In the 90 years since its establishment in 1928, the JGC Group has played an important role in providing solutions to a wide range of social and industrial needs, not only in Japan but in areas around the world. These businesses include total engineering, consisting mainly of the engineering, procurement, construction and maintenance services of plants and facilities for oil & gas and infrastructure industries, and the manufacturing of catalysts, fine chemicals, and fine ceramics, as well as environmental and energy consulting. Especially notable is its success in carrying out more than 20,000 projects in 80 countries, which has established its reputation as one of the premier engineering contractors in the world.

As the world moves toward the realization of a sustainable society through means such as decarbonization, the demand for improved levels of sustainability and the greater sophistication of the advances required is rising. The JGC Group is transforming itself into a corporate group that deepens its existing business and explores new fields simultaneously, and continues to tackle the tasks that are necessary to promote the creation of a more sustainable world in terms of the environment as well as enabling social and economic progress.
The JGC Group comprises the holding company, JGC Holdings Corporation, and more than 80 member companies worldwide. The Group is engaged in a wide range of businesses including, principally, general plant engineering, functional materials manufacturing, and energy and environmental consulting.

In the fields of oil and gas and infrastructure, JGC Group activities call for the engineering, procurement, construction and maintenance of plants and facilities. General engineering overseas is carried out by JGC Corporation, while domestic projects are the responsibility of JGC Japan Corporation.

In the area of functional materials, JGC Catalysts and Chemicals Co., Ltd. manufactures catalysts and fine chemicals, while Japan Fine Ceramics Co., Ltd. conducts the development, manufacture and sale of its products. In addition, Japan NUS Co., Ltd. is focused on consulting in the energy and environmental sectors.

### Outline of the JGC Group

JGC HOLDINGS CORPORATION

**Business Areas**

- Total Engineering Business
  - Overseas Oil & Gas
  - Overseas Infrastructure
  - Domestic EPC & Maintenance

- Functional Materials Manufacturing Business
  - Catalysts / Fine Chemicals
  - Fine Ceramics

- Consulting Business
  - Energy and Environment Consulting

**Main Operating Companies**

- **JGC CORPORATION**
  - Oil & Gas Project Company
  - Infrastructure Project Company

- **JGC JAPAN CORPORATION**

- **JGC Catalysts and Chemicals Ltd.**

- **Japan Fine Ceramics Co., Ltd.**

- **Japan NUS Co., Ltd.**

Plus 82 other companies.
In the oil and gas upstream fields, JGC Group implements numerous projects and has extensive experience with oil and gas gathering facilities, separation plants, pressure boosting facilities, and other facilities in the Middle East, North Africa, and Southeast Asia.

Additionally, it participates aggressively from the planning stage in resource development projects by the major oil firms and national oil companies of oil and gas producing nations. The company contributes to maximizing the investment effect and rapid realization of development plans by developing comprehensive proposals that extend from support for development planning to plant construction through to operation and maintenance.

World-Leading Performance in Executing Large-Scale Projects

Increasingly large and complex plant construction projects. By applying its high-quality engineering and outstanding project management skills, the goal of JGC Corporation is to meet clients’ needs in terms of quality, cost and delivery.

Furthermore, the company anticipates client requirements throughout project execution, adopting greater technical digitalization.
The demand for oil is likely to further increase globally as a transportation fuel and petrochemical raw material amid rapid economic advances by emerging countries. The JGC Group is capable of promptly responding to changes in petroleum refining by drawing on its extensive experience of construction petroleum refining plants worldwide. It also has substantial accumulated experience in the execution of refinery modernization projects involving heavy-oil cracking facilities such as FCCs (Fluid Catalytic Cracking) and hydro-crackers, as well as greenfield and brownfield projects for sulfur-free gasoline and diesel fuel against a backdrop of stricter environmental regulations worldwide.

The JGC Group has designed and built liquefied natural gas (LNG) plants accounting for over 30% of the world’s current total LNG production volume. As a leading LNG plant contractor, it has helped clients succeed in projects by meeting their needs. It expects growing demand, mainly in Asia, for LNG, which places less burden on the environment and can be consumed in locations far from the production site. In response to this increased demand, plans for the exploitation of LNG resources in the polar regions that were previously considered too difficult to access, as well as the development of smaller gas fields, are being explored. The company is striving to accumulate a variety of technologies that can increase LNG extraction, such as the utilization of modular construction for facilities, the installation of Hot Air Recirculation (HAR) prediction systems, and the practical use of FLNG.

