by loosely linking its environmental management systems to its quality management systems.

### Environmental Management Systems



## Environmental Objectives, Targets, and Achievement

# Environmental Objectives, Targets, and Achievement



Promotion of the Zero Emissions Initiative 2015

### Promotion of the Zero Emissions Initiative 2015

Since 2008, as part of its corporate social responsibility, the JGC Group has enacted environmental improvements through the Zero Emissions Initiative, which details strategies for reducing the harmful by-products of JGC's business activities to zero. In 2011, with new targets set for the mid- and long-term in consideration for the development of our environmental business, we have renewed the initiative under the new title, "Zero Emissions Initiative 2015."

The Zero Emissions Initiative 2015 covers the head office, the Research and Develop-

ment Center, JGC construction sites in Japan and overseas, JGC Group companies in Japan and overseas, and domestic and international sales bases.

- **GC Group Offices**

Environmental improvements were promoted in offices by adopting an environmental target of a five-year average reduction of 1% or more in energy-related CO<sub>2</sub> emissions units.

- **JGC Domestic Construction Sites**

Environmental improvement targets were quantified in three areas: final disposal rate, number of leaks, and CO<sub>2</sub> emission units. The target (3%) for the final disposal rate was not reached (5.8%). The JGC Group will continue to make every effort to achieve the target in the next fiscal year. On a positive note, the targets for the number of leaks and CO<sub>2</sub> emission units were reached with the Group securing favorable results

### Recycling of Construction Waste

JGC aims at minimizing final waste through the rigorous implementation of the "Zero Emissions Initiative 2015."

In fiscal 2013, the final disposal rate of domestic construction projects was 5.8%.

On every site, before contracting disposal to a provider of intermediate waste treatment services, we confirm its recycling rate with our own industrial waste surveys.

In particular, because there are significant differences between contractors regarding the treatment methods and recycling rates of construction sludge, we carefully compare treatment methods and costs.

Before starting construction, we also establish an adequate waste separation plan based

on the characteristics of waste to be generated.

In addition, through the rigorous separation of wastes in accordance with this plan, we seek to improve the recycling rate during construction.

- **JGC Overseas Construction Sites**

Compared with domestic sites, overseas sites have different conditions for each site, which make it challenging to quantify environmental improvement targets. In this difficult context, in an operating environment that tends to lack sufficient recycling mechanisms, efforts were made regarding the use of valuable resources, rigorous reuse of materials, and prevention, preparation of treatment, and handling of oil leaks. In addition, internal HSE audits are conducted at all sites.

- **Efforts in Group Companies**

Because these companies conduct extremely varied forms of business, they pursued independent efforts aiming at zero by-products, based on their respective business characteristics.

## Environmental Objectives, Targets, and Achievement

In accordance with our Environmental Policy, JGC strives for continuous improvement of our environmental management systems by setting environmental objectives and targets, and measuring and assessing achievement as shown in the table below.

### Fiscal 2013 Results and Fiscal 2014 Improvement

**Assessment**

E: Completely implemented G: Extensively implemented NG: Not yet implemented

**Improvement:**

↗ Substantial modification of environmental improvement measures

→ Continuation of environmental improvement measures

Activity objective	Fiscal 2013 results	Assessment	Initiatives for fiscal 2014	Improvement
Implementation of the Zero Emissions Initiative 2015	<ul style="list-style-type: none"> <li>• CO<sub>2</sub> emissions reduced to the Kyoto Protocol level.</li> <li>• Soil pollution from leaks reduced to almost zero.</li> <li>• Reduced the final disposal of waste (reduction in the amount of final disposal without an improvement in the final disposal rate)</li> <li>• Promoted environmental investment</li> </ul>	G	Continued implementation of the Zero Emissions Initiative 2015	→
Environmental targets	In departments that provide supervision/guidance, setting of environmental targets directly linked to original business, promoting of linkage with quality management systems.	G	Continuing promotion of environmental improvements directly linked to original business	→
Strengthening of internal auditing	Implemented at all overseas sites. (Currently implemented 11 times in total.) <b>Score: 87.4 points (target: 82 points)</b>	E	Planning for multiple implementation at all overseas sites (To be implemented 19 times in total.) <b>Target: 84 points</b>	↗
Strengthening initiatives for biodiversity	Initiatives for biodiversity directly linked to original business (expansion also at overseas sites and in Group companies.)	G	Continued the implementation of initiatives for biodiversity directly linked to original business	→

**Notes:**

- Office activities ... Regarding office activities, environmental performance has reached a satisfactory level that indicates saturation. Consequently, environmental improvements in offices are now implemented with environmental targets as operation and maintenance items.
- Project execution ... Divisional environmental targets for project execution are set for environmental improvements in the original business and are matched to quality targets. Consequently, targets cover a broad range of division-specific items, they are loosely linked to the quality management systems, and they produce steady results.
- Group companies ... Group companies also actively engaged in activities of the "Zero Emissions Initiative 2015" and obtained significant results in environmental improvement. However, because these companies conduct very diverse forms of business, summarized environmental targets are difficult to express, and for this reason they are not mentioned in this report.

