TAKUMA

CSR Report 2019

Bringing new value to society with +TAKUMA

Founder Tsunekichi Takuma invented the first boiler to be produced entirely in Japan by bringing expertise and technology to a product that had to be imported until that time.

By passing down this philosophy over time and augmenting it with Takuma's technology, we continue to create products with new value today.

Going forward, we will provide that value to customers through plants that take advantage of the proprietary technologies we have developed since our founding in areas such as combustion, waste treatment, and water treatment.

Contents

(Cover: Thai Udonthani Power Co., Ltd.)

Message from Top Management

Contributing to the sustainable development of society by providing new value the world needs

Assessing change in the business environment and boosting our ability to grow

I'm Hiroaki Nanjo, and I became President and CEO of Takuma in April.

The Takuma Group, which has adopted the goals 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 ordinary profit of JPY 10 billion in FY2020, has embraced a vision of building structures capable of consistently earning an ordinary profit of at least JPY 10 billion even as the business environment undergoes a process of significant change. As the final stage in our direct to achieve that vision, we are working to implement the 12th Medium-Term Management Plan (FY2018 to FY2020). That effort includes a variety of business activities undertaken as part of the Plan, which outlines a three-year period during which we have sought to boost our corporate capabilities to facilitate the achievement of our vision and consistent growth afterwards based on a sure assessment of how the business environment is likely to change in the future.

Continuing to be a company that plays an essential role in society

I'd like to take advantage of this opportunity to describe my basic approach to management as I take on these new responsibilities.

First, I believe in the importance of respecting our Management Principles. The Takuma and Takuma Group Management Principles state, "Takuma will strive for social contribution, corporate value enhancement, long-term corporate development and the satisfaction of all stakeholders by providing goods and services that are needed and recognized as valuable in society." That impetus can also be found in our founding spirit of "Service to the nation through boiler manufacturing*," and it means contributing to the world through the goods and services that we create. It also informs corporate social responsibility (CSR), which we have currently embraced as a key issue in the company's management. Companies must build and maintain good relationships with a variety of stakeholders, including customers, business partners, employees, shareholders, and investors. Such relationships cannot be realized in a day. The first step is for the company to conduct itself in a way that inspires trust on the part of stakeholders.

Through endless effort to provide new value after conducting ourselves in line with the dictates of legal compliance, impartiality, ethical values, and social mores while ensuring transparency in decision-making and fulfilling the obligations of accountability, we must build and maintain good relationships; only then will society acknowledge the value of Takuma's continued existence. I believe that management is founded on corporate governance, compliance, and risk management.

Second, I embrace the practice of seeing things from both a short-term and a medium-/long-term perspective. As the business environment continues to undergo significant change, we are called upon to deal with those changes in an appropriate manner and to generate results as we do so. Additionally, as a publicly held company, we are required to increase management efficiency and to improve our performance. However, merely pursuing short-term profits in the context of an effort to achieve long-term development of the business while satisfying all stakeholders is unlikely to lead to sustained growth. We must cultivate a medium- and long-term perspective and incorporate it into our management while reliably dealing with the immediate opportunities and issues that present themselves to us. In particular, the Group's products—Energy from Waste plants, water treatment plants, and energy plants—are key parts of society's underlying infrastructure, and as such they operate for 20 to 30 years after being delivered to the customer. We will continue to work to manufacture optimal products through careful attention to all phases of the life cycle, from design to construction and maintenance, in order to ensure that customers can utilize these facilities for as long, and in as effective a manner, as possible. At the same time, ESG investment is attracting attention as a means of boosting corporate value over the long term. We will contribute to society by focusing even more closely on developing and supplying products and services that make contributions to the environmental priorities of reducing environmental impacts and lowering greenhouse gas emissions.

Third, I am committed to carrying on a good corporate culture that allows all employees to pursue their jobs with enthusiasm and ambition while enjoying personal growth. Takuma has created a culture that encourages such growth by allowing relatively inexperienced employees to take on job responsibilities so that they can gain motivation and experience a sense of accomplishment while being mentored by supervisors and older colleagues. I look forward to continuing to develop an environment that allows each Takuma employee to approach his or her job with a desire to improve, to take full advantage of his or her skills and abilities, to grow through the company's activities, and to enjoy a sense of motivation and happiness.

Message from Top Management

Accommodating customers' diversifying needs through new initiatives such as the O&M* business

Currently, Takuma's principal businesses include the Solid Waste Treatment Plant Business; the Energy Plant Business, which includes our Package Boiler Business; and the Water Treatment Plant Business. These three core areas of operations have grown thanks to continuous effort over many years, and by cultivating trusting relationships with customers, they have earned us excellent market share. We are now embarking on a new initiative that will seek to develop an O&M business for energy plants, an area that shares our focus on maintenance, into a robust contributor to Takuma's bottom line by taking advantage of the experience we've gained in solid waste treatment plants. Continuous action will be needed in the future in order to accommodate customers' diversifying needs so that we can continue to grow. Through the creative efforts of all employees, we will show the way forward for each business so that we can achieve the goals of the 12th Medium-Term Management Plan and realize our medium- and long-term vision for the next stage in our history.

Helping solve social issues from the world's standard perspective

Takuma has been a signatory to the United Nations Global Compact* since 2006, and we support its 10 fundamental principles in the 4 areas of human rights, labour, environment, and anti-corruption. We will work to develop our business while understanding and respecting these globally shared principles. In addition, concerning the implementation of the Sustainable Development Goals (SDGs) adopted by the United Nations and the provisions of the Paris Agreement adopted at COP21, the Group is helping resolve social issues with technologies for reducing emissions of greenhouse gases like carbon dioxide through such means as high-efficiency generation of electricity using waste and biomass.

In closing, in compiling this CSR Report we have sought not only to provide a resource by means of which a broad range of stakeholders could learn more about the Takuma Group's activities, but also to help each and every Group employee think carefully about CSR and bring that perspective to bear in his or her work. We at the Takuma Group encourage readers to offer their candid views and advice, which we will carefully review in order that we might better resolve social issues and contribute to the sustainable development of society.

July 2019

Hiroaki Nanjo
President and CEO
Takuma Co., Ltd.

* Service to the nation through boiler manufacturing:
It was the Company Motto of Takuma, then Takuma Boiler Manufacturing Co., Ltd., founded by Mr. Tsunekichi Takuma, one of the ten great inventors of Japan during the Meiji and Taisho periods (1868-1926).

* O&M: Operation & Maintenance

* United Nations Global Compact:
The Takuma Group has joined the United Nations Global Compact (UNGC), which is a voluntary effort to create a global framework for implementing sustainable growth by having companies and groups exercise responsible and creative leadership while acting as good members of society.

Company Motto

Value Technology, Value People, Value the Earth

Management Principles

Takuma will strive for social contribution, corporate value enhancement, long-term corporate development and the satisfaction of all stakeholders by providing goods and services that are needed and recognized as valuable in society.

The founding spirit of Takuma was "Service to the nation through boiler manufacturing," which in present-day language means "contribution to society by supplying goods and services that we yield." This spirit can also be applied to the concept of Corporate Social Responsibility (CSR) that in recent years has become a vital issue for corporate management. The management principles of the Takuma group companies are all based on the said founding spirit.

Takuma Group Ethics Charter

Takuma and the Takuma Group companies believe that it is essential for the sound development of the group that all of the directors and employees remain aware of our social responsibilities and the circumstances surrounding us as well as act in response to social ethics complying with applicable related laws and ordinances. Bearing the above in mind, we have established and will promote this ethics charter as our code of conduct, aiming to realize our management principles.

1. We shall strive for proactive social contribution while establishing a harmonious coexistence with the global environment as good corporate citizens.
2. We shall act in good faith in accordance with sound business custom, while complying with applicable laws and regulations and committing ourselves to fair, transparent and free competition, as well as conducting lawful business activities.
3. We shall never have any relationship with antisocial forces or organizations, which may pose a threat to the social order and security of civil society.
4. We shall respect fundamental human rights and never practice discrimination.
5. We shall strive to provide high quality products and services, based on our advanced technologies, to attain high acclaim and confidence from our customers.
6. We shall strive to disclose corporate information to shareholders and investors through investor relations (IR) and other activities on a timely and equitable basis.
7. We shall strive to protect corporate properties as well as information, while never using either for improprieties or any unjustifiable purpose other than normal business operations.

Takuma Group Code of Conduct

Harmony with society
1. Coexistence with the global environment
2. Coexistence with international society
3. Practice of social contribution activities

Practice of compliance with laws and ordinances as well as sound economic activities
4. Free competition and fair trade
5. Relationship with politics and public administration
6. Policies concerning business entertainment and gift-giving
7. Prohibition of involvement in anti-social activities
8. Appropriate export and import transactions

Respect for basic human rights
9. Prohibition of discriminatory actions
10. Respect for individuality, personal quality, and privacy
11. Safe work environment

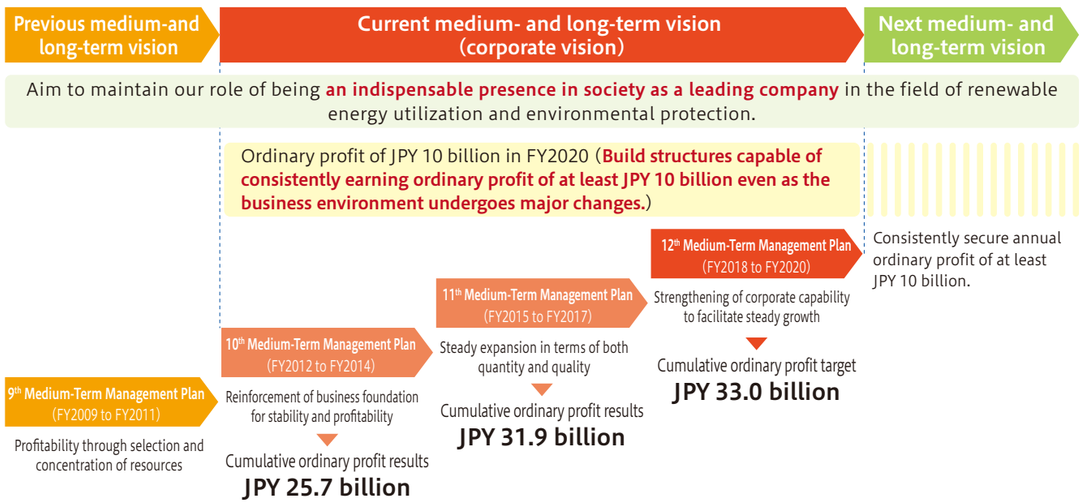
Practice of customer satisfaction
12. Safety of products and services as well as ensuring reliability
13. Policies concerning advertising

Making appropriate disclosure of information
14. Transmission of corporate information
15. Ensuring reliability of financial reporting
16. Prohibition of insider trading

Protection of corporate properties and information
17. Management and proper use of corporate properties
18. Handling of confidential information
19. Intellectual property protection

1.Positioning of the 12th Medium-Term Management Plan

- The plan represents the final stage of the current medium- and long-term vision (corporate vision), for which FY2020 is the target year.
- During its three years, we will achieve the vision and boost our corporate capabilities to prepare for steady growth in the future in response to future changes that are forecasted to occur in the business environment.



