



JGC HOLDINGS CORPORATION

Green Bond Framework

August 2023



1. Introduction

1.1. JGC's Purpose "Enhancing planetary health"

Since its establishment in 1928, the JGC Group has developed its business as a presence that supports the foundations of industry as well as society by placing the harmonization of energy and the environment at the center of the issues it must address, while constantly striving to undertake self-reform in tandem with the changing times.

Today, paradigm shifts in society and industry are occurring at an unprecedented speed, and the business environment surrounding the JGC Group is changing dramatically. Global climate change issues, innovations in digital technology, and the coronavirus pandemic, form the backdrop for our ongoing efforts.

In order for the JGC Group to achieve sustainable growth in these uncertain times, we must respond quickly and flexibly to changes in the environment and transform ourselves. With this in mind, we have defined our purpose as "Enhancing planetary health," and have formulated our long-term management vision, "2040 Vision," as well as our medium-term business plan, "Building a Sustainable Planetary Infrastructure 2025" (BSP) in 2021, and are currently working to realize them.

By 2040, the JGC Group aims to achieve its goal of "Enhancing planetary health" by making full use of the technologies and track records we have accumulated over the years as we aim to solve the following three social issues: pursuing both a stable energy supply and decarbonization, reducing the environmental impact of resource consumption, and building and maintaining vital infrastructure and services. We will diversify our business into five domains, including energy transition, and proactively transform ourselves to achieve sustainable growth.

JGC's Purpose



***Enhancing
planetary health***

The Group's purpose is defined to reflect our message of creating a more prosperous future by pursuing the intertwined health of humans and the earth.

1.2. Sustainability Management

The JGC Group has established the Basic Sustainability Policy in order to achieve continuous growth in corporate value through sustainability initiatives.

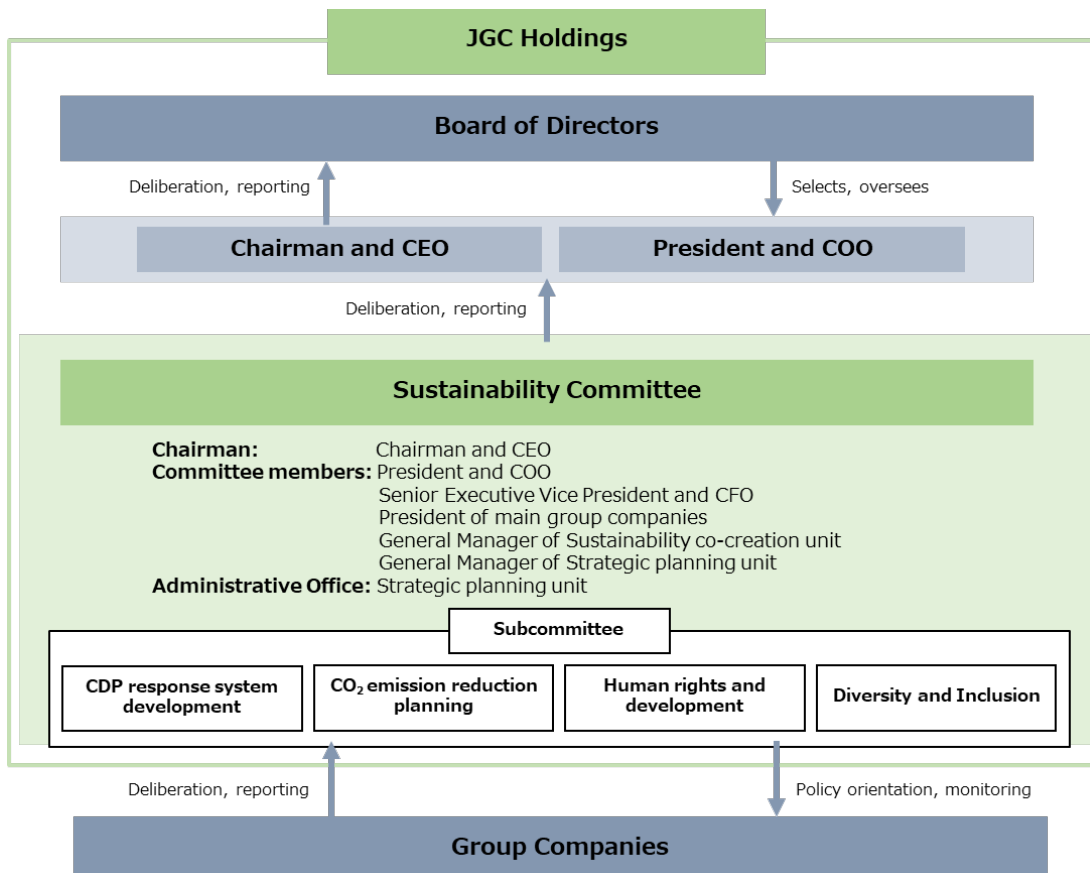
Basic Sustainability Policy

Creating social value in line with the Group's purpose of "Enhancing planetary health" is intended to make JGC more valuable as a corporate group.