### Zero Emissions Initiative 2015 Environmental Performance (JGC sites in Japan)

Environmental indicators	Unit	Fiscal 2009	Fiscal 2010	Fiscal 2011	Fiscal 2012	Fiscal 2013
1. Final disposal rate of industrial waste	Result (Target) %	3.7 (7)	4.1 (4)	3.3 (3)	4.2 (3)	5.8 (3)
2. Number of leaks	Result (Target) Leaks	2 (0)	1 (0)	0 (0)	0 (0)	0 (0)
3. Energy-related CO <sub>2</sub> emission units	Result (Target) kg-CO <sub>2</sub> /hour	0.94 (1)	0.75 (1)	0.46 (1)	0.36 (1)	0.58 (0.9)

## Environmental Report on Office Activities

# Environmental Report on Office Activities

### Efforts based on Minato Mirai 21 Urban Management

The Queen's Tower A building, which houses JGC's Yokohama World Operations Center, is located in Queen's Square Yokohama, a complex in the Minato Mirai 21 district in the Nishi Ward of Yokohama city. This area is being developed with consideration for a more efficient use of energy, the needs of a recycling-oriented society, urban disaster prevention, and environmental friendliness. Its urban management is based on the "Basic Agreement on Town Development under Minato Mirai 21."

The efforts made by JGC to mitigate the environmental impacts of its office activities are also based on this concept, and they include reducing electricity consumption, heating and cooling consumption, energy consumption, and waste, and increasing the recycling rate.

### Efforts to Reduce Electricity Consumption

In fiscal 2013, JGC's consumption of electricity declined 5.1% compared with the previous fiscal year.

JGC is undertaking a variety of activities to achieve power savings of 15%. These activities are being implemented by the Queen's Square Yokohama Management Association at the Company's Yokohama World Operations Center in line with a ministerial ordinance for the restriction of the use of electricity, based on article 27 of the Electricity Business Act, in the wake of the Great East Japan Earthquake. Steps have been taken to replace fluorescent lighting in the upper open area of the second floor, indirect lighting in elevators, and down lights between the 23rd and 35th floors with LED bulbs. Through these

Minato Mirai 21 District



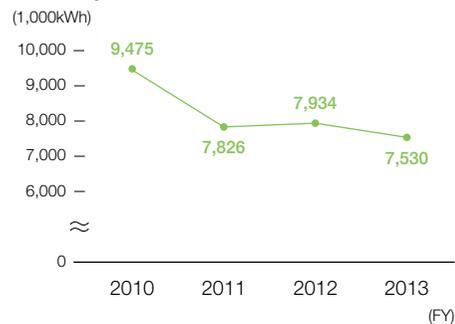
## Environmental Report on Office Activities

and other endeavors, the JGC Group is continuing with efforts aimed at reducing its electric power consumption.



A sticker calling for power-saving efforts in the use of personal computers was distributed to all employees. Moreover, new high-performance, energy-saving models have been introduced at the time personal computers are replaced.

### Electricity consumption by JGC Yokohama World Operations Center



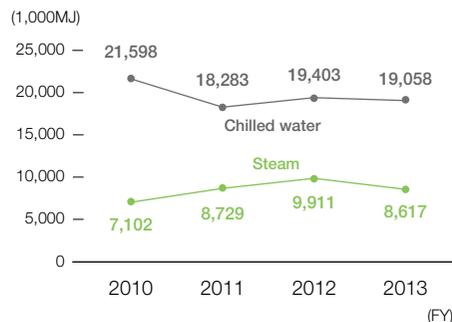
### Efforts to Reduce Heating and Cooling Consumption

For cooling and heating, the Minato Mirai 21 District adopts a District Heating and Cooling System designed for the efficient use of energy, with centralized production, provision, and management of heat, cold, and steam for necessary uses such as cooling, heating, hot water, etc. The air conditioning of the Queen's Tower A building, where JGC's Yokohama World Operations Center is located, receives all its heating and cooling through this system.

In fiscal 2013, the volume of chilled water necessary to regulate heating and cooling decreased by 1.8% year on year. While average temperatures over the period from the middle of July 2013 through to September 2013 were up compared with the corresponding period of the previous year as a result of the extraordinarily oppressive summer, this decrease was largely attributable to successful efforts aimed at holding down the consumption of water during peak periods by bringing forward air conditioning operating times. Meanwhile, the volume of steam necessary at the time of heating also declined 13.1% year on year in fiscal 2013.

This was mainly due to the renewal of high-efficiency air-conditioning automatic control equipment (IDC controller: zero energy band control), which helped to regulate the volume of steam consumption. As a result, the use of chilled water and steam for the year fell 5.6% compared with the previous fiscal year.

### Consumption of chilled water and steam by JGC Yokohama World Operations Center

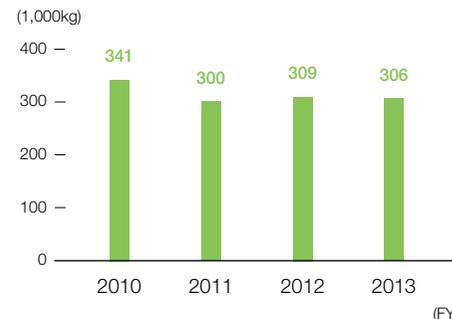


### Efforts to Reduce Energy Consumption

The JGC Yokohama World Operations Center is a Type 1 Designated Energy Management Facility under the Act on the Rational Use of Energy (Energy Saving Act), and as such, we are legally obligated to report on our volume of energy consumption (crude oil equivalent). In fiscal 2013, the volume of our energy consumption was 2,908kl, down 5.3% from 3,069kl the previous year.

