

# TAKASAGO CORPORATE REPORT 2020



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# Takasago Thermal Engineering Co.,Ltd. Management Policy and Principles

- Management Policy** Contribution to society through personal harmony and creativity
- Management Principles**
- 1.To serve society through the development of business activities that focus on the creation of the best product quality
  - 2.To develop technology that serves our customers' needs and utilizes the creativity of all employees
  - 3.To enhance personal character and harmony between people by nurturing talent and promoting mutual respect

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### Editorial policy

The Takasago Thermal Engineering Group started to issue the Corporate Report (an integrated report) in 2017, and this is the fourth report. We have kept in mind that this report contains useful information for those who are interested in the current situation and medium- to long-term future of the Takasago Thermal Engineering Group. We will continue to improve the quality of the report based on your feedback and suggestions.

- Target organizations for this report  
Takasago Thermal Engineering Co., Ltd. (all offices both in Japan and overseas) and Takasago Thermal Engineering Group companies  
\* The entire Takasago Thermal Engineering Group is referred to as "the Takasago Thermal Engineering Group" or "our Group," and Takasago Thermal Engineering Co., Ltd. alone is referred to as "Takasago Thermal Engineering" or "we."
- Reporting period  
April 1, 2019 to March 31, 2020  
\* Some information before/after this period is included.
- Month of issue  
December 2020
- Referenced guidelines  
"International Integrated Reporting Framework," International Integrated Reporting Council (IIRC)  
"Guidance for Integrated Corporate Disclosure and Company-Investor Dialogues for Collaborative Value Creation," Ministry of Economy, Trade and Industry (METI)  
"G4 Sustainability Reporting Guidelines (4th edition)," Global Reporting Initiative (GRI)

### Relationship of major reporting materials



For details, see the website of Takasago Thermal Engineering : <https://www.tte-net.com/english>





**Atsushi Ouchi**  
Chairman and Representative Director  
CEO

**Kazuhito Kojima**  
President and Representative Director  
COO

Sticking to our policy to contribute to society through personal harmony and creativity, we will promote multi-faceted innovations and evolve into a constantly growing corporate group

**Establishment of a new management system**

I am Kazuhito Kojima and I became President and Representative Director, COO on April 1, 2020.

While our 100th anniversary is only three years ahead, we are now facing various management issues including abnormal weather caused by global warming, the establishment of a low-carbon society and the problem of long working hours due to the shortage of labor and other causes. Moreover, it is still unclear when the COVID-19 outbreak will end. While it is like sailing in a storm to assume the heavy responsibilities of the President and COO under these circumstances, I will fulfill them with a strong will to convert the crisis into opportunities.

We introduced the CEO/COO system in April 2020 in order to practice healthy corporate management and make prompt management decisions through the segregation of supervision and execution of management. From now on, while the CEO will control the overall management as the chief executive, I, the COO, will operate the business of the Takasago Thermal Engineering Group as the person in charge of the control of business operations as a whole.

I recognize that business management is activities performed through close cooperation of people for the happiness of people and a series of such activities will create harmony of people. Accordingly, I am certain that thorough adherence to our Management Policy of "Contribution to society through personal harmony and creativity" will stimulate the DNA of Takasago to willingly face challenges and help create a corporate group that contributes to the achievement of a sustainable society while giving top priority to social contribution. With a desire to do things according to nature's law based on the right vision of life, I will unite minds with executives and employees and work vigorously towards the continuous growth of our Group.

**Long-term visions and 3 medium-term management plans**

In the long-term management framework "GReen PRIDE 100," which was launched in 2014 towards our 100th anniversary, we set the following three long-term visions:

- Company group continuously meeting customer expectations and always relied on and trusted by them
- Environmental company whose presence is admired in the global market
- Environmental solution professional contributing to the global environment

We have developed medium-term business plans to turn these visions into reality and promoted them while dividing them into three steps.

The first step "iNnovate on 2016" was positioned as the stage to build foundations for innovation and we worked to enhance on-site capabilities, set up a mechanism for human resource development and ensure stable profitability. In the second step "iNnovate on 2019 just move on!," we employed "Bold implementation of innovations for growth" as the theme and focused on the establishment of the one-stop system including electricity, hygiene, interior and communications while setting HVAC systems at the core. We also invested in the development of AI, IoT and other new technologies and strived to cultivate new businesses. Then, the third step "iNnovate on 2023 go beyond!" was designed. With the theme of "Strengthening of management infrastructure" to develop abilities to respond to unexpected situations, the Takasago Thermal Engineering Group will become an "environmental creator" and contribute to the establishment of a low-carbon society.

**3 keywords**

At the same time, we will lead business management with the following three keywords as essential factors for surviving this unpredictable time.

The first keyword is "**Engagement.**"

The growth potential of a company depends on the sum of the potential of all executives and employees. We will develop the potential of personal harmony, which will enhance connections with trust in all relationships surrounding Takasago Thermal Engineering, such as those of executives and employees with the company and those of customers with us.

The second one is "**Sustainable.**"

We will demonstrate creativity to develop continuity such as survival with a view to the future of the earth, perpetual growth of the company and the maintenance of good relations of people.

Then, the third one is "**Global.**"

With the efforts of all Group companies, we will sharpen our sensitivity and pursue the technologies and values needed by the world to establish competitive strength and ensure that our presence is admired in the global market.

We call these three keywords "Takasago's ESG." Mobilizing all resources of the Group to develop its power, the Takasago Thermal Engineering Group aims to become able to continuously grow and evolve under any circumstances.

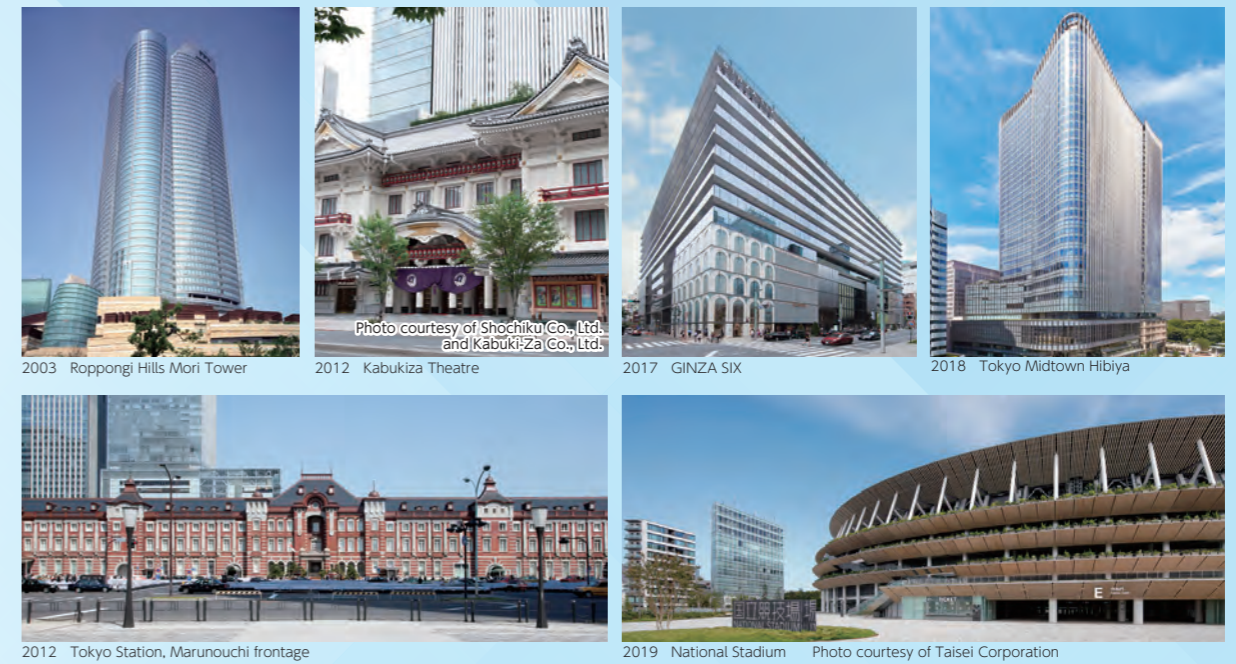
President and Representative Director, COO  
Takasago Thermal Engineering Co., Ltd.

小島 和人

# History of the Takasago Thermal Engineering Group

Founded in 1923, Takasago Thermal Engineering Co., Ltd. has worked for research and development, as well as the advancement of technologies, as a pioneer of HVAC system construction with the ethos that if anything is needed but not available, we will make it ourselves. While the world is headed for a low-carbon society now, the Takasago Thermal Engineering Group will make maximum use of the technical capabilities developed in the past and continuously create a pleasant and comfortable environment needed by people for the solution of various social and environmental challenges.

## Major construction results



## Inaugural years

From heating to air conditioning

## Growing years

Expansion of the group and entry into new fields

## Period of reform

From an environmental engineering company to an environmental creator

- 1923 Takasago Heating Works Co., Ltd. was established by Kunizo Hara
- 1927 Completed Japan's first temperature and humidity control system
- 1930 Developed Takasago Ebara turbo refrigerator, which was the first domestically-produced product
- 1943 Company was renamed Takasago Thermal Engineering Co., Ltd.
- 1949 Completed registration according to the Construction Industry Act

- 1969 Listed on the stock exchange
- 1968 Started to construct full-fledged clean rooms in the company
- 1970 Expo '70 was held in Osaka; Introduced Japan's first district heating and cooling facilities
- 1972 Established NIPPON PMAC CO., LTD. and Nihon Kaihatsu Kosan Co., Ltd.
- 1974 Started to enter overseas markets with Singapore as the first target
- 1980 Established T.T.E. Engineering (Malaysia) Sdn. Bhd. in Malaysia
- 1984 Established Thai Takasago Co., Ltd. in Thailand
- 1988 Developed a supercooled water type ice thermal storage system, Super Ice System (SIS®)
- 1994 Established Takasago Thermal Engineering (Hong Kong) Co., Ltd. in Hong Kong
- 1998 Developed lower underfloor air conditioning system, LUFT®

- 2003 Established Takasago Constructors & Engineers (Beijing) Co., Ltd. (current Takasago Constructors and Engineers (China) Co., Ltd.) in Beijing, China
- 2005 Established Takasago Singapore Pte. Ltd. in Singapore  
Developed a swirling induction type HVAC system, SWIT®  
Started to supply a data collection and analysis tool, GODA®
- 2007 Established Takasago Vietnam Co., Ltd. in Vietnam
- 2009 Developed clean booths for medical use, BARRIFLOW® and BARRIHOOD®

- 2012 Made Nihon Setsubi Kogyo Co., Ltd. an affiliate accounted for by the equity method
- 2013 Established PT. Takasago Thermal Engineering in Indonesia
- 2014 Established the Myanmar office (current Myanmar Branch)  
Established Takasago Marusei Engineering Service Co., Ltd. (current TMES Corporation)
- 2015 Established Takasago Engineering Mexico, S.A. de C.V. in Mexico
- 2017 Made Integrated Cleanroom Technologies Pvt. Ltd. in India a consolidated subsidiary
- 2018 Made Kiyota Kougyo Co., Ltd. a consolidated subsidiary
- 2019 Made Kazusa Environmental Research Center Co., Ltd. a subsidiary
- 2020 Completed an R&D base "Takasago Thermal Engineering Innovation Center"



1920 Heating and Ventilation Vol. 1 and 2, written by Masanosuke Yanagimachi, the first president (Building Mechanical and Electrical Engineering Heritage No. 2)



1930 Takasago Ebara turbo refrigerator, which was the first domestically-produced product



1968 Cleanroom that was also able to be used for semiconductor production (TCR Super MP)



1988 Super Ice System (SIS®)



2005 SWIT®



2009 BARRIFLOW®

April 2019

## Launch of an automatic meter reading service for building maintenance as the first project adopted through the accelerator program

LiLz Inc., which was selected in the first Takasago Thermal Engineering Accelerator "just move on!" program, jointly developed LiLz Gauge with TMES Corporation, our Group company, and Takasago Thermal Engineering. This cloud-based service is based on the automatic reading of meters with IoT cameras and machine reading and helps improve the efficiency and quality of on-site building maintenance operations.

▶See P37 for details.



May 2019

## Issuance of a "health declaration"

To become a company where all executives and employees are physically and mentally healthy and work energetically ("Well-Being Company"), we issued a "health declaration." The Health Care Office was set up as the department dedicated to helping executives and employees maintain and improve their health and promoting health and productivity management. The office is committed to initiatives including "education and enlightenment to improve the health literacy of executives and employees," "establishment of an organizational structure centering on industrial physicians" and "development of an integrated health management system."



October 2019

## Joint development of a voice inspection service using wearable devices for construction and maintenance sites

We jointly developed a voice inspection service for construction and maintenance sites with Nain Inc., which was selected in the second accelerator program. Aiming for the early introduction of the service into Takasago Thermal Engineering and its Group, as well as the promotion of the commercialization, we will also invest in Nain (by underwriting part of the capital raising through the issuance of new shares) to enhance the cooperative relationship.

▶See P37 for details.



December 2019

## Appointment as a corporate partner of HAKUTO-R, a commercial lunar exploration program operated by ispace, inc.

We concluded a contract with ispace, inc. to become a corporate partner of HAKUTO-R, the world's first commercial lunar exploration program. In this program, water electrolysis equipment developed by us will be mounted in a lander (lunar module) transported by ispace to the moon for the demonstration on the surface. We are trying to generate hydrogen and oxygen in the lunar environment for the first time in the world.

▶See P37 for details.



July 2019

## Issuance of Takasago Thermal Green Bonds

We issued the Takasago Thermal Green Bonds with a recognition that they are consistent with the medium- to long-term policy of the Takasago Thermal Engineering Group in its efforts to make active contributions to the achievement of a sustainable society through the evolution and creation of environmental improvement technologies aimed at net-zero energy, as well as further vitalization of open innovation. The capital procured with the bonds is appropriated for the construction of the Takasago Thermal Engineering Innovation Center and equipment in the center.

▶See P41 for details.



September 2019

## Selection as a component of the MSCI Japan ESG Select Leaders Index

This is an index of Morgan Stanley Capital International, Inc. (MSCI) and composed of companies with high ESG rates selected from among the components of its parent index "MSCI Japan IMI Top 700 Index" (top 700 companies by total market value). It presents a market benchmark for the reduction of ESG risks and the selected companies are considered by MSCI as having a relatively high tolerance to various ESG risks that can occur in the future. Takasago Thermal Engineering has been included in the index continuously since December 2018 and received the MSCI ESG rating of AA, which is the second-highest category, for the second time in a row.



January 2020

## Renewal of field uniforms for the first time in 27 years

The new uniforms adopted a slim shape and a design that gives a clean and professional impression, as well as specifications suitable for the characteristics of men/women and improved functions including convenient pockets. The combination of muted colors with navy as the base color was selected in response to requests from young employees who are responsible for the future of the company. All of the old uniforms to be disposed of are collected and recycled as materials for polyester products and biofuels.



February 2020

## Completion of the Takasago Thermal Engineering Innovation Center, our new research and development base, in Tsukubamirai, Ibaraki Prefecture

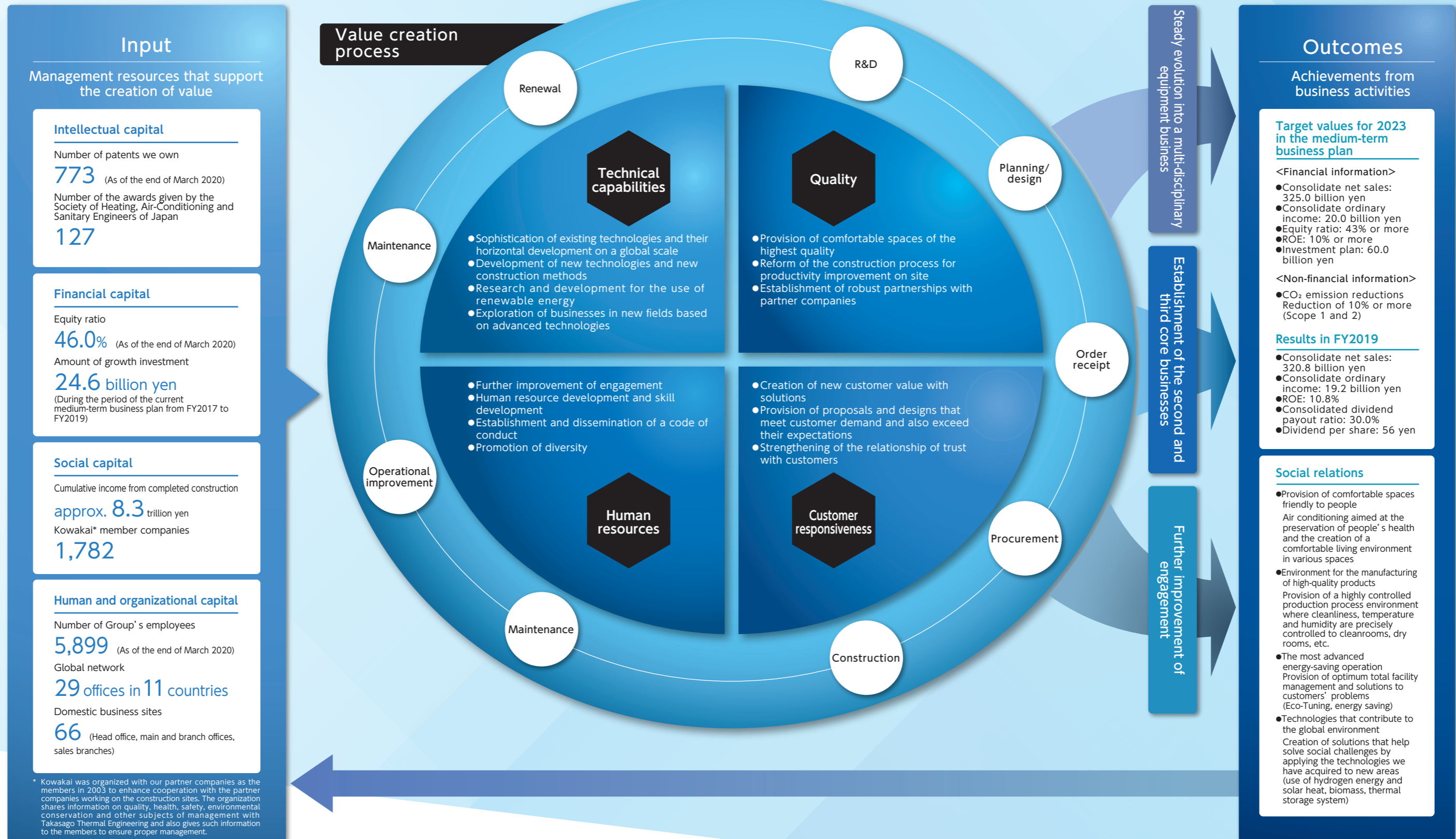
We completed the Takasago Thermal Engineering Innovation Center, which integrates part of the headquarters functions (planning and development departments) and research facilities, and started its operation in the spring of 2020.

▶See P23 for details.



## MANAGEMENT PRINCIPLES

- "To serve society through the development of business activities that focus on the creation of the best product quality"
- "To develop technology that serves our customers' needs and utilizes the creativity of all employees"
- "To enhance personal character and harmony between people by nurturing talent and promoting mutual respect"



### Process to identify important challenges

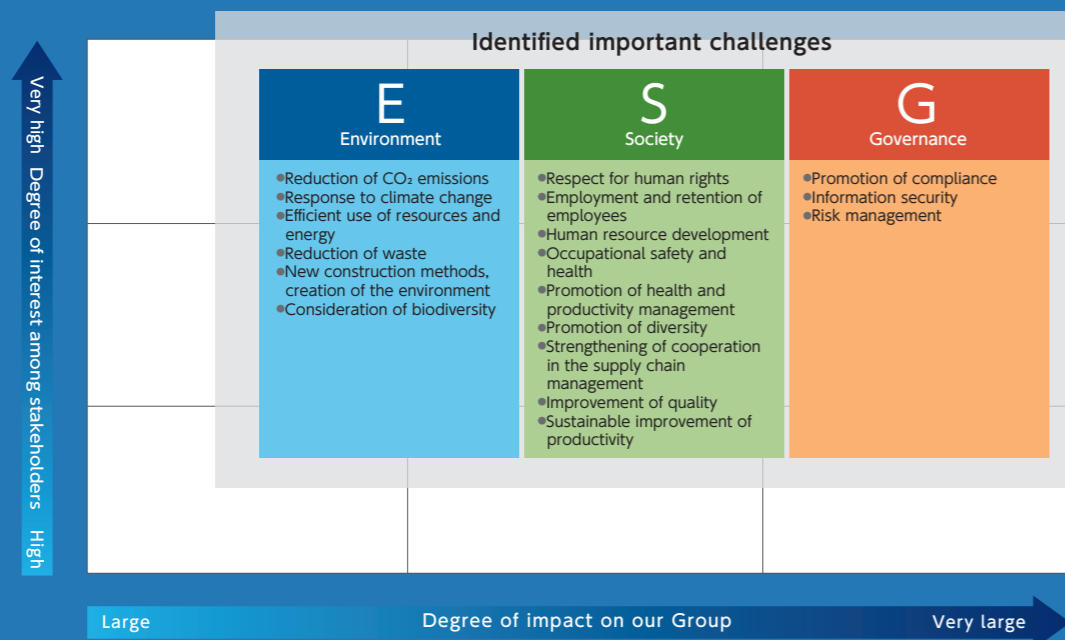
Among a wide range of social challenges, we identify important challenges (materiality) to which we should give priority through the following process while also considering the current social conditions and changes in the business environment.



\* ISO 26000: International standard on social responsibility

### Assessment of the identified challenges

We assessed each of the identified challenges from the perspectives of (1) importance for stakeholders and (2) importance for our Group.



### Identification of social challenges and our initiatives

Identification of social challenges	Main items that we will work to solve through business activities and KPIs	
<b>Measures to address climate change and environmental conservation</b> Creation of: Recycling-oriented society Society harmonized with nature Low carbon society	Reduction of CO <sub>2</sub> emissions	Proposal for energy saving in design for contract work ▶ Reduction of 10% for new construction and 30% for renovation
		Proposal for energy saving at the construction stage ▶ Reduction of 10% or more
		Medium- to long-term reduction ▶ Reduction of 10% or more in 2023 Reduction of 27.5% or more in 2030 (Scope 1 and 2)
	Reduction of waste	Reduction of materials on construction sites and recycling of industrial waste ▶ Reduction of 10% and a recycling rate of 85%
		Refrigerant recovery rate ▶ 100%
	Reduction of water use	Introduction of no water discharge flushing ▶ 50 construction sites or more
	Use of renewable energy	Use in the Innovation Center ▶ Renewable energy of 560 MWh or more (1,500 MWh or less in total)
Development of element technology	Development related to environmental and quality improvement ▶ Publication of 35 external papers or more	
<b>Provision of a strong, safe, secure and comfortable space environment</b> Improvement of the work environment	Improvement of quality	Generation of troubles and complaints ▶ Less than the previous year's level
		Correction of long working hours ▶ Percentage of technical employees working externally for 80 hours or less in a month
		Eradication of harassment ▶ Percentage of "No" in answers to the questionnaire
	Improvement of engagement, work styles, diversity, human rights, health and productivity management, cultivation	Employee satisfaction ▶ Overall satisfaction index of 3.05 or higher
		Long-term continuous employment ▶ Reduction of turnover
	Social contribution (society in harmony with nature)	Promotion of health and productivity management ▶ Reduction of persons with high stress
		Forestation (Takasago Thermology Forest, the University of Malaysia, Sarawak) ▶ Once or more in each office
Local cleaning activities ▶ Once or more in each office		
Donation activities		
<b>Enhancement of corporate governance</b> Thorough compliance and enhancement of risk management Information disclosure and dialogue Composition of the members of the Board of Directors	Compliance, fairness and transparency of business management	Legal compliance and thorough risk management ▶ Verification at the committees
		Integrated report ▶ "Average" or higher in the evaluation
		Enhancement of information disclosure and dialogue ▶ 80 institutional investors, etc. or more

We launch "iNnovate on 2023 go beyond!" towards our 100th anniversary in fiscal 2023.

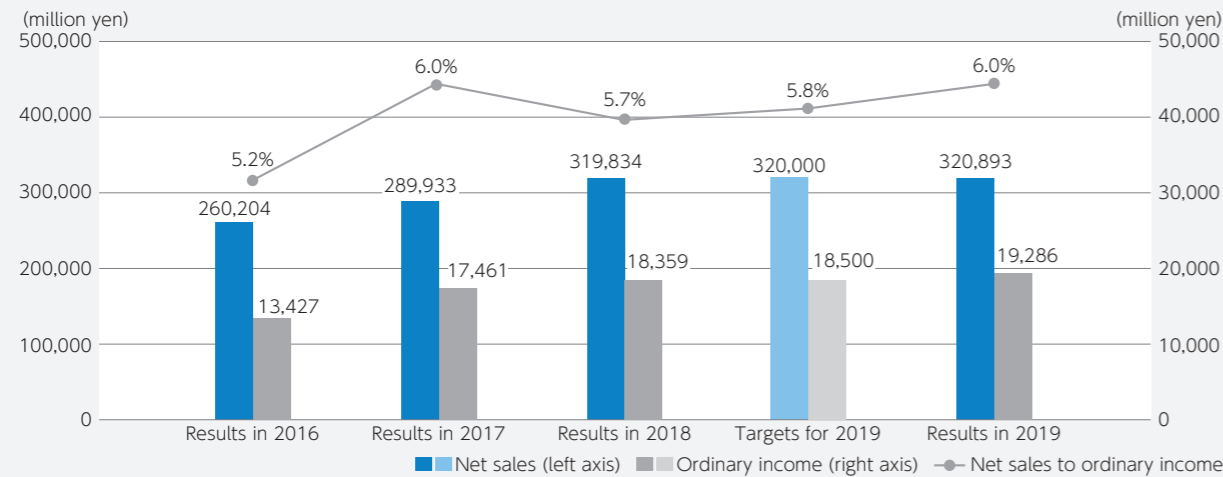
Review of iNnovate on 2019 just move on!

Review of the performance

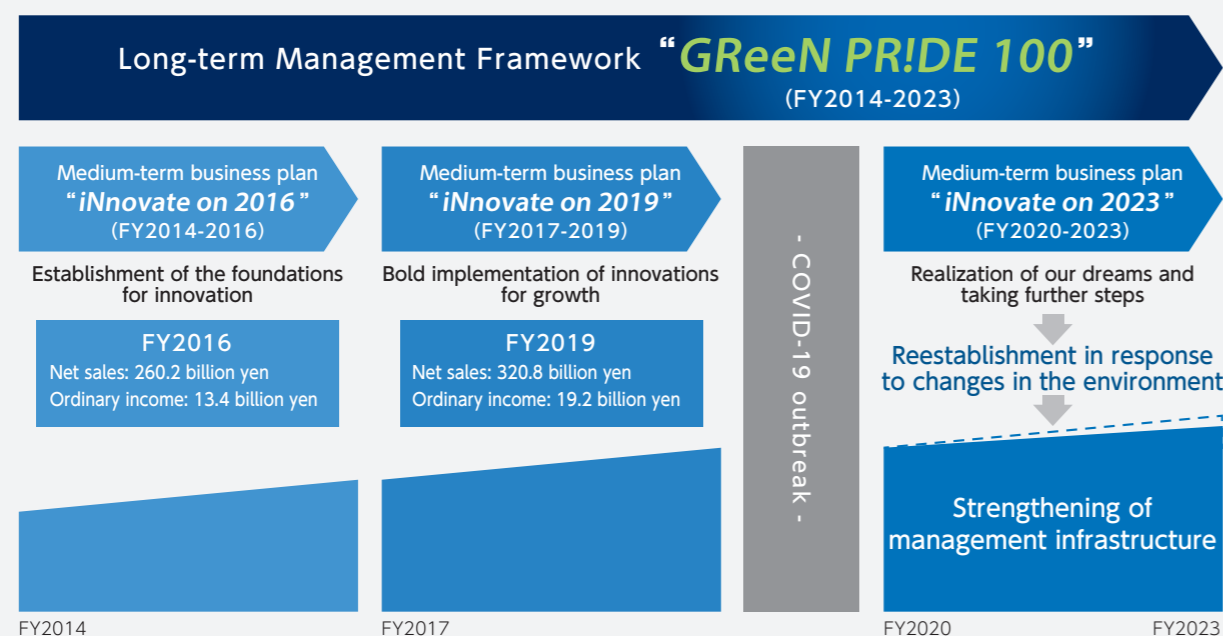
During the period of the previous medium-term business plan, our Group developed business activities under favorable market conditions including progress in large-scale redevelopment projects mainly in the Tokyo Metropolitan Area and the growth of construction demand towards the organization of the Olympic Games, along with demand increases in semiconductor and other industrial air conditioning fields. In our consolidated business results for the fiscal year ended March 2020, net sales (320.8 billion yen) and

ordinary income (19.2 billion yen) both exceeded the performance targets set in the medium-term business plan and also marked a record high as a result of our efforts to enhance on-site capabilities and improve productivity. For growth, we mainly invested in the construction of the Innovation Center, the renovation of the mission-critical system, the establishment of IoT and AI platforms and M&As in Japan and overseas during the three years. These investments solidified the foundation of our business and consolidated a basis for further expansion of the business.

● Consolidated performance of our Group during the period of the previous medium-term business plan by year



● 3 steps for the achievement of the long-term management framework



Review of the priority action items

With the slogan of "Bold implementation of innovations for growth," we set and implemented eight priority action items under the basic policies of "thorough emphasis on profits" and "the utilization

of the Group's collective strengths." The outcomes of the action items are outlined below.

Basic policies		Thorough emphasis on profits and the utilization of the Group's collective strengths
Strengthening of earning power	Enhancement of on-site capabilities	For the improvement of productivity, we outsourced part of our jobs on construction sites and developed and used ICT tools for on-site jobs.
Achievement of Group synergies	Strengthening of Group collaboration	We developed a system for mutual support between Group companies and organized the exchange of human resources between us and Group companies. We also worked to create synergies in the business of the Group through such initiatives as the practical use of the technologies developed through our accelerator program in Group companies.
Stabilization of earnings in international business	Reestablishment of the international business	To enhance and stabilize management infrastructure, we worked to examine the business model based on the local characteristics of each country and find local partner companies. As a major outcome, we made Integrated Cleanroom Technologies Pvt. Ltd. (ICLEAN), an Indian manufacturer of clean room-related systems and interior materials, a consolidated subsidiary and promoted the strengthening and expansion of the foundation of international business by the use of the knowledge, know-how and trade area owned by ICLEAN in the pharmaceutical field.
Establishment of new core businesses	Advances to the areas other than the contracting or subcontracting business	In the SIS business, we received orders through the development of sales activities aimed at a wider range of customers. Accumulating knowledge of highly fresh distribution, we are continuously committed to initiatives to expand the sales channels.
	Creation of new services	We constructed and started to operate the Takasago Thermal Engineering Innovation Center as a research and development base aimed at creating new businesses.
Improvement of the vitality of employees	Building of workplace environments that allow a work-life balance	In recognition of our efforts to improve the work environment and thereby help employees maintain their health, including the establishment of a support system with industrial physicians and public health nurses, we were certified as "Health Management Excellent Corporation 2020 (Large Corporation Category)".
	Development of various human resources	We introduced a new personnel system to help diverse human resources work actively and also strived to cultivate human resources with high levels of expertise and comprehensive capabilities in a planned and systematic manner.
Innovation of work	Strengthening of investments for innovations and management infrastructure (including M&As, etc.)	We conducted mergers and acquisitions in Japan and overseas to compensate for the lack of management resources in our Group. The renovation of the mission-critical system for the strengthening of management infrastructure and the improvement of work efficiency has advanced as planned and we will be continuously committed to it.