2.Policies of the 12th Medium-Term Management Plan

❶Strengthening and expanding our revenue foundation

Many of the Group's products are used for a long period of time, for example for 20 or 30 years from the time of delivery. Offering high-quality after-sales service in an ongoing manner so that customers can use those products more effectively and over a longer period of time contributes to both customers' and the Group's profits, helping to create a foundation for stable, long-term earnings.

We will work to further strengthen and expand our revenue foundation by continuing to provide high-quality solutions throughout the plant and product life cycle as we meet customers' diversifying needs in an individualized manner.

❷Achieving sustained growth

Over the 80 years since the Group's founding, we have built a reputation as an essential part of society by providing products that are recognized for their value utilizing our technologies which are the core part of our company.

We will create customer value by continually developing unique technologies, services, and business models based on Takuma's strengths such as the technologies, track record, experience, and expertise that we've accumulated through our business activities to date. In addition, we will work to secure sustained growth by securing and creating competitive advantages as we respond quickly to changes in the business environment, such as evolving customer needs and emerging social issues.

❸Increasing productivity, for example by reforming business processes

The nature of the Group's businesses is undergoing major evolution as the business environment changes, for example due to changes in social structure such as the shrinking and aging of Japan's population and the emergence of more advanced and diverse customer needs as well as social issues.

We will strive to improve productivity, make effective use of human resources, and further increase the level of value we provide by fundamentally reviewing and rebuilding business processes that have become increasingly complex in order to accommodate these changes while focusing on businesses with higher added value (which will help us create and provide value).

❹Using human resources effectively

We will work to hire and train the diverse workforce that will be essential as we develop the Group's businesses going forward. At the same time, we will strive to create an environment that keeps individual employees engaged in their work and able to make full use of their skills and abilities (by cultivating a healthy workplace culture, reforming individual awareness, and facilitating fulfilling workstyles).

❺Continuing to pursue compliance management

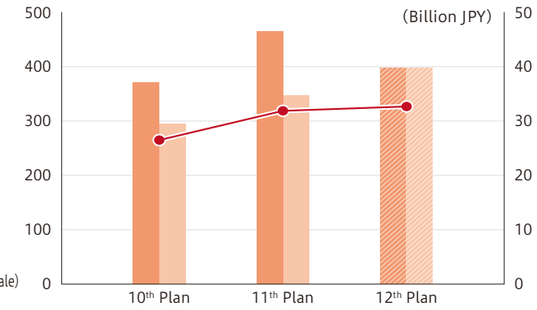
The Group considers compliance to be a key foundation of its corporate activities, and we've worked to spread awareness and foster adoption of good practices by including compliance as a policy in the last several Medium-Term Management Plans.

Awareness of the importance of compliance has steadily taken root among our employees thanks to ongoing awareness-raising and educational activities, and we will continue to pursue such initiatives to ensure that the trust we've built up in our quality and integrity remains unshakable. In addition, we will work to further spread and improve compliance awareness throughout the Group by effectively implementing and utilizing mechanisms such as our internal reporting system and CSR awareness survey.

3.Financial Target

Target: 3-year cumulative consolidated ordinary profit of JPY 33 billion

The 12th Medium-Term Management Plan, which represents the final stage of our current medium- and long-term vision, establishes the above targets to guide our achievement of the vision's goal of consistently earning ordinary profit of JPY 10 billion while simultaneously directing the company to utilize all its resources to build a robust business and management foundation in response to future changes in the business environment.



	10th Medium-Term Management Plan results	11th Medium-Term Management Plan results				12th Medium-Term Management Plan	
	2012 to 2014	2015	2016	2017	Total	2018	FY2018 to FY2020
Order value	371.0	99.9	191.0	177.1	468.0	179.8	JPY 400 billion (approx.) (3-year cumulative total; reference value)
Sales	296.5	113.0	116.3	118.1	347.5	121.9	
Ordinary profit	25.7	9.6	11.6	10.6	31.9	12.3	**Target: JPY 33 billion (3-year cumulative total)**

4.Core Business Units and Emphasis of Future Activities

Municipal Solid Waste Treatment Plant Business

Business Environment

- As facilities age, there is ongoing robust demand for renewal and service life elongation.
- Volume is growing for DBO projects as well as O&M services for existing facilities.

Emphasis of Future Activities

- Strengthen the profitability of our plant operation business.
- Further strengthen initiatives to prolong the service life of facilities.

Water Treatment Plant Business

Business Environment

- There is growing demand for sludge incineration plants that conserve and create energy.
- There is increasing use of PPP/PFI arrangements in the sewer business.

Emphasis of Future Activities

- Strengthen the competitiveness of our sludge-fueled power system.
- Scale our waste management expertise horizontally to other businesses.

Boiler Plant Business (Japan)

Business Environment

- FIT demand remains robust.
- The number of plants targeted for maintenance is increasing as facilities are completed and transferred to customers.
- There is growing demand for plant operational management and O&M.

Emphasis of Future Activities

- Capture new orders for FIT biomass plants.
- Strengthen our maintenance structures.
- Scale our waste management expertise horizontally to other businesses.

Boiler Plant Business (Overseas)

Business Environment

- Demand for biomass power plants in Southeast Asia remains robust.
- Our flagship bagasse-fired boiler plants continue to experience intense competition.

Emphasis of Future Activities

- Capture orders continually by creating competitive advantages.
- Strengthen the ability of our local subsidiary (SIAM TAKUMA) to carry out its business operations.

Waste Treatment Plant Business (Overseas)

Business Environment

- There is a growing need for proper waste management and energy utilization against a backdrop of growing urbanization, increase of waste volume, and diversification of waste characteristics.

Emphasis of Future Activities

- Build structures to facilitate collaboration with partner companies.
- Build schemes for entering new markets.

Package Boiler Business

Business Environment

- We are continuing to see a certain level of demand in Japan, particularly in terms of renewal demand.
- The need for energy-conserving boilers is increasing overseas, particularly in developing nations.

Emphasis of Future Activities

- Maintain and expand our domestic business.
- Expand our overseas business.

* DBO: Design Build Operate / PPP: Public Private Partnership / PFI: Private Finance Initiative / FIT: Feed-in Tariff

5.Progress in Implementing the 12th Medium-Term Management Plan

In this section, members of Takuma's management team present progress in implementing the goals of the 12th Medium-Term Management Plan, which began in FY2018.

Kengo Numata
Director & Executive Vice President
Executive Manager, Corporate Planning & Administration Division

The central theme of this Medium-Term Management Plan is strengthening our corporate capability to facilitate steady growth. During FY2018, we worked to do just that in an effort to not only boost profitability, but also better earn the trust of a wide range of customers and other stakeholders, including by offering high-quality solutions that help resolve a variety of today's social issues. I think it was a good start for the first year of the Plan.

In FY2019 and beyond, we will continue to help build a sustainable society by strengthening our corporate capabilities through operations including our environmental plant, energy plant, and other businesses and by maintaining our role of being an indispensable presence in society as a leading company in the field of renewable energy utilization and environmental protection.

The Japanese Solid Waste Treatment Plant and Boiler Plant Businesses performed well during the first year of the Plan. Orders, sales, and operating income all exceeded the initial planned values as we enjoyed a smooth start in terms of quantitative performance.

Looking at the business environment, the transition in the Japanese market from manufacturing alone to a service business that uses products as tools is accelerating, and there is demand in the overseas market for products and services that can accommodate individual countries' different situations and needs.

In order to achieve steady growth, it is necessary for companies to bolster their capabilities to ensure they can adapt to changes in the tenor of the times. One of the key themes for this plan is strengthening and expanding the Japanese plant operation business and bringing new creativity to its development overseas. Our goal is to enhance our adaptability and create a foundation that will enable us to secure stable profits in the future by actively developing more appropriate structures based on revamped resource allocation, accumulating more skills, and offering a selection of products that meet the needs of the times.

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

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

In order to build a society in which the global environment and natural environment are protected and conserved in an appropriate manner into the future, it will be necessary to utilize waste effectively as a resource and to expand production of renewable energy.

Our mission is 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. In keeping with that mission, our Engineering Group will continue to help build a sustainable society by providing plants that make significant inroads in the drive to protect the environment, develop a recycling-based society, and reduce CO_2 emissions through pioneering solid waste treatment that helps reduce environmental impacts, Energy from Waste projects that generate power from municipal waste and sewage sludge, and carbon-neutral biomass power generation.

Company Outline

Name:	TAKUMA CO., LTD.
Head office location:	2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan TEL +81-6-6483-2609 FAX +81-6-6483-2751 (operator)
Representative Director:	Hiroaki Nanjo, President and CEO
Established:	June 10, 1938
Capital:	JPY 13,367,457,968 (as of March 31, 2019)
Main business areas:	The design, construction and superintendence of a wide variety of boilers, plant machinery, pollution prevention plants, environmental equipment plants, and heating and cooling equipment and feed-water / drainage sanitation equipment and facilities The design, construction and superintendence of civil, architecture and other works
Number of employees (non-consolidated):	852 (as of March 31, 2019)
Number of employees (consolidated):	3,619 (as of March 31, 2019)

Takuma's business offices

1. Head Office (Amagasaki, Hyogo)
2. Osaka Office (Osaka)
3. Tokyo Branch (Minato-ku, Tokyo)
4. Hokkaido Branch (Sapporo, Hokkaido)
5. Tohoku Branch (Sendai, Miyagi)
6. Chubu Branch (Nagoya, Aichi)
7. Kyushu Branch (Fukuoka)
8. Okinawa Branch (Ginowan, Okinawa)
9. Harima Factory (Takasago, Hyogo)
10. Taipei Branch (Taipei, Taiwan)

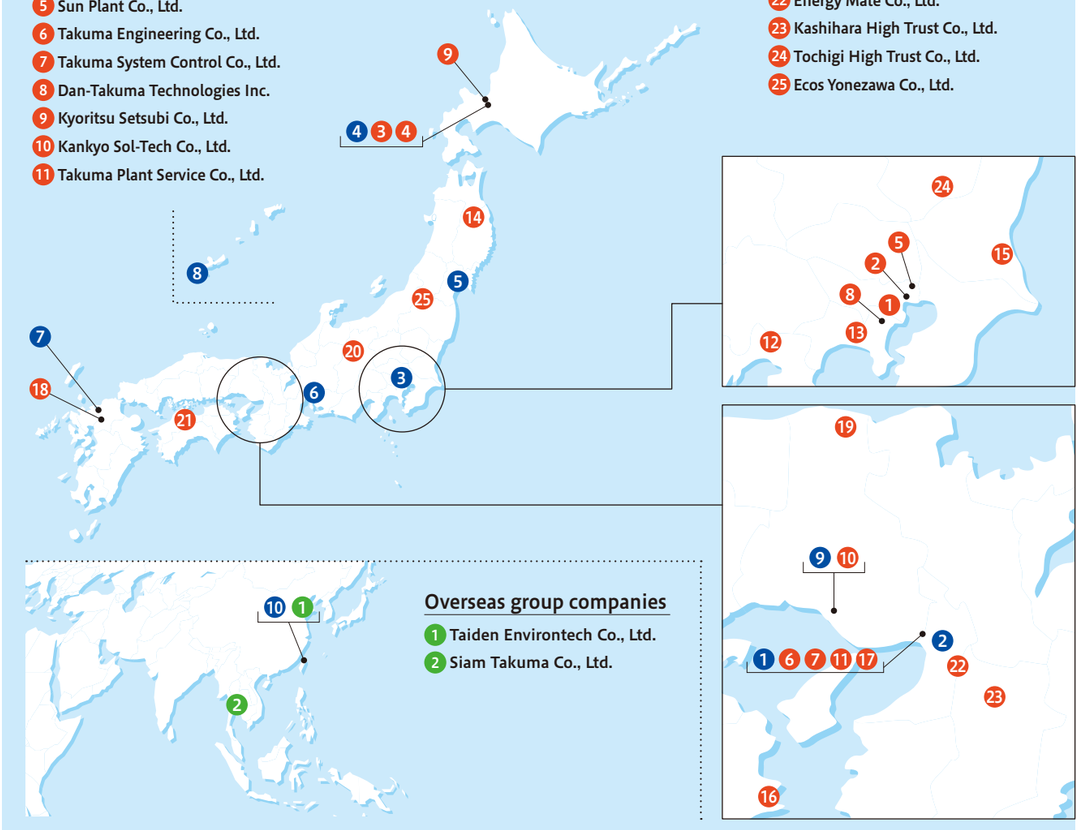
The Takuma Group Network

(As of June 26, 2019; see Takuma's website for details.)