\*In both fiscal 2012 and fiscal 2013, the power consumption crude oil conversion emissions coefficients as well as the chilled water and steam CO2 conversion coefficients were 9.97 and 1.36, respectively.

### Volume of waste disposal by JGC Yokohama World Operations Center



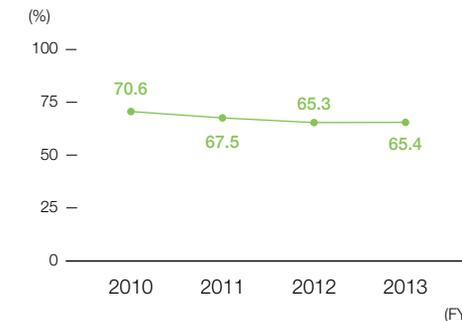
### Efforts for Resource Saving, Waste Reduction, and Recycling

In the Minato Mirai 21 District, all companies recycle used paper, bottles, and cans under a joint program to reduce waste and save resources.

In fiscal 2013, JGC's total volume of waste disposal edged down by 0.8% compared with the previous fiscal year. While certain areas of the Group were relocated as a result of organizational changes, the relevant departments had only limited amounts of unnecessary files requiring disposal.

While the volume of recycling waste emission was down, the recycling rate edged up 0.1% compared with the previous fiscal year to 65.4% in fiscal 2013, which took into account the decrease in general waste (for incineration).

### Rate of waste recycling by JGC Yokohama World Operations Center



## Using JGC's Environmental Technology to Solve Difficult Issues

# Using JGC's Environmental Technology to Solve Difficult Issues

### Promoting Medium- to Small-Scale LNG Plant Projects

As the demand for energy continues to rise globally, and the development and production of shale gas continues to advance, many observers consider that natural gas will play an important role as a comparatively environmentally-friendly energy source to bridge the gap toward a renewable-energy-based, low-carbon society. At the same time, the demand for liquefied natural gas (LNG) is expected to expand steadily in emerging countries such as China and India.

Recently, baseload LNG plants have tended to be large in scale because of investment efficiency considerations.

JGC has contributed to the construction of more than one-third of the world's LNG plants. Making full use of the technology and knowledge we have accumulated in this field, JGC has developed a design and construction concept for medium- to- small scale LNG plants where demand is expected to increase. With production on the scale of about one million tons LNG per year, emphasis is being placed on ensuring sufficient economic efficiency.

Image of a completed 1.0 MTPA LNG plant



Through the application of this design concept, JGC contributes to developing projects using as-yet undeveloped small- to medium-sized gas fields into successful LNG operations. By using this generic concept the time from front-end engineering design to plant start-up will be shortened to three and a half years, down from the corresponding six to eight years for conventional LNG project development. Furthermore, JGC has developed a Floating LNG (FLNG) standard design concept to accommodate annual production of between one million and two million tons in an effort to support offshore gas field development. In this manner, energies are being channeled toward addressing a broad range of client needs.

In addition, LNG is also gaining momentum in the U. S. and Europe as a clean fuel for the internal combustion engines of trucks and vessels, while new business models are under study, such as the LNG production of thousands to tens of thousands of tons per year from pipeline gas and its retail in LNG stations. By further developing its medium- to small-scale LNG plant concept, JGC will support the creation of this new LNG-based business chain.

#### Keywords of JGC's design concept

##### Low cost

Standardized design for reduced engineering cost

##### Short delivery

Ordering of preselected equipment and repeated orders of the same equipment reduces delivery times

##### Compact

Modularization of plant equipment for minimized construction work on site

## Using JGC's Environmental Technology to Solve Difficult Issues

### Development of an Efficient CO<sub>2</sub> Separation and Recovery Technology

JGC has developed the High Pressure Acid-gas Capture Technology (HiPACT<sup>®</sup>) process in partnership with BASF of Germany. HiPACT<sup>®</sup> is a technology for high-pressure recovery of the CO<sub>2</sub> in natural gas and synthesis gas. The technology makes it possible to greatly reduce the energy use and cost of CO<sub>2</sub> underground storage, and could help promote widespread use of Carbon Dioxide Capture and Storage (CCS).

After the completion of basic technology pilot testing at our Research and Development Center, JGC conducted demonstration testing of CO<sub>2</sub> recovery (40,000 tons per year) using actual natural gas at the carbon dioxide gas removal facility of INPEX Corporation's Koshijihara Gas Plant (Nagaoka City, Niigata Prefecture) in 2010. Now that testing has confirmed that energy reduction targets can be achieved, commercial applications are possible. Because it reduces costs and operational energy, HiPACT<sup>®</sup> could contribute to the early dissemination of CCS, which is viewed throughout the world as a promising technology for achieving large-scale reductions of CO<sub>2</sub> emissions.