## Basic policies for iNnovate on 2023 go beyond!

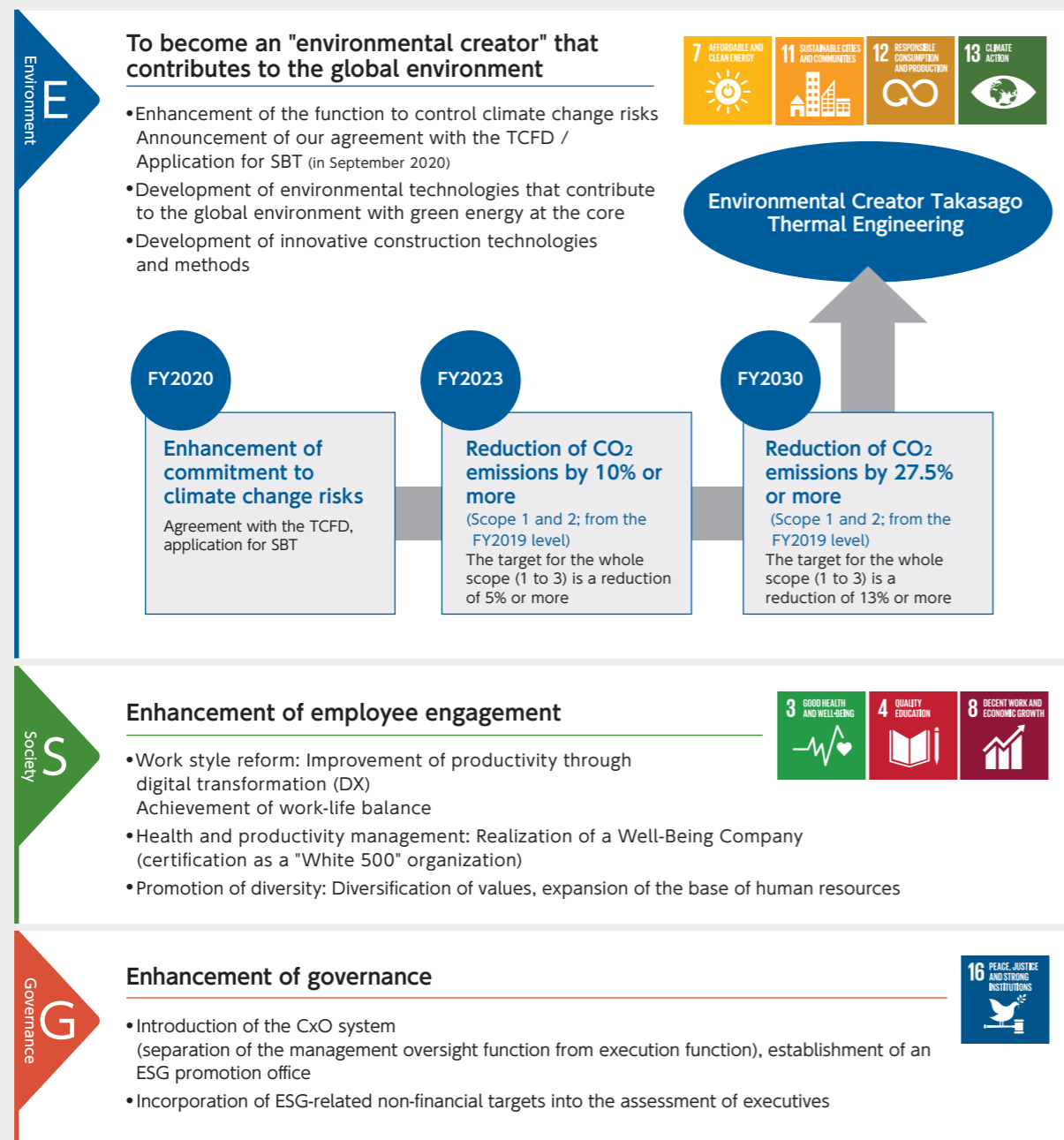
In the development of the medium-term business plan, we set "commitment to ESG and SDGs" and "enhancement of employee engagement with the company" as the core elements of our Group's business.

Based on the shared understanding, we have specified the three basic policies of "steady evolution into a multi-disciplinary equipment business," "establishment of the second and third core businesses" and

"further enhancement of engagement" to strengthen management infrastructure in consideration of COVID-19 and other changes in the environment. In accordance with this medium-term business plan, our Group aims to become an "environmental creator\*" that contributes to the global environment for the creation of a low-carbon society.

\* An environmental creator is a company that introduces air-conditioning technologies for the environment where people have activities, as well as environmental technologies that contribute to the global environment (environmental engineering), to society and creates a new environment.

### Initiatives to solve ESG-related challenges



## Commitment to ESG and SDGs

Our Group has been engaged in the planning, design, construction, maintenance and operation of all types of buildings with HVAC systems at the core and provided air environments needed by customers. Moreover, we have actively been committed to the reduction of CO<sub>2</sub> emissions through the design and construction of facilities, proposal of energy-saving renovation and tuning and other initiatives for the creation of a low-carbon society.

Based on these activities, we will promote initiatives for each item of ESG.

### E: To become an environmental creator that contributes to the conservation of the global environment

To achieve the target of reducing CO<sub>2</sub> emissions by 27.5% or more (from the FY2019 level in Scope 1 and 2) in fiscal 2030, we will enhance our functions to control climate change risks and develop green energy\*-based environmental technologies and innovative construction technologies and methods.

\* Green energy is the energy that emits no hazardous substance to the earth to contribute to the global environment, including hydrogen, sunlight, wind power and biomass.

### S: Enhancement of employee engagement

We will work to enhance employee engagement with the company through the promotion of work style reform and health and productivity management while also promoting diversity to become a Well-Being Company where all executives and employees are physically and mentally healthy and work energetically.

### G: Governance

We will work to further enhance governance through the separation of management oversight from execution, continuous review of the system for the remuneration of executives, development of a compliance culture and enhancement of the proper risk control system.

## Enhancement of engagement with Takasago Thermal Engineering

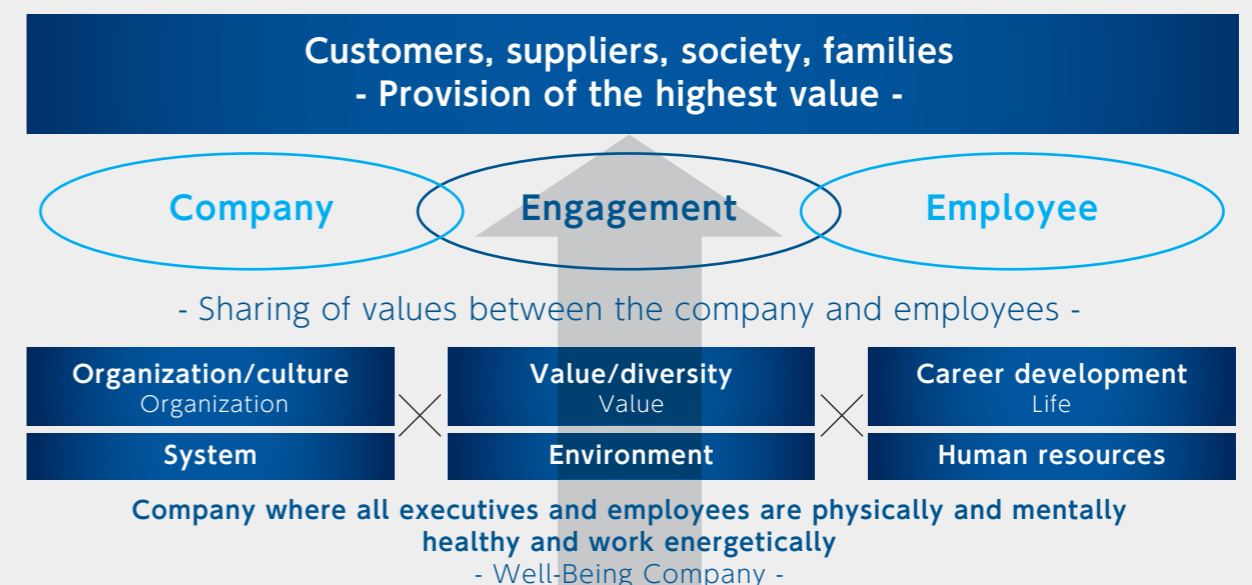
Our Group considers that sharing of values between the company and employees to trust each other and grow together will help us provide the highest value to society. To ensure that each person can realize the "Contribution to society through personal harmony and creativity," which is our management policy, and work with high performance, we will be committed to the improvement of productivity through digital transformation (DX) and work style reform with the achievement of work-life balance and other measures.

We will also establish and disseminate the Takasago Way, which links the management policy, management

principles and management plans with the actions of employees and serves as a guide that encourages them to make autonomous decisions and actions.

In addition, to promote work styles that ensure that human resources can work effectively, we will strive for human resource development that maximizes everyone's potential, as well as the use of human resources based on the personal data of each employee.

### Enhancement of engagement and targets



### 3 growth strategies in the new medium-term business plan

In iNnovate on 2023 go beyond!, we will implement the following three growth strategies under the basic policies.

#### ① Strengthening of business in Japan

To respond to changes in the business environment including decreases in construction investment and the working population and realize the creation of the highest quality and the improvement of productivity, we will work for the promotion of DX in the underlying business, reform of the construction process and the standardization and succession of design techniques and promote Takasago Transformation, which is the fundamental reform of our core business.

At the same time, we will reform and review the construction system to establish a multi-disciplinary equipment function and strengthen management infrastructure.

#### ② Reform of international business

In consideration of the unstable world situation and the impact of COVID-19, we will promote the stabilization of our international business management and the adoption of new business models.

While establishing the "ALL Takasago" system through the cooperation of local subsidiaries with our business divisions, we will work for the expansion of the building/plant construction business, in addition

to the facility construction business, and review of the profit structure, as well as enhancement of the sales system beyond regional borders, fostering of executives in local subsidiaries and improvement of the skills of each employee.

For the business model reform, we will be committed to PM/CM\* that handles the whole process from the receipt of an order to maintenance and operation in an integrated manner and the development of design, consulting and maintenance businesses.

\* PM: project management  
CM: construction management

#### ③ Entry into environmental business

In response to energy and climate change issues and other global challenges, we aim to establish businesses that can contribute to society based on the environmental technologies cultivated in our Group.

Setting the Takasago Thermal Engineering Innovation Center as the starting point, we will strive for the development of environmental technologies based on hydrogen, biomass and other green energy, as well as an attempt to enter the frontier business and the establishment of real estate business specializing in the improvement of the environmental performance of small and medium-sized buildings through renovation and conversion. Through these activities, we seek to establish our second and third core businesses and diversify revenue sources.

### Main management indicators of Takasago Thermal Engineering Group for FY2023: KGIs (Key Goal Indicators)

We aim to achieve consolidated net sales of 325.0 billion yen and consolidated ordinary income of 20.0 billion yen in fiscal 2023, which is the final fiscal year for the medium-term business plan.

As a new management indicator, ROE is set as a KGI and we seek to achieve ROE of 10.0% or more in the whole Group in fiscal 2023.

For the creation of a low-carbon society, to which

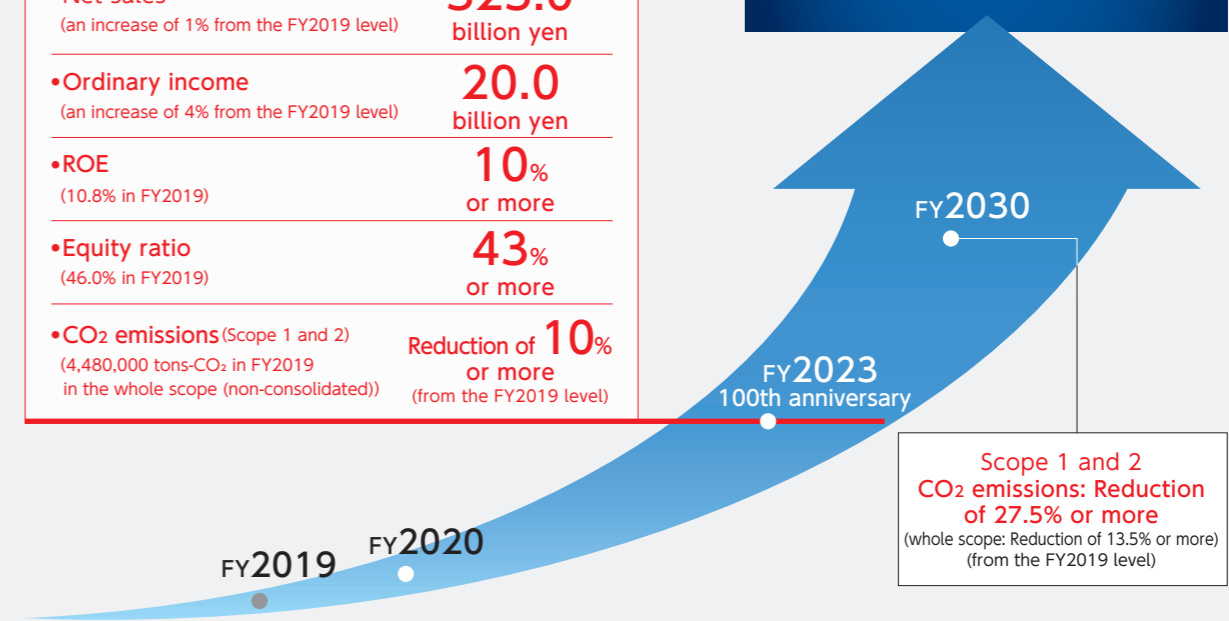
our Group should particularly be committed from the perspective of ESG, we aim to reduce CO2 emissions by 10% or more (Scope 1 and 2) from the fiscal 2019 level in fiscal 2023.

In our financial and investment plan, we are expected to have an equity ratio of 43.0% or more in fiscal 2023 while planning to invest a total of around 60 billion yen on a cash basis over four years.

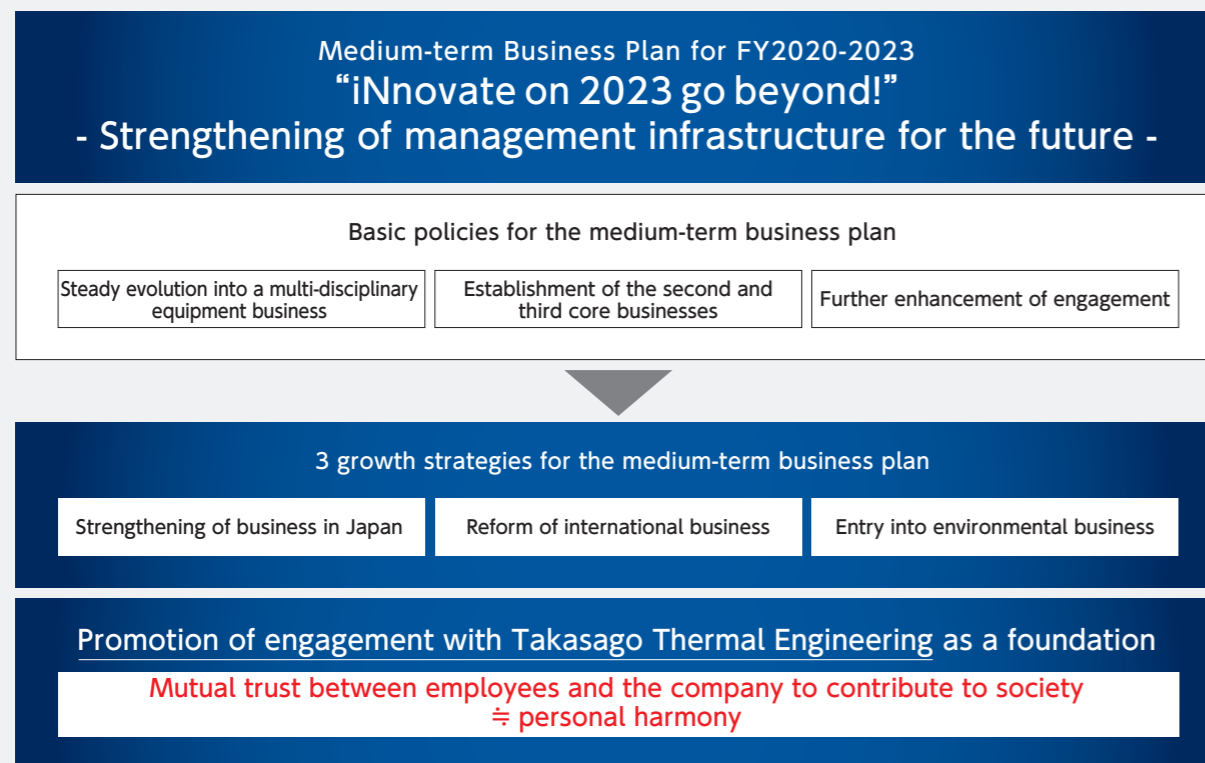
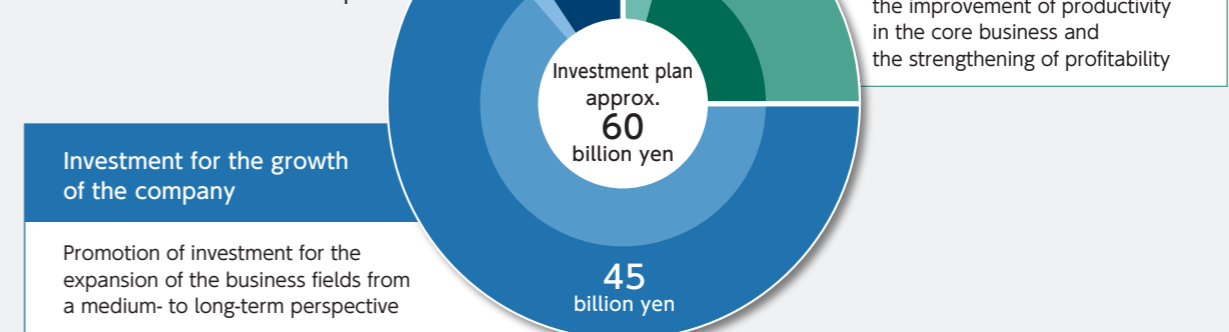
#### ● KGIs for the new medium-term business plan

Performance targets for FY2023 (consolidated)	
• Net sales (an increase of 1% from the FY2019 level)	<b>325.0</b> billion yen
• Ordinary income (an increase of 4% from the FY2019 level)	<b>20.0</b> billion yen
• ROE (10.8% in FY2019)	<b>10%</b> or more
• Equity ratio (46.0% in FY2019)	<b>43%</b> or more
• CO2 emissions (Scope 1 and 2) (4,480,000 tons-CO <sub>2</sub> in FY2019 in the whole scope (non-consolidated))	<b>Reduction of 10% or more</b> (from the FY2019 level)

Contribution to the global environment for the creation of a low-carbon society as an environmental creator



#### ● Investment plan in the new medium-term business plan



An immediate challenge is to achieve a good balance between well-prepared responses to changes in the environment due to COVID-19, etc. and investment for growth while maintaining financial soundness



**Yoshiyuki Hara**  
Director and CFO  
Takasago Thermal Engineering Co., Ltd.

●Rating (as of September 30, 2020)  
Long-term issuer **A**  
Bond **A**  
Rating agency: Japan Credit Rating Agency (JCR)

ensure the proper amount of cash and deposits on hand and reduce excess borrowing to thereby increase asset turnover. Accounts receivable for completed construction work can be reduced through business operations that keep cash flow in mind. We will focus on the creation of operating cash flow through the improvement of efficiency of working capital and other measures to maximize free cash flow. With respect to shares held for purposes other than investment, we regularly verify the shareholding policy for each stock to reduce them in a rational manner. As a result of the examination of the overall earnings including related trading profits and dividends, as well as the risks and costs associated with shareholding, for each stock, we reduced 33 stocks and a total sale (market) value of approximately 8.6 billion yen over the past five years. To lower the stock price fluctuation risk, we will work for the continuous reduction of the stocks including replacement with real estate and other assets.

as a measure to evolve the technological and on-site capabilities we have developed over many years and provide new value to customers. More specifically, we will build a foundation for the reform of the business structure towards the future with focus on the "improvement of productivity and profitability in the core business" and "investment for the expansion of the business fields from a medium- to long-term perspective." In the meantime, growth investment requires a strategy from a medium- to long-term perspective along with risk-taking. We will analyze and assume risks not as negative aspects but as potential sources of revenue and pursue the maximization of returns while also determining their negative impact. We will also conduct thorough monitoring in the implementation phase after an investment decision and establish objective criteria for decisions including the downsizing or withdrawal of business, which is especially difficult to decide, to eliminate sunk cost.

**The business environment and future outlook**

In the consolidated performance of our Group in fiscal 2019 (year ending March 2020), net sales and income indexes were the highest in our history since our foundation due to high construction demand in Japan and overseas as well as the outcomes of our efforts to improve productivity.

As to the future business environment, in addition to the present situation that it is a low demand period for construction work, we need to pay attention to the trend in capital investment in association with decreases in corporate earnings and uncertainty over the future in various industries due to the spread of COVID-19. While it is estimated that our income indexes will decline as a result of the sales drop in the current fiscal year, we will develop operations to maintain medium- to long-term growth with steady construction demand.

We understand that it is important to continuously ensure a good balance between well-prepared responses to changes in the business environment including the

spread of COVID-19 and investment for growth to further increase corporate value.

**Direction of the financial and capital strategy**

The policy in the financial and capital strategy of our Group is to seek the maintenance of financial soundness and the improvement of capital efficiency through the efficient allocation of management resources, as well as harmony between sustainable growth investment and continuous and stable shareholder returns.

We aim to maintain 10% or more of ROE in fiscal 2023 as a medium-term target for the whole Group. (The average in the past three years was 10.5%.)

To achieve the target ROE level, while also working to increase profitability, we will take financial approaches including the improvement of total asset turnover with reduction of assets and financial leverage with proper debt management.

**(1) Improvement of total asset turnover with reduction of assets**

We will optimize the cash conversion cycle (CCC) to

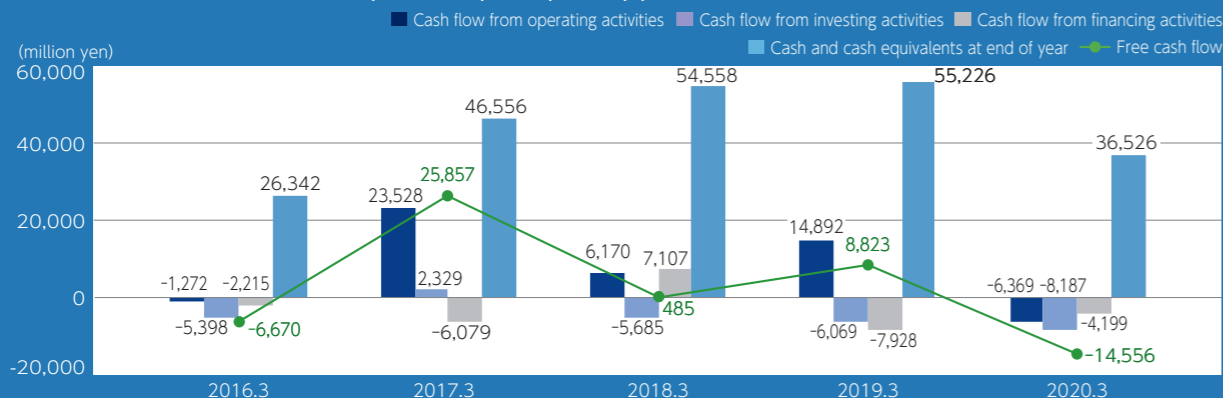
**Fundraising and shareholder return policy**

We issued green bonds for the construction of the Takasago Thermal Engineering Innovation Center in July 2019 and also procured funds from new investor groups that attach importance to ESG. Using the technologies developed through the HVAC business with the center at the core, we aim to solve social challenges and win the trust of stakeholders.

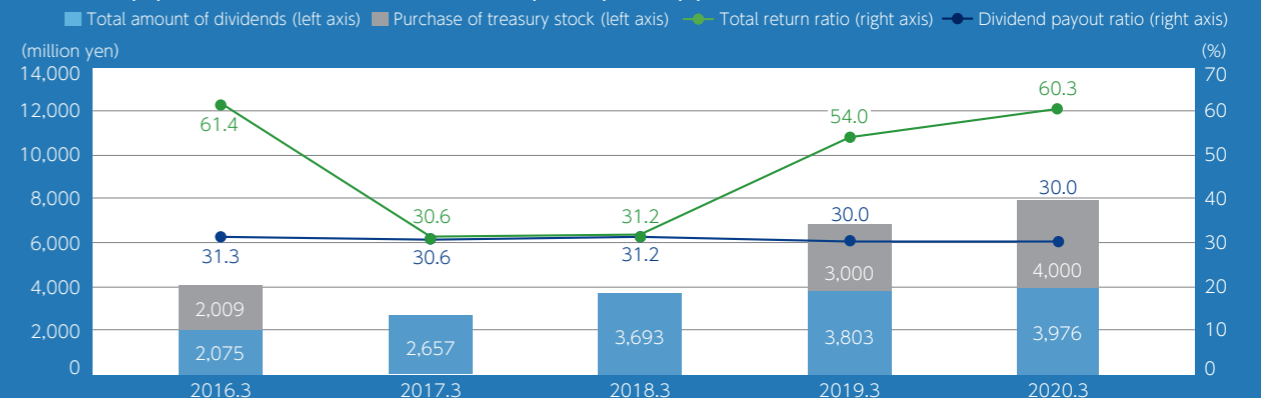
We recognize the return of profits to shareholders as one of the most important issues in business management. The basic policy of our Group on dividends centers on maintaining stable dividends while increasing profitability and capital efficiency and we have specified the rules to distribute dividends with a consolidated payout ratio of 30% and a consolidated dividend on equity ratio (DOE) of 2% as the lower limits. However, when a temporary decline of performance due to special causes such as the outbreak of COVID-19 is anticipated, we will also review stable dividends.

In addition, with the awareness of the total return ratio for shareholders, we will continue to acquire treasury stock flexibly in light of the business environment.

●Cash flow and cash, etc. at end of year in the past 5 years, by year

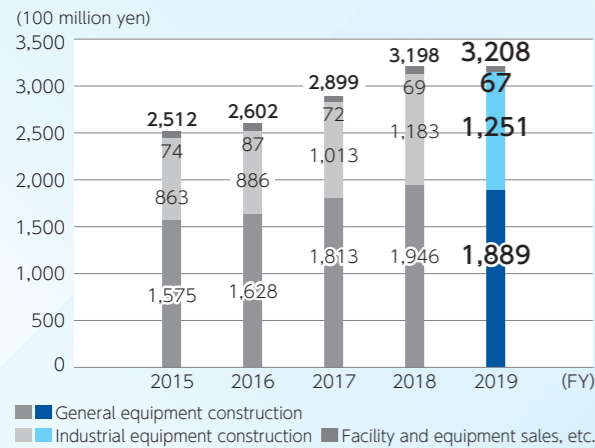


●Dividend payout ratio and total return ratio in the past 5 years, by year

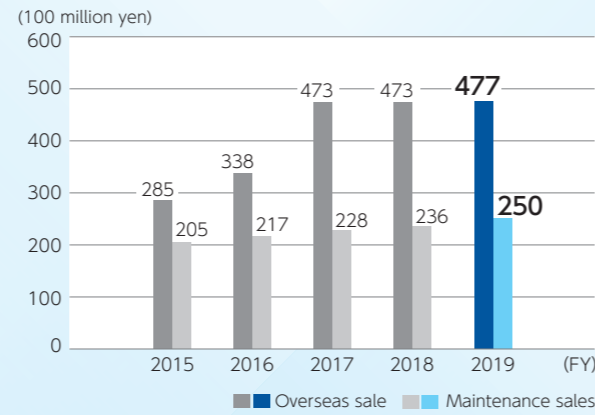


Financial performance

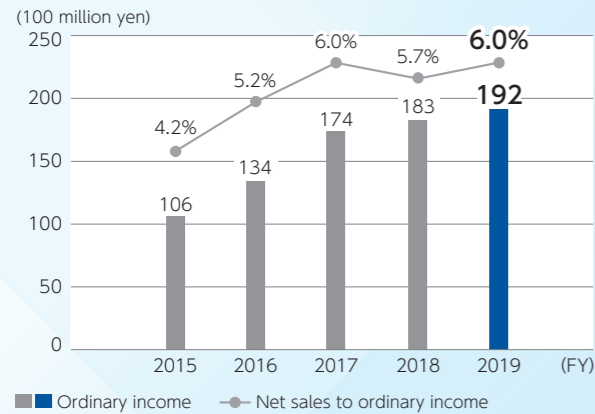
Net Sales



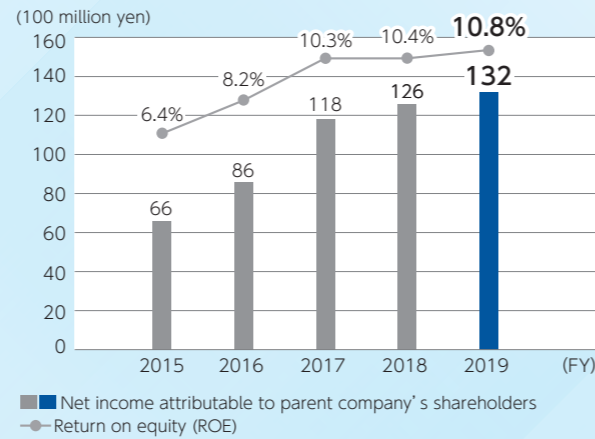
Overseas sales and maintenance sales



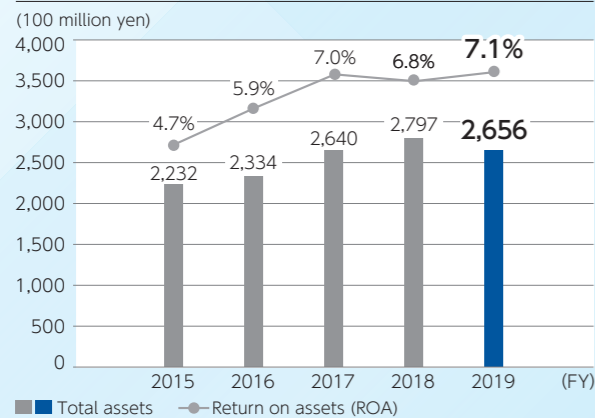
Ordinary income and net sales to ordinary income



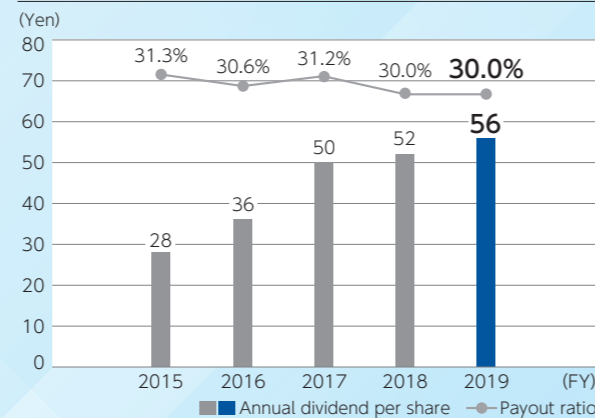
Net income attributable to parent company's shareholders and return on equity (ROE)



Total assets and return on assets (ROA)



Annual dividend per share and payout ratio

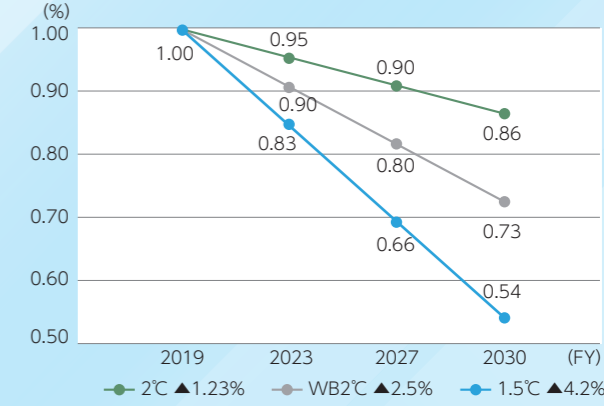


Non-financial Highlights

CO<sub>2</sub> emissions and reduction rate (t-CO<sub>2</sub>)

	2019	Annual reduction rate	2030	From the 2019 level
Scope 1	1,224	▲2.5%	887	▲27.5%
Scope 2	3,110		2,255	
Scope 3	448	▲1.23%	388	▲13.5%

Criteria on applying for SBT: CO<sub>2</sub> reduction rate



\* The emissions and reduction targets mentioned above are on a non-consolidated basis (Takasago Thermal Engineering alone).

