



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 issuing the Corporate Report (an integrated report) since 2017, and this is the third 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 "the Group," and Takasago Thermal Engineering Co., Ltd. alone is referred to as "Takasago Thermal Engineering" or "we."
- **Reporting period**
April 1, 2018 to March 31, 2019
* Some information before/after the period above is included.
- **Month of issue**
September 2019
- **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)



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

Top Message

Turning changes in the business environment into good opportunities for innovations, we will get closer to the realization of our long-term management framework



The current business environment provides a boost to the Takasago Thermal Engineering Group and encourages us to strive for innovations. Demand for construction in Japan has remained strong, supported by preparation for the 2020 Tokyo Olympic and Paralympic Games, large-scale redevelopment projects in the Tokyo metropolitan area and active capital investment by companies. Orders placed with the Takasago Thermal Engineering Group have also increased. In the meantime, demand for work style reform, the shortage of construction workers and the anticipation of a low birthrate and an aging population motivate us to pursue the thorough improvement of productivity. The global movement toward the realization of a decarbonized society by the mid-21st century based on the Paris Agreement also gives great opportunities to our Group, which sets environmental engineering as a motto, in Japan and overseas.

In our current medium-term business plan, which is the second step of our long-term management framework named GReen PRIDE 100, we have promoted actions that take advantage of changes in the business environment while setting eight priority action items, which are the enhancement of on-site capabilities, strengthening of group collaboration, re-establishment of the international business, advances to the areas other than the contracting or subcontracting business, the creation of new services, the building of workplace environments that allow a work-life balance, the development of various human resources and the strengthening of investments for innovations and management infrastructure. While working to maintain profits in the building service business, we are making growth investment from a medium- to long-term perspective under the themes including mergers and acquisitions (M&A), the acceleration of globalization, the strengthening of IT infrastructure, the promotion of new business creation and the strengthening of management infrastructure.

In our performance for fiscal 2018, all of the orders received, net sales and income indexes were the highest in our history since our foundation. Accordingly, the annual dividend of 52 yen per share was paid to shareholders, which was increased by 2 yen from the previous fiscal year. Although we still have a long way to go, we consider that our efforts based on the long-term management framework have produced certain achievements.

In fiscal 2019, which is the final fiscal year for the current medium-term business plan, we are developing initiatives for the shift to a hybrid form of business in which we conduct both construction and the provision of solutions in a comprehensive manner. As a representative example of the businesses in a hybrid form, we focus on the facility management (FM) business. Our commitment to the business is moving to a new stage through the synergy of group collaboration, the development of human resources with advanced skills, the establishment of IT infrastructure, etc. In addition, our efforts to accelerate innovations are being enhanced mainly with the cooperation of startup companies and the construction of a new research and development base. We also set up a new organizational structure and personnel systems that support those initiatives in April 2019.

Moreover, we focus on measures that accelerate the development of a health management system. With the recognition that health is the most important asset for companies, we have issued a health declaration with an aim of becoming a company where all executives and staff are physically and mentally healthy and work energetically ("Well-being Company").

Through those initiatives, we will further enhance our commitment to Sustainable Development Goals (SDGs).

Please look forward to the continuous growth of the Takasago Thermal Engineering Group as an environmental engineering company that contributes to the global environment.



Atsushi Ouchi
Chairman and Representative Director, CEO
Takasago Thermal Engineering Co., Ltd.

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Management

Directors

From left on the back row

Director and Managing Executive Officer Yoshiyuki Hara

In Charge of Corporate Strategy Headquarters, Corporate Operations Headquarters, Financial Strategy and Japanese Group Companies

Director and Managing Executive Officer Hiroshi Yamawake

Chief Executive Officer, Business Innovation Headquarters, General Manager, Innovation Center, in Charge of Technical and Business Creation Management Department

Director and Executive Officer

Toshikazu Yokote

Chief Executive Officer, Corporate Operations Headquarters and in Charge of Compliance

Director and Executive Officer

Kazuhito Kojima

Chief Executive Officer, Corporate Strategy Headquarters

From left on the back row

Director and Executive Officer

Tadashi Kamiya

Deputy Chief Executive Officer, Business Management Headquarters, General Manager, Work Style Reform Office and in Charge of Work Style Reform

Executive Director

Kiyoshi Fujimura

(Outside Director)

Executive Director

Yoko Seki

(Outside Director)

From left on the front row

Representative Director, Senior Managing Executive Officer Choichi Takahara

Chief Executive Officer, Business Management Headquarters, in Charge of Quality Environment & Safety Control, Business Development Department, Property Development Management Department and International Group Companies

Chairman and Representative Director, CEO Atsushi Ouchi

From left on the front row

Executive Director

Kazuo Matsunaga

(Outside Director)

Executive Director

Mitoji Yabunaka

(Outside Director)



Corporate Auditors



Full time Corporate Auditor
Kunihiko Kondo



Full time Corporate Auditor
Yukitoshi Yamamoto



Outside Corporate Auditor
Tetsuo Ito



Outside Corporate Auditor
Masahiro Seyama



Outside Corporate Auditor
Makio Fujiwara

Executive Officers

Senior Managing Executive Officer

Takuya Matsuura

In Charge of Sales & Marketing Management

Fumiaki Okano

General Manager, General Sales Management Division of Business Management Headquarters and in Charge of Procurement

Nobuhiro Mita

General Manager, Tokyo Main Office

Managing Executive Officer

Toshio Fujimori

In Charge of Sales & Marketing of Business Management Headquarters (West area in Japan)

Harutoshi Yasuhara

General Manager, Nagoya Branch

Kazuto Yamamoto

General Manager, Osaka Branch

Executive Officers

Masanori Kurata

Special Business Project Manager, Business Innovation Headquarters

Toshihiro Mitsui

In Charge of Sales & Marketing of Business Management Headquarters (International Business)

Akira Tsukada

In Charge of Sales & Marketing of Business Management Headquarters (East area in Japan)

Shiro Okazaki

General Manager, Business Development Department

Hirokazu Tanaka

General Manager, Business Creation Management Department

Masatoshi Murata

Deputy General Manager, Tokyo Main Office

Masato Nakamura

Deputy Chief Executive Officer, International Business Headquarters and General Manager, International Management Division

Norinaga Tsuchiya

General Manager, Yokohama Branch

Masanori Atarashi

Chief Executive Officer, International Business Headquarters

Hiroshi Kubota

General Manager, Sales & Marketing Management Division of Business Management Headquarters

Hirofumi Yamada

General Manager, Hiroshima Branch

Jun Tanaka

General Manager, Kanto-Koshinetsu Branch

Fumiaki Tamura

General Manager, Engineering & Technology Management Division of Business Management Headquarters and TAKASAGO Technical School

Takahiro Akamatsu

Deputy General Manager, Osaka Branch and Technical First General Manager, Osaka Branch

Takashi Watanabe

General Manager, Engineering Department

Susumu Hashimoto

General Manager, Tohoku Branch

Masato Takayama

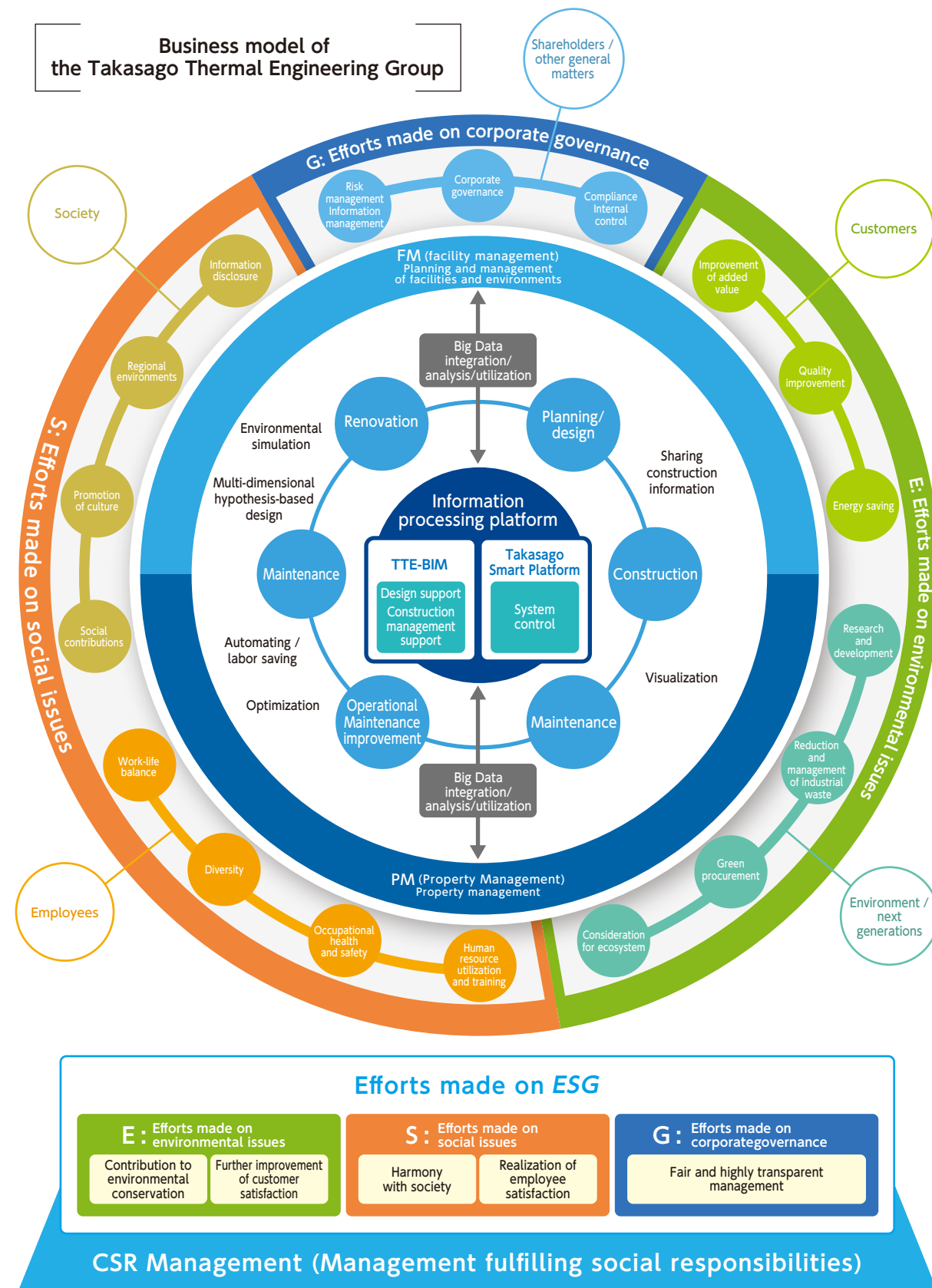
President, Nihon Setsubi Kogyo Co., Ltd.

Creation of Value by the Takasago Thermal Engineering Group

Aiming to actively contribute to the establishment of a sustainable society through the provision of solutions throughout the lifecycle of buildings, factories and facilities for all purposes, we create social value by means such as creating comfortable spaces friendly to people, environments for the manufacturing of high-quality products and the most advanced energy-saving operation.

MANAGEMENT POLICY

"Contribution to society through personal harmony and creativity"



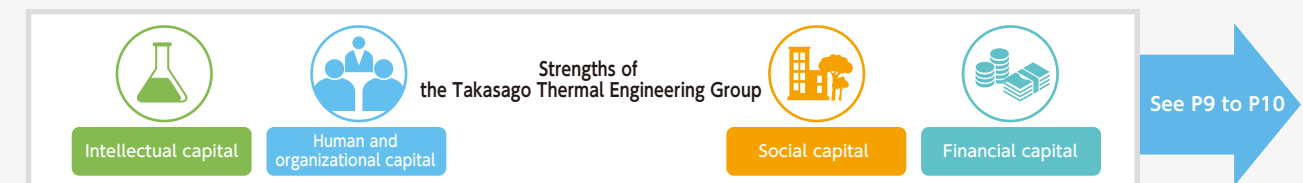
Creation of Social Value and Improvement of Corporate Value

Main kinds of social value that the Takasago Thermal Engineering Group creates through its business



Comfortable spaces friendly to people	Air conditioning aiming to realize preservation of people's health and comfortable living environment in spaces such as office buildings, skyscrapers, commercial facilities, hotels, leisure facilities, and underground malls.	
Environments for the manufacturing of high-quality products	Air conditioning aiming to provide highly controlled production process environment whose cleanliness, temperature and humidity are precisely controlled such as clean rooms and dry rooms.	
The most advanced energy-saving operation	We provide optimum total facility management and solutions to solve customers' problems by leveraging the equipment management technologies we have been fostering and the rich experiences we have been acquiring while achieving various accomplishments. <ul style="list-style-type: none"> ●Eco-Tuning / energy saving consultations ●Energy service (heat source contract) ●Optimizing facility operation 	<p>● Conceptual diagram of energy management business</p>
Solving social challenges in new areas	We use the technologies we have acquired in new areas and create solutions that contribute to solving social challenges. <ul style="list-style-type: none"> ●Hydrogen energy applications / solar thermal applications ●Solution for highly fresh fishery distribution using seawater sherbet-like (SIS-HF®) ●Biomass, Thermal strage system 	

In December 2015, the Paris Agreement was adopted at the 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21), and a shift to a low-carbon society began to be further promoted on a global scale. Supporting this trend is the social mission of the Takasago Thermal Engineering Group, which has been providing air environments friendly to humans, products, and nature for various kinds of buildings including office buildings, hotels, hospitals, and factories, and the specific outcomes of getting closer to a low-carbon society will be the core of the social value that we will create in the future.



Strengths of the Takasago Thermal Engineering Group



Intellectual capital

Since its foundation in 1923, Takasago Thermal Engineering has been involved in the design and construction of a large number of offices, factories and various other types of buildings. Through the design and construction work, we have accumulated a wealth of know-how on engineering and construction management of heating, ventilation and air conditioning (HVAC) systems. We organize internal seminars and have databases to share the know-how throughout the company and also have in place a system to meet the latest demand from various customers. We aggressively present the outcomes of our activities to "develop technology that serves our customers' needs," which is mentioned in our management principles, at the conferences of the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan. The number of awards we have received has been the largest in the HVAC industry for many years and we also remain the leader in the industry in terms of the number of patents, etc. owned. We also set a basic approach that "we will work to enhance the legal protection and use of intellectual properties while respecting legitimate intellectual property rights of third parties" and promote intellectual property activities in coordination with "contact personnel" in each of the main office and branches.

Number of patents, etc. we own

796

(As of the end of February 2019)

Number of the awards given by
the Society of Heating,
Air-Conditioning and Sanitary Engineers of Japan

123

(1963 to 2018)



Financial capital

With increases in both sales and profits for five consecutive terms, Takasago Thermal Engineering has maintained financial soundness. We have also made efficient use of capital with a ROE of 10% or more for two years in a row. While we received an external rating of A- from the Japan Credit Rating Agency (JCR) in March 2016 and have maintained it since then, the rating outlook was revised from Stable to Positive in March 2019.

Issuance of Green Bonds

- We issued Takasago Thermal Greed Bonds (issuance amount of 5 billion yen) in July 2019.
- JCR assigned preliminary Green 1, which is the highest rating in the JCR Green Bond Evaluation.
- The procured capital is scheduled to be used for the construction of the Innovation Center (tentative name), which is under construction in Tsukubamirai, Ibaraki Prefecture, as well as for equipment in the center.

Equity ratio

43.6%

(As of the end of March 2019)

Amount of growth investment

350 billion yen

(During the current medium-term business plan)



Social capital

Since its foundation under the company name of Takasago Heating Works Co., Ltd. in 1923, Takasago Thermal Engineering has engaged in the construction of the HVAC systems of many renowned buildings, as well as district heating and cooling, and developed numerous systems and devices to the present. Through the operation, we have not only cultivated the techniques in the HVAC construction business but also established trust with partner companies. The circle of our partners has grown to involve more than 1,600 companies. Together with Kowakai (partner company organization)*, we will make social contributions as an environmental engineering company that helps realize a sustainable world such as the creation of a decarbonized society and a recycling-oriented society.

* Kowakai was organized with our partner companies as the members in 2003 to enhance cooperation with the partner companies working on the construction sites. The organization shares information on quality, health, safety, environmental conservation and other subjects of management with Takasago Thermal Engineering and also gives such information to the members to ensure proper management.

Cumulative income
from completed construction

Approximately 8.0 trillion yen

(As of the end of March 2019)

Kowakai Member companies

1,613 companies

(As of the end of June 2019)



Human and
organizational capital

Takasago Thermal Engineering adopted a new personnel system in fiscal 2019 to systematize career paths and enhance the motivation of employees through such measures as the introduction of a flexible age-limit system where employees can select the age of retirement between 61 and 65, the integration of duties of the limited-area main career track with those of the general track with an aim to expand the career of female employees, the replacement of an age-based pay system with a role-based pay system and the adoption of an overseas trainee program for young employees with an aim to develop global human resources. In addition, in order to develop human resources who will create Takasago's future, we have established the Takasago Academy, at which we offer practical and multifaceted educational programs through the combination of various types of training (Off-JT: off the job training) and various experiences (OJT: on the job training). As initiatives for work style reform, we have introduced a teleworking system and a system of paid holidays that can be taken by the hour to help employees work without being bound by time or place. We have also set up a health management office where an industrial physician and public health nurse are stationed to support employees and promote health management.