The JGC Group has accumulated extensive experience in the wide range of fields that extends from petrochemical raw materials to related derivatives, such as ethylene, polyethylene, aromatics and others. For gas chemicals, a field with growing capital investment in recent years due to advances in shale gas development, the company has handled large projects in the Middle East and the United States, including downstream chemical plants mainly for large-scale ethane crackers. It also collaborates with its overseas EPC group companies to provide effective support for overseas initiatives by Japan’s chemicals industry.

The consumption of natural gas, which has the lowest CO₂ emissions per unit of heating value among fossil fuels and allows for stable wide-area supply over pipeline networks, is significantly growing worldwide due to the expansion of electricity demand driven by economic advances in emerging countries. Additionally, natural gas usage is likely to further expand thanks to advances in shale gas development, mainly in North America.

The JGC Group implements construction projects for large-scale gas processing plants throughout the world, leveraging its outstanding engineering technology and project management capabilities. Its activities are supporting the global expansion of natural gas usage.

The JGC Group has designed and built liquefied natural gas (LNG) plants accounting for over 30% of the world’s current total LNG production volume. As a leading LNG plant contractor, it has helped clients succeed in projects by meeting their needs. It expects growing demand, mainly in Asia, for LNG, which places less burden on the environment and can be consumed in locations far from the production site. In response to this increased demand, plans for the exploitation of LNG resources in the polar regions that were previously considered too difficult to access, as well as the development of smaller gas fields, are being explored. The company is striving to accumulate a variety of technologies that can increase LNG extraction, such as the utilization of modular construction for facilities, the installation of Hot Air Recirculation (HAR) prediction systems, and the practical use of FLNG.

The JGC Group has accumulated extensive experience in the wide range of fields that extends from petrochemical raw materials to related derivatives, such as ethylene, polyethylene, aromatics and others. For gas chemicals, a field with growing capital investment in recent years due to advances in shale gas development, the company has handled large projects in the Middle East and the United States, including downstream chemical plants mainly for large-scale ethane crackers. It also collaborates with its overseas EPC group companies to provide effective support for overseas initiatives by Japan’s chemicals industry.

The consumption of natural gas, which has the lowest CO₂ emissions per unit of heating value among fossil fuels and allows for stable wide-area supply over pipeline networks, is significantly growing worldwide due to the expansion of electricity demand driven by economic advances in emerging countries. Additionally, natural gas usage is likely to further expand thanks to advances in shale gas development, mainly in North America.

The JGC Group implements construction projects for large-scale gas processing plants throughout the world, leveraging its outstanding engineering technology and project management capabilities. Its activities are supporting the global expansion of natural gas usage.
Infrastructure

Overseas Infrastructure Business

JGC CORPORATION

Infrastructure Project Company

Attractive Proposals for Infrastructure Facilities in Asia

With the rapid population and economic growth in Asia and other regions, we are advancing plans to respond to the urgent demand for a wide range of infrastructure developments in accordance with the environmental and other characteristics of each region in the areas of power generation through renewable energy sources, healthcare facilities, transportation facilities, among others.

Renewable Energy

- Mega Solar Power Generation
- Biomass Power Generation
- Wind Power Generation
- Waste to Energy

In the rapidly developing countries of Southeast Asia and elsewhere, amid economic growth, expanding populations and increased urbanization, the requirement for infrastructure facilities and institutions that balance the need for environmental protection and economic rationality is rapidly increasing. With extensive experience in the construction of various types of power generation facilities, the JGC Group applies its technologies and expertise accumulated through a wide variety of renewable energy plants using solar power or biomass to off-shore wind power and other forms of renewable energy including waste materials. The company analyzes the needs in individual areas and plans and constructs the facility or system that will respond to those needs while making our utmost efforts to help preserve the environment.
Against a background of aging populations and advances in medical services, there is an increasing demand for advanced medical services around the world. During the past 30 years, the JGC Group has undertaken the construction of 250 medical centers including hospitals and other facilities within Japan, bringing extensive experience in this field. As the leading contractor in the field of LNG, the JGC Group has not only been responsible for the construction of LNG plants in many areas of the world but has also carried out the construction of LNG receiving facilities within Japan. In recent years, in addition to rapid population growth in Asia and certain other countries and the consequent increased demand for electrical power, greater urbanization has been seen with the result that there has been a proliferation of LNG/LPG receiving facilities planning. Leveraging its position in the field of LNG, the JGC Group is providing support for the realization of these plans, especially in Southeast Asia.