Engagement of employees

(the data on satisfaction indexes, work style reform, work-life balance and health and productivity management are on a non-consolidated basis)

●Satisfaction indexes (Note 1)

Overall index	3.05
In-house programs	2.70
●Number of employees	
Non-consolidated	2,064
Consolidated	5,899

●Work style reform

Total annual working hours per person (unit: hours)	2,340.9
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●Work-life balance

Percentage of annual paid holidays taken	62.7%	
Number of persons who took childcare leave	Total	41
	Women	19
	Men	22*
Rate of return to work after childcare leave	100%	

\* Among them, 19 persons took a leave of one week or less.

●Health and productivity management

Percentage of those who had a health checkup	100%
Comprehensive health risk (Note 2)	93

(Note 1) The satisfaction indexes are calculated based on the results of an employee questionnaire conducted every year. The questions are answered on a four-point scale (with "4" as the highest).

(Note 2) The comprehensive health risk is calculated by HOKENDOHJINSHA INC., a company that implements stress checks. The average is 100 and a lower value indicates that the risk is lower.

●Diversity

Number and ratio of female employees* (excluding fixed-term employees)	309 (16%)
Number and ratio of newly employed female employees in fiscal 2020	28 (35.8%)
Number of managers appointed from among local staff*	188
Employment rate of people with disabilities	2.26%

\* The above-mentioned figures are on a non-consolidated basis except for the number of managers appointed from among local staff.  
\* As of the end of March 2020

Research and development - number of patents -

Number of patents (non-consolidated)

**773**

(as of the end of March 2020)

Research and development costs (consolidated)

**1,350 million yen**

(fiscal 2019)

# Creating innovations for the future

- The Takasago Thermal Engineering Innovation Center was completed and started operation -

Having been completed on a site near Miraidaira Station of Tsukuba Express Line in February 2020, the Takasago Thermal Engineering Innovation Center is a research and development base newly constructed to support the long-term growth strategy of our Group in a comprehensive manner. The center, which required two years for the development of the idea and took one year each to plan and construct, has become a special place to create innovations for the future.

Special  
Feature



## We will promote research and development for the next stage by using collaborative creation as a driving force

The Takasago Thermal Engineering Group is trying to create innovations for the future by increasing opportunities for collaborative creation as a driving force. While we have abandoned the self-sufficient policy and worked to enhance activities to support venture businesses and cooperate with major research institutes, this movement will be accelerated with the completion of the center.

Taking advantage of the location in Tsukuba, the center will expand collaboration with national research institutes, universities and companies. The first case was the demonstration of ZEB with support from Shin-ichi Tanabe Laboratory at Waseda University and Akashi Laboratory at the University of Tokyo. Since then, we have also enhanced our relationship with the National Institute of Advanced Industrial Science and Technology (AIST) and participated in Smart City Institute Japan and Tokyo Zero-emission Innovation Bay to explore the fields of town development and urban development.

While also working to increase the R&D budget and personnel, we will boost opportunities for collaborative cooperation and promote research and development for the next stage. Then, we will steadily evolve from "Takasago as an HVAC company" into "Takasago as an environmental creator."



**Hiroshi Yamawake**

Director and Managing Executive Officer  
Director in Charge of Research and Development  
Headquarters and Environmental Business  
Development Department

Strategy and Plan

### For the realization of the new R&D strategy

The Takasago Thermal Engineering Group has reviewed its main R&D fields and specified the four new items of "energy value chain technologies," "resource recycling technologies," "production system reform technologies" and "technologies to provide an advanced environment" so that we can meet social demand for the conservation of the global environment and health and productivity management beyond conventional frameworks.

Meanwhile, we position AI and IoT technologies, which will be used across different fields, as fundamental technologies. The management of various systems through the integration and optimization of them according to the purpose will enable us to take advantage of the technologies accumulated in our Group.

The Takasago Thermal Engineering Innovation Center, which integrates part of the headquarters functions (planning and development departments) and research facilities, was constructed as a place to facilitate the realization of this R&D strategy. Its concept embodied the targets of "using state-of-the-art technologies," "making the center a place where innovations can be generated easily" and "using it to demonstrate a wide range of technologies" in a composite manner.

The center roughly consists of three components, which are an office building mainly composed of work areas and multi-purpose areas, a laboratory building with demonstration rooms, laboratories and research rooms and the section connecting these two buildings composed of an exhibition space and a presentation room.

### Cutting-edge sustainable construction

The Takasago Thermal Engineering Innovation Center was designed to make it a sustainable construction that reduces the impact on the global environment and

improves intellectual productivity at the same time. The core factors are energy saving with our unique cutting-edge HVAC system and stable use of renewable energy. A major feature of this HVAC system is the use of heat in groundwater, which maintains low temperature throughout the year, in a cascade style (multistage manner). Groundwater is pumped up at night and stored in an underground storage tank for floor radiation air conditioning with the heat radiated to the structure (use of zero-order heat). In the daytime, groundwater is supplied to desiccant air conditioners\*1, radiation panels, personal air conditioners integrated with desks and DC fan coil units attached to desks and tables. Air conditioning using the groundwater is operated only as needed in the places where it is needed (use of primary heat). In addition, water heat source heat pump air conditioners, which use return condensate after the use for air conditioning as heat source water, have been introduced for the full use of heat in groundwater (use of secondary heat).

The HVAC system has the function of task air conditioning to finely address the areas where air conditioning is needed while intentionally minimizing the output of the system as a whole. Sensors are installed at intervals of 1.8 m on the ceiling in the work areas of the office building to sense the temperature of the space in three dimensions and distribute fresh outdoor air according to the number of people based on the data collected with location information sensors. The system allows workers to directly operate task air conditioners through a dedicated application to satisfy themselves and also has in place a mechanism to store the use history of equipment and apply it to future development activities. Moreover, the system is designed to introduce prevailing wind\*2 efficiently and use outdoor air cooling effectively during the intermediate periods (mainly from April to May and from October to November).

\*1 Air conditioners that control temperature and humidity separately to provide a comfortable environment efficiently  
\*2 Wind that blows frequently during a certain period. In this sentence, it refers to wind from Mt. Tsukuba.

The renewable energy we use is woody biomass and sunlight. Two cogeneration biomass gasification power generators manufactured by Volter in Finland have been installed to supply the heat emitted at the time of power generation to desiccant air conditioners for the regeneration (drying) of dehumidifying rotors, which reduces the heating and cooling load in the building as a whole. Needless to say, it is also used for hot water supply equipment. Solar power generation panels installed on the roof of the laboratory building are used in combination with power storage equipment to utilize surplus electricity and secure an emergency power source.

Through these efforts to thoroughly pursue the possibilities of energy saving and energy creation, the office building and the site as a whole have achieved "ZEB\*3" and "nearly ZEB," respectively. Visitors can observe the main equipment used to achieve ZEB in the exhibition space through the glass.

\*3 A net-zero energy building (ZEB) is a building that reduces the consumption of primary energy by 100% or more with energy saving (at least 50%) and energy creation. Nearly ZEB is a building that reduces the consumption of primary energy by 75% or more.

### Creation of an environment that stimulates innovation

In addition to using the latest technologies, we worked to make the Takasago Thermal Engineering Innovation Center a place where future technologies and innovations can be created, which was a major challenge in its design, construction and operation.

The first floor of the office building is an open space that serves as the entrance of the whole facility to welcome anyone and is used as a starting point for exchange. The exhibition space next to it displays some of the

innovations sought by our Group.

The work areas of the office building have functions for various purposes (to discuss, work, hide away, gather and rest) based on ideas for the work style reform approached by Takasago Thermal Engineering. With spacious rooms and the introduction of the free address system, we recommend flexible uses of the space according to the needs of the moment. Employees can select their seats in order of arrival and are encouraged to change their places every day.

There are various meeting sections, ranging from open areas that anyone can casually drop by, to closed rooms. Vacant places can be used anytime and users can change the layout freely. A monitor is installed in each of the sections to enable presentations to be made on the spot. The center is shared by employees of the Research and Development Headquarters and Environmental Business Development Department to achieve the target of creating an environment where they naturally promote exchange and collaboration. The sections are also used by visitors from outside the company.

In the laboratory building as well, we work to develop an environment that facilitates collaborative creation. The rooms named Co-Creation Satellites are designed to have various factors including space/equipment, IT environment and security on the assumption that they are jointly used by people in various positions. The utilization is gradually growing despite the impact of the COVID-19 pandemic.

## Creating innovations for the future

### As a large testing site

The Takasago Thermal Engineering Innovation Center is making many attempts that are possible only in in-house facilities and actively approaching technologies that are promising but whose effect has not been demonstrated.

While the achievement of ZEB is partly attributed to the thorough use of heat in groundwater, another critical factor is the minimum design of the HVAC system that can be realized because the center is our facility. Minimum necessary demand for air conditioning was estimated and the equipment was designed based on the estimate to reduce the equipment capacity by around 30% and energy consumption by more than 50% in comparison with the ordinary design.

The HVAC system adopts a one-way system based on outside air treatment air conditioners, which constantly supplies 100% of necessary outside air intake and also discharges 100% of emissions. No air conditioners of a circulating type are used other than those for personal use or no control based on indoor temperature is conducted. These are all new attempts. Instead of adopting the approach of decreasing the outside air intake to reduce burdens on air conditioning, we made a plan to ensure people can always work in a comfortable environment with fresh air quality while also using outside air cooling through a natural ventilation system without becoming obsessed only with the energy consumption. We are promoting demonstration studies in view of the use of this system in such environments as office buildings, commercial establishments and hospitals.

We introduced a displacement air conditioning system using a product of our Group\*4 on the first floor of the office building, which accommodates a cafe restaurant and multi-purpose space. Only the areas where people stay are made comfortable, which is possible even with low airflow because conditioned air is blown off from low positions of walls, etc. to create temperature stratification. In addition, dirty air is exhausted through upper vents to achieve energy saving and comfort. While

we have used this technology mainly in factories and other work areas, we introduced it with the judgment that it is also effective in the common areas of the center based on simulation results. We will verify the actual effectiveness with data collected after the start of the operation.

In the work areas on the second floor of the office building, personal air conditioners are installed in part of the ceiling surface and all desks. This system enables workers to operate air conditioners by themselves according to their needs to achieve a sense of satisfaction while also reducing energy consumption. The personal air conditioners are operated through the smartphone of each worker, which allows us to collect data on "who" operated "which air conditioner" "when" to understand individual needs and use them for system development in the future. We have also established a mechanism to motivate workers to reduce energy consumption by providing those who have used air conditioners for a shorter time with reward points that can be used as money in the cafe. In the future, we will seek the most effective way while also checking feedback from the workers.

To verify the comfort achieved with this experimental HVAC system, we measure temperature, humidity and CO<sub>2</sub> level in various parts of the center. In the meantime, a desk for a virtual employee "Ami Takasago," who is an android with sensors, is set on a corner of a work area to evaluate the working environment objectively.

Wall greening is applied to the inlets and outlets for outdoor air to introduce the air through plant filters into the building. We also observe how the quality of the air passing through the plants influences the working environment as one of the research subjects. Water basins are placed in front of the wall to verify their effect of removing dust contained in the air introduced into the building, as well as their air cooling and humidifying effect.

\*4 Swirling induction type HVAC system, SWIT®

We are also taking experimental approaches to energy and recycling. The ashes discharged from woody biomass gasification power generators are applied to the field on the premises to cultivate Erianthus spp., which are gramineous biofuel crops and pelletized and used as fuel for the pellet boilers in the facilities. Erianthus spp.

are perennial herbaceous species with a similar level of calorific value with woody species and are expected to play a role in efforts to address degraded agricultural land in the future. The center will verify the species through operation and other initiatives.

### To make the center a place to demonstrate technologies in response to social demand

Since I became the head of the project office for the Takasago Thermal Engineering Innovation Center in April 2018, I have incorporated the "systems I wanted to establish but could not alone as a builder" into the execution design to the maximum extent possible.

I was especially committed to the minimum design of the HVAC system. When we work at facilities of customers, we simulate various situations and give some leeway. Now, with the chance of a lifetime to construct our own facilities, we will verify whether or not we can achieve the highest energy-saving performance with the combination of a minimum necessary ventilation (outdoor air treatment) system with personal air conditioning while also ensuring comfort. If we can establish it as an effective system as a result of verification, we will be able to make a much wider range of proposals for a low-carbon society and health and productivity management.

While ventilation in buildings has attracted public attention due to the recent COVID-19 outbreak, we believe that the center will offer solutions to the issue.

Aiming to meet social demand, solve challenges on the social environment and technologies and create innovations, we will make maximum use of the Innovation Center as a place to demonstrate technologies as well.



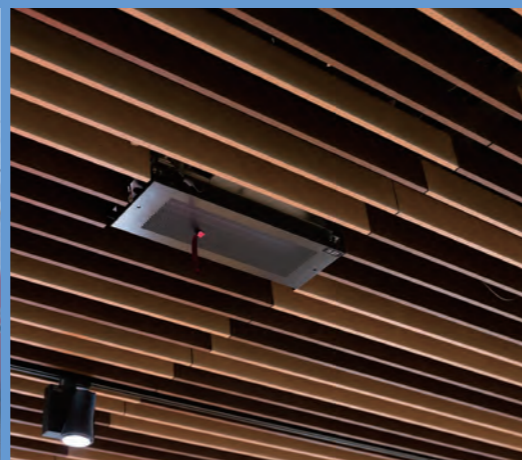
**Yoshihiro Hirahara**  
Deputy Executive Officer General Manager of Research and Development Headquarters and New Technology Development Division



Displacement air conditioning panel SWIT® installed on the walls of the cafeteria



Desk for the virtual employee "Ami Takasago"



Air conditioner for individual use (DCFCU) that allows users to control the setting according to their preference



Monitoring of the comfort level of workplaces

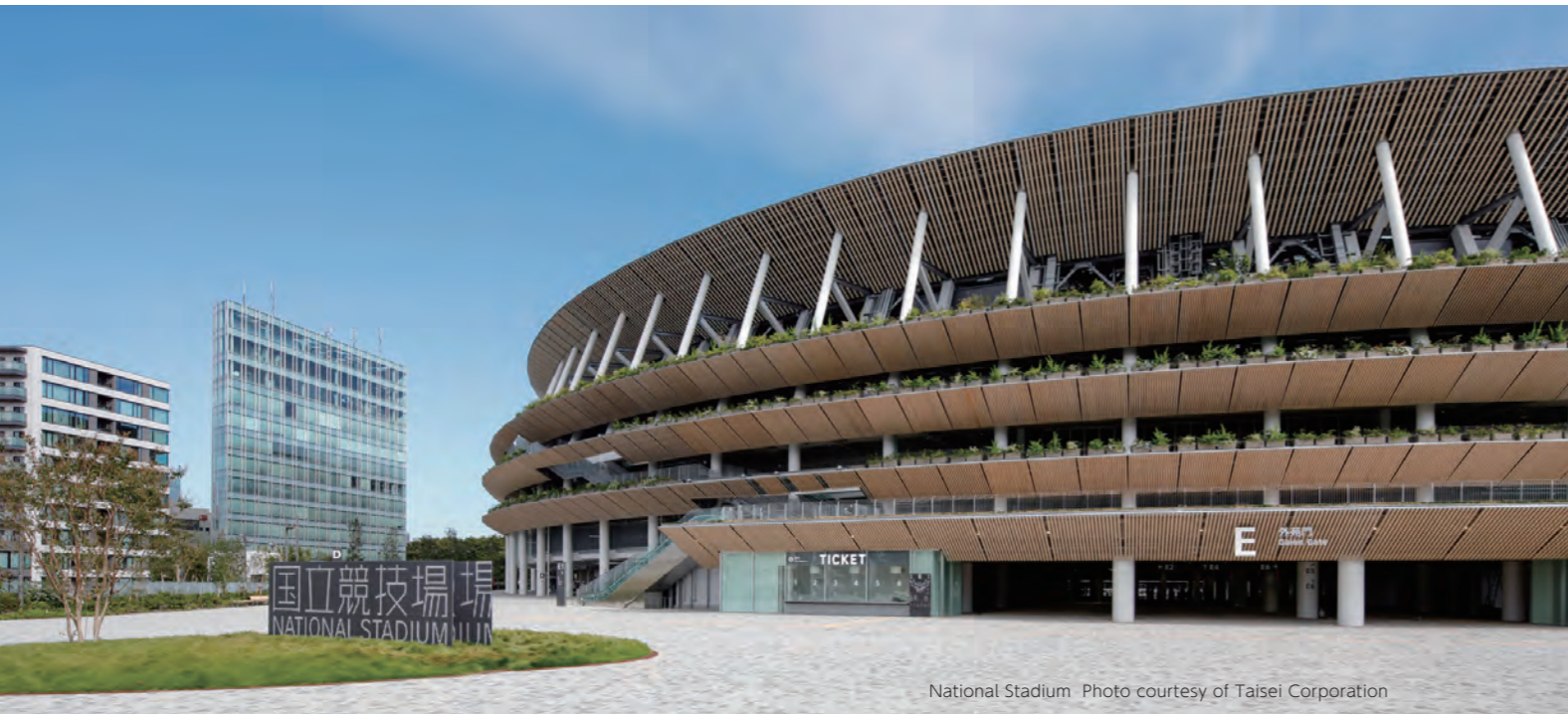


Outdoor air inlets installed on the exterior wall

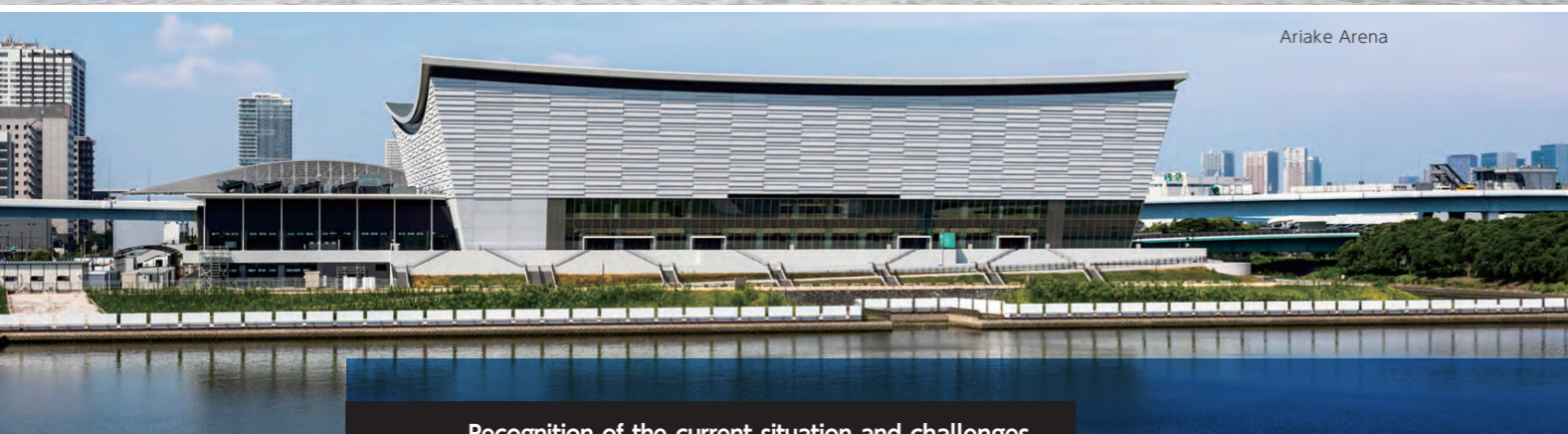


Field to cultivate Erianthus spp. where the ashes generated from woody biomass power generation are reused

## For taking a leap into the comprehensive building service business with HVAC system construction as the core business



National Stadium Photo courtesy of Taisei Corporation



Ariake Arena

### Recognition of the current situation and challenges

Although capital investment has been expanding continuously in large-scale redevelopment mainly in the metropolitan areas, as well as manufacturing and non-manufacturing industries, the outlook is becoming unclear. Meanwhile, the issues of skyrocketing labor costs and labor shortage show no sign of improvement. Accordingly, while it is necessary to take a conservative approach to business operation, we need to be committed to bold reforms such as the improvement of work efficiency.

To substantially reform the operating process in such a business environment, we will throw away the old-fashioned ways of doing jobs in the construction industry, establish a platform that integrates the technological capabilities we have cultivated over many years with digital techniques and develop supply chain management (SCM) with production bases that function as the hubs for affiliated companies and construction sites.

We will also systemize and standardize design skills as know-how based on digital techniques to further sophisticate the skills and continuously hand them down.

While there has been a gap in planning capabilities, abilities to prepare resources and construction quality between construction sites, as well as a gap in the level of specific skills between workers, we will level them at high levels through the initiatives mentioned above and promote business operation for the achievement of the highest quality and high productivity.

### Initiatives taken in fiscal 2019 and their details

Initiatives	Details
Strengthening of technological capabilities and sales capabilities	<ul style="list-style-type: none"> <li>The company-wide enhancement of the technological level, as well as the strengthening of special technologies, through the development of engineers with high design skills and strengthening of activities in the technological specialist program</li> <li>Discovery and selection of new partner companies for the strengthening of the one-stop service system and the alliance</li> <li>Acquisition of skilled craftworkers and handing down of skills by using the Takasago Technical School and other training organizations</li> </ul>
Strengthening of management control and support for construction sites	<ul style="list-style-type: none"> <li>Implementation of practical training aimed at enhancing organizational sales capabilities</li> <li>Initiatives for young sales staff including the improvement of their abilities to propose solutions based on technical knowledge, training on sales engineering and development of global personnel</li> </ul>
Strengthening of integrated management across the Group	<ul style="list-style-type: none"> <li>Establishment of a system to divide and concentrate overall technical operations according to their characteristics and the standardization of the operations</li> <li>Promotion of work style reform for operations on site</li> </ul>
	<ul style="list-style-type: none"> <li>Implementation of activities to make Group-wide proposals with focus on renewal sales activities</li> <li>Identification of challenges and setting of common targets while taking initiatives for the achievement of synergies</li> </ul>

### Initiatives in fiscal 2019

#### Provision of technical training for partner companies

As part of the activities of the Takasago Technical School, we organized a technical training program for staff to become general foremen at the Fuji Education and Training Center from July 22 to 25, 2019, which was attended by 14 young foremen selected from the branches of Kowakai across Japan. A participant commented that he acquired skills that he had not had and another participant mentioned that knowledge of other business categories were especially useful. We will continue to develop initiatives for Kowakai including the provision of training, information, etc.



#### For the improvement of efficiency in on-site operations

The Process Support Section of the Tokyo Main Office is committed to daily tasks to achieve the goal of becoming a department that pushes through work style reform. The in-house operation of jobs, mainly the preparation of construction drawings, plan documents and manuals, has been promoted because they can be conducted in a concentrated manner in the company and the jobs of 64 sites of the Main Office were shifted to in-house operation in the previous fiscal year. For part of the operating process that can be outsourced, including technical calculation, sorting out of construction photos and check of safety documents, we have established the procedures from the standardization of tasks to their operation while setting the target of introducing them into all offices. In the previous fiscal year, we responded to 170 requests from the sites to contribute to the reduction of the work volume of employees.



TV conference with staff on site  
Persons in charge from the Process Support Section and the CAD team of Nihon Kaihatsu Kosan joined the conference

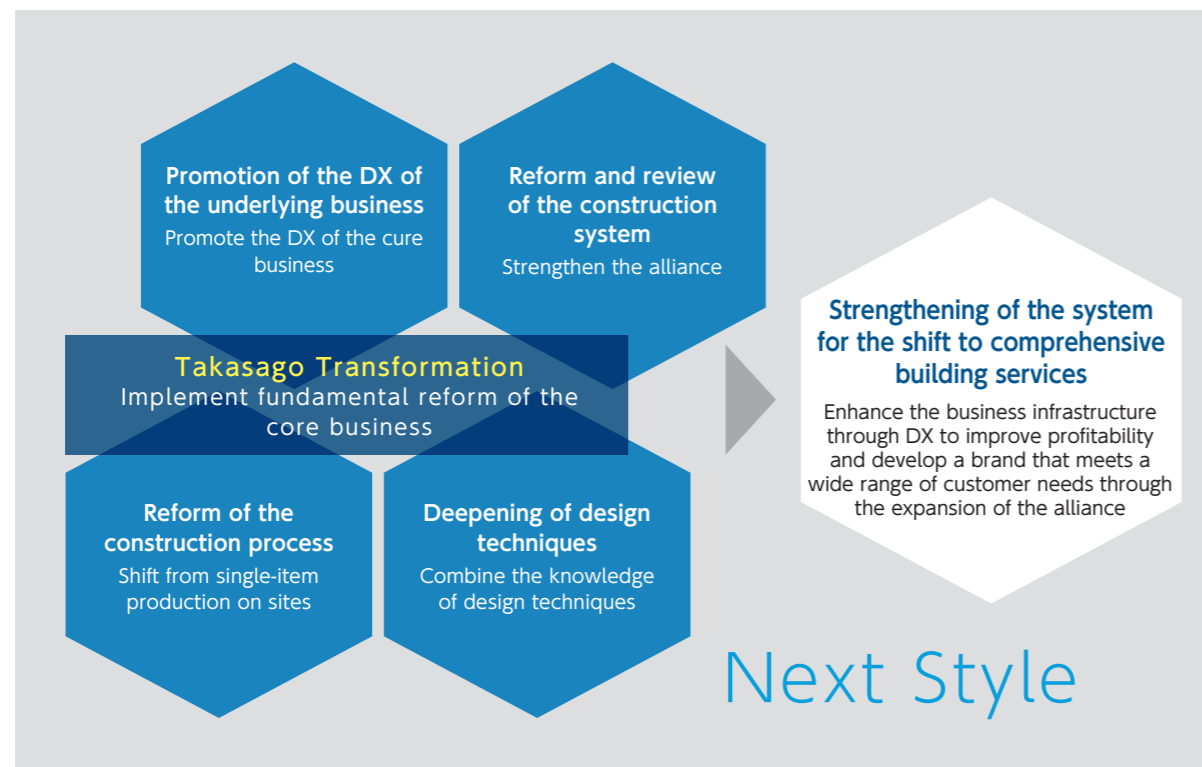
#### Global personnel training for sales staff

To develop sales staff who will work actively on the international stage, we sent young employees to Thailand, Vietnam and Malaysia for three months. While having difficulty communicating in English at first, they got used to the local culture and customs gradually to fit in well and visited customers with local staff. They also organized study sessions about the information on marketing in Japan and sales methods of Takasago Thermal Engineering to mutually exchange information and opinions. In addition, they received lectures on business management from the presidents of the overseas subsidiaries and had opportunities to experience it. Since their return to Japan, the employees have been working actively as international influencers for other employees in the same generation and played a part in the promotion of globalization and borderless operation of the sales staff.



### Commitment to making our business in Japan resilient based on the new medium-term business plan

On the basis of the worsening of business conditions anticipated in the future including decreases in construction investment and labor population and changes in the business structure as a result of technical innovations, we will work for the fundamental reform of our business in Japan and strengthening of management infrastructure for the future.



#### Initiatives in the medium-term business plan

##### Fundamental reform of the business in Japan → Takasago Transformation

- **Promotion of the digital transformation (DX) of the underlying business**
  - Appoint a CDXO (Chief DX Officer) who will promote the DX of the core business.
  - Use BIM, AI, mission-critical systems and other digital technologies and seek coordination with all operations
- **Reform of the construction process**
  - Work to turn construction equipment into logistics.
  - Develop technologies and construction methods for the improvement of productivity of on-site operations.
- **Deepening of design techniques**
  - Formalize the unique technologies we have accumulated and promote the enhancement of design technologies and the development of human resources.
  - Set up a high technology team for the standardization of the technologies needed for challenging facilities.
- **Reform and review of the construction system**
  - Work to strengthen the alliance and build a construction system that meets customer demand.

### Strengthening of the structure for the execution of the new medium-term business plan

In the anticipation that the strategy to receive orders in Japan and overseas will become even more important, we separated the sales function from the Business Management Headquarters to enhance our abilities to increase sales from customers and optimize the receipt of orders on a company-wide scale and newly established the Sales & Marketing Headquarters in fiscal 2020. Amid rapid changes in the business environment for customers and the diversification of their demand, we will strengthen organizational sales abilities to become a corporate group that is appreciated by customers through the provision of high value to them. Under the Sales & Marketing Management Division in the Sales & Marketing Headquarters, we have set up three offices that include the Sales Management Office, Market Cultivation Management Office and International Sales

Management Office. With the policy to give top priority to customers, we will take initiative to receive more high-quality orders from global and company-wide perspectives. The Sales & Marketing Headquarters serves as a technical and administrative department that integrates the windows for technological issues in the whole Group in Japan and overseas and strives to establish Takasago as a leading technology-oriented company through the setup of new departments including the Design Management Division, which performs the planning and management of design and after-sales services in an integrated manner, and the Productivity Improvement Planning Office, which promotes the improvement of productivity on sites and the reform of the construction process and the sophistication of construction plans and drawings.

### For the acceleration of integrated management across the Group

The Takasago Thermal Engineering Group provides one-stop services in a wide range of fields in addition to construction work while making maximum use of the respective features of the Group companies. In recent years, we have worked to expand the fields and also promoted initiatives for total optimization including restructuring with focus on synergies in the Group. In the new medium-term business plan launched in

fiscal 2020, which aims at a shift from an HVAC business operator to a comprehensive building service provider, as well as growth into an environmental creator, we will further enhance cooperation for the achievement of the targets in the plan by Group companies and the Group as a whole.

#### TMES Corporation

- **Main initiatives taken in and before the previous fiscal year**  
Expansion of the comprehensive facility management and establishment of the Contact Center as a base for solutions
- **Priority items in the new medium-term business plan**  
Establishment of "smart maintenance" and the TMES brand

#### NIPPON Pmac CO., LTD.

- **Main initiatives taken in and before the previous fiscal year**  
Solidification of foundations for the exploration of new markets and new businesses and development of products
- **Priority items in the new medium-term business plan**  
Expansion of the businesses including those in new fields and evolution into a manufacturer of environmental equipment

#### Nippon Development Kosan Co., Ltd.

- **Main initiatives taken in and before the previous fiscal year**  
Enhancement of the lineup in the outsourcing business and improvement of profitability
- **Priority items in the new medium-term business plan**  
Further expansion of business operations in the outsourcing business and improvement of services

#### Kiyota Kougyo Co., Ltd.

- **Main initiatives taken in and before the previous fiscal year**  
Development of a training system and improvement of work efficiency through the introduction of ICT
- **Priority items in the new medium-term business plan**  
Strengthening of salesforce capabilities and on-site construction capabilities

#### Nihon Setsubi Kogyo Co., Ltd.

- **Main initiatives taken in and before the previous fiscal year**  
Strengthening of price competitiveness through the development of a cost management system
- **Priority items in the new medium-term business plan**  
Improvement of productivity through the establishment of a new organization in charge of the activities from order receipt to procurement

#### Kazusa Environmental Research Center Co., Ltd.

- **Main initiatives taken in and before the previous fiscal year**  
Reduction of labor and improvement of efficiency in operations through the introduction of new analytical equipment and instruments
- **Priority items in the new medium-term business plan**  
Enhancement of the financial system and promotion of the collaboration with the Group



## Becoming an environmental company whose presence is admired in the global market



Project name: TDS Battery Factory & Warehouse Project  
 Use: On-vehicle lithium-ion battery plant  
 Client's name: TDS Lithium-Ion Battery Gujarat Private Limited  
 Purchaser's name: SMCC Construction India Limited  
 Area /Country: Gujarat, India

### Recognition of the current situation and challenges

While overseas construction markets are facing changes in the international circumstances as well as various geopolitical challenges, the construction markets in Asia and other emerging countries have high growth potential and the re-establishment of the supply chain will likely advance on a global scale.