Takuma's business offices / Group companies in Japan / Overseas group companies

Group companies in Japan

1. Nippon Thermoener Co., Ltd.
2. Takuma Technos Co., Ltd.
3. Hokkaido Sanitary Maintenance Co., Ltd.
4. Takuma Technos Hokkaido Co., Ltd.
5. Sun Plant Co., Ltd.
6. Takuma Engineering Co., Ltd.
7. Takuma System Control Co., Ltd.
8. Dan-Takuma Technologies Inc.
9. Kyoritsu Setsubi Co., Ltd.
10. Kankyo Sol-Tech Co., Ltd.
11. Takuma Plant Service Co., Ltd.
12. Nagaizumi High Trust Co., Ltd.
13. Fujisawa High Trust Co., Ltd.
14. Iwate-Kenpoku Clean Co., Ltd.
15. Hitachinaka-Tokai High Trust Co., Ltd.
16. Anan High Trust Co., Ltd.
17. Takuma Energy Co., Ltd.
18. Kurume High Trust Co., Ltd.
19. Hokutan High Trust Co., Ltd.
20. Suwako High Trust Co., Ltd.
21. Imabari High Trust Co., Ltd.
22. Energy Mate Co., Ltd.
23. Kashihara High Trust Co., Ltd.
24. Tochigi High Trust Co., Ltd.
25. Ecos Yonezawa Co., Ltd.



Overseas group companies

1. Taiden Environtech Co., Ltd.
2. Siam Takuma Co., Ltd.

Business Summary

Environment and Energy Business

Municipal solid waste treatment plants

We support the realization of a recycling-oriented society using advanced waste treatment technologies that meet the needs of local communities.

- Energy from Waste plant
- Pyrolysis gasification and melting plant
- Resource recycling and collection plant
- Bulky garbage crushing plant
- Incineration ash and fly ash melting plant
- Waste to solid fuel conversion plant
- Transition and intermediate processing plant
- Raw fuel (biogas) recovery plant
- Various types of pollution prevention equipment

Energy from Waste plant

Bulky garbage crushing plant

Industrial waste treatment plants

Using advanced incineration technologies, we can even treat toxic substances suitably and we are supporting the environmental protection efforts of industry.

- Industrial waste treatment plant

Industrial waste treatment plant

Plant that generates power from industrial waste and provides heat to a plantation

Energy plants

Takuma's core technologies are utilized in various types of boilers, starting with biomass boilers, as well as total systems.

- Biomass boiler
- Fossil fuel boiler
- Waste heat boiler
- Power plant

Biomass power generation boiler

Waste heat boiler

Water treatment plants

We are working to purify wastewater with a holistic perspective through a "dialogue with water."

- Sewage and wastewater treatment plant
- Various types of advanced sewage treatment plant
- Sludge treatment plant
- Sewage sludge-fueled power plant
- Plant to process water that infiltrates final disposal sites

Upflow moving-bed filtration system

Sewage sludge-fueled power plant

Package Boiler Business

General-purpose boilers

As the convergence of Takuma's combustion technologies, our boilers are a reliable brand that has earned the support of a wide range of industries.

- Steam Boilers (EQOS, Super EQOS)
- Vacuum-type Water Heaters (Vacotin Heater)
- Package Water-tube Boilers
- Flue and Smoke Tube Boilers (RE Boiler)
- Heat Medium Oil Boilers (Thermoheater)
- Radiation Heating Equipment (Strip Heater)

Vacotin Heater

Thermoheater

Super EQOS

RE Boiler

Note: These products are handled by Nippon Thermoener Co., Ltd., which is one of our group companies.

Equipment and Systems Business

Air-conditioning equipment and clean systems

We provide comfortable, clean environments to customers in the semiconductor industry as well as many locations such as universities, research institutions, and hospitals.

- Building equipment
- Air-conditioning equipment
- Cleaning and drying devices
- Clean room
- Clean devices
- Chemical filters

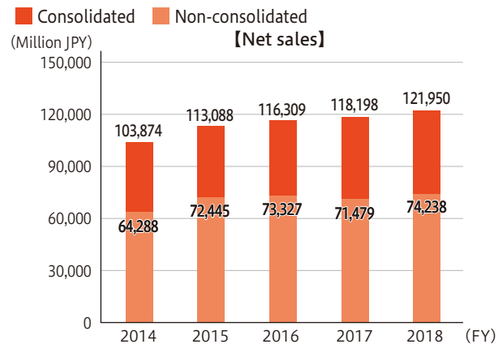
Chemical filters

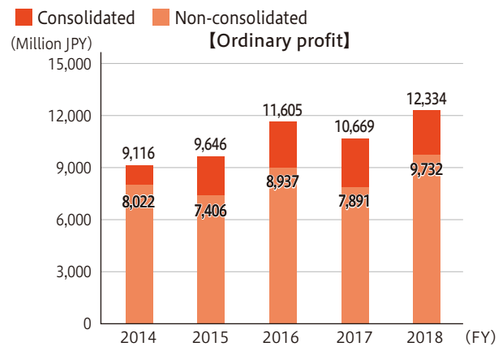
Clean oven

Clean booths

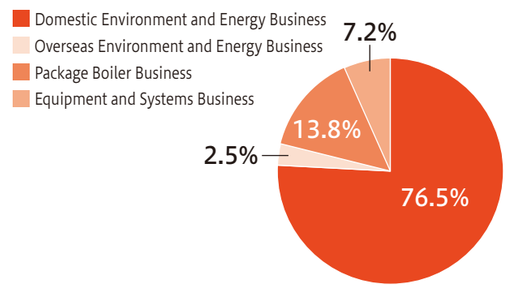
Financial and non-financial information

Overview of financial results

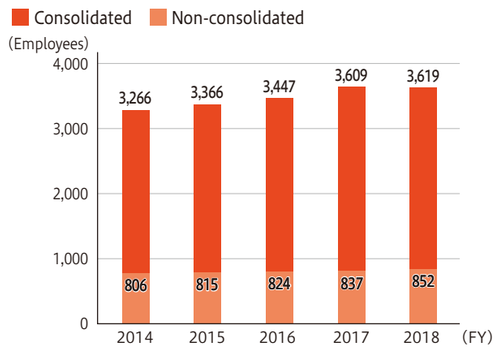




Net sales composition ratios (FY2018)



Number of employees (as of March 31, 2019)



(Related SDGs)

NTEC

株式会社日本サーモエナー

NIPPON THERMOENER CO., LTD.

Established	August 1, 1961
Representative	Masahiko Izumi President and Representative Director
Employees	431 (as of March 31, 2019)

Business Profile: Nippon Thermoner

As a company that manufactures and sells general-purpose boilers and hot-water heaters in the Takuma Group, we strive to contribute to society through our activities in the field of package boilers in keeping with the founding spirit of "Service to the nation through boiler manufacturing." And as a manufacturer specializing in heat source equipment, we meet a diverse range of needs for customers in Japan and overseas with a broad array of products and services along with an integrated system that encompasses sales, installation, and maintenance for products and related equipment.

Manufacturing and sales

- Boilers and associated equipment
- Energy-saving heat source equipment

Vacuum-type Water Heaters
Vacotin Heater

Steam Boilers
EQOS Series

Heat Medium Oil Boilers
Thermoheater

Flue and Smoke Tube Boilers
RE Boiler FII Series

Increasing our corporate value

Heat sources, which are generally required by industrial and commercial facilities, can be classified based on their use of either steam, which is needed for heating and sterilization, or hot water, which is used for bathing and cleaning. In addition to general-purpose boilers such as EQOS Series steam boilers and Vacotin Heater vacuum-type water heaters, which deliver some of the best performance of any models in their respective industries, we offer a selection of special-purpose boilers including flue and smoke tube boilers, water-tube boilers, and heat medium oil boilers. Our goal is to select and combine heat-source equipment that suits customers' applications and requirements based on deep knowledge of their businesses. Going forward, we will continue to help create a clean global environment by supplying high-efficiency, high-performance products that take advantage of technological capabilities developed over many years so that we can accommodate the changing needs and environment of our times. This commitment is evident in accomplishments such as our becoming the first company in the industry to introduce hybrid hot water systems that combine heat pumps, which deliver excellent energy-saving benefits, with hot water heaters.

Principal customers

JR; Ground, Maritime and Air Self-Defense Forces; manufacturing plants in various industries; hospitals; hotels; cleaning companies and linen plants; social welfare facilities; public baths; golf courses; etc.

(Related SDGs)

株式会社 タクマテクノス

Takuma Technos Co., Ltd.

Established	September 27, 1967
Representative	Kazunori Tsuji, President
Employees	1,721 (as of March 31, 2019)

Business Profile: Takuma Technos

Our company, which maintains 63 sites and offices nationwide, operates and manages plants including waste incineration facilities, bulk waste treatment facilities, and recycling facilities. Our approach to those operations has been changing, and recently we're involved with more DBO and O&M projects with Takuma.

Because we offer what is in effect a type of government service, our business activities are intimately connected to the lives of local residents. Consequently, we see our mission as ensuring safety, stability, and peace of mind at each facility we operate, and we are confident that by doing so in a reliable manner we can boost our corporate value.

Our executives and employees work closely together to ensure everyone involved with our company is satisfied. We strive to do our part in developing a recycling-based society while boosting compliance and CSR awareness.

Businesses

- Maintenance, management and operation of waste treatment facilities, water treatment facilities and other facilities
- Design, installation and management of various types of boilers, environmental equipment and other equipment

Entering new business domains

In April 2019, we joined Takuma in launching the Group's first O&M business for biomass power-generating equipment owned by a private-sector company. Customers outsource operation, management, and maintenance of equipment for 20 years after the start of operation to us, so we're dedicated to keeping those facilities running and supplying power in a stable manner.