The JGC Group undertakes non-ferrous metal refining plant construction projects based on its broad engineering technologies acquired through the design and construction of chemical plants, nuclear-related facilities and other facilities. In particular, it possesses global top-class technology expertise and experience in designing and building plants for “wet smelting” which is of central interest because it addresses the problems posed by the need to exploit lower-rank ore deposits, increased sulfur and other impurities in ores, and overall efforts to reduce the environmental burden resulting from processing these ores. Securing non-ferrous metals, such as copper, nickel, and rare metals, is growing in importance worldwide amid robust demand from emerging countries. The company contributes to the expansion of non-ferrous metal supply by offering integrated services for non-ferrous metal refining plant construction projects that extend from business feasibility surveys to design, construction, and test operation assistance.

With population growth and higher living standards in Asia, the demand for biomedicines and other pharmaceutical products to support advanced medical care has increased. Utilizing its GMP technology making it a leader in pharmaceutical engineering in Japan, the JGC Group contributes to creating facilities for the manufacture of new drugs in advanced medical treatment together with pharmaceutical plants for the effective production of generic pharmaceuticals on a large scale. The wave of airport privatization that started in Europe in the 1990s has spread to countries around the world. The JGC Group’s focus is on airport construction projects that can benefit from the application of excellent project management capabilities.
Japan is said to be among the first countries in the world to face the multi-faceted problems of population decline, a falling birthrate and an aging population. As well as in the plant construction and maintenance field, the company offers solutions for the complex social and industrial issues facing the country.

Providing Solutions for a Developed Nation

While the JGC Group has been responsible for the construction of numerous oil and gas plants and facilities in many parts of the world, it has also supported the economic growth of Japan by carrying out a large number of petroleum refining, petrochemical, chemical and LNG receiving terminal projects domestically. The JGC Group supports the profitability and investment planning of its clients by executing work to improve the efficiency of existing refineries and petrochemical complexes and by building new facilities to produce specialty chemicals and other value-added products.

Efficient operation and maintenance to ensure plant integrity is an important factor for plant owners. The JGC Group offers efficient plant maintenance to plant owners by supplying maintenance services. We are also developing means of predicting operational trouble through the analysis of operating data and other big data. The JGC Group delivers services that lift business value for plant owners.
Electricity demand is steadily expanding, mainly in emerging countries, amid rapid population increases and rising standards of living. The JGC Group, which has construction experience for power facilities with diverse energy sources and formats, helps meet the growth in global electricity demand through the realization of power facilities for regional needs.

Fossil Fuels
The JGC Group handles fossil fuel power plant construction projects for oil, coal, natural gas and other energy sources in Japan and other countries. It is also the first company worldwide to offer both design and construction of integrated gasification combined cycle (IGCC) plants fueled by residual oil requiring advanced technology capabilities. It is aggressively promoting the development and use of new power-producing technologies, such as a system that runs on boil-off gas (BOG) from tanks at LNG receiving terminals.

Renewable Energy
The JGC Group provides power facilities utilizing a wide range of renewable energies, including solar and biomass, in addressing global warming, the most important present-day environmental issue. It builds renewable energy power facilities that accommodate circumstances in various regions by leveraging its broad range of accumulated engineering technologies.

Nuclear Energy
Nuclear power occupies an important position globally as an electricity source alongside oil, natural gas and coal. The JGC Group has handled numerous projects calling for the design and construction of facilities for the treatment and disposal of radioactive waste as well as for spent nuclear fuel reprocessing in Japan.

Pharmaceuticals and R&D Facilities
The development of bio-pharmaceuticals and other medical products for advanced medicine is steadily progressing amid rapid progress in gene therapy, regenerative medicine and other medical fields. Capital investment in the production of generics medicines is also growing as part of efforts to curtail increases in medical costs.