Koshijihara Gas Plant of INPEX Corporation



### Development of NO<sub>x</sub> Removal Catalysts for Overseas Markets

Since introducing the world's first honey-comb-shaped flue gas denitration catalyst in 1975, the JGC Group company JGC Catalysts and Chemicals Ltd. has extended the licensing out of its production technologies not only in Japan but also to Europe, the United States, and South Korea.

Focusing on China, which in recent years has been showing remarkable economic growth, JGC Catalysts and Chemicals has contributed to preserving the environment in that country by licensing out there, too. The company has already completed the licensing out of its production technologies for DeNO<sub>x</sub> (NO<sub>x</sub> removal) catalysts for coal-fired power plants to two Chinese companies.

One of the environmental problems in China is that of garbage. Landfill remains the country's predominant method of garbage disposal, which has resulted in such problems as wildfires caused by fermentation and heat generation as well as the hygiene problems caused by insect pest outbreaks. The installation of waste incin-

erators to help solve these problems was under way last year. NO<sub>x</sub> regulations were tightened in China at the start of 2012, and waste incinerators are also subject to emission controls. However, DeNO<sub>x</sub> catalysts for waste incinerators have different design concepts to those for coal-fired power plants and, including JGC Catalysts and Chemicals' two licensees, there were no manufacturers in China capable of producing this type of catalyst. Having therefore won an order to supply catalysts for the first waste incinerator installed after China had tightened its NO<sub>x</sub> regulations, JGC Catalysts and Chemicals is aiming to steadily expand the market for these catalysts in China.

As a leading company in the global business for DeNO<sub>x</sub> catalysts, JGC Catalysts and Chemicals will aggressively develop the business overseas by initiating contact with major local companies in India, a market expected to see growth in demand for environment-related equipment alongside economic expansion.

#### Selective catalytic reduction (SCR) facility

**Note:** DeNO<sub>x</sub> catalyst is contained in the reactors visible on the right of the picture.

The volume of catalysts per reactor can reach several hundred cubic meters in total, depending on the size of the reactor.



## Using JGC's Environmental Technology to Solve Difficult Issues

### Biomass Power Generation Project Started for Greenhouse Gas Reduction

Since the Great East Japan Earthquake, dispersed electricity generation, especially from renewable energy sources, has been attracting attention. Because Japan is a heavily forested country, the efficient use of woody biomass has been a much studied topic. However, examples of commercialization have been limited, because of the challenge of efficiently collecting woody biomass, which is thinly spread over wide areas. In this context, Japan's Ministry of the Environment conducted its Challenge 25 Community Building Project (renamed Focused Support Model Project to Create Low-Carbon Communities in fiscal 2013), with the objective of expanding new energy projects including those that use woody biomass. In the Shonai region of Yamagata Prefecture, the Ministry put into operation a demonstration project that uses a woody biomass gasification cogeneration system proposed by the JGC Group company Japan NUS Co., Ltd.

By making use of the residue removed after the thinning of mountain forests, orchard prunings, and driftwood, this system ensures the efficient collection and necessary quantities of woody biomass feedstock. The aim was high commercial viability and profitability by process-

ing these woody residues into wood chips for use as feedstock in the demonstration plant, from which power and heat would be supplied to nearby PVC farm greenhouses and heat to welfare facilities. Plant installation and commissioning were completed during the first year, in fiscal 2011. From fiscal 2012 to fiscal 2013, the plant operated normally for approximately 350 days, allowing its CO<sub>2</sub> reduction effect and other benefits to be demonstrated. As a result, the generation of electric power by and the supply of heat from the demonstration plant resulted in CO<sub>2</sub> emissions being reduced by 86.69t-CO<sub>2</sub> per year. In addition, the demonstration plant's generator was a scaled-down 25kW version. A feasibility study was undertaken into operating a standard 75kW generator for around 350 days in parallel with the machine producing bio-diesel fuel (BDF) at the demonstration plant, on the assumption of a profit in selling the excess BDF used at the demonstration plant. As a result of the feasibility study, it was discovered that an investment subsidy rate of more than 28% would be needed to recover the investment in 15 years, but were the subsidy rate 50%, as is common in subsidy systems, only 12 years would be needed.

Biomass power generation demonstration plant



Introducing woodchips (fuel)



### Effective use of material from cut-down trees (woodchip paving) at a solar power plant construction site

Solar power generation projects have spread rapidly since the launch in Japan of a renewable energy buyback program in 2012.

Coastal industrial zones and idle land at landfill sites are seen as good choices for the building of solar power plants. However, as securing such sites has become more difficult following the construction boom of recent years, the trend is for the development of forest land as a candidate for new construction sites.

On the other hand, the burden of the costs needed to maintain forests and labor shortages are becoming serious problems for forest owners in depopulated areas. The construction of solar power plants is expected to be able to generate new value in property while maintaining harmony with nature.

The construction of a solar power plant requires the felling of the minimum number of trees. Although effective use can be made of some trees as a resource, tree felling forces many trees to be treated as industrial waste.

