# **CHAPTER 3**

# Materiality Initiatives

This chapter presents key issues and specific initiatives of the JGC Group toward sustainability in society.

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Solar power plant (Chiba, Japan)

## **E** Societies in Harmony with Environment

Recognized Social Issues	Group Initiatives
Reducing the environmental impact of fossil energy	Construction of Fossil Energy Plants with a Lighter Environmental Footprint
Promoting use of a greater share of renewable energy	Construction of Renewable Energy Plants
Protecting ecosystems, maintaining biodiversity	Protecting rare plants and animals near construction sites
Promoting development of products and technologies that help curb global warming	Producing environmentally beneficial products in volume and pioneering environmental technology business

## **Construction of Fossil Energy Plants with a Lighter Environmental Footprint**

#### LNG Plant Construction

In view of energy demand from a growing global population, fossil fuels are expected to continue to fulfill an essential role to a certain extent over the next few decades.

Among fossil fuels, natural gas has a low volume of carbon dioxide (CO<sub>2</sub>) and nitrogen oxide (NOx) compared to coal and oil when burned, and its use is being expanded globally as a source of energy with an extremely low environmental burden that emits no sulfur oxide.

JGC possesses the technology to design and construct liquefaction equipment, the heart of LNG plants-something that few companies in the

world are able to do. Since building JGC's first LNG plant in Brunei in 1973, over a period of 50 years we have designed and constructed LNG plants responsible for over 30% of global output, responding to our clients' needs and accomplishing their projects as the leading contractor of LNG plants. Furthermore, in recent years we have been developing technology for offshore LNG plants constructing and improving the productivity of LNG plants using AI technology, and we are actively working towards creating an environmentally friendly society through our business activities.

#### Emissions of Fossil Fuel Combustion Products (relative quantities with coal as 100)



Source: IFA "Natural Gas Prospects to 2010"





## Protection of Rare Plants and Animals Near Construction Site

#### Conservation During LNG Canada Construction

The construction site of LNG Canada Project is surrounded by grand nature, which is home to a large variety of native animals and plants. We are executing this project in harmony with the environment through the implementation of various conservation activities, such as realigning a river to avoid construction activities, as well as protecting native fish and expanding their habitat.

## Mass Production of Environmentally Beneficial Products and Pioneering of Environmental Technology Business \*

#### Production of Microbead Alternatives

Recent years have seen the global emergence of problems with essentially non-biodegradable microbead pollution in the ocean. Cosmetics manufacturers are now using less of the plastic beads, spurred in part by an EU policy introduced in early 2019 to phase out this material as an additive in various products.

As an alternative to plastic microbeads on a scale of hundreds of microns, which are used in cosmetics such as foundation, lipstick, emulsion, and sunscreen as well as abrasive products including face scrubs and toothpaste, JGC Group develops and sells beads of silicon dioxide (silica), an abundant natural resource that makes up nearly 60% of the Earth's crust. Silica is a naturally circulating, sustainable mineral component. Hydrophilic

### Volume Production of High Thermal Conductivity Substrates for EV/HEV Power Semiconductors

Amid growing needs for energy-efficient electric and hybrid vehicles, highspeed railways, and industrial equipment supporting a low-carbon society, it is essential to improve the performance of power modules that control the power of various equipment. Semiconductor substrates in particular are central in power modules, and as vehicle performance has improved in recent years, needs have emerged to develop robust components that do not break even under large currents.

By employing silicon nitride, a highly heat-resistant compound used in applications such as ball bearings, JGC Group has succeeded in developing silicon nitride ceramics with the world's highest thermal conductivity. Substrates made with the material withstand current 10 times higher than usual, which in conjunction with structural refinements that dissipate heat well can improve motor operating efficiency.

Slated for operation in 2020, a plant to produce silicon nitride ceramic substrates in volume is now under construction.

\*\* Please go to "Accelerating Commercialization of Environmental Technologies" (p.31-32) for initiatives in pioneering of environmental technology business





Conceptional drawing of the plant at completion

silica dissolves in water and is incorporated into phytoplankton and other organisms.





Silicon dioxide

Non-biodegradable plastic microbeads



High thermal conductivity silicon nitride substrate

Recognized Social Issues	Group Initiatives
Contributing to economic and industrial development in emerging markets	Construction of plants and facilities in emerging markets
Creating employment in emerging markets	Promoting procurement in emerging markets
Supporting technology transfer and human resource development in emerging markets	Training and educating engineers in emerging markets

## **Construction of Plants and Facilities in Emerging Markets**

## Contributing to Development in Algeria

Algeria boasts abundant resources, including crude oil and natural gas, and here, resource exploitation and exportation is the key industry. This business supports the country's economic and industrial development. Starting in 1969 when JGC Group was awarded Arzew Refinery construction by state-owned oil company Sonatrach, the Group has contributed to national development through construction of a variety of energy plants that have formed a cornerstone of industry for nearly 50 years.