Healthcare
Due to the aging of Japan’s population and the need to reform the health care system, there exists an urgent requirement for new hospitals and other care facilities. The JGC Group has an impressive track record in the design and construction of highest standard hospitals and other care facilities in Japan, applying its accumulated engineering skills and expertise.
The JGC Group delivers top-quality plants and facilities while maintaining defined budgets and project schedules. As an engineering contractor, the company views project management as its core skill. It forecasts and analyzes various risks inherent in projects and formulates optimal project implementation plans. The JGC Group is a leader among global contractors in seamless project implementation capabilities, notably lump-sum turnkey projects.

First-class project execution capabilities

1

The JGC Group leverages its expertise in design technologies, including process technology, in its engineering work for plants and facilities. It factors in both plant construction costs (CAPEX) and plant operating costs (OPEX). The company’s approach to technology is not limited to the proactive utilization of the IoT and other advanced technologies; it also includes environmental efforts such as reducing the burden of fossil fuel energy and promoting wider use of renewable energy.

Advanced Technologies for Maximum Returns

2

Top Priority on Safety

3

Completing accident and injury free projects for our clients. The JGC Group’s attitude toward the importance of safety is evidenced not only in the procedures adopted for every aspect of design and on-site work to ensure the safety of construction and operation but also through the implementation of programs to foster safety awareness among all participants in the project and this combination has gained us a top-class reputation for safety among engineering enterprises.

Highly-Driven Human Resources for Excellent Leadership and Goal Completion

4

Talented professionals are headed by excellent managers who provide leadership and controls over a project staff that might at times reach as many as tens of thousands of people. Project managers devise and resolutely implement optimal response measures for issues that occur at all phases of projects and move projects forward to successful completion.

Reducing Environmental Burden

5

The JGC Group is committed to addressing environmental protection on a worldwide basis. It pursues energy-saving in plant operations and possesses global-leading technology for underground CO2 storage. Furthermore, it focuses on wider use and promotion of renewable energy and has extensive accumulated experience.
Responding to World Need for Advanced Materials

As well as catalysts for oil refining, petrochemical and environmental plants, we meet the needs of our clients and contribute to improvements in people’s lives through the development, manufacture and sale of fine ceramic products made possible through the heat and corrosion resistance and highly rigid fine materials adopting the company’s nanotechnology.

With the aim of tackling issues associated with energy resources and the environment, the JGC Group supplies a wide variety of catalysts (for oil refining, chemicals, environmental protection, etc.) Adopting its advanced technologies, the JGC Group has the top share of the domestic market for fluid catalytic cracking catalysts (FCC) and flue gas denitrification catalysts contributing to an environmentally friendly society.

Based on its experience with nanoparticles and their control gained through its manufacture of catalysts, the company produces a range of fine chemicals used in familiar products. Especially, the low refractive silica particles used as a low reflective film for high-definition displays, the high refractive index silica particles used to make the coating for high-grade thin spectacles lenses, environmentally friendly cosmetic materials, and other materials the company contributes to modern life.
New-material fine ceramics offer almost limitless opportunities. The JGC Group is actively engaged in technology development, application development as well as the manufacturing and sales of electronic ceramics, engineering ceramics and advanced metal matrix composites (MMC), meeting the diverse requirements of a variety of advanced industries with our unique technologies.

**Strengths in Catalysts and Fine Chemicals**

**Ultra-Fine Particle Technology**

1. The JGC Group is devoted to the manufacture of the “Only One” material through application of its nanoparticle preparation technology. The company is the top supplier of fluid catalytic cracking (FCC) catalysts used for crude oil treatment, and for fine chemical products such as antireflective coating material for flat-panel televisions, cosmetic materials and other high-value-added fine products based on our nanoparticle control technology.

**Strength in Fine Ceramics**

**Ceramics Manufacturing Technology**

2. With their heat, corrosion and wear resistance, engineering ceramics are used for semiconductor manufacturing equipment. Metal composite ceramic material characterized by light weight, low thermal expansion and vibration damping qualities were used in the production of the asteroid probe, “Hayabusa2”, reflecting the high evaluation of products by clients in terms of both performance and cost.
Consulting
Energy and Environment Consulting Services

JAPAN NUS CO., LTD.

Supporting the Realization of a Sustainable Society
By combining optimal methods from among a wide range of means including surveys, analysis and evaluations, simulations and risk assessment, we provide technological consulting services for a wide range of themes in the fields of energy and the environment.

Energy and Environment Consulting

JAPAN NUS CO., LTD. develops consulting projects targeting extensive areas including information research, field research, analysis and evaluation, reliability and risk assessment, numerical simulations and policy support, with a focus on the environment and energy fields.