In this commitment, we will actively pursue sustainability in environmental, social, governance, quality, safety, and health initiatives.

■ Governance and Risk Management for Sustainability in General

The JGC Group has established the Sustainability Committee, chaired by the Chairman and CEO, to formulate policies and action plans in the field of sustainability, including climate change and human capital, to evaluate and promote the status of activities, and to submit proposals and reports to the Board of Directors in accordance with the contents. In addition, the Group Risk Management Committee, chaired by the President and COO, identifies and organizes the Group's risks as a whole, maintains and establishes a risk management system, and proposes and deliberates on improvements. It works in collaboration with the Sustainability Committee to address sustainability-related risks such as climate change.



1.3. Materiality

Materiality is positioned as a fundamental element in establishing management policies and conducting business. Through business activities, the JGC Group addresses social issues and create economic, social, and environmental value.

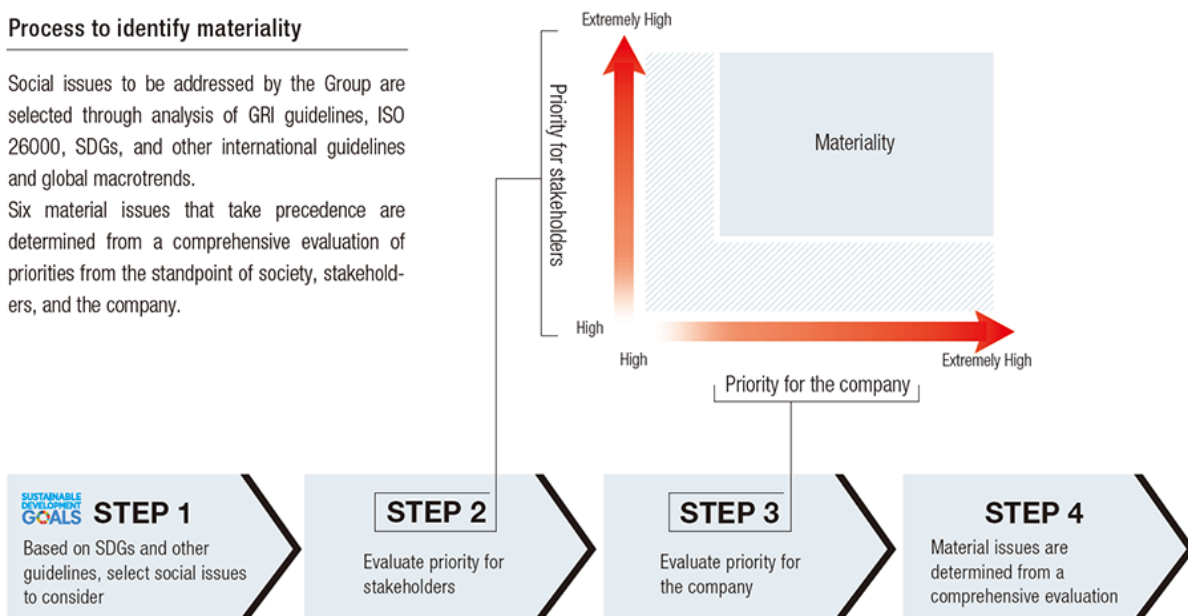
Positioning of Materiality



Process to identify materiality

Social issues to be addressed by the Group are selected through analysis of GRI guidelines, ISO 26000, SDGs, and other international guidelines and global macrotrends.

Six material issues that take precedence are determined from a comprehensive evaluation of priorities from the standpoint of society, stakeholders, and the company.