We've seen a surge of initiatives related to power businesses that use biomass fuel since the launch of Japan's feed-in tariff program for renewable energy, and going forward we will work with Takuma to increase orders.

History

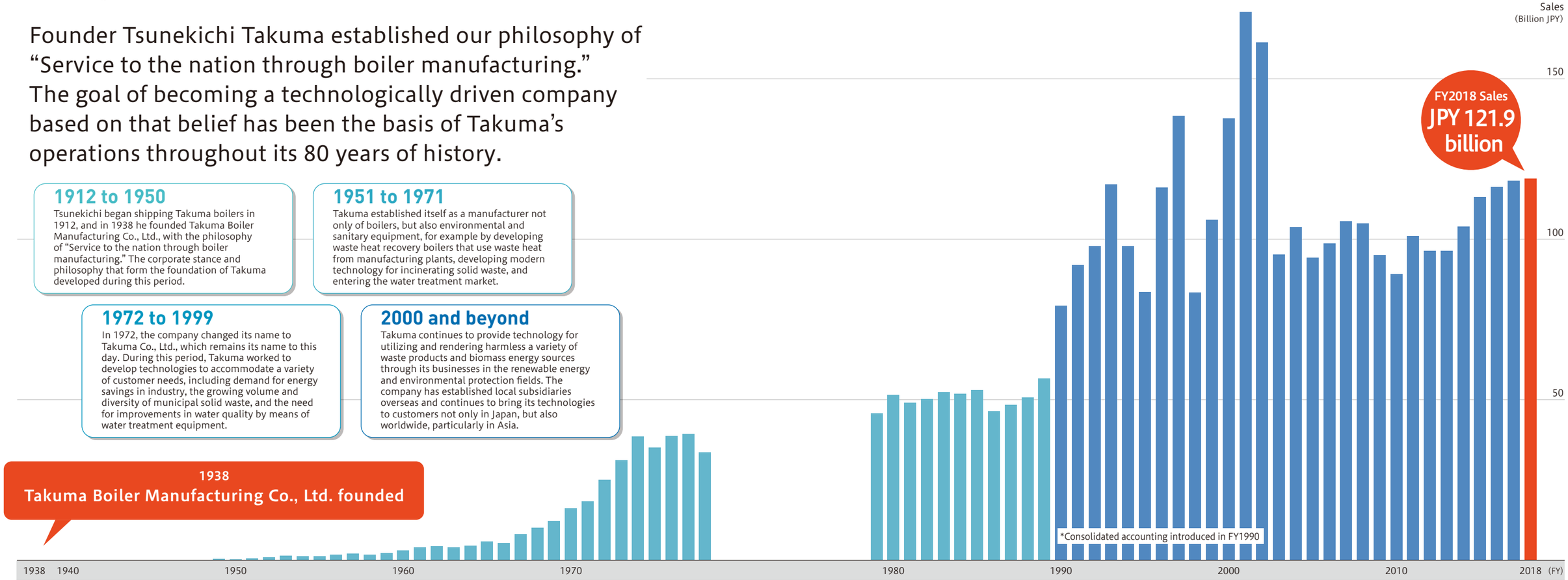
Founder Tsunekichi Takuma established our philosophy of "Service to the nation through boiler manufacturing." The goal of becoming a technologically driven company based on that belief has been the basis of Takuma's operations throughout its 80 years of history.

1912 to 1950
Tsunekichi began shipping Takuma boilers in 1912, and in 1938 he founded Takuma Boiler Manufacturing Co., Ltd., with the philosophy of "Service to the nation through boiler manufacturing." The corporate stance and philosophy that form the foundation of Takuma developed during this period.

1951 to 1971
Takuma established itself as a manufacturer not only of boilers, but also environmental and sanitary equipment, for example by developing waste heat recovery boilers that use waste heat from manufacturing plants, developing modern technology for incinerating solid waste, and entering the water treatment market.

1972 to 1999
In 1972, the company changed its name to Takuma Co., Ltd., which remains its name to this day. During this period, Takuma worked to develop technologies to accommodate a variety of customer needs, including demand for energy savings in industry, the growing volume and diversity of municipal solid waste, and the need for improvements in water quality by means of water treatment equipment.

2000 and beyond
Takuma continues to provide technology for utilizing and rendering harmless a variety of waste products and biomass energy sources through its businesses in the renewable energy and environmental protection fields. The company has established local subsidiaries overseas and continues to bring its technologies to customers not only in Japan, but also worldwide, particularly in Asia.



1912 The first "Takuma boiler" introduced by our founder, Tsunekichi Takuma


Tsunekichi Takuma

1930 Tsunekichi Takuma commended as one of the ten great inventors of Japan during the Meiji and Taisho periods (1868–1926)

1938 Takuma Boiler Manufacturing Co., Ltd. founded
Company Motto instituted:
"Service to the nation through boiler manufacturing"


Amagasaki Factory

1942 Operation began at Harima Factory


Harima Factory under construction

1949 Bagasse-fired boiler, the first product of its kind in the industry, exported

1949 Company listed on the Osaka and Tokyo stock exchanges

1953 Head Office moved to Osaka's Kita-ku District


Former head office (Dojimahama)

1958 Business expanded into the environmental facility sectors, including waste incineration and water treatment plants

1963 Japan's first waste incineration plant delivered
Sewerage treatment facility delivered


Japan's first waste incineration plant

1970 Waste Management and Public Cleansing Act and Water Pollution Control Act enacted

1972 Company renamed Takuma Co., Ltd.

1975 Bulk production began on "Vacotin Heater" the world's first vacuum-type hot water heater


Vacotin Heater

1986 The first overseas delivery of a waste treatment facility completed

1992 New Company Motto instituted:
"Value Technology, Value People, Value the Earth"

1993 Basic Environment Act enacted

1995 Amagasaki Head Office Building completed


Amagasaki Head Office Building

1997 ISO9001 certification obtained

1998 Japan's largest Energy from Waste plant delivered
(Tokyo Shinkoto Waste Treatment Plant Capacity: 1,800 tons per day)

1999 ISO14001 certification obtained for Harima Factory

1999 Act on Special Measures against Dioxins enacted

2004 Takuma's first "Environmental Report" issued
The "Takuma Group Code of Conduct" instituted

2005 Takuma Hanyokikai Co., Ltd., a subsidiary involved in the manufacture and sale of small boilers, and Ebara Boiler Co., Ltd. merged and renamed Nippon Thermoener Co., Ltd.

2005 The "Takuma Environmental Policy" instituted
The "Personal Information Protection Policy" instituted

2006 The "Compliance Declaration" instituted
The "Takuma Group Ethics Charter" instituted
Takuma participated in the UN Global Compact

2007 Takuma's first "CSR Report" issued

2010 Energy from Waste plant delivered in Europe (U.K.)


Lakeside EfW Plant

2012 Feed-in tariff (FIT) program launched to facilitate fixed-cost purchases of renewable energy

2013 Operation of the Takuma Solar Power Plant began


Takuma Solar Power Plant

2019 Order received for a 74,950 kW biomass power plant (FIT-approved facility)


Biomass Power Plant

Feature
01

Supporting innovation in agricultural technologies for a new era by making sustainable facility operation a reality

Energy Plant Business: Biomass Power Plant Construction/O&M Project in Kasaoka

SARA Inc.

Related SDGs

Construction site

Located in southwest Okayama Prefecture near Hiroshima Prefecture, Kasaoka City is home to the Kasaoka Bay Reclamation Site, one of four largest reclamation sites in Japan.

As a company dedicated to “Taking Agriculture in Asia into the Future,” plant customer SARA Inc. is dedicated to offering a stable supply of delicious vegetables that can be consumed with peace of mind throughout the year and to achieving reasonable, sustainable relationships with producers, sellers, and consumers. At an enormous reclamation site on Kasaoka Bay in Okayama Prefecture, SARA operates one of the world’s most advanced protected horticulture businesses that combines vegetable cultivation in a 13-hectare semi-enclosed greenhouse which is one of the largest structures of its kind in Japan and a biomass power plant. Here the company grows and ships safe, delicious, and fresh salad tomatoes, paprika, and leaf lettuce that can be enjoyed with peace of mind.

Facility overview

Feature 01

Supporting innovation in agricultural technologies for a new era by making sustainable facility operation a reality

Energy Plant Business: Biomass Power Plant Construction/O&M Project in Kasaoka
SARA Inc.

The power of group collaboration to achieve sustainable facility operation

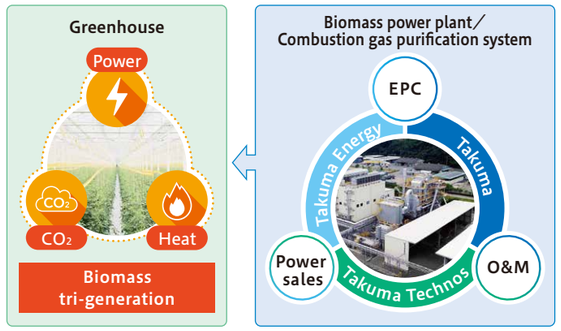
In this project, the Takuma Group came together to help achieve an innovative initiative being undertaken by SARA Inc.

The biomass power plant and combustion gas purification system installed in this project use lumber from nearby regions and imported wood products such as palm kernel shells (PKS) as fuel in a biomass tri-generation plant that supplies three types of energy necessary for facility operation: electricity, heat for heating and cooling use, and carbon dioxide for promoting vegetable growth. In this way, the facility can be operated in a sustainable manner.

Takuma and Takuma Technos will provide operational management and maintenance of the facility for 20 years after the start of operation. By deploying the ***POCSYS***®, a proprietary operational support system, and applying expertise from DBO, O&M, and other projects involving municipal waste incineration facilities, it is possible to achieve higher-quality, efficient operation and maintenance management.

Group company Takuma Energy will purchase enough surplus electricity from the facility to fulfill the annual power needs of about 20,000 households, and some of that electricity will be supplied to local kindergartens, daycare centers, middle schools, and other facilities to encourage local consumption of locally produced power.

Customer	SARA Inc.
Project name	SARA Power Plant
Generating capacity	10, 000 kW 80 million kWh annually (Enough to power about 20,000 households)
Principal fuel	Imported wood products such as PKS and lumber
Completion date	March 2019
O&M contract dates	April 1, 2019, to March 31, 2039 (tentative)



*EPC: Engineering Procurement Construction

Interview

We spoke to CEO Takenobu Kobayashi of SARA Inc., who played a central role in this project, about how he first encountered Takuma and his subsequent experiences.

Mr. Takenobu Kobayashi
CEO
SARA Inc.

Impressed by Takuma's frontier spirit and confident of its ability to overcome challenges together

In the run-up to the establishment of our company in January 2014, we were hard at work planning to build a large-scale vegetable farm at a reclamation site in the city of Kasaoka, Okayama Prefecture, which we considered a promising site. Our concept included using a biomass power plant to supply the three types of energy needed by the farm, specifically electricity, heat, and carbon dioxide. We met with several plant manufacturers as part of that process and spoke to them about the concept, but only one company indicated an understanding of our intentions and a willingness to embrace the challenges they posed together. I have a strong impression of that company's frontier spirit, which inspired it to boldly take on a tri-generation project in an unknown area of operations. That impression remains unchanged today.