Environment
JAPAN NUS brings extensive experience and reliable technology to a broad range of consulting services in identifying solutions to the problems brought on by global warming, pollution of the sea and other diverse global environmental issues both in Japan and overseas. With an understanding of the natural environment and the current state of the social environment together with making predictions regarding environmental impacts, the company proposes and implements measures to maintain, manage and improve the environment, contributing to an environmentally friendly society.

Energy & Resources
The company applies its abundant experience and proven technologies gained in the field of energy, combined with extensive consulting capabilities, in working on the issues faced in the realm of energy and resources. In the field of nuclear power generation in particular, the company has a proven track record in diverse areas including analysis and evaluation of safety and simulations. Further, the company provides its consulting services for the challenges impacting energy resources such as oil, gas and minerals as well as renewable energy sources.

Social Science
JAPAN NUS brings its knowledge and experience to the areas of risk communication, public participation and science/technology communication, thereby contributing to fostering communication within society on a range of matters. In addition, using knowledge and experience of the economic factors of electric power supply liberalization and CO2 reduction, the company contributes to finding solutions for the problems that arise.

A Wide Range of Consulting Services Concerning Energy and the Environment
1. In the field of energy, for example, the JGC has created the largest database in Japan on a range of themes, especially those dealing with nuclear power generation. In the environmental field, the company examines the effects of waste disposal, hazardous chemical substances and radioactive materials on the sea, the land, the atmosphere and living organisms and, on a world-wide scale, the influence on the environment of phenomena associated with climate change.

Optimal Approach for Each Issue
2. The JGC Group proposes the best solutions for each situation by combining the optimal methods selected from among a wide variety of means such as surveys, analysis/evaluation, simulation, system development, risk communication, policy support, administrative and local community relations.

Handling Cross-Discipline Themes and Specialized Themes
3. Through cooperation with research organizations and academic institutions and by forming alliances with consulting firms, the company develops solutions for wide-ranging disciplines, as well as those with a specialized focus.

Strengths in Consulting
Confronting Challenges Through Advanced Consulting Skills
Company Profile

Corporate Name: JGC HOLDINGS CORPORATION
Representative: Masayuki Sato, Representative Director, Chairman and Chief Executive Officer (CEO)
Locations: 2-3-1, Minato Mirai, Nishi-ku, Yokohama 220-6001, Japan
Tel: 81-45-682-1111 Fax: 81-45-682-1112
Date Established: October 25, 1928
Capital: 23,554.87 million yen (as of March 31, 2020)
Employees: (Consolidated) 7,607 (as of March 31, 2020)
Securities listing: Tokyo Stock Exchange, First Section (Code: 1963)

Main Operating Companies

Corporate Name: JGC CORPORATION
Representative: Yutaka Yamazaki, Representative Director, Executive Officer and President
Locations: 2-3-1, Minato Mirai, Nishi-ku, Yokohama 220-6001, Japan
Tel: 81-45-682-1111 Fax: 81-45-682-1112

Corporate Name: JGC JAPAN CORPORATION
Representative: Shoji Yamada, Representative Director, Executive Officer and President
Locations: 2-3-1, Minato Mirai, Nishi-ku, Yokohama 220-6001, Japan
Tel: 81-45-682-1111 Fax: 81-45-682-1112

Corporate Name: JGC CATALYSTS AND CHEMICALS LTD.
Representative: Toshiharu Hirai, Representative Director and President
Locations: Solid Square East Tower 16F, 580, Horikawa-cho, Saiwai-ku, Kawasaki 212-0013, Japan
Tel: 81-44-556-9120 Fax: 81-44-556-9127

Corporate Name: JAPAN FINE CERAMICS CO., LTD.
Representative: Hiroshi Tanaka, Representative Director and President
Locations: 3-10, Akadori, Izumi-ku, Sendai 981-3206, Japan
Tel: 81-22-378-7825 Fax: 81-22-378-7832

Corporate Name: JAPAN NUS CO., LTD.
Representative: Kazuhiko Chikamoto, Representative Director and President
Locations: Nishi-Shinjuku Prime Square 5F, 7-5-25, Nishi-Shinjuku, Shinjuku-Ku, Tokyo 160-0023, Japan
Tel: 81-3-5925-6710 Fax: 81-3-5925-6715

Plus 82 other companies.