The Takasago Thermal Engineering Group recognizes that it is indispensable to strengthen its international business when looking ahead to 2023, the year when we mark our 100th anniversary, and the subsequent decade. We will be actively committed to SDGs and work for "stabilization of management infrastructure in the international business" and "expansion of business fields overseas" as the core factors with focus on environmental business fields. We have steadily achieved results from our commitment to the improvement of management efficiency through the reinforcement of management control departments of overseas subsidiaries, as well as the enhancement of our purchasing power through the strengthening of their technology departments to provide good quality to customers.

Aiming to become an "environmental company whose presence is admired in the global market," which is one of the visions in our long-term management framework, we will raise the ratio of overseas components in our business portfolio to an appropriate level.

While countries are taking different approaches to the COVID-19 pandemic, we will secure the safety of Group employees and also respond to customer demand in a proper and flexible manner. Then, we aim to establish a strong position in the countries to which we advance as an environmental creator that creates the future earth where people can live in prosperity.

### Initiatives taken in fiscal 2019 and their details

Initiatives	Details
Stabilization of management infrastructure in the international business	Enhancement of technical guidance to overseas subsidiaries including the promotion of the use of BIM
	Strengthening of internal control through the check (on-site inspection) of the work process in overseas subsidiaries
	Examination of a group finance scheme to realize efficient financing between overseas subsidiaries
	Improvement of commitment to compliance in cooperation with the Legal Division (whistle-blower system) and enhancement of compliance education

### Initiatives in fiscal 2019

#### International Business Headquarters Technology Conference

We organize the International Business Headquarters Technology Conference, in which representatives from overseas subsidiaries present details of advanced technologies they have examined and put into practice for their operations, as well as their achievements, to allow the technologies to be introduced into other subsidiaries and help them improve their technological capabilities. The group selected as the best presenter at this conference is qualified to participate in the Takasago Thermal Engineering Group Technology Conference, which naturally intensifies the competition among the local staff. As a feature of this conference, the types of construction work and equipment that are unfamiliar in Japan are often presented. In fiscal 2019, a presentation group from I CLEAN received the best award and participated in the 36th Takasago Thermal Engineering Group Technology Conference to win the excellent technology award.



#### LOMA (use of IoT technologies)

Thai Takasago has launched the LOMA (Link, Operate, Monitor and Analyze) service to visualize facilities of customers with IoT technologies and help them improve the efficiency of failure prediction and preventive maintenance. The data collected from sensors are managed in the cloud in an integrated manner to allow the operation status of facilities to be checked easily on a screen of the LOMA Dashboard. As a major feature, this service can collect temperature, humidity, pressure, electricity consumption and other data irrespective of the manufacturers of the sensors, which enables the more flexible application of the service to the facilities of customers in comparison with the competition.



#### Technical training of local employees

To strengthen and maintain the technical strength of staff in overseas subsidiaries, we organize a one-week program in Japan to give technical training to local employees who have worked for three to five years in their respective subsidiaries. The program is organized with focus on giving the trainees opportunities to directly see and experience site management and the latest technologies in Japan through visits to sites under construction, showrooms and our Green Air Plaza and Research & Development Center as well as inspection of a company-wide technology conference and participation in facility-related lectures. We have also introduced a system that allows locally recruited Japanese employees of overseas subsidiaries to attend technical training for young employees of Takasago Thermal Engineering.



### Situation in each overseas subsidiary

With the stagnation of economy and corporate activities on a global scale caused by the COVID-19 pandemic, the economic growth rate is expected to decline significantly. Even in this situation, renewable energy for the reduction of environmental impact, electric cars, 5G high-speed communication networks, biotechnology and other advanced technologies are emerging worldwide. Overseas subsidiaries will take all possible measures to prevent COVID-19 infections to minimize its impact on their business operations.

#### About the overseas subsidiaries

**[Thailand]** We received orders for lithium-ion battery plants and semi-solid battery (which is a next-generation battery) plants. We are also promoting aggressive activities to receive orders in Bangkok because large-scale regional cold source systems and urban development are actively planned in the city.

**[China]** While economic activities were restricted earlier, they are currently on the recovery track mainly in industrial facilities. With the relaxation of the restriction on entry to the country, Japanese companies are also recovering gradually.

**[Vietnam]** One of the largest cogeneration facilities, for which the order was placed to us, will be starting operation. We are acting vigorously in the bustling market with a high willingness to invest even amid the COVID-19 pandemic.

**[Malaysia and Singapore]** Recovery in investment is anticipated in advanced industrial fields such as 5G and semiconductors. Our technologies and expertise in cleanrooms are used to promote sales activities.

**[Mexico]** Under the COVID-19 infection keeps spreading, we are taking thorough measures to manage the health of our employees as well as those of partner companies. We are developing a wide range of sales activities aimed at both Japanese and non-Japanese customers while also using web-based marketing.

**[India]** With ICLEAN playing the main role, we are enhancing the development and marketing of products for the prevention of COVID-19 infection and working to secure suppliers of materials and maintain the production system in our plants.

### Topics

#### Thai Takasago received an order for a lithium-ion battery pilot plant project from GPSC

Taking advantage of our construction result of dry rooms over many years, We received an order for the construction of the first pilot plant for semi-solid lithium-ion batteries in Thailand. In this project, Global Power Synergy Public Company Limited (GPSC), a PTT Public Company Group company engaged in the power generation business, works for the establishment of a new pilot plant for semi-solid lithium-ion batteries. Also, Thai Takasago was awarded an EPC contract to be in charge of the operations from design and procurement to construction in a collective manner. Using clay-like electrodes impregnated with the electrolytic solution, semi-solid lithium-ion batteries feature high safety and a simplified production process and are also expected to make a large contribution to the environment. We will continue to be actively committed to projects focusing on the rechargeable battery market, in which demand is likely to grow.



#### Initiatives of ICLEAN in India to contribute to R&D activities on COVID-19

Prompt investigation and clarification of COVID-19 is the most important challenge in India as well. While the study of the virus requires facilities with a high level of safety specified by WHO and the government, the country lacks research laboratories that satisfy the safety standards to face an urgent need to establish such facilities. In these circumstances, Integrated Cleanroom Technologies Pvt. Ltd. (ICLEAN) received a request from a government research and development organization to supply research facilities and delivered (donated) a laboratory to the government-affiliated ESIC hospital in two weeks thanks to an idea to create a mobile laboratory while it usually takes six months to construct a laboratory. The laboratory was named Mobile Virology Research and Diagnostic Laboratory (MVRDL). In recognition of the delivery in a record short period amid the lockdown, which made it seriously difficult to procure materials and produce products, to accelerate research and investigation activities, ICLEAN was commended by the Minister of Defense. The company will continue to deliver MVRDL in various parts of India to make social contributions for the end of COVID-19 and also promote activities that help raise its profile and improve the performance.



### Initiatives to reform the business model of international business based on the new medium-term business plan

In consideration of the unstable global situation and the impact of the COVID-19 infection, we will make flexible decisions on the receipt of orders to stabilize corporate management and achieve steady growth. While promoting the localization of the management of overseas subsidiaries, we will work to introduce a new business model necessary for the establishment of robust business foundations in overseas markets.

#### Establishment of the "ALL Takasago" system

We will promote the cooperation of overseas subsidiaries with business divisions of the head office in Japan and also work to strengthen the management infrastructure of the subsidiaries to solidify the foundation for the establishment of a new business model.



#### Initiatives in the new medium-term business plan

##### Further enhancement of the MEP construction (mechanical, electrical and plumbing) business for the stabilization of management infrastructure

We will expand the building/plant construction business, in addition to the facility construction business, to promote the strengthening of the revenue structure.

##### Establishment of a local network across the region (enhancement of the presence in the market)

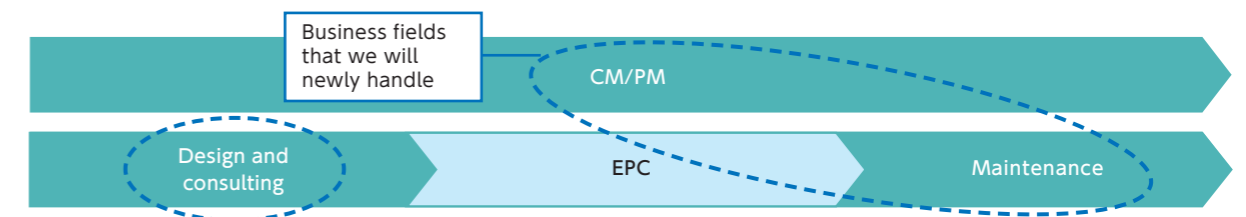
We will strengthen the sales organization to increase the appeal to important Japanese customers and raise the ratio of non-Japanese customers.

##### Handing down for integration with local staff - Human resource development and improvement of management abilities -

We will develop executives among local employees (for succession) and be committed to helping improve the skills of individual employees (for handing down).

#### Direction in the business model reform

Based on our expertise in project management developed through the execution of EPC works, we aim to manage projects in a comprehensive manner and maximize earning opportunities.



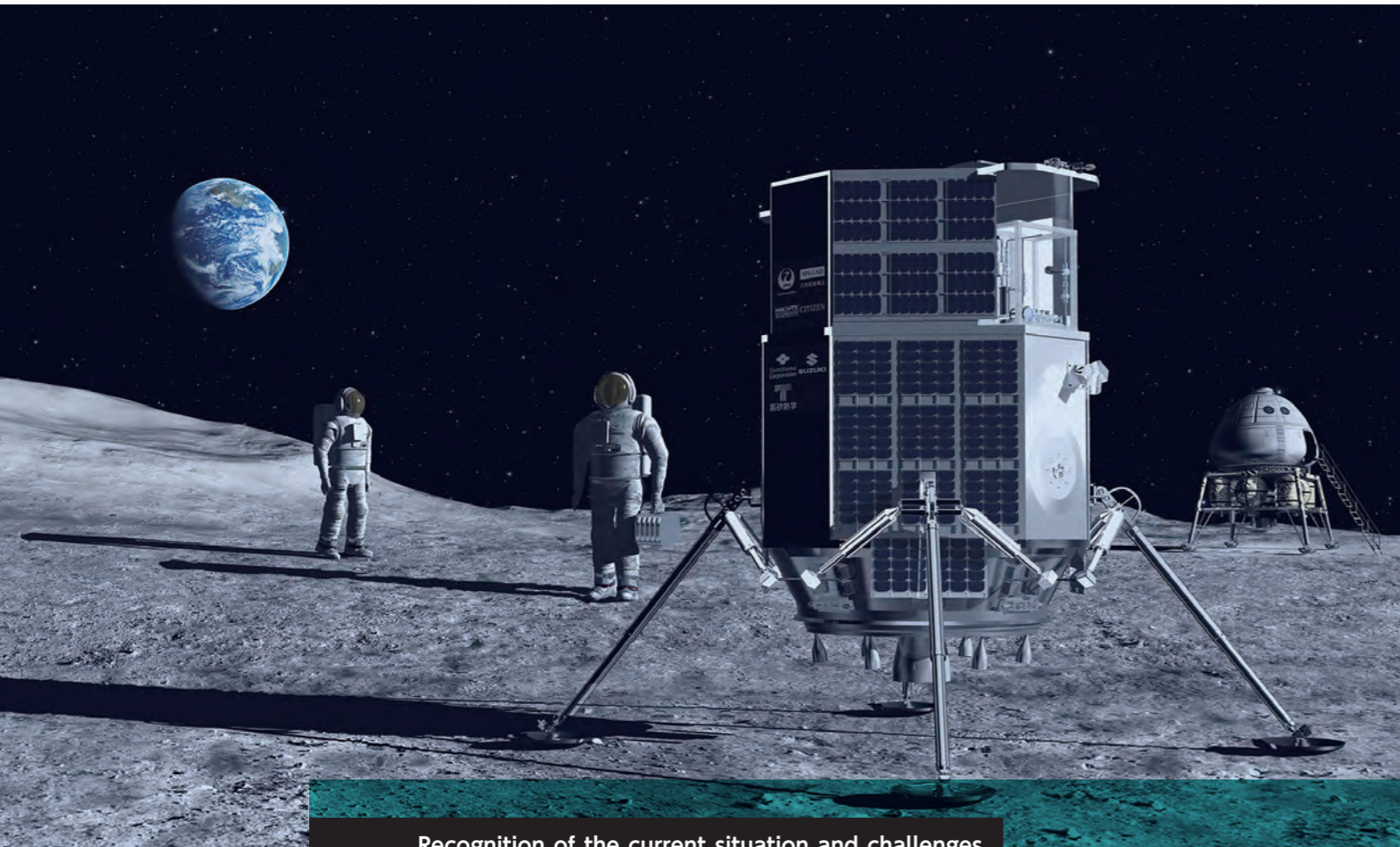
##### Dealing with the activities from the receipt of an order to maintenance and operation in an integrated manner

- Construction management (CM) function
- Project management (PM) function
- Facility operation and management function with DX

##### Investment for the next generation

- ➡ Design and consulting business (new)
- ➡ EPC business (strengthening of the function)
- ➡ Maintenance business (new)

We aim to achieve a sustainable society and create new value by putting open innovation into practice



Recognition of the current situation and challenges

For the improvement of productivity aimed at work style reform, while developing internal information infrastructure, we have been committed to the reform of the production system through the establishment of the Takasago Smart Platform, which serves as a base for providing services over the life cycle of a building including consulting services on optimal operation of facilities and energy saving, and the promotion of efficiency improvement and automation of operations by effectively using building information modeling (BIM), IoT and AI.

For the sophistication of operation through the establishment and use of systems to support construction management and other tasks with BIM at the core, we have enhanced the functions of technical calculation programs that can coordinate data with a BIM model and developed software for construction planning systems with an aim to introduce them for operation in all offices. We have also developed IT tools for the improvement of efficiency in on-site operations and now promote the introduction of them into construction sites. In our efforts to advance proprietary technologies, we are working for the widespread use of the EI-brazing method (local nitrogen replacement method) and the aluminum refrigerant piping system in the equipment industry.

In the meantime, to accelerate these initiatives including research and development, we have established an "innovation center" that integrates functions for marketing, R&D and incubation and are promoting open innovation with various partners in Japan and overseas. We opened the Takasago Thermal Engineering Innovation Center in Tsukubamirai, Ibaraki Prefecture as a base for innovation with part of the headquarters functions and started the operation in the spring of 2020. While these initiatives will be taken over by the Research and Development Headquarters, we will cooperate with wide-ranging partners in the industry, educational field and government and develop new technologies and services for the achievement of a sustainable society in an attempt to create new value.

Initiatives taken in fiscal 2019 and their details

Initiatives	Details
Strengthening of technical capabilities	Sophistication of operation through the establishment and use of systems to support construction management and other tasks with BIM at the core
<ul style="list-style-type: none"> <li>•Creation of new services using IT infrastructure</li> <li>•Establishment of IT infrastructure for the creation of new services</li> </ul>	Establishment of the Takasago Smart Platform
Establishment of IT infrastructure for the sophistication of operation	<ul style="list-style-type: none"> <li>•Review and development of information management rules and support for the operation of the rules</li> <li>•Development of security management methods for the provision of services using IoT/AI</li> <li>•Establishment of CRM</li> </ul>
<ul style="list-style-type: none"> <li>•Development of a new business model</li> <li>•Establishment of a mechanism to create new businesses</li> </ul>	<ul style="list-style-type: none"> <li>•Promotion of the Innovation Center organization</li> <li>•Promotion of open innovation</li> <li>•Commercialization of accelerator programs and implementation of the phase to examine the commercialization</li> </ul>
Enhancement of management control and support for construction sites	Development of information infrastructure for the renovation of the mission-critical system

Initiatives in fiscal 2019

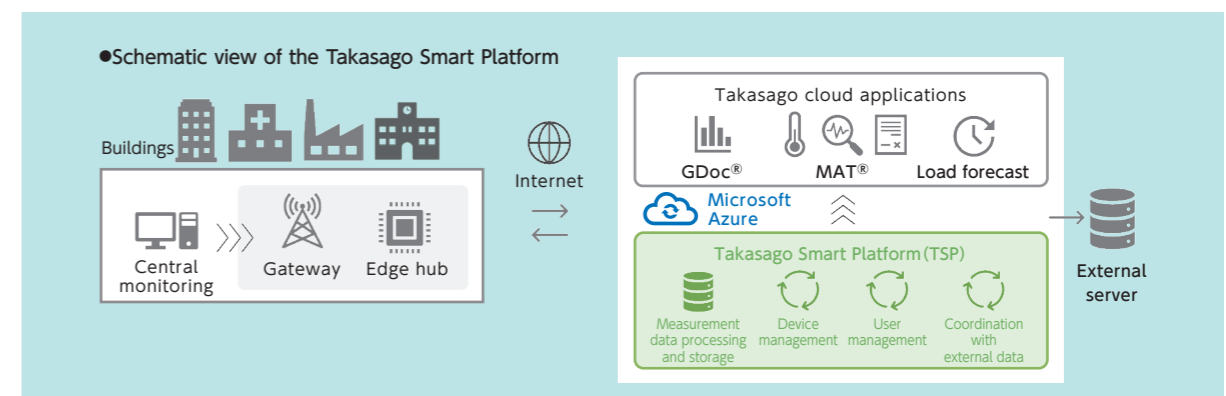
Takasago Smart Platform

While there is concern that the COVID-19 pandemic may have an impact for a long period, various initiatives have been underway on the assumption that we will coexist with the virus. The reconsideration of the conventional lifestyle is required in various parts of society, as exemplified by the promotion of teleworking by many companies and restriction on entry into office buildings and factories. It is also predicted that the concept and methods of facility management will change dramatically.

Takasago Thermal Engineering started to operate the Takasago Smart Platform, which is information infrastructure that collects information on the management of buildings in the cloud and grasps and analyzes the operation status and problems of facilities and other data, in April 2019. The management information is uploaded in the cloud on a real-time basis to make it accessible anywhere. In the meantime, high-functional parts on the cloud server can be combined and used to enable predictive maintenance based on machine learning and optimal facility operation. Thus, the platform is

expected to be very useful for remote equipment management and manpower saving in the society coexisting with COVID-19. Using Microsoft Azure in the cloud environment and Azure Machine Learning for the estimate of air conditioning load in buildings, the Takasago Smart Platform collects and analyzes facility operation data from devices and sensors to achieve optimal operation of facilities and cost saving. We will create more added value through the coordination of the platform with in-house applications to support facility operations such as GDoc® (communication BEMS) and MAT® (total system for measurement, analysis and evaluation), as well as various external cloud-based applications.

In the future, the need to address social demand for environmental regulations, SDGs, etc., along with the society coexisting with COVID-19, will further increase. In addition to the design and construction of buildings and facilities, which is our conventional main business, we aim to provide comprehensive services throughout the life cycle of buildings, such as consulting services on optimal operation of facilities and energy saving, based on the platform.



**Commitment to space development**

Hydrogen attracts attention as a technology that contributes to the global environment. It is expected to replace fossil fuels as a new energy source and efforts are being made to put it into practice in society to control global warming. To meet such social demand, Takasago Thermal Engineering has internally developed the water electrolyzer-fuel cell unitized reversible cell system, which is a technology realized by the National Aeronautics and Space Administration (NASA), to promote an initiative to achieve a low-carbon society. As a new activity in this initiative, we have been committed to research and development for the practical use of this system on the moon. It is believed that the moon has billions of tons of water. As the electrolysis of water produces hydrogen and oxygen, the use of technology to electrolyze water on the moon can produce hydrogen as a fuel for rockets and energy for equipment and contribute to the promotion of space development.

As the first step for the goal, we concluded a contract to become a corporate partner of HAKUTO-R, which is a commercial lunar exploration program operated by a space venture company ispace, inc., in December 2019. The company also requested the reinforcement of its ties with us as a long-term partner for the creation of a lunar economic zone and we subscribed to a third-party allocation of new shares by ispace.

In the future, in tandem with the development of water electrolyzer systems designed for use on the moon, we will try to apply the HVAC technologies we have cultivated to the development of thermal mining, a technology to collect water resources that are believed to exist on the moon, as well as the establishment of a "lunar ecosystem" to use water resources as energy on the moon.

We will work to apply the achievements made through this program to the practical use of the hydrogen utilization system on the earth in an effort to contribute to both the moon and the earth.

**Accelerator program**

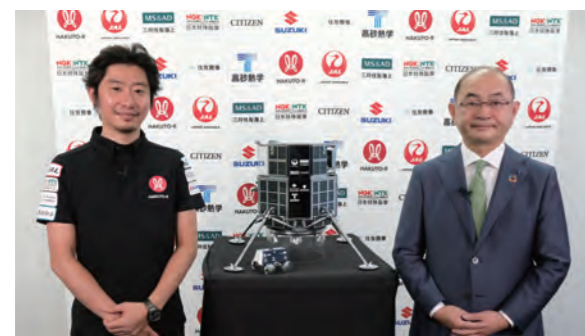
As an initiative to create new businesses and services jointly with startup companies, we have implemented an accelerator program since 2017. This program aims to use the platform of open innovation to create new value beyond the conventional framework of HVAC construction work.

This program has generated two new services to improve the efficiency of on-site operations.

Jointly with LiLz Inc., which was selected in the first program, we developed LiLz Gauge as a service to save labor for the walk-around check of meters in buildings and factories. In this cloud-based service, measurements are automatically read from images of analog meters taken with dedicated IoT cameras to record the data. Having received multiple awards in external competitions, the service is also highly valued outside the company.

In the second program, Nain Inc. was selected and we jointly developed Zeeny Pro, a hearable IoT service for audio entry of data in forms at the time of inspecting equipment, with the company. This service allows operators to conduct inspections more safely and efficiently because they can enter inspection results with voice according to the sound to announce the inspection items and use their eyes and hands more freely during on-site operations.

Hmcomm Inc. was selected in the third program TAKASAGO ACCELERATOR 2020. While inspectors try to identify any faint abnormal noise to detect defects of equipment in the construction industry, this task usually requires the inspectors to have experience and skills. The aging of experienced engineers is ongoing in the construction industry and the shortage of human resources expected in the future is a serious problem. With AI-based audio analysis technology, Hmcomm Inc., the latest winner of the program, is engaged in the development of techniques to detect abnormal noise. We consider that the combination of the know-how on construction management in our Group with the abnormal noise detection technology of the company can lead to the stable operation of facilities and labor saving on construction sites, as well as unmanned operation control of tasks to stabilize facility operation.



Mr. Takeshi Hakamada, Founder & CEO of ispace, inc., and Kazuhito Kojima, President & COO



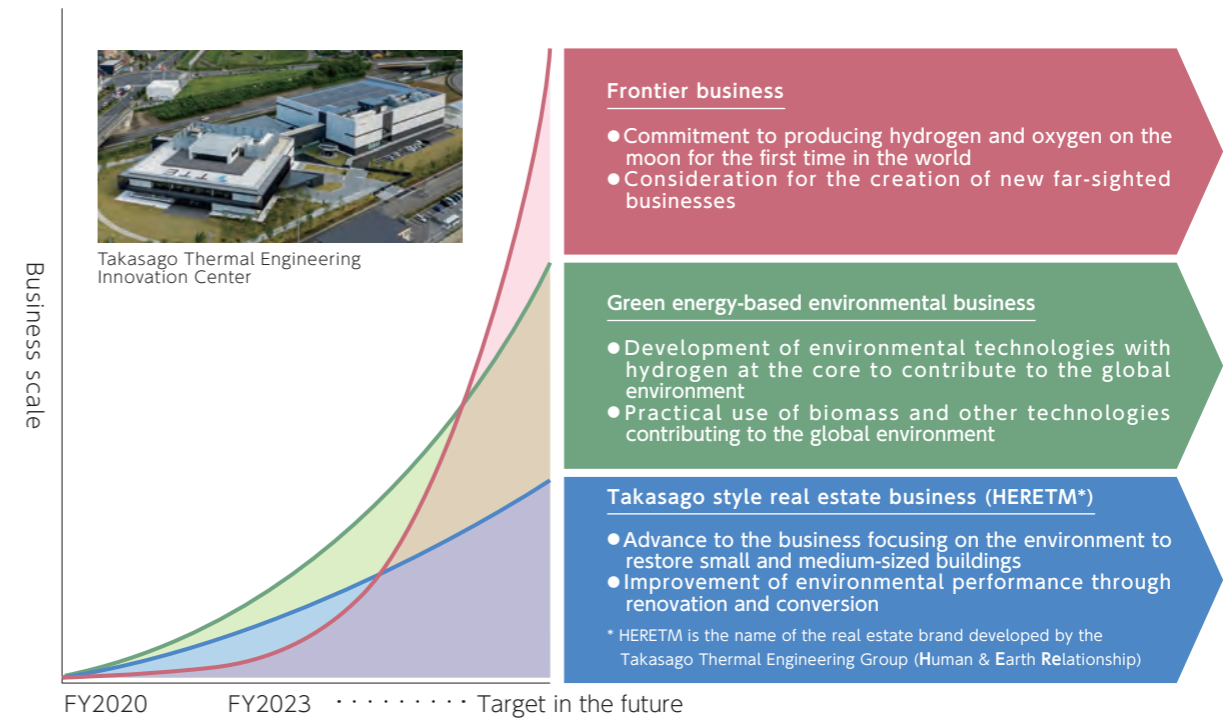
Screening meeting for the accelerator program

**Initiatives to create growing businesses through the expansion of environmental technologies based on the new medium-term business plan**

To contribute to the conservation of the global environment, we aim to practically use the environmental technologies we have developed in the frontier business, green energy\*-based environmental business and real estate business.

\* Green energy is the energy that emits no hazardous substance to the earth and contributes to the global environment, including hydrogen, sunlight, wind power and biomass.

●Fields to create business and the business scale



**Examples of research and development for the establishment of environmental businesses**

- **Energy value chain technologies**  
We will develop technologies to use renewable energy and store electricity and energy, as well as energy systems that are consistent with local production for local consumption, and provide zero-energy systems of the Takasago Thermal Engineering model (energy grid system using hydrogen technology, virtual power plant (VPP), etc.).
- **Resource recycling technologies**  
Focusing on the life cycle of energy use to the final stage, we will develop environmental technologies that contribute to the global environment, such as those for production, self-sufficiency, storage and control, in an effort to grow into an environmental creator (supply of algae/biomass fuel).

- **Technologies to provide an advanced environment**
  - Spaces aimed at realizing health and productivity management and improving intellectual productivity
  - Development of technologies to provide added value as a comprehensive building service provider
- **Technologies to reform the production system**
  - Improvement of construction quality with video calling and remote monitoring systems
  - Improvement of efficiency of transportation tasks and development of containers to be used for the tasks and as a foothold
  - Development of construction units integrating aluminum equipment and interior decorating
  - Development of technology for the automatic processing of three-layer pipes
  - Development and introduction of 3D-CAD and BIM tools

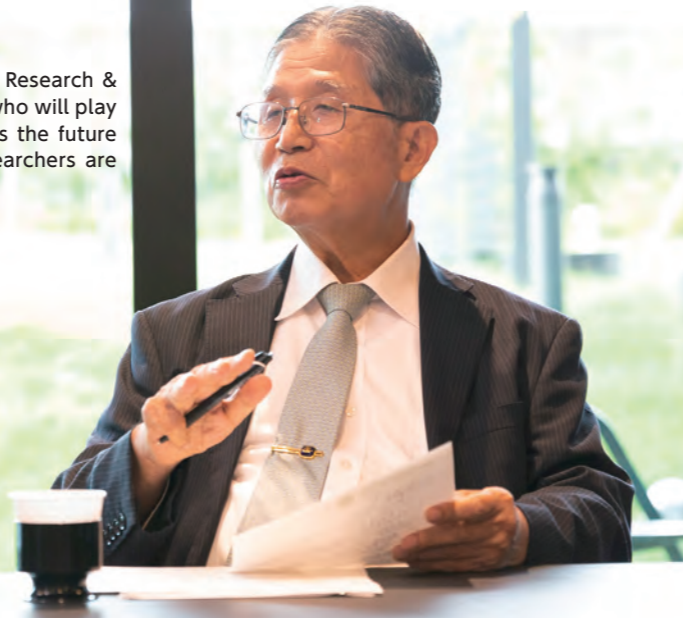
# Future prospects of research and development

Professor Akira Fujishima, who became the Honorary Director of our Research & Development Center this spring, talked with three young researchers who will play major roles in the future of Takasago Thermal Engineering to discuss the future prospects of research and development in the Group and what researchers are required to do.

## Akira Fujishima

Honorary Director, Research & Development Center

Professor Fujishima is a Distinguished Professor of the Tokyo University of Science and an Honorary Emeritus Professor of the University of Tokyo. His areas of specialty are photochemistry, titanium oxide photocatalysts, optical functional materials and diamond electrochemistry. He became the Honorary Director of the Research & Development Center in the Research and Development Headquarters in April 2020.



**Daisuke Baba** (joined the company in 2013)  
Chief Research Engineer, Research & Development Center, Research and Development Headquarters



**Yuuki Matsunami** (joined the company in 2012)  
Engineer, AI · IoT Development Division, Research and Development Headquarters



**Miho Suzuki** (joined the company in 2011)  
Engineer, New Technology Development Division, Research and Development Headquarters

## Stance towards research and development

**Fujishima:** All of you gained experience in construction management for five years right after joining the company. It is interesting, and also encouraging, that you went through a stage of learning what the construction sites are like first.

**Baba:** There is a movement to increase corporate value in the long run in the United States as well. In the rapidly changing world, what do you think should we change and not change in the approach to research and development?

**Fujishima:** The most important thing will be to think about the purpose of conducting research. We need to ensure that we can maintain a favorable

environment that allows everyone to live a healthy life until natural death. You have been, and will be, required to dedicate your best efforts to achieving the target.

**Matsunami:** In research and development, I also feel a dilemma between the solution of urgent challenges for our company, as well as for the construction industry as a whole, and the pursuit of the long-term vision. Would you give me advice on how I should achieve a good balance between them as a researcher?

**Fujishima:** While I was relatively free from such a dilemma because I spent a long time in universities, it is certainly a difficult challenge for Takasago Thermal Engineering, which is seeking an ideal environment

in offices while also working to solve issues on space development. I think it is necessary to think from a long-term perspective and a short-term perspective alternately with an idea that the technologies to be used for space development may also be useful for solving immediate challenges.

**Matsunami:** What do you think about the attitude of conducting research to produce results?

**Fujishima:** A key is to constantly have more than one major subject, which will allow you to get involved with a significantly wider range of people through research. Based on my experience, something can happen more easily when you set subjects that have factors overlapping with each other.

**Baba:** In your research on photocatalysts, you shifted your focus from the generation of hydrogen to oxidative decomposition ability and superhydrophilicity to open the path to the application of them to antibacterial tiles and air cleaners. What thinking process did you undergo?

**Fujishima:** I did everything I could for the experiments and examination of the generation of hydrogen. The subjects that were left after the accumulation of research were oxidative decomposition ability and superhydrophilicity. While such a shift requires some sort of sense, you can improve it through daily efforts. It is useful to expand the scope of the information you receive and to collect and sometimes review the information tirelessly. For example, it is not a waste of time to read recent Naoki Prize-winning novels on Bungeishunju.

## Human resource development and self-improvement

**Baba:** For an engineering company like Takasago Thermal Engineering, it is extremely important to develop human resources who become researchers and engineers. While I will hold a leadership position in the Research and Development Headquarters in the future, one of my concerns is what guidance I should give.