Number of Group's employees

5,912

(As of the end of March 2019)

Global network

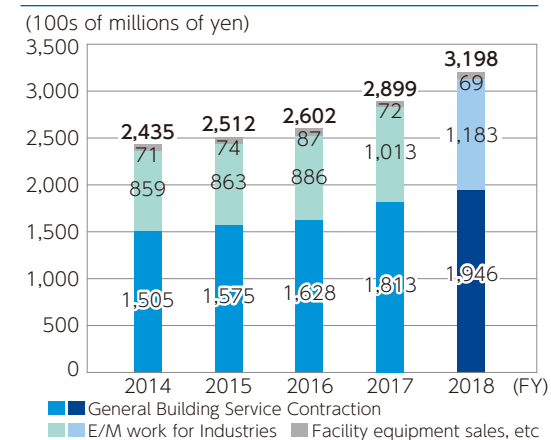
28 11
companies in countries

(As of the end of March 2019)

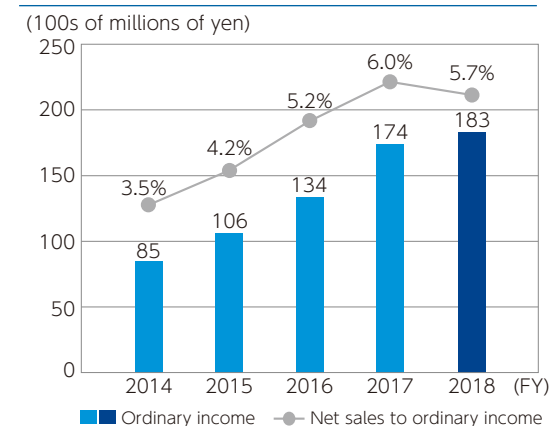
Financial and Non-Financial Performance

Financial Highlights

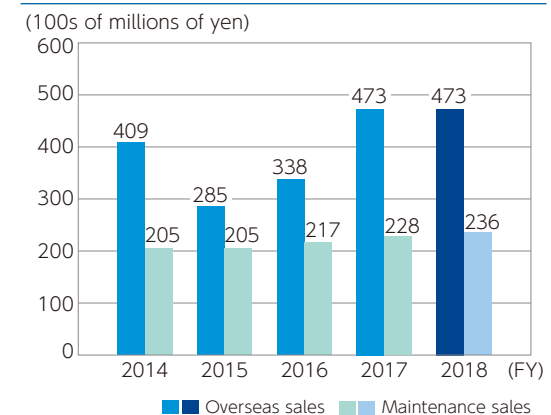
Net Sales



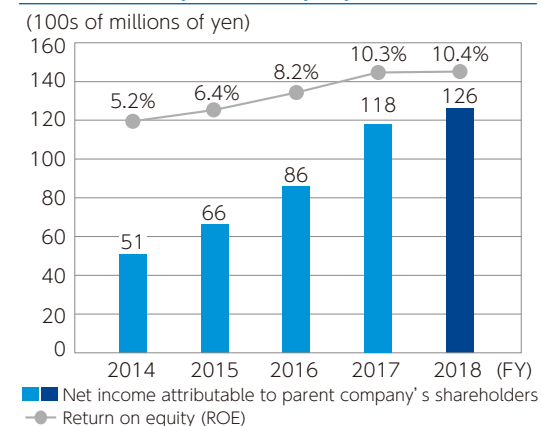
Ordinary Income and Net Sales to Ordinary Income



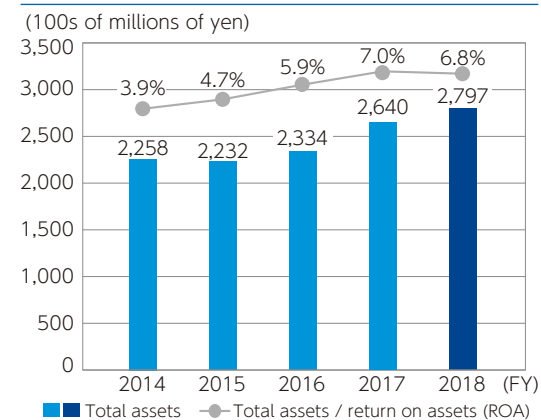
Overseas sales / maintenance sales



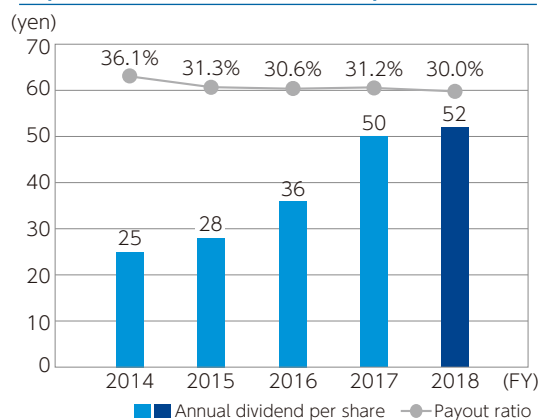
Net income and return on equity (ROE) attributable to parent company's shareholders



Total assets / return on assets (ROA)



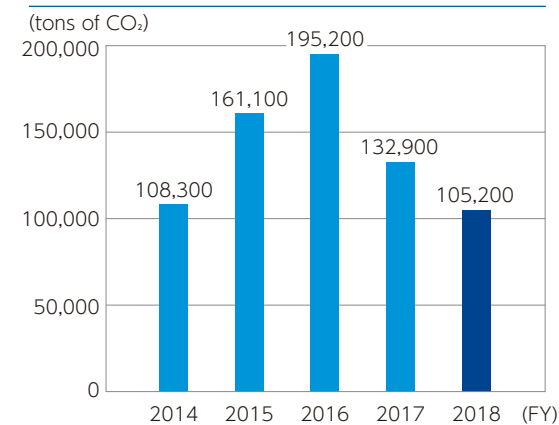
Payout ratio / annual dividend per share



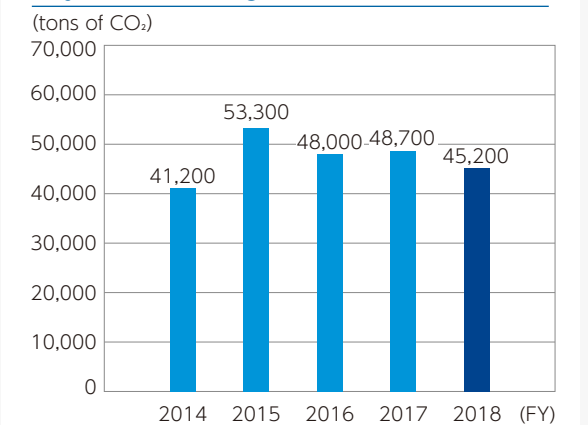
Non-financial Highlights

*Figures are rounded down to the nearest unit.

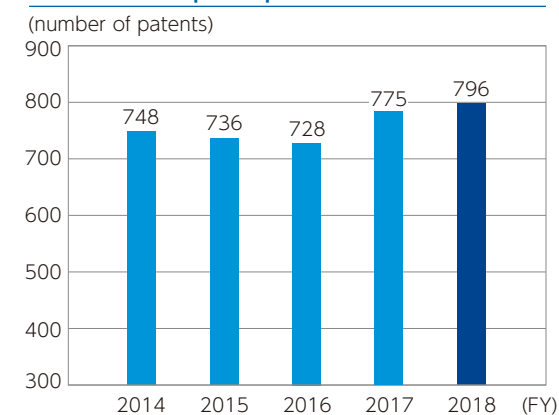
CO₂ emissions reductions from HVAC systems that we deliver to our customers



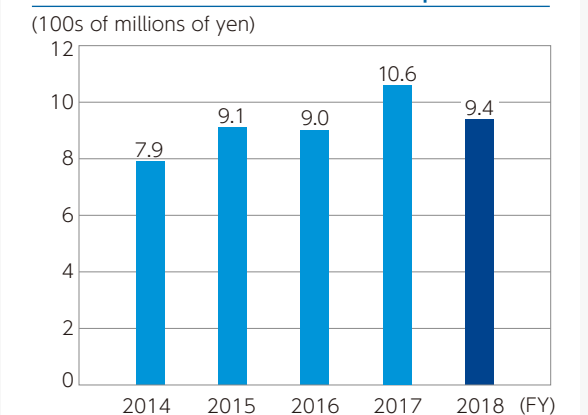
CO₂ emissions caused by major manufacturing activities



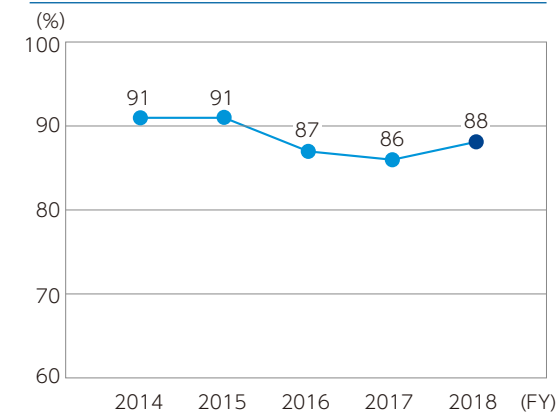
Number of acquired patents



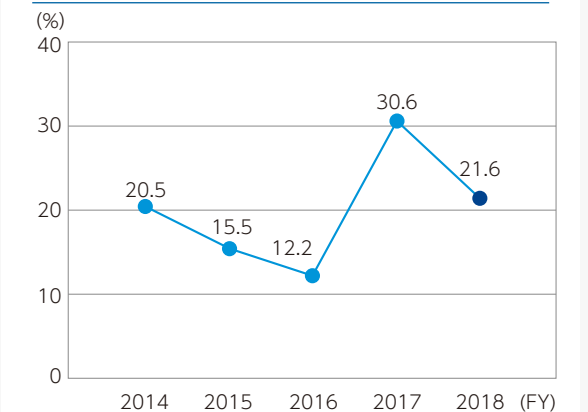
Investment in research and development



Implementation rate of zero-emissions activities for industrial waste at construction sites



Hiring rate for women as a freshwoman



Highlights in Fiscal 2018

Takasago Thermal Engineering Group, which is engaged in conservation of the global environment including saving energy and reducing CO₂ emissions, and contributing to realization of a decarbonized society globally by environmental engineering activities through business as an expert in heat and energy trusted by stakeholders and society, will introduce the highlights of a year's initiative from both the management and product perspectives.



'18
Jun.

Participated in the United Nations Global Compact

We signed the framework for the cooperation of the UN with companies to realize sustainable growth and were registered as a participating company.



'18
Sep.

Opened a dedicated office for the promotion of industry-academia collaborative activities and the PR of the company on the campus of the Nagaoka University of Technology



'18
Oct.

Our first forest conservation activity outside Japan - Planting of trees on the campus of the University of Malaysia, Sarawak on October 6 -



'18
Nov.

Introduced Apple Watches to improve the operation
Developed dedicated sensors and applications

'18
Nov.

Acquired shares of Kiyota Kougyo Co., Ltd.



'19
Jan.

Held a tour of a construction site for analysts

We held a tour of a construction site for security analysts and institutional investors to help them improve their understanding of our business.



'19
Feb.

Started the construction of Innovation Center (tentative name), a new research and development base, in Tsukubamirai, Ibaraki Prefecture

* The operation is scheduled to start in the spring of 2020.

2018

2019

April

May

June

July

August

September

October

November

December

January

February

March

'18
Sep.

Launched the second Takasago Thermal Engineering Accelerator "just move on!" program to inspire innovations in the construction industry



'18
Sep.

Formed a business alliance with Yamato Scientific Co., Ltd.



Takasago
Thermal Engineering

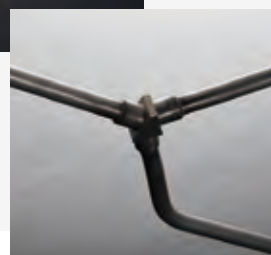
ヤマト科学株式会社

'18
Oct.

Jointly developed a branch pipe unit for aluminum refrigerant piping for accelerating the development of the aluminum refrigerant piping method



Branch pipe unit for aluminum refrigerant piping



'19
Jan.

The heat source and HVAC system retrofit project at Kyoto Station Building, in which Takasago Thermal Engineering was in charge of construction work, jointly received the Minister's Prize, the Ministry of Economy, Trade and Industry in the Successful Case of Energy Conservation Category of the FY2018 Grand Prize for Excellence in Energy Efficiency and Conservation



'19
Jan.

Introduced a new personnel system

* Implemented in April 2019

4 pillars (points) to be achieved in the reform of the personnel system

Introduction of a flexible age-limit system at the age of 65 (to extend retirement according to the life plan of each employee)

Multi-path personnel system (to allow employees to be promoted through various career paths/courses)

Systematization of career path (for growth through the experience of wide-ranging duties)

Revision of the grade, compensation and evaluation systems (for pay system based on abilities and roles)

'19
March

Acquired all shares of Kazusa Environmental Research Center Co., Ltd. to make it a subsidiary



Kazusa Environmental Research Center Co., Ltd.



The Takasago Thermal Engineering Group aims to be an environmental solution professional that contributes to the global environment, which is a future image of the Group presented in its long-term management framework "GReen PRIDE 100." To achieve it, we promote the development of business and the establishment of foundations. Up-to-date information on progress in those efforts is presented below.

Special Feature

1

Delivery of Environmental Solutions to Society

For the establishment of a hybrid form of business in which we conduct both construction and the provision of solutions

To provide high added value to customers through environmental engineering using advanced technologies beyond the conventional borders of the building service business, the Takasago Thermal Engineering Group promotes a "shift to a hybrid form of business in which we conduct both construction and the provision of solutions" as the main subject for the current medium-term business plan.

The core business in this initiative is the support of customers in their facility management (the effective use and management of facilities as long-term management resources), which is called "FM solution" in our Group. Through cooperation within the Group, we will make facilities such as offices, commercial buildings, hospitals, universities and museums more comfortable and energy saving and also reduce the burdens on customers. Then, while establishing long-term relationships with customers, we will offer new value in accordance with their needs, which are different between the cases. We have already promoted the activities on a trial basis for several years. At present, our branches are involved in pilot projects (model construction sites). The activities in the pilot projects are adjusted to ensure that they cover all of the promising areas for our Group.

Keys to the provision of a wide range of FM solutions are the establishment of infrastructure to analyze and use data for the optimization of the life cycle of equipment and facilities and the development of human resources who will be in charge of the solutions. In fiscal 2018, we made significant progress in both aspects.

An example of environmental solutions in the Kyoto Station Building

Kyoto Station Building heat source and HVAC system repair work commissioning project

The Kyoto Station Building, which was constructed in 1997 and serves an entrance to Kyoto, an Eco-Model City, was consuming more primary energy than any other single building in the city and its CO₂ emissions accounted for approximately 3% of total emissions in the commercial sector in Kyoto City. In response, Kyoto Station Building Development Co., Ltd., which was the contractee of the project, implemented renewal work that adopted "full-spec commissioning," which comprehensively covers surveying, basic design, execution design, construction and operation, for the first time in Japan for a large-scale building. This project was a part of the efforts of Kyoto City to achieve its target of reducing greenhouse gas emissions by 60% over 60 years. As a result, the repaired equipment reduced the consumption of primary energy by 60% and the whole building including the parts that have not been repaired reduced the consumption by 30%. Thus, a significant reduction in energy consumption and CO₂ emissions has been achieved.

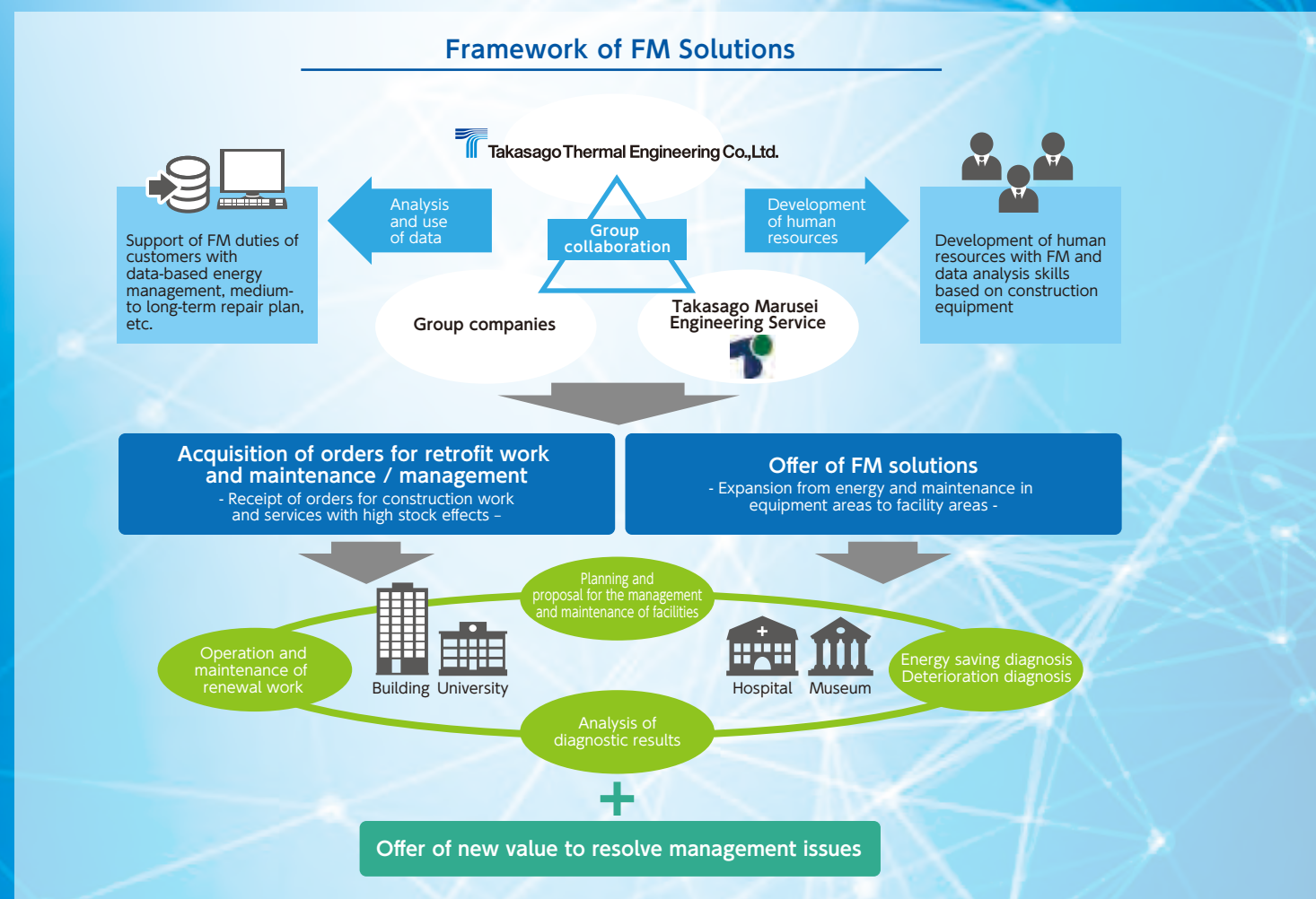
The commissioning team consisted of the commissioning management team (with the members organized by the

Building Services Commissioning Association), which was responsible for the promotion of the project, along with contractees, designers, contractors and operation managers. Takasago Thermal Engineering was involved in the construction and operation phases of the project as a contractor and contributed to it by optimizing the equipment capacity and specifications (VE), preparing a construction work plan that can be executed even in a 24-hour operation and proposing the improvement of efficiency of the functionality and performance test using cloud BEMS (GODA® cloud of our Group).

In recognition of this project, the commissioning team jointly received the Minister's Prize, the Ministry of Economy, Trade and Industry in the Successful Case of Energy Conservation Category of the FY2018 Grand Prize for Excellence in Energy Efficiency and Conservation, Renewal Award in the 7th Special Award of the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan and the 7th Carbon Neutral Award.



Offer of new value to resolve management issues



"Eco-system" created on a platform

We launched Takasago Thermal Engineering Accelerator "just move on!," which is a program to create new businesses and services by combining the ideas, technologies and performance capabilities of startup companies with our resources, in fiscal 2017. LiLz Inc., which was selected in the first program, jointly developed LiLz Gauge with Takasago Thermal Engineering and Takasago Marusei Engineering Service, a Group company. LiLz Gauge is a cloud-based service that helps improve the efficiency and quality of building maintenance based on automatic reading of meters with IoT cameras and machine learning.

The data read by LiLz Gauge are stored in the cloud and the accumulated data can be analyzed with various tools. As more various meters can be read, the accumulated data also increase to analyze a wider range of data. We will repeat such a process to expand the scope of FM solutions. Moreover, we will consider the use of them for preventive maintenance of equipment so that we can create a unique "eco-system" on a platform to offer new value.



Dedicated IoT camera to LiLz Gauge



Images of meters are remotely checked and automatically converted into numerical data

Effective use of operation data of equipment and devices

The Takasago Thermal Engineering Group provides Eco-Tuning® support, which properly improves the operation of equipment, devices and systems while maintaining comfort and productivity, in order to reduce greenhouse gas emissions from buildings, plants and other establishments for the realization of a decarbonized society. In a building, a central monitoring system collects operational data of the equipment. However, there are not many facilities where those data are effectively used.