JGC Group Materiality

	Materiality	Related SDGs	Recognized Social Issues
E	Societies in harmony with environment		<ul style="list-style-type: none"> Reducing the environmental impact of fossil energy Promoting use of a greater share of renewable energy Protecting ecosystems, maintaining biodiversity Promoting development of products and technologies that help curb global warming
S	Materiality to address through business activities	Working with local communities around the world	<ul style="list-style-type: none"> Contributing to economic and industrial development in emerging markets Creating employment in emerging markets Supporting technology transfer and human resource development in emerging markets
		Human rights, employee motivation	<ul style="list-style-type: none"> Promoting workplace diversity Promoting female hiring and strengthening skill-building Respecting human rights in all business activities
	Materiality to achieve as a result of business activities	Energy access	<ul style="list-style-type: none"> Meeting greater global energy demand Promoting wider use of renewable energy that contributes to sustainable growth Enhancing productivity through greater global energy efficiency
		Quality of life	<ul style="list-style-type: none"> Responding to aging social and industrial infrastructure Promoting development of social and industrial infrastructure in emerging markets Improving global medical standards Making life more convenient and comfortable
G	Corporate governance, risks management		<ul style="list-style-type: none"> Strengthening and improving corporate governance Ensuring regulatory compliance in business activities Responding appropriately to corporate and business risk

The JGC Group has identified “societies in harmony with the environment” as a material issue in the environmental field, and has identified four recognized social issues to be recognized in realizing “societies in harmony with environment”: “reducing the environmental impact of fossil energy,” “promoting use of a greater share of renewable energy,” protecting ecosystems, maintaining biodiversity” and “promoting development of products and technologies that help curb global warming.” Besides taking climate action through environmentally conscious business activities, the JGC Group studies, formulates and discloses business strategies accounting for the guidelines of the Task Force on Climate-related Financial Disclosures (TCFD).

1.4. Commitment to Carbon Neutrality by 2050

Though the JGC Group business has long served the core domain of Oil & Gas, the Group has taken the opportunity of this transformation for enhancing planetary health to commit to the ambitious target of carbon neutrality by 2050, attesting to its dedication to sustainable gains in corporate value. In fiscal 2022, the JGC Group is promoting the following initiatives:

Targets in the commitment to carbon neutrality by 2050

Target	Net-Zero Initiatives
Scope 1+2 2050 Net-zero CO₂ emissions	Develop “JGC Group CO ₂ emission reduction plan” in fiscal 2022, and for Scope 1 and 2 reductions, adopt low-carbon / decarbonized practices, such as by reducing energy consumed in business activities, by using renewable energy, and by other means.
Scope 1+2 2030 30% reduction in CO₂ emissions per unit of production	
Scope 3 Reduction as determined in consultation with stakeholders	For Scope 3 reductions, leverage technologies cultivated by the JGC Group to provide energy transition solutions to stakeholders <ul style="list-style-type: none"> • Reduction of plant energy consumption through smart O&M • CCS technology • Construction of environmentally conscious facilities such as solar power, biomass power, offshore wind power, and SMRs • Hydrogen / fuel ammonia operations • Chemical recycling (plastic and fiber waste), SAF, etc.

In fiscal 2021 (April 2021 to March 2022), Scope 1 and 2 GHG emissions (CO₂ from energy) were 133,573 tons of CO₂ equivalent, a 2% increase of 2% from the previous fiscal year on a net sales basis. Scope 3 emissions in fiscal 2021 stood at 702,873 tons of CO₂ equivalent. The actual emissions are those of six companies in the group (JGC Holdings Corporation, JGC Corporation, JGC Japan Corporation, JGC Catalysts and Chemicals Ltd., Japan Fine Ceramics Co., Ltd., and Japan NUS Co., Ltd.). For details, including assumptions and breakdown, please refer to JGC’s July 2022 response to CDP, the international framework for disclosing climate-related information.

https://www.jgc.com/en/esg-hsse/environment/climate-change/pdf/climate_change2022_e.pdf

2. Transforming into a corporate group that contributes to enhancing planetary health

2.1. Long-Term Management Vision “2040 Vision”

Change is sweeping through our business environment. For the JGC Group to continuously enjoy sustained growth, we have established the “2040 Vision” on Fiscal 2021, anticipating the future 20 years from now based on the global, long-term perspective of enhancing planetary health, while responding swiftly to the current trends.