Feeling the appeal of a track record in extended operation that promised stable business profits

I knew that Takuma had a long and successful track record in biomass plant construction projects, but as we learned more about Takuma's conceptual and proposal capabilities in the thoroughgoing use of surplus heat and supply of CO_2 from combustion gas purification, which were new business domains, the company earned our trust and made us confident that our concept would in fact be viable and profitable. In this way, a process that included numerous discussions ultimately led to a facility that provided both economy and stability. I will never forget how we completed the world's first system to supply high-quality CO_2 by purifying combustion gases through a joint demonstration project.

Proposal capability and human ability that led to a relationship of trust

Numerous people from different departments participated in the process of gaining an understanding of our concept and developing a variety of proposals to make it a reality, and all of them approached their task with an extremely high level of enthusiasm. It was truly a project that tapped the entire company. Each employee was appealing in his or her own way, and after each meeting I was left with a strong impression that Takuma is a trustworthy manufacturer.

One of the reasons we asked Takuma to build the plant was that I knew based on that impression that the company would continue to do its utmost in a spirit of good faith in design, construction, and after-sales service after we entered into a contract.

A relationship that facilitates new value creation and application through continued exchanges

During the design and construction phase after we entered into a contract, each coordinator and site manager offered service in a spirit of good faith, and Takuma was able to deliver the plant on time without major incident. The facility continues to operate smoothly today.

Following the delivery of the plant, we entered into a long-term operational and maintenance management (O&M) contract with Takuma Group company Takuma Technos. The facility has only just begun to operate, but I trust that we will be able work together to maximize profits from power generation while minimizing running costs.

Additionally, through the power sales business operated by Takuma Energy, we're able to give something back to the local community together with Takuma, including by supplying power to local facilities. I look forward in the future to joining together to create and apply new value through business initiatives and continued exchanges.

Feature 02

Contributing to the development of the sugar industry by helping lead the way to success in the form of stable production and power sales

Overseas business: Biomass Power Plant Construction Project in Thailand

Related SDGs

Construction site

Located about 550 kilometers north-northeast of the capital Bangkok, Udonthani means “northern town” in Sanskrit.

Contribution of energy supply in Thailand

Thailand is the world’s leading producer of sugar and the second-largest exporter of the commodity in the world. Since our establishment in 1974, we have become one of Thailand’s premier sugar manufacturers. Recently, in addition to the sugar business, we are committed to becoming a producer of electricity using the renewable fuel bagasse (fiber remaining after sugarcane is crushed).

We have used bagasse-fired boilers from Takuma since our company’s founding. More recently, we installed four more Takuma boilers to obtain a stable supply of steam and electric power in our new plant in Udonthani. Thailand needs a growing energy supply, and we look forward to contributing to the sugar business here by supplying clean energy from Takuma biomass-fueled boilers. It is our hope that Takuma and Siam Takuma will continue to provide plants engineered to facilitate environmental conservation and industrial development.

Thai Sugar Mill Group Co.,Ltd.
Thai Sugar Mill Co.,Ltd.
Thai Udonthani Sugar Mill Co.,Ltd.

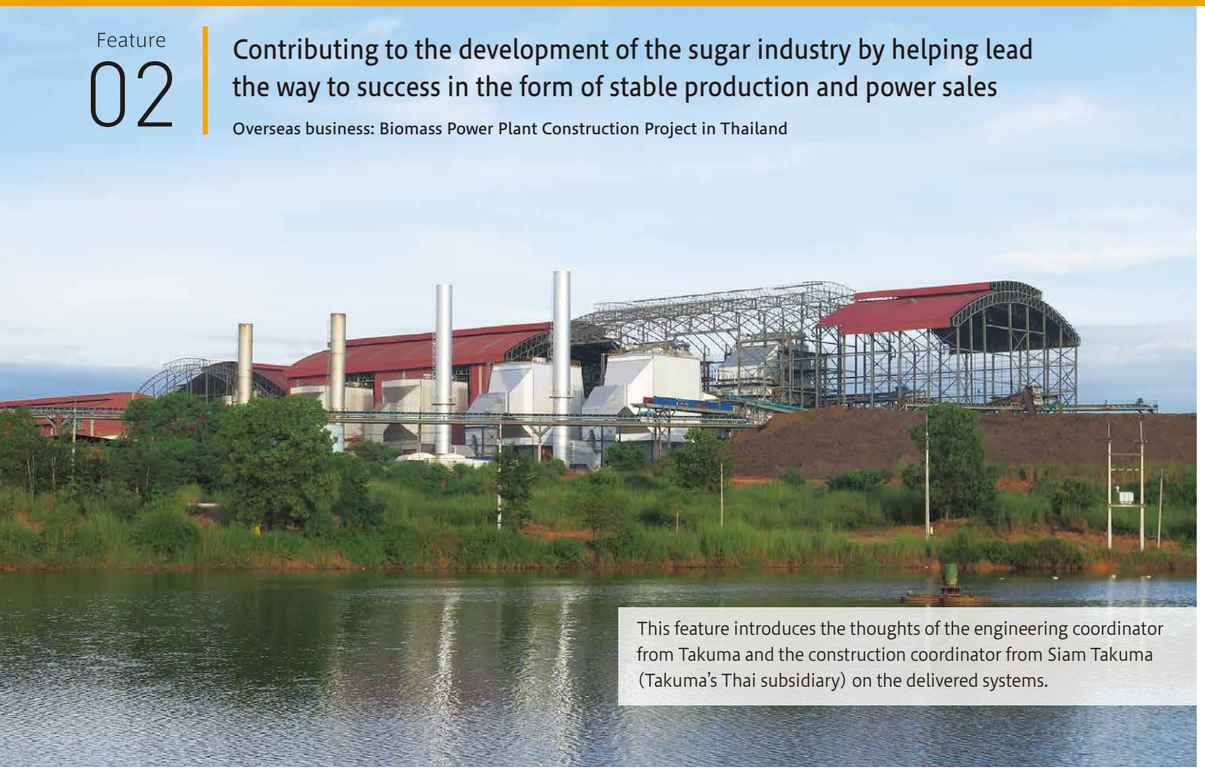
Thai Sugar Ethanol Co.,Ltd.
TSM Bio Energy Co.,Ltd.
TSM Power Co.,Ltd.
Thai [illegible]hanaburi Power Co.,Ltd.

Mr. Jetsada Wongwatanasin
Managing Director
Thai Udonthani Power Co., Ltd. (TSM Group)

Feature
02

Contributing to the development of the sugar industry by helping lead the way to success in the form of stable production and power sales

Overseas business: Biomass Power Plant Construction Project in Thailand



This feature introduces the thoughts of the engineering coordinator from Takuma and the construction coordinator from Siam Takuma (Takuma's Thai subsidiary) on the delivered systems.

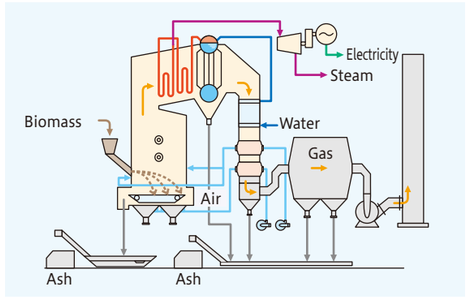
The customer for this project is an energy company in Thailand that operates a power boiler plant fueled by fiber remaining after sugarcane is crushed, which is known as bagasse.

Sugarcane harvested in the area is pressed at the adjacent sugar mill to produce sugar. By using the bagasse generated during that process to generate steam and electricity, the customer is able to use those products to power the plant and to sell surplus power back to the grid.

As part of the project, we delivered a new two-boiler power plant in order to supply additional energy (in the form of steam and electricity) needed as a result of an expansion of the customer's sugar plant.

We had previously delivered the facility's existing two-boiler power plant. Going forward, our four-boiler bagasse-fueled power boiler plant will contribute to the customer's ability to produce sugar in a stable and consistent manner while efficiently selling surplus power to the grid.

Customer	Thai Udonthani Power Co., Ltd. (TSM Group)
Project name	N-6500H Bagasse Fired Boiler
Fuel	Bagasse
Steam conditions	170 tons per hour × 4.2 MPaG × 450°C × 2 boilers (delivered in January 2019)
(Existing plant)	
Customer	TSM Power Co., Ltd.
Project name	N-5000H Bagasse Fired Boiler
Steam conditions	150 tons per hour × 4.2 MPaG × 450°C × 2 boilers (delivered in November 2012)



Message from the engineering coordinator

Atsushi Nishina
Section 3, Energy Engineering Department 2
Project Center

In this project, the customer already had experience operating a pair of Takuma boilers that had been delivered in the past. In light of the company's favorable evaluation of our boiler plant's operational track record and technological reliability, we were eager to plan and design a system so that we could deliver a high-quality product that would meet the customer's expectations.

I look forward in the future to planning and designing even better plants that take into account Takuma's record of success in Japan and overseas and to working closely with Siam Takuma's highly experienced staff so that we can supply high-quality plants that satisfy customers' requirements.

Plant construction process

Siam Takuma procured materials and equipment needed for the project and carried out construction and commissioning work with a focus on staying on schedule and ensuring worker safety.

Boiler plant construction starts with the construction of the boiler building and then proceeds with the installation of machinery, piping, electrical equipment, and other components. Once those steps are complete, the entire facility undergoes adjustment and commissioning processes, and performance is verified before it is transferred to the customer. We carried out these tasks in line with a construction schedule and work procedures that had been carefully formulated based on our extensive experience.

Takuma focuses on getting work done safely while taking steps to ensure that materials and equipment are delivered on time and in line with the schedule and that all parties, including subcontractors, are able to communicate smoothly and effectively. In such construction projects, it is extremely important to work closely with the customer while building a trusting relationship during the construction process, which can take a long time.

Message from the construction coordinator

Teekatat Promsungyang
Manager, Construction Section
Siam Takuma Co., Ltd.
(Shown at right)

At Siam Takuma, I am in charge of construction and commissioning work for Takuma boilers, and also responsible for safety and quality control management at construction sites and subcontractor factories. I also handle correspondence with Takuma to confirm specifications and requirements.

In this project, we installed two bagasse-fired boilers at Thai Udonthani Power Co., Ltd., which was already operating two Takuma boilers. Challenges included integrating the new systems into the existing plant, which was operating at the time, and keeping to a tight construction schedule.

Thanks to the cooperation of the customer and Takuma's Head Office, we were able to finish the construction and commissioning work generally on schedule. I was relieved and proud as I watched the row of four boilers begin operating together.

Takuma boilers are famous in the sugar industry in Thailand, where customers expect us to contribute to the supply of renewable energy in a country where biomass fuels are plentiful.

1.Environmental Plant Business

Strengthening our value chain and supplying facilities that create new value

Hidetoshi Tomita Executive Officer
Executive Manager, Environmental Plant Division

We receive orders for a broad range of services, from construction to maintenance.

Since constructing Japan's first fully continuous mechanical Energy from Waste plant in 1963, Takuma has delivered Energy from Waste plants for more than half a century as a leading company in its industry. To date, we've delivered more than 360 plants in Japan, including Energy from Waste plants with some of the largest processing capacities in Japan (at 1,800 tons per day) and methane gasification facilities.