This problem can happen when the data are held only in the local system or when the facility manager stationed on-site does not have sufficient skills or time to analyze the data. As a solution to it, we have developed a cloud-based version of GODA®, a data analysis tool that enables users to operate it flexibly, to allow the local facilities to be connected to analyzers in a remote place.

In addition, to provide a wide range of FM solutions to various issues of customers such as the shortage of facility management personnel and the optimization of the life cycle of facilities, we have promoted the establishment of the Takasago Smart Platform, which is also a priority measure in our medium-term business plan. This platform collects measurement data and equipment operation data using the IoT to automatically give advice on the optimal equipment operation method and enable automatic control of equipment in an optimal manner. We launched the services in April 2019 and have promoted even more effective use of data since then.

Development of human resources who can propose solutions to management issues

Our FM solution services bring wide-ranging advantages to clients by supporting them in the use of their commercial real estate. Proposals from the Takasago Thermal Engineering Group have conventionally placed an emphasis on the reduction of the running cost of facilities. In the future, we need to pay close attention to the management issues of clients and present solutions to them when we make proposals. Our FM solutions have great potential to respond to such management issues because they can mix a wide range of approaches such as the operation of equipment on behalf of customers by using GODA® Cloud and Takasago Smart Platform, the supply of renewable energy and the maintenance of business continuity in case of a disaster. A key is the human resources who can realize it. We will endeavor to develop as many human resources as possible who will be committed to understanding customers and identifying and solving their problems.



Yasuhiro Kuroda
Head of Facility & Property Management Promotion Office,
Sales & Marketing Management Division
Business Management Headquarters,
Takasago Thermal Engineering

The improvement of productivity is a significant challenge to be addressed when we work to properly meet the growing construction demand and implement work style reform. Using this situation as an opportunity, the Takasago Thermal Engineering Group has started to try to create new ways of doing jobs on a full scale.

Special Feature

2

Implementation of Work Style Reform

Commitment to the Improvement of Productivity

While construction demand is growing prior to the Tokyo Olympic and Paralympic Games in 2020, social awareness of work style reform is being enhanced with the establishment of the related laws in Japan. As a result, the improvement of productivity has become an urgent task in the construction industry. This is also an extremely important factor for the Takasago Thermal Engineering Group to maintain its medium- to long-term competitive strength.

We have set up dedicated divisions and cross-sectoral internal working groups to work for the improvement of productivity from various perspectives. One of the effective approaches is an internal outsourcing mechanism, which centralizes common duties for different sites in a functional unit to reduce on-site duties and improve the efficiency of overall tasks at the same time. We have named this functional unit "Process Support Section."

The Process Support Section has been set up in each of our branches in Japan. We give a certain degree of flexibility to its roles, which can be adjusted by the branches according to their respective circumstances. In some branches, the Process Support Section serves as a sort of internal consultant that supports staff on a construction site with accumulated knowledge and technology or promotes the improvement of the efficiency of operations in the whole company.



Implementation of Work Style Reform Commitment to the Improvement of Productivity

Tohoku Branch is establishing a new workflow

Our Tohoku Branch, which is in charge of the six prefectures in the Tohoku Region, set up the Process Support Section in fiscal 2017. The section has expanded its structure in a phased manner and now operates with three employees, including the manager, and four external staff members. It has three main duties, namely the preparation of construction drawings, overall drawings, etc., the preparation of documents including working instructions and the development and online entry of safety information. In fiscal 2018, the preparation of drawings represented 60% of its total jobs.

At present, the most important function of the Tohoku Branch is to support large-scale construction sites. It gives intensive support to the review of construction and other drawings that is too burdensome for on-site staff to handle alone. Our branch is also becoming more aware that on-site staff members should be responsible for core duties only and the Process Support Section should be responsible for the duties that can be addressed outside the site. In fiscal 2019, we also plan to conduct a questionnaire survey of on-site staff, which has not been conducted, to improve our approach to support for them.

Yokohama Branch is working to further improve the mechanism for the improvement of productivity

The Process Support Section of the Yokohama Branch currently consists of eight employees along with nine external staff members in charge of drawing and planning. The section is divided into the four groups of Construction Drawing Group, Construction Planning Group, Electric Instrumentation Group and Training and Office Work Group. Each of the groups conducts duties under the group leader. Our activity policy for fiscal 2019 is to "become a section that creates extraordinary construction sites." With this policy, we aim to allocate jobs to workers on each construction site in coordination with the Process Support Section to ensure that they can concentrate on core duties and their excellent skills and abilities can be effectively used for the operation of the sites. Having developed a list of the duties of the Process Support Section, we meticulously adjust which part of the

construction process should involve the section in coordination with on-site staff in view of the difficulty level of the on-site duties as well as the capabilities of the staff in charge. The leveling of duties in the Process Support Section is also promoted in cooperation with the Tokyo Main Office.

The Yokohama Branch recognizes that the Process Support Section should be in charge of wide-ranging duties and actively encourages the section to have a perspective beyond the scope of the branch. We also plan to promote initiatives to enhance the efficiency of duties through digitizing business forms, improving labor management in coordination with the technical administration work section and facilitating collaboration with partner companies.

We will enhance the productivity of the branch as a whole through the accumulation of efforts



Atsushi Hara
Manager, Process Support Section,
Technology Division Tohoku Branch,
Takasago Thermal Engineering Co., Ltd.

I was assigned to the Process Support Section in Tohoku last year after 10 years of engagement in construction work in Tokyo and one year of work in the Process Support Section in Tokyo. So, this is my second year in the section. When I was transferred from outside work to office work, I realized that it is reasonable for the Process Support Section to be in charge of some on-site duties including drawing and document preparation tasks.

The target of our section for this fiscal year is "Process Support Section that is helpful for the construction site." In my opinion, to achieve it, we should consider that the construction site is our workplace, rather than thinking that we support the site. I also try to get other staff to understand the idea continuously.

Although we cannot address all on-site duties at present, we will try our best to increase the jobs for which on-site staff can depend on the Process Support Section with a sense of trust. We will also let on-site staff know that they can improve work efficiency by devising the way of making requests to the Process Support Section. An accumulation of such efforts will lead to a further increase in requests for support from the construction site and thereby allow the staff to concentrate more on core duties. As a result, the productivity and quality of the duties of the branch as a whole will be improved. I am engaged in daily jobs with such a virtuous cycle in mind.

We will establish a mechanism involved in all construction processes

The Yokohama Branch places the most importance on ensuring that the Process Support Section establishes a mechanism involved in all construction processes from groundbreaking to completion. All members of the section recognize and consider the ideal state of the Process Support Section and make best efforts to execute their duties proactively. To build a foundation for it, we also work to improve the skills of the section staff. We repeat trial and error every day while also aiming at the ultimate situation that the jobs that can be done only on the site are left to the site and the Process Support Section is in charge of the other jobs including the preparation of construction drawings and construction plans and technical calculations. A view of our section staff working hard while talking with persons in charge of the site makes me feel confident about our commitment.

On the other hand, it is also true that some on-site workers may not have opportunities to experience the difficulty of on-site duties as a result of the proactive implementation of the duties by the Process Support Section. How to rotate staff between construction sites and the Process Support Section, as well as within the section, to avoid imbalance or shortage of experience or knowledge is an important future challenge and we have to examine it.



Shinji Inogaki
Manager, Process Support Section,
Technology Division Yokohama Branch,
Takasago Thermal Engineering Co., Ltd.

"NANBA new style" for the improvement of productivity

The Nanba Office of the Osaka Branch has drastically renovated the workplace for the improvement of productivity. To allow staff to choose the working conditions according to the content and situation of their jobs, the workplace is basically used as a free-address office and divided into different zones such as concentration zone, drawing zone, project zone and relaxing zone. While fixed desks are maintained in part to ensure user-friendliness, the conference and main conference zone and refreshing space are also provided to facilitate communication between employees. We have also introduced a "power nap" program to encourage employees to take a nap for 20 minutes as well as an initiative to urge them to return home by playing music on a "no overtime" day.



Medium-term Business Plan

We are trying to "take a leap into the comprehensive building service business with HVAC system construction as our core business" and "create our second and third businesses" as the second step to establish the long-term management framework "GReeN PR!DE 100".

Medium-term business plan

To enhance its corporate value in a sustainable manner, the Takasago Thermal Engineering Group has designed a long-term management framework "GReeN PR!DE 100" towards its 100th anniversary in 2023. In the long-term management framework, Takasago Thermal Engineering aims to achieve three goals, namely "Company group continuously meeting customers expectations and always relied on and trusted by them," "Environmental company whose presence is admired in the global market" and "Environmental solution professional contributing to the global environment." We have developed and promoted a medium-term business plan that is divided into three steps as a roadmap to achieve the goals.

For the three years to fiscal 2016, as the first step of the long-term management framework, we were committed to the establishment of a foundation of innovations with the aims of enhancing on-site capabilities, developing human resources and ensuring stable profitability. Based on the outcomes, as the second step of the framework, we are working to "take a leap into the comprehensive building service business with HVAC system construction as our core business" and "create our second and third businesses" with the slogan of "iNnovate on 2019 just move on! Bold implementation of innovations for growth" for three years from fiscal 2017.

In the current medium-term business plan, we set eight priority action items to promote the bold implementation of innovations for growth, including the enhancement of on-site capabilities and strengthening of group collaboration. The whole Takasago Thermal Engineering Group is committed to the "shift to a hybrid form of business

in which we conduct both construction and the provision of solutions," which also includes facility management (FM) and property management (PM), to offer higher added value based on environmental engineering using leading-edge technologies. We have also decided to establish the Innovation Center (tentative name) as a collaborative research base to create new businesses and conduct technical research jointly with companies and research institutes outside the Takasago Thermal Engineering Group. The construction of the center is underway to start the operation in the spring of 2020.

For the strengthening of investments for innovations and management infrastructure, we have reconsidered the shares held for purposes other than investment, issued straight bonds and green bonds and developed a growth investment plan to invest 35 billion yen over the three years from fiscal 2017. The raised funds have been invested for subjects such as M&As that support the strengthening of the construction system and the expansion of our business fields, as well as the acceleration of globalization, the reinforcement of IT infrastructure, the promotion of new business creation and the strengthening of management infrastructure.

Business results and forecast

In the consolidated settlement of accounts for fiscal 2018, the Takasago Thermal Engineering Group posted sales of 319.8 billion yen (an increase of 10.3% from the previous fiscal year), operating income of 17.2 billion yen (an increase of 5.2% from the previous fiscal year), ordinary income of 18.3 billion yen (an increase of 5.1% from the previous fiscal year) and net income attributable to parent

company shareholders of 12.6 billion yen (an increase of 6.8% from the previous fiscal year), all of which were the record high since our foundation.

Demand for facility construction has been strong due to special demand for construction prior to the Tokyo Olympic Games in 2020, vigorous investments in large redevelopment projects in the Tokyo metropolitan area and active capital investment by companies, supported by the gradual recovery of the Japanese economy. On the other hand, a decline in capital investment due to the trade conflict between the US and China, etc., a sharp rise in labor costs because of the shortage of workers and other issues have become apparent. In consideration of those market changes, as well as our construction system, etc., we have set new business targets to maintain a solid trend.

As to our performance in fiscal 2019, we anticipate sales of 320.0 billion yen (an increase of 0.1% from the previous fiscal year), operating income of 17.7 billion yen (an increase of 2.8% from the previous fiscal year), ordinary income of 18.5 billion yen (an increase of 0.8% from the previous fiscal year) and net income attributable to parent company shareholders of 12.8 billion yen (an increase of 1.5% from the previous fiscal year). We have also set a target for the amount of orders received of 285.0 billion yen (a decrease of 13.6% from the previous year) assuming that we will work to receive orders according to the plan that takes profitability and our construction system into consideration.

Contribution to the establishment of a decarbonized society

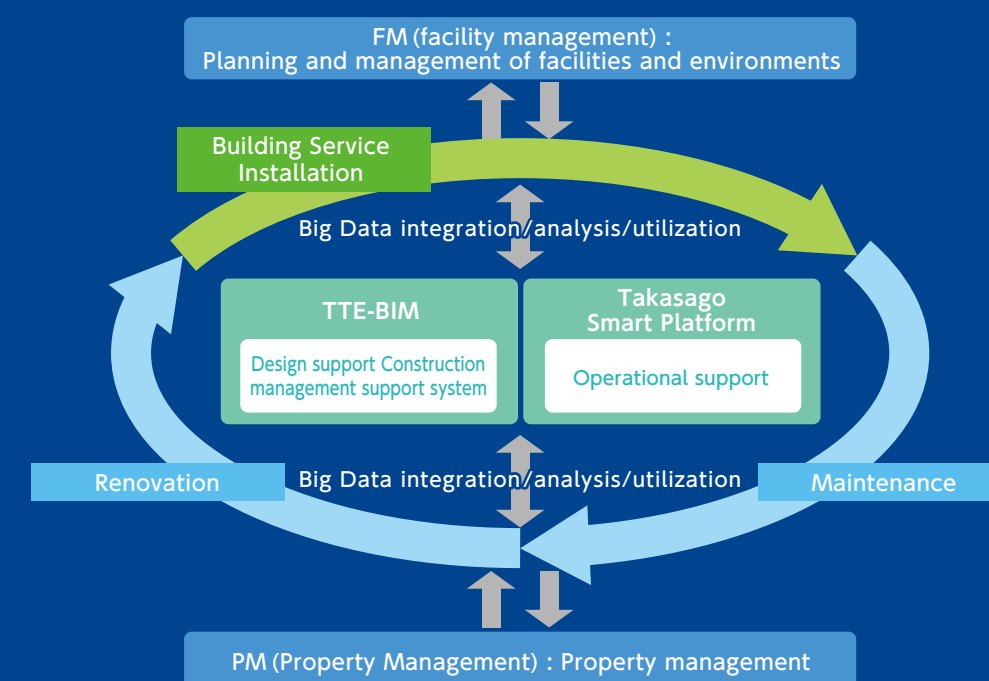
Triggered by the Paris Agreement adopted by the UN in 2015, environmental awareness has spread on a global scale. Decarbonization is a key challenge for the achievement

of a sustainable society and wide-ranging measures are taken to contribute to the global environment in various parts of the world. The Takasago Thermal Engineering Group pursues harmony with the international community and promotes initiatives that contribute to the global environment as an environmental engineering company. To this end, the group is affiliated with Global Compact Network Japan and other organizations involved in activities to conserve the global environment with an aim to establish a decarbonized society. We are also considering the development of a business strategy that sets SDGs, which are guidelines for the solution of global issues including climate change, environmental destruction and energy, as the core of our corporate management. Specifically, in the Innovation Center (tentative name) that we are currently constructing in Tsukubamirai, Ibaraki Prefecture, we plan to use energy harvesting such as renewable energy, heat in groundwater and natural sunlight to achieve ZEB (net zero energy building; ZEB Ready (50%) in the buildings as a whole and Net ZEB (100%) in the office building). We are also committed to research and development of an adsorbent thermal storage system that stores and uses low-temperature waste heat of 100°C or lower and a hydrogen energy system, which is expected as next-generation energy, with an aim to put them into practical use. In addition, we are working to develop and introduce AI- and IoT-based energy management systems for the optimization of energy use in buildings for the decarbonization of the whole value chain.

Long-term Management Framework and Medium-term Business Plans



Future direction for the group



Creation of new services

We are also committed to creating our second and third core businesses, which is a challenge for the Takasago Thermal Engineering Group, from multiple perspectives. Our business and capital alliances with Tsukishima Kikai Co., Ltd. and Yamato Corporation are used to share each other's know-how and to work together to create new, unprecedented models for the construction business.

Meanwhile, we are also making efforts to apply existing technologies to other uses. For example, we have created a new business called SIS-HF® (Super Ice System® for HIGH FRESHNESS), which applies an ice thermal storage of an air conditioning system using supercooled water to the distribution of marine products while keeping their freshness. The product is highly valued in the fishery market because of the sales method that takes a series of processes for an on-site demonstration.

In addition, in an effort to promote open innovation, we have launched a program called Takasago Thermal Engineering Accelerator "just move on!", which combine the ideas and technologies of startup companies with the strengths of the Takasago Thermal Engineering Group to create new businesses and services. The technologies of startup companies in such fields as AI technologies, AR/VR, IoT, robots and building information modeling (BIM) are integrated to expand our business fields.

We will continue to proactively engage in exchanges through various opportunities, such as industry-academia-government collaboration, to expand our view as a

company and develop a corporate culture in which innovations can naturally occur.

Financial and investment strategies

1. Financial strategies

1 Increase in cash flow

We will work to increase our sales cash flow by making improvements in income and expenditures related to construction in order to ensure funds for growth investment. Furthermore, we will endeavor to make effective use of our assets through the sale of shares held for purposes other than investment and other measures.

【About Takasago Thermal Green Bonds】

The Takasago Thermal Engineering Group promotes business activities while setting "Contributing to a decarbonized society for the world through environmental engineering" as the future goal for the group. Specific activities we perform for the purpose are "Contribution to establishing a decarbonized society," "Contribution to a society harmonized with nature" and "Contribution to creating a recycling-oriented society." In July 2019, we issued Takasago Thermal Green Bonds (third round of unsecured bonds) (seven-year bonds with an issuance amount of 5 billion yen at an interest rate of 0.27%). The funds raised with the bonds are

scheduled to be used as new investment funds for the construction of the Innovation Center (tentative name), which is under construction in Tsukubamirai, Ibaraki Prefecture, as well as equipment in the center.

2 Maintenance of financial discipline

While working to maintain a sound ROE, we will raise funds through borrowing, etc. at low interest rates and in a planned manner.

3 Proactive returns to shareholders

With the basic policy of maintaining stable dividends while improving profitability and capital efficiency, we will pay dividends based on the consolidated dividend payout ratio of 30% and the minimum ratio of consolidated dividend on equity (DOE) of 2%. We will promote shareholder returns including treasury stock acquisition while keeping the total return ratio in mind.

2. Investment strategies

For growth investment, we have set funds of up to 35 billion yen in total to be invested over three years for the following five subjects and are currently implementing the investments.

Image of the allocation of investments

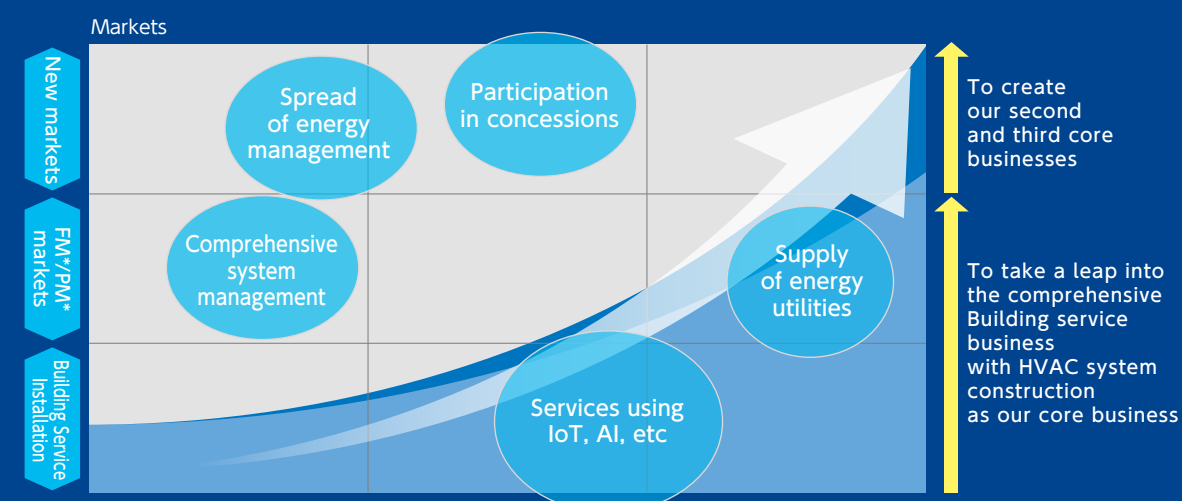
1. Mergers and acquisitions (M&As)
2. Acceleration of globalization
3. Strengthening of IT infrastructure such as an information processing platform
4. Promotion of new business creation
5. Strengthening of management infrastructure

Growth investment
quota for FY2017
to FY2019

35 billion yen

● Growth Strategy Load Map

Starting with our current equipment installation business, our Group aims to evolve into a company contributing more to society, through entry into the FM and PM markets and the development of new markets.