■ Social Issues Targeted by the JGC Group

The 2040 Vision builds on foresight that we have cultivated as a JGC Group strength. Anticipating how the world will be in 2040, the document identified issues to address and roles to fulfill in view of environmental changes expected from various perspectives, including that of the energy sector. Guided by the purpose of “Enhancing planetary health,” the JGC Group will pursue the vision for 2040 by applying proven capabilities and experience to address the three social issues of “pursuing both a stable energy supply and decarbonization,” “reducing environmental impact of resource consumption” and “building and maintaining vital infrastructure and services.”

Issues addressed by JGC Group

Expectations in the 2040 Vision



Future described in the 2040 Vision, issues addressed by the JGC Group

- Under a scenario based on current policies, global primary energy demand is set to expand from 14.4 billion toe (ton of oil equivalent) in 2019 to 17.1 billion toe in 2040.
Source: *World Energy Outlook 2020*, International Energy Agency (IEA)
- Global average temperature is expected to rise 1.5°C between 2030 and 2050, at the current rate of warming.
- In renewable energy, the current supply of 900 million toe is expected to increase to 3.3 billion toe by 2040.

➡ Pursuing both a stable energy supply and decarbonization

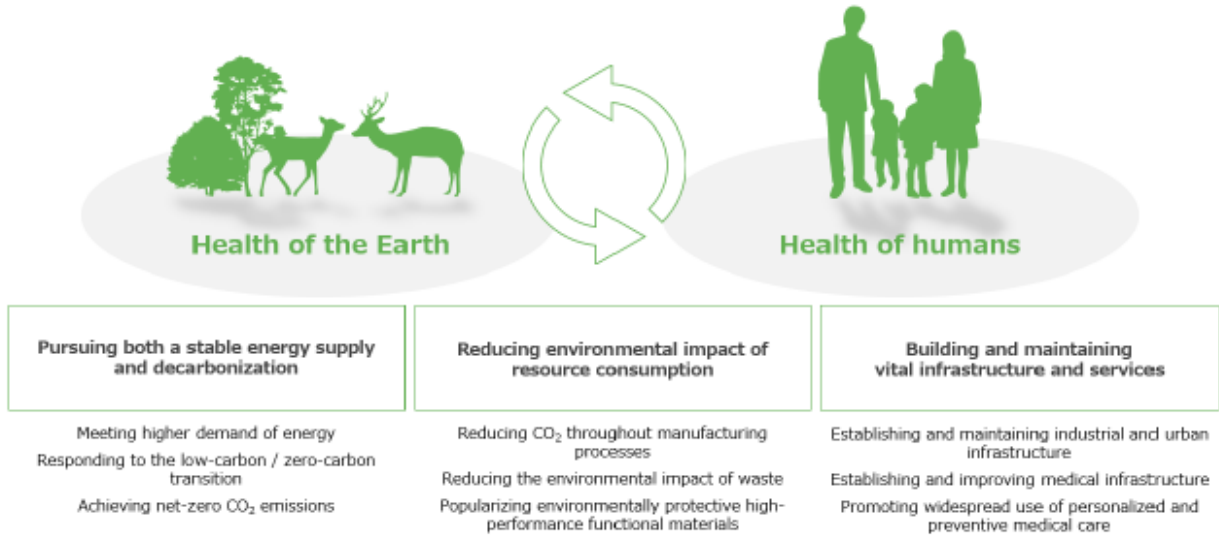
- In waste generated, the 2016 level of 2 billion tons is expected to reach 3.4 billion tons by 2050.
- 12% of this total will be plastic waste that is not biodegradable.

➡ Reducing environmental impact of resource consumption

- Cities are expected to swell from 50% of the total population in 2018 to 66% in 2050 as economic growth drives urbanization.
- Development of medical infrastructure will be in demand in emerging economies and elsewhere, and needs will increase for higher standards of treatment and specialized medicine.

➡ Building and maintaining vital infrastructure and services

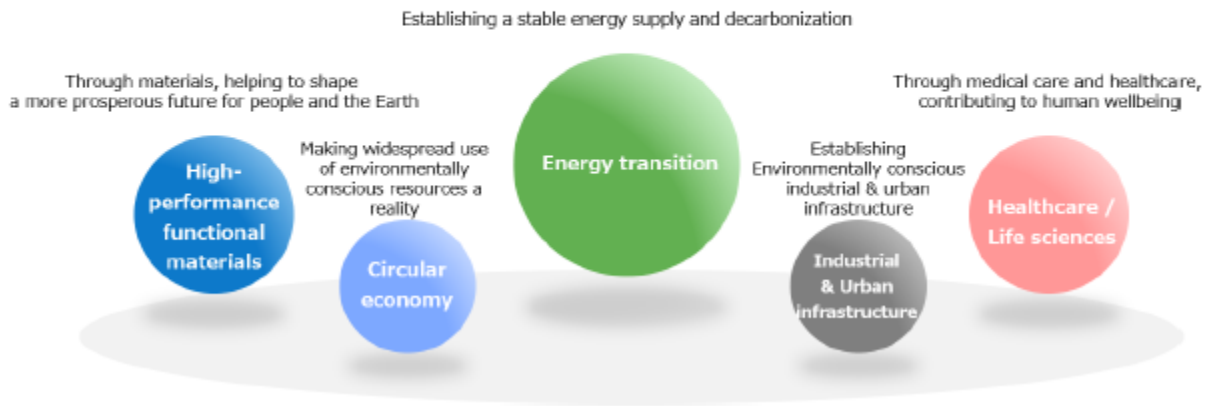
Role of JGC Group toward 2040



■ **2040 Vision of JGC Group**

As a corporate group committed to enhancing planetary health, the JGC Group will leverage its technologies and experience, applying its core competencies to fulfill this purpose in five business areas.

A corporate group that contributes to enhancing planetary health in five (5) business areas



Energy transition

One task for the company to confront is responding to global demand for both “more energy” and “carbon neutrality.” As the JGC Group adopts low-carbon/decarbonization practices in its core Oil & Gas business, it

integrates this business with clean energy business (for which the efforts have accelerated since the 2010s) under the new concept of “energy transition”.

Healthcare/Life sciences

In the area of pharmaceuticals, drug discovery has become more diverse and sophisticated, from large molecule drugs to biopharmaceuticals and new modalities. The field of medical care also faces some urgent issues, such as realization of digitally enhanced smart hospitals and responding to greater medical needs in emerging economies. The JGC Group will further contribute to human health through healthcare and life sciences based on an extensive experience in supporting domestic pharmaceutical and healthcare clients since the 1970s.

High-performance functional materials

The potential of materials will also help the JGC Group shape a more prosperous future for people and the Earth. The JGC Group manufacturing companies will apply expertise in catalysts, fine chemicals, and fine ceramics to develop new products and expand capacity in applications linked to its other business areas, such as carbon/chemical recycling, environment/new energy, semiconductors/telecommunications, and life sciences.

Circular economy

The JGC Group will work toward solutions to issues associated with waste generated from the life cycle of petrochemical products such as plastics, as the JGC Group promotes widespread adoption of resources with a lighter environmental footprint. For this purpose, the JGC Group applies process engineering capabilities from refining and petrochemicals in order to build “circular economy” operations into a profitable pillar of business with the partners.

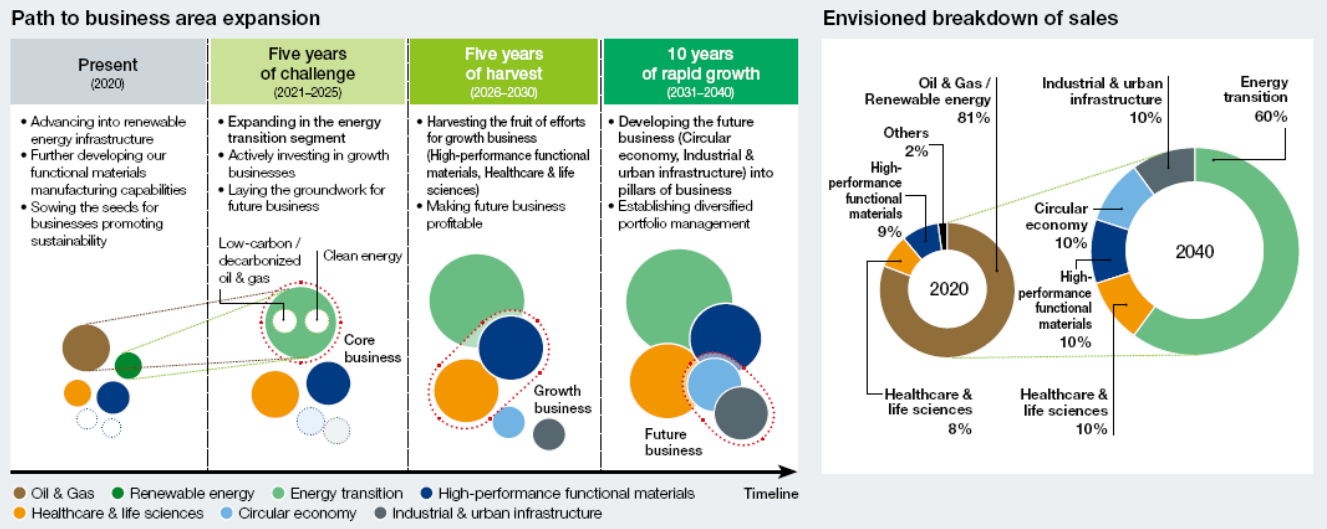
Industrial and Urban infrastructure

The JGC Group will venture into industrial and urban infrastructure based on its fundamental technologies and project management capabilities developed to date, which enable us to meet urbanization needs through environmentally conscious solutions where demographic and economic growth is expected. The efforts in this area will involve implementing integrated industrial and urban infrastructure that also applies solutions from energy transition, circular economy, and other business areas.

2.2. Medium-Term Business Plan “BSP 2025”

The JGC Group positioned the first five-year stage (fiscal 2021-2025) on the path to the 2040 Vision as five years of challenge. In the medium-term business plan “Building a Sustainable Planetary Infrastructure 2025

(BSP 2025)" for this period, the Group has made "Transformation of EPC operations," "Expansion of manufacturing business for high-performance functional materials" and "Establishment of future engines of growth" as its key strategies and is actively engaged in strategic investments to expand and diversify earnings. BSP2025 is now in its third year in fiscal 2023, and over the past two years we have steadily implemented the key strategies set forth in BSP2025.



Three key strategies

01 Transformation of EPC operations

Increase competitiveness and profitability in mega-sized EPC projects	Take on EPC growth markets and segments
<p>Improve project gross profit ratios</p> <ul style="list-style-type: none"> • Refine risk management • Improve project negotiations <p>Improve competitiveness in securing orders</p> <ul style="list-style-type: none"> • Develop and execute joint venture strategies • Develop and apply digital technologies • Optimize construction methods 	<p>Expanding into growth markets</p> <ul style="list-style-type: none"> • Actively expand business in the Asia region <hr/> <p>Expanding into growth segments</p> <ul style="list-style-type: none"> • LNG receiving terminals, Gas-fired power • Solar power, Biomass power • Pharmaceuticals / hospitals • Chemicals

02 Expansion of manufacturing business for high-performance functional materials

Offer more product lineups in existing business for increased revenue	Catalysts for chemical refineries, original chemical catalysts, materials for semiconductor / high-speed telecom applications, products used in semiconductor manufacturing equipment, etc.
Expand sales of strategic products	New chemical catalysts and fine chemicals products, high thermal conductivity silicon nitride substrates, etc.
Explore and develop next-generation business	Catalysts for carbon recycling and chemical recycling, materials for high-speed communications, materials used in the life sciences, all-solid-state battery, materials for bone regeneration

03 Establishment of future engines of growth

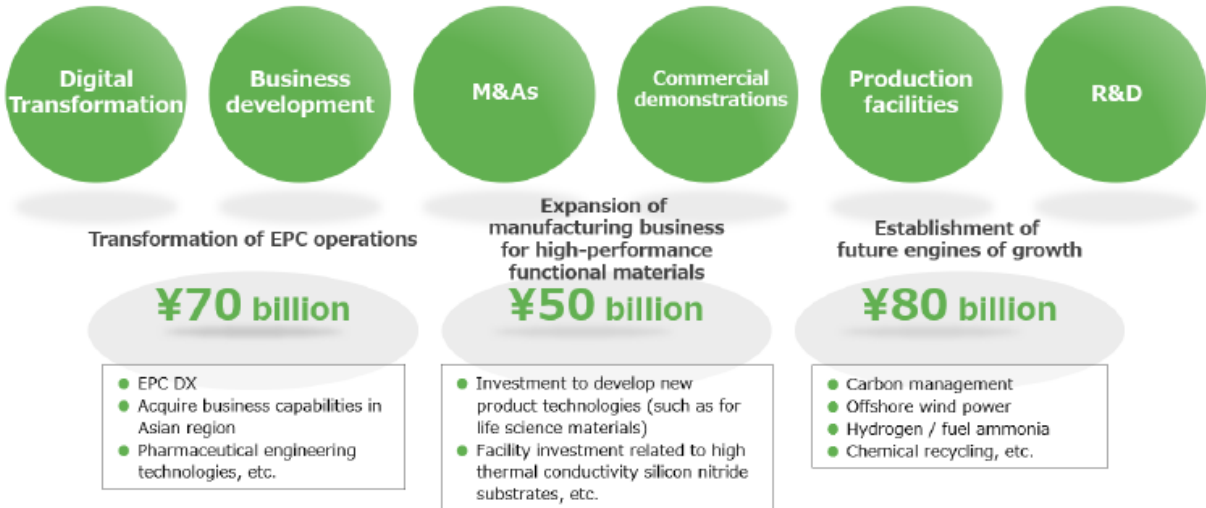
Among the business areas defined in the 2040 Vision, the following are especially promising in this regard. Operations established in these new areas will be developed into profitable future pillars of business.

Business areas	Growth engines	Business areas	Growth engines
Energy transition	<ul style="list-style-type: none"> • Carbon management • Offshore wind power • Hydrogen / fuel ammonia • Small modular reactors (SMRs) • Smart O&M 	High-performance functional materials	<ul style="list-style-type: none"> • Catalysts for carbon recycling, chemical recycling • Bone regeneration materials / OCP, etc.
		Circular economy	<ul style="list-style-type: none"> • Chemical recycling of plastic and fiber waste • Sustainable aviation fuel (SAF)
Healthcare & life sciences	<ul style="list-style-type: none"> • Smart hospitals • Smart factories • Digital healthcare 	Industrial & urban infrastructure	<ul style="list-style-type: none"> • Water treatment • Railways

The path to success through these key strategies is planned to call for a total of ¥200 billion in investment during the medium-term business plan in areas such as digital transformation, M&As, production facilities, business development, commercial demonstrations, and R&D. Specifically, ¥70 billion is planned to be

strategically invested in transformation of EPC operations, ¥50 billion in expansion of manufacturing business for high-performance functional materials, and ¥80 billion in establishing future engines of growth.

Investment for the three key strategies



Over five years, make strategic investments totaling ¥200 billion

2.3. Rationale for Issuance of Green Bond

Toward a sustainable society, addressing climate change has become a global challenge. The JGC Group defines “societies in harmony with environment” as a materiality, and is working to develop projects and technologies that contribute to low-carbon and decarbonization.

In the three key strategies of BSP 2025 — “Transformation of EPC operations,” “Expansion of manufacturing business for high-performance functional materials,” and “Establishment of future engines of growth,” — we are launching a capital investment plan to increase production of high thermal conductive silicon nitride substrates in the “Expansion of manufacturing business for high-performance functional materials” strategy and a number of new projects such as hydrogen / fuel ammonia, chemical recycling and sustainable aviation fuel (SAF) in the “Establishment of future engines of growth” strategy. The JGC Group has decided to utilize green bonds as a means of raising funds for these projects.

We believe that the issuance of green bonds will demonstrate the JGC Group’s value-creation efforts to create economic, social and environmental value by solving social issues through business activities to a wide range of stakeholders, including investors, and will promote initiatives to realize our purpose “Enhancing planetary health.”

3. Green Bond Framework

This green bond framework has been developed to address the four key elements in line with the principles and guidelines listed below:






- ✓ “Green Bond Principles 2021” by the International Capital Market Association (ICMA)
- ✓ “Green Bond Guidelines 2022” by Ministry of Environment Japan


We will raise funds through green bonds based on this framework.

3.1. Use of Proceeds

The net proceeds raised via sustainable finance will be used to finance and/or refinance, in part or in full, new or existing projects that meet the following eligibility criteria. The look-back period for refinancing will be 36 months prior to the date of financing.

Green Eligibility Criteria

Project Category	Eligible Projects	GBP Category	SDGs
Carbon Recycling / Chemical Recycling	<p>R&D, capital investment and expenditures related to biofuels, biomaterials, hydrogen and ammonia production through carbon and chemical recycling</p> <ul style="list-style-type: none"> • Raw materials are limited to those derived from waste materials, biomass, and other materials that do not have a serious adverse effect on the environment or society • When using biomass as a raw material, use only unused materials for domestic materials and those that have obtained FSC or other sustainability-related certifications for imported materials <p>Project Examples</p> <ul style="list-style-type: none"> - Investment in SAF production facilities using waste cooking oil - Development of polymer synthesis technology by microorganisms using CO₂ as direct raw material - Hydrogen production by gasification of plastic wastes 	<ul style="list-style-type: none"> • Circular economy adapted products, production technologies and process • Pollution prevention and control 	  
Energy Transition	<p>R&D, capital investment and expenditures required for the following technologies and products to realize the energy transition toward a carbon-neutral society</p> <ul style="list-style-type: none"> • Technologies, core components and infrastructure essential for widespread adoption of electric and hydrogen vehicles <ul style="list-style-type: none"> - Excluding technology and products used in internal combustion engines • Production of hydrogen and ammonia derived from renewable 	<ul style="list-style-type: none"> • Clean Transportation • Circular economy adapted products, production 	 

	<p>energy</p> <ul style="list-style-type: none"> • Solar power, onshore/offshore wind power <p>Project Examples</p> <ul style="list-style-type: none"> - Capital investment in high thermal conductivity silicon nitride substrates for high-efficiency, high-power power modules for EV vehicles 	<p>technologies and process</p> <ul style="list-style-type: none"> • Renewable Energy 	<p>13 CLIMATE ACTION</p> 
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3.2. Process for Project Evaluation and Selection

Based on the green eligibility criteria set forth above, the financial division, with the support of relevant internal departments, selects eligible projects to which the proceeds will be allocated, and CFO makes the final decision.

The following environmental and social risk mitigation measures are implemented for eligible projects, as necessary.

- Compliance with environment-related laws and regulations required by the national and local governments where the project is located and environmental impact assessment as necessary
- Full explanation of the project to local residents
- Proper management and treatment of waste, rationalization of energy use and consideration of the introduction of non-fossil energy, resource recycling for construction work, and management of environmentally hazardous substances

3.3. Management of Proceeds

Until full allocation to Eligible Green Projects, the financial division, in collaboration with the departments and group companies responsible for eligible projects, continuously monitors the allocation of proceeds from green bonds using dedicated books, etc. Unallocated funds will be managed as cash or cash equivalents until they are allocated to Eligible Green Projects.

3.4. Reporting

■ Allocation Reporting

Until the proceeds are fully allocated, we will report the following items concerning the allocation of the proceeds on our website at least once a year. If a significant change occurs in the allocation status from the plan at the time of funding, we will disclose that on our website appropriately.

- Allocated amount for each eligible project (including amount or percentage of new financing and refinancing)

- Unallocated amount

■ Impact Reporting

As long as the proceeds are outstanding, we will report, where feasible and reasonably practicable, the following items related to the impact for each eligible project on our website at least once a year.

Project Category	Eligible Projects	Impact Reporting Items and Metrics
Carbon Recycling / Chemical Recycling	<p>R&D, capital investment and expenditures related to biofuels, biomaterials, hydrogen and ammonia production through carbon and chemical recycling</p> <ul style="list-style-type: none"> • Raw materials are limited to those derived from waste materials, biomass, and other materials that do not have a serious adverse effect on the environment or society • When using biomass as a raw material, use only unused materials for domestic materials and those that have obtained FSC or other sustainability-related certification for imported materials 	<ul style="list-style-type: none"> • Brief description of projects <For projects contributing to GHG emissions reduction> • GHG emission reduction (t-CO₂e) (actual or estimated) <For projects contributing to pollution prevention and control> • Waste reduction amount/effect (actual or estimated) * When quantitative reporting is difficult such as in R&D, the qualitative impact will be disclosed in detail to the extent practicable
Energy Transition	<p>R&D, capital investment and expenditures required for the following technologies and products to realize the energy transition toward a carbon-neutral society</p> <ul style="list-style-type: none"> • Technologies, core components and infrastructure essential for widespread adoption of electric and hydrogen vehicles <ul style="list-style-type: none"> - Excluding technology and products used in internal combustion engines • Production of hydrogen and ammonia derived from renewable energy • Solar power, onshore/offshore wind power 	<ul style="list-style-type: none"> • Brief description of projects • GHG emission reduction (t-CO₂e) (actual or estimated) * When quantitative reporting is difficult such as in R&D, the qualitative impact will be disclosed in detail to the extent practicable

3.5. External Review

We have obtained a second party opinion from Rating and Investment Information, Inc. (R&I), an independent external reviewer, that this framework is aligned with the ICMA “Green Bond Principles 2021” and the Ministry of Environment Japan “Green Bond Guidelines 2022.”