**Fujishima:** Nothing is more important than to teach by example in your daily work. Your commitment to each of the challenges, as well as your efforts to study every day, will show your attitude. All of such actions will be witnessed by those who are learning from you. For those who have difficulty showing good performance, it is important to try to find something you can praise objectively in them and lift up their spirits.

**Matsunami:** Now, in the world that has slowed down due to the COVID-19 pandemic, I think that it

is especially important to improve ourselves for the future. Would you give me advice on self-improvement?

**Fujishima:** Research is an endless journey and what you can study is limitless. I am also studying again to write a book and acutely feeling that my knowledge is not enough. It is important to have the willingness to tackle challenges and spend time and money wisely for study without sparing them.

## Communication with society

**Suzuki:** The Innovation Center plans to focus on a relationship with local people, especially children including elementary school students in the neighborhood, in its future activities. When you communicate with children through hands-on lectures, etc., what do you consider for making them interested and also to have fun?

**Fujishima:** While I give as many as 100 hands-on lectures across Japan in a year, I always place importance on stimulating their interest with something familiar. Why is the sky blue? Why are clouds white? Why does ice float on water? Such questions give them an opportunity to learn that any natural phenomenon can be a subject of investigation.

**Suzuki:** While you have established a library for children at your expense in Kawasaki, in what way do you operate the library?

**Fujishima:** The Photocatalyst Museum I have opened in Kawasaki owns a large number of children's storybooks, which have motivated mothers to visit the museum with small children. I will be happy if the children who come to read the storybooks also read science books.

## Expectation for the Takasago Thermal Engineering Innovation Center

**Fujishima:** This is a wonderful place with a well-developed environment. I hope that researchers produce astonishing results through their devotion to research activities with a high degree of freedom. Research and development activities hardly advance in a straightforward way. It is vital to make steady efforts and miss no abnormal phenomena. While most people consider any abnormal phenomenon they have faced to be useless and ignore it, I hope that you recognize it as a good opportunity and tackle the challenge.

Based on the principle “to develop technology that serves our customers’ needs and utilizes the creativity of all employees,” the Takasago Thermal Engineering Group unites its efforts to promote research and development in line with the following basic policies:

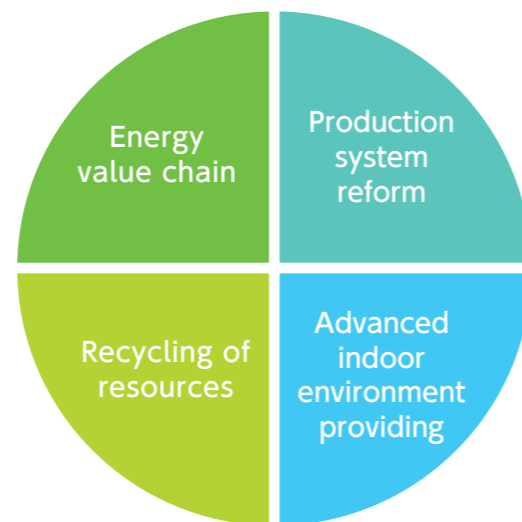
1. To provide an optimized environment for low energy consumption
2. To pursue environmental technologies to improve productivity
3. To develop building construction technologies to contribute to high quality and labor savings

### Contribution to the world for achieving a low-carbon society

As an environmental creator, our Group is creating technologies, products and services that help realize a low-carbon and sustainable society and putting them into effect in society. While checking our activities to ensure they can contribute to the achievement of SDGs, we will aim for the goals in 2030 together with society. In the field of energy value chain technologies, we focus on the development of systems to provide one-stop services to optimize the management of buildings throughout their life cycle while also being committed to the commercialization of the system to store, transmit and use the low-temperature waste heat that is conventionally discarded, as well as hydrogen utilization technologies and biomass utilization technologies. In the fields of resource recycling technologies and technologies to provide an advanced environment, we work to develop energy-saving technologies that help reduce CO<sub>2</sub> emissions and technologies for water purification and organic solvent recovery systems. In the field of technologies to reform the production system, we are committed to the use of BIM technologies in construction sites, which also leads to internal reforms of work styles, as well as research and development aimed at the improvement of intellectual productivity in offices. The use of AI and IoT is aggressively promoted with the recognition that they are essential for the achievement of the above-mentioned targets. We will advance our commitment to creating these businesses through the functions of the Innovation Center

in research and development and incubation, as well as integration with our Group, and develop green technologies\* that will contribute to the global environment in the future.

\* Green technologies are environmental technologies that contribute to the global environment



### Takasago Thermal Green Bond Reporting

#### (1) Allocation of funds

The funds of 5.0 billion yen procured from the Takasago Thermal Green Bonds have been entirely allocated as funding for the construction and facilities of the Takasago Thermal Engineering Innovation Center, our new R&D base that was completed in February 2020 and started operation in March of the same year, as of the end of March 2020. If there is any significant change in the conditions in the future, we will disclose the outline of the funded eligible projects, the amount allocated to the projects and the unallocated amount on our website as needed.

#### (2) Environmental improvement effects

The Innovation Center adopts photovoltaic and biomass power generation as renewable energy sources, in addition to various energy-saving methods, and procures green electricity from the Aqua Premium plan of TEPCO to meet any additional demand for commercial electricity to achieve the target of establishing a carbon-free building with zero CO<sub>2</sub> emissions while CO<sub>2</sub> emissions from a standard building used for comparison are 1,115 tons-CO<sub>2</sub> per year. We plan to disclose the results of the environmental improvement effects on our website from the next fiscal year.

#### (Acquired environmental certification)

CASBEE for Building (New Construction) (2016 edition): S rank (self-assessment); BELS: 5 star (reduction of design primary energy consumption by 91%); Nearly ZEB; LEED V4 BD+C (NC): Gold; CASBEE-WO 2020 (V1.0): S rank

### Closed VOC recovery system

While volatile organic compounds (VOCs) such as toluene and ethyl acetate are used in great quantities in printing factories, adhesive tape production plants, etc., it is known that VOCs emitted into the air are responsible for the generation of suspended particulate matters (SPMs) and photochemical oxidants, which cause photochemical smog and thereby create health damage to the respiratory system and mucous membranes.

The most common method to treat VOC exhaust gas from plants is incineration, which generates a large amount of CO<sub>2</sub>. Therefore, the treatment of VOCs without incineration is needed for the prevention of global warming.

We have developed a system that recovers and treats VOCs without incineration and also reduces the amount of VOCs emitted into the air significantly. This system has been realized by adopting a closed recovery system that purifies exhaust gas including VOCs emitted from drying furnaces in plants with an adsorption rotor and then reuses the gas as the air supplied to the furnaces.

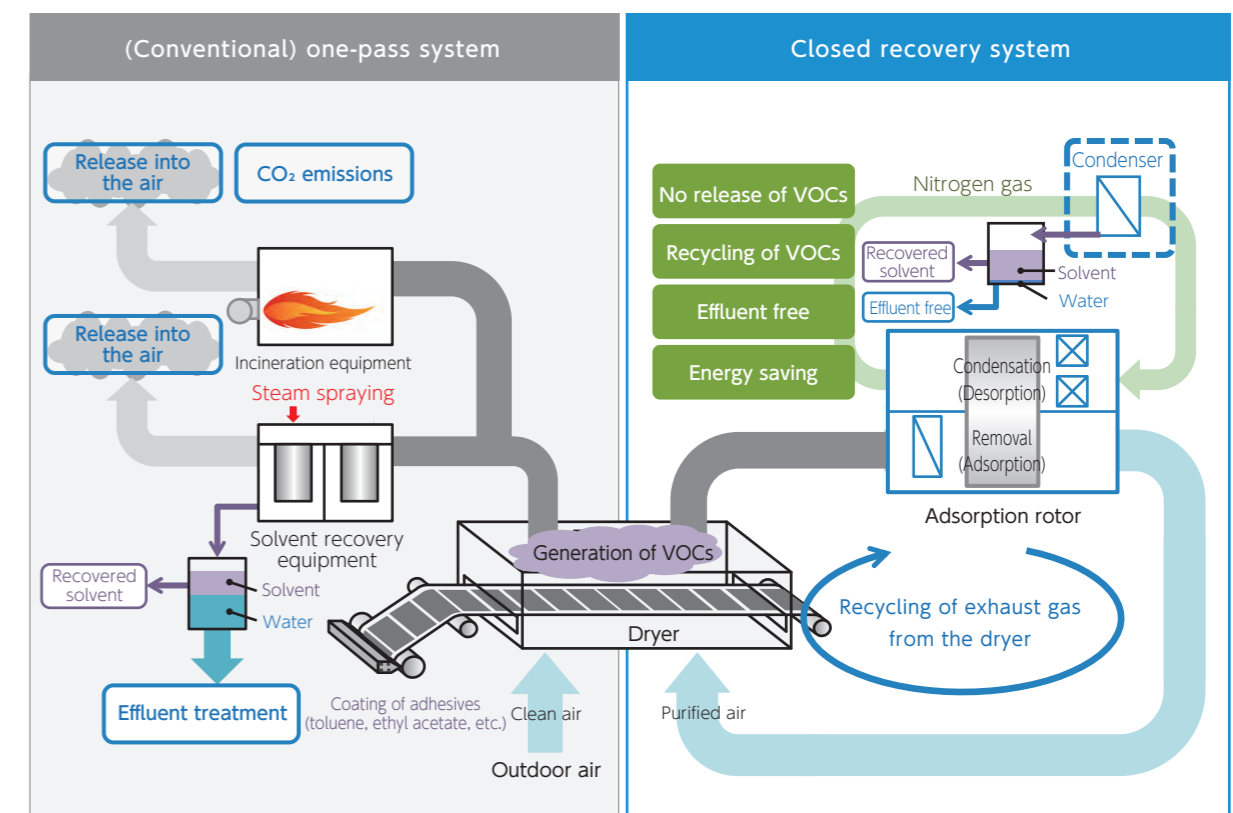
This fiscal year, we started the operation of a demonstrated system in an adhesive tape plant as the first attempt in an operating plant with the cooperation of Teraoka Seisakusho Co., Ltd. We will collect data from the actual operation including VOC treatment ability and the conditions of the recovered solvent and also verify the

yield of adhesive tape products and other data. We will promote the introduction of this system, which achieves the reduction of CO<sub>2</sub> emissions through non-incineration treatment and the reduction of VOC emissions to the air at the same time, to contribute to the conservation of the global environment.



Demonstration system

#### Comparison with a conventional system



## Hydrogen energy utilization system



While we delivered hydrogen production equipment for a demonstration project of the Ministry of the Environment of Japan last fiscal year, we will start to sell Hydro Creator, a water electrolysis-based hydrogen production system, based on the operation results of the equipment this fiscal year. Concurrently, we established a hydrogen system exhibition room in the Takasago Thermal Engineering Innovation Center and launched the permanent display of Hydro Creator

and the demonstration of the production of CO<sub>2</sub>-free hydrogen using renewable energy. The production of hydrogen using renewable energy attracts worldwide attention as a crucial technology that can make a great contribution to the achievement of a low-carbon society. We will provide Hydro Creator to hydrogen-related demonstration projects and hydrogen system suppliers to help create a hydrogen-based society beyond the field of commercial buildings.



Hydrogen Creator, a water electrolysis-based hydrogen production system we will start to sell

Hydrogen system exhibition room (Takasago Thermal Engineering Innovation Center)

## Adsorbent thermal storage system: Realizing the recovery and use of low-temperature waste heat of around 100 °C



The use of waste heat is required for further energy saving and reduction of CO<sub>2</sub> emissions in the areas of industry. While the use of high-temperature waste heat for power and steam generation, etc. is promoted, most low-temperature waste heat of around 100 °C is discarded at present because their uses are limited and the mismatch

in time and space between the supply of the heat and thermal demand makes it difficult to use the heat. To solve this challenge, we have developed a new large-scale thermal storage system that recycles waste/unused heat for air conditioning and as a thermal source.

### Features of this system

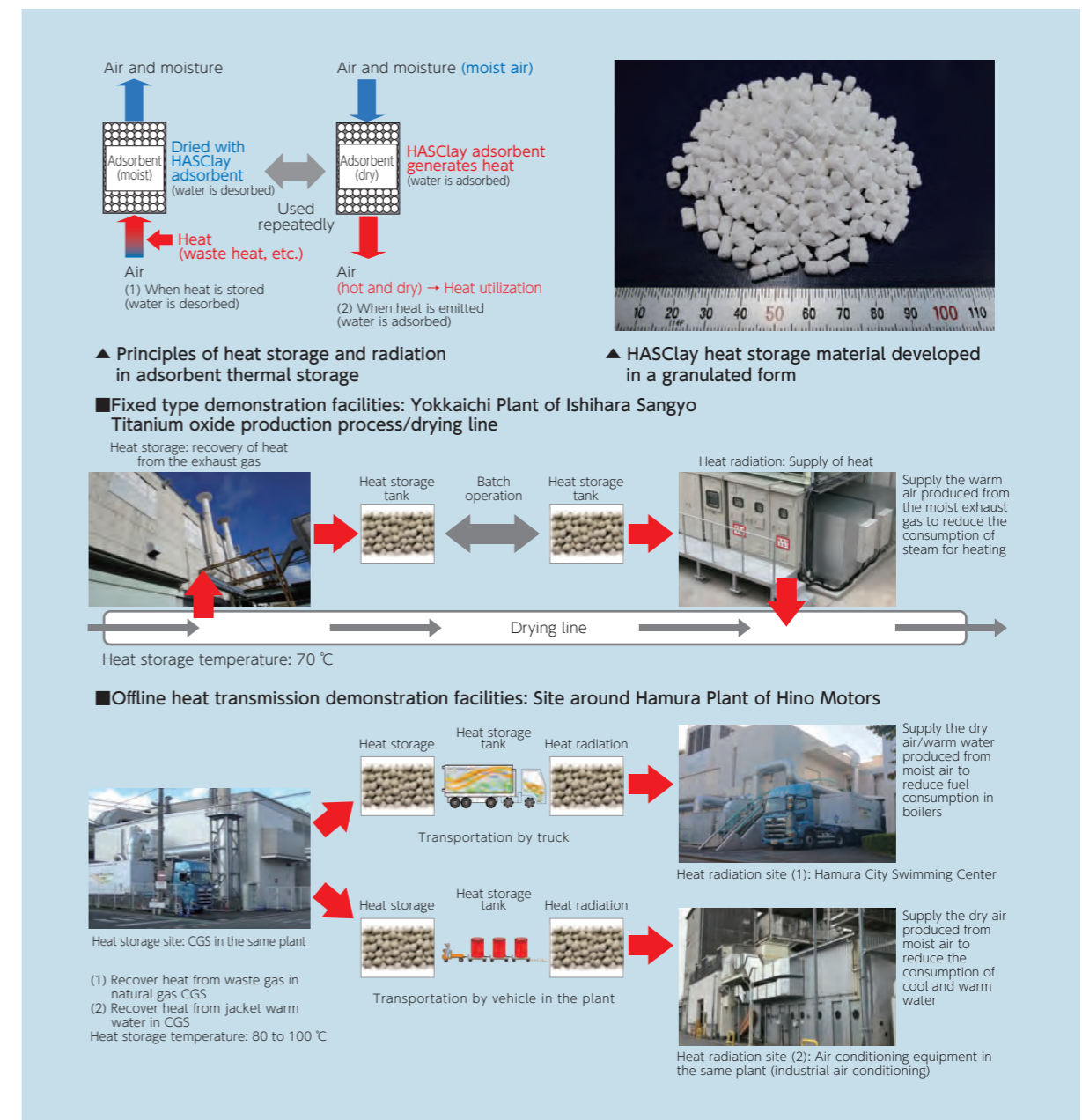
- The low-temperature waste heat of around 100 °C can be stored.
- The thermal storage density is more than twice that of a conventional latent thermal storage system (500 kJ/liter or more).
- The recovered waste heat can be used for air conditioning (heating, outdoor air processing, dehumidification) and hot water supply.
- The heat loss from the stored heat is reduced (because the absorption and desorption reactions of water are used as the principle).
- The users of the heat can substantially reduce their CO<sub>2</sub> emissions.

This system can be fixed or used as a portable type in plant facilities and enables the recovered heat to be used in different places and at different times. The heat can be used effectively for dehumidification, heating and drying processes, for example.

We also expect to introduce it as an offline heat recovery, transport and utilization system to recover waste heat from sludge and garbage incineration plants of local governments, etc., as well as waste heat from factories, and use the heat in the nearby areas.

In fiscal 2018-19, we launched a demonstration test for the system as a project subsidized by the New Energy and

Industrial Technology Development Organization (NEDO) jointly with Hamura City, Tokyo, TEPCO Energy Partner, Incorporated, Ishihara Sangyo Kaisha, Ltd., Morimatsu Industry Co., Ltd., Hino Motors, Ltd. and the National Institute of Advanced Industrial Science and Technology (AIST). We have created a thermal storage system using HASClay, a new high-density heat storage material, to collect full-year demonstration data on the fixed type and the offline heat transport type and demonstrated the storage of waste heat from factories, cogeneration exhaust gas and waste warm water, as well as the use of heat in production lines and commercial facilities.



## Technical development for refrigerant piping work



### Development and dissemination of an aluminum refrigerant piping system

To reduce CO<sub>2</sub> emissions, we developed a brazing method for aluminum refrigerant piping to be used in multi air conditioning systems for buildings while we had also developed structural members of aluminum refrigerant pipes, mechanical joints for aluminum refrigerant piping and branch pipe units for aluminum refrigerant piping for the system. Starting the use of the method in all offices in April 2019, we have introduced it into nine buildings in total so far. In addition, we participated in the APEA Equipment Performance Examination Committee of the Aluminium

Plumbing Equipment Association (APEA) to prepare technical materials for the adoption of aluminum refrigerant piping in cooperation with equipment manufacturers, etc. In the APEA Construction Subcommittee, we also combined the know-how of the members to formulate construction guidelines that outline the issues to be noted in the aluminum refrigerant piping work. In the future, we will disseminate this system while ensuring its quality and performance based on those technical materials.



Installation of aluminum refrigerant pipes



Installation of mechanical joints for aluminum refrigerant piping

### Development and dissemination of the EI-brazing method (local nitrogen replacement method)

The EI-brazing method (local nitrogen replacement method) for refrigerant copper pipes has been introduced into more than 100 construction sites in total to save labor in construction work while there are 544 certified operators and 327 quality managers of this method at present. As its features, this method can reduce the process of oxidation prevention at the time of connecting refrigerant pipes (brazing) by 80% while lowering the amount of nitrogen to be filled in them by 70% in comparison with the batch nitrogen replacement method because the EI-brazing method fills nitrogen locally. It has been set as our standard method for the prevention of oxidation in

refrigerant copper pipes as it is effective to ensure quality and save labor. In construction sites, the batch nitrogen replacement method and the EI-brazing method are used in combination in consideration of the operation status and process to further improve construction efficiency and follow the process schedule. In the meantime, this method has been registered in the New Technology Information System (NETIS) of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) under the name of the local nitrogen replacement method. We will work to meet the target of listing it as a publicly recognized method in the specifications of the MLIT in the future.



Workshop for the certification of quality managers of the EI-brazing method

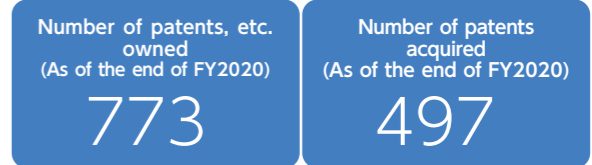


Construction work to apply the EI-brazing method

## Intellectual property management

As of the end of March 2020, the number of patents, etc. we own is 773 (including patents, utility models, designs and trademarks), which is the largest in the HVAC industry. Among them, the number of patents is 497, which account for two-thirds of the total, comprising 477 domestic patents and 20 overseas patents. In addition to patents concerning quality improvement and energy saving in the design and construction of HVAC systems, which is our main business, we are aggressively working to acquire patents of unique technologies in our new business fields. We are also

promoting initiatives to use the patents we have acquired not only for our solutions but also for open innovation and to grant them to other companies.



### Intellectual property management structure

Located in the Takasago Thermal Engineering Innovation Center, the Intellectual Property Management Office has in place an internal system to cooperate directly with the research and development departments and also with the main office and branches via contact personnel. The office has also established a system to work together with patent offices in relevant technological fields and law firms specializing in IP-related conflicts.

a challenge for the construction industry as a whole. We work to obtain intellectual property rights in line with the dissemination of new technologies. When we have produced results from the development of a new technology that can be a foothold for an advance into a new business field, we obtain their intellectual property rights from the perspective of competitive advantage over other companies. We are also engaged in the activities of other companies to introduce new technologies as well as the evaluation of new technologies.

#### Prevention of technology leakage

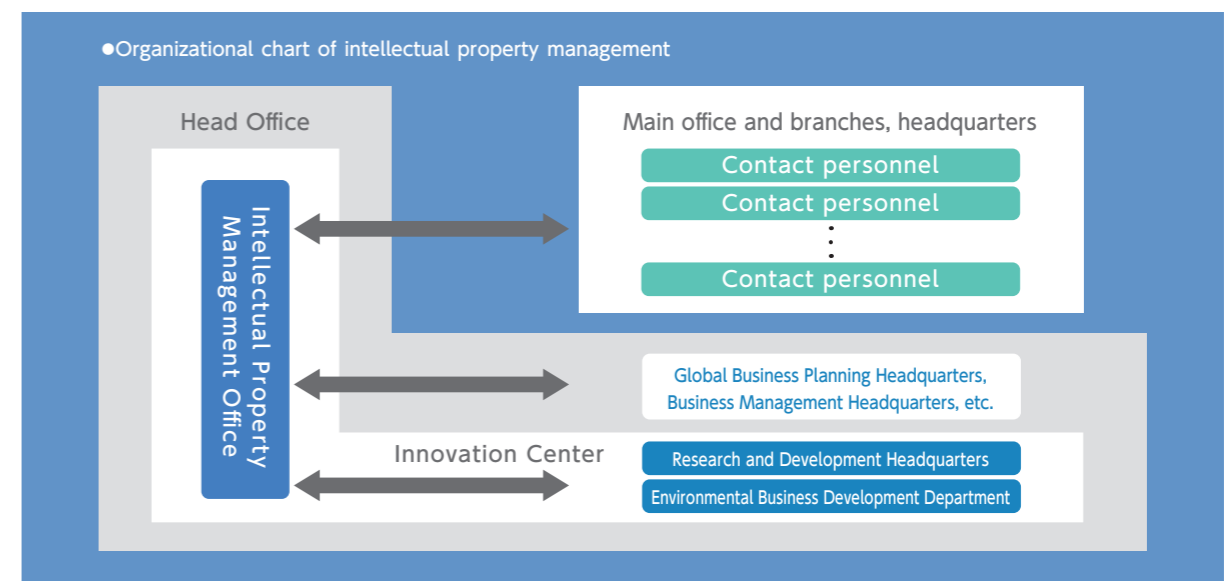
Since technological know-how on design, procurement and construction is an important management asset for engineering companies, we are also involved in the establishment of internal rules for security management of technological know-how to prevent the leakage and misuse of the know-how accumulated on a daily basis. The dissemination of the rules in the sites, etc. is promoted via the contact and other personnel.

#### Establishment of business models and support for intellectual property contracts

When an engineering company introduces new technologies into society, it is essential to cooperate with manufacturers. In particular, companies in the construction industry cooperate with individual companies in the value chain including parts manufacturers and sales agencies. We provide backup support for intellectual property contracts aimed at co-existence and co-prosperity with individual companies in the value chain so that we can prevent technology leakage and recover the investment in development while seeking to maximize our revenue.

#### Protection of new technologies

The improvement of productivity in design, procurement and construction to compensate for the lack of labor is





We will develop activities for the conservation and improvement of the global environment by fully using environmental conservation technologies and also reduce the environmental impact of our business activities continuously

Support for realizing a low-carbon society



Our basic philosophy on environmental conservation is to "contribute to the conservation of the global environment while working for the sustainable development of society by fully using environmental conservation technologies and our corporate power." Based on this philosophy, we have established the Basic Environmental Policy to specify rules on the promotion system. We will actively develop energy-saving and CO<sub>2</sub> emission reduction technologies in our business activities and achieve optimal operation

of facilities through cooperation with customers to help create a low-carbon society. Meanwhile, we have estimated CO<sub>2</sub> emissions in fiscal 2019 for the disclosure of environmental data (CO<sub>2</sub> emissions), etc. The value is used as a benchmark for long-term targets to be achieved in fiscal 2025 and 2030.

CO<sub>2</sub> emissions by scope (results in FY2019)\*

Class/category	Scope of the estimation	Relevant activities	Emissions in FY2019 (tons-CO <sub>2</sub> )
Scope 1	Direct emissions	Direct emissions from the use of oil, etc. and industrial processes in the company	1,224
2	Energy-derived indirect emissions	Indirect emissions in association with the use of the electricity and heat purchased by our Group	3,110
3	Other indirect emissions (excluding those which fall under Scope 1 or 2)	Design, construction work, etc.	4,485,183
Category 1	Purchased goods and services	Ductwork, piping, scaffolding	173,731
		Main items of HVAC systems (freezers, air conditioners, packaged air conditioners, fan coils, fans)	
2	Capital goods	Additional construction of production facilities	39,557
3	Energy-related activities	Minerals required for the generation of the electricity purchased by the company	459
4	Transportation (upstream)	Emissions in association with the transportation of products from suppliers to construction sites	3,678
5	Waste generated in operations	General waste from buildings and offices	22
		Disposal of industrial waste from sites	9,592
6	Business travel of employees	Business travel	2,474
7	Employee commuting	Commuting	547
11	Use of the sold product	Emissions in association with the use of products by users (consumers, business operators)	4,254,802
12	End-of-life treatment of sold products	Emissions in association with the end-of-life treatment of products	321
<b>Total</b>			<b>4,489,517</b>

\* An independent third-party assurance has been received from Sustainability Accounting Co., Ltd.

Support for realizing a recycling-oriented society



Reduction of waste

We regard waste as precious domestic resources and aggressively strive for 3R in production sites and offices to use it effectively. All of the waste manifests in contract work sites are controlled for the thorough management of waste up to the final disposal.

\* 3R means Reduction, Reuse and Recycling.

Achievement of a recycling rate of 86% on sites

We worked to reduce construction facility waste from contract work through such initiatives as the use of prefabricated facilities, elimination of packaging, promotion of recycling and thorough separation of waste. As a result, the overall recycling rate in our 994 contract work sites in fiscal 2019 was 86%. We will continuously endeavor to increase the recycling rate.

Recovery of 100% of CFCs

We started to recover CFCs in fiscal 1995, ahead of other members of the industry. In fiscal 2019, we recovered 100% of the CFCs to be collected in 375 sites, which weighed approximately 33 tons in total. The amount of CFCs we have recovered since the start of the activities is equivalent to 771 tons. We will continue to control the recovery process completely and strive to recover CFCs to protect the ozone layer.

Creation of a society in harmony with nature



Practical use of technology

for flushing without any water drainage

To reduce the environmental impact of effluent from production sites, we have developed technology for flushing without any water drainage and are committed to the practical and widespread use of it. For effluent treatment, we have developed a technique to purify effluent containing zinc eluted from coated zinc as a result of flushing in pipes at the completion of piping and to return the purified effluent to the pipes instead of discharging it. We worked to disseminate the technique and had 49 cases of the introduction into sites in fiscal 2019.



Flushing water purification unit

Targets and achievements of environmental conservation activities

In fiscal 2019, we implemented environmental conservation activities to meet the quantitative target set for each of

the activity targets and items in construction sites and offices. As a result, we met the target for all items.

Targets and achievements of environmental activities in fiscal 2019

✓: Achieved

Goal of the activities	Description of the activities		Control items	Baseline value	Actual result	Evaluation
Contribution to the realization of a low-carbon society	Proposal for energy saving at the design and construction stages	New construction	Amount of energy saved <sup>1</sup> Baseline <sup>2</sup> energy consumption	10%	26%	✓
		Renovation	Amount of energy saved <sup>1</sup> Baseline <sup>2</sup> energy consumption	30%	33%	✓
		Reduction of energy used by equipment during construction	Amount of energy saved <sup>3</sup> Energy consumption in the original design	10%	13%	✓
	Energy saving in offices	Reduction of energy used at head office, main branches, sales branches and R&D center	Reduction of power consumption in offices	270 kWh or less per person per month	100%	✓
Reduction of construction materials	Reduction of the amount for piping, ductwork and equipment scaffolding during construction	1- Amount of reduced materials Amount of materials used for ductwork, piping and scaffolding in the original design	10%	17%	✓	
Contribution to the realization of a society in harmony with nature	Participation in local environmental activities		Local cleanup activities and support for events	One or more activities per office	100%	✓
	Practical and widespread use of technologies that contribute to biodiversity		Trial introduction of the flushing technology to clean pipes without any water drainage	40 cases	49 cases	✓
Contribution to the realization of a recycling-oriented society	Implementation of activities to generate no industrial waste from construction sites <sup>4</sup>		Recycling rate Final disposal volume Total waste volume	85%	86%	✓
	Thorough management of industrial waste manifests		Number of sites managed with manifests Total number of contract work sites	100%	100%	✓
	Thorough management of the CFC recovery process control table		Number of sites managed with the CFC recovery process control table Total number of sites recovering CFCs	100%	100%	✓

\*1: Buildings of a certain scale designed by the company (new construction and renovation)

\*2: The baseline value is annual energy consumption equivalent to the baseline in the Act on the Rational Use of Energy or the amount defined specifically for each building.

\*3: Buildings of a certain scale (new construction and renovation)

\*4: All buildings in contract work

To ensure that our sites can constantly achieve the aggressive target of "the creation of the best product quality," we are committed to initiatives on wide-ranging aspects.

### What is the best product quality?

To provide value to customers and have them realize the value, it is important to consider that customers can realize the value only when they make full use of the goods. Therefore, quality assurance cannot be completed without taking the operation process of customers into consideration. Our organization also has to establish a quality assurance system that does not only meet the performance and service specifications required by customers but also includes the processes until customers can realize the value through the

provided performance and services. We aim for an ideal quality assurance system where quality is based on the perspective of ensuring that customers can realize the value at the highest level, in addition to the performance of the goods.

#### Basic policies on quality and the environment

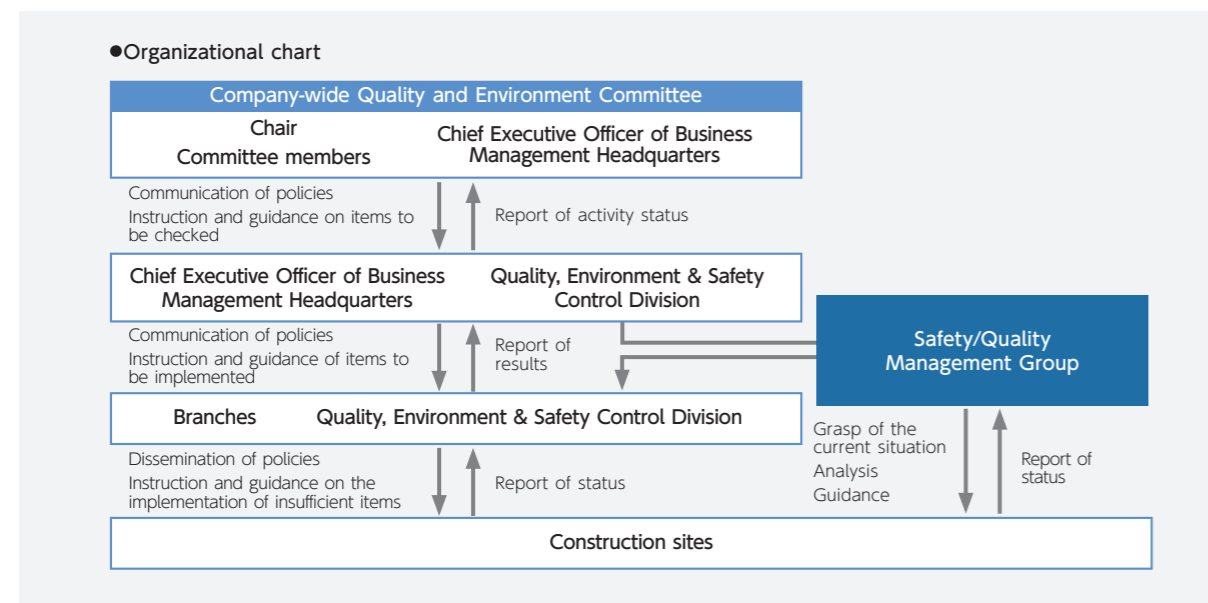
\* Those related to quality are extracted.