*FM: Facility management. Planning and management of facilities and environments PM: Property management

● Sustainable Development Goals (SDGs)

Our Group aims to contribute to SDGs through business activities.



Business in Japan

New roles of the Business Management Headquarters

In fiscal 2019, we reorganized the Business in Japan Headquarters into the Business Management Headquarters to further expand the areas it controls while domestic business and international business used to be controlled by different units. This reorganization aimed to place importance on taking actions on a global scale through the eyes of customers and promote our business including international business with united efforts in Japan and overseas. We also set up Facility & Property Management Promotion Office, Market Cultivation Management Office and Customer Center under the Sales & Marketing Management Division with an aim to enhance the capabilities of the headquarters to support sales activities in the main office and branches. With the three promotional organizations, the headquarters will strengthen its abilities to increase sales from customers and expand the business. It will also cooperate with the Work Style Reform Office for more viable business operation while shortening the distance between it and the construction sites.



- **Work Style Reform Office**
The office designs measures to develop an open working environment in consideration of circumstances on construction sites, such as the review and renewal of duties and the promotion of work sharing and job rotation.
- **General Sales Management Division**
The division promotes stable revenue management based on speedy coordination between domestic business and international business, the strengthening of the awareness of compliance with laws and other rules and the improvement of work efficiency.
- **Quality, Environment & Safety Control Division**
The division implements safety and quality management in cooperation with the main office and branches, enhances the sharing of information with International Business Headquarters and gives support to group companies.
- **Sales & Marketing Management Division**
The division makes efforts to strengthen our basic earning power both in Japan and overseas by, for example, enhancing abilities to meet requests from customers based on deepened organizational sales activities, conducting facility management that supports construction sites and promoting sales coordination with group companies.
- **Engineering & Technology Management Division**
The division works to establish an optimal construction system by, for example, taking measures to reduce burdens on on-site workers, strengthening the supply chain, promoting the one-stop system and developing coordination and mutual support with Kowakai.
- **Procurement Management Division**
The division works to enhance strategies using purchase data, improve work efficiency based on IT systems and realize the improvement, leveling and sophistication of purchase skills.

Marunouchi Nijubashi Building

Efforts to realize the medium-term management plan

We will be committed to innovations for the future in preparation for new growth opportunities and promising markets with an eye to the busy period with high demand related to the Tokyo Olympic and Paralympic Games as well as the period after the event.

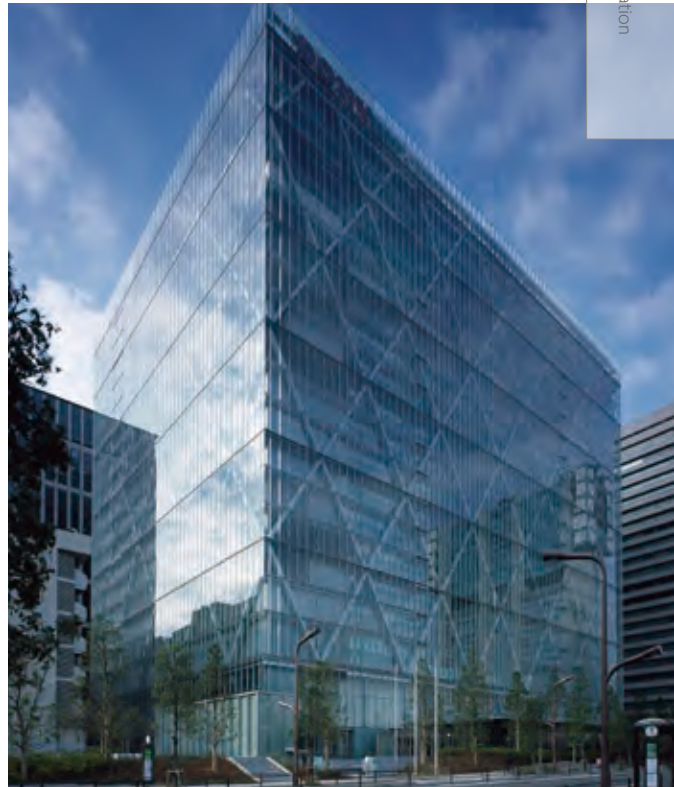
Improvement of work efficiency and changes in ways of working	<ul style="list-style-type: none">● Strengthening of the system for prosperous coexistence with partners optimized in each region that takes advantage of the strengths of our group● Maintenance of skilled craftworkers and transfer of their techniques by using the Takasago Technical School and other educational organizations
Support of the reestablishment of international business and the development of diverse human resources	<ul style="list-style-type: none">● Advance into FM/PM domains and new business areas such as non-construction fields● Development of criteria on the roles of human resources for sales jobs and tools to develop them and systemization of career plans for them● Dispatch of young domestic sales staff to overseas bases for the promotion of globalization
SDGs and the promotion of business strategies	<ul style="list-style-type: none">● Initiatives to create new services such as those for the reduction of burdens on the global environment and the utilization of unused energy● Promotion of the understanding of SDGs to help solve international challenges

After the second year of the medium-term business plan

Construction demand remained strong due to the reasons including the full-scale progress of large redevelopment projects mainly in metropolitan areas and active investments for increases in production capacity, etc. in both manufacturing and non-manufacturing industries. On the other hand, the costs of materials, equipment and labor rose and the shortage of construction workers became apparent. Accordingly, we were required to take a conservative approach to business operation and improve our productivity. Under such a business environment, we were committed to the promotion of the establishment of a construction system in a planned manner, the outsourcing of part of our jobs on construction sites to reduce the burdens on our staff, the improvement of our safety and quality management abilities through organizational improvement efforts and the enhancement of on-site construction capabilities. We were also able to secure stable earnings by ensuring order receiving activities with an emphasis on profitability and strengthening cost management. Those efforts resulted in the strategic achievement of the targets set in the medium-term business plan to some extent.



Japan Radio Kawagoe Works
(photo: Harunori Noda; Received the 33rd Promotion Award (Technology Promotion Award) from the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan, and the 7th Carbon Neutral Award from the Japanese Association of Building Mechanical and Electrical Engineers)



Sony City (Received the 19th Special Award "Ten-Year Award" from the Society of Heating, Air-Conditioning and Sanitary Engineers of Japan)

Introduction of group companies

The Takasago Thermal Engineering Group offers one-stop services in wide-ranging fields beyond the borders of the HVAC construction business through the united efforts of the whole group while making maximum use of the respective features of the group companies.

We have added Kiyota Kougyo Co., Ltd., which engages in the design and construction of air conditioning and sanitation equipment, and Kazusa Environmental Research Center Co., Ltd., which conducts environmental research and analysis, as new members of our group. In an effort to help create a decarbonized society with environmental engineering, we will work to further enhance collaboration in the group.

Kiyota Kougyo Co.,Ltd.

● We create wind, water and warmth

Kiyota Kougyo is an engineering company that has contributed to the maintenance and development of local communities in the fields of air conditioning systems and plumbing and sanitary systems since its foundation. We have engaged in a large number of construction works for important social infrastructure including nuclear and coal-fired power plants, schools, housing complexes and office buildings. In particular, when working in power plants, we meet standards for high quality and safety construction work and receive high evaluations from customers. Taking our affiliation to the Takasago Thermal Engineering Group as an opportunity, we will strive for new development in new business fields.

- Address : Ozawa Building, 3-4-14 Higashinohbashi, Chuo-Ku, Tokyo 103-0004
- Tel : +81-3-3662-3661
- Date of establishment : December 7, 1946
- End of accounting period : March 31
- Capital : 50 million yen
- Ownership : Takasago Thermal Engineering 51%
- Number of employees, etc. : 73

● Business description

Design and construction of air conditioning, plumbing, sanitation, firefighting, septic tanks and other systems and comprehensive management of building facilities



Construction management



Design review

Kazusa Environmental Research Center Co.,Ltd.

● Aiming to establish an ideal relationship between industrial activities and the global environment

Kazusa Environmental Research Center has made efforts to conserve the environment through general services of environmental analysis since its foundation. We have a track record for advanced analysis techniques and accuracy management in a wide range of fields including sulfur oxides and nitrogen oxides contained in combustion exhaust gas from factories, etc., air pollution in large cities, water pollution and eutrophication of rivers, lakes and other water bodies due to factory effluent and domestic wastewater from general households and the recycling of waste. There is a growing demand for the analysis of trace materials under the Environmental Impact Assessment Law, which has been established recently. We will continue to conduct reliable surveys and analysis that can satisfy customers and provide technical support to make a social contribution.

- Address : 2-12 Shiomi, Kisarazu City, Chiba Prefecture 292-0834
- Tel : +81-438-36-5001
- Date of establishment : May 23, 1978
- End of accounting period : September 30
- Capital : 10 million yen
- Ownership : Takasago Thermal Engineering 100%
- Number of employees, etc. : 84

● Business description

Various types of environmental surveys and analysis (ambient air surveys, ambient water quality and drinking water surveys, analysis of hot spring agents, soil pollution surveys, exhaust gas measurement, surveys and analysis of offensive odors, measurement of dioxins, measurement of the work environment and indoor environment, surveys and analysis of asbestos, environmental impact assessment, etc. and measurement of noise and vibrations)



Analysis with various instruments



River survey

International Business

New roles of the International Business Headquarters

For the growth of our international business with our overseas group companies playing a pivotal role, it is necessary to try to enter new markets and develop new businesses based on the strengthening and expansion of existing core businesses. However, this may also increase

potential risks. It is important to further enhance risk management for the prevention of loss, accurately understand changes in regional markets and implement flexible strategies. We have determined our policy for fiscal 2019 as shown in the following page.



Challenge in a large wind tunnel environment laboratory in China

Takasago Constructors & Engineers (China) Co., Ltd., our local subsidiary in China, participated in a project of a large wind tunnel testing laboratory and made proposals on unique design and construction. The company made full use of the excellent technical capabilities of national staff to meet all of the strict requirements on quality, and as a result, received high evaluations from customers. Using the track record in the large wind tunnel environment laboratory, we will make substantial progress in our efforts to enter the Chinese car market, which is expected to further grow in the future.

Efforts to realize the medium-term management plan

1. Independence of business management in overseas local subsidiaries

- 1. Strengthen internal control through compliance and operation of business processes at overseas local subsidiaries
- 2. Enhance governance and compliance systems at overseas local subsidiaries
- 3. Improve the accuracy of accounting such as settlement of accounts in local subsidiaries by accounting and finance staff residing in Southeast Asia and give instructions to national staff in charge of management

2. Stabilization of revenues of overseas local subsidiaries

- 1. Promote the acquisition of both Japanese and non-Japanese customers through the strengthening of cooperation between the International Business Headquarters and sales sections of local subsidiaries
- 2. Reestablish a business model to tap into the growth of the Indonesian and Vietnamese markets
- 3. Reconsider the business strategies in accordance with changes in the market trends in Singapore and Malaysia
- 4. Focus on and respond to the Mexican market in consideration of the political and economic circumstances such as the renegotiation of NAFTA

3. Reestablishment of local partnership and discovery of new partners

- 1. Continue activities to create synergy with ICLEAN, a local subsidiary in India
- 2. Consider business and capital alliances (M&As) with local partners that help us enter growing markets and expand the business fields

Examples of the efforts in fiscal 2018

Technical training for local employees

To strengthen and maintain the technical strength of staff in our overseas group companies, 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 companies. The program focuses on giving the trainees opportunities to directly see and experience site management and the latest technologies in Japan through visits to sites under construction, plants and showrooms on equipment and our Green Air Plaza and Research & Development Center as well as participation in a company-wide Technology conference. We have also developed a system that allows locally recruited Japanese employees of overseas group companies to attend technical training for young employees of Takasago Thermal Engineering.

Technology conference

Representatives from our overseas group companies present details of the advanced technologies they have examined and put into practice for their operations, as well as the achievements, to each other at the International

Business Headquarters Technology conference. The best group at the presentation event is qualified to join the Takasago Thermal Engineering Group Technology conference.

In fiscal 2018, the presentation group from our local subsidiary in China won the best technology award in the 35th Takasago Thermal Engineering Group Technology conference. Thus, this event has produced outstanding results.

Promotion of technical administration work

To promote independent business management in overseas local subsidiaries, we are working to enhance the technical administration work section in each of them. With an aim to establish technical administration work that adapts to various situations in the respective countries and meets the demand exactly without excess or deficiency, a meeting for the staff in charge of technical administration work is held by the staff in respective countries to ensure that they can share know-how. Our International Business Headquarters also visits group companies to check their activities and give instructions.



Technical training for local employees



Technology conference

Effort of group companies

Takasago Singapore Pte. Ltd.

Takasago Singapore, our local subsidiary in Singapore, created multi-purpose spaces to let more people learn our technical capabilities. The rooms are air-conditioned with SWIT®*. The comfortable environment facilitates exchanges between people, such as staff training, business talks with customers and collaboration with other companies. They also have sections for the demonstration of the real machines of SWIT® and other products of the Takasago Thermal Engineering Group.

* SWIT® (swirling induction type HVAC system)
This temperature stratified air-conditioning system enables air conditioning with less amount of air than a mixed air conditioning system. The blowout temperature can also be close to room temperature. Accordingly, a low-cost and energy-saving air-conditioning system can be constructed.



National Staff Joint Conference

We held a joint conference involving sales representatives of our overseas group companies in Southeast Asia and South Asia (Singapore, Malaysia, Thailand, Vietnam, India and Indonesia) and local sales representatives of our partner companies to actively exchange opinions about their sales activities. Thus, we have taken the first step to promote and enhance collaborative activities to cultivate customers in the future in respective countries not only between Japanese staff but also between national staff.



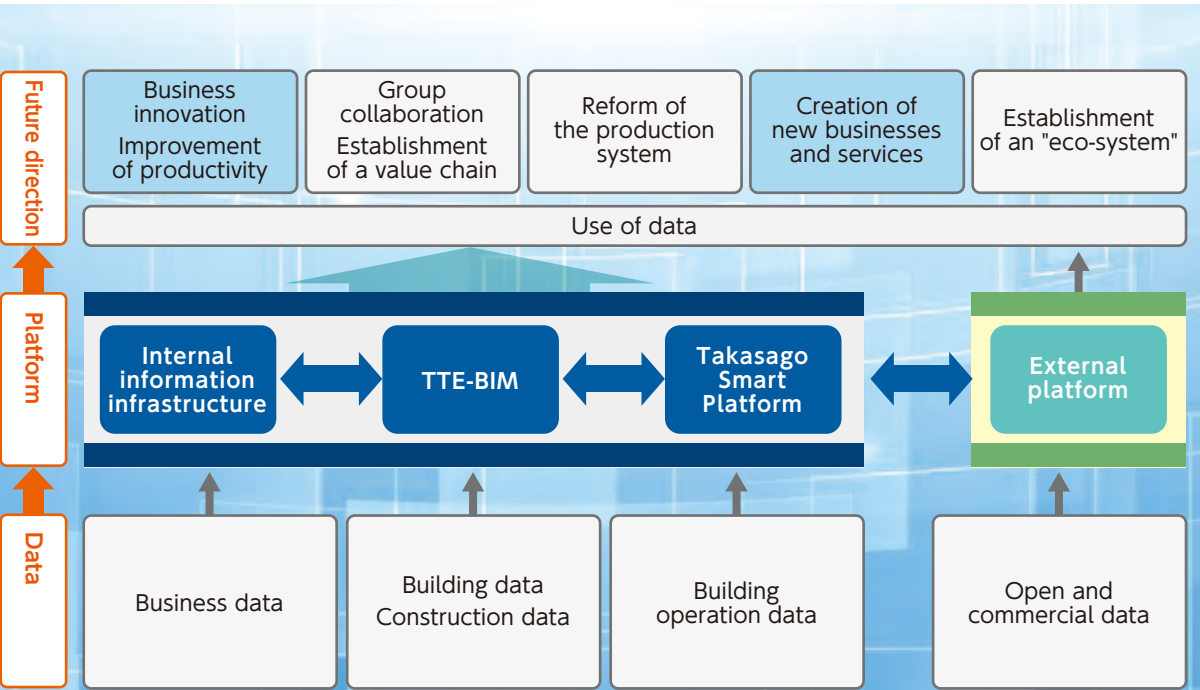
Business Innovation

New roles of the Business Innovation Headquarters

In line with the medium-term management plan, the Business Innovation Headquarters has been established so that we can keep growing as a corporate group relied upon and trusted by customers by meeting their expectations. At the same time, in order to accelerate the creation of new businesses and business innovation for work style reform, the Innovation Center, a new organization that integrates functions for marketing, research and development and incubation, was established in the Business Innovation Headquarters. Facilities for innovation will be opened in Tsukubamirai, Ibaraki Prefecture in the spring of 2020. Through cooperation with various entities in the industry, academia and government, the Business Innovation Headquarters engages in the creation of new value through research and development and business development for the realization of a sustainable society and the reform of the operation to support health management.

● Innovation Center (organization for creating new businesses and new services)

Developing marketing functions	Establishment of a mechanism and system to uncover market and customer needs that have never been identified before
Strengthening research and development functions related to leading-edge technologies	Promotion of open innovation for creation of new services and prompt development of technologies
Development of incubation functions	Establishment of a mechanism and system to promote commercialization
Cooperation with FM/PM businesses	Establishment of a hybrid form of business in which construction and the provision of solutions are integrated



Business innovation for work style reform and creation of new businesses and services

For business innovation, we have developed an internal information infrastructure and promoted the establishment of Takasago Smart Platform as the foundation of FM/PM services. We will also make full use of BIM (building information modeling), IoT (Internet of things) and AI (artificial intelligence) to promote the automation of business processes and the improvement of work efficiency. In addition, we will work for the reform of the production system and create new businesses and services through the use of operation data and the coordination of external data.