A JGC Group company, JGC Plant Innovation Co., Ltd., proposes wood chip paving as

way to effectively utilize materials from cut-down trees and has introduced the product at construction sites. Although the climate at Koshimizu, on the Sea of Okhotsk side of Hokkaido, means that snowfall is comparatively light, the winds are strong, and the soil becomes frozen to a depth of 80cm. The Koshimizu Solar Power Plant construction site displayed many typical soil characteristics and was not a realistic prospect: poor drainage because of clay; places that are almost impassable to vehicular traffic; and if the topsoil had to be improved, the solar power plant installation costs would be higher.

So, JGC Plant Innovation reused woodchip materials made from cut-down trees and spread them on the road way, which improved the poor drainage and enabled vehicular traffic. (Volume of woodchip deposited: approx. 5,000m<sup>3</sup>; estimated amount of cut timber: approx. 30,000m<sup>2</sup>)

As an EPC contractor that eyes local community issues and the effective utilization of resources, JGC Plant Innovation will continue to be actively engaged in environmental conservation activities in the years to come.

Forest development land turned over for the construction of a solar power plant.



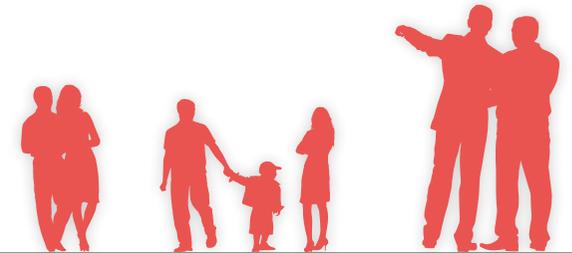
# Society

## Activities as a Corporate Citizen

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Social prosperity and the development of our business are inextricably linked. Always giving consideration to our coexistence with society, the JGC Group engages in diverse activities to fulfill our social responsibility.

### Establishing Client Satisfaction and Earnings Society's Trust, Developing Our Business through Coexistence with Society

The above words are taken from the "Principles of Business Conduct of the JGC Group," which was formulated to guide JGC on the path to being an enduring company achieving consistent innovation. Recognizing that our business development is inextricably linked with social prosperity, we always give consideration to our coexistence with society.

### The Four Priorities of Social Contribution Activities

JGC, as a professional engineering contractor, has established the following principles in an effort to contribute to the preservation of the global environment.

- 1. Environment:** To actively contribute to environmental conservation
- 2. Education:** To support the education of the next generation of qualified professionals
- 3. Science and Technology:** To support science and technology that will form the foundation of sustainable development
- 4. Community:** To contribute to the sustainable development of the areas where we do business

In this section, we cover specific examples of our education, science and technology and community activities.



## Field training Program

Since fiscal 2013, JGC has dispatched all new employees to construction sites inside and outside Japan for six months out of their first year. By having them see with their own eyes and feel the plants that JGC constructs as its final product at an early stage in their careers, the new employees gain an understanding of how engineering blueprints drawn up in Yokoyama are used in plant construction by experiencing construction in various stages. The ultimate aim is for the new employees to experience the weight of the responsibility of delivering quality plants to customers on schedule.

At overseas construction sites, there are times when people from several tens of different countries come together to work. At the work site, there is a mix of customers, vendors that supply materials and

equipment, as well as subcontractors involved in plant construction work, and they each have their own way of thinking and value systems. In this environment, JGC expects new employees to represent the company and develop the leadership and teamwork skills necessary to align everyone toward the goal of completing the plant.

Of the new employees that have participated in this training, some have said that while initially bewildered by the new environment, they felt the responsibility that they must fulfill, the teamwork built through daily face-to-face communication, and sense of accomplishment constructing a massive plant. JGC will continue to implement this training program for new employees.



When JGC introduced this system, a new employee training program, which had previously focused on classroom learning, switched to a more hands-on style. In particular, one month was spent training new employees about the work that is expected of them as an employee of JGC while deepening their knowledge of safety and technology at worksites. In addition to regular safety lectures, JGC works to raise awareness of safety among employees by holding Safety Moments every morning, where new employees tell a story about safety based on their own experiences, and through case studies of actual accidents.

For employees to increase their knowledge about plants at an early stage, employees are taught lessons where they create piping and instrumentation diagrams for an entire plant, given opportunities to operate a small-scale prototype plant, and provided with other training to ensure a smooth transition to actual worksites.

## Personnel Development and Communication with Employees

# Personnel Development and Communication with Employees

As an engineering company, JGC's sustained growth depends upon our people.

Therefore, the JGC Group focuses on personnel development and communication with our employees.

### Personnel Systems

JGC's fundamental policy for personnel systems is defined as the "autonomous development and creation of new value." In 2001, we introduced a personnel system that aimed to "enable employees to autonomously develop their professional skills, while sharing the strategic direction of the

company, and offering new value and contributions to customers and society."

Improving our systems when appropriate, we strive for the growth of the Company and of its individual employees.

### Personnel Development

#### (A) Personnel Development Initiatives

As an engineering company that does not possess assets such as production facilities, JGC's most important assets are its personnel. Each person is regarded as a professional in the engineering business, and thus we provide personnel development programs that bring out their abilities and enable them to play an active part on the world stage. The scope of the development programs ranges from all forms of engineering technology to English- and Japanese-language business skills and leadership development.