Besides creating many jobs for construction workers, this plant construction also contributes to overall plant industry growth, which is driven by our proactive stance on procurement from domestic material and equipment makers



Arzew Refinery (completed in 1973)

## **Training and Educating Engineers in Emerging Markets**

## Promoting Domestic Procurement for Construction Sites

By actively promoting domestic procurement where plants are built, JGC Group contributes to the development of plant industries as a whole, including material and equipment manufacturing. Technology transfer is also supported. When JGC Group orders equipment that is difficult to manufacture, we dispatch our engineers to provide technical assistance tailored to local expertise and facilities, which helps build proficiency in new technologies.

Training for welders (Malaysia)



## **S** Human Rights, **Employee Motivation**

Recognized Social Issues	
Promoting workplace diversity	Pr
Promoting female hiring and strengthening skill-building	Ex
Respecting human rights in all business activities	Er

## Promotion of Measures that Encourage Workplace Diversity

## Measures Respecting Diversity: Women, People with Disabilities, Seniors, Global Personnel, and Others

Fair personnel management that emphasizes human rights is fundamental to JGC Group. This fairness is reflected in recruitment practices and personnel systems. Diversity and inclusion are also promoted from a belief that respecting diverse lifestyles, motivating all employees, and fostering workplaces where everyone can reach their full potential as dynamic professionals is vital to creating a broad range of value and driving sustained growth.

### System and Policies for Accomplishing Diversity

JGC Group has created a supportive environment. for example through an expansion of our family

**People with Disabilities** JGC Group strives to strictly observe the employment ratio designated by the Act for Promotion of Employment of Persons with Disabilities and provides appropriate workplace

environments

## **Promotion of Women's Careers**

In the energy plant business, technicians from science and technology Number and Ratio of Women in Management Positions<sup>\*</sup> backgrounds, few of them women, previously comprised the majority of Number of women in - - Ratio of management position (persons) 9.0% company staff, and due to factors such as carrying out construction work among total female employees 8.0% 7.4% under harsh environmental conditions or a multitude of projects in Islamic 6.8% 64% countries, the field was characterized by obstacles to women's careers. 5.0% 15 However, at JGC Group we have been advancing the promotion of women to leadership positions and the creation of a supportive work environment for women through, e.g. discussions with female employees and expansion of our family care system, including working from home, and in recent years the 2014 2019 (ter 2015 2016 2017 2018 number of female employees and managers has been steadily increasing. \* Applies to employees of the former JGC Corp., before adoption of a holding company structure on October 1, 2019

## System for Athletes with Disabilities

Para Taekwondo

A system supporting athletes with disabilities who are also competitive athletes was introduced in 2018. Through work style flexibility and management by objectives, JGC Group supports athletes with disabilities who are balancing a career with athletic endeavors as they pursue their dreams.

### lete with a disability who is also a talented athlete



Materiality Initiatives

Related SDGs »



#### **Group Initiatives**

romoting measures that encourage workplace diversity

panding the personnel system accounting for opportunities and skill-building for women

nsuring thorough respect for human rights, including in supply chains

#### Seniors

By raising the retirement age to 65, we support the work of seniors at the frontlines and promote the internal transfer of expertise

#### **Global Human Resources**

Promotion of recruitment and training of nulticultural human resources able to work globally



Works in HR management in the Talent & Organization Development Department. Started Para Taekwondo in 2017, taking advantage of stamina and leg strength from playing soccer since elementary school. Awarded a silver medal at the Asian Para Taekwondo championships in May 2018.

# **S** Energy Access



Recognized Social Issues	Group Initiatives			
Meeting greater global energy demand	Construction of various types of energy plants in regions worldwide			
Promoting wider use of renewable energy that contributes to sustained growth	Promoting wider use of renewable energy			
Enhancing productivity through greater global energy efficiency	Making energy plants more efficient and reducing energy consumption			

## **Construction of Renewable Energy Plants**

## Solar Power Plant Construction in Vietnam

To meet rising energy demand from the country's growing population while protecting the environment, Vietnam is promoting expanded use of renewable energy. In 2018 the Group was awarded construction of three large-scale solar power plants here. Each was completed successfully, applying ample experience from some of Japan's largest solar installations. In generation capacity, our record of solar plant construction in Vietnam has reached nearly 190 megawatts (DC), which provides power equivalent to the annual consumption of about 130,000 households.