Development of an information platform for the sophistication of facility operation

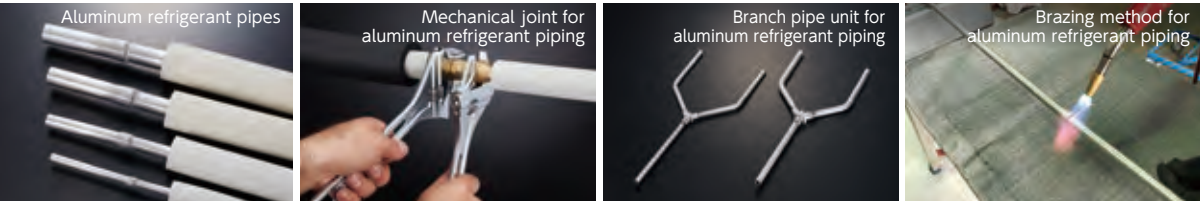
We worked for the development of Takasago Smart Platform and started its operation this fiscal year. Takasago Smart Platform is a cloud-based platform that helps customers make the operation of facilities in their buildings and plants more sophisticated throughout the life cycle. This information processing platform controls facility operation data in an integrated manner to enable the specialized units of Takasago Thermal Engineering and its group companies to collect and analyze the data, report the operation status and make proposals and

take actions for the improvement in a quick and timely manner. Takasago Smart Platform is equipped additionally with GDoc®, an energy management system that supports customers in their equipment operation, as well as software for the verification of performance of heat source devices, to provide information on energy-saving operation and predictive maintenance. We will continue to enhance functions for facility operation and environmental solutions to help realize a decarbonized society.

Development of an aluminum refrigerant piping system

While copper pipes have been conventionally used for the refrigerant piping of air-cooled heat pump PAC air conditioners, we will replace them with aluminum pipes. The use of aluminum pipes can alleviate burdens on workers because their weight is one-third of copper pipes. In addition, we estimate that CO₂ emissions can

be reduced by 28% when the recycling rate of aluminum materials is increased in the equipment industry. It also contributes to the realization of a decarbonized society. Therefore, we aim to actively introduce them to construction sites.



Received Japan Association of Refrigeration and Air-Conditioning Contractors Chairman's Special Award in the 36th Excellent Energy Saving Equipment Awards

Open innovation

As the activities of companies and the lifestyle of people change dynamically, the challenges faced by society are becoming more diverse and complicated. To respond promptly to such rapid changes in the external environment and create new value, we are committed to research and development and business development in collaboration with various organizations. We concluded an agreement on comprehensive cooperation with Nagaoka University of Technology in 2014 and have organized technical workshops, joint research, etc. To further strengthen the ties, we set up a dedicated satellite

office for Takasago Thermal Engineering in the campus of the university in fiscal 2018. We have also promoted technical exchange with the Bavarian Centre for Applied Energy Research (ZAE Bayern) in Germany in a wide range of fields including thermal storage technologies since fiscal 2017. The Takasago Thermal Engineering Accelerator "just move on!" program was launched in fiscal 2017 to cooperate with startup companies with the aim of creating value beyond the borders of the HVAC construction business.



Agreement on comprehensive cooperation with Nagaoka University of Technology



Takasago Thermal Engineering Accelerator

Research and development

Based on one of our management principles “to develop technology that serves our customers’ needs and utilizes the creativity of all employees,” the Takasago Thermal Engineering Group proceeds with its research and development in accordance with the following policies:

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

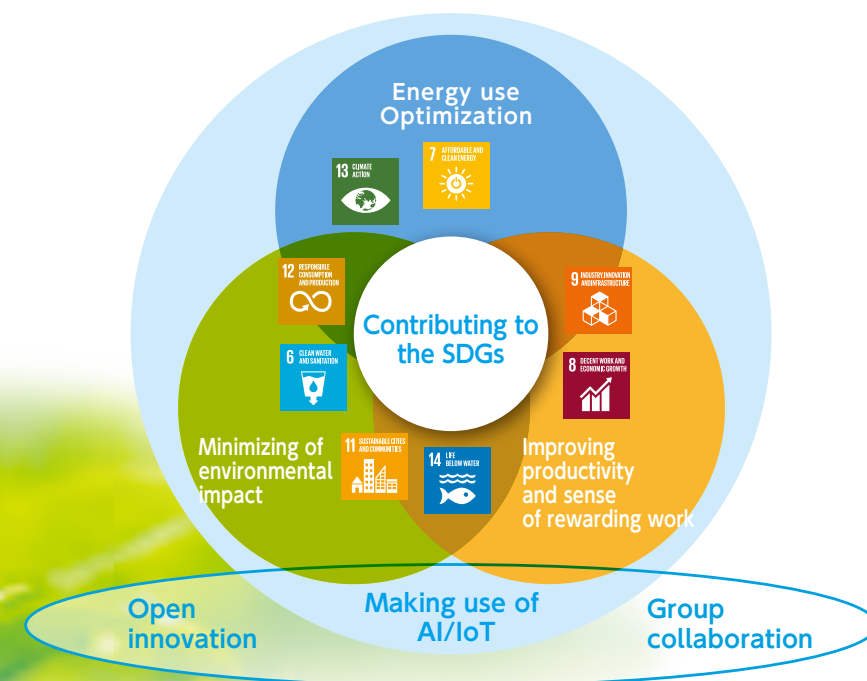
Contribution to the world towards the establishment of a decarbonized society

As an environmental solution professional contributing to the global environment, the Takasago Thermal Engineering Group develops technologies, products and services that help realize a decarbonized society and a sustainable society and introduces them into society for practical use. While checking our activities to ensure that they can contribute to the achievement of SDGs, we will aim to achieve the goals for 2030 together with society.

For energy use optimization, we focus on the development of a system and structure to provide one-stop services for the optimization over the lifecycle of buildings and also work on the commercialization of a system to store, transport and use low-temperature waste heat that has conventionally been disposed of, as well as technologies to use hydrogen and biomass. We are also committed to the development of technologies for the minimization

of environmental impact including energy-saving technologies that help reduce CO₂ along with technologies for water purification and a system to recover organic solvents. For the improvement of productivity and job satisfaction, we are working for the use of BIM technologies on construction sites, which can also promote work style reform in our company, as well as research and development for the improvement of intellectual productivity in office work. We aggressively promote the effective use of AI and IoT because we consider that it is essential for the achievement of the goals mentioned above.

We will promote those development and business creation activities based on an integrated R&D and incubation system with the Innovation Center playing the main role and through internal and external cooperation as well as cooperation within our Group.



Intellectual property management

As of the end of February 2019, the number of patents we own is 796 (including patents, utility models, designs and trademarks), which is the largest in the industry. Among them, the number of patents is 509, which account for two-thirds of the total, comprising 488 domestic patents and 21 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. Meanwhile, 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. We have already concluded some agreements to grant our patents.

Number of patents,
etc. owned
(FY2019)

796

Number of patents
acquired
(FY2019)

509



Research and development activities and their outcomes

Hydrogen energy system

We delivered our water electrolyzer (a device to produce hydrogen and oxygen by electrolysis of water) to a demonstration project for the production of electrolytic hydrogen using renewable energy and the supply and use of hydrogen mixed gas, which is implemented by NTT Data Institute of Management Consulting and other companies under commission from the Ministry of the Environment of Japan. In this

project, CO₂-free hydrogen is produced by electrolysis of water using the electricity generated at a wind farm in Noshiro, Akita Prefecture. We will continue to contribute to a hydrogen-based society, which should be realized in the future, beyond the borders of the commercial building business by delivering devices for various demonstration projects, etc.



Water electrolyzer delivered to the demonstration site in Noshiro



Opening ceremony

Low-temperature waste heat storage systems using adsorptive materials

We launched a demonstration test for the systems jointly with a few companies as a project subsidized by the New Energy and Industrial Technology Development Organization (NEDO). In this project, year-around data are collected on the economic efficiency of a system developed for the use of waste heat at fixed places and a system for off-line heat transportation in order to demonstrate the storage of waste heat from plants, cogeneration exhaust gas and hot water Jacket. We plan to commercialize the developed systems

after technical evaluation and product review based on their demonstration data in the future. The off-line heat transportation and storage system is expected to be deployed to the market as a system to use a wide range of heat such as waste heat from sludge and waste incineration plants of local governments and waste heat from factories. The fixed heat storage system is also expected to be deployed to use unused low-temperature waste heat for dehumidification, heating and drying processes.



External view of a fixed heat storage system



External view of an off-line heat transportation and storage system



● Facility overview of the Innovation Center

Address	2-9 Fujimigaoka, Tsukubamirai, Ibaraki
Site area	22,746m ²
Total floor area	approx. 11,610m ²
Building height/structure	2-story, 15,455 m/steel construction (RC construction in part)
Construction period	February 1, 2019 to January 31, 2020

Conceptual drawing
Copyright 2019, Takenaka Corporation

Towards further innovation

Construction of a new development base

We are constructing Innovation Center (tentative name) (hereinafter "Innovation Center") as a new research and development base and the existing Research & Development Center will also be moved to the new facilities. The construction was started in February 2019 and is scheduled to be completed in January 2020 and the operation will be initiated in the spring of 2020. Its facilities include an office building with exhibition and working

spaces, a laboratory building for R&D activities and an equipment exhibition building that supplies energy. Under the concept of "sustainable construction that reduces burdens on the global environment and improves intellectual productivity at the same time," the Innovation Center aims to achieve Net ZEB*1 in the office building and ZEB Ready*2 in the facilities as a whole through the active use of renewable energy and advanced HVAC systems.

*1: Net ZEB: Buildings that reduce the consumption of primary energy by 100% or more with energy saving (at least 50%) and energy creation
*2: ZEB Ready: Buildings that reduce the consumption of primary energy by 50% or more

Operational concept of the Innovation Center

Reduction of environmental burdens	Promote the development of HVAC and other building facility systems and construction technology, as well as technologies and new businesses concerning their peripheral areas such as energy and the reduction of environmental burdens, to expand the business fields of Takasago Thermal Engineering
Open innovation	Promote open innovation through the strengthening of collaboration with various external research institutes, universities, companies, etc. to accelerate development and commercialization
Demonstration and evaluation of energy saving, etc.	Demonstrate and evaluate the initiatives taken in the center to enhance energy saving, improve intellectual productivity and create a healthy environment to provide the outcomes to society to contribute to it
Contribution to the local community	Contribute to the local community by offering the exhibition space, which can also be used for experiment learning, as well as the cafe restaurant as an open space, to local people

Fundraising by issuing green bonds

We raise the funds for the construction of the Innovation Center and its facilities by issuing green bonds. Our green bonds received Green 1, the highest grade in the preliminary evaluation by a third party (the Japan Credit Rating Agency (JCR)) and we have confirmed that the issuance meets the criteria of the Green Bond Principles 2018 developed by the International Capital Market Association (ICMA) and the Green Bond Guidelines 2017 of the Ministry of the Environment of Japan.

Suggestions from overseas advisers

Dr. Andreas Hauer

Dipl. -Phys.
Head of Division Energy Storage
at Bavarian Centre for Applied Energy
Research



Proposal

1

As advisor to Takasago R&D activities Dr. Andreas Hauer will support the strategic approach of optimizing energy production, storage and consumption for a sustainable society. At Takasago's brand new R&D center he will propose and discuss relevant R&D topics as well as innovative business opportunities with the scientist and engineers. Focus of future R&D fields will be based on Takasago's core competences, which are trying to establish a well-balanced relationship between work, life and nature. In the intensive exchange new ideas for projects and products shall emerge. At the same time Dr. Andreas Hauer will introduce Takasago members to the broad range of R&D activities in Europe. Once a year Takasago's mission will be guided to a number of R&D institutes, which are leading players in related fields such as heat pumps, chillers, sustainable buildings or hydrogen production. These trips shall open the door to new collaboration possibilities and strengthen the international network of Takasago Thermal Engineering. The Cooperation between Dr. Andreas Hauer and TTE started in April 2019.

Proposal

2

With a geographical advantage which I reside in Palo Alto, California – the heart of Silicon Valley –, my objective is to link TTE (Takasago Thermal Engineering Co.,Ltd.) which is one of technology savvy companies in Japan, with the current technology trends and standards, along with the new companies leading these new markets created by transitions in technologies and business models. Currently, my team and I are focused on IOT and AI technologies that enable Smart Building and clean energy products and services which TTE may leverage to expand its business and improve the buildings provided to customers. These technologies can also be applied to reduce the cost and time required to develop and project-manage new building projects. Adopting these technologies, TTE can enter new markets as well such as demand-response services with power generation providers, on-site clean energy that is cost-effective based on leveraging technology, and facilities management services across multiple buildings.

My team and I are also exploring new technologies and products that enable 3D visualization of new building projects including use of drones to confirm specifications fit the design, use of location-tracking tags for expensive tools and HVAC equipment, and inclusion of real-time camera and sensor visualization of the building site. TTE can leverage new product technologies and partner

Mr. Michael Matthys

Founder and Managing Partner
at Doorga Capital



with selected Silicon Valley companies that have been proven and successful in the USA market in order to improve its business and explore new markets as well.

Provision of the Quality with which We Can Gain Customers' Satisfaction and Their Trust

To ensure that our construction sites can constantly achieve the aggressive target of "the creation of the best product quality," we are committed to initiatives on various aspects including process, support system, platform and human resources.

Approach to quality

The basic approach of Takasago Thermal Engineering to quality is based on our Management Policy, which aims at "Contribution to society through personal harmony and creativity," and our Management Principles, which set "To serve society through the development of business activities that focus on the creation of the best product quality" as the first principle.

Moreover, the first basic policy in our Quality and Environmental Basic Rules stipulates that we shall endeavor to grasp customer needs and provide the optimal quality that contributes to the corporate activities of customers, which indicates an idea that the best product quality is achieved by providing an optimal system for customers. As the title of the rules shows, we handle the creation of quality and environmental conservation in an integrated manner. We also regard safety as part of quality.

Meanwhile, our Quality Basic Bylaws clarify how to guarantee quality. As part of it, they also set two types of standards, which are the standard that must be surely followed and "Takasago standards," which we recommend to customers.

Based on our quality management system (which has received ISO 9001:2015 certification), we work for construction work and construction management that meet requests on delivery period while ensuring quality, as well as the support of the operation, to satisfy customers.

Quality assurance process and the system to support it

Our Quality Basic Bylaws stipulate that our quality assurance activities mainly aim to ensure the management of the quality assurance work standards at each important point through the concerted efforts of the organization and that the activities place a particular emphasis on the management at the important points in the upstream stages.

In a project, we hold a kick-off meeting involving interested persons first prior to the construction work. We check and examine the key issues for the construction work to share them and pursue the improvement of work efficiency and quality assurance.

In-process inspections are conducted in the course of the construction work. Inspection items are wide ranging including pressure and airtightness tests of pipes, factory inspections of equipment and devices (check of the appearance and performance) and on-site installation tests. As an inspection is conducted for each process, it is common to conduct some sort of inspection once a week or so and it may be conducted for two consecutive days in some cases. After the completion of the construction work, it takes at least a month for commissioning and adjustment. Three months or more may be needed when the demand level is high as in the case of a semiconductor plant.

The procedures to achieve the quality defined in each project are incorporated into the on-site workflows by

making use of the internal system. Based on our creed that quality can be achieved only with the accumulation of on-site efforts, we control quality at important points in a meticulous manner while also considering the speed. We have established the Safety/Quality Management Group as a cross-sectoral organization that supports those activities. Internal human resources who have knowledge and skills and are also familiar with quality control are deployed as members of the group in each of the branches. They are effectively working as advisers and consultants for on-site staff and as specialized staff members who also patrol the sites.

An IT platform developed by Takasago Thermal Engineering is also used to create the best product quality. We receive facility operation data from customers to make proposals based on the results of the analysis of the data and visualize problems. These activities help us share recognition with customers. If any problem is found, we can feed it back to our quality assurance activities promptly.

Technical and quality education

Our Quality Basic Bylaws stipulate that we shall give education and training on proprietary technologies and management technologies to employees to maintain and raise the level of quality assurance.

We established the Takasago Academy in fiscal 2014 to develop a technical staff training and education system and improve the skills of our employees as well as the

employees of our group companies. In particular, we focus on position-based training and education of technical staff to improve their capabilities and also encourage them to obtain qualifications that can lead to their skill improvement. We also renewed the new employee training program in fiscal 2017 to launch practical training at the Fuji Education and Training Center, which is operated by the National Association of Construction Industry Education and Training in Fujinomiya City, Shizuoka Prefecture. In the program, trainees directly experience piping and other work conducted on actual construction sites to deepen their knowledge on safety and quality that construction managers should have. We also organize company-wide technical presentation fairs and technical seminars every year and publish periodical technical newsletters.

In the meantime, we support the growth of partner companies and give instructions to them in the Takasago Technical School. We have prepared training and education materials to reduce burdens on on-site staff and improve the quality of construction work. A program to certify skilled workers of partner companies who are superior in technical skills and leadership as top-notch technicians ("Takasago Meisters") was set up in fiscal 2007. In addition, we established a new program to certify the Takasago Meisters who have especially high skills and awareness to contribute to the transfer of techniques and call them "Takasago Senior Meister: Koki (Brilliance)" in fiscal 2017. Through these initiatives, we will help improve technical abilities in the whole industry.

For the creation of product quality in the future



Kinya Yoshida
Manager, Quality Environment & Safety Control Division
Business Management Headquarters,
Takasago Thermal Engineering Co., Ltd.

The essence of "the creation of the best product quality," which is mentioned in our management principles, is to provide systems with high added value for customers and thereby enhance customer satisfaction. Our group has a chance to demonstrate our abilities when we respond to customer demand as much as possible and identify and meet the needs that have not been recognized even by customers.

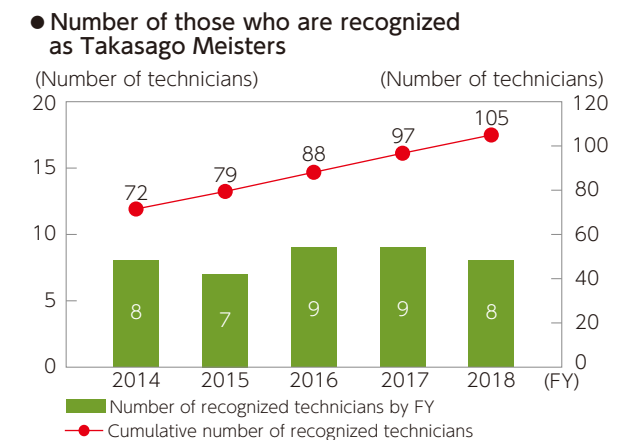
Our commitment to the creation of product quality is about to enter a new stage. The period when the construction industry is exempt from the Act on the Arrangement of Related Acts to Promote Work Style Reform will end in 2024. While restrictions on working hours will be tightened, we cannot compromise our efforts to pursue quality. Accordingly, we have to take measures that have not been implemented before. While we are currently promoting activities for the improvement of productivity and the effective use of information-communication and IoT technologies, I consider that those efforts will be key factors that support the creation of product quality in the future.



FY2018 Excellent Company Award commendation /
Takasago Meister certification ceremony



35th Technical Presentation Fair



Safety patrol

FM Solution Activities

In recent years, there has been a growing movement to make effective use of facilities for the purpose of responding to changes in work styles due to work style reform and other reasons as well as globalization and environmental issues (energy saving and reduction of CO₂ emissions). Facility management using IoT and ICT is also becoming widespread. Takasago Thermal Engineering provides "FM solutions," which support the facility management of customers (execution of facility strategies related to management strategies), to help customers solve their management issues and also enhance the added value of facilities.