#### (B) JGC Techno College Held

In addition to the personnel development programs offered by the Company, the JGC Techno College was founded in 2001 as a place where motivated personnel can voluntarily participate in continuing education courses. Senior staff members volunteer to act as instructors at the college and organize and run the sessions, thereby helping to pass on their skills and experience to younger employees. The college also invites prominent experts from Japan and foreign countries to give lectures. In fiscal 2013, JGC held approximately 210 lectures that were attended by more than 2,200 employees.

## Personnel Development and Communication with Employees

### Personnel Diversity

#### (A) Development of Global Recruitment

Up to now, JGC has been involved in more than 20,000 projects in 80 countries across the world. To further strengthen its involvement in projects undertaken on a multinational basis, JGC is promoting diversity in terms of the nationality of its employees. The Company is enterprisingly conducting recruitment drives at universities outside Japan and employing exchange students who come to Japan.

#### (B) Giving Senior Staff Members a New Lease of Life

Under the Revised Act for Stabilization of Employment of Older Persons, the Company is implementing a re-employment system for employees aged 60 or over. In principle, all

those who wish to participate in the program are re-employed. In addition to assuming the responsibility of continuing in employment, the senior staff member elements are passing on their techniques, providing advice, and making a major contribution to the training of young engineers.

#### (C) Employment of the Disabled

Under a law promoting their employment, JGC actively works to comply with the legal ratio of employees with disabilities. Efforts are made to upgrade or improve workplace environments to cater for the type and degree of a person's disability.

Company information session for foreign students



### Efforts toward a Work-Life Balance

#### (A) JGC Family Day (Bring-Your-Child-To-Work Day)

Held annually since 2009, the JGC Family Day allows children to observe their parents' workplaces. In addition to developing children's social awareness and fostering the concept of work and occupation, the aim is for them to gain an understanding of the work family. The event is designed for employees' children in the fourth to sixth grades of primary school. In fiscal 2013, 14 children attended, exchanged handmade business cards with their parents' work colleagues, and observed work and meetings in the actual company office.

#### (B) Support for Childcare/Nursing Care

To enable employees to care for their families or children, the Company introduced a

system that includes leave of absence, time off, and reduced working hours. Since 2007, JGC has also consistently gained the Kuru-min Mark accreditation in recognition of its active support for the bringing up of children.

#### (C) Health Checks, Mental Health

The Company implements, for example, partially subsidized medical checkups, including regular health checks that are held in-house twice a year, and actively works to improve awareness of health issues among its employees. Besides requiring its managers to attend mental health workshops, interviews are conducted by industrial physicians at our on-site health management centers.

Employees and their children participating in the JGC Family Day



## Our Contributions to Society

# Our Contributions to Society

### Educating Future Engineers (Piping Layout Training Center)

To train plant piping layout engineers, who are expected to be in short supply in the years ahead, the JGC Group company, JGC Plant Innovation Co., Ltd., opened a Piping School in Morioka City, Iwate Prefecture, in April 2007.

Among other people, the school hires high school graduates from the area with an interest in industrial plants and design. After one year of intensive training in basic design techniques at the school, they refine their skills through on-the-job training (OJT) in Yokohama. By 2014, 61 students had graduated and were already accumulating experience through this OJT system.

JGC Plant Innovation established Morioka-based Plant Engineering Morioka Co., Ltd. as a piping layout training center to take on the responsibility for training from fiscal 2013.

Plant Engineering Morioka is taking charge of plant design for some portions of the projects that the JGC Group is working on worldwide. This initiative is attracting local interest within Morioka City, as a measure that is helping to provide young people with stable jobs.

General view of OJT (On-the-job training)



## Our Contributions to Society

### JGC-S Scholarship Foundation: Support for the Next Generation

Through the JGC-S Scholarship Foundation, JGC contributes to the cultivation of scientists and the advancement of science and technology in Japan and overseas. The foundation was established in March 1968 with an endowment from JGC founder Masao Saneyoshi. Its principal undertakings include the provision of educational loans to Japanese university and graduate students majoring in scientific and technical fields, grants to foreign students studying in Japan, and research funding assistance for young researchers.

As of fiscal 2013, the foundation has provided assistance to a total of 20,233 persons, through educational loans to 13,656 students and educational grants to 6,577 students (1,374 Japanese and 5,203 foreigners studying in Japan at their own expense). The foundation has also provided research funding assistance to a total of 2,118 young researchers. Annual disbursements have reached 331 million and 180 thousand yen. Having set up a special reserve for victims of the Great East Japan Earthquake following fiscal 2012, the foundation is supporting students affected by the 2011 Great East Japan Earthquake who are attending either three foundation-designated universities in the disaster-stricken areas or two other non-designated universities.

Fiscal 2013 grant students



### Science Classes for Children

With the aim of interacting with and contributing to local communities, JGC Group company JGC Catalysts and Chemicals Ltd. holds science experiment classes every year for elementary school students at its Kita-Kyushu Operation Center in Fukuoka Prefecture.

As a chemicals maker, we hope to pique the curiosity of children in science through these classes and for them to have thoughts of aiming to become researchers in the future. Every year, the classes are so popular that they are filled to their 20-student capacity a day after registration opens.