During FY2018, we received two orders for new municipal solid waste treatment plants, one for the Osaka City・Yao City・Matsubara City Environment Facilities Association (located in Osaka Prefecture), and one for the Ariake Living Environment Facilities Association (located in Fukuoka Prefecture). We also received a total of four orders for primary equipment improvement work and equipment renovation work for customers including the Oshima District Cooperative of Municipal Solid Waste Management (located in Hokkaido Prefecture) and the City of Hitachiota (located in Ibaraki Prefecture). We also received orders for overhaul work, regular adjustment, and maintenance inspections from local governments, and we're working hard to maintain plant performance and stable operation.

We're seeing steady growth in orders for filtration systems.

Takuma also has more than 50 years of experience in water treatment, another key aspect of the Environmental Plant Business. Our products excel particularly in advanced wastewater treatment technologies, and we've delivered numerous upflow moving-bed filtration systems (Uniflow Sand Filter).

During FY2018, we received orders for sand filtration systems and other products, and order volume is generally in line with our goals for the first year of the current Medium-Term Management Plan.

We're helping build a sustainable society.

Noteworthy accomplishments during FY2018 included receipt of the Grand Prix, the most prestigious award at the Association for Resilience Japan's Japan Resilience Award (Resilience Grand Prize) 2019, together with Imabari City (Ehime Prefecture), NPO Imabari Center, and Imabari High Trust Co., Ltd. The accolade recognized advanced and extensive disaster prevention initiatives carried out by the four partners at the Imabari City Waste Management Center, a facility that we delivered in FY2017.

In this way, we will continue to supply safe facilities that inspire peace of mind and comfort on the part of local residents, enhance operations and service, and strengthen our value chain in areas such as plant maintenance and operation.

The United Nations Sustainable Development Goals were adopted in 2015, and the Paris Agreement came into force in 2016. Going forward, Takuma will work to help build a sustainable society by striving to reduce its environmental impacts.

Business topics

Receiving the Japan Resilience Award (Resilience Grand Prize) 2019 Grand Prix

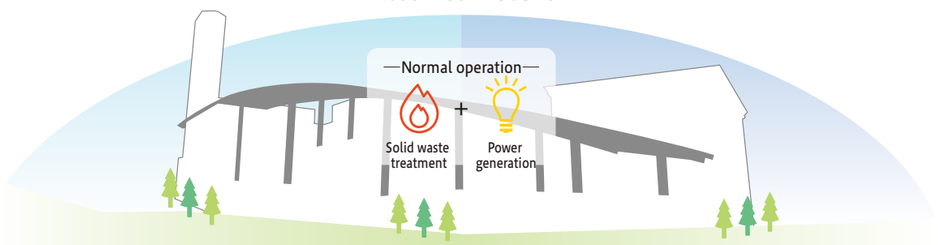
The Imabari City Waste Management Center, which received the Japan Resilience Award (Resilience Grand Prize) 2019, incinerates solid waste from about 160,000 residents of the city of Imabari and uses the resulting thermal energy to generate electricity. The plant is the first solid waste treatment facility in Japan to adopt the "Phase Free" concept, allowing it to function as a place where residents can gather and enjoy interaction with other members of the community during times of normal operation and as a designated evacuation center where residents can seek refuge in times of disaster. The facility has incorporated procedures such as disaster prevention training and evacuation center operation into its operation in order to ensure it can serve as a space where residents can evacuate with peace of mind in the immediate aftermath of a disaster.

The plant received the Grand Prix in recognition of these advanced and extensive disaster prevention initiatives.

* Japan Resilience Awards
The Japan Resilience Awards recognize advanced companies and organizations that have undertaken activities, technology or product development programs, or other initiatives to help make their country, region, people, or industry more resilient in an effort to build a next-generation society that is resistant to the effects of disasters.

At the award ceremony

Imabari City Waste Management Center
Phase Free initiative



Always (normal operation)
- Waste treatment
- Environment awareness-raising activities
- Events
- Supply of power to the community
- Resident activities
- Communication of facility information

In times of emergency (natural disasters)
- Continuation of waste treatment
- Disaster waste treatment
- Evacuation center
- Supply of power to evacuation centers
- Provision of space for evacuees
- Communication of disaster information

The facility's gym is used for resident activities.

The facility supports events by local NPOs.

The gym can be used as an evacuation center.

The facility supports evacuation center operation by local NPOs.

Equipment-focused initiatives (Resilient facilities and equipment) Organizational initiatives (Personnel support and community development)

Opening Solution Lab, a next-generation facility that utilizes ICT

Since opening in 2004, Takuma's Comprehensive Operation Support Center has provided remote monitoring and operational support for municipal solid waste treatment facilities. In 2019, we opened the Solution Lab with the goal of further enhancing the Center's functionality by augmenting the expertise it's accumulated to date with use of operational and maintenance management data obtained by means of the latest information and communications technologies (IoT, "Big Data," and AI). As a result, it is able to offer optimal, high-quality operational support services in partnership with group company Takuma Technos.

The Solution Lab will move to the sixth floor of the tentatively named Takuma Building New Wing (Training Center)*, which is being built at our Head Office campus.

* The Takuma Building New Wing, which is scheduled to be completed in October 2020, is a six-story, next-generation wood structure built using cross-laminated timber (CLT) and fireproof laminated wood. The structure was selected as part of the Ministry of Land, Infrastructure, Transport and Tourism's FY2018 Sustainable Building Leading Program (Leading Wood Structures).

Three roles of the Solution Lab

Operation and maintenance support	Customer issue resolution and research	Human resources development and technology training

(Related SDGs)

Municipal Solid Waste Treatment Plant Business

Municipal solid waste treatment plants built recently are required to offer far-reaching performance and functionality, including increased generating efficiency and recycling rates, reduced greenhouse gas emissions, enhanced facility resilience, and longer service lives.

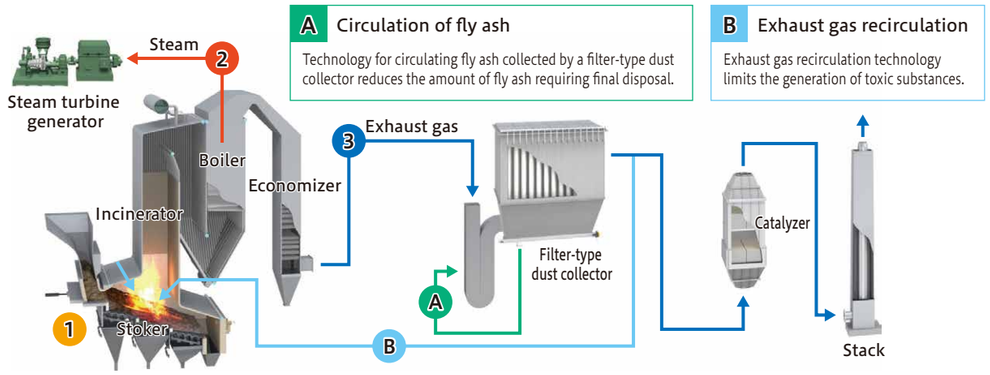
To meet precisely these demands from society and customers, Takuma delivers safe facilities that inspire peace of mind by taking maximum advantage of the advanced technologies and expertise that have been fostered by its extensive track record of projects.

Plant construction

Stoker-type incinerators

Energy from Waste plants must process waste in a safe and stable manner. Takuma stoker-type incinerators, which are one of our flagship products, excel at safe, stable combustion and generate lower CO_2 emissions than other designs that require auxiliary fuel.

By combining a stoker-type incinerator with other technologies such as high-efficiency power generation and advanced exhaust gas treatment, we're helping municipalities around Japan solve their solid waste treatment issues.



A Circulation of fly ash

Technology for circulating fly ash collected by a filter-type dust collector reduces the amount of fly ash requiring final disposal.

B Exhaust gas recirculation

Exhaust gas recirculation technology limits the generation of toxic substances.

1 Incineration of solid waste

- Solid waste introduced into the incinerator burns at a temperature of 850°C or higher as it moves on the stoker (a step grate stoker system).

2 Use of steam

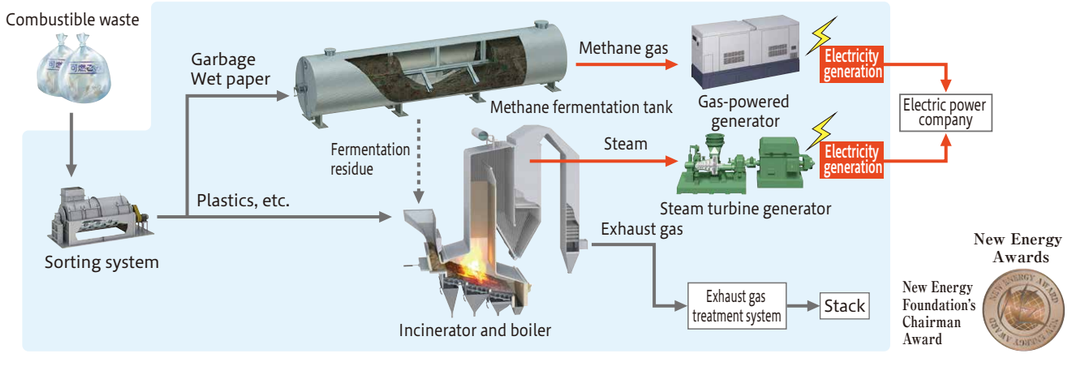
- Heat produced during the incineration process is recovered by the boiler and economizer and used to produce steam, which flows through a steam turbine generator to generate electricity.
- Steam also serves as a heat source for hot water, heating, cooling, and other uses in the plant and nearby facilities.

3 Processing of exhaust gas

- Toxic substances in exhaust gas flowing out of the boiler and economizer are removed by a filter-type dust collector and catalyzer so that they do not remain in smoke generated by the plant.

Methane recovery plants

Recently the Ministry of the Environment has been encouraging the introduction of methane recovery plants for use with municipal solid waste. This is an area where Takuma is helping further lower CO_2 emissions with a combined system of methane fermentation and incineration for municipal solid waste to recover the maximum amount of energy from the waste treatment and utilize it in high-efficiency power generation. (The system received the New Energy Foundation's Chairman Award at the FY2014 New Energy Awards.)



New Energy Awards

New Energy Foundation's Chairman Award

Primary equipment improvements

Municipal solid waste treatment plants must operate for extended periods of time, but their equipment must be updated once 20 or more years have passed since the start of operation. In addition, changes to applicable laws and social conditions may necessitate large-scale modifications.

Takuma draws on the sophisticated heat utilization technologies and energy-saving technologies it has accumulated as a boiler and environmental plant manufacturer to carry out high-value-added and large-scale renovation projects. In this way, we are able to help extend facilities' service life while lowering CO_2 emissions.