Development of human resources who offer FM solutions

FM solutions aim at offering value throughout the lifecycle of buildings and facilities and involve the establishment and maintenance of a close relationship with customers, as well as the identification of unspoken demand in some cases, to make new proposals. Such a pattern of actions is totally different from the conventional facility construction business. Accordingly,

the human resources who engage in FM solutions are required to have a new awareness in addition to expertise in the related fields such as building equipment, facility management and data analysis. We introduced the FM domain into our education program this fiscal year to develop human resources who offer FM solutions.

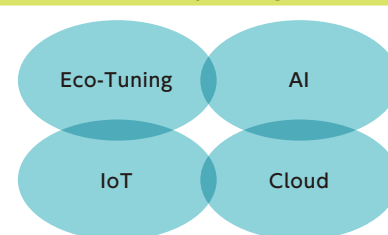


Support for the solution of challenges by using advanced technologies (IoT, AI and cloud)

Examples of support for the solution of challenges

- Reduction of costs in facilities with Eco-Tuning*
- IoT-based optimal operation of energy in the whole factory
- Cloud-based consultation for energy saving in the main office of a company with multiple facilities
- AI-based optimal operation of large-scale heat sources

Support for planning staff in the development of facility strategies



① Use of advanced technologies

Effective use of IoT, ICT and cloud (= management strategies of companies)

② Development of facility strategies

FM Solutions
• Energy • Maintenance



* Eco-Tuning aims to improve and optimize the operation of facilities, equipment and systems, while maintaining the amenity and productivity of buildings, in order to reduce greenhouse gases from buildings for the realization of a low-carbon society. Eco-Tuning is a registered trademark of the Ministry of the Environment of Japan.

Visualization of energy use for the optimization of production facilities and building facilities

● Example of solutions

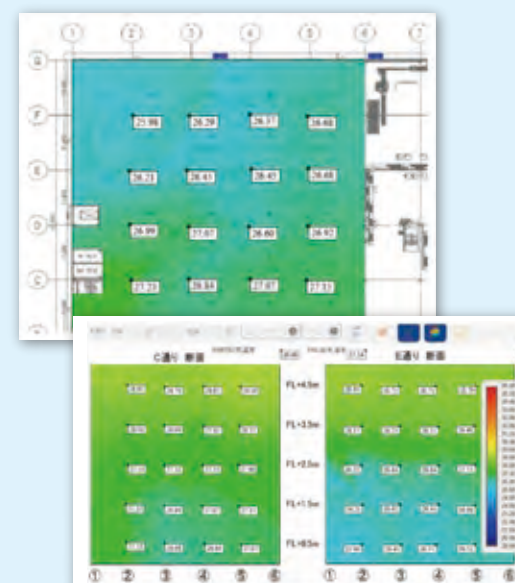
Challenges for a customer: Wants to visualize energy use of not just the air conditioning system but the factory as a whole including production facilities. Wants to establish a low-cost system that can also adapt to flexible production conditions to optimize energy use.

Solution: Use IoT sensors* that are wireless to eliminate wiring and can be easily installed and relocated. Grasp energy use per production volume and combine it with the energy consumed for building facilities to establish an energy management system that has a direct impact on business management.

Building facilities (air conditioning)

Visualization of temperature and humidity in the production and office environment and CO₂ emissions with contour figures

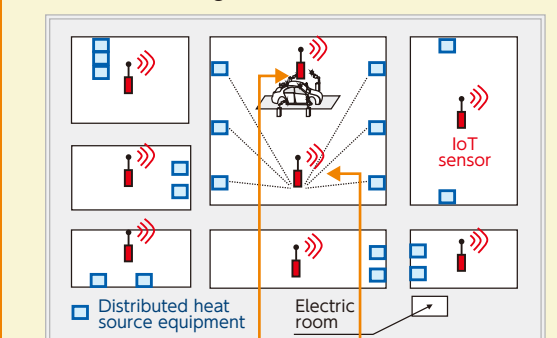
Planar distribution of temperature



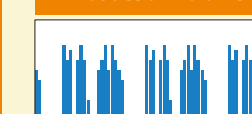
Cross-sectional distribution of temperature

Production facilities (manufacturing equipment)

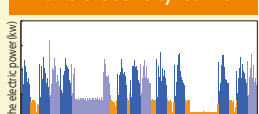
Use of IoT sensors to visualize energy use in production systems, energy use per production volume, categories of warning and other data based on the latest IoT technologies



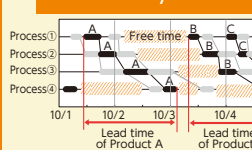
Production volume



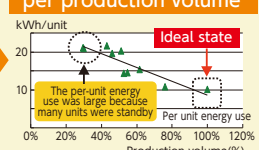
Plant electricity curve



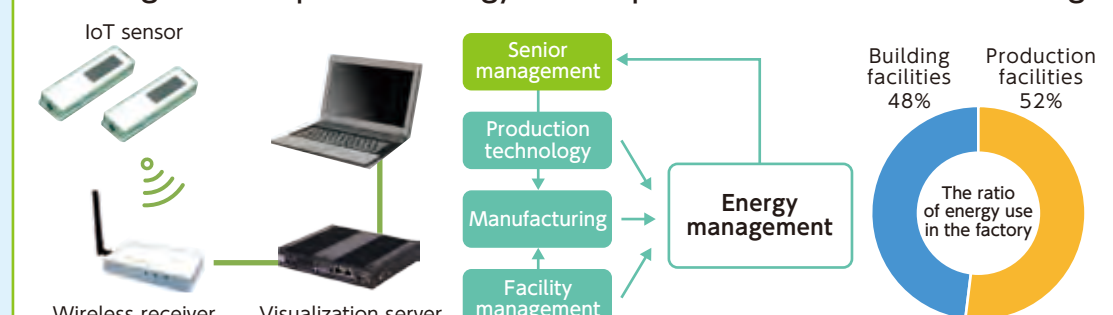
Process cycle time



Grasp of energy use per production volume



Management of per-unit energy use for production and air conditioning



* IoT sensor: a generic term of small wireless sensors for energy and environmental measurements

Environmental Conservation

We work on our contributions to the realization of a decarbonized society, a society harmonized with nature, and the establishment of a recycling-oriented society by proactively using environmental conservation technologies. We support the efforts made by our customers for environment conservation, as well as continuing to reduce the environmental load generated by our own business activities.



Realization of a decarbonized society

Takasago Thermal Engineering is committed to the realization of a decarbonized society in its business activities based on the Basic Policy for the Environment through the active use of energy saving and CO₂ saving technologies and the optimization of facility operation in cooperation with customers. Meanwhile, we ensure compliance with all relevant environmental laws and work to prevent environmental pollution while also actively promoting efforts to reduce energy use and CO₂ emissions in the company through our production activities on construction and other sites as well as activities in offices. As a result, we reduced CO₂ emissions from HVAC systems delivered to customers by 105,200 tons-CO₂ while also achieving CO₂ emission reductions of 45,200 tons-CO₂ through resource-saving efforts at the construction stage in fiscal 2018.

* For our Basic Policy for the Environment and environmental management system, see the CSR pages of our website.

Efforts to help establish 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 recover useful resources from waste and use them effectively. In addition, we thoroughly control waste until final disposal.

*3R means Reduction, Reuse and Recycling.

Production 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. Our recycling rate in fiscal 2018 was 88%, which met the target. We will endeavor to further promote the sorted collection of waste to increase the recycling rate.

Thorough control of CFCs and industrial waste

We started to collect CFCs in fiscal 1995, ahead of other members of the industry. In fiscal 2018, we collected 100% of the CFCs to be collected in 316 sites, which weighed approximately 30 tons in total. The amount of CFCs we have collected since the start of the activities is equivalent to 738 tons. We also controlled all of the construction facility waste manifests in 923 contract work sites. In the meantime, we have turned 92% of the manifests into an electronic format.

Consideration for ecosystem

We recommend the purchase of products with low environmental burdens (green procurement) to customers and buy environmentally friendly office supplies out of consideration for biodiversity and the ecosystem. In addition, we are involved in tree planting and other forest conservation activities through local environmental initiatives. Moreover, we have developed a flushing technique involving no water discharge to reduce the environmental burden of effluent discharged from construction sites and are working to put the technique into practical use and disseminate it.

Proposal of products with low environmental burdens (green procurement) to customers

To support green purchasing by customers, we provide them with related data including information on environmental burdens of the items designated as the targets of green procurement in a notification of the Ministry of the Environment and a table to compare environmental burdens. We have established guidelines for green procurement and developed a database in the internal network. The database shows environmental data on freezers and other HVAC devices by manufacturer and by model in a comprehensible manner to support customers in green purchasing. We made 298 proposals in fiscal 2018.

100% green purchasing for 13 items of the designated office supplies

Again in fiscal 2018, we achieved 100% green purchasing in the procurement of 13 designated products including copying paper. We will continuously work to enhance our green purchasing efforts to reduce environmental burdens.

Practical use of the flushing technique involving no water discharge

We conduct various research and development activities to reduce the impact of effluent and exhaust gas on the biological environment during construction work and in the operation of facilities after completion. With respect to effluent treatment, we developed a technique to purify the effluent containing zinc eluted from coated zinc as a result of flushing in pipes at the completion of piping and return the effluent to the pipes instead of discharging it. The technique was introduced to 47 construction sites in fiscal 2018.



Flushing water treatment unit

Targets and achievements of environmental conservation activities

In fiscal 2018, we implemented environmental conservation activities to meet the quantitative target set for each of the activity items in construction sites and offices. As a result, we met the target for all items. We will further promote environmental conservation activities to further improve them in fiscal 2019.

Targets and achievements of environmental activities in fiscal 2018

Goals of activities	Description of Activity			Control Items	Control Standard	Actual result	Evaluation
Contributing to the realization of a low carbon society	Proposing energy savings at design and construction stages	Proposing energy savings in design	new construction	$\frac{\text{Amount of energy saved}^{*1}}{\text{Baseline}^{*2} \text{ energy consumption}}$	10%	22%	✓
			refurbishment	$\frac{\text{Amount of energy saved}^{*1}}{\text{Baseline}^{*2} \text{ energy consumption}}$	30%	32%	✓
		Reducing equipment capacity in construction		$\frac{\text{Amount of energy saved}^{*3}}{\text{Energy consumption in original design}}$	10%	15%	✓
	Saving energy at offices	Reduce energy usage at head office, mainbranches, sales branches, and R&D center		Reduction of power consumption at offices	270 kwh or less per person, per month	100%	✓
	Reducing amount of construction materials	Reducing volume of piping, ductwork, andequipment scaffolding in construction		$1 - \frac{\text{Reduced volume of materials}}{\text{Materials used for ductwork, piping, and scaffolding in original design}}$	10%	19%	✓
Contributing to a society harmonized with nature	Implementing and proposing green procurement ^{*4}			$\frac{\text{Number of sites at which proposals were made}}{\text{Number of potential sites}}$	90%	100%	✓
	Participating in local environmental activities			Support for local cleanup activities and events	One or more activities per branch	100%	✓
	Commercializing and deploying technologies that contribute to biodiversity			Testing deployment of the no water discharge flushing method	40 cases	47 cases	✓
Contributing to the building of a recycling-oriented society	Implementing zero-emissions activities ^{*5} for industrial waste at construction sites			$1 - \frac{\text{Recycling rate}}{\frac{\text{Final disposal volume}}{\text{Total waste volume}}}$	85%	88%	✓
	Thoroughly managing industrial waste manifests			$\frac{\text{Number of implementing sites}}{\text{Total number of contracting sites}}$	100%	100%	✓
	Thoroughly managing CFC collection process manifests			$\frac{\text{Number of sites at which CFC collection process manifests are managed}}{\text{Total number of sites at which CFC collection is implemented}}$	100%	100%	✓

*1 New buildings designed by the Company of a certain scale (new construction and refurbishment)
*2 The baseline value is the energy consumption for the year or the amount defined for a specific project, equivalent to the baseline in the Act on the Rational Use of Energy.
*3 Contracts of a certain scale (new construction and refurbishment)
*4 Prime contracts of a certain scale (new construction and refurbishment)
*5 All prime contracts

Employee Satisfaction

In accordance with the management policy
“Contribution to society through personal harmony and creativity,”
we make efforts for systematic and organized human resource development
and strive to create an environment in which employees can work actively.



Basic concept for human resource development

To contribute to the realization of a decarbonized society through environmental engineering as a pioneer in the building facility business, Takasago Thermal Engineering is committed to the development of human resources with abilities to “create the best product quality and develop technology using creativity,” as mentioned in our management principles. In line with our philosophy that “people are our most important assets” in our Basic Policy for Human Resource Development, we conduct employee education in a systematic and organized manner and strive to create an organizational culture that cultivates a mindset to enjoy taking on new challenges, as well as inventive ingenuity.

Educational programs tailored to individual career stages

In order to develop human resources who will create our future, we have established the Takasago Academy, at which we offer practical and multifaceted educational programs in a planned manner by combining various types of training (Off-JT: off the job training) and various on-site experiences (OJT: on the job training).

At the Takasago Academy, individual human resources seek to acquire necessary capabilities and business skills and foster ethics so that they can work actively at all stages from the time of joining the company through retirement. We reformed new employee education in the training programs by job type in fiscal 2018. In the revised programs, new employees participate in a common curriculum for two years after joining the company regardless of whether they are technology-related or administrative employees. After the period, they are assigned to the respective departments to help them pursue diverse career paths. In the position-based training programs, while focusing on management skills, we offer opportunities to acquire an MBA degree and implement the Young Board Project to train next-generation leaders, Transformative Manager Seminars for management candidates, Transformative Leader Seminars for young employees and other programs to continuously develop human resources who will play the main role in our future management. By continuing to expand the training programs for employees, we will try to be a company that learns and keeps growing.



Deepening technical training



New employee experience learning at the Fuji Education and Training Center

● 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 education	Basic technical training	Deepening education				Career design training
Management / Training by position			Transformative leader seminar	Transformative manager seminar	Management seminar		
				External study of MBA in Japan			
International	Global seminar						
CSR	Information security training, compliance training, harassment training						
Other	Leadership improvement training			Facilitation training			
	Presentation skill improvement training						
Self-development	Programs to support the acquisition of official qualifications, distance learning, language study, etc.						

Operation of a fair personnel evaluation system

Our personnel evaluation system aims to properly evaluate targets and their achievement level and thereby motivate employees and facilitate human resource development. Specifically, we set targets appropriate for the respective occupational abilities and roles of employees and evaluate their achievements through interviews with their superiors to operate the evaluation system in a convincing way. We also give evaluator training to all management staff to improve the skills of the evaluators for the setting of proper targets, application of consistent evaluation standards, etc.

Introduction of a flexible age-limit system to extend the retirement age to 65

Based on the social background such as a declining labor force population in Japan due to the low birthrate and a rise in the age at which people may receive pension benefits, as well as the diversification of personal lifestyles, we introduced a flexible age-limit system where employees can select the age of retirement with 65 set as the upper limit to extend the retirement age in fiscal 2019 to enable employees to work actively while finding the job rewarding even after the age of 61. We help employees develop more fulfilling career plans through initiatives including the organization of career design training at the time when employees select their retirement age.

For the realization of work-life balance

Enhancement of leave systems

For the establishment of a working environment where people can work with a sense of security, it is essential to fully consider the health and safety of employees and promote their work-life balance. To this end, we have

improved relevant systems through concerted efforts of labor and management.

● Leave systems

In fiscal 2019, we started to grant five days of annual paid holidays each year in a planned manner and also introduced a system of paid holidays that can be taken by the hour to allow employees to take annual paid holidays more flexibly. We have other leave systems such as a vacation given as a reward for many years of service (20, 30 and 40 years), refreshment leave and anniversary leave. For the cases where employees need to take a leave of absence due to non-work related injury or illness, we have established a system with which we grant the annual paid holidays for the last ten years that have not been taken to the employees as a special leave so that they can concentrate on their treatment. We also have a volunteer leave system and encourage employees to take refreshment leave for a consecutive week in order to create an environment where employees can take holidays with a sense of security.

Enhancement of the childcare and nursing care system

To ensure that employees can balance work and family life, we have introduced a leave system and a reduced working hour system for employees engaged in childcare or nursing care of family members. In fiscal 2019, we also established a system to appoint the employees who cannot be easily relocated because of childcare or nursing care as employees to work in a specific area with no transfers. Furthermore, we enable our employees to use day-care centers in the premises of other companies. We have also concluded an agreement with an NPO “Umi wo Koeru Care no Te” to organize nursing care workshops and provide opportunities to consult for free across Japan. In addition, we encourage male employees to take childcare leave for raising children with family cooperation. Moreover, we promote the achievement of work-life balance through the establishment of systems to facilitate response to changes in the family circumstances such as leave for the care of sick children and nursing care leave.

Voice of a male employee who took childcare leave



Yoshiaki Tajima, Sales Section, Fourth Office, Tokyo Main Office

Takasago Thermal Engineering encourages male employees to take childcare leave and I had also wished to take childcare leave if the opportunity was given. When I found out that my wife was pregnant and then applied for the leave, my superiors and colleagues in the section kindly accepted it. While I worried most about my duties during the leave, there was no problem thanks to support from my superiors and colleagues. Full participation in childcare allowed me to feel the daily growth of my child and realize anew how tough childcare is. The experience was very significant for me and also broadened my view to have a favorable impact on my job after I returned to work. I strongly suggest to male employees who will become fathers that they should take childcare leave.

Harmony with Society

Our basic concept for social contribution is to fulfill our social responsibility as a good corporate citizen by engaging voluntarily in social contribution activities.

We inform all executives and employees of the basic policy and actively become involved in the support of local environmental activities as well as art and cultural activities and other initiatives to pursue harmony with the local communities.



Stricter measures to handle harassment issues

To prevent sexual and other forms of harassment including discrimination against pregnant employees and abuse of authority, we send messages of top management and clarify our stance 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 and endeavor to develop a comfortable work environment where all employees can fully demonstrate their abilities.

Commitment to occupational health and safety

Efforts to become a company with physically and mentally healthy and vigorous employees

To become a company where all executives and employees are physically and mentally healthy and work energetically ("Well-being company"), we take various initiatives including the issuance of a "health declaration" by the CEO. In April 2019, we set up the Health Care Office to further help executives and employees maintain and improve their health. In the office, an industrial physician and public health nurse are stationed to give advice on physical and mental health to executives and employees when necessary. The office is also involved in the support of balancing treatment and work, follow-up actions after health checkups and education and enlightenment activities to improve health literacy.

Efforts to ensure occupational safety

Basic concept for occupational health and safety

In 2000, we established our safety and health philosophy, "Safety is the top priority in carrying out all business tasks." Under this philosophy, we strive for health and safety activities in 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. In fiscal 2019, with the slogan "the elimination of fall accidents," we are taking measures including the effective use of health and safety work procedure manuals, confirmation of health and safety management activities by business operators and enhancement of safety awareness.

The Safety/Quality Management Group, which was established for the strengthening of safety and health activities, engages in on-site patrols to evaluate activities for the achievement of priority targets while also planning and managing measures taken commonly across the company to ensure safety and checking the situation of construction site management to provide instructions based

on the review of it.

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

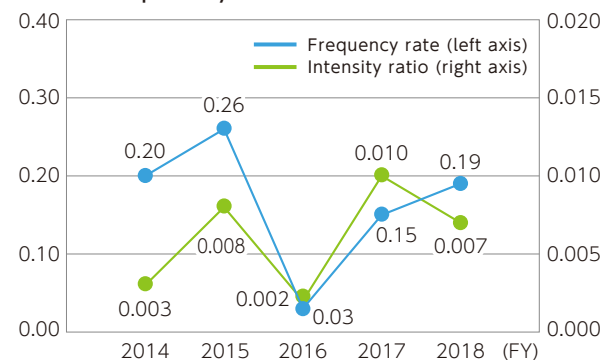


Company-wide Safety and Health Conference

Safety records by year

In fiscal 2018, despite the activities of the Safety/Quality Management Group (on-site patrols and checks), 51 accidents (7 lost-time injuries and 44 non-lost-time injuries) occurred. We will improve our activities with a focus on the elimination of fall accidents, which can directly lead to a serious accident, the elimination of accidents at the time of transporting heavy objects, which increased in the previous fiscal year, and the elimination of accidents caused by unskilled workers, which have been increasing recently.

● Frequency rate and intensity ratio over the past 5 years (%)



Education, follow-up and collaboration with Kowakai to eliminate accidents

The Safety/Quality Management Group checks the management items specified in the safety priority targets and gives instructions based on the results. Those efforts have produced certain results including the improvement of safety management of young employees, who have been increasing in recent years. In fiscal 2019, we will have each of the branches conduct patrols to enhance its safety management and we will provide adequate education and conduct follow-up activities to prevent accidents.

Kowakai, which is composed of our partner companies, has also implemented activities for the improvement of health and safety since 2003, including the transmission of information on technologies related to health and safety, PR activities and notification of relevant laws and regulations to ensure compliance with them.

Activities for the local environment

Takasago Thermal Engineering is continuously involved in local cleanup activities in various parts of Japan through cooperation with group companies and partner companies. They give us precious opportunities to communicate with local people. In fiscal 2018, a total of 895 persons participated in those cleanup activities.



Clean Shinjuku! Cleanup Campaign



Activities of the Sapporo Branch for the global environment



Activities of the Kyushu Branch for the global environment

Eco-cap campaign

Our business offices collect caps of PET bottles ("eco-caps") and send them to Ecocap Movement, which is an NPO approved by the Cabinet Office, to support various social contribution activities including medical support, donation of vaccines, support of persons with disabilities and environmental education of children.

The recycling of "eco-caps" also helps conserve the environment because it prevents CO₂ emissions that would have been caused if the caps had been incinerated.

Cumulative number of the caps collected

127,409

CO₂ emission reduction

933.3 kg*

* The incineration of "eco caps" of 1 kg generates CO₂ of 3.15 kg.

Operation of vending machines with a donation function

We have operated vending machines with a donation function since fiscal 2016. The total annual amount of "green funds" raised in fiscal 2018, which are used for tree-planting activities and international contributions in the environmental field, was 615,450 yen.

Sponsorship and support for art and cultural activities

To promote culture and art, we sponsor and support festivals, celebrations and relevant action groups.



Concert for Children (photo courtesy of Seiji Ozawa Matsumoto Festival Executive Committee)

Fair and highly transparent management

We make efforts for thorough consciousness and practice, with a recognition that compliance is an essential element of CSR management. In addition, we are making efforts for measures to prevent management risks from arising, and minimizing the impact of crises.

Compliance

Based on the recognition that the establishment of compliance is the foundation of CSR management, we are continuously working to enhance the awareness of compliance and ensure it in daily activities. We have also set up the Compliance Committee chaired by the executive in charge of the Corporate Operations Headquarters to ensure thorough compliance with

corporate ethics. In addition, we develop and promote the compliance system through such initiatives as the transmission of information from the Compliance Office and dissemination of the consultation and reporting counters.

The Takasago Thermal Engineering Group has established the "Ten Group Action Guidelines" and we distribute a portable booklet "Group Corporate Code of Ethics" to executives and employees to use it for daily duties, in-house training and other purposes.

Ten Group Action Guidelines

1. Act in compliance with laws and regulations and internal rules and according to ethical standards.
2. Ensure appropriate accounting and safeguard company property.
3. Promote a fair, safe, and healthy working environment.
4. Secure safety at construction sites and maintain/improve the quality of work
5. Promote appropriate management/disclosure of information.
6. Maintain ethically appropriate relationships with customers.
7. Maintain fair competition with competitors.
8. Establish ethically appropriate relationships with subcontractors.
9. Consider social responsibility, social contributions, and the global environment.
10. Break relationships with anti-social forces and organizations.

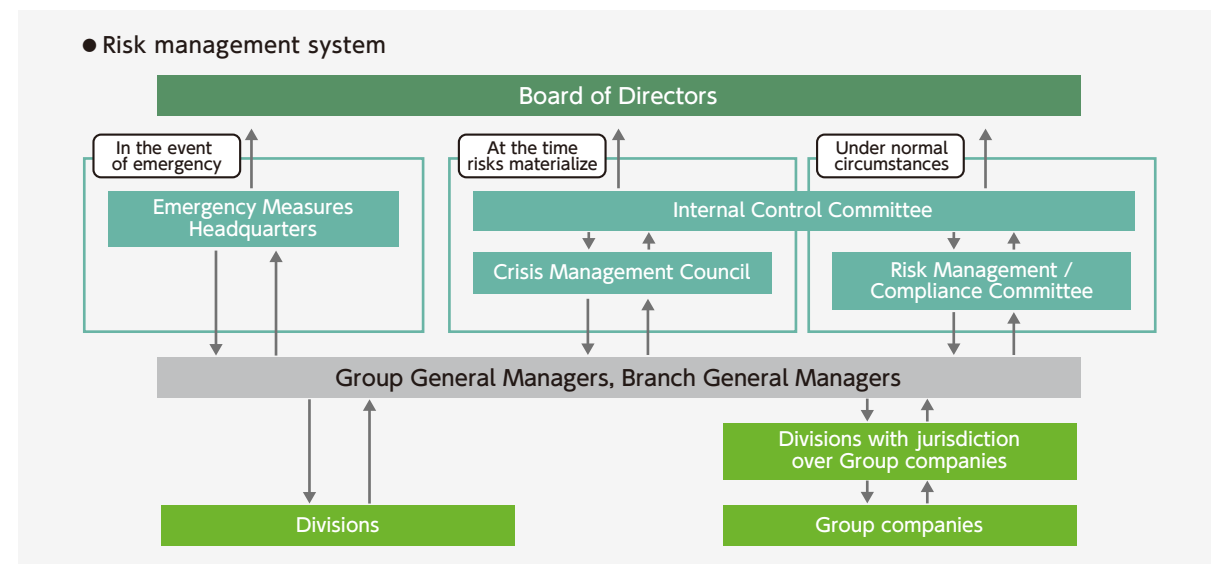


Group Corporate Code of Ethics

Risk management

We conduct risk management in order to prevent all risks from materializing and to minimize damage in case a risk actually materializes to cause a crisis. To prevent risks from materializing, we established the Risk Management Committee chaired by the officer in charge of the Corporate Strategy Headquarters, in which the CEO serves as the chief officer, in accordance with the Risk Management Regulations. The committee is responsible for the determination of the risk management policy, the identification of risks and the

assessment of the risks based on the probability of occurrence and their impact on business management while also developing risk mitigation measures and managing their progress to ensure the effectiveness of risk management. 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.



Strengthening our capacity to respond to disasters in accordance with the Business Continuity Plan (BCP)

In April 2014, the Business Continuity Plan (BCP) was established in preparation for a large-scale earthquake. We have determined procedures for initial responses and restoration efforts to organize the business continuity system within the target time after the occurrence of a large-scale earthquake. In addition, we have developed a system to fulfill our social responsibility as a building constructor at the time of a disaster, such as



BCP booklet



Emergency response training for BCP

assistance for the recovery of hospitals and other facilities of a highly public nature as well as the supply chains of our customers.

In FY2018, we carried out initial training at the head office and the Nagoya branch (Nagoya city, Aichi prefecture) to prepare our initial response in case a capital earthquake should occur.

We are working on a so-called BCM* to enhance the effectiveness of the BCP.

* BCM (Business Continuity Management): Activities that enhance the effectiveness of a BCP such as implementing training and strengthening necessary business resources whereas BCP means a plan to continue operations when there is a disaster.

Improvement of information security

To prevent the leakage of personal information, customer and supplier information and all other information handled in the course of business operations, we have developed our Information Security Policy to clarify our policy on information security in the whole group, as well as Confidentiality Regulations on the maintenance of confidentiality, Social Media Guidelines for Individuals on the use of social media and the Emergency Response Manual to specify the basic actions to be taken in case of

an information related accident. We work to familiarize relevant persons with them.

Moreover, we take technical measures for the improvement including the encryption of all PCs installed in the offices of construction sites, which have closer contact with customer information, and promote the strengthening of the information management system through the establishment of the Information Security Management Office. Other initiatives include the implementation of information security education to enhance the awareness of information management and the issuance of an information security pamphlet.



Information security pamphlet

Enhancement of Corporate Governance

In its basic policy on corporate governance, Takasago Thermal Engineering aims to ensure the legitimacy, transparency and promptness of management and increase management efficiency in order to earn the trust of society and raise its mid- to long-term corporate value.

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.

Through these activities, the board aims to improve management efficiency and ensure the legitimacy and adequacy of business execution.

The Audit & Supervisory Board currently consists of five members (including three outside corporate auditors). 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 Committee to enhance deliberation on important matters concerning management and make more prompt 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 Compensation Committee as an arbitrary advisory body for the Board of Directors. The committee deliberates on the new appointment, reappointment and dismissal of directors, corporate auditors and executive officers of Takasago Thermal Engineering and its subsidiaries to make recommendations to the board (however, the new appointment or reappointment of corporate auditors requires the approval of the Audit & Supervisory Board) as well as the remuneration of the directors and executive officers of our company and its subsidiaries while also checking the policy for the plan on CEO successors developed by the CEO and its progress. A majority of the committee must be outside directors.

Furthermore, we have formed the Advisory Council as an arbitrary advisory body for the Board of Directors, which 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 training to directors and corporate auditors and the provision of information.

In addition to the activities mentioned above, corporate auditors coordinate with accounting auditors and the

Internal Audit Office to enhance corporate governance by conducting effective audits through active communication between them.

(1) Corporate auditors

The corporate auditors 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 corporate auditors exchange information with the directors and corporate auditors of subsidiaries at group-wide meetings of the Management Committee and the Group Audit & Supervisory Board and other occasions. Outside corporate auditors obtain and provide information from an independent standpoint and strive for monitoring from an external perspective. On the other hand, full-time corporate auditors conduct monitoring based on their familiarity with our operations. The corporate auditors are thus enhancing the effectiveness of audits from their respective positions.

(2) Internal audits

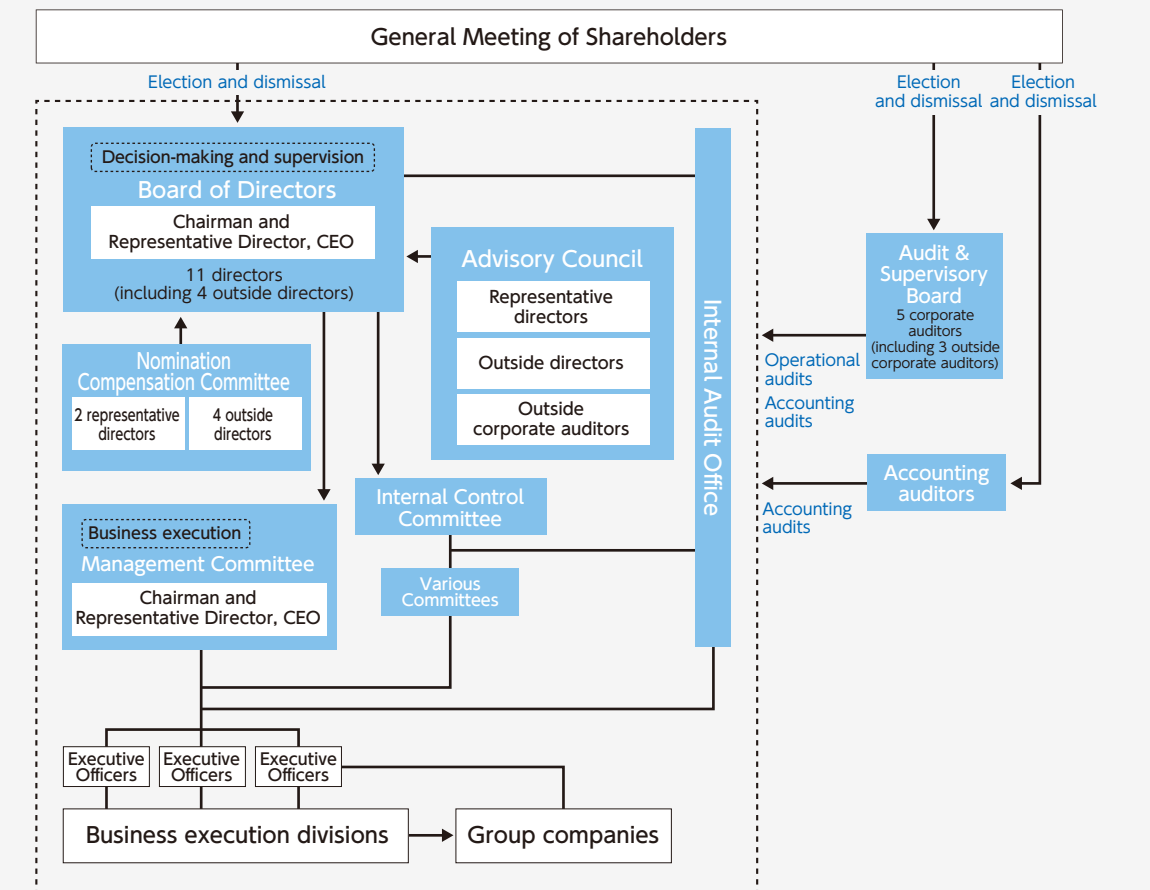
Having established as a section under the direct control of the CEO, the Internal Audit Office (with six staff members) conducts systematic audits on the appropriateness and efficiency of business operations from an independent standpoint based on the Internal Audit Regulations. With respect to subsidiaries, it engages in the exchange of information and other activities on an as-needed basis. The Internal Audit Office reports the results of audits to the Representative Director, CEO 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 corporate auditors and accounting auditors, the office works to conduct effective internal audits.

(3) 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 two and three years, respectively. They also have six certified public accountants as their assistants along with six other assistants.

External officers	External Directors	External Auditors
	4 persons (out of 11 directors)	3 persons (out of 5 auditors)

Corporate governance system



Policy on the appointment of executives

In the nomination standards, candidates for directors are required to have qualities including: insight on business management and excellence in foresight, vision and objective judgment; abilities to demonstrate leadership for the sustainable growth of the group and improvement of the corporate value; potential to make an active contribution to the development of the next generation of management personnel; integrity, popularity, high ethical standards and courage; physical and mental health to have no problem to execute their duties; and the absence of specific problems such as special business interests. Those conditions are examined comprehensively to evaluate the candidates.

Candidates for corporate auditors are required to have qualities including: the quality to fulfill the duties

of corporate auditors; high ethical standards; physical and mental health; and the absence of specific problems such as special business interests, which are examined in a comprehensive manner for the nomination of the candidates.

When executive officers are appointed, we comprehensively evaluate candidates based on their competency. For example, they are required to have the following qualities: high levels of expertise and achievements and abilities to be in charge of important management duties for the business strategy; abilities to demonstrate leadership for the sustainable growth of the group and improvement of the corporate value; potential to make an active contribution to the development of the next generation of management personnel; integrity, popularity, high ethical standards and courage; physical and mental health to have no problem to execute their duties; and the absence of specific problems such as special business interests.

Remuneration of executives

As to the remuneration of directors and corporate auditors, we set the upper limit for the total amount of the remuneration, etc. of all the directors and corporate auditors by resolution at a shareholders' meeting.

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 Compensation 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.

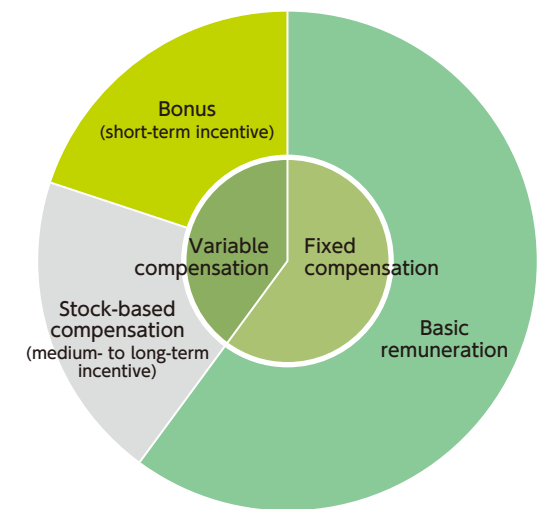
The basic remuneration is determined as a fixed amount according to the position of each of the directors.

As to the bonus, on April 1, 2019, we introduced a mechanism to change the amount from 50% to 150% of the basic

amount for each position based on the performance in the previous fiscal year and qualitative assessment of the individual executives in order to improve morale for the achievement of single-year performance targets and other purposes.

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 Compensation 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 corporate auditors is basic remuneration only and the amount of the basic remuneration of each corporate auditor is decided through consultation with corporate auditors 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., corporate auditors receive no bonus or trust-type stock-based compensation system or other stock-based remuneration.

● Image of the composition of the remuneration of directors



Executive remuneration (FY2018)

● Amount of remuneration and other compensation for directors (excluding outside directors)
6 persons 343 million yen

● Amount of remuneration and other compensation for outside directors
4 persons 36 million yen

● Amount of remuneration and other compensation for corporate auditors (excluding outside auditors)
2 persons 47 million yen

● Amount of remuneration and other compensation for outside corporate auditors
3 persons 44 million yen

Constructive dialogue

Takasago Thermal Engineering makes full use of opportunities to give explanations and have constructive dialogue in the stock market in an effort to promote the understanding of our business management. We will continue to share the information obtained through the dialogue in the company and also consider the incorporation of the information into our business management when necessary.

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

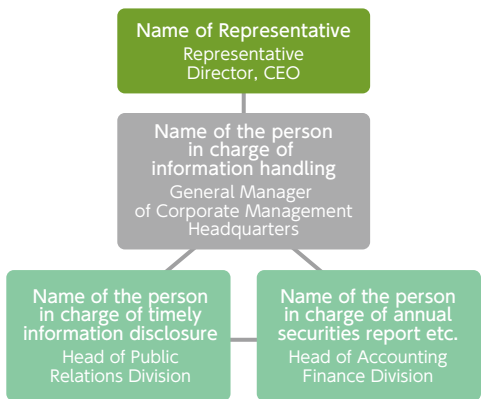
- (1) For the dialogue with shareholders, we appoint the Representative Director, CEO as the person who controls the dialogue, the General Manager of Corporate Operations Headquarters as the person responsible for handling the information, the Head of the Public Relations Division as the person in charge of timely disclosure and the Head of the Accounting Finance Division as the person in charge of annual securities reports, etc. (the structure is shown in the schematic diagram of the outline of the timely disclosure system later in this page).
- (2) The sections mentioned above, which belong to the Corporate Planning Division or 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.
- (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 responsible for 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 Committee 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) Corporate auditors 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 outline of the timely disclosure system



Financial results briefing session

History of Takasago Thermal Engineering

Takasago Thermal Engineering was founded under the company name of Takasago Heating Works Co., Ltd. sponsored by Kunizo Hara on November 16, 1923. Starting with air conditioning construction business, we have continued to make bold efforts for advancement of technologies as a designer/constructor trusted by customers and as a developer of optimum systems and equipment. Today, as the world moves towards decarbonization, we will respond to society's demands towards the 100th anniversary of our foundation, aiming to become an environmental solution professional company while further improving our technical capabilities.

From *focusing on technologies* to *harmonization*, the capability of individuals was thoroughly demonstrated through the company-wide cooperation and we received a technical reputation in the industry and has built the foundation of future development.

Early days

- 1923** Takasago Heating Works Co., Ltd. established
- 1943** Company renamed Takasago Thermal Engineering Co., Ltd.
- 1949** Completed registration pursuant to the Construction Industry Act

Growing years

- 1969** Listed on stock exchange
- 1972** Established NIPPON PMAC CO., LTD. and Nihon Kaihatsu Kosan Co., Ltd.
- 1974** Started entering overseas market from Singapore
- 1980** Established T.T.E. Engineering (Malaysia) Sdn. Bhd.
- 1984** Established Thai Takasago Co., Ltd.
- 1994** Established Takasago Thermal Engineering (Hong Kong) Co., Ltd.
- 2003** Established Takasago Constructors & Engineers (Beijing) Co., Ltd.
- 2005** Established Takasago Singapore Pte. Ltd.
- 2007** Established Takasago Vietnam Co., Ltd.

Period of reform

- 2012** Made Nihon Setsubi Kogyo Co., Ltd. an affiliate
- 2013** Established PT. Takasago Thermal Engineering
- 2014** Established the Myanmar office (current Myanmar Branch) and Takasago Marusei Engineering Service Co., Ltd.
Engaged in a business and capital alliance with Tsukishima Kikai Co., Ltd.
- 2015** Established Takasago Engineering Mexico, S.A. de C.V.
- 2017** Engaged in a business and capital alliance with Yamato Corporation
Made Integrated Cleanroom Technologies Pvt. Ltd. in India a consolidated subsidiary
- 2018** Concluded a business collaboration agreement with Yamato Scientific Co., Ltd. Made Kiyota Kougyo Co., Ltd. a consolidated subsidiary
- 2019** Made Kazusa Environmental Research Center Co., Ltd. a subsidiary



1930
Takasago and Ebara-type centrifugal refrigerating machines, which was Japan's first refrigerating machine



1927
Japan's first Precised temperature and humidity Control System (Iwakuni Plant of Teikoku Rayon Co., Ltd. (current Teijin Limited))



1973
The New Building of the Bank of Japan's Head Office
Source: Bank of Japan



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



1978
Sunshine 60



1973
The New Building of the Bank of Japan's Head Office
Source: Bank of Japan



1970
Expo '70 was held in Osaka. Introduced Japan's first District cooling facilities



1993
Yokohama Landmark Tower
1988
Developed a supercooled water base ice thermal storage system: Super Ice System (SIS®)



1980
Main building of the Tokyo Metropolitan Police Department



1988
Tokyo Dome
Air conditioning of Japan's first air-supported dome stadium
Photo courtesy of Tokyo Dome Corporation



2001
Sapporo Dome



1996
Head office building of Fuji Television Network, inc.
2005
Developed a swirling induction type HVAC system, SWIT®



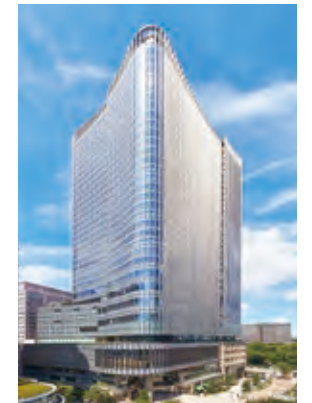
2012
Kabukiza Theatre



2012
Tokyo Station, Marunouchi frontage



2003
Roppongi Hills Mori Tower



2018
Tokyo Midtown Hibiya



2017
GINZA SIX



2012
Shibuya Hikarie

Corporate Overview

Company Outline

(as of March 31, 2019)

Company name	Takasago Thermal Engineering Co., Ltd.	Stock listing	First Section of the Tokyo Stock Exchange
Established	November 16, 1923		
Number of employees	2,051 (consolidated: 5,912)	Head Office	6-27-30, Shinjuku, Shinjuku-ku, Tokyo 160-0022
Capital	13,134 million yen	Phone (main)	+81-3-6369-8212
End of accounting period	March	Fax (main)	+81-3-6369-9103

Business Description

- Air conditioning systems
- Clean rooms, and associated systems
- District heating and cooling (DHC) facilities
- Plumbing and Drainage systems
- Co-generation systems
- Electrical systems, Automatic control system and communication systems
- Equipment diagnosis
- Equipment diagnosis / failure diagnosis systems
- Dehumidifying/drying systems
- HVAC systems for nuclear energy facilities
- High-precision HVAC systems
- Waste vacuum transfer facility
- Construction work
- Discharged-heat recovery systems
- Heating/cooling systems
- Refrigerating/freezing systems
- Design, construction, production, installation and maintenance of other various environmental control and thermal engineering system
- Design, manufacture, import, export, sale and mediation of machinery, equipment and various materials machinery, equipment and various materials
- Consulting and services concerning energy saving and environmental measures
- Business related to greenhouse gas emissions rights trading
- Purchase and sale, brokerage, lease, and management of real estate
- Labor 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 :

From December 4, 2015 to December 3, 2020

Duration of License Validity :

From December 4, 2015 to December 3, 2020

Licensed Fields of Construction Work :

Plumbing, Machine and Equipment Installation, Electrical, Telecommunication, and General Building

[Ordinary Construction Business]

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

License Date :

From December 4, 2015 to December 3, 2020

Duration of License Validity :

From December 4, 2015 to December 3, 2020

Licensed Field of Construction Work :

Fire Protection Facilities

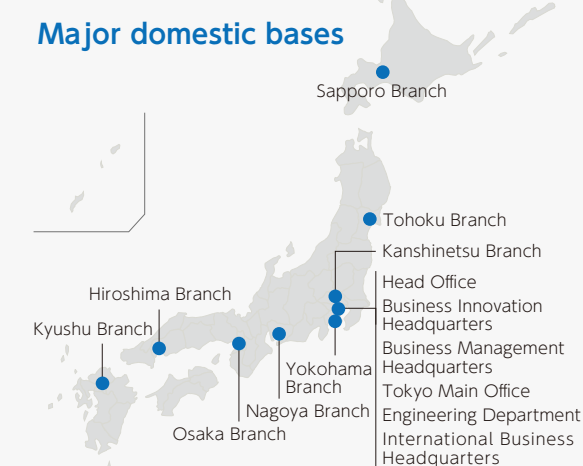
Major bases

9 overseas group companies (in 9 countries)

- Takasago Constructors & 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)

*In Myanmar, we established Myanmar branch of Takasago Thermal Engineering Co., Ltd.

Major domestic bases



7 group companies in Japan

- Takasago Marusei Engineering Service Co., Ltd.
- NIPPON PMAC CO., LTD.
- Nihon Kaihatsu Kosan Co., Ltd.
- Kiyota Kougyo Co., Ltd.
- Kazusa Environmental Research Center Co., Ltd.
- Nihon Setsubi Kogyo Co., Ltd.
- Tomakomai District Heating Co., Ltd.

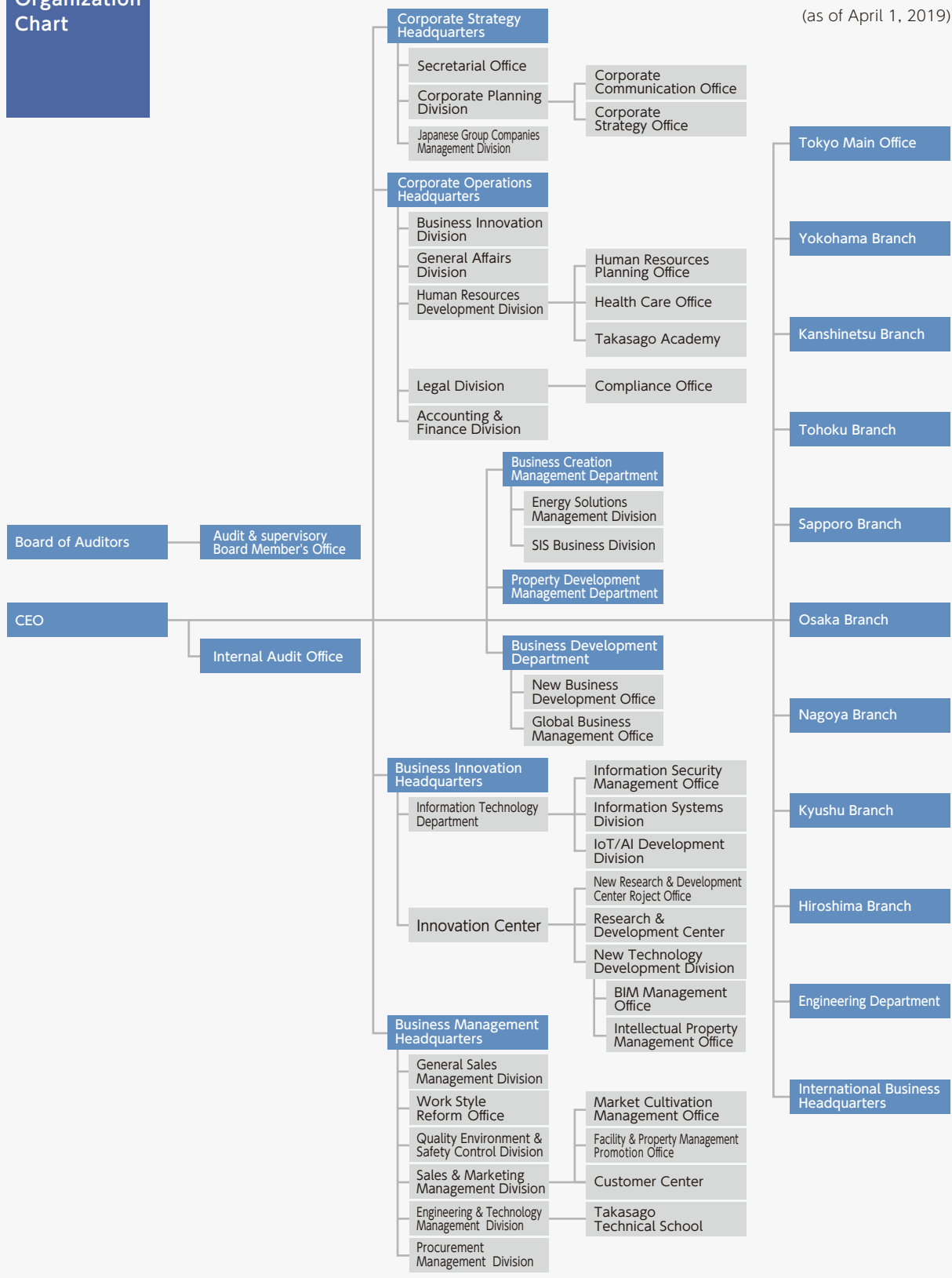
Value Creation and Performance

Development of the Medium-term Business Plan

Foundations Supporting

Basic Information

Organization Chart



Stock information

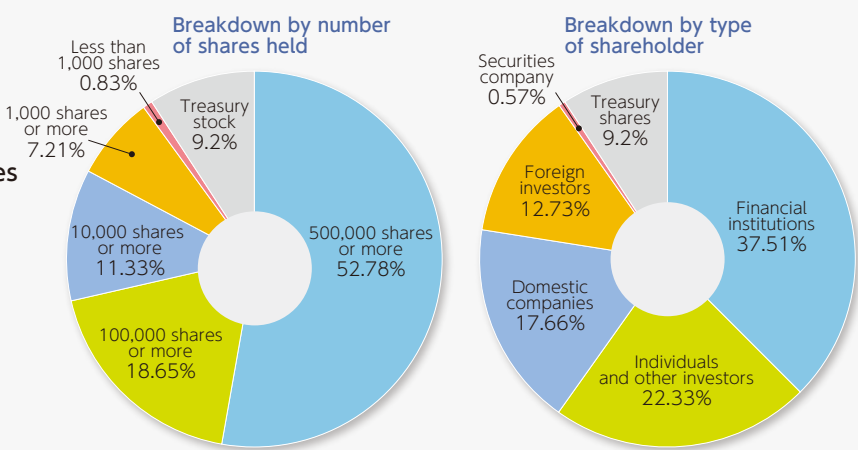
Major shareholders (top 10) (as of March 31, 2019)

Names of shareholders	Number of shares held (1,000 shares)	Salient ratio (%)
Nippon Life Insurance Company	4,560	6.29
Dai-ichi Life Insurance Company, Limited.	4,231	5.84
The Master Trust Bank of Japan, Ltd. (Trust Account)	3,250	4.48
Japan Trustee Services Bank (Trust Account)	3,220	4.44
Employee stock ownership of Takasago Thermal Engineering Co., Ltd.	3,207	4.42
Takasago Kyoekai	2,474	3.41
MUFG Bank, Ltd.	2,346	3.23
Mizuho Bank, Ltd.	2,177	3.00
Japan Trustee Services Bank (Trust Account 5)	1,069	1.47
Keiokaku Co., Ltd.	1,016	1.40

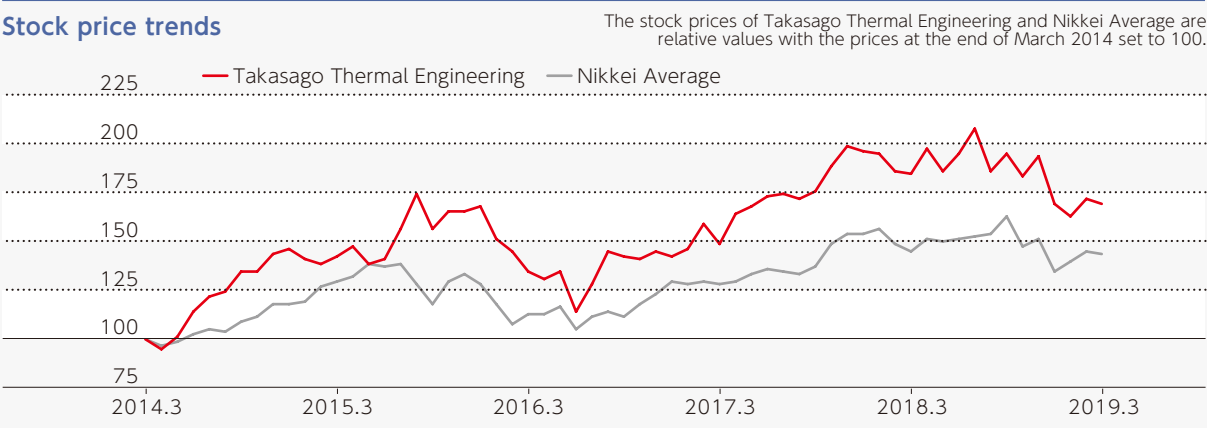
(Note)
1. Numbers of shares are rounded down to the nearest thousand.
2. The treasury stock (7,337 thousand shares) is excluded from the calculation of the shareholding ratio.
3. The shareholding ratio is rounded down to two decimal places.
4. The treasury stock excludes our shares owned by the executive remuneration BIP trust (544,700 shares).

Situation of shares

- **Total number of authorized shares**
200,000,000 shares
- **Total number of issued shares**
72,428,629 shares
(excluding 7,337,629 shares of treasury stock)
- **Number of shareholders**
5,605
(decreased by 207 from the end of the previous fiscal year)



Stock price trends



Financial and Non-Financial Data

© Financial Information (consolidated)

		* Rounded down to less than one million yen									
		(FY) 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Business Results											
Orders Received	(million yen)	206,016	207,283	221,431	253,918	264,280	255,648	265,301	273,464	288,646	333,887
Net sales	(million yen)	209,298	213,175	215,464	248,430	237,389	243,582	251,291	260,204	289,933	319,834
Operating income	(million yen)	5,751	5,205	5,214	3,570	7,780	7,727	9,289	12,383	16,362	17,219
Ordinary income	(million yen)	6,438	5,910	6,695	4,760	9,109	8,582	10,602	13,427	17,461	18,359
Profit attributable to owners of parent	(million yen)	4,341	3,003	4,269	2,186	4,011	5,196	6,650	8,665	11,804	12,609
Net income per share	(yen)	54.03	38.72	55.23	28.74	53.24	69.28	89.40	117.83	160.41	173.29
Return on equity	(%)	5.3	3.7	5.2	2.5	4.4	5.2	6.4	8.2	10.3	10.4
Return on Asset(ROA)	(%)	3.3	3.3	3.6	2.4	4.3	3.9	4.7	5.9	7.0	6.8
Operating profit on sales	(%)	2.7	2.4	2.4	1.4	3.3	3.2	3.7	4.8	5.6	5.4
R & D expenses	(million yen)	916	935	996	843	768	791	918	903	1,064	945
Capital investment	(million yen)	791	446	481	1,209	962	2,019	2,325	862	3,303	3,962
Financial Condition											
Total assets	(million yen)	188,151	175,166	197,434	207,465	217,132	225,810	223,267	233,426	264,062	279,743
Net assets	(million yen)	82,713	81,786	85,771	93,932	97,416	108,362	104,613	111,574	124,484	126,208
Net assets per share	(yen)	1,064.33	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
Net worth equity capital	(million yen)	82,565	81,655	84,075	90,371	93,415	105,725	102,325	109,382	120,546	122,060
Equity ratio	(%)	43.9	46.6	42.6	43.6	43.0	46.8	45.8	46.9	45.7	43.6
Cash flow											
Cash flows from operating activities	(million yen)	8,604	△5,939	569	13,054	13,575	△3,423	△1,272	23,528	6,170	14,892
Cash flows from investing activities	(million yen)	472	1,443	△556	△870	1,455	△4,921	△5,398	2,329	△5,685	△6,069
Cash flows from financing activities	(million yen)	△4,783	△2,273	△1,157	△2,801	△3,285	△837	△2,215	△6,079	7,107	△7,928
Dividend Situation											
Dividend per share	(yen)	25	25	25	25	25	25	28	36	50	52
Payout ratio	(%)	46.3	64.6	45.3	87.0	47.0	36.1	31.3	30.6	31.2	30.0
Dividend on equity ratio (DOE)	(%)	2.4	2.4	2.3	2.2	2.1	1.9	2.0	2.5	3.2	3.1
© Non-financial Information											
Number of employees	(number of persons)	2,562	2,617	4,085	4,312	4,405	4,471	4,576	4,831	5,714	5,912
The company alone	(number of persons)	1,770	1,817	1,845	1,859	1,850	1,858	1,885	1,950	2,025	2,051
Domestic consolidated subsidiaries	(number of persons)	481	524	1,909	1,908	1,938	1,940	1,999	2,040	2,120	2,218
Overseas consolidated subsidiaries	(number of persons)	311	276	331	545	617	673	692	841	1,569	1,643
CO ₂ emissions caused by major manufacturing activities	(t-CO ₂)	—	29,000	72,100	43,700	58,790	41,200	53,300	48,000	48,700	45,200
Final disposal rate of construction waste (excluding sludge)	(%)	—	14	19	10	14	9	9	13	14	12