In 2013, we also held a class for around 20 students from a neighboring elementary school. There are students who attend every year, which makes topic selection difficult, but this time we demonstrated three experiments: the dilatancy effect experience, using potato starch; the  $-196^{\circ}\text{C}$  world experience, using liquid nitrogen;

and the air cannon experience. The experiments were of great interest to the children, who could not tear their eyes away as they tried to imagine how the experiments worked.

The children worked first to complete the experiments, and it was very impressive to see them having fun that used all five senses. Moreover, in the "air cannon experience," the children came up with more and more new ways to play, and you had to admire the abundance of their ideas.

JGC Catalysts and Chemicals believes that the experiments provide children with an opportunity to deepen their interests and that they sense the significance in the fun they derive from those experiments. Looking ahead, the company will maintain its strong relationships with local communities and would like to continue contributing to society.

A science experiment class with children



## Our Contributions to Society

### Contributing to Project Engineering Management Personnel Training in Singapore

Our local affiliate in Singapore, JGC Singapore PTE LTD, accepts a few college students every year through an industrial attachment (IA) placement program promoted by Nanyang Technological University (NTU), an elite national university established in 1991 by the National University of Singapore (NUS).

In fiscal 2013, during the six-month period from January to June, JGC Singapore PTE LTD's Process Engineering Division took in two students, one from NUS, and one from NTU. The two university students were provided with the opportunity of on-the-job training with top-class JGC Singapore engineers working on the front line. In addition to being exposed to expert knowledge, the students experienced the intricacies of the EPC business.

Furthermore, the Singapore Economic Development Board (EDB) launched an Engineering Services Roadshow in fiscal 2013 that targets students from both of the abovementioned universities, as part of its plans to train project engineering management personnel. Having also received a request from the EDB, JGC Singapore participated in the initiative and deepened knowledge of project engineering management through Q&A sessions with students and a stand at the roadshow.

JGC Singapore believes it is fulfilling its social responsibility as a member of the local community and would like to support the training of the personnel who will be responsible for the next generation by participating in activities such as this.

### Donation for Massive Flood Damage in Indonesia

Extensive flood damage is caused when the annual rainy season arrives in Indonesia, where PT. JGC Indonesia is based. The floods in January 2013, when Prime Minister of Japan Shinzo Abe made his first visit to the country, resulted in extensive damage that was enough to paralyze the functions of capital city Jakarta. The flood damage caused by the rainy season from early 2014 dealt a serious blow to the Indonesian economy. In the floods caused by the torrential rain in mid-January 2014, close to 40,000 people were evacuated in Jakarta alone. JGC Indonesia employees were in the same situation, as their routes to work were submerged in floodwater, and many were unable to leave for work as their homes were flooded.

Under these circumstances, employees at JGC Indonesia played a pivotal role in soliciting donations, contributing to assist those affected by the floods by raising 25 million rupiah (around 250,000 yen) for distribution via the Aksi Cepat Tanggap (ACT) fund and also donating relief supplies.

Employees at JGC Indonesia also take the initiative in other ways. For example, they make local donations to coincide with religious festivals, such as the Islamic Eid-al-Fitr (End of Ramadan), and visit and give donations to orphanages at Christmas time. In Indonesia, acts of giving to the needy are widely performed on a daily basis, and the employees and the company and would like to continue to work together to provide assistance in the years to come.

Process engineers and the IA students at JGC Singapore's Civil Engineering Division



The handover of the relief funds in Indonesia



## Our Contributions to Society

### Donation of Relief Funds for Those Affected by Typhoon Haiyan in the Philippines

On November 8, 2013, typhoon Haiyan struck the central Philippines and caused extensive damage.

To provide relief for those affected and to assist in the recovery and reconstruction of the disaster-hit areas, the Company and JGC Philippines, Inc. donated a total of 8 million pesos (approximately 18 million yen) to the GMA Kapuso Foundation established by the major Philippine TV network GMA.

In parallel to the money raised for the foundation, in-company donations were also encouraged, and nearly 1.7 million yen collected from directors, employees, and other people involved. The donation was handed over to the Embassy of the Philippines.

Particularly in respect of natural disasters in areas where it has close business links, the JGC Group would like to continue undertaking activities that assist relief operations.

The handover of the relief funds in the Philippines



### Students Tour of the Donggi-Senoro LNG Project Site

Tours of the Donggi-Senoro LNG Project in Indonesia were held for high school and university students from central Sulawesi. Started in 2012, the program has held tours on 10 occasions, in which a total of 482 students have participated.

The program has two major aims. One is to convey to local residents the reasons for the Donggi-Senoro LNG plant construction project. In the area surrounding this project are more than 50 villages of various sizes, and it is essential for the smooth running of the project that JGC builds a good relationship with the local community. The students who take part in the plant tours speak about JGC's business contribution in conversations with their families, which leads to the adults in the area gaining a better understanding.

Another aim is to provide a catalyst for all the students who take part to think about their future careers through the plant tour. In much the same way as social studies field trips are undertaken in Japan, we would appreciate it if all the students were to gain an interest in the oil and gas field from having actually experienced what it is like at the front line.

We also believe that these kinds of events, which are geared toward all young people, contribute just as much to the future of the countries in which they are held. Even if it is only one of the students who took part, it is our hope that we are encouraging a younger generation that has many high aspirations and dreams.