1. We will work to understand customer needs and provide the best quality that contributes to the corporate activities of customers.
2. We will comply with relevant laws as required.
3. We will promote research and development and provide advanced quality.
4. We will provide services continuously through the life cycle of construction facilities.
5. To promote them, we will develop a quality control system and work to maintain and improve it continuously.

### Quality control system

We have obtained quality management system certification (ISO 9001:2015) and continuously improve it. Based on the management system, we implement the quick delivery of high-quality construction and construction management, as well as operational support, to satisfy customers. As an initiative to enhance quality control, we have set up the Safety/Quality Management Group in the Business

Management Headquarters to integrate the quality control system. Setting a target every quarter, we develop and manage quality assurance measures commonly taken by all offices, check the situation of site management through site patrol of each office and provide instructions based on the review of it.



### Efforts to ensure occupational safety

#### Basic concept for occupational health and safety

Under our safety and health philosophy "Safety is the top priority in carrying out all business tasks," we strive for health and safety activities on construction sites based on the basic approach "The employees working for Takasago Thermal Engineering and their families must never suffer from accidents at construction sites."

#### Analysis and identification of risks and measures to address them

We have introduced risk assessment for safety and health management and ensure that safety and health work procedures are prepared and observed on the construction sites. In response to the occurrence of serious fall accidents in recent years, we have set the elimination of fall accidents as a priority target and are taking measures for it including the effective use of health and safety work procedure manuals, thorough implementation of health and safety management activities by business operators and enhancement of safety awareness.

In addition, we raise awareness of safety and health activities through the Company-wide Safety and Health Conference held in the spring of every year.

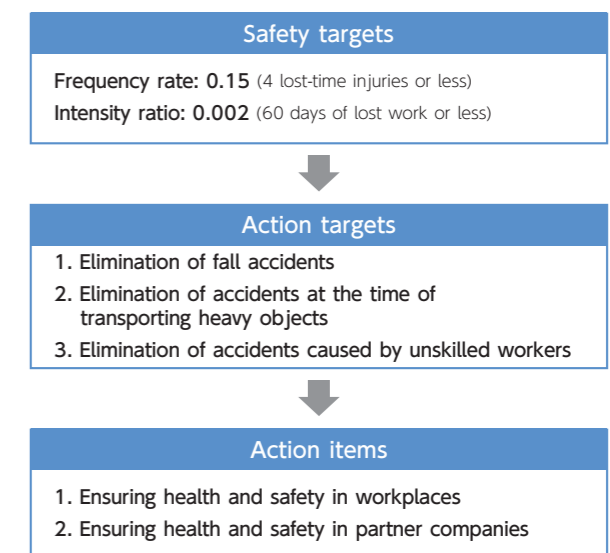


Safety patrol by Kazuhito Kojima, President, during the COVID-19 outbreak

#### Cooperation with partner companies

To enhance cooperation with the partner companies working together on the construction sites, we organized Kowakai with our partner companies as the members in 2003. The organization gives our guidance and instructions concerning cost, quality, observance of delivery time, safety and health and environmental conservation and ensures that the members follow them. Kowakai consists of the headquarters and branches. The health and safety cooperation committee established in each of them is committed to the communication of information on safety and health technologies, PR activities and thorough dissemination of relevant laws. The branches implement activities to improve health and safety including the Branch Office Health and Safety Convention. Kowakai also operates an online system for safety improvement, TKCS-s (Takasago Kowakai Communication Systems-safety), to share safety information.

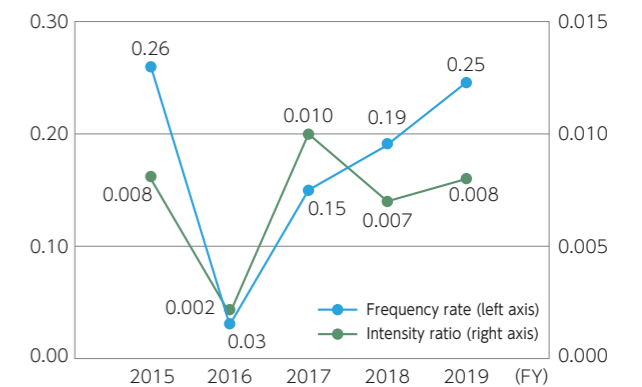
#### Health and safety activity policy in fiscal 2019



#### Safety records by year and pursuit of the elimination of accidents

In fiscal 2019, 61 accidents (9 lost-time injuries and 52 non-lost-time injuries) occurred, which resulted in failure to meet the safety targets. In fiscal 2020, we are developing activities with a focus on "prevention of risks according to the safety and health work procedures" to prevent serious accidents, as well as "practice of danger prediction activities in line with the working environment" and "training on measures to prevent human errors" to completely prevent the repetition of the same accidents.

#### Safety records by year: Frequency rate and intensity ratio in the past 5 years (%)



The Takasago Thermal Engineering Group works to increase its corporate value while fulfilling its social responsibility as a good corporate citizen and promotes CSR activities that help achieve a sustainable society.

Activities for the local environment



Cleanup activities

Takasago Thermal Engineering is involved in local cleanup activities in various parts of Japan through cooperation with Group companies and partner companies. In fiscal 2019, a total of 824 persons participated in those cleanup activities.



Cleanup campaign of Kitatohoku Office

Organization of a special lecture

We gave a special lecture at a school designed as a Super Science High School (SSH) by the Ministry of Education, Culture, Sports, Science and Technology. In addition to basic technologies for air conditioning, we introduced our research and development activities, including our initiatives on BIM as well as VR technology to see construction drawings in three dimensions, to high school students who will play major roles in the future.



Special lecture

Takasago Thermal Engineering Forest

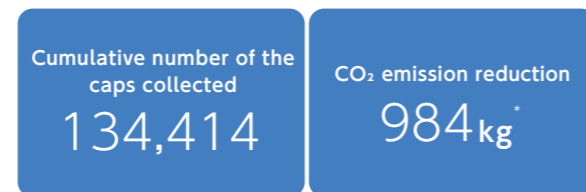
Based on the relevance with our businesses, we promote the maintenance and enhancement of the functions of forests to give public benefits, such as the absorption of carbon dioxide, to help conserve the global environment. We agreed to the activities to create corporate forests, which are promoted by the national and local governments, and has continuously been committed to tree planting in various parts of Japan including a natural forest in Gunma Prefecture named "Takasago Thermal Engineering Forest." Moreover, as our first initiative outside Japan, we planted trees in a 10-ha section of the premises of the University of Malaysia, Sarawak to be used for its rainforest restoration program and named the section "Takasago no Mori" (Forest of Takasago). This initiative aims to use the forest for investigation and research by the university on forest restoration as well as afforestation in Malaysia and safety and restoration of the rainforest.



Takasago no Mori in Malaysia

Eco-cap campaign

Our business offices collect caps of plastic bottles ("eco-caps") and send them to Ecocap Movement, an NPO, to support various social contribution activities. The recycling of eco-caps also prevents the generation of CO<sub>2</sub> emissions that would have been caused if the caps had been incinerated.



\* The incineration of eco caps of 1 kg generates CO<sub>2</sub> of 3.15 kg.

We have been consistently committed to human resource development and the creation of a comfortable working environment to achieve the growth of employees and the growth of the company at the same time.

Development of human resources and support for their activities



Shift to a personnel system focusing on the added value created by employees

In April 2019, we fundamentally revised the conventional grade, compensation and evaluation systems and introduced a new personnel system that evaluates employees based on the added value created by them instead of their age or

working hours. Through the introduction of this new system, we aim to encourage employees to grow and feel motivated and also help reform the organization of the company.

1. Revision of the grade, compensation and evaluation systems	To establish a system that highly values the employees who increase productivity and create higher added value within a limited time, we abolished age-based pay in the salary system, which used to be composed of performance-based pay and age-based pay, and newly introduced role-based pay.
2. Introduction of a flexible age-limit system at the age of 65	In consideration of phased increases in the pension age and the diversification of life plans, we introduced a selective retirement system where employees can select the retirement age from 60 to 65.
3. Multi-path personnel system	In addition to the line management posts who manage an organization, we established new posts higher than general managers for specialist personnel (chief engineers, fellows, experts, etc.) to allow them to pursue career advancement. We also created a new post of high-level professional personnel in the annual salary system to facilitate the appointment of human resources with a high level of professional skills.
4. Systematization of career paths	We systematized career paths to develop human resources through the experience of wide-ranging duties and deploy human resources from a long-term perspective according to what is best for the company as a whole. In addition to the job rotation system, we introduced a new overseas trainee system to give short-term work experience to employees.

Basic policy for human resource development

Based on our principle that "people are our most important assets," we will develop human resources who have high ethical standards and awareness of problems and work for the growth of themselves and the younger workforce through systematic and well-planned training in the most inventive manner.

Training tailored to individual objectives and career stages

Human resource development in the Takasago Academy

In the Takasago Academy, which aims to develop human resources who will create our future, we offer practical and multifaceted training programs with various types of training (Off-JT: off the job training) and various experiences (OJT: on the job training) as the two main components and provide training tailored to individual objectives and career stages with "Steady evolution into a multi-disciplinary equipment business," "Establishment of the second and third core businesses" and "Further improvement of engagement" in the medium-term business plan as the basic policies.



Technical training for new employees

On-site training in the first two years

On-site training is given to new employees, irrespective of whether they are technical or clerical staff, for two years after they join the company. This program, which allows the new employees to directly learn and understand how the company grows through the creation of added value and profits, helps them develop diverse career paths subsequently.

Purpose-based training and position-based training

In the purpose-based training, the trainees work to acquire necessary capabilities and business skills and develop a sense of ethics so that they can work actively at all stages from the time of joining the company through retirement. In the position-based training, which focuses on management skills, we offer opportunities to acquire an MBA degree and implement the Young Board Project to train next-generation leaders, manager seminars for management candidates, leader seminars for young employees and other programs to continuously develop human resources who will play the main role in our future management.

●Training system chart

	New employees to 2nd-year employees	3rd to 5th-year employees	Career development period	Mid-level class	Management staff	Senior management	Retirement
Skills	New employee training	Basic technical training	Training for evolution				Career design
Management			Leader / manager seminars		Management seminar		
Management				MBA / external study in Japan			
International	Global seminar						
CSR	Information security, compliance, harassment training						
Other	Leadership improvement, presentation skill improvement, facilitation training						
Qualification	Programs to support the acquisition of official qualifications, distance learning, language education, etc.						

To ensure that all employees can demonstrate their abilities to the fullest with enthusiasm

Establishment of an environment where people can work with a sense of security

To encourage employees to take annual paid holidays, we started to grant annual paid holidays in a planned manner and introduced a system of paid holidays that can be taken by the hour. We also have other systems such as a refreshment leave given as a reward for many years of service (20, 30 and 40 years), three-day summer holidays and anniversary leave.

In the event that employees need to take a leave of absence due to non-work related injury or illness, we grant the annual paid holidays for the last ten years that have expired as special leave. We have also established a welfare system to partially compensate for the income loss of employees who have become unable to work for a long time due to injury or illness.

Health and productivity management

We set up the Health Care Office as a department dedicated to helping executives and employees maintain and improve their health and promoting health and productivity management in April 2019. To become a company where all executives and employees are physically and mentally healthy and work energetically

("Well-Being company"), we issued a "health declaration" while we were certified as a 2020 Health and Productivity Management Organization (Large Enterprise Category) in March 2020.

Diversity

Setting mutual respect as a basis in our management principles, we promote the fair appointment of human resources irrespective of sex, nationality or whether they have disabilities or not. We are actively committed to the creation of workplaces where diverse human resources can make the fullest use of their personality and capabilities through such initiatives as the employment of persons with disabilities and international students with foreign nationalities as well as career training for female employees.

●Employment rate of persons with disabilities



Support for achieving a balance between work and family life

To support employees in balancing work and childcare or nursing care, we have introduced various programs including a system of transfer to a position to work in a specific area with no relocation and a teleworking system, in addition to legally required systems such as a childcare/nursing care leave system, a reduced working hour system and a system of leave for taking care of sick or elderly family members. We also support men in taking part in childcare actively and encourage male employees to take a childcare leave by, for example, allowing them to take the leave partly with pay. We also give support for the return

to work from a childcare leave such as the introduction of nursery schools operated by companies.

●Number of male employees who took childcare leave by year



VOICE



**Yuuki Matsunami**  
Engineer, AI · IoT Development Division, Research and Development Headquarters

Comment from a male employee who took childcare leave

I had heard from a senior employee before that our company is encouraging men to take childcare leave and my wife and I hoped that I could take it when our child was born. When my first child was born and I informed my superior of it, he first asked me whether I needed to take childcare leave or not, which allowed me to make up my mind to take it. After the schedule for the leave was decided, my colleagues also gave me full support and I was able to take leave with no problem. Through the childcare leave, I directly learned how hard it is to raise a child, which renewed my awareness of it. I was also able to share the same recognition with my wife. Thus, it was a very precious time for me. I believe that it is highly significant for both individuals and the company that the number of male employees who take childcare leave continues to rise and people participate in work and childcare irrespective of sex.

Measures to address harassment issues

To prevent sexual and other forms of harassment including abuse of authority and discrimination against pregnant employees, we send messages of top management and clarify our basic policy to never allow any forms of harassment. We have set up consultation counters on and off the company premises to address the matter and also conduct regular questionnaire surveys to check whether there is any harassment in the workplace. Moreover, we continuously provide training to enhance awareness of the prevention of harassment.

On the other hand, many employees recognized the decision making speed and why they should stop and consider the work slowly as challenging items. We are discussing and practicing various measures for improvement. In the medium-term business plan launched in fiscal 2020, we set "Further enhancement of engagement" as a basic policy and are committed to further improvement of employee satisfaction.

●Employee satisfaction level (4-point scale)



Further enhancement of engagement

To ensure that employees are motivated to perform their tasks with enthusiasm, it is important to provide a proper environment. We conduct an Employee Satisfaction Survey every year and analyze the results to understand the achievements and challenges and make the working environment more comfortable based on them. The results of the survey in fiscal 2019 showed high scores in loyalty to the company, and pride in jobs and motivation, which indicated very good relationships with superiors and colleagues.

VOICE

Comment from a trainee of the career training program

In the training, after analyzing myself with a focus on self-understanding, I exchanged opinions on the results with team members and also received feedback, which gave me a good opportunity to review myself. I have made it a habit to analyze what I can do and what I cannot and consider what I should do based on the analysis. Also learning about changes in women's physical and mental health, I found the training really helpful. I will be engaged in daily operations while always thinking about what I want to be like in the future.



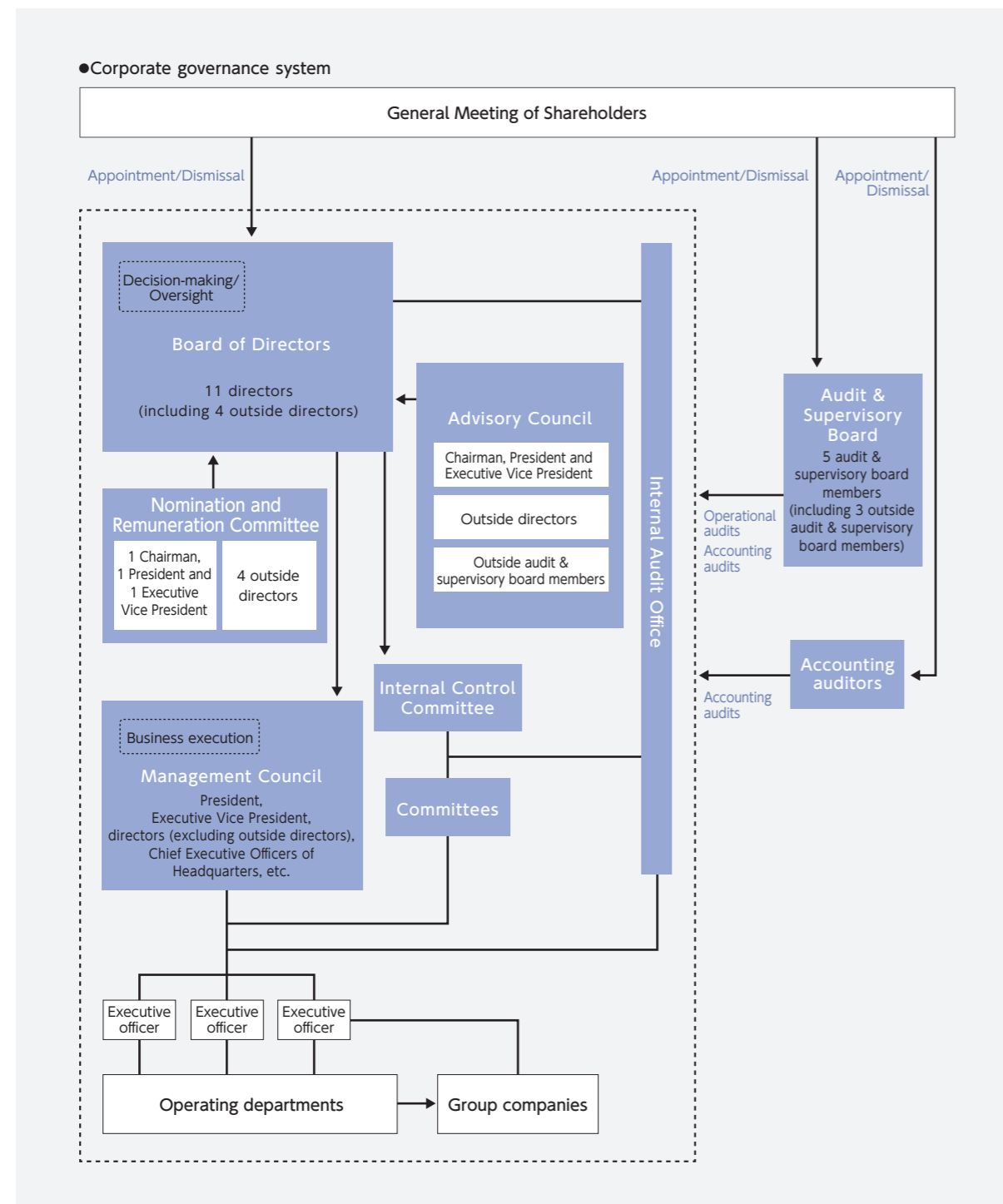
**Natsumi Murayama**  
Manager, First Section, Design Division, Osaka Branch

To achieve our Group’s sustainable growth and medium and long-term improvement in corporate value, we will work to secure the legality, transparency and agility of corporate management and improve management efficiency.

**Corporate governance system**

Takasago Thermal Engineering has a Board of Directors and an Audit & Supervisory Board. We have adjusted the number of directors and shortened their term, which is one year at present, and also introduced an executive officer system to clarify management decision-making and supervisory functions as well as business execution functions for prompt and flexible management.

The Board of Directors currently consists of 11 members (including four outside directors) and its meeting is held once a month in principle and on an as-needed basis. At the meetings, the Board of Directors passes resolutions on the matters specified by laws and the articles of incorporation as well as important matters based on the Board of Directors Regulations to supervise the execution of duties by the directors.



The term of directors is one year with specified management responsibility. Outside directors provide useful advice and opinions from an independent perspective while outside audit & supervisory board members provide useful advice and opinions from an objective and professional perspective by attending board meetings. As such, they try to fulfill the roles expected of outside officers. The Board of Directors strives to improve the efficiency of business management and secures the legality and validity of business execution by making important decisions on business execution and supervising the performance of duties by directors.

The Audit & Supervisory Board currently consists of five members (including three outside audit & supervisory board members). Its meeting is held once a month in principle and an extraordinary meeting is also held when necessary. The Audit & Supervisory Board supervises the execution of duties by the directors through the reporting of audit results to the Board of Directors and other activities.

We have also established the Management Council to enhance deliberation on important matters concerning management and make prompter decisions on the allocation of management resources, as well as the Internal Control Committee to promote the improvement and operation of the internal control system of Takasago Thermal Engineering and its Group in a cross-sectoral manner.

In addition, we have set up the Nomination and Remuneration Committee as an arbitrary advisory body for the Board of Directors. The committee deliberates on the new appointment, reappointment and dismissal of directors, audit & supervisory board members and executive officers of Takasago Thermal Engineering and its subsidiaries to make recommendations to the board (however, the new appointment or reappointment of audit & supervisory board members requires the approval of the Audit & Supervisory Board) as well as the remuneration of the directors and executive officers of Takasago Thermal Engineering and its subsidiaries while also checking the policy and the progress of the plan for the successor of the Director and CEO formulated by the Director and CEO. A majority of the committee must be outside directors.

Furthermore, we have formed the Advisory Council, which consists of Representative Directors, outside directors and outside audit & supervisory board members, as an arbitrary advisory body for the Board of Directors. The Council helps activate the board through such activities as the examination of the structural balance of the Board of Directors as a whole, the analysis and assessment of its effectiveness and the check of the policy for the training of directors and audit & supervisory board members and the provision of information.

In addition to the activities mentioned above, audit & supervisory board members coordinate with accounting auditors and the Internal Audit Office to enhance corporate governance by conducting effective audits through active communication between them.

**Organizations and their members**

Title	Name	Board of Directors	Management Council	Audit & Supervisory Board	Nomination and Remuneration Committee*	Internal Control Committee	Advisory Council
Chairman and Representative Director, CEO	Atsushi Ouchi	◎	○		○	○	◎
President and Representative Director, COO	Kazuhito Kojima	○	◎		○	◎	○
Director and Executive Vice President	Choichi Takahara	○	○		○	○	○
Director and Senior Managing Executive Officer, CFO	Yoshiyuki Hara	○	○			○	
Director and Managing Executive Officer	Hiroshi Yamawake	○	○			○	
Director and Managing Executive Officer	Tadashi Kamiya	○	○			○	
Director and Managing Executive Officer, CDXO	Toshikazu Yokote	○	○			○	
Outside Director	Kazuo Matsunaga	○			○		○
Outside Director	Mitoji Yabunaka	○			○		○
Outside Director	Kiyoshi Fujimura	○			○		○
Outside Director	Yoko Seki	○			○		○
Full-time Audit & Supervisory Board Member	Yukitoshi Yamamoto			◎			
Full-time Audit & Supervisory Board Member	Kunihiro Kondo			○			
Outside Audit & Supervisory Board Member	Tetsuo Ito			○			○
Outside Audit & Supervisory Board Member	Masahiro Seyama			○			○
Outside Audit & Supervisory Board Member	Makio Fujiwara			○			○

○: Member of the organization, ◎: Head of the organization \* The head is elected by mutual vote

## Corporate governance system

### Audit & supervisory board members

The Audit & Supervisory Board currently consists of five members (including three outside audit & supervisory board members). The audit & supervisory board members monitor the implementation status of governance, attend the Board of Directors' meetings and other important meetings, review important approval documents and visit business sites for on-site audits in accordance with the audit policy and audit plan set by the Audit & Supervisory Board. They also strive to increase the effectiveness of the audits to monitor the execution of duties by the directors through coordination with accounting auditors and the Internal Audit Office and other efforts. For subsidiaries, the audit & supervisory board members exchange information and cooperate with the directors and audit & supervisory board members of subsidiaries at a meeting of the Group Management Council and the Group Audit & Supervisory Board and other occasions. Outside audit & supervisory board members obtain and provide information from an independent standpoint and strive for monitoring from an external perspective. On the other hand, full-time audit & supervisory board members conduct monitoring based on their familiarity with our operations. The audit & supervisory board members are thus enhancing the effectiveness of audits from their respective positions.

### Internal audits

Having been established as a section under the direct control of the President, the Internal Audit Office (with six staff members) conducts systematic audits on the appropriateness and efficiency of business operations from an independent standpoint based on the Internal Audit Regulations. For subsidiaries, the office exchanges information and conducts other activities on an as-needed basis. The Internal Audit Office reports the results of audits to the President and Representative Director, COO and also checks the measures to be taken based on the results and the implementation of improvement. It also evaluates the operational status of internal control concerning the financial reporting of our company and important consolidated subsidiaries. While working closely with audit & supervisory board members and accounting auditors, the office works to conduct effective internal audits.

### Accounting auditors

The certified public accountants engaged in the execution of our accounting audit work are Mr. Atsuki Kanazuka and Mr. Junichi Kimura, who belong to KPMG AZSA LLC. Mr. Kanazuka and Mr. Kimura have served as our accounting auditors for three and four years, respectively. They also have five certified public accountants as their assistants along with nine other assistants.

### ●Activities of outside officers

Category	Name	Attendance at the Board of Directors' meetings, etc.	Main activities
Director	Kazuo Matsunaga	Board of Directors: 11 out of 13 meetings	With a wealth of experience and insight mainly in the field of public administration, Mr. Matsunaga gives advice and opinions useful for our business management from an independent position. He also served as a member of the Nomination and Remuneration Committee.
Director	Mitoji Yabunaka	Board of Directors: 12 out of 13 meetings	With a wealth of experience and insight mainly in the field of public administration, Mr. Yabunaka gives advice and opinions useful for our business management from an independent position. He also served as a member of the Nomination and Remuneration Committee.
Director	Kiyoshi Fujimura	Board of Directors: 13 out of 13 meetings	With a wealth of experience and insight as a director and CIO of Mitsubishi Corporation, Mr. Fujimura gives advice and opinions useful for our business management from an independent position. He also served as a member of the Nomination and Remuneration Committee.
Director	Yoko Seki	Board of Directors: 9 out of 10 meetings	With expertise mainly as an attorney and certified public accountant, Ms. Seki gives advice and opinions useful for our business management. She also served as a member of the Nomination and Remuneration Committee.
Audit & supervisory board member	Tetsuo Ito	Board of Directors: 11 out of 13 meetings Audit & Supervisory Board: 12 out of 13 meetings	With expertise mainly as an attorney, Mr. Ito gives advice and opinions useful for our business management.
Audit & supervisory board member	Masahiro Seyama	Board of Directors: 13 out of 13 meetings Audit & Supervisory Board: 13 out of 13 meetings	With a wealth of experience and insight as president and corporate auditor of overseas affiliates of Matsushita Electric Industrial Co., Ltd. (currently Panasonic Corporation), Mr. Seyama gives advice and opinions useful for our business management from an independent position.
Audit & supervisory board member	Makio Fujiwara	Board of Directors: 13 out of 13 meetings Audit & Supervisory Board: 13 out of 13 meetings	With a wealth of experience and insight as director and corporate auditor, etc. of Tokyo Electric Power Co., Inc. (currently Tokyo Electric Power Company Holdings, Incorporated), Mr. Fujiwara gives advice and opinions useful for our business management from an independent position.

(Note) Ms. Yoko Seki was newly appointed as a director at the 139th Ordinary General Meeting of Shareholders held on June 26, 2019 and assumed the post on the same day. Accordingly, her attendance at the Board of Directors' meetings after her assumption of the post is mentioned.

### Analysis and evaluation of the effectiveness of the Board of Directors as a whole

We evaluate the effectiveness of the Board of Directors annually based on the self-evaluation of each director and audit & supervisory board member to secure the efficacy and effectiveness of the Board. Each of the directors and audit & supervisory board members performs a self-evaluation based on the "Self-Evaluation Sheet," and the results are analyzed and evaluated by the Board of Directors after being discussed by Representative Directors and outside officers. The summary results of this analysis and evaluation are shown below, and we believe that the efficacy and effectiveness of the entire Board of Directors is secured. Given the results, we will work to further improve the supervisory and decision-making functions of the Board.

- As a result of promoting more in-depth discussions at the meetings of the Management Council and the Internal Control Committee, which are organized under the Board of Directors, as well as enhanced internal control, it was confirmed that the appropriate development of highly effective oversight and risk management systems, which is one of the responsibilities of the Board of Directors, has been conducted on a continuous basis.
- It was confirmed that active discussions and full and multifaceted reviews were conducted at the Board of Directors meetings, showing that the Board was vitalized. In addition, there was an opinion that we should deepen more multilateral discussions to further enhance debates about the direction of medium and long-term management.

#### ●Actions and improvement measures to be taken based on the self-evaluation results

##### 1. Composition of the Board

- While we have promoted the appointment of younger inside directors and female outside directors to diversify the composition of board members, we will continuously strive for higher diversity by reference to the fields of experience, skill matrix and other factors.

##### 2. Responsibilities of the Board of Directors

- We will enhance debates about the direction of our management based on the medium-term business plan. To this end, we will add provisions of "Items for consideration" to the Rules for the Board of Directors to create opportunities to discuss basic policies for entry into new business fields and the important direction of business execution.

##### 3. Training of directors and audit & supervisory board members

- We will continue to organize group training on subjects that help increase corporate value.

##### 4. Operation of the Board of Directors

- We will make efforts to promote the transfer of authority to the Management Council and also secure time for debates on the direction of the corporate strategy in the Board of Directors meetings.
- As part of the efforts, we will consider an increase in opportunities to discuss medium and long-term business issues and the direction of response to them.
- To clarify points for the discussion, we will work again to ensure the preparation and explanation of materials and recommend the attachment of an executive summary, etc. depending on the subject of the discussion.

### Policy for the training of directors and audit & supervisory board members

We believe that matters required of directors and audit & supervisory board members mainly consist of matters unique to Takasago Thermal Engineering such as necessary knowledge of our businesses, finance and organization and general matters such as the roles required of directors and audit & supervisory board members and their legal and other responsibilities.

Executive directors work to gain a better understanding of general matters, such as our businesses, finance and organization, through discussions at the Management Issue Review Committee every year. Executive directors and audit & supervisory board members that are not outside audit & supervisory board members strive to understand the roles and responsibilities required of

directors and audit & supervisory board members by participating in training by external experts.

We provide an explanation of matters such as our businesses, finance and organization to outside directors and outside audit & supervisory board members when they assume their posts and as required, to facilitate the acquisition of knowledge required of our outside directors and outside audit & supervisory board members. As such, we develop an environment for them to fulfill their roles. In addition, we provide opportunities and services and pay the necessary expenses to acquire and properly update the knowledge required of each director and audit & supervisory board member. The Board of Directors regularly checks progress in the training of executive directors.

## Remuneration of executives

As to the remuneration of directors and audit & supervisory board members, we set the upper limit for the total amount of the remuneration, etc. of all the directors and audit & supervisory board members by resolution at a shareholders' meeting.

To enhance the independence, objectivity and transparency of the remuneration of executives, we established the Nomination and Remuneration Committee as an optional advisory body consisting of Representative Directors, the Chairman and Director, the President and Director, the Director and Executive Vice President and outside directors. After discussions at the Committee, we determine the remuneration of directors, etc. based on a resolution of the Board of Directors.

For the medium- to long-term growth of our business and continuous and sustainable increases in our corporate value and common interests of shareholders, we have resolved on adopting a policy to ensure that the remuneration system for our directors gives a healthy incentive to them in consideration of various issues including trends on corporate governance, survey data provided by external specialized agencies and the remuneration level in other companies. The specific levels are decided by resolution of the Board of Directors after deliberations in the Nomination and Remuneration Committee.

The remuneration of directors consists of basic remuneration, a bonus as a short-term (annual) incentive and a trust-type stock-based compensation system as a medium- to long-term incentive. The composition is set in consideration of the relevant policy.