Example of a primary equipment improvement project

Measures to recover energy

Improvement of heat recovery

- Installing boilers on water-injection furnaces
- Expanding boilers' heating surface

Improvement of steam turbine capacity

Improving generating capacity by increasing steam intake capacity and optimizing design features

Enhancement of combustion equipment efficiency

Improving stable combustion by changing furnace shape and stabilizing the volume of steam generation and power generation

Measures to save energy

Control changes

Introducing inverters for speed and airflow control

Raising efficiency

Raising the efficiency of electric machinery and other components

Maintenance

Annual maintenance is essential in order to ensure stable operation of municipal solid waste treatment plants. Maintenance demands both sophisticated technological capabilities and experience, both because waste treatment plants draw on a range of expertise and because the manner in which their equipment deteriorates over time varies with the properties of the waste they process. Takuma takes maximum advantage of its accumulated expertise to contribute to stable waste treatment and long-term facility operation by developing long-term repair plans, carrying out elaborate site investigations, and then performing maintenance that has been optimized in terms of both timing and content.

Repairing an incinerator's refractory

Maintaining a conveyor

Long-term turnkey operation business

The long-term turnkey operation business, in which customers enter into contracts covering both operation and maintenance management for a term of 10 to 20 years, has become the most common approach in the industry in recent years, for example in the form of DBO projects. The Takuma Group operates many facilities using this approach.

We've been introducing **POCSYS**®, a comprehensive operation, maintenance, and management support system that we developed in FY2016, to these facilities in an effort to improve our operation and maintenance management services. Furthermore, we're offering additional support for operation while helping customers resolve issues by using data collected from facilities we operate by the Solution Lab (see page 26).

We will continue to meet the needs of customers and society by making maximum use of the Takuma Group's technologies and expertise, including maintenance management expertise accumulated by Takuma and operational management expertise accumulated by Group company Takuma Technos.

Operated facility

Operating data

Inspection data

Maintenance data

Increasing the quality of our operation, maintenance, and management services

- Implementation of safe and sophisticated operation
- Streamlining of maintenance and management
- Optimization of utility use and power income/expenditures

Aggregation of data

Utilization of system functionality and provision of technical support

Takuma, Takuma Technos

POCSYS® **integrated server**

Central management and accumulation of a range of data types

- Statistical analysis of data and machine learning
- Evaluation of equipment performance and failure prediction
- Visualization of service level and study of reductions etc.

Solution Lab

(Related SDGs)

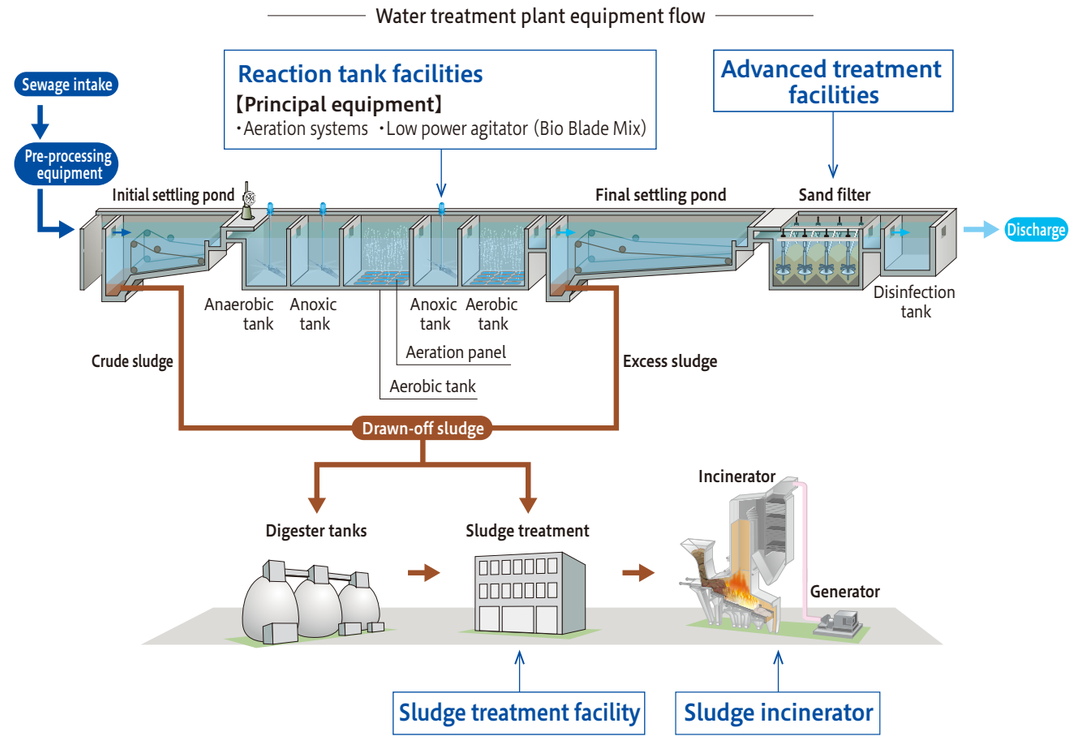
Water Treatment Plant Business

Takuma has delivered numerous systems utilizing advanced technologies, particularly for treating wastewater, in an effort to help conserve the aquatic environment.

The recent trend is for plants to be called upon not only to purify water, but also to reduce power use by treatment equipment and create energy from sewage sludge. In an effort to meet these requirements, Takuma has been focused on developing a step grate stoker furnace sewage sludge power generation system and commercializing technologies that use waste heat from the incineration process to generate electricity.

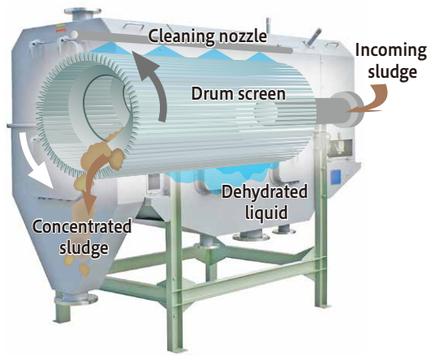
Going forward, we will continue to help conserve the aquatic environment by supplying products that meet the needs of our times.

Water Treatment Plants



● Sludge treatment facility 【Principal equipment】・Rotating drum-type concentrator

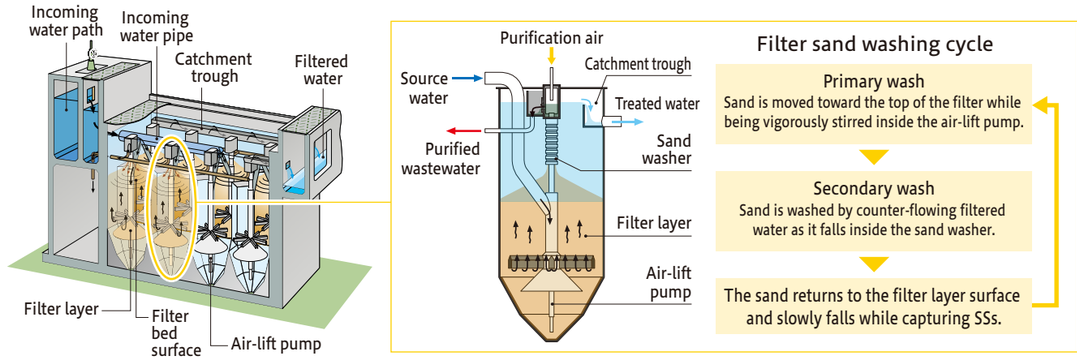
A rotating drum-type concentrator consists of a drum-shaped screen consisting of metal wedge wire that separates and concentrates solid and liquid components from coagulated sludge as the drum rotates. Following solid-liquid separation, sludge is transported to the exit side of the system as it is concentrated and pushed by spiral-shaped vanes on the inside of the rotating drum. Thanks to a simple design whose operation hinges on a slowly rotating drum screen, the system uses less power than its conventional counterparts, yielding high energy savings.



● Advanced treatment facility 【Principal equipment】・Upflow moving-bed filtration (Uniflow Sand Filter)

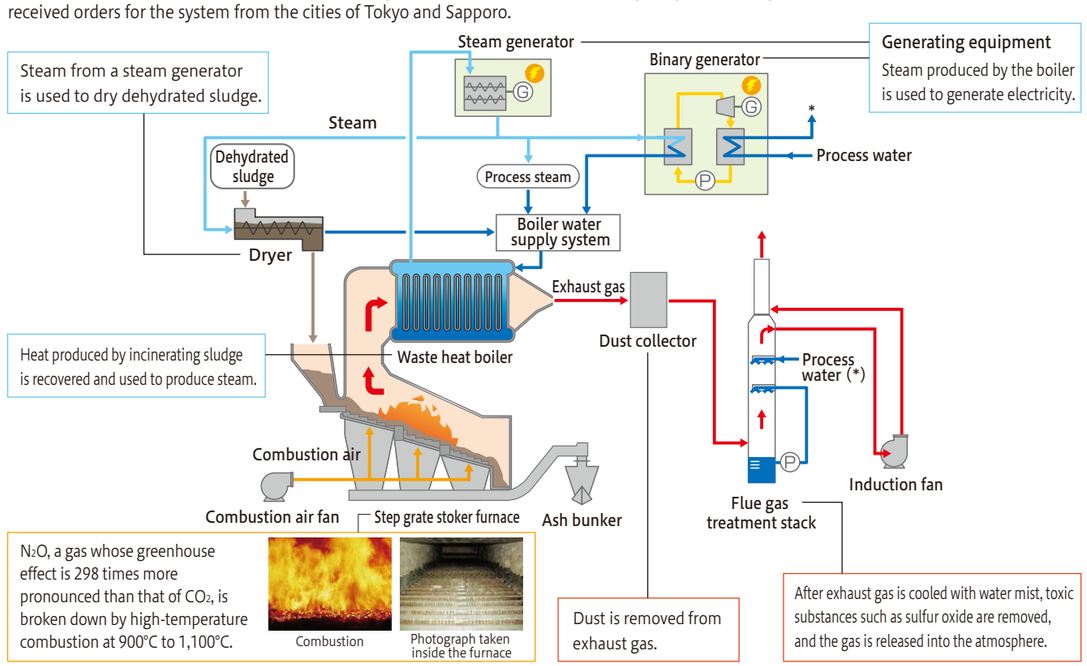
Measures undertaken to improve the quality of public water sources and the need to reuse treated sewage are spurring demand for more advanced water treatment. Upflow moving-bed filtration systems (Uniflow Sand Filter), which eliminate suspended solids (SSs) from water, are used in a variety of fields, including in final processing at sewage treatment plants and in pre-processing to remove solids at water plants. This particular model is a long-selling product featuring proven water purification technology of which we have delivered more than 2,700 units in Japan. A design that combines filtration treatment with continuous backwashing of the filtration sand ensures stable operation and exceptional maintainability.

The product line includes high-speed models with double or triple the filtration speed of the standard model as well as denitrifying and dephosphorizing variants that add functionality for eliminating nitrogen and phosphorus to standard SS elimination functionality.



● Sludge incinerator 【Principal equipment】・Step grate stoker furnace sewage sludge power generation system (step grate stoker furnace and innovative step grate stoker furnace)

Because it contains a large amount of energy, sludge generated during the sewage treatment process has been attracting attention in recent years as a biomass resource. We are taking advantage of our core incineration and boiler technologies to make effective use of the energy contained in sludge by using it as a fuel to generate electricity. Following the system's selection for inclusion in the Ministry of Land, Infrastructure, Transport and Tourism's Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH) in FY2013, we have received orders for the system from the cities of Tokyo and Sapporo.