Students who took part in a plant tour flanked by company employees.



## Our Contributions to Society

### Barzan Project Educational Support Activities for Children at Japanese School in Qatar

The Barzan project in Qatar undertakes educational support activities for children at the Doha Japanese School. All the teachers and children from the Japanese School were invited to the site and given an overview of the project as well as a simply worded explanation of the contribution it is making to the country of Qatar. On the plant tour, in front of a huge structure the like of which cannot be see inside an ordinary school, all the children's eyes sparkled as they listened intently to our commentary.

Staff from the Barzan project had visited the Japanese School beforehand to give a lecture. They visited the Japanese School to give a pre-tour lecture to get the children, who will play a leading role in the future, interested in or developing a liking for environmental conservation.

They were provided with illustrations of the contribution being made to the environment at the Barzan project, given a simple explanation of the processes, from the familiar sorting of the garbage to the garbage being recycled, followed by a quiz devised so that the children would have fun while learning. Looking ahead, we would like to continue these educational support activities that contribute to local society.

A group photo taken during the plant tour.



A scene from the on-site lecture



### Sales of Bread Hand-Made in Facilities for the Disabled

JGC is continuing the initiative, started in January 2012, of using the lunchtime period to support sales of bread baked by physically or developmentally challenged people at facilities for the disabled in Yokohama City. The initiative supports the local community near JGC's head office and provides employees with the opportunity to make a social contribution in a simple way. Aimed at helping Yokohama residents with disabilities participate in society, this project became possible through the cooperation between the city of Yokohama, which supports efforts to address such issues as finding sales opportunities and channels for products made in these facilities, and JGC, which was considering contribution activities aimed at benefitting the area.

Vendors were selected through food tasting sessions and test sales organized by members of related divisions of JGC, and there are currently five facilities (including two facilities on alternating weeks) selling bread on four days a week on a day-by-day rotating basis.

The bread is moderately priced, tastes good, and is very popular with JGC staff.

The bread is sold at the lunchbox vending space, on the sixth floor of the JGC Yokohama World Operations Center. Workers from other nearby offices are also welcome to purchase their lunch here, as the space is open to the public (for about one hour from 11:30, on business days only).

The area where the bread is sold is crowded with employees.



## Our Contributions to Society

### Sponsorship of the “Fureai Concert-Fostering the Heart” in Yokohama City

Since fiscal 2011, JGC has been a sponsor of the Fureai Concert Series “Fostering the Heart” organized by the Board of Education of Yokohama City. This initiative comes under education and community, two of JGC’s four major CSR priorities.

The Fureai Concert Series “Fostering the Heart” has been held since fiscal 1998 for upper grade pupils of municipal elementary schools and the elementary departments of schools for the deaf and blind as well as for the physically or mentally disabled. The purpose of the concert series is to hone students’ sensibilities through music appreciation and to nurture participants’

qualities and abilities so that they try to live their lives to the full. Greatly appreciated by the children, the concert series is attended by about 33,000 pupils in total (approximately 3,300 pupils per day).

Every year, the concert series includes performances by the Kanagawa Philharmonic Orchestra and organ performances. Also acting as the master of ceremonies, the conductor provides the audience with playful, easy-to-understand explanations of the pieces performed, allowing not only children but also parents and other adult participants to develop their cultural knowledge while enjoying the music.

### Social Welfare Grants by the JGC Social Welfare Foundation

The JGC Social Welfare Foundation provides welfare equipment for persons with physical disabilities, as well as funding for support groups and volunteer organizations for senior citizens and persons with disabilities in Kanagawa Prefecture. Established in March 1994, by fiscal 2013 the foundation had made 641 contributions to support groups, 412 contributions to

volunteer organizations, and 19 contributions to other groups. In fiscal 2013, the foundation made 50 contributions to support groups, 26 contributions to volunteer organizations, and six contributions to other groups.

### Forest Conservation in the Watershed Forests of Kanagawa Prefecture

To commemorate its 80th anniversary, JGC became a watershed forest partner in Kanagawa Prefecture’s Water Source Conservation Project in August 2008 and launched an environmental conservation project that marked its fifth year in 2013. In September 2013, a donation was made to Kanagawa Prefecture and the decision taken to continue as a forest renewal partner in the project for another five years. Through the project, employees of the JGC Group assist with watershed forest conservation while deepening their understanding of the role of watershed forests and the importance of coexisting with nature.

Activities are carried out once a month, and in fiscal 2013 more than 100 employees participated in various events, including forest walking tours and aquatic wildlife observation tours,

which gave them the opportunity to enjoy occasional contact with nature in all four seasons. In September 2013, a large bus was chartered for an event that was attended by around 50 people, including the president, employees, and their families. En route, those on board the bus were given an explanation of the significance of watershed forest conservation. Upon arrival at the forest, they were divided into three groups—Tree Thinning, Craftwork, and Forest Walking Tour—under the guidance of an instructor. While exchanges between those present transcended generations and nationalities, all learned about the importance of forest conservation.

We plan to increase our ongoing efforts in environmental initiatives, for example by even introducing forest activities into new employee training.

Many employees participated along with President Koichi Kawana