Solar power plant for Gia Lai Electricity Joint Stock Company

## Making Energy Plants More Efficient, Reducing Energy Consumption

## Measures to Improve LNG Plant Productivity

Many LNG plants built since the 1980s have air cooling that releases waste heat from heat exchangers into the atmosphere. However, in some, hot air from heat exchangers is drawn back into the intake. Plants affected by this hot air recirculation (HAR) have lower cooling capacity, which poses problems in lower productivity. The Group has developed Airlize LNG<sup>®</sup> services that can control airflow and enable optimal plant design, construction, and equipment layout to minimize the impact of HAR. Some 10 sites have already benefited from these services.

#### Hot Air Recirculation Recirculation of hot exhaust air between trains Hot exhaust air Hot exhaust air 1 1 1 1 **1** -----------1 1 1 1 1 Air-cooled Air drawn in Air drawn in heat exchanger Hot exhaust air is drawn back into trains LNG plant LNG plant



# **S** Quality of Life

Recognized Social Issues	
Responding to aging social and industrial infrastructure	C
Promoting development of social and industrial infrastructure in emerging markets	C
Improving global medical standards	C
Making life more convenient and comfortable	D

## **Construction of Pharmaceutical Plants**

Construction of Pharmaceutical Plants Equipped with Advanced Technologies

For nearly half a century JGC Group has been involved in pharmaceutical plant construction in Japan and elsewhere. This record has surpassed 600 projects. Development of biopharmaceuticals and other groundbreaking advanced medicine continues amid rapid progress in sophisticated treatment such as gene therapy and regenerative medicine. Meanwhile, needs for streamlined production – manufacturing with fewer workers, for example – are growing.

To keep pace with great technological progress in medicine, JGC Group engages in construction of advanced pharmaceutical plants, which includes developing unattended production lines automated with robots.

### Automating Steps in Tablet Production with Robots



## Development and Production of Functional Materials for Electronics, Everyday Products, and More

## Supplying Parts for Advanced Medical Devices

Medical devices must be highly safe and reliable to fulfill their vital roles. The array of ceramics supplied by JGC Group are used in advanced medical devices including blood pumps, orthodontics, endoscope components, and ventricular assist devices, where they fulfill supportive roles in many lives.



#### **Group Initiatives**

- Conducting maintenance business for social and industrial infrastructure
- Construction of various infrastructure facilities in Southeast Asia
- Construction of pharmaceutical plants and medical facilities
- Development and production of functional materials for electronics, everyday products, and more



Pharmaceutical plant for Tamura Pharmaceutical Co., Ltd.



## S **Ensuring Occupational Health and Safety**

#### **Basic Stance**

In accordance with group policy on health and safety and basic HSSE\* guidelines, and under the leadership of senior management, JGC Group is committed to preventing worksite and traffic accidents

\* HSSE: Health. Safety. Security and Environment

## **HSSE Organization**

Following the adoption of a holding company structure in October 2019, the JHD HSSE Committee was established in the holding company as the highest authority to plan and coordinate HSSE matters for JGC Group as a whole. The Committee deliberates on and determines basic Group HSSE matters, establishes, maintains, and manages the HSSE management system, helps develop and maintain HSSE action plans, and oversees and manages measures to implement the plans. Results are regularly reported by the Committee to senior management.



involving our own employees and those of partner companies. These

practices are also appreciated by clients, and JGC Group will continue

to maintain a rigorous approach to safety.

## **Overview of Fiscal 2019 Activities**

In fiscal 2019, domestic and overseas construction sites were kept aware of HSSE matters. For office workers as well, safety training was visual, auditory, and virtual. VR experiences also simulated accidental falls with vibration and wind pressure. In this way, opportunities for all employees to learn about basic safety were provided. As a result, Group companies around the world maintained an outstanding safety record compared to competitors.



Safety training using VR

## **Response to Covid-19**

In response to the state of emergency declared in Japan on April 7, 2020 as the Covid-19 pandemic spread, JGC Group adopted teleworking and generally requested employees at the main office in Yokohama to refrain from commuting. Even after the emergency was lifted on May 25, commuting has been combined with teleworking, among other steps to help contain the virus. As similar measures at active construction sites, work proceeded with the utmost attention to preventing infection and maintaining safety for employees and others alike.

## **ESG Data Highlights**

This table introduces our initiatives related to the environment, society, and governance (ESG) and our key performance indicators (KPI).