1.Environmental Plant Business

Main Recent Projects

The following are the main plants supplied by Takuma during FY2018.

Municipal Solid Waste Treatment Plant Business

New construction

Environmental Forest Center, Kizugawa

Project name
Clean Center Facility Maintenance Project

Capacity
Incineration facility:
94 tons per day (47 tons per 24 hours × 2 units)
Power output: 1,220 kW

Location
Kyoto Prefecture

Primary equipment improvements

Kumagaya Sanitation Center No. 1 Plant

Project name
Kumagaya Sanitation Center No. 1 Plant
Primary Equipment Improvement Project

Capacity
Incineration facility:
140 tons per day (70 tons per 24 hours × 2 units)

Location
Saitama Prefecture

The Inariyama Environmental Center

Project name
Primary Equipment Improvement Project,
The Inariyama Environmental Center, Sayama City

Capacity
Incineration facility:
165 tons per day (55 tons per 24 hours × 3 units)
Power output: 264 kW

Location
Saitama Prefecture

Water Treatment Plant Business

Takasu Sewage Treatment Plant

Project name
Urado Bay Eastern Basin Takasu Sewage Treatment Plant
Sludge Treatment System Construction Part 12

Capacity
Type: Pressurized screw press dehydrator
Treatment capacity: 225 kg-DS per hour

Location
Kochi Prefecture

Matsubara Preprocessing Plant

Project name
FY2017 Matsubara Preprocessing Plant Automatic Coarse Dust Eliminator Renovation Project

Capacity
Type: Intermittent front-surface mixing-type screen
Specifications: 3,500 (W) × 1,100 (D) mm

Project name
FY2018 Matsubara Preprocessing Plant No. 2 Concentration Tank Sludge Scraper Update Project

Capacity
Type: Sludge scraper (center-drive vertical type)
Specifications: ⌀17.9 m × 1 unit

Location
Hyogo Prefecture

Kasai Water Reclamation Center

Project name
Kasai Water Reclamation Center Sludge Concentration Tank No. 1 Machinery and Equipment Improvement Project

Capacity
Type: Sludge scraper (center-drive post type)
Specifications: ⌀28 m × 1 unit

Location
Tokyo Prefecture

Iizaka Clean Site

Project name
Iizaka Clean Site Phase 2 Final Treatment Plant Seepage Water Treatment Plant Construction Project (No. 2 Area)

Capacity
Type: Contact oxidation-type nitrification denitrification system
Specifications: 110 m^3 per day
Type: Centrifugal dehydrator
Specifications: 515 kg-DS per hour

Location
Fukushima Prefecture

2.Energy Plant Business

Contributing to local communities and the renewable energy industry with plants of the highest possible level of quality

Mitsuaki Adachi
Managing Executive Officer
Executive Manager, Energy Plant Division

Meeting growing demand with a sure track record

Our Energy Plant Business traces its roots back to the founding of Takuma in 1938 by Tsunekichi Takuma, who developed Japan's first high-performance boiler. Since that time, we've enhanced technologies for using a variety of fuels including biomass and solid waste and delivered numerous boilers to customers (more than 600 in Japan and overseas; a total of more than 3,220 boilers including units that burn oil, gas, and wood).

Demand for wood-fueled biomass power plants has been growing since Japan's introduction of a feed-in tariff (FIT) program for renewable energy in 2012, and we have delivered such facilities to many customers that have praised our long-running track record. I am grateful for this achievement and recognize that it is the result of our stakeholders' support. We take pride in marshalling all of our capabilities to fill orders by supplying plants of the highest possible level of quality.

Biomass power as a solution for social problems

We recently received our first O&M order for a biomass power plant that will be delivered to a private-sector company. Going forward, we will strive to ensure we can contribute to customers' businesses in a comprehensive way by offering a range of proposals, including for O&M projects.

Under the FIT program, biomass power is treated as a source of power that strives to facilitate medium- and long-term autonomy while coexisting with local communities, and it is a business that can contribute directly to the resolution of social issues in the form of unused lumber left on mountains and local employment. Consequently, we look forward to helping facilitate the sustainable development of local communities and of the renewable energy industry by making a broad contribution to customer businesses based on technologies and comprehensive capabilities developed over many years, even as we keep tabs on factors such as discussions of an expected future review of the FIT program.

(Related SDGs)

Contributing to society through business activities

We're helping realize a sustainable society while working to resolve customers' issues as well as social problems through our business activities.

Promoting renewable energy

We're helping promote renewable energy by supplying biomass power plants.

Preserving the environment in the form of water, air, and mountain forests

We're helping preserve the global environment by supplying plants that utilize appropriate technologies and systems to protect the environment.

Making effective use of unutilized resources

We're helping realize a recycling-based society by supplying plants that can efficiently burn fuels and waste products that have gone underutilized in the past.

Reducing CO_2 emissions

We're helping realize a low-carbon society by supplying high-efficiency power plants.

Value provided by Takuma's Energy Plant Business

1. Plant engineering

We supply plants that can burn a variety of fuels and waste products in a stable manner over extended periods of time based on our extensive track record of deliveries.

Biomass power plants

We supply power plants that can utilize a variety of biomass fuels to operate in a stable manner over extended periods of time, including unused lumber, lumber waste, construction waste, PKS, pellets, livestock waste, bagasse, and papermaking sludge.

Facilities that incinerate industrial waste to generate power

We supply facilities that can recover heat in a highly efficient manner, including by using it to generate electricity, after burning even difficult-to-treat waste products in an appropriate manner.

2. After-sales service

We offer service designed to ensure that plants can operate in a stable manner over the long term based on our advanced technologies and extensive experience.

Maintenance

We offer proposals for, and carry out, plans for periodic inspections and maintenance, functional improvements, and preventive maintenance in order to maintain high plant performance and prevent unplanned stoppages.

O&M

We accept orders for operation, maintenance, and management over 20-year terms to reduce workload and life cycle costs so that customers can maximize the profitability of their businesses.

Main Recent Projects

The following are the main plants supplied by Takuma during FY2018.

Energy plants

KOBE BUSSAN CO., LTD.

Project name
Biomass Power Plant Construction Project

Capacity
Fuel: Wood fuel
Steam conditions (normal operation):
28 tons per hour × 5.98 MPaG × 425°C
Power output: 6,250 kW

Location
Hokkaido Prefecture

Ariake Co., Ltd., No. 2 Power Plant

Project name
Arao No. 2 Biomass Power Plant
New Construction Project

Capacity
Fuel: Wood fuel
Steam conditions (normal operation):
29.2 tons per hour × 6.0 MPaG × 425°C
Power output: 6,250 kW

Location
Kumamoto Prefecture

Mogami Biomass Power Co., Ltd.

Project name
Mogami Wood Biomass Power Plant
Generating System Construction Project

Capacity
Fuel: Wood fuel
Steam conditions (normal operation):
28 tons per hour × 5.98 MPaG × 465°C
Power output: 6,800 kW

Location
Yamagata Prefecture

Daisen Biomass Power Generation Co., Ltd.

Project name
Biomass Power Plant Construction Project

Capacity
Fuel: Wood fuel
Steam conditions (normal operation):
28 tons per hour × 5.98 MPaG × 480°C
Power output: 7,050 kW

Location
Akita Prefecture

Chugoku Mokuzai Co., Ltd., Hyuga factory

Project name
Chugoku Mokuzai Wood-fueled Boiler (No. 2)
Construction Project

Capacity
Fuel: Wood fuel
Steam conditions (normal operation):
24 tons per hour × 1.3 MPaG × 195°C

Location
Miyazaki Prefecture

SARA Inc.

Project name
SARA Power Plant Construction Project

Capacity
Fuel: Wood fuel, PKS
Steam conditions (normal operation):
50 tons per hour × 6.0 MPa × 425°C
Power output: 10,000 kW

Location
Okayama Prefecture

3.Overseas Business

Assessing changes in global trends in the overseas market to ensure we can continue to contribute to the development of industry in countries worldwide

Takashi Manabe
Managing Executive Officer
Executive Manager, International Division

Resolving issues by accommodating a diversifying array of needs

The International Division is responsible for sales of boiler plants and waste treatment plants in overseas markets. We take pride in the fact that promoting those businesses, which reduce greenhouse gases by making effective use of non-fossil fuels while contributing to the resolution of environmental issues through the appropriate treatment of waste, will help achieve the Sustainable Development Goals (SDGs) that Takuma is pursuing.

We've already delivered close to 400 biomass boilers to overseas customers. Nowhere is the viability of this business more apparent than in Thailand, where Takuma has a local subsidiary and where we have been supporting the sugar industry as well as other sectors of the economy for over 60 years. In the past, biomass boilers were used to provide heat and power for equipment at industrial plants, but today their role is diversifying as a recent global trend toward converting to renewable energy drives expectations that they will function as true power plants by taking on some responsibility for ensuring society's supply of electricity.

We've also delivered dozens of waste treatment plants overseas. In recent years, the appropriate treatment of waste has become a particularly urgent issue in developing nations. While environmental awareness, governmental programs, budgets, and other considerations vary from country to country, we're making preparations to ensure success in a careful and steady manner based on these and related developments, for example by formulating optimal schemes by which to pursue potential orders and develop projects.

Bringing necessary, valuable products to the international community

There is no doubt that plants that generate electricity using Takuma's core technologies to burn biomass and waste are earning recognition as both necessary and valuable in a society that's working to achieve the SDGs in a concerted manner. Although the business environment will remain intensely competitive, we will continue to contribute to the international community by developing latent customer demand in a fine-grained manner and supplying solutions that meet those needs.

(Related SDGs)

Overseas boiler plant business

The sugar business has been booming in Thailand, where Takuma has a local subsidiary. We have supported the industry for many years and have an extensive track record of supplying boilers that burn bagasse (fiber remaining after sugarcane is crushed) since our first delivery in 1959.

Going forward, we will continue to tap sure technology and fine-grained service based on our experience to date to help realize the biomass-derived, Earth-friendly supply of power in not only Thailand, but also in Indonesia, Vietnam, and other Southeast Asian countries.

*For more information on facilities delivered during FY2018, please see Feature 02, "Biomass Power Plant Construction Project in Thailand," on page 21.

Overseas waste treatment plant business

As emerging nations develop, they experience population growth and urbanization, causing waste-related issues to manifest themselves. Their environmental regulations and legal systems are also in a state of development, and inadequacies in information about waste and technologies for treating it mean these countries have high expectations for Energy from Waste technologies. We pursue sales activities, for example by studying information such as local systems and waste composition, so that we can meet those expectations by delivering waste treatment plants that satisfy customers.

As one example, during FY2018 we conducted a viability study of a project in the Indian state of Telangana by taking advantage of a Ministry of the Environment program. The results of the study, which we carried out along with local governments in Japan as part of a government-industry partnership and with the cooperation of local stakeholders in India, were reported jointly to the local government. By making effective use of a cooperative framework that brought together the Japanese and Indian governments, we were able to build a good relationship with the local government while discovering important information about local needs.

Takuma will continue to work to realize solutions to environmental problems by delivering waste treatment plants.

Waste composition study in Telangana

Main Recent Project (Waste treatment plant)

This section introduces one of the main projