

Section 01

Growth Strategies

Value Creation Process	25
Vision 2030 Long-Term Vision	29
Implementing ESG Management	31
Key Issues (Materiality) for the Takuma Group	32
Medium-Term Management Plan	35
Business Strategies	41



Value Creation Process

We are working to create new value by strengthening initiatives that address key issues (Materiality) through businesses that tap the Group's strengths in light of medium- to long-term trends and social issues.

External environment

World

- Rising energy demand and waste issues, particularly in emerging nations
- Increasingly serious problem of climate change
- Progress of the Fourth Industrial Revolution

Japan

- Shrinking population
- Aging population
- Increasingly large-scale natural disasters
- Tight financial conditions
- Aging infrastructure

Risks and opportunities

- Rising expectations towards renewable energy
- Initiatives to realize carbon neutrality by 2050

Key Issues (Materiality) P32

- 1 Helping combat climate change
- 2 Conserving resources and protecting the environment
- 3 Strengthening relationships of trust with customers and communities
- 4 Pursuing partnerships and innovation
- 5 Promoting activities of human resources
- 6 Ensuring safety and health
- 7 Strengthening corporate governance

Management Resources and Strengths



Relationships of trust with customers

Relationships of trust with customers built up over the 83 years since our founding



Technology and expertise

Engineering throughout the plant life cycle, from planning to construction and operation

Our achievements (to date)

Boilers	3,200+ units*
Municipal solid waste treatment plants	360+ facilities
Industrial waste treatment plants	120+ facilities

*Of which, biomass boilers: 630+ units



Human resources

Tenacious, dedicated human resources who will carry on Takuma's founding spirit and work closely with customers in the spirit of good faith

Consolidated employees 3,925



Financial base

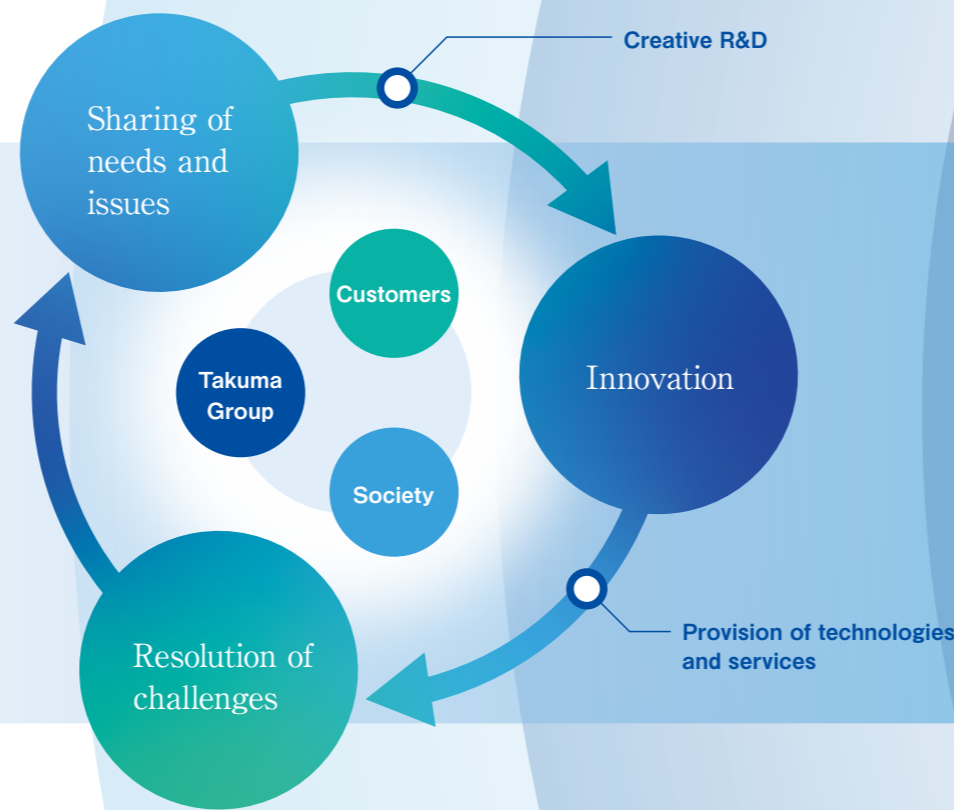
A robust base to ensure customers can readily depend on us over the long term for 20 to 30 years

Net assets	JPY 90.5 billion
Capital adequacy ratio	50.7%
Rating (R&I)	A-

(As of March 31, 2021)

Business Strategies

The Takuma Group will strive to become a great partner for its customers while resolving challenges faced by customers and society through useful technologies and services that are founded on innovation. We will seek to realize sustained growth alongside our customers and society through the ongoing repetition of this approach.



Medium-Term Management Plan P35

Business activities P41

The Takuma Group operates the following business segments:

- Domestic Environment and Energy Business
- Overseas Environment and Energy Business
- Package Boiler Business
- Equipment and Systems Business

Strengthening the management foundation P39

- Human resources
- Digital technologies
- Partnerships
- R&D (Manufacturing and engineering capabilities)
- Capital investment
- Compliance

Created Value

The environment

- Creating clean energy
- Reducing greenhouse gas emissions
- Reducing environmental impacts

Customers and regional society

- Protecting the environment in which we live through the construction and operation of safe, secure municipal solid waste treatment plants
- Maintaining regional and industrial infrastructure through the highly efficient and stable supply of energy
- Revitalizing the regional economy and strengthening resilience through the construction and operation of facilities

Shareholders

- Increasing corporate value

Business partners

- Building stable relationships of trust through fair and safe business transactions

Employees

- Realizing a workplace environment characterized by health, safety, high productivity, and high motivation

Takuma Group Vision

Realizing Takuma's Management Principles and Vision 2030 P29

Products / Services

- Engineering, procurement, construction, and commissioning of municipal solid waste treatment plants, water treatment plants and energy plants
- After-sales service for plants (operation management, maintenance)
- Power Retail Business
- General-purpose boilers such as compact once-through boilers and vacuum-type hot water heaters
- Air-conditioning, water, and wastewater equipment installation services
- Equipment for use in the semiconductor manufacturing industry such as clean devices and cleaning systems

FY2020 results

Net sales: JPY 146,726 million
 Ordinary profit: JPY 11,028 million
 Profit attributable to owners of parent: JPY 7,529 million
 ROE: 8.6% Dividends: JPY 36 per share P85
 (As of March 31, 2021)

Value Creation Process

The source of value creation

The Takuma Group's strengths include relationships of trust with customers as well as technology and expertise. These strengths are the source on which we draw to create value in society, and we leverage them throughout the value chain, starting with R&D and extending to sales activities, design, procurement and manufacturing, construction management, commissioning and after-sales service, and the Head Office functions that underpin those processes.

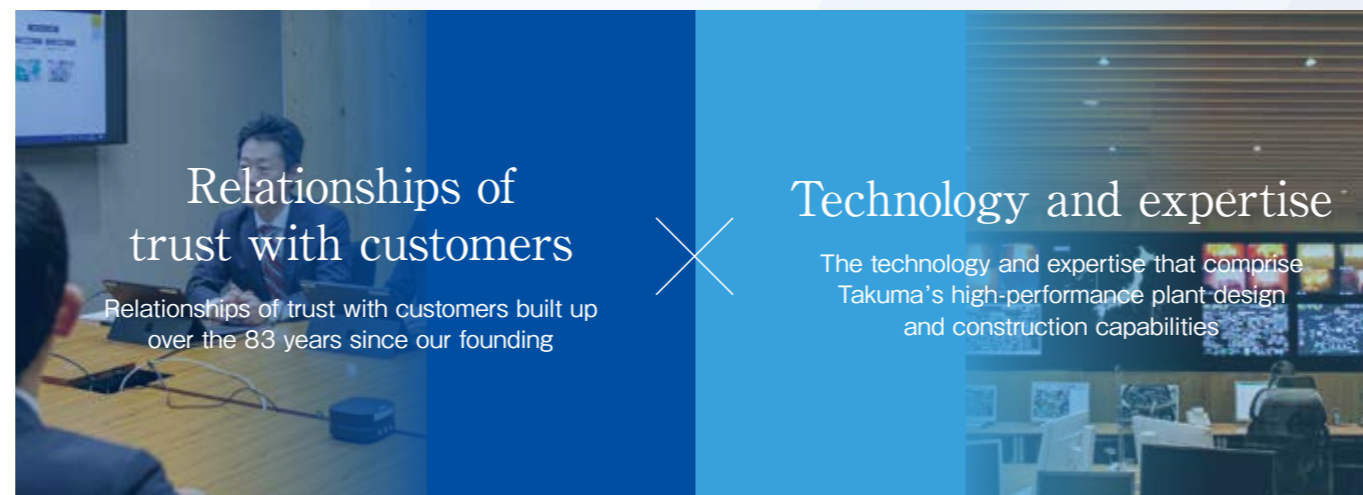
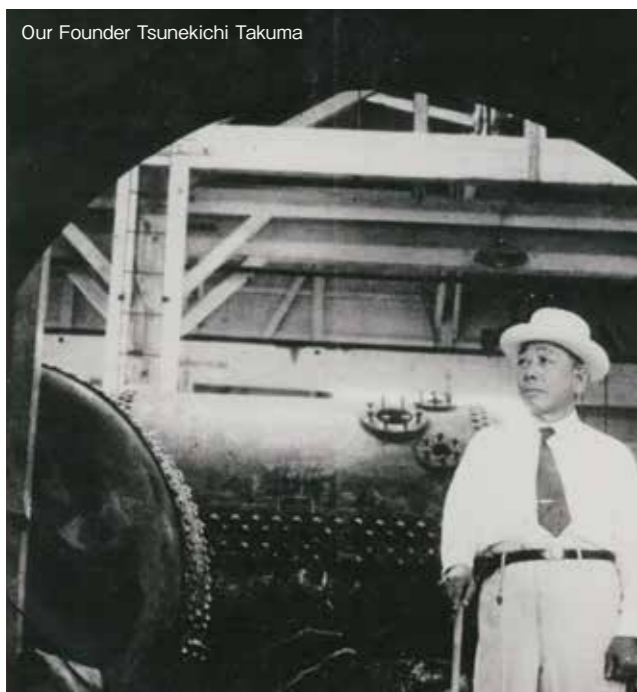
Motivated by a desire to solve issues facing customers, our founder Tsunekichi Takuma invented the TAKUMA boiler based on a unique design following a period of painstaking research, making a significant contribution to the development of Japanese industry through its performance that overwhelmed the foreign technologies that dominated the field at the time.

Over more than 80 years from its founding in 1938 until today, the Takuma Group has carried on its founding spirit of "Serve society through boiler manufacturing" by creating products that support society, including not only boilers, but also products such as waste incineration plants and water treatment plants that apply boiler combustion technology and water treatment technology, in response to the issues faced by customers and the needs exhibited by society over time, including the rebuilding of Japan's economy following World War II, the subsequent period of high economic growth, and efforts to deal with the pollution that accompanied those phases of the nation's history.

Through these products and the after-sales service offered for them, we have accumulated a variety of technology and expertise related to after-sales service and plant engineering around core combustion technologies developed through our boiler business while contributing to the development of society and helping solve issues faced by customers, including by working to increase the production capacity of customers' facilities, enhance society's environmental sanitation, and prevent pollution.

Today, we continue to provide optimal products and services that meet customers' needs by drawing on our philosophy of working closely with customers, and on these technologies to design and build plants that operate stably over the long term by burning a variety of fuels and waste types in a stable manner, and by offering after-sales service for those facilities.

Our Founder Tsunekichi Takuma



Relationships of trust with customers

Relationships of trust with customers built up over the 83 years since our founding

Technology and expertise

The technology and expertise that comprise Takuma's high-performance plant design and construction capabilities

- **Proposals crafted from the customer's perspective**
- **Engineering capabilities developed through many years of experience**
- **Custom-made designs based on manufacturing technologies and capabilities**
- **Fast, precisely-targeted after-sales service**
- **Use of these to supply plants that operate stably over the long term**

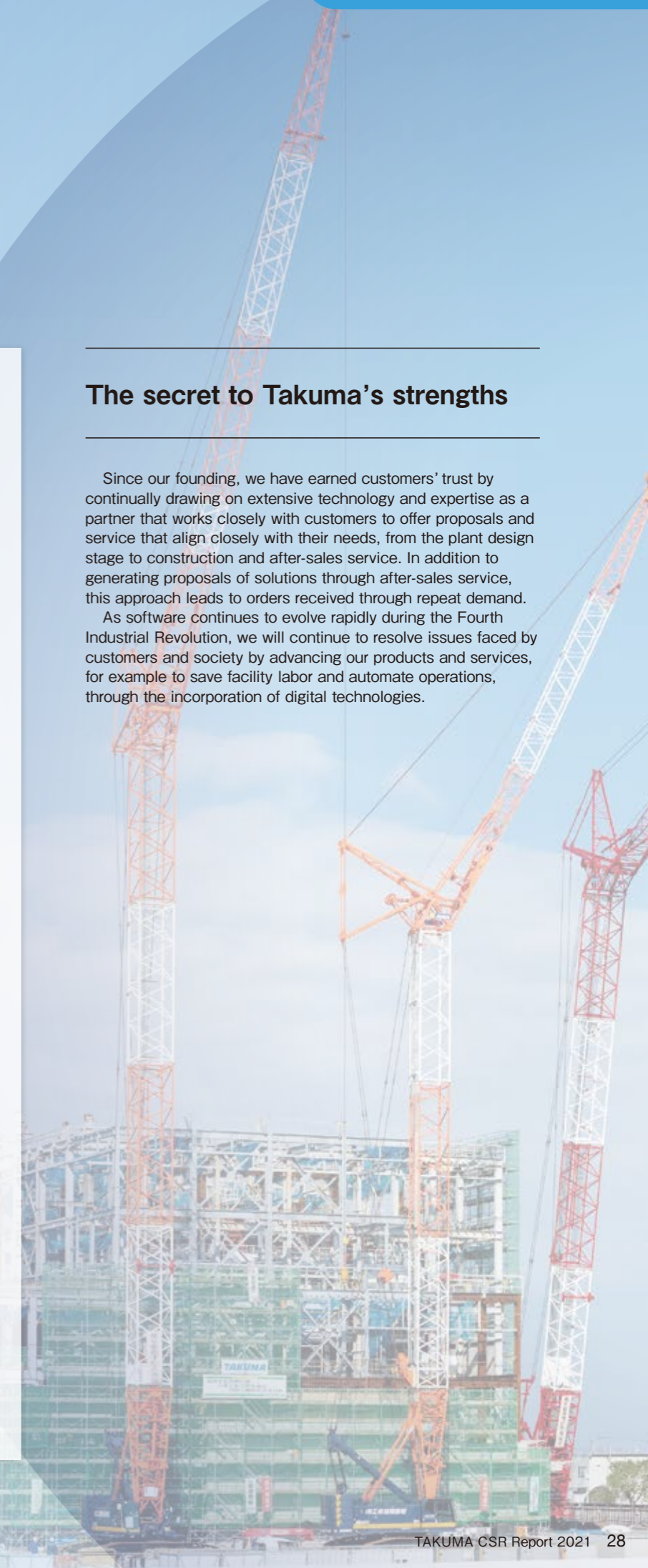
- **Combustion technologies for burning a variety of fuels and waste types, including not only biomass but also household waste and sewage sludge, in a stable manner, as developed around core boiler combustion technologies**
- **Heat recovery technologies for efficiently recovering heat as energy through boilers**
- **Water treatment technologies developed from improving supply water quality and purifying waste water for boilers and waste incineration plants**
- **Pollution-preventing technologies, for example to treat (or clean) flue gases**
- **Technology for manufacturing boilers that efficiently convert heat into steam, electrical power, and other forms of energy**
- **Plant and system engineering capabilities developed from boiler installation technologies and through after-sales service experience and expertise to take into account the entire life cycle, from construction to operation and maintenance**
- **Operation management and maintenance capabilities accumulated through after-sales service provided for a large number of plants**



The secret to Takuma's strengths

Since our founding, we have earned customers' trust by continually drawing on extensive technology and expertise as a partner that works closely with customers to offer proposals and service that align closely with their needs, from the plant design stage to construction and after-sales service. In addition to generating proposals of solutions through after-sales service, this approach leads to orders received through repeat demand.

As software continues to evolve rapidly during the Fourth Industrial Revolution, we will continue to resolve issues faced by customers and society by advancing our products and services, for example to save facility labor and automate operations, through the incorporation of digital technologies.



Vision 2030 Long-Term Vision

The Takuma Group's management strategy

The Takuma Group formulated Vision 2030 as its long-term vision for 2030.

To realize this vision, we are pursuing the necessary investments and business strategies.



Long-Term Vision

Vision 2030

Aim to maintain our role of being an indispensable presence in society as a leading company in the field of renewable energy utilization and environmental protection by realizing sustained growth alongside our customers and society through implementation of ESG management.

Financial target

FY2030 ordinary profit: **JPY 20.0 billion**

External environment outlook

Global-scale concerns include a worsening of the problem of climate change; deterioration in the sanitation environment due to rapid population growth and urbanization, particularly in emerging nations; and growth in energy demand. Concerns in Japan include falling internal demand caused by the shrinking and aging of Japan's population, shortages of human resources and future leaders, tight financial conditions, and aging infrastructure.

- | | |
|-------------------------|---|
| Global | <ul style="list-style-type: none"> ● Rising demand for resources, food, water, energy, and waste treatment as the planet's population grows ● Increasingly serious problem of climate change ● Progress of the Fourth Industrial Revolution and the digital transformation (DX) |
| Domestic (Japan) | <ul style="list-style-type: none"> ● Shortages of human resources and future leaders caused by the shrinking and aging of Japan's population; depopulation around large cities and in rural areas ● Tight financial conditions caused by declining tax revenues in the face of the shrinking population and the need to deal with natural disasters and infectious disease ● Contraction and streamlining of public services due to tight financial conditions; increasing reliance on private-sector companies ● Demolition, consolidation, effective use, and replacement of aging and underutilized infrastructure, houses, etc. |



Vision for FY2030

Based on these external environmental factors, the Takuma Group will implement Environment, Social, and Governance (ESG) management, an approach that consists of addressing key ESG-related issues in an effort to achieve sustained growth by resolving issues faced by customers and society through business activities.

In pursuing business activities built on a core of ESG management, we will strive to become a great partner for our customers by leveraging the technologies and expertise related to energy utilization and environmental protection that are the Group's strengths, along with the relationships of trust we have developed with customers over the long term through after-sales service and other interactions. Through the useful technologies and services created through innovation by the Group, which carries on the spirit of a tenacious inventor, we will resolve challenges faced by customers and society, with a focus on the fields of renewable energy utilization and environmental protection.

Through the implementation of ESG management in this manner we will seek to achieve sustained growth alongside our customers and society and realize a sustainable society while securing ordinary profit of JPY 20.0 billion as a yardstick of profitability.

Aim to maintain our role of being an indispensable presence in society as a leading company in the field of renewable energy utilization and environmental protection.



Sustainable growth by implementing ESG management

Realizing solutions to challenges faced by customers and society, with a focus on renewable energy utilization and environmental protection

Provision of technologies and services

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> ● Expanding clean energy ● Improving energy efficiency ● Capturing and effectively utilizing CO₂ ● Reducing power and manpower requirements of plant facilities while making them more resilient | <ul style="list-style-type: none"> ● Reducing greenhouse gas emissions ● Realizing stable treatment of waste ● Providing decarbonization technologies | <ul style="list-style-type: none"> ● Saving energy ● Utilizing unused resources ● Realizing local production and consumption of energy |
|--|--|---|

Takuma Group business activities

EPC business	Recurring revenue model businesses	Overseas businesses
Engineering, Procurement, and Construction (EPC) of a variety of plants Maintenance and expansion of position as a leading company	Maintenance, operation management, O&M, energy services, etc. Additional expansion as a core driver of growth	EPC and after-sales service for Energy from Waste plants and biomass power plants Expansion with a focus on emerging nations in Asia and its development into a core business for the Group
Package boiler business	Equipment and systems business	New businesses
Expanding business domain as a manufacturer specializing in heating systems	Aiming for steady growth by strengthening corporate strength	Creating new business opportunities centered on the renewable energy and environmental fields

Implementing ESG Management

We are implementing ESG management, which seeks to satisfy all stakeholders and realize sustained growth for the Group by strengthening initiatives that address ESG issues through our business activities.

In this approach, we have identified seven key issues (Materiality) related to ESG that deserve to be given priority when being addressed through our business activities.

To realize a sustainable society, we will create positive outcomes by addressing these issues through our business activities.



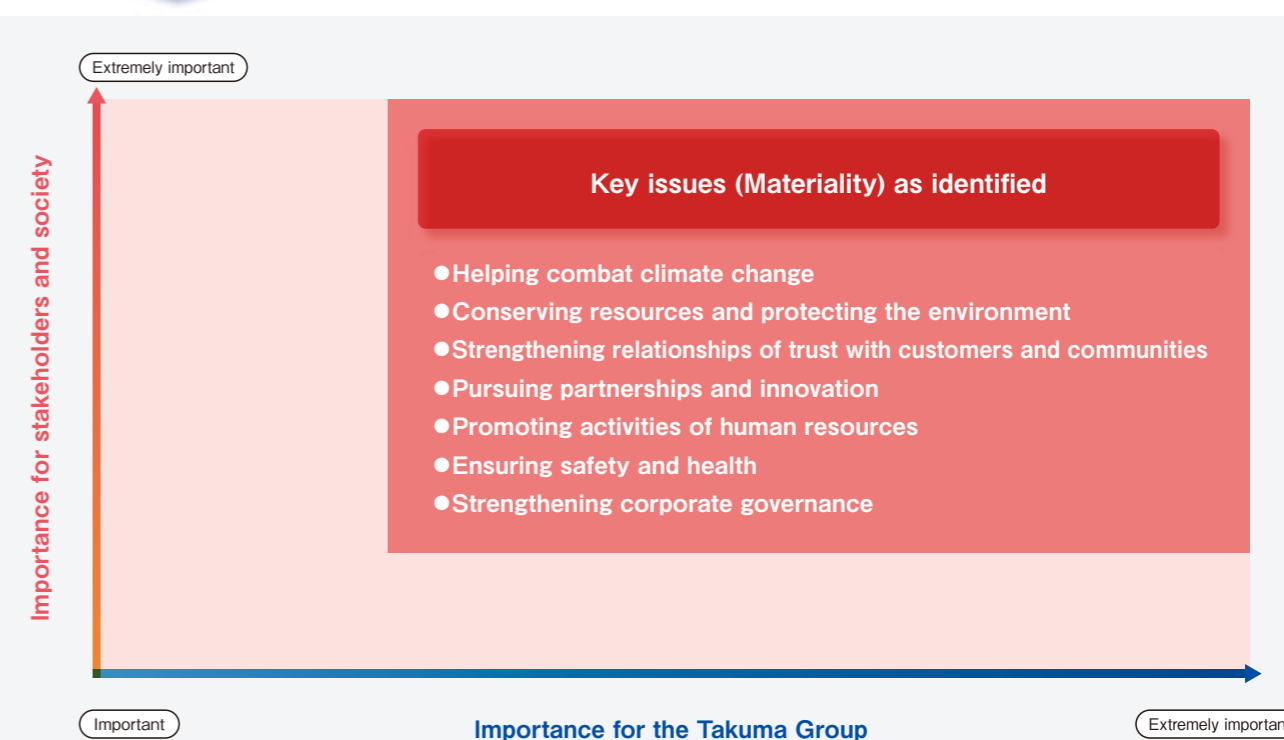
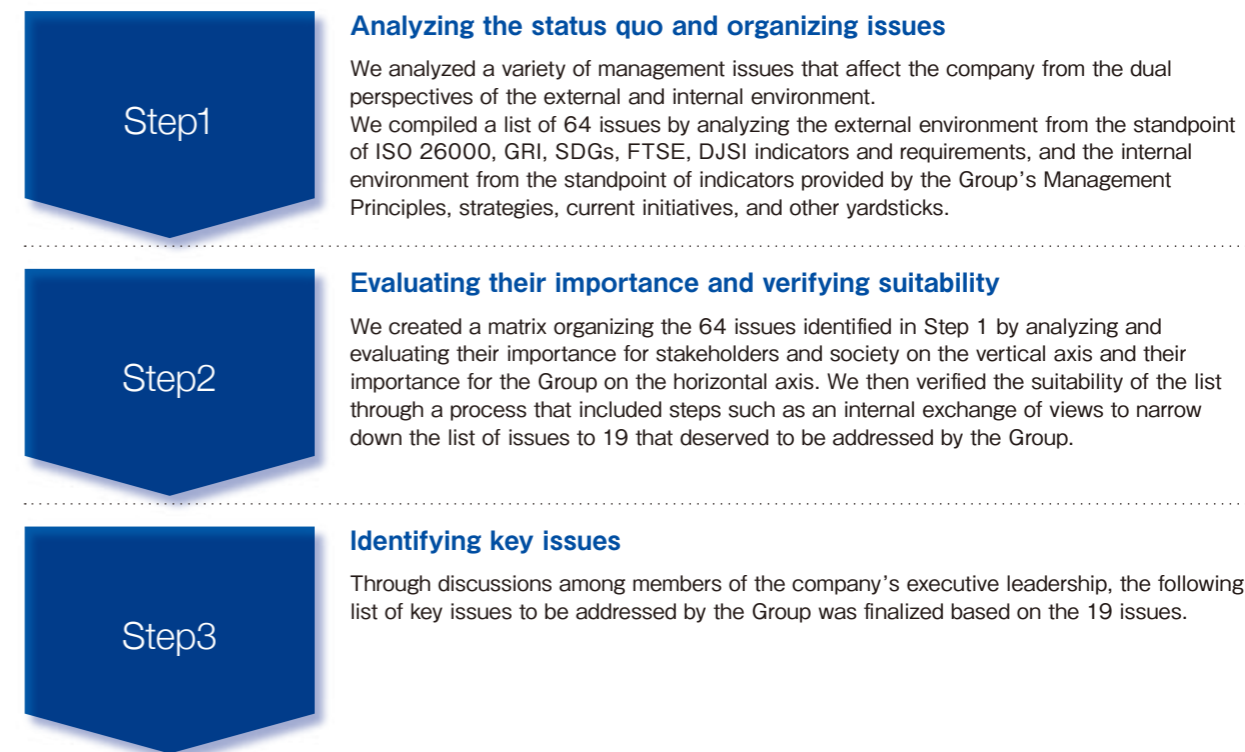
Key Issues (Materiality) for the Takuma Group

The Group has identified seven key issues (Materiality) and 19 issues that deserve to be given priority when being addressed through our business activities.

We are pursuing initiatives to strengthen our business activities and management foundation for each of these materialities and issues.

Process for identifying key issues

The following process was used to identify key issues.



Key Issues (Materiality) for the Takuma Group

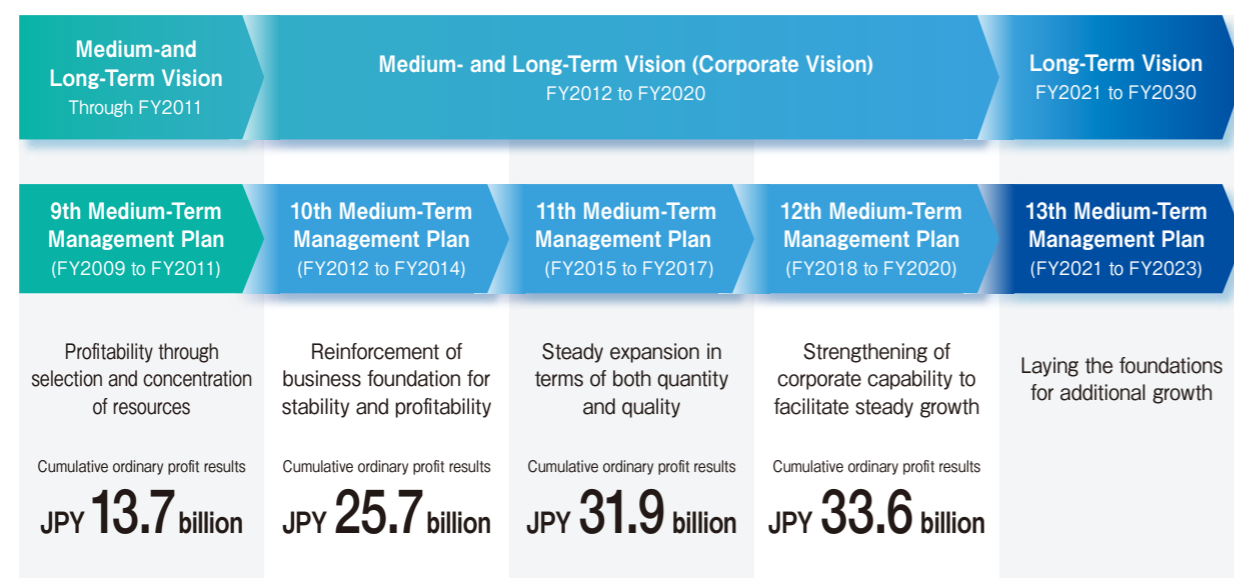
Materiality and KPI (Key Performance Indicator)

	Materiality	Detailed description	Issue	Reason for selection		Risks and opportunities	Specific initiatives	KPI
E Environmental initiatives	Helping combat climate change	P59	1. Promoting renewable energy (non-fossil energy) 2. Improving energy efficiency	We will help alleviate the global problem of climate change using the technology and expertise we have accumulated over more than 80 years.		[Risks] <ul style="list-style-type: none"> Accommodation of policies and regulations intended to realize a decarbonized society Changes in customer requirements, for example additional improvements in energy efficiency Reduction in support from policies, for example as a result of the review of the FIT program [Opportunities] <ul style="list-style-type: none"> Growth in the market for renewable energy and environmental businesses due to strengthening of environmental regulations Growth in energy usage demand for biomass (including waste, sewage sludge, and other resources) in order to alleviate climate change 	<ul style="list-style-type: none"> Supply of biomass power plants Supply of fuel conversion (biomass, RPF, etc.) boilers Supply of renewable energy and CO₂-free power Reduction in CO₂ emissions (energy consumption) by Takuma Improvement in energy efficiency at facilities Takuma operates on a contractual basis Proposal of energy efficiency improvements for customer facilities and equipment 	Magnitude of potential reduction in CO ₂ emissions due to newly delivered power plants* <ul style="list-style-type: none"> FY2023: 800,000 tons per year FY2030: 2.5 million tons per year *Biomass power plants and Energy from Waste plants delivered from FY2021 to FY2030
	Conserving resources and protecting the environment	P59	1. Conserving resources and reducing environmental impacts 2. Making effective use of unutilized resources	We will contribute to the effective use of unutilized resources and to the conservation of resources with Takuma technologies while helping make it possible to reduce environmental impacts and realize a Sound Material-Cycle Society.		[Risks] <ul style="list-style-type: none"> Reduction in domestic waste volume due to the shrinking of the population [Opportunities] <ul style="list-style-type: none"> Growth of appropriate treatment of waste and growth in demand for use of energy from waste in emerging nations Growth in expectations towards resource-saving and low-environmental-impact systems and the effective use of unutilized resources 	<ul style="list-style-type: none"> Supply of high-efficiency, low-environmental-impact Energy from Waste plants Supply of sewage sludge-fueled power plants Supply of advanced treatment sand filter systems Establishment of combustion technology for unutilized biomass Development of technology for reusing incineration ash Development of technology for recovering and using CO₂ 	
S Social initiatives	Strengthening relationships of trust with customers and communities	P65	1. Pursuing customer satisfaction 2. Ensuring the stable, continuous operation of plants and equipment 3. Recycling local resources and creating new value for communities	We will help resolve issues facing customers and communities and strengthen relationships of trust by providing safe, high-quality products and services and undertaking initiatives that address local resource recycling.		[Risks] <ul style="list-style-type: none"> Loss of trust in the event Takuma fails to provide safe, high-quality products and services Shrinking budgets of local governments [Opportunities] <ul style="list-style-type: none"> Growth in demand for biomass power generation as a type of energy that can be produced and consumed locally Growth in expectations toward the creation of new value for communities, for example through disaster prevention facilities and energy centers Additional growth in the use of private-sector entities to provide government services 	<ul style="list-style-type: none"> Supply of products and services that satisfy customers Improvements in the quality of Takuma's operation and O&M businesses Increasing sophistication of maintenance service Initiatives addressing the Regional Circular and Ecological Sphere (Regional CES), regional use, and decentralized power supplies Initiatives such as PPP that address additional use of private-sector entities 	
	Pursuing partnerships and innovation	P67	1. Utilizing digital technologies (AI, IoT, robots, etc.) 2. Developing open partnerships 3. Pursuing innovation	We will facilitate the supply of high-value-added products and services by introducing digital technologies and expanding partnerships with outside companies.		[Risks] <ul style="list-style-type: none"> Opportunity loss due to lag in accommodating new technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) [Opportunities] <ul style="list-style-type: none"> Growth in demand for efficiency-boosting and labor-saving technologies in plant operation (remote monitoring and operation, data analysis, maximization of amount of power sold, etc.) Creation of revolutionary technologies and services as well as new business opportunities through the expansion of partnerships 	<ul style="list-style-type: none"> Increases in the added value of facilities and plants Strengthening of competitiveness in EPC operations, operation management, and maintenance service Pursuit of open innovation Pursuit of new businesses that contribute to the enhancement of existing businesses and services Development of technologies and products that are sought by society and customers 	Number of main career track and management positions filled by women: At least 35 (cumulative total for FY2021 to FY2025)
	Promoting activities of human resources	P69	1. Securing, and training human resources 2. Promoting diversity 3. Improving employee satisfaction	Putting in place an environment in which all employees can make the most of their abilities is essential in order to facilitate the company's growth and strengthen its competitiveness.		[Risks] <ul style="list-style-type: none"> Reduction in competitiveness due to a shortage of employees with specialized skills Discontinuity in the passing down of skills as highly experienced employees reach retirement age and leave the workforce [Opportunities] <ul style="list-style-type: none"> Strengthening of competitiveness through human resources development and management that promotes diversity 	<ul style="list-style-type: none"> Hiring of new graduates and mid-career employees Development of optimal human resources programs in response to social changes Development of an effective training system Active hiring of diverse human resources and development of career support programs 	Utilization of parenting support programs: At least 25% (average for FY2021 to FY2025)
	Ensuring safety and health	P71	1. Ensuring occupational safety and health 2. Managing employee health 3. Creating a comfortable working environment	Safeguarding the physical and mental health of workers and building a comfortable working environment helps create a stable foundation for Takuma's value creation activities.		[Risks] <ul style="list-style-type: none"> Reduction in productivity and social trust due to problems involving the safety and health of employees and affiliates (loss of order opportunities due to the occurrence of serious occupational accidents, etc.) [Opportunities] <ul style="list-style-type: none"> Improvement in productivity and strengthening of competitiveness through improvements in the workplace labor environment 	<ul style="list-style-type: none"> Reduction in the occurrence of occupational accidents Prevention of health problems and rectification of overwork Implementation of workstyle reforms 	Number of fatal accidents: 0
G Governance initiatives	Strengthening corporate governance	P73	1. Strengthening corporate governance 2. Strengthening risk management 3. Ensuring compliance	Strengthening corporate governance both supports companies' stable growth and helps avoid and reduce losses and other adverse events by making possible the organizational management of risk.		[Risks] <ul style="list-style-type: none"> Reduction in business sustainability due to a lack of appropriate decision-making Cessation of business due to violations of competition or environmental law or regulations on conduct such as corruption, and associated reduction in social trust [Opportunities] <ul style="list-style-type: none"> Improvement in the ability to create value along with avoidance and reduction of risk as a result of strengthened corporate governance 	<ul style="list-style-type: none"> Sustained improvement through practices such as evaluations of the effectiveness of the Board of Directors Continued conduct of appropriate internal audits Additional improvement in the effectiveness of risk management activities Even more thorough project risk management Implementation and ongoing reassessment of Business Continuity Planning (BCP) Ongoing implementation of compliance education 	Number of serious compliance violations: 0

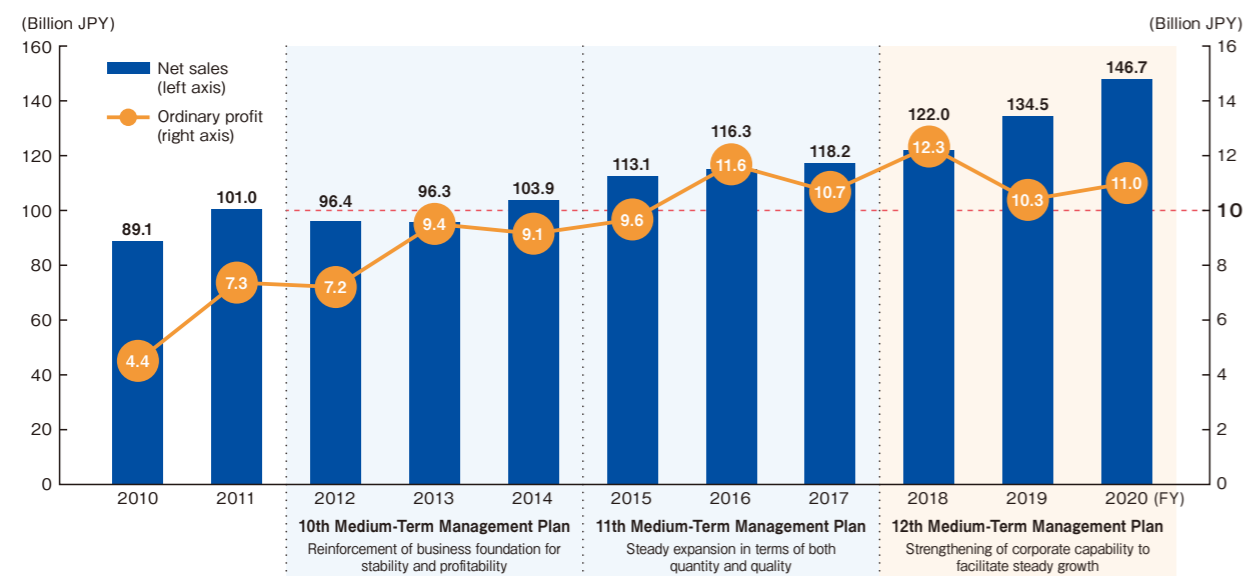
Medium-Term Management Plan

Corporate Vision (FY2012 to FY2020) and Medium-Term Management Plans to date

The Takuma Group worked to build business structures capable of consistently earning ordinary profit of at least JPY 10.0 billion even as the business environment underwent major changes under the 10th to 12th Medium-Term Management Plans in an effort to realize its Corporate Vision of "aiming to maintain our role of being an indispensable presence in society as a leading company in the field of renewable energy utilization and environmental protection" and of achieving an ordinary profit of JPY 10.0 billion in FY2020.



Building structures capable of consistently earning ordinary profit of at least JPY 10.0 billion even as the business environment undergoes major changes



Summary of the 12th Medium-Term Management Plan (FY2018 to FY2020)

As the final stage of our Corporate Vision, we implemented business strategies based on a set of basic policies and priority measures in an effort to achieve cumulative ordinary profit of JPY 33.0 billion over three years by building a resilient business and management foundation that enables Takuma to respond to future changes in the business environment. In terms of ordinary profit, we were able to achieve the targets set forth in the Corporate Vision and Medium-Term Management Plans to earn at least JPY 10.0 billion starting in FY2016, JPY 11.0 billion in FY2020, and a cumulative total of JPY 33.6 billion under the 12th Medium-Term Management Plan from FY2018 to FY2020.

Positioning of the 12th Medium-Term Management Plan

- Final stage of the Corporate Vision that was launched in FY2012
- Strive to achieve cumulative consolidated-basis ordinary profit of JPY 33.0 billion over three years by building a resilient business and management foundation that enables Takuma to respond to future changes in the business environment.

Results and issues

- Strengthening and expanding our revenue foundation**
 - Orders increased as we proposed solutions based on customers' needs through recurring revenue model businesses (equipment improvements and service life extensions).
 - Progress made in initiatives designed to reduce Life Cycle Costs (LCC), for example by using POCYSYS[®] P42.
 - Received multiple orders in our O&M business, including from the private-sector for the first time, in our Energy Plant Business; began operations and broadened the range of services we offer.
 - Firm orders secured for package boilers as well as equipment and systems helped to contribute to stable consolidated-basis profits.
- Achieving sustained growth**
 - In the EPC business, we maintained our market position thanks to steady or increasing orders for domestic waste treatment and energy facilities.
 - Initiatives to maintain our position in sludge incineration and expand the overseas business are ongoing.
 - Progress in efforts to refine core technologies and development of proprietary technologies has generally been smooth.
- Increasing productivity, for example by reforming business processes**
 - Initiatives to improve productivity, for example by utilizing Information and Communications Technologies (ICT), have delivered results but remain ongoing.
- Promoting activities of human resources**
 - The workforce situation remains tight despite significant expansion in the number of hires as we work to secure the necessary human resources.
- Continuing to pursue compliance management**
 - Awareness of the importance of compliance has permeated the Group thanks to ongoing educational activities. Developing even more effective measures remains an issue.

Financial targets and results under previous medium- and long-term vision and the 12th Medium-Term Management Plan

- Previous medium- and long-term vision:
FY2020 ordinary profit Target JPY 10.0 billion → Result **JPY 11.0 billion**
- 12th Medium-Term Management Plan:
Cumulative three-year ordinary profit Target JPY 33.0 billion → Result **JPY 33.6 billion**

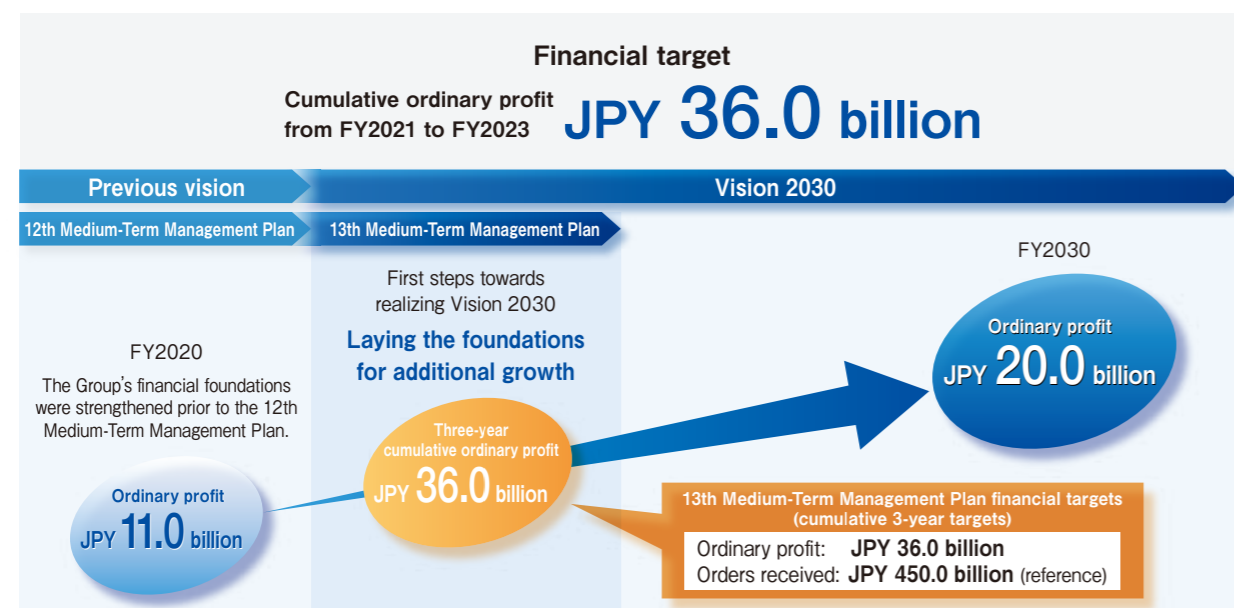
Medium-Term Management Plan

13th Medium-Term Management Plan (FY2021 to FY2023)

We will develop measures to fuel additional growth as a plan for taking the first steps towards realizing the financial target of ordinary profit of JPY 20.0 billion as set forth in Vision 2030. Specifically, we will work to earn cumulative ordinary profit of JPY 36.0 billion over three years while strengthening conventional businesses and accommodating future environmental changes in every area of our business activities by strengthening six core areas of our management, including investments in human resources and digital technology.

Positioning

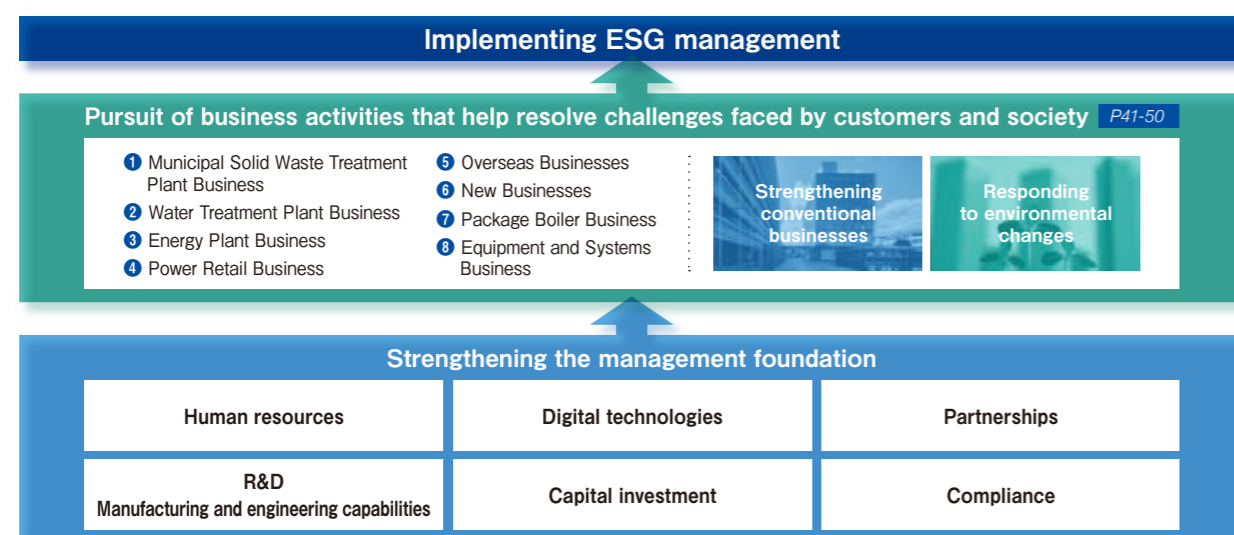
Lay the foundations for additional growth and take the first steps under the 13th Medium-Term Management Plan as we prepare to realize the Vision 2030 target of ordinary profit of JPY 20.0 billion.



Basic policy

Strengthening conventional businesses by reinforcing the Group's management foundation and at the same time accelerating its response to future environmental changes

Striving to realize sustainable growth alongside customers and society by implementing ESG management through these business activities



On implementing the 13th Medium-Term Management Plan

Hideki Takeguchi
Director & Senior Managing Executive Officer
Executive Manager of Engineering Group

Tsuyohito Nishiyama
Director & Senior Managing Executive Officer
Executive Manager of Corporate Marketing Group



Plan positioning and business strategy towards implementation

Based on the results and issues of the 12th Medium-Term Management Plan, the 13th Medium-Term Management Plan seeks to lay the foundations for additional growth while securing cumulative ordinary profit of JPY 36.0 billion over its three-year period as the first step towards realizing the target of ordinary profit of JPY 20.0 billion as set forth in Vision 2030. To achieve these targets, we will steadily earn and carry out EPC projects with a focus on our

flagship businesses, the Municipal Solid Waste Treatment Plant Business, Energy Plant Business, and Water Treatment Plant Business, while expanding after-sales service such as operation management and maintenance of facilities and equipment delivered across all of our businesses (recurring revenue model businesses). We will also work to maintain and expand the Package Boiler Business and the Equipment and Systems Business. Additionally, we will pursue initiatives with goals such as expanding the Power Retail Business, studying new businesses, and growing overseas businesses as the foundation for realizing Vision 2030, and we will strengthen our management foundation through initiatives including hiring and training the human resources who will be necessary in order to pursue the Group's business strategies, pursuing a range of partnerships as well as R&D, embracing digitalization, and updating the Harima Factory.

Implementing ESG management to ensure sustained growth

With a focus on evaluating companies from a non-financial standpoint, ESG provides a set of indicators for measuring how well a company is working to resolve social issues through its business activities. We believe that sustained growth can be realized

by actively pursuing ESG.

The Group has worked throughout its history to resolve social issues such as climate change and environmental protection through its business activities, for example by supplying municipal solid waste treatment plants and biomass power plants, and this approach aligns with the ESG management approach. The new Medium-Term Management Plan identifies the Takuma Group Materiality that deserve to be addressed on a priority basis through our business activities and establishes Key Performance Indicators (KPI) in order to clarify these initiatives. We will strive to achieve sustained growth by continuing to address materialities that help resolve social issues through business activities that resolve customers' issues and implementing ESG management.

Conclusion

In addition to further developing an approach to ESG management that has already taken root at Takuma in order to achieve the targets set forth in the 13th Medium-Term Management Plan and, on a longer-term basis, in Vision 2030, we will further enhance and expand recurring revenue model businesses by treating them as drivers of the Takuma Group's growth in order to realize stable operation of facilities over the next 20 to 30 years. At the same time, we will work to maintain and expand our position as a leading company in the Engineering, Procurement, and Construction (EPC) business.

In this way, the Group will come together to implement the 13th Medium-Term Management Plan and create a bright future by growing in a sustained manner alongside its customers and society.



Medium-Term Management Plan

Strengthening the management foundation

We will work to strengthen the following six core areas of our management by allocating and investing management resources to steadily implement our business strategies.

Human resources

In addition to systematically hiring and training the human resources who will be necessary in order to maintain and expand the Group's business activities and to accommodate the changing times, we will strive to strengthen the Group's competitiveness and realize additional growth through initiatives in areas such as promoting diverse workstyles and fostering employee health.



Digital technologies

In addition to providing continuous remote monitoring and operational support for customer plants through our Solution Lab, we are implementing initiatives to realize stable, efficient plant management by utilizing "big data" from plants through our POCSSYS® Plant Optimization Comprehensive Support System. Going forward, we will strive to realize additional growth for the Group by working to improve plant added value and strengthen competitiveness in EPC as well as after-sales service through the use of digital technologies such as Artificial Intelligence (AI) and Information and Communications Technologies (ICT).



Corresponding principal Materiality and issues

- Promoting diversity
- Managing employee health

Theme 1 Strengthening recruiting activities and reviewing employment systems

- Systematically hiring new graduates and mid-career employees
- Reviewing programs to make use of older workers and to hire specialized workers

Theme 2 Reviewing the human resources development system

- Implementing career development support measures such as job rotation programs to help train engineers and other personnel, programs to follow up on the development of young workers, etc.

Theme 3 Pursuing workstyle reforms and enhancing the workplace environment

- Examining a diverse range of workstyles that allow workers to do their jobs without regard to time or place
- Implementing health-focused management

Corresponding principal Materiality and issues

- Ensuring the stable, continuous operation of plants and equipment
- Using digital technologies

Theme 1 Bringing digital technologies to products and services

- Rolling out digital technologies to reduce manpower requirements and streamline operations at plants, improve maintainability and functionality, and realize more stable operations

Theme 2 Improving management efficiency

- Implementing paperless workflows and Robotic Process Automation (RPA)
- Sharing knowledge and expertise on a companywide basis



Partnerships

The Takuma Group is pursuing a partnership-based initiative to operate municipal solid waste treatment plants, which play a role as disaster prevention facilities. As the Regional Circular and Ecological Sphere (Regional CES)* and activities to realize carbon neutrality by 2050 gather momentum, we will continue to pursue initiatives to create new value in communities while making use of partnerships with outside companies and organizations.

*An approach that seeks to make the most of regional energy through mutual support and the supplementation of resources in line with regional characteristics while facilitating the formation of autonomous, decentralized communities and making maximum use of regional resources like beautiful natural landscapes (source: website of the Ministry of the Environment)

R&D, manufacturing, and engineering capabilities

In addition to enhancing our technologies in plant-related fields, we will strengthen our business competitiveness through further improvements to the safety and quality of products and services supplied by the Group.



Capital investment

In implementing our plan for the new Harima Factory, we will strive to realize a sustainable plant that is effectively CO₂ emission-free while further increasing productivity and quality.



(Artist's conception of new Harima Factory)
Tentative completion: December 2022
Total investment: approximately JPY 13.0 billion

Compliance

We will continue to promote compliance as a key foundation that sustains corporate activities through ongoing compliance education and other programs while working to realize further improvements in the effectiveness of our risk management activities.

Corresponding principal Materiality and issues

- Making effective use of unutilized resources
- Recycling local resources and creating new value for communities
- Developing open partnerships

Theme Creating new value through alliances

- Pursuing robust partnerships with non-group companies and other stakeholders in a variety of contexts

Corresponding principal Materiality and issues

- Pursuing innovation
- Pursuing customer satisfaction
- Ensuring occupational safety and health

Theme 1 Strengthening R&D

- Creating products and services required in this new era by utilizing open innovation

Theme 2 Strengthening manufacturing and engineering capabilities

- Refining and improving the quality of core technologies, the overall plant, and main equipment
- Increasing intrinsic safety in design and installation, and preventing occupational accidents

Corresponding principal Materiality and issues

- Improving energy efficiency
- Pursuing customer satisfaction

Theme Pursuing plans for the new Harima Factory

- Developing a sustainable plan that aims to achieve effectively zero CO₂ emissions
- Improving boiler manufacturing capabilities (quality and efficiency)
- Examining ways to utilize the Supply Chain Lab [P42](#)

Corresponding principal Materiality and issues

- Strengthening corporate governance

Theme Increasing the effectiveness of compliance and risk management

- Improving and enhancing educational programs
- Continuing and improving risk management activities [P81](#)

Domestic Environment and Energy Business

Municipal Solid Waste Treatment Plant Business



1 Business Summary

We provide solutions that extend throughout the plant life cycle, from construction (EPC) of municipal solid waste treatment plants for local governments to maintenance, primary equipment improvement and service life extension, operation management, and operation (O&M).

Principle products

- Waste incineration plants, biogas recovery plants, recycling plants, etc.



2 Strengths

Since delivering Japan's first fully continuous mechanical waste incineration plant in 1963, Takuma has supplied more than 360 municipal solid waste treatment plants, more than any other manufacturer in Japan. In addition to supplying products and services that meet regional needs based on the technology and expertise that we have accumulated through a long series of improvements across more than half a century, we are working to further increase the value we provide by incorporating leading-edge technologies like Artificial Intelligence (AI) and the Internet of Things (IoT).

Our achievements (cumulative deliveries to local governments)

- Waste incineration plants over 360 facilities
- Recycling plants over 90 facilities
- Biogas recovery plants 2 facilities

3 Market Environment

Some 1,000 facilities in Japan incinerate about 170,000 tons of waste per day, and those plants are aging, with more than 60% of them having been operating for at least 20 years. With many facilities built during the 1990s to address the problem of dioxin emissions reaching the point in their service lives at which they need to be updated, we expect to see strong replacement and service life extension demand continue for the time being.

Use of the O&M business, which comprises a comprehensive contract for facility operation management and maintenance, and DBO arrangements, which comprise orders for both facility construction and operation (O&M), is growing from the standpoint of taking advantage of private-sector expertise. At the same time, facilities are expected to provide functionality that creates new value for their region, for example by serving as regional disaster prevention facilities or energy centers, rather than simply treating waste.

Furthermore, as society works to realize carbon neutrality by 2050, we expect to see more sophisticated use of waste to generate electricity and heat along with growing demand for biogas recovery (methane fermentation) plants and combined systems that pair incineration with methane fermentation and other technologies.

4 Initiatives

Strengthening conventional businesses

- Improving quality and strengthening profitability in the plant operation business and after-sales service business
- Maximizing profitability by extending the service life of existing facilities
- Ensuring a sustained flow of orders by creating customer value

Responding to environmental changes

- Developing structures that will allow us to provide new services, for example additional use of private-sector partners and Regional Circular and Ecological Sphere (Regional CES) businesses

Currently, about 120 of the municipal solid waste treatment plants we have delivered continue to operate, and we are supporting safe, stable, and appropriate waste treatment in their regions through after-sales service including regular maintenance, functional improvements, service life extension work, and operation management.

In an effort to enhance its after-sales service offerings, the Takuma Group began offering remote support service for customer plants in 2004, and in 2016 we launched the POCOSYS[®] Plant Optimization Comprehensive Support System, which dramatically enhanced that functionality. Then in 2019, we opened the Solution Lab as a remote monitoring and operation support facility. In addition to supplying safe, secure, and stable plant operation to customers through 24-hour operational support, we are helping streamline plant operation, for example to increase the amount of power sold and reduce chemical consumption, by analyzing, visualizing, and otherwise utilizing operating data. Furthermore, we plan to launch the Supply Chain Lab, an after-sales service facility, in December 2022, and we will work to realize additional quality and profitability improvements in after-sales service by effectively utilizing these resources.

Going forward, municipal solid waste treatment plants will be called upon to create new value in order to resolve regional issues, for example by promoting the recovery and use of waste energy, serving as disaster prevention and energy facilities, and revitalizing regional economies as part of the effort to realize a decarbonized society and Regional Circular and Ecological Sphere (Regional CES) (local SDGs).

In addition to promoting power and labor savings in plant operation through the use of digital technologies while working to realize more efficient energy recovery through the refinement of combustion technology and energy recovery technology, which are core Takuma technologies, as well as use of Artificial Intelligence (AI) and the Internet of Things (IoT), we will help resolve regional issues by creating new value through the expansion of our Power Retail Business and through partnerships with various companies and organizations.

Materiality

- Helping combat climate change
- Conserving resources and protecting the environment
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation

Water Treatment Plant Business



1 Business Summary

In addition to construction (EPC) and maintenance of water treatment and sludge incineration plants, particularly for sewage treatment plants run by local governments, we supply operation management and other services.

Principle products

- Sewage sludge-fueled power plants, moving-bed sand filtration systems (Uniflow Sand Filter), etc.



2 Strengths

Since entering the water treatment field in 1962, we have accumulated technology and expertise by supplying water treatment plants and sludge incineration plants in a variety of fields, including sewage, human waste, and industrial wastewater. In recent years, we have been particularly focused on the sewage treatment field, and we are helping resolve customers' issues with unique technologies like an energy-saving and energy-creating sludge-fueled power generation system featuring low emissions of the greenhouse gas N₂O and moving-bed sand filtration systems (Uniflow Sand Filter), of which we have delivered about 2,700 units since 1979.

Our achievements (to date)

- Moving-bed sand filtration systems (Uniflow Sand Filter)..... over 2,700 units
- Sewage sludge incineration plants..... over 20 facilities

3 Market Environment

There are some 2,200 sewage treatment plants in Japan, and those facilities are aging, with more than 80% having been operating for at least 15 years.

Additionally, as we work to realize a decarbonized society, there is growing need to reduce greenhouse gases in sewage treatment and to utilize sewage sludge, a type of biomass, as a form of renewable energy.

At the same time, we expect utilization of the private sector through arrangements such as Public Private Partnerships (PPPs) and Private Finance Initiatives (PFIs) to increase in the future due to the challenging management environment in which sewage projects run by local governments must operate.

4 Initiatives



Strengthening conventional businesses

- Ensuring a sustained flow of orders for sludge incineration plants
- Expanding the after-sales service business
- Accommodating replacement demand from existing facilities



Responding to environmental changes

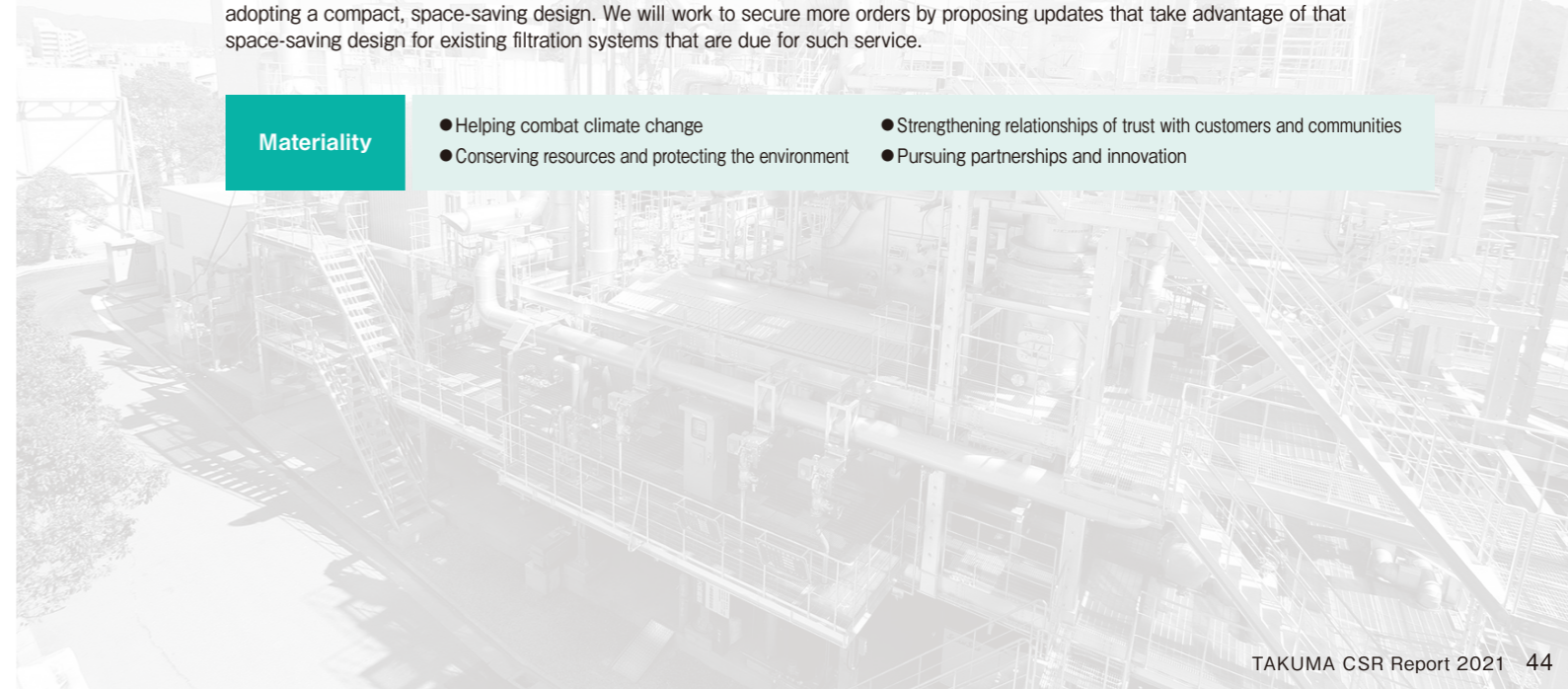
- Developing structures that will allow us to accept long-term comprehensive contracts

The sludge-fueled power generation system we developed differs from conventional incinerators in that it does not require auxiliary fuel, and it excels in terms of environmental performance thanks to its low emissions of the greenhouse gas N₂O, an issue affecting incineration treatment of sewage sludge. Moreover, the system is capable of generating electricity, and its low consumption of power offers excellent energy-saving performance. We have received orders for three plants using this system to date, and we will help reduce greenhouse gas emissions in sewage treatment by continuing to earn more orders in the future.

Additionally, we have delivered numerous high-speed sand filtration systems that boost filtration speed by a factor of two to three while adopting a compact, space-saving design. We will work to secure more orders by proposing updates that take advantage of that space-saving design for existing filtration systems that are due for such service.

Materiality

- Helping combat climate change
- Conserving resources and protecting the environment
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation



Energy Plant Business



1 Business Summary

In addition to construction (EPC) and maintenance of energy plants for private-sector operators, we offer operation (O&M) and other services.

Principle products

- Biomass power and heat-use plants, RPF power and heat-use plants, industrial waste treatment plants, etc.



2 Strengths

Since our founding in 1938, we have manufactured an array of boilers for industrial, power, marine, and other applications, and we have delivered more than 3,200 boilers throughout Japan and around the world. Over the course of our long history, we have helped reduce and eliminate dependence on carbon on the part of customers and society through the supply of plants that recover energy from a variety of biomass and non-fossil fuels such as wood, poultry manure, and RPF based on proprietary combustion and heat recovery technologies that we have improved and evolved together with customers.

Our achievements (to date)

- Boilers over 3,200 units
Of which, biomass boilers..... over 630 units
- Industrial waste treatment plants over 120 facilities

3 Market Environment

Since Japan's 2012 launch of its Feed-In Tariff (FIT) program, which imposes fixed pricing on purchases of renewable energy, demand for biomass power plants has grown rapidly. Takuma, which has long manufactured biomass boilers, has delivered more than 40 biomass power and heat-use plants (including facilities that do not take advantage of the FIT program) since 2014, when it delivered its first FIT boiler. That said, as the FIT program is reviewed, we expect demand to shift towards small and medium-size biomass power and heat-use plants as a way to implement regional-use power supplies and regional decentralized energy.

Additionally, many industrial boilers that use fossil fuels such as coal and heavy fuel oil, which are common in plant applications, are due to be updated, and we expect that the level of need for conversions to non-fossil fuels such as biomass and RPF will grow as society works to reduce and eliminate dependence on carbon.

4 Initiatives



Strengthening conventional businesses

- Expanding our market presence through steady orders for biomass power plants
- Expanding our business through further promotion of proposals for after-sales service business



Responding to environmental changes

- Capturing demand for fuel conversions in industrial boilers

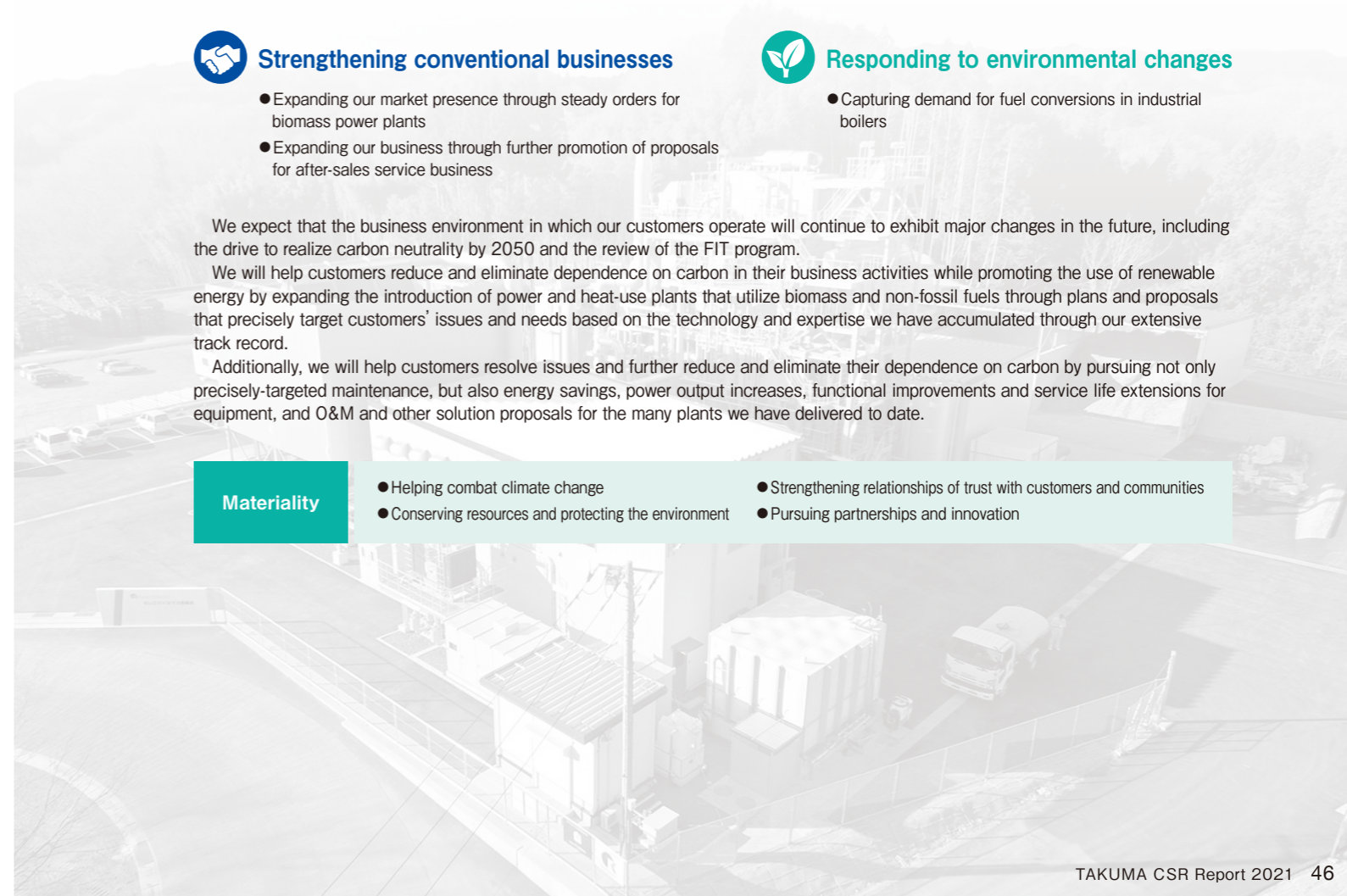
We expect that the business environment in which our customers operate will continue to exhibit major changes in the future, including the drive to realize carbon neutrality by 2050 and the review of the FIT program.

We will help customers reduce and eliminate dependence on carbon in their business activities while promoting the use of renewable energy by expanding the introduction of power and heat-use plants that utilize biomass and non-fossil fuels through plans and proposals that precisely target customers' issues and needs based on the technology and expertise we have accumulated through our extensive track record.

Additionally, we will help customers resolve issues and further reduce and eliminate their dependence on carbon by pursuing not only precisely-targeted maintenance, but also energy savings, power output increases, functional improvements and service life extensions for equipment, and O&M and other solution proposals for the many plants we have delivered to date.

Materiality

- Helping combat climate change
- Conserving resources and protecting the environment
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation



Business Strategies

Power Retail Business



1 Business Summary

Takuma Energy Co., Ltd., a Group company, operates the Power Retail Business, which draws on power generated by municipal solid waste treatment plants and biomass power plants that Takuma has delivered as its principal sources of power.

2 Strengths

Takuma Energy Co., Ltd., which was established in August 2015 to supply services that increase the amount of value added by plants delivered by Takuma through the purchase and supply of power, operates the Power Retail Business.

The company is helping promote renewable energy power with a regional character in a way that takes advantage of the relationships that link Takuma's customers and Group companies, for example by operating a business that facilitates the local production and consumption of power by supplying power generated by municipal solid waste treatment plants and biomass power plants to public facilities and other regional energy users in four regions.

Our achievements in local production and consumption of power

- Hokutan region, Hyogo Prefecture Starting in August 2016
- Fujisawa, Kanagawa Prefecture April 2017 to March 2021
- Kizugawa, Kyoto Prefecture Starting in April 2018
- Kasaoka, Okayama Prefecture Starting in April 2019



3 Market Environment

The need for decentralized energy as well as the local production and consumption of power is growing from the perspective of securing energy supplies in times of emergency, utilizing energy efficiently, and revitalizing regions. We expect the importance of power and energy services in the Group's business domain to grow in the future, for example in the development of the Regional Circular and Ecological Sphere (Regional CES) in waste treatment and in regional-use power supplies in the FIT program.

Additionally, the level of need for renewable energy and CO₂-free power that have environmental value is growing from the perspective of reducing and eliminating dependence on carbon in business activities. The market is expected to grow further as society works to realize carbon neutrality by 2050.

4 Initiatives

Strengthening conventional businesses

- Expanding the scale of the business by enhancing products in areas such as renewable energy and CO₂-free power and developing new sales channels
- Realizing additional expansion in the local production and consumption of power

Responding to environmental changes

- Examining expansion of our service menu to provide the power demanded by communities and customers

In addition to working to expand our sales menu, for example with renewable energy power and CO₂-free power, we will seek to further expand our business involving the local production and consumption of power through region-optimized schemes that maximize use of environmental value and producing region value, with a focus on plants that Takuma has delivered. We will also work to expand our line of services designed to resolve regional issues through partnerships with a variety of companies.

Materiality

- Helping combat climate change
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation

Overseas Environment and Energy Business



Overseas Businesses

1 Business Summary

We supply construction and maintenance services for biomass power plants and Energy from Waste plants with a focus on Thailand and Taiwan, where we have local subsidiaries.

Principle products

- Biomass power plants,
- Energy from Waste plants



2 Strengths

Since delivering a bagasse fired boiler (bagasse: fiber remaining after sugarcane is crushed) to a customer in Taiwan in 1949, we have delivered more than 380 biomass boilers overseas, primarily to customers in Southeast Asia. Approximately 120 of those boilers were delivered in Thailand, primarily to sugar mills, highlighting how we have contributed to the development of the country's sugar industry.

We have also delivered a total of 16 waste treatment plants to customers in Taiwan, China, South Korea, and the UK since delivering our first such plant overseas in the U.S. in 1986.

3 Market Environment

Although we expect to continue to see a certain level of demand for bagasse-fired biomass power plants in Thailand, competition with Indian and Chinese manufacturers remains intense. At the same time, the Thai government has announced a policy of promoting biomass power generation, and demand, including for biomass other than bagasse, is expected to grow.

On the other hand, Energy from Waste projects in the emerging nations of Southeast Asia are often derailed for reasons such as a lack of programs and standards related to waste treatment and insufficient government funding, and a stable market has not yet developed. That said, the level of need for waste-fueled power generation is rising significantly due to population growth and urbanization, and we expect the sector to remain a growth market over the medium and long term.

4 Initiatives

Strengthening conventional businesses

- Ensuring a sustained flow of orders for biomass power plants
- Expanding the flow of orders for maintenance

Responding to environmental changes

- Capturing orders for Energy from Waste plants and developing associated structures
- Implementing global procurement

With regard to biomass power plants, we will strive to earn orders on an ongoing basis by both working to achieve further cost reductions, such as by expanding the scope of overseas procurement, and by differentiating ourselves from Indian and Chinese manufacturers, for example by enhancing maintenance services through our local subsidiary in Thailand.

With regard to Energy from Waste plants, we will put in place structures to secure orders, for example partnerships with local companies, in an effort to capture demand in the future, particularly in Thailand and Taiwan.

Materiality

- Helping combat climate change
- Conserving resources and protecting the environment
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation

Package Boiler Business

Package Boiler Business

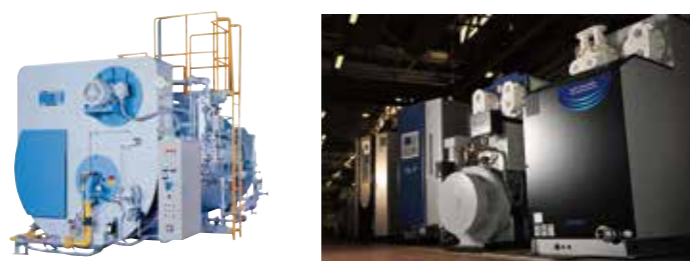


1 Business Summary

Group company Nippon Thermoener Co., Ltd., manufactures, sells, and maintains general-purpose boilers in addition to designing and building related heat source equipment and systems for various types of manufacturing plants as well as hotels, hospitals, commercial buildings, and other facilities.

Principle products

- Once-through Boilers (Equos)
- Vacuum-type Hot Water Heaters (Vacotin Heater)
- Heat-transfer Boilers (Thermoheater)
- Flue and Smoke Tube Boilers (RE Boiler)
- Hybrid Hot Water Systems, etc.



2 Strengths

Over the many years since its establishment in 1961, Nippon Thermoener Co., Ltd., has supported consumer lifestyles as well as industry by accumulating extensive experience in an array of package boilers, a type of boiler, which are used in a variety of industries and applications. In an effort to accommodate the changing times and environment as a manufacturer specializing in heat source equipment, the company meets a diverse range of customer needs by developing new heat source systems such as hybrid hot water systems based on the technological capabilities and expertise it has accumulated over its long history.

3 Market Environment

Although the domestic general-purpose boiler market has matured and is on track to shrink over the medium and long term, the sector remains broad in its reach. We expect a certain level of demand to continue for the time being, for example due to replacement demand. Additionally, demand for energy-saving boilers is expected to increase overseas, particularly in emerging nations. Furthermore, efforts to develop boilers with additional energy savings and higher energy efficiency are expected to accelerate as part of the effort to reduce and eliminate dependence on carbon, and over the long term, the field is likely to transition to heat source equipment that uses non-fossil energy.

4 Initiatives

Strengthening conventional businesses

- Maintaining and expanding the scale of orders in the existing domestic general-purpose boiler market
- Expanding our overseas business

Responding to environmental changes

- Building and expanding a basis for profit by developing a new market for heating systems based on a decarbonized society

We will support consumer lifestyles as well as industry while working to maintain and expand the scale of orders received in the domestic market by proposing optimal systems that meet individual customers' needs based on our line of diverse products and to expand our overseas business, particularly in Southeast Asia, where our Thai subsidiary is located. At the same time, we will help reduce greenhouse gases by promoting energy-saving, high-efficiency systems.

Additionally, we will work to develop a new heat source equipment market that suits the characteristics of the decarbonized society of the future by offering systems with greater energy-saving effectiveness, for example hybrid hot water systems that combine heat pumps with vacuum-type hot water heaters, and new heat source equipment that uses non-fossil energy sources, for example wood chip-fueled biomass boilers.

Materiality

- Helping combat climate change
- Conserving resources and protecting the environment
- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation

Equipment and Systems Business

Equipment and Systems Business



1 Business Summary

Group companies SUNPLANT Co., Ltd., and Dan-Takuma Technologies Inc. design and build various types of building equipment, including air conditioning, water supply and drainage sanitation, and firefighting systems, and they manufacture, sell, and maintain equipment for the semiconductor and electronic device industries, including clean rooms, chemical air filters, and magnetically shielded chambers.

Principal products and services

- Building equipment installation, chemical air filters, environmental monitoring systems for use in clean rooms



2 Strengths

SUNPLANT Co., Ltd., which operates a building equipment business, was established as a boiler installation company in 1941. After entering the equipment construction business in 1965, the company began offering a variety of building equipment for use in education and research facilities, healthcare and social welfare facilities, commercial and cultural facilities, factories, railroad facilities, and other sites. In this way, it has supplied pleasant environments that are custom-made to suit a variety of applications and requirements based on the technology and expertise it has accumulated over many years.

Since its establishment in 1969, Dan-Takuma Technologies Inc., which operates a semiconductor industry equipment business, contributes to the development of the semiconductor and electronic device industries by supplying an array of clean technologies, primarily to customers in the semiconductor industry, and by drawing on the high level of trust it has earned through its extensive track record of deliveries to develop products that are customized in collaboration with customers.

3 Market Environment

Although there are concerns that construction demand may be affected by a temporary drop-off in private-sector investment due to the effects of the COVID-19 pandemic, robust demand is expected to continue over the medium and long term thanks to the replacement and repair of aging public facilities and the construction of new healthcare and social welfare facilities.

Additionally, the market for semiconductor manufacturing equipment is expanding thanks to rising semiconductor demand worldwide, which is being fueled by the adoption of new technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and 5G—all areas where there has been steady progress—and by the trend towards digitalization. Going forward, markets serving the semiconductor and electronic device industries are expected to grow over the medium and long term despite short-term fluctuations.

4 Initiatives

Strengthening conventional businesses

- Expanding the flow of orders by improving sales and construction capability (equipment)
- Expanding market share by improving products' competitiveness (systems)

Responding to environmental changes

- Improving functionality and expanding business opportunities through alliances (systems)

In the building equipment business, we will work to further strengthen our sales and installation capabilities by hiring, retaining, and training human resources, and we will strive to achieve steady growth in the scale of orders received by creating optimal environments that are custom-made to suit a variety of applications and requirements.

For semiconductor manufacturing equipment, we will work to boost competitiveness by developing products that are customized in collaboration with customers and through joint research with universities, and we will strive to expand our business by supplying products that meet customer needs through a variety of alliances.

Materiality

- Strengthening relationships of trust with customers and communities
- Pursuing partnerships and innovation

Our Achievements

Main Recent Projects

This page introduces some of the main plants that Takuma supplied during FY2020 in the Domestic Environment and Energy Business.

Municipal Solid Waste Treatment Plants

New Construction



The Clean Plaza/ Regional Cleaning Union of the city of Ota and three towns

Project name: Regional Cleaning Union of the city of Ota and three towns Municipal Waste Treatment Facility Construction and Operation Project
Location: Gunma Prefecture
Capacity: 330 tons per day (165 tons per day × 2 units)
 Power output: 9,700 kW



Miyazu-Yoza Clean Center

Project name: Miyazu-Yoza Wide-area Waste Treatment Facility Development and Operation Project
Location: Kyoto Prefecture
Capacity: Waste incineration facility: 30 tons per day (30 tons per day × 1 unit)
 Methane gasification facility: 20.6 tons per day (20.6 tons per day × 1 system)
 Recycling facility: 14.9 tons per day
 Power output: 270 kW



Hikarigaoka Incineration Plant

Project name: Hikarigaoka Incineration Plant Reconstruction Project
Location: Tokyo
Capacity: 300 tons per day (150 tons per day × 2 units)
 Power output: 9,150 kW



Eco Clean Center Nanetsu (No.1 Clean Center)

Project name: Nanetsu Seiso Kumiai (Sanitation Association) New Waste Treatment Facility Development and Operation Project
Location: Fukui Prefecture
Capacity: 84 tons per day (42 tons per day × 2 units)
 Power output: 1,470 kW

Primary Equipment Improvements



Tankou District Sanitation Center Incineration Plant Waste Incineration Facility

Project name: Tankou District Sanitation Center Incineration Plant Waste Incineration Facility Primary Equipment Improvement Project
Location: Iwate Prefecture
Capacity: 240 tons per day (120 tons per day × 2 units)
 Power output: 1,990 kW



Clean OSHIMA

Project name: Clean OSHIMA Primary Equipment Improvement Project
Location: Hokkaido
Capacity: 126 tons per day (63 tons per day × 2 units)
 Power output: 1,600 kW



Hitachiota City Clean Center

Project name: Hitachiota City Clean Center Primary Equipment Improvement Project
Location: Ibaraki Prefecture
Capacity: 100 tons per day (50 tons per day × 2 units)

Water Treatment Plants



Tokyo Basin Sewerage Tamagawa Joryu Water Reclamation Center

Project name: Tamagawa Joryu Water Reclamation Center Sludge Incineration Facility Reconstruction Project
Location: Tokyo
Capacity: Sludge-fueled power generation system
 Treatment capacity: 140 tons per day × 1 unit
 Power output: 137 kW



Yahagi River Basin Sewerage Yahagigawa Sewage Treatment Center

Project name: Yahagi River Basin Sewerage Water Treatment Facility Equipment Project (No.1)
Location: Aichi Prefecture
Capacity: Moving-bed upflow continuous sand filter
 Treatment volume: 20,000 m³ per day
 Equipment specifications:
 M60 × 6 units per pond, total of 2 ponds

Energy Plants



Gifu Biomass Power Co., Ltd.

Project name: Power Plant No.2 Generation Equipment Installation Project
Location: Gifu Prefecture
Capacity: Fuel: Wood fuel
 Steam conditions (normal operation):
 28 tons per hour × 5.98 MPaG × 465°C
 Power output: 6,800 kW



Nihonkaisui Co., Ltd.

Project name: Ako Power Station No.2 Biomass Power Generation Equipment Construction Project
Location: Hyogo Prefecture
Capacity: Fuel: PKS, Wood fuel
 Steam conditions (normal operation):
 125 tons per hour × 6.0 MPaG × 460°C
 Power output: 30,000 kW



The owner of the facility, Clean Authority of Tokyo, is responsible for performing intermediate treatment of municipal waste in Tokyo's 23 wards in a stable manner.

The newly completed Hikarigaoka Incineration Plant is the result of demolishing the former Hikarigaoka Incineration Plant, which operated at the site until 2016, and building a new plant in the same location. Through this project, the outdated plant was reborn as a state-of-the-art facility that blends seamlessly into residents' lives while contributing to stable waste treatment.

In 2021 in Tokyo's Nerima City, we completed the next-generation, environmentally friendly

Hikarigaoka Incineration Plant

Facility name: Hikarigaoka Incineration Plant
 Incineration capacity: 300 tons per day (150 tons per day × 2 units)
 Power generating equipment: Steam turbine generator (rated output: 9,150 kW)
 Design and construction: Takuma-Konoike Special Construction Joint Venture
 Construction period: June 28, 2016, to March 15, 2021

A site surrounded by large apartment complexes A construction process shaped by careful consideration of the impact on the neighboring area

Situated in the northern part of Tokyo's Nerima City, Hikarigaoka Incineration Plant is surrounded by facilities that are frequented by large numbers of residents, including medium- and high-rise apartment complexes, shopping centers, and Hikarigaoka Park, a municipal park. In order to complete the rebuilding project in this location, it was necessary to give careful consideration to the impact on the surrounding environment.

In demolishing the old plant, it was particularly important to give adequate consideration to factors such as noise and dust. To resolve these issues, we installed an enormous, temporary tent that completely covered the old plant (measuring 121.5 meters by 78 meters in footprint and 47 meters in height) that completely covered the old plant. By incorporating soundproof sheets and soundproof panels that provided dual functionality and keeping the interior at negative pressure, the tent made it possible for workers to do their jobs while minimizing the effects of noise and dust on the neighboring area.



Former plant



After being completely covered with the tent



Steam turbine



Induced draft fan



Tour route



Solar panels

Maximizing surplus power and helping prevent global warming

The facility's steam turbine generator operates at higher efficiency than did the former plant's, allowing it to make effective use of the energy contained in waste.

Additionally, we took steps to reduce power consumption by the plant's equipment, for example by using high-efficiency compressors and implementing inverter control for the plant's major fans and pumps. Furthermore, we installed a circulating gas system* for the incinerators to reduce emissions, decrease fan power consumption, and reduce environmental impacts.

We also worked to lower energy use by building

equipment, for example by using high-efficiency hardware and LED lighting and otherwise greenifying the building.

As another initiative, we installed solar panels and skylights so that the facility can make effective use of natural energy.

In this way, the new facility combines high-efficiency power generation with energy-saving measures to maximize the surplus power that can be obtained by its waste-to-energy power generation process.

*Combustion technology for drawing in combustion gas above the burn-out grate, where the oxygen concentration is comparatively high inside the furnace, and blowing it as circulating gas into the incinerator. In this way, the technology fosters complete combustion while limiting generation of nitrogen oxides with less combustion air.

Message from our partner company

In June 2016, we began demolishing the former plant building inside a large tent that set a Guinness world record. Construction of the new plant began in earnest in March 2018. As a result of addressing various issues in a forward-looking manner with plant construction personnel and aligning our efforts so that we could pursue a unified approach, we were able to complete the project without incident. I would like to express my thanks to everyone who was involved, including the more than 130,000

construction and other workers at the construction site who worked diligently and closely together, and also to the facility owner as well as the local residents for their kind support and guidance. Going forward, my hope is that the facility will extend its roots into the surrounding community while helping residents enjoy a pleasant lifestyle.

Mr. Kenshin Nabeshima
Site Manager
KONOIKE CONSTRUCTION CO., LTD.



An exterior design that blends into the surrounding environment

Because it is situated in the heart of a residential area, the facility needed to incorporate a design that blends into the surrounding environment by reducing the imposing appearance that such plants tend to produce. By adopting an architectural structure that makes extensive use of underground areas, we designed the plant so that buildings visible aboveground are shorter than they were at the old plant.

Reflecting the need for the plant's color to give a sense of cleanliness, we chose a cream color that harmonizes with the surrounding residential areas for the building and the same white color that was used at the old plant for the stack so that the facility would offer the same appearance as a landmark even as it blends into the area.



Message from the construction coordinator

Completing a landmark in Hikarigaoka while accommodating changes in the social landscape

The Hikarigaoka Incineration Plant Reconstruction Project, which had a total construction period of 57 months and a construction site located in a dense urban area, unfolded successfully against the backdrop of a variety of changes in the social landscape, including soaring material and labor costs due to the economic boom fueled by the Olympics, ongoing workstyle reforms, and the COVID-19 pandemic.

This success was entirely the result of the understanding exhibited by the owner and by residents of the surrounding area, and I would like to express my thanks to them. My hope is that the plant will inspire affection as a new Hikarigaoka landmark.

Hideaki Kotani
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