	JGC's main KPI	Units	Fiscal 2015	Fiscal 2016	Fiscal 2017	Fiscal 2018	Fiscal 2019
E Report on Environmental Initiativ	es						
Environment-related Initiatives • Contribution to environmental protection • Environmental Improvement Activities in Line with Our Business • Promotion of the Zero Emissions Initiative	Industrial waste recycling rate (Domestic construction sites)	%	96.3	98.1	97.7	96.1	85.2
	Number of incidents of leaks of hazardous substances, etc. (Domestic and overseas construction sites)	Incidents	0	0	1	0	0
	Energy-related CO <sup>2</sup> emissions (Domestic construction sites)	kgCO <sup>2</sup> /hr	0.64	1.43	3.52	2.39	0.61
	Rate of diffusion of electronic manifests	%	79.4	96.0	64.2	79.5	69.5
	Energy consumption (Yokohama Head Office) *2	Crude oil equivalent (kl)	2,579	2,405	2,248	2,224	2,139
	Yokohama Head Office power consumption	1,000 kWh	6,720	5,974	5,571	5,497	5,221
	Consumption of chilled water by Yokohama Head Office	1,000 MJ	16,195	15,857	14,071	15,353	15,503
	Consumption of steam by Yokohama Head Office	1,000 MJ	8,021	8,886	9,153	7,724	7,170
	Volume of waste disposal by Yokohama Head Office	1,000 kg	224	209	212	206	191
	Rate of recycling of waste by Yokohama Head Office	%	66.6	64.9	65.7	61.4	59.5
S Report on Social Initiatives							
	Number of women in management positions	Persons	15	17	19	21	24
	Rate of employment of people with disabilities	%	1.75	1.81	1.82	1.87	1.97
	Number of re-employed employees"3	Persons	208	189	159	109	55
	Number of non-Japanese employees "3	Persons	97	94	100	89	86
	Number of employees taking childcare leave (Male)	Persons	1	2	8	11	14
	Number of female employees taking childcare leave (Rate of reinstatement of female employees taking childcare leave)	Persons(%)	29(100)	27(96)	24(100)	24(100)	19(100)
nitiatives related to human rights and labor	Number of employees taking spousal childbirth leave	Persons	72	81	81	64	80
Promotion of diversity	Number of employees taking sick or injured childcare leave	Persons	125	115	123	185	187
<ul> <li>Support for realization of work-life balance</li> <li>Support for employee career formation</li> </ul>	Number of employees taking nursing care leave	Persons	4	8	20	22	11
	Number of employees taking temporary retirement for nursing care	Persons	2	2	1	0	0
	Number of employees working reduced hours for childcare	Persons	37	44	42	51	47
	Number of employees working reduced hours for nursing care	Persons	1	1	2	0	0
	Rate of utilization of annual leave	%	53	53	57	53	59
	Number of employees dispatched for onsite training/ onsite instruction	Persons	98	62	72	86	45
	Number of employees dispatched to overseas companies, etc.	Persons	2	5	5	2	4
nitiatives related to health and safety	Total project working hours	1,000 hrs.	185,433	128,036	81,072	90,993	56,478
<ul> <li>Fostering of culture of health and safety</li> <li>HSSE leadership by top management</li> </ul>	Number of fatal accidents	Accidents	0	3	2	0	0
Enhancement of HSSE management system for investment projects	Number of accidents accompanied by lost work time	Accidents	14	8	9	8	7
Ongoing implementation of traffic safety	Number of restrictions on work	Restrictions	37	25	6	11	18
Purther development of in-house health	Number of conditions requiring specialized treatment	Conditions	99	65	41	31	46
and safety education Phancement of Head Office construction	Rate of frequency of accidents accompanied by lost work time"4		0.015	0.012	0.022	0.018	0.025
HSSE functions	Rate of frequency of recordable accidents '5		0.16	0.16	0.14	0.11	0.25
G Report on Governance							
nitiatives related to fair business practices • Realization of increased compliance awareness	Number of times compliance training implemented/number of employees receiving compliance training	Times (People)	18(600)	12(373)	13(353)	6(199)	21(559)
Number of reports received by hotlines		Numbers	5	12	18	28	47
nitiatives related to the promotion of nformation security Information management awareness verification surveys and voluntary inspections Drills against targeted threats	Number of serious information security-related incidents	Incidents	0	0	0	0	1 <sup>(*6)</sup>
Reinforcement of governance system	Number of outside directors	Persons	1	2	2	2	3
Internet of governance system		1 0130113	I	۷.	2	۷	3

\*1 Data for Fiscal 2019 applies to the scope of business covered by the former JGC Corp., before adoption of a holding company structure on October 1, 2019. \*2 Eneroy consumption (Yokohama Head Office): Taroets for fiscal 2015 and fiscal 2016 have been set as an average annual reduction of 1%, with 2013 as the base year. \*3 Number of re-employed employees and number of non-Japanese employees = (Number of employees in April + Number of employees in April + State of frequency of accidents accompanied by lost work time × 200,000 ÷ Total project working hours \*5 Pate of frequency of recordable accidents = (Number of fatal accidents + Number of accidents accompanied by lost work time + Number of restrictions on work + Number of conditions requiring specialized treatment) × 200,000 ÷ Total project working hours \*6 Number of serious information security-related incidents: 1 (Emails sent to external parties due to unauthorized access)Corrective measures for the above incident: introduction of measures to prevent unauthorized access through two-factor authentication