Outside directors receive only basic remuneration while no bonus or trust-type stock-based compensation system is provided.

The basic remuneration is determined as a fixed amount according to the position of each of the directors.

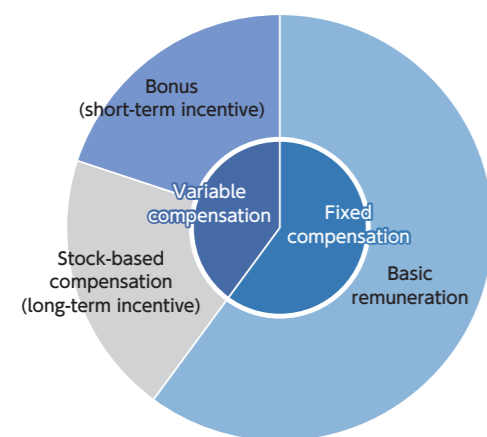
For the amount of the bonus, on April 1, 2019, we introduced a new mechanism with an aim to increase the motivation

of directors to achieve their single-year performance targets and other goals. In this mechanism, the bonus amount changes from the basic amount for each position based on the performance in the previous fiscal year and qualitative assessment of the individual executives (degree of achievement of the goal for each person, training of successors, improvement of corporate value, commitment to SDGs, vitalization of the Board of Directors and compliance).

The trust-type stock-based compensation system aims to further enhance motivation to contribute to the improvement of medium- to long-term performance and corporate value. Points are granted according to the position of the director every year and the shares of our company that are equivalent to the total points are issued at the time of resignation. The remuneration of executive officers also consists of basic remuneration, a bonus as a short-term (annual) incentive and a trust-type stock-based compensation system as a medium- to long-term incentive as in the case of directors. The levels are decided by resolution of the Board of Directors after deliberations in the Nomination and Remuneration Committee.

The directors (excluding outside directors) and executive officers make efforts to acquire our shares by voluntary contribution through the Official Shareholding Association. Remuneration, etc. of audit & supervisory board members is basic remuneration only and the amount of the basic remuneration of each audit & supervisory board member is decided through consultation with audit & supervisory board members based on the comprehensive examination of the content, volume and difficulty of his/her duties, the degree of responsibility, etc. In view of their duties, etc., audit & supervisory board members receive no bonus or trust-type stock-based compensation system or other stock-based remuneration.

●Image of the composition of the remuneration of directors



●Total remuneration, etc. by officer category, the total amount of each type of remuneration and the number of eligible officers

Category	Total amount of remuneration, etc. (million yen)	Number of eligible officers (persons)
Director (except for outside director)	348	9
Outside director	45	4
Audit & supervisory board member (except for outside audit & supervisory board member)	53	2
Outside audit & supervisory board member	47	3
<b>Total</b>	<b>493</b>	<b>18</b>

## Policy for constructive dialogue with shareholders

We believe that listening to shareholders and taking proper measures lead to sustainable growth and medium- and long-term improvement in corporate value. Therefore, we are committed to building a constructive relationship with shareholders through dialogue with them and the disclosure of materials.

Our policy on constructive dialogue with shareholders is as mentioned below.

- (1) For the dialogue with shareholders, we appoint the President and Executive Officer as the person who controls the dialogue, the Chief Executive Officer of Corporate Operations Headquarters as the person in charge of handling the information, the Manager of the Communication Division as the person in charge of timely disclosure and the Manager of the Accounting & Finance Division as the person in charge of annual securities reports, etc. (the structure is shown in the schematic diagram of an overview of the system for timely disclosure later in this page).
- (2) The divisions mentioned above, which belong to the Corporate Operations Headquarters, share information and issues on a daily basis through regular meetings and other opportunities for the promotion of coordination while making efforts to take appropriate actions.
- (3) In addition to biannual financial results briefing sessions, we plan and organize opportunities for dialogue such as

briefing sessions for investors on an as-needed basis. We also participate in external events for investors. In the meantime, the financial results briefing session at the end of the fiscal year ended March 2020 was canceled due to the recent COVID-19 pandemic.

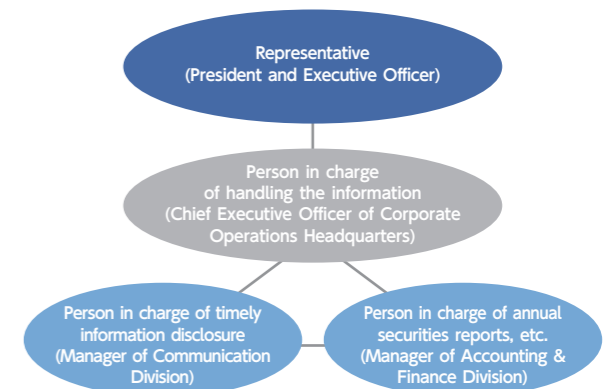
- (4) Directors and senior executives will obtain information directly through attendance at briefing sessions for investors, development of analyst reports and other channels and receive reports from responsible sections regularly and when necessary.
- (5) In order to prevent insider trading, we strictly adhere to the Insider Trading Management Rules, which stipulate regulations concerning matters such as compliance with the Financial Instruments and Exchange Act and other related laws as well as the management of internal information. When we have dialogue, we try to manage the information in a way to avoid being suspected of giving any insider information while disclosing information not selectively but fairly. We set the period from the following day of the end of the settlement term (quarterly and full-year) to the date of the announcement of financial statements as a "period of silence." In the meantime, we obtain knowledge on the prevention of insider trading and give education to update the knowledge.

## Outline of the timely disclosure system

Our internal system for the timely disclosure of corporate information is described below.

- (1) The representative and the person in charge of handling the information endeavor to ensure the timeliness, legitimacy, accuracy and fairness of the information to be disclosed. The information is discussed and reported at the Management Council and Board of Directors meetings as necessary.
- (2) The person in charge of timely information disclosure complies with the Timely Disclosure Rules and relevant laws on a daily basis and also collects information from related sections in a prompt and comprehensive manner for the execution of his/her duties. He/she also makes efforts to prepare proper disclosure materials and enhance the disclosure such as investigation of cases of information disclosure in other companies.
- (3) Audit & supervisory board members and accounting auditors provide advice and instructions on information disclosure to us in addition to periodical audits. We also seek opinions from third-party experts, etc. when necessary.
- (4) We have established the Insider Trading Management Rules and the Disclosure Policy (Information Disclosure Rules) as internal rules, as well as the Group Corporate Code of Ethics, which mentions that they must be strictly followed. Through these and other initiatives, we strive for the prevention of insider trading in our Group including affiliates as well as compliance with the fair disclosure rules.

●Schematic diagram of an overview of the system for timely disclosure



Financial results briefing session

Directors

Chairman and Representative Director, CEO

**Atsushi Ouchi**

Date of birth: July 29, 1949



April 1975 Joined Takasago Thermal Engineering  
 April 2006 Executive Officer  
 April 2008 Managing Executive Officer; Branch General Manager, Osaka Branch  
 June 2008 Director and Managing Executive Officer  
 April 2010 President and Representative Director, CEO  
 January 2015 President and Representative Director, CEO; Director in Charge of Engineering Headquarters  
 April 2015 President and Representative Director, CEO  
 April 2016 Chairman, President and Representative Director, CEO  
 April 2020 Chairman and Representative Director, CEO (to the present)

**Reason for selection as an officer**

Having served as President and Representative Director since April 2010 and Director, Chairman and President since April 2016, Atsushi Ouchi engages in management by exercising his leadership as the Group CEO. We believe that, as Chairman and CEO, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

President and Representative Director, COO; Director in Charge of Work Style Reforms and Global Business Planning Headquarters

**Kazuhiro Kojima**

Date of birth: September 6, 1961



April 1984 Joined Takasago Thermal Engineering  
 April 2015 Administration Officer; Branch General Manager, Yokohama Branch, East Japan Headquarters  
 April 2017 Executive Officer  
 April 2018 Branch General Manager, Osaka Branch  
 April 2019 Chief Executive Officer, Management Strategy Headquarters  
 June 2019 Director and Executive Officer  
 April 2020 President and Representative Director, COO (to the present); Director in Charge of Work Style Reforms and Global Business Planning Headquarters (to the present)

**Reason for selection as an officer**

Through the execution of the air conditioning equipment business, Kazuhiro Kojima has gained abundant experience and deep insight in the design/construction of building equipment relating to the Group's businesses. He has also fulfilled his executive responsibilities through the development of the Group's medium-term/annual business plans and through structural reforms and ESG/SDG-conscious corporate planning operations. We believe that, as President and COO, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director and Managing Executive Officer; Director in Charge of Total Engineering, Research and Development Headquarters and Environmental Business Development Department

**Hiroshi Yamawake**

Date of birth: April 16, 1957



April 1982 Joined Takasago Thermal Engineering  
 April 2010 Deputy Chief Executive Officer, Industrial Air Conditioning Headquarters  
 April 2011 Administration Officer; General Manager, Industrial Facilities Division, Engineering Headquarters  
 April 2015 Executive Officer; General Manager, Engineering Division, Engineering Headquarters  
 June 2015 Director and Executive Officer  
 April 2016 Director and Managing Executive Officer (to the present); Chief Executive Officer, Technology Group; Director in Charge of Quality, Environment and Safety Control  
 April 2017 Chief Executive Officer, Business Innovation Headquarters; Director in Charge of Total Engineering and New Business Development  
 April 2018 Director in Charge of Environmental Solutions Business Promotion Department  
 April 2019 Director in Charge of Technical and Business Creation Management Department  
 April 2020 Director in Charge of Total Engineering, Research and Development Headquarters and Environmental Business Development Department (to the present)

**Reason for selection as an officer**

Through the execution of the air conditioning equipment business, Hiroshi Yamawake has gained abundant experience and deep insight in the design/construction of building equipment relating to the Group's businesses. He has also fulfilled his executive responsibilities for the development of new technologies that contribute to the technical growth of the Group's building equipment as well as the creation of new revenue sources. We believe that, as Director in Charge of Total Engineering including R&D, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director and Managing Executive Officer; Director in Charge of Quality, Environment & Safety Control, Japanese Group Companies and Business Management Headquarters

**Tadashi Kamiya**

Date of birth: October 19, 1963



April 1986 Joined Takasago Thermal Engineering  
 April 2016 Administration Officer; General Manager, Engineering Division, Engineering Headquarters  
 April 2018 Executive Officer  
 April 2019 Deputy Chief Executive Officer, Business Management Headquarters; Officer in Charge of Work Style Reforms  
 June 2019 Director and Managing Executive Officer (to the present); Director in Charge of Quality, Environment & Safety Control, Japanese Group Companies and Business Management Headquarters (to the present)

**Reason for selection as an officer**

Through the execution of the air conditioning equipment business, Tadashi Kamiya has gained abundant experience and deep insight in the design/construction of building equipment relating to the Group's businesses. He has also fulfilled his executive responsibilities through business management and productivity improvement in the air conditioning equipment business. We believe that, as Director in Charge of Quality, Environment & Safety Control including core business management, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director and Executive Vice President; President Adviser; Director in Charge of International Group Companies and Sales & Marketing Headquarters

**Choichi Takahara**

Date of birth: March 13, 1954



April 1972 Joined Takasago Thermal Engineering  
 April 2010 Executive Officer; Branch General Manager, Kanto Branch  
 April 2011 Branch Deputy Chief Executive Officer, East Japan Headquarters; Chief Executive Officer, Purchasing Group  
 June 2013 Director and Executive Officer  
 April 2014 Director and Managing Executive Officer  
 April 2015 Chief Executive Officer, East Japan Headquarters; General Manager, Tokyo Main Office  
 April 2016 Director in Charge of Business in Japan; Chief Executive Officer, East Japan Headquarters; General Manager, Tokyo Main Office  
 April 2017 Representative Director and Senior Managing Executive Officer; Chief Executive Officer, Business in Japan Headquarters; Director in Charge of Quality, Environment and Safety Control  
 April 2018 Director in Charge of Domestic Affiliates and Development Business Promotion Department  
 April 2019 Chief Executive Officer, Business Management Headquarters; Director in Charge of Quality, Environment and Safety Control, Business Development Department, Property Development Management Department and International Group Companies  
 April 2020 Director and Executive Vice President (to the present); President Adviser and Director in Charge of International Group Companies and Sales & Marketing Headquarters (to the present)

**Reason for selection as an officer**

Through the execution of the air conditioning equipment business, Choichi Takahara has gained abundant experience and deep insight in the design/construction of building equipment relating to the Group's businesses. We believe that, as Executive Vice President, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director and Senior Managing Executive Officer, CFO; Director in Charge of Property Development Management Department

**Yoshiyuki Hara**

Date of birth: August 12, 1957



April 1981 Joined Nippon Life Insurance Company  
 March 2009 General Manager, Metropolitan Area Corporate Finance Dept.  
 April 2012 Joined Takasago Thermal Engineering  
 April 2013 Administration Officer; Deputy Chief Executive Officer, Corporate Planning Group  
 April 2014 Executive Officer  
 April 2015 Executive Officer; Deputy Chief Executive Officer, Corporate Administration Group  
 June 2015 Director and Executive Officer; Deputy Chief Executive Officer, Corporate Administration Group  
 April 2016 Director and Managing Executive Officer; Chief Executive Officer, Corporate Administration Group  
 April 2017 Chief Executive Officer, Corporate Operations Headquarters; General Manager, Corporate Planning Division; Director in Charge of Management Strategy and Compliance  
 April 2019 Director in Charge of Management Strategy Headquarters, Corporate Operations Headquarters and Japanese Group Companies  
 April 2020 Director and Senior Managing Executive Officer, CFO (to the present); Director in Charge of Property Development Management Department (to the present)

**Reason for selection as an officer**

Yoshiyuki Hara has gained deep insight in finance and banking fields through his years of service with financial institutions. He has also fulfilled his executive responsibilities associated with accounting, finance and planning-related operations toward the enhancement of the Group's corporate governance and management foundation. We believe that, as CFO, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director and Managing Executive Officer, CDXO; Director in Charge of Compliance, Corporate Operations Headquarters and Business Innovation Headquarters

**Toshikazu Yokote**

Date of birth: March 29, 1961



April 1985 Joined Takasago Thermal Engineering  
 April 2017 Administration Officer; Branch General Manager, Hiroshima Branch  
 April 2018 Executive Officer  
 April 2019 Chief Executive Officer, Corporate Operations Headquarters; Officer in Charge of Compliance  
 June 2019 Director and Executive Officer  
 April 2020 Director and Managing Executive Officer (to the present); Director in Charge of Compliance, Corporate Operations Headquarters and Business Innovation Headquarters (to the present)  
 December 2020 Director and Managing Executive Officer, CDXO (to the present)

**Reason for selection as an officer**

Through the execution of the air conditioning equipment business, Toshikazu Yokote has gained abundant experience and deep insight in the design/construction of building equipment relating to the Group's businesses. He has also fulfilled his executive responsibilities through the enhancement of the management foundation, as an officer in charge of human resources, general affairs, accounting & finance and legal-related operations. We believe that, as Director in Charge of Compliance including overall corporate management, he can be expected to achieve the Group's sustainable growth as well as medium and long-term improvement in corporate value and to revitalize and strengthen the functions of the Board of Directors.

Director

**Kazuo Matsunaga**

Date of birth: February 28, 1952



[Significant concurrent positions]  
 Outside Director, Sony Corporation  
 Outside Director, HASHIMOTO SOGYO HOLDINGS CO., LTD.  
 Representative Chairman of the Board, Mitsubishi Fuso Truck and Bus Corporation

April 1974 Joined Ministry of International Trade and Industry (currently Ministry of Economy, Trade and Industry)  
 June 2004 Director, Nuclear and Industrial Safety Agency  
 September 2005 Director-General for Policy Planning and Coordination, Minister's Secretariat  
 July 2006 Deputy Vice-Minister of Economy, Trade and Industry, Minister's Secretariat  
 July 2008 Director-General, Economic and Industrial Policy Bureau  
 July 2010 Vice-Minister of Economy, Trade and Industry  
 August 2011 Advisor to Ministry of Economy, Trade and Industry  
 June 2013 Director, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

Mr. Kazuo Matsunaga has abundant experience and knowledge of public administration and the economy, and we believe that he can supervise and check business management from an independent perspective based on such experience and knowledge. While he was not involved in corporate management by any other method than serving as outside officer, we believe that he can adequately perform his duty as outside director given the reason mentioned above such as offering advice and opinions useful to our business management. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.



Directors

Director

**Mitoji Yabunaka**

Date of birth: January 23, 1948



[Significant concurrent positions]  
Outside Director, Mitsubishi Electric Corporation

- April 1969 Joined Ministry of Foreign Affairs of Japan
- December 2002 Director-General, Asian and Oceanian Affairs Bureau
- January 2005 Deputy Minister for Foreign Affairs (Economy)
- January 2007 Deputy Minister for Foreign Affairs (Political affairs)
- January 2008 Vice-Minister for Foreign Affairs
- August 2010 Advisor to Ministry of Foreign Affairs
- June 2014 Director, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

Mr. Mitoji Yabunaka has abundant experience and knowledge of foreign diplomacy and public administration, and we believe that he can supervise and check business management from an independent perspective based on such experience and knowledge. While he was not involved in corporate management by any other method than serving as outside officer, we believe that he can adequately perform his duty as outside director given the reason mentioned above such as offering advice and opinions useful to our business management. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

Director

**Kiyoshi Fujimura**

Date of birth: November 3, 1949



- April 1972 Joined Mitsubishi Corporation
- February 2002 Director and President, Mitsubishi Corporation Financial & Management Services (Japan) Ltd.
- June 2003 Corporate Auditor (full-time), Mitsubishi Corporation
- June 2007 Executive Officer, Corporate Functional Officer (CIO)
- April 2008 Executive Vice President, Corporate Functional Officer (CIO)
- April 2009 Director and Executive Vice President, Corporate Functional Officer (CIO)
- April 2010 Director and Executive Vice President, officer in charge of auditing and internal controls
- June 2012 Resigned from Mitsubishi Corporation
- June 2018 Director, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

Mr. Kiyoshi Fujimura has abundant experience and knowledge as director and CIO of Mitsubishi Corporation. We believe that he can supervise and check business management from an independent perspective based on such experience and knowledge, and he can adequately perform his duty as outside director given the reason mentioned above such as offering advice and opinions useful to our business management. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

Full-time Audit & Supervisory Board Member

**Kunihiro Kondo**

Date of birth: January 28, 1957



- April 1980 Joined Fuji Bank, Limited (currently Mizuho Bank, Ltd.)
- April 2004 Branch Manager of Kudan Branch, Mizuho Bank, Ltd.
- April 2007 Executive Officer; Branch Manager of Osaka Branch
- April 2010 Corporate Auditor of Mizuho Private Wealth Management Co., Ltd.
- April 2011 Joined Takasago Thermal Engineering; Executive Officer
- April 2012 Executive Officer; Officer in Charge of Sales and Marketing, East Japan Headquarters
- April 2014 Executive Officer; Deputy Chief Executive Officer, Sales and Marketing Headquarters
- April 2017 Advisor, Takasago Thermal Engineering
- June 2017 Full-time Audit & Supervisory Board Member (to the present)

**Reason for selection as an officer**

Kunihiro Kondo has abundant experience and knowledge of finance and accounting from his work at financial institutions. As he has served as Deputy General Manager of the Tokyo Main Office and Deputy Chief Executive Officer of the Sales & Marketing Headquarters since joining Takasago Thermal Engineering, we believe that he can supervise and check business management.

Audit & Supervisory Board Member

**Tetsuo Ito**

Date of birth: March 15, 1948



[Significant concurrent positions]  
Outside Corporate Auditor, UNIZO Holdings Company, Limited  
Outside Corporate Auditor, Asahi Kasei Corporation  
Outside Director, Japan Petroleum Exploration Co., Ltd.  
Of Counsel, Nishimura & Asashi

- September 1972 Passed the National Bar Examination
- April 1975 Became a public prosecutor
- June 2001 Chief of Special Investigation Department, Tokyo District Public Prosecutors Office
- July 2007 Chief Prosecutor, Tokyo District Public Prosecutors Office
- July 2008 Chief Prosecutor, Takamatsu High Public Prosecutors Office
- January 2009 Deputy Chief Prosecutor, Supreme Public Prosecutors Office
- December 2010 Retired from public service
- April 2011 Registered as an attorney
- June 2014 Audit & Supervisory Board Member, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

We believe that Mr. Tetsuo Ito is capable of conducting a proper audit from a professional perspective nurtured through his long years of experience as a prosecutor and a lawyer. As a result, we believe that he can adequately perform his duty as an outside audit & supervisory board member. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

Director

**Yoko Seki**

Date of birth: August 30, 1970



[Significant concurrent positions]  
Outside Corporate Auditor, TAJU LIFE INSURANCE COMPANY LIMITED  
Supervisory Director, AEON REIT Investment Corporation

- October 2002 Registered as an attorney
- November 2002 Registered as a certified public accountant
- December 2006 Joined Ginza Prime Law Office (to the present)
- April 2014 Professor at Kokushikan University (to the present)
- June 2019 Director, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

Ms. Yoko Seki has abundant experience and knowledge as a lawyer and a certified public accountant, and we believe that she can supervise and check business management from an independent perspective based on such experience and knowledge. While she was not involved in corporate management by any other method than serving as outside officer, we believe that she can adequately perform her duty as outside director given the reason mentioned above such as offering advice and opinions useful to our business management. In addition, as she is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

Audit & Supervisory Board Members

Full-time Audit & Supervisory Board Member

**Yukitoshi Yamamoto**

Date of birth: November 23, 1951



- April 1974 Joined Takasago Thermal Engineering
- April 2012 Executive Officer
- April 2013 Managing Executive Officer; Deputy General Manager, Management Headquarters
- April 2014 Deputy Chief Executive Officer, Corporate Administration Group
- April 2015 Advisor
- June 2015 Full-time Audit & Supervisory Board Member (to the present)

**Reason for selection as an officer**

We believe that Yukitoshi Yamamoto can supervise and check business management by using his knowledge of construction, overall technology such as technological administration and general administration such as general affairs and human resources.

Audit & Supervisory Board Member

**Masahiro Seyama**

Date of birth: July 18, 1949



- April 1972 Joined Matsushita Electric Industry Co., Ltd. (currently Panasonic Corporation)
- September 1995 Seconded to Panasonic Latin America Co., Ltd.; responsible for sales
- September 1999 General Manager of Planning Division and General Manager of Sales Division, Central and South America Group, Matsushita Electric Industry Co., Ltd. (currently Panasonic Corporation)
- February 2001 President of Matsushita Electric Brazil, LLC
- June 2005 Group General Manager, Central and South America Group, Matsushita Electric Industry Co., Ltd. (currently Panasonic Corporation)
- June 2008 Senior Corporate Auditor (full-time)
- June 2014 Audit & Supervisory Board Member, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

We believe that Mr. Masahiro Seyama has abundant experience and knowledge as president and corporate auditor of overseas affiliates of Matsushita Electric Industrial Co., Ltd. (currently Panasonic Corporation) and is capable of conducting a proper audit based on such experience and knowledge. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

Audit & Supervisory Board Member

**Makio Fujiwara**

Date of birth: August 14, 1950



- April 1974 Joined Tokyo Electric Power Company Co., Ltd. (currently Tokyo Electric Power Company Holdings, Incorporated)
- June 2007 Senior Director, Group General Manager of New Business Promotion Group
- June 2009 Senior Director, Deputy Group General Manager of Sales Group
- June 2010 Director and Vice President, Group General Manager of Sales Group
- June 2011 Director and Vice President, Group General Manager of Customer Group
- June 2011 Senior Corporate Auditor, Chairman of Board of Corporate Auditors
- June 2014 Audit & Supervisory Board Member, Takasago Thermal Engineering (to the present)

**Reason for selection as an officer**

We believe that Mr. Makio Fujiwara has abundant experience and knowledge as director and corporate auditor of Tokyo Electric Power Co., Inc. (currently Tokyo Electric Power Company Holdings, Incorporated) as well as outside corporate auditor of Kandenko and is capable of conducting a proper audit based on such experience and knowledge. In addition, as he is not from a parent company, a fellow subsidiary, a major shareholder or a major client or supplier of Takasago Thermal Engineering, we believe that there is no particular problem in terms of independence.

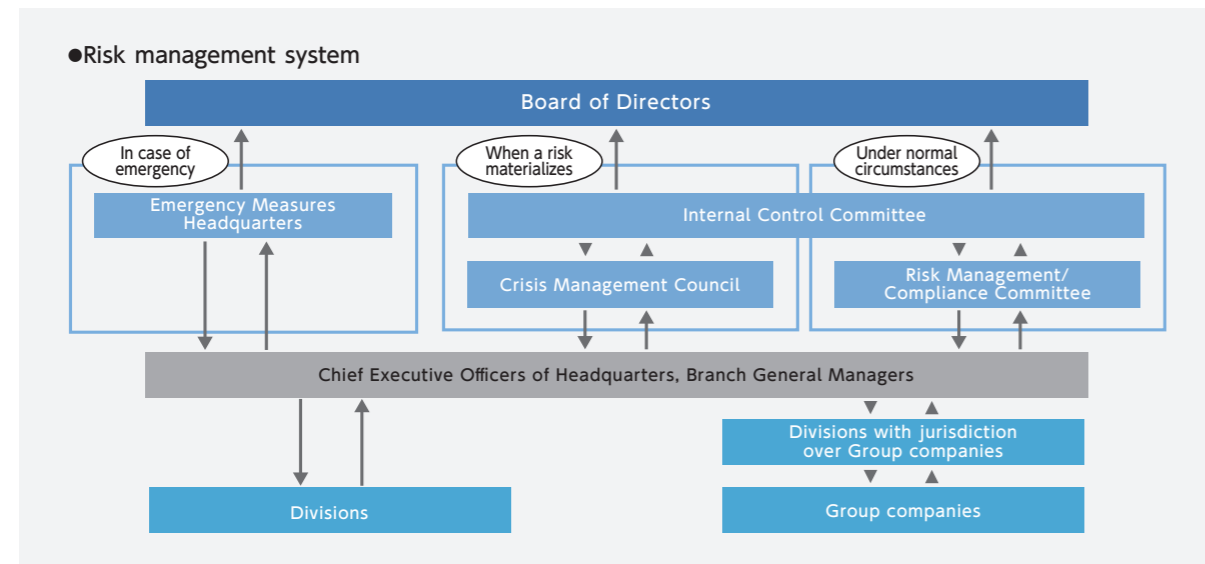
We are committed to measures to prevent management risks from materializing and minimize the impact of crises.

Risk Management

The Takasago Thermal Engineering Group carries out risk management to prevent all risks from materializing and minimize damage in case a risk actually materializes. To prevent risks from materializing, we established the Risk Management Committee chaired by Director and CFO (Chief Financial Officer), in which President and Representative Director, COO (Chief Operating Officer) serves as the chief officer, in accordance with the Risk Management Regulations. The committee is responsible for the development of the operating policy and plan for the risk management system, the identification of any risks that may have a significant

impact on our Group and the evaluation of the adequacy of measures to address risks. We have developed a system to minimize damage and loss in case a risk materializes to cause a crisis in accordance with the Crisis Management Regulations.

In risk management, we give first priority to the risks that especially have a large impact on business management and can occur with a high probability as focused key risks. We are enhancing the PDCA cycle in which progress and problems are reviewed every quarter and fed back for risk reduction activities.



Business and other risks

We have identified the risks that may have significant impacts on the financial conditions, corporate performance, cash flow, etc. of our Group as listed below. We will take various measures to address them to reduce the risks.

Risk item	Assumed impact	Measures to address the risk
Fluctuations in private capital investment	As a result of the suspension, postponement, change, etc. of investment plans of customers, the demand for construction and HVAC systems may fall more than previously estimated.	We will implement comprehensive company-wide measures including the reduction of fixed costs.
Fluctuations in procurement costs	When material and equipment prices for duct, piping, heat insulation, refrigerant and other utility works have sharply risen but it is difficult to reflect the cost increase on the contract amount, the costs of the construction work may increase more than previously estimated.	We will strengthen the procurement function based on the advantage of scale by enhancing the system to control purchases and accelerating the integration of purchases by all offices.
Shortage of technical staff and skilled workers	We may fail to establish a sufficient construction structure to complete the construction work by the specified deadline and lose the trust of customers as a result.	We will try to improve productivity through the establishment and use of an outsourcing system, the utilization of IT tools such as Apple Watch and SPIDERPLUS and standardization of operations and secure technical staff through commitment to the recruitment of new workers in contract construction firms and the introduction of the construction career development system promoted by the MLIT.

Risk item	Assumed impact	Measures to address the risk
Overseas business development	We may face various risks in the target countries such as the regulations and supervision by authorities including voluntary regulatory bodies, economic and political instability and differences in business practices, as well as intensified competition with competitors that have a competitive edge in a specific country/region or the global market.	We will promote the review of the strategic bases to achieve profitability in our international businesses as a whole and implement proper monitoring through the constant exchange of information with overseas Group companies.
Expansion of the business fields	In a target market, the technologies we own may not be suitable or we may not be able to achieve the initially anticipated results depending on the speed of the market expansion, the scale of the growth or difficulty in entering the market.	We will judge whether we need to withdraw from the market or not according to the predetermined criteria.
M&A	Contingent liabilities may occur or unrecognized liabilities may be found after an acquisition. The possibility to recover the invested capital may decline to losing the whole or part of the investment if the revenue cannot be produced as expected due to changes in the business environment, sluggish performance of the invested company, etc.	Before an M&A or investment, we will perform due diligence on details including the financial statements and contractual relationships of the target company.
Trend of the financial market Decrease in the credit strength of our Group	We may fail to raise funds in a timely manner under favorable conditions for our Group, which may constrain the execution of our business.	We will successively communicate and exchange information with financial institutions.
Occurrence of liability for damage or defect liability	We may be required to pay compensation for damage that is too large to be covered by the umbrella liability insurance carried for unforeseeable circumstances.	To prevent such a situation, we will thoroughly control health and safety through measures such as the provision of instructions on health and safety to sites and the establishment of a proper working environment.
Aging of employees	Decreases in the number of employees are anticipated due to increases in the employees who retire at mandatory retirement age, possibly leading to problems for our future business activities.	We will promote long-term employment by reinforcing the retirement age extension and re-employment systems and increase productivity with labor saving and efficiency improvement through the visualization of techniques by using IoT, etc. We will enhance the use of diverse human resources including international personnel.
Appointment of young workers and professional human resources	If we cannot appoint sufficient young workers and professional human resources, it may create problems for the continuity of our business activities.	We will visit universities, etc. in Japan actively, organize recruitment workshops and conduct an internship program while also increasing professional human resources by employing mid-career workers.
Absence or infringement of patents	The technologies, etc. used in our Group are not protected if we fail to acquire their patent rights and other intellectual property rights. In the meantime, in case we unintentionally infringe any patent rights and other intellectual property rights of others, we may be required to pay compensation for damage.	We will establish a system to thoroughly investigate infringed patents and constantly share information among all departments.
Asset holding	Marketable stocks, etc. involve the risk of price fluctuations. We may suffer an impairment loss due to a significant decline in market prices and post it as an extraordinary loss.	While paying attention to the economic trends, we will consider options, including the sale of the assets we own, to reduce the risk of a decrease in the value of the assets.
Fluctuations in the exchange rate	The financial results, assets and liabilities of overseas affiliates can be affected by fluctuations in the exchange rate because those figures are converted from the local currency to yen for the preparation of consolidated financial statements.	When conducting a transaction in a foreign currency, we will try to reduce the risk of fluctuations in the exchange rate with foreign exchange reserves and other actions while paying attention to the economic trends.
Possession of personal information and secret information of customers	In case of external leakage, abuse, etc. of information with illegal access, etc., we may be involved in a legal dispute and subject to punishment from supervisory authorities in Japan and overseas.	We will take measures to address cyber-attacks and strengthen IT governance while giving relevant training to employees and taking other initiatives to improve their information literacy.
Application of legal regulations, etc.	The operation of our Group may be subject to new constraints due to the establishment or revision of legal regulations, withdrawal of an approval/license or punishment by supervisory authorities, the establishment or revision of new guidelines or voluntary rules, etc.	We will promote cross-sectoral initiatives for compliance in the Group and report the status of the initiatives to the Risk Management Committee and the Board of Directors to ensure proper execution of duties while also conducting internal audits to reinforce the compliance system.
Lawsuits, etc.	Our Group may face lawsuits and other claims concerning various issues including the environment, labor and intellectual property rights.	We will try to prevent them through the establishment of a crisis management system to prepare for emergencies, as well as the activities of the Crisis Management Council, while also purchasing various insurance policies.
Natural disasters	The occurrence of large-scale natural disasters, such as earthquakes, typhoons and tsunamis, and the pandemic of infectious diseases might result in a suspension or significant delay of construction works as well as a decline in the demand for construction due to the slowdown of economic activities in society as a whole.	We will work to improve the accuracy of the business continuity planning (BCP) manual and develop measures to address emergencies.
Expansion and prolongation of infectious diseases	Such a situation might lead to a decline in the demand for construction due to the economic downturn, as well as sharp rises in the prices of materials and equipment.	We will set up task forces internally and take various measures to prevent infection.

## Response to the risks that will increase in the future

### [Risks related to climate change]

Climate change is a challenge that can have an impact on a global scale. The rising temperature and abnormal weather, as well as natural disasters, etc. caused by them, may lead to an inability to procure materials and equipment, increase procurement costs and suspend construction work and other business activities. In addition, the tightening of laws and other regulations to control climate change in Japan and overseas including those concerning the efficient use of energy and measures to combat global warming may affect the operations, financial conditions and business performance of the Takasago Thermal Engineering Group with the generation of new burdens on our Group and increases in business

operating costs due to the need of material and equipment changes and other actions. While it is difficult to predict what event, etc. could specifically occur in association with climate change, our Group will examine the long-term impact of climate change under the existing risk control system. Takasago Thermal Engineering also announced its approval for the Task Force on Climate-related Financial Disclosures (TCFD) in the summer of 2020. We will continue to actively disclose our financial information related to climate change.

### ●Risks and business opportunities associated with climate change

Assumed risk			Assumed impact on business operations		
Large classification	Middle classification	Small classification	Risk	Opportunity	Impact
Transition risk	Policies and regulations	Carbon tax	<b>Medium and long-term</b> •Increases in energy procurement costs •Decreases in sales and profits due to higher material and equipment prices reflecting the cost increases •Increases in renewable energy procurement costs and waste treatment costs •Decline in competitiveness with the loss of differentiators due to the compulsory use of low-carbon products •Material and process changes towards the achievement of a low-carbon society	<b>Medium and long-term</b> •Increases in business opportunities by ensuring the trust of customers (major construction companies and owners) with a commitment to society •Differentiation from competitors with early actions to obtain business opportunities •Increases in the receipt of orders as a result of the development of energy-saving and ZEB-related technologies •Increases in business opportunities for environmentally friendly products that help achieve a low-carbon society	Large
		Tightening of regulations Renewable energy policy			
	Market and technical changes	Technology investment Market changes			
	Reputation	Reputation damage	<b>Medium and long-term</b> •Decline in the reputation of the companies that do not reduce CO <sub>2</sub> emissions among investors and customers	<b>Short and medium-term</b> •Potential of stable fundraising by presenting actions for resource recycling	Medium
Physical risk	Acute	•Frequent occurrence of typhoons •Heavy rain, drought	<b>Short-term</b> •Increases in damage such as the suspension of work on construction sites and sales decreases •Sale decreases due to the disruption of the supply chain	<b>Short-term</b> •Growth of the demand for the strengthening of infrastructure (increases in the receipt of orders associated with it) •Acceleration of the renewal of aging infrastructure (increases in the receipt of orders associated with it) •Growth of the demand for facilities to prepare for disasters	Large
			<b>Medium and long-term</b> •Increases in the payment of insurance premiums		
	Chronic	•Rise in average temperature •Sea level rise •Changes in rainfall patterns	<b>Short-term</b> •Sale decreases due to the disruption of the supply chain and increases in the cost for the re-establishment of the supply chain <b>Medium and long-term</b> •Increases in heatstroke and diseases caused by global warming (labor shortage of technical staff) •Increases in air conditioning costs	<b>Short-term</b> •Increases in the sales of products that have heat insulation effects	Medium

## Strengthening of our capabilities to respond to disasters, etc. based on business continuity plans (BCPs)

In preparation for large-scale earthquakes, we established business continuity plans (BCPs) in April 2014. The BCPs specify the initial response and recovery procedures in case of the occurrence of a large-scale earthquake to establish a system for business continuity within a target time while also setting up a system to fulfill social responsibilities to be assumed by the construction industry at the time of a disaster, including support for the restoration of hospitals and other facilities of a highly public nature and the supply chains of customers. In fiscal 2019, we conducted the first initial response drill of the Head Office on the assumption that an earthquake occurred directly underneath Tokyo.

We are committed to BCM\* to enhance the effectiveness of the BCPs. In addition, we have sorted out the activities we have implemented to cope with the ongoing COVID-19 pandemic and developed a BCP manual on infectious diseases to prepare for the pandemic of such diseases that can occur in the future.

\* BCM (business continuity management): While a BCP is a plan to continue business operations at the time of a disaster, BCM aims to enhance the effectiveness of BCPs through the implementation of emergency drills, strengthening of necessary resources for operations and other activities.



## Response to the novel coronavirus

The novel coronavirus named COVID-19, which was first discovered in China in December 2019, spread worldwide and the World Health Organization (WHO) declared the outbreak of the virus to be a pandemic in March 2020. Takasago Thermal Engineering launched a supervisory task force to prevent the infection in February while promptly promoting the use of teleworking, changing the meeting style to online and telephone conferences and prohibiting domestic and international business trips and business entertainment involving dining. In April, we reduced the office workers who came to the office to the minimum necessary in the specified regions in line with the declaration of a state of emergency by the Japanese government. At present, even after the termination of the declaration, we still aim to keep the overall ratio of those who come to the office below 50%. Meanwhile, in the construction sites and offices, we give top priority to ensuring the safety of our executives and employees and the workers of our partner companies. Through full cooperation and coordination with the ordering parties and other relevant companies, we have taken specific measures in line with the construction work and features on each site.



Meeting to address COVID-19



BCP manual on infectious diseases

### Contribution to the prevention of COVID-19 infection

While we developed BARRIFLOW® and BARRIHOOD®, which are clean booths for medical use, to prevent novel influenza patients from spreading the viruses in 2009, we are hastily increasing the production of those products in response to the interest in them that grew again after the outbreak of COVID-19. The two products have been introduced into many

medical institutions in Japan and overseas.

We have also set up an in-house team specially appointed for the prevention of infectious diseases. This team is committed to initiatives that help control the spread of such diseases including the enhancement of the proposal of effective prevention measures that are suitable for the uses of buildings.

### VOICE

### Comment from a customer

Dr. Yoshio Otani, Director, Head of Ikebukuro Otani Clinic

While our hospital installed BARRIFLOW® at the end of April, I am afraid that the situation would be even worse in the coming autumn and winter. I have thought that it is necessary to take possible measures in advance because influenza and other infectious diseases will spread in addition to COVID-19. It is excellent that this equipment features both positive pressure and negative pressure. I decided to introduce it as I heard that it can be used for different purposes depending on the situation of the outbreak, such as the use of negative pressure for the collection of specimens for PCR tests, etc.

While patients in our hospital were surprised, they now understand that it is for handling COVID-19 and feel secure with the solid measure to prevent infection.



In a clean space of the booth under positive pressure, doctors can reduce the risk of being infected and examine many patients safely.

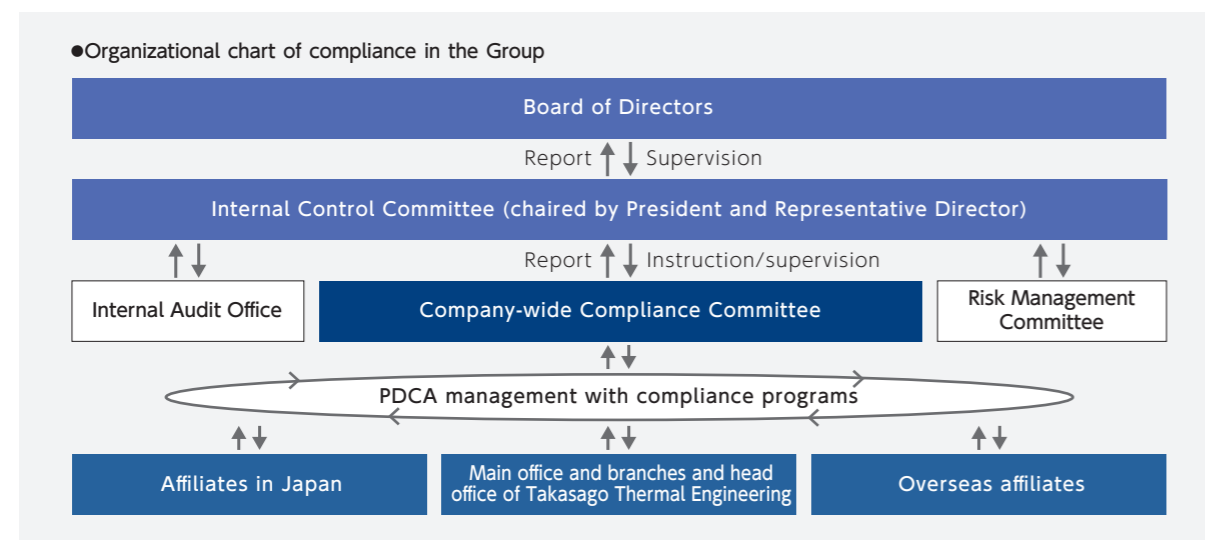
Based on the recognition that the establishment of compliance is the foundation for strengthening corporate governance, we are continuously working to enhance the awareness of compliance and ensure it in daily activities.

### Compliance promotion system

We have set up the Compliance Committee chaired by the officer in charge of the supervision of risk management in the Takasago Thermal Engineering Group as a whole. This committee takes various measures based on the basic policy on compliance. The Compliance Office, which is a dedicated section, is committed to establishing the compliance system and promoting measures for it including the transmission of information to executives and employees and the dissemination of the consultation and reporting counters. While incorporating major subjects on compliance, such as the prevention of harassment and compliance with competition laws, into the compliance programs, we work to

promote compliance through shared recognition of problems as well as the confirmation of progress in measures and the examination of cooperation and coordination between departments by the Company-wide Risk Management/Compliance Committee.

An officer in charge of corporate ethics and staff in charge of the promotion are appointed in each of our affiliates in Japan and overseas to enhance coordination with us and continuously develop the Group-wide system.



### Continuous activities to promote compliance

#### Awareness-raising activities with Group Corporate Code of Ethics and various tools

We have established the Group Action Guidelines as the basic action guide for executives and employees and distributed a portable booklet "Group Corporate Code of Ethics" to executives and employees to use for daily duties, in-house training and other purposes.

In addition, we organize various training programs on compliance for not only employees but also partner companies and periodically prepare and distribute tools for small study sessions in workplaces.

#### Compliance awareness survey

We conduct a compliance awareness survey once a year to grasp yearly changes and any new trends in the awareness of compliance among employees.

This survey asks questions about the awareness of various types of harassment and the awareness among employees about placing orders, as well as circumstances in the company, to identify any problems and solve them quickly. The results of the survey in fiscal 2019 showed a significant improvement in awareness of compliance with competition laws. The answers to harassment-related questions presented gaps between different positions and other attributes. Accordingly, we will continue to develop activities to prevent harassment and raise awareness of it. The survey results are disclosed to all employees and used for compliance training and other purposes in each department. The analysis of the answers is reported to various committees to share the problems and help develop action policies and measures for improvement.

#### Results of the compliance awareness survey

Implementation rate	Gaps in the awareness of various types of harassment between different attributes	
98.1%	<ul style="list-style-type: none"> <li>I believe that there was sexual harassment Men: 7%; Women: 21%</li> <li>A gap of 14%</li> </ul>	<ul style="list-style-type: none"> <li>I believe that there was an abuse of authority Managers: 7%; Non-managers: 16%</li> <li>A gap of 9%</li> </ul>

### Maintenance of proper relationships with customers (commitment to the prevention of bribery)

To maintain proper relationships with customers, we have prohibited excessive business entertainment, in addition to the offering of bribes to government workers, etc. and commercial bribery to private customers, in the Group Corporate Code of Ethics. In consideration of the current international situation

and other factors, we have also established the rules concerning the prevention of bribery that explicitly prevent bribery in each of our subsidiaries in Japan and overseas. The effectiveness of the rules is enhanced through the adaptation of them to the local culture and business practices as well as regular monitoring.

### Measures to comply with the Anti-Monopoly Act

For thorough compliance with the Anti-Monopoly Act and other competition-related laws, we have specified and practiced measures for each of the stages from "prevention" to "detection and early discovery," "response to the occurrence or suspicion of a violation" and "measures to prevent any violations from being forgotten or the rules from losing substance."

Our executives and employees will strive for thorough compliance and we will continue to create an environment for the continuous execution of sound operations.

#### Results of the e-learning to comply with competition laws conducted in fiscal 2019

Implementation rate	Percentage of questions answered correctly
97.5%	86.4%

Prevention	<ul style="list-style-type: none"> <li>Clarification of rules with the Basic Rules on Compliance with Competition Law and the Guidelines on Contact with Competitors and periodical review of them</li> <li>Enhancement and improvement of training for compliance with competition laws</li> </ul>
Detection and early discovery	<ul style="list-style-type: none"> <li>Check and storage of records on contact with competitors</li> <li>Voluntary inspection by sales sections and management sections</li> <li>Internal audits or monitoring by legal sections</li> </ul>
Response to the occurrence or suspicion of a violation	<ul style="list-style-type: none"> <li>Establishment of procedures to prevent violations</li> <li>Development of an in-house investigation system</li> </ul>
Measures to prevent any violations from being forgotten or the rules from losing substance	<ul style="list-style-type: none"> <li>Periodical review and implementation of training in the "Compliance Month"</li> <li>Report of the status of management and operation of the Competition Law Compliance Program to the Internal Control Committee and the Board of Directors</li> </ul>

### Whistle-blower system

We have established wide-ranging consulting counters including lawyers and external services, in addition to an internal section in charge of the system. To ensure that the counters can be used with a sense of security, the Rules on the Protection of Whistle-blowers in the Group have been stipulated and operated.

In fiscal 2019, we received a total of 10 reports through this system, including reports on harassment and opinions to the company.

The reports are passed to the Company-wide Compliance Committee and the Whistle-blowing Committee, while the protection of the whistle-blowers is ensured, to identify and remedy problems early. The content of the reports is also reflected in the subjects selected for compliance training. We thus use this system for our efforts to prevent problems. In overseas bases, we work to make the whistle-blower system known and promote the establishment of the counters in multiple languages.

#### The number of reports made in the whistle-blower system by category

Category	FY2017	FY2018	FY2019
Harassment	2	2	5
Complaints about superiors	—	—	1
Opinions to the company	—	1	1
Other including labor management	6	2	3
<b>Total number of reports</b>	<b>8</b>	<b>5</b>	<b>10</b>

Company overview (as of March 31, 2020)

Company name	Takasago Thermal Engineering Co., Ltd.
Established	November 16, 1923
Number of employees	2,064 (consolidated: 5,899)
Capital	13,134 million yen
Financial closing	March
Listed	On the First Section of the Tokyo Stock Exchange
Address	6-27-30 Shinjuku, Shinjuku-Ku, Tokyo 160-0022
Tel.:	+81-3-6369-8212
Fax:	+81-3-6369-9103

Business description

- Air conditioning systems
- Clean rooms and associated equipment and devices
- District heating and cooling facilities
- Plumbing and sanitary systems
- Co-generation systems
- Electrical, instrumentation and communication systems
- Equipment diagnosis
- Failure diagnosis systems
- Dehumidifying/drying systems
- HVAC systems for nuclear energy facilities
- High-precision HVAC systems
- Waste vacuum transfer systems
- Construction work
- Exhaust heat recovery systems
- Heating/cooling systems
- Refrigerating/freezing systems
- Design, construction, production, installation and maintenance of other environmental control and thermal engineering systems
- Design, manufacture, import, export, sale and mediation of machinery, equipment and materials
- Consulting services concerning energy-saving and environmental measures
- Business related to greenhouse gas emissions trading
- Purchase, sale, brokerage, lease and management of real estate
- Worker dispatch business
- Security business
- Cleaning business
- Energy supply business
- Power generation business
- Water treatment business

License under the provisions of Article 3, paragraph (1) of the Construction Business Act

[Special construction business]

License No.: (TOKU-27) No. 5708 issued by the Minister of Land, Infrastructure, Transport and Tourism

License date: December 4, 2015

Duration of license validity: From December 4, 2015 to December 3, 2020

Licensed fields of construction:

Plumbing, machine and equipment installation, electrical work, telecommunications work and general construction work

[Ordinary construction business]

License No.: (HAN-27) No. 5708 issued by the Minister of Land, Infrastructure, Transport and Tourism

License date: December 4, 2015

Duration of license validity: From December 4, 2015 to December 3, 2020

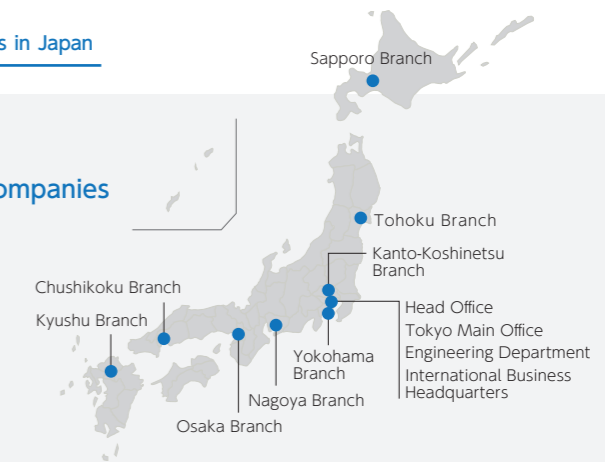
Licensed fields of construction: Fire protection facility construction work

Major bases

(as of April 1, 2020)

Major bases in Japan

7 Group companies in Japan



- TMES Corporation
- NIPPON Pmac CO., LTD.
- Nippon Development Kosan Co., Ltd.
- Kiyota Kougyo Co., Ltd.
- Kazusa Environmental Research Center Co., Ltd.
- Nihon Setsubi Kogyo Co., Ltd.
- Tomakomai Heat Supply Co., Ltd.

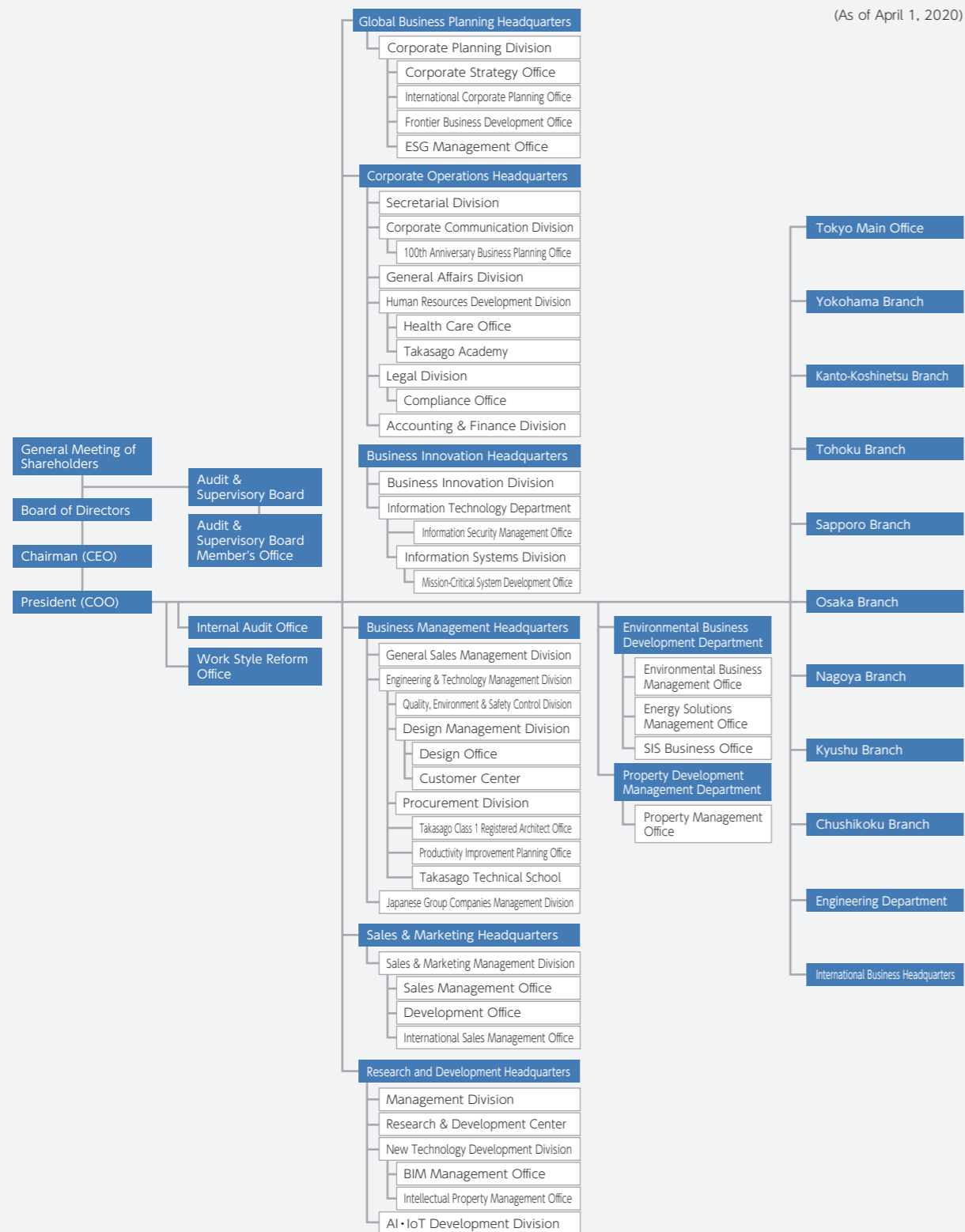


9 overseas Group companies

- Takasago Constructors and Engineers (China) Co., Ltd. (China)
- Takasago Singapore Pte. Ltd. (Singapore)
- Thai Takasago Co., Ltd. (Thailand)
- T.T.E. Engineering (Malaysia) Sdn. Bhd. (Malaysia)
- Takasago Thermal Engineering (Hong Kong) Co., Ltd. (Hong Kong)
- Takasago Vietnam Co., Ltd. (Vietnam)
- PT. Takasago Thermal Engineering (Indonesia)
- Takasago Engineering Mexico, S.A. de C.V. (Mexico)
- Integrated Cleanroom Technologies Pvt. Ltd. (India)

\* Myanmar Branch Office of Takasago Thermal Engineering has been established in Myanmar.

Organization chart



Stock information

Major shareholders (Top 10)

(as of March 31, 2020)

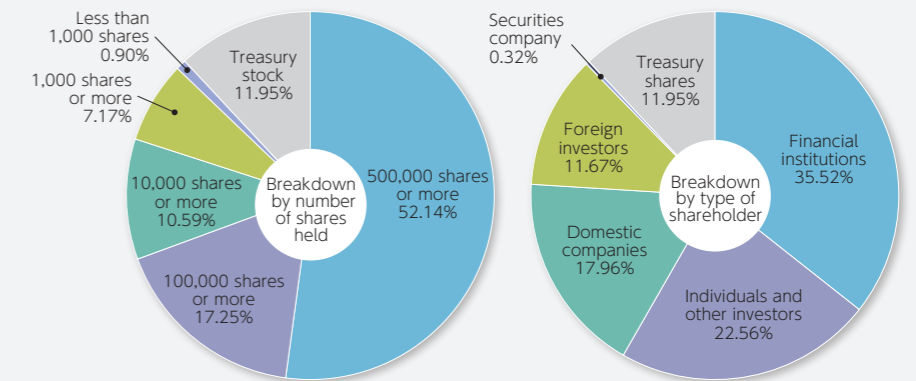
Shareholder name	Number of shares owned (thousand shares)	Percentage (%)
Nippon Life Insurance Company	4,560	6.49
The Dai-ichi Life Insurance Company, Limited	4,231	6.02
Japan Trustee Services Bank, Ltd. (Trust Account)	3,561	5.07
The Master Trust Bank of Japan, Ltd. (Trust Account)	3,354	4.77
Takasago Thermal Engineering Employee Shareholding Association	3,247	4.62
Takasago Kyoeikai	2,627	3.74
MUFG Bank, Ltd.	1,892	2.69
STATE STREET BANK AND TRUST COMPANY 505001	1,366	1.94
JP MORGAN CHASE BANK 385151	1,307	1.86
Mizuho Bank, Ltd.	1,210	1.72

(Note) 1. Numbers of shares are rounded down to the nearest thousand.  
 2. The shareholding ratio is rounded down to two decimal places.  
 3. The treasury stock (9,534 thousand shares) is excluded from the calculation of the shareholding ratio.  
 4. The treasury stock excludes our shares owned by the executive remuneration BIP trust (504 thousand shares).

Status of shares

(as of March 31, 2020)

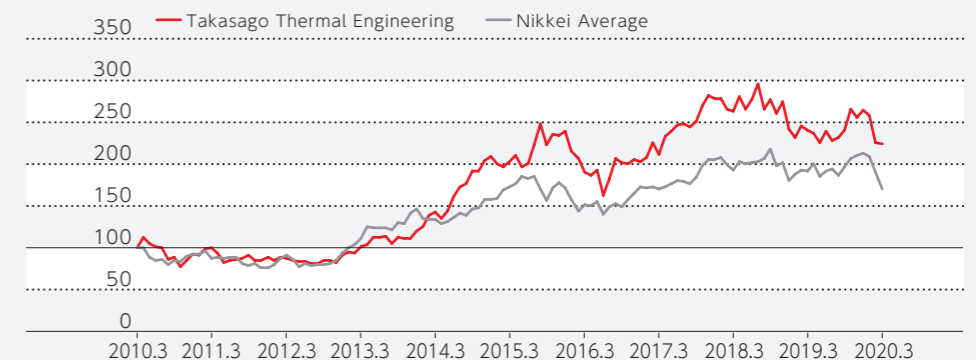
•Total number of issuable shares: 200,000,000 shares  
 •Total number of issued shares: 70,230,797 shares (excluding 9,534,971 treasury stock shares)  
 •Number of shareholders: 5,849 (increased by 244 from the end of the previous fiscal year)



(Note) As the shareholding ratio is rounded down to two decimal places, the total may not become 100%.

Stock price trends

The stock prices of Takasago Thermal Engineering and Nikkei Average are relative values with the prices at the end of March 2010 set to 100.



Financial data  
(consolidated)

\* Rounded down to the nearest million yen

Business results		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	(FY)
Orders received	(million yen)	207,283	221,431	253,918	264,280	255,648	265,301	273,464	288,646	333,887	297,883	
Net sales	(million yen)	213,175	215,464	248,430	237,389	243,582	251,291	260,204	289,933	319,834	320,893	
Gross profit	(million yen)	22,021	22,572	22,249	27,308	27,800	29,526	34,082	39,550	41,877	43,376	
Selling, general and administrative expenses	(million yen)	16,816	17,357	18,678	19,527	20,073	20,237	21,699	23,187	24,657	25,476	
Operating Income	(million yen)	5,205	5,214	3,570	7,780	7,727	9,289	12,383	16,362	17,219	17,900	
Ordinary Income	(million yen)	5,910	6,695	4,760	9,109	8,582	10,602	13,427	17,461	18,359	19,286	
Net income attributable to owners of parent	(million yen)	3,003	4,269	2,186	4,011	5,196	6,650	8,665	11,804	12,609	13,231	
Net income per share	(yen)	38.72	55.23	28.74	53.24	69.28	89.40	117.83	160.41	173.29	186.49	
Rate of return on equity	(%)	3.7	5.2	2.5	4.4	5.2	6.4	8.2	10.3	10.4	10.8	
Ratio of ordinary income to total assets	(%)	3.3	3.6	2.4	4.3	3.9	4.7	5.9	7.0	6.8	7.1	
Gross profit margin	(%)	10.3	10.5	9.0	11.5	11.4	11.8	13.1	13.6	13.1	13.5	
SG&A margin	(%)	7.9	8.1	7.5	8.2	8.2	8.1	8.3	8.0	7.7	7.9	
Ratio of operating income to net sales	(%)	2.4	2.4	1.4	3.3	3.2	3.7	4.8	5.6	5.4	5.6	
Dead equity ratio	(times)	0.04	0.06	0.05	0.05	0.07	0.09	0.05	0.14	0.14	0.18	
R&D expenses	(million yen)	935	996	843	768	791	918	903	1,064	945	1,357	
Capital investment	(million yen)	446	481	1,209	962	2,019	2,325	862	3,303	3,962	12,669	
Depreciation and amortization	(million yen)	750	709	734	770	758	840	776	730	824	1,299	
Financial positions												
Total assets	(million yen)	175,166	197,434	207,465	217,132	225,810	223,267	233,426	264,062	279,743	265,649	
Net assets	(million yen)	81,786	85,771	93,932	97,416	108,362	104,613	111,574	124,484	126,208	125,861	
Interest-bearing debt	(million yen)	3,516	5,058	4,443	4,447	7,700	9,435	5,527	16,277	17,402	21,733	
Net assets per share	(yen)	1,052.62	1,105.66	1,186.44	1,248.38	1,413.59	1,392.30	1,487.29	1,637.63	1,704.31	1,757.68	
Shareholders' equity	(million yen)	81,655	84,075	90,371	93,415	105,725	102,325	109,382	120,546	122,060	122,091	
Equity ratio	(%)	46.6	42.6	43.6	43.0	46.8	45.8	46.9	45.7	43.6	46.0	
Cash flows												
Cash flows from operating activities	(million yen)	△5,939	569	13,054	13,575	△3,423	△1,272	23,528	6,170	14,892	△6,369	
Cash flows from investing activities	(million yen)	1,443	△556	△870	1,455	△4,921	△5,398	2,329	△5,685	△6,069	△8,187	
Cash flows from financing activities	(million yen)	△2,273	△1,157	△2,801	△3,285	△837	△2,215	△6,079	7,107	△7,928	△4,199	
Dividends												
Dividends per share	(yen)	25	25	25	25	25	28	36	50	52	56	
Payout ratio	(%)	64.6	45.3	87.0	47.0	36.1	31.3	30.6	31.2	30.0	30.0	
Ratio of dividends to net assets	(%)	2.4	2.3	2.2	2.1	1.9	2.0	2.5	3.2	3.1	3.2	
Non-financial data												
Number of employees	(persons)	2,617	4,085	4,312	4,405	4,471	4,576	4,831	5,714	5,912	5,899	
Non-consolidated	(persons)	1,817	1,845	1,859	1,850	1,858	1,885	1,950	2,025	2,051	2,064	
Consolidated subsidiaries in Japan	(persons)	524	1,909	1,908	1,938	1,940	1,999	2,040	2,120	2,218	2,201	
Overseas consolidated subsidiaries	(persons)	276	331	545	617	673	692	841	1,569	1,643	1,634	
Number of persons who took childcare leave	(persons)	7	8	13	6	10	11	12	10	20	41	
Employment rate of persons with disabilities	(%)	—	—	—	—	—	—	—	1.77	2.20	2.26	
Turnover rate (within the first three years of employment)	(%)	17	10	11	11	9	27	14	12	13	23	
Final disposal rate of construction waste (excluding sludge)	(%)	14	19	10	14	9	9	13	14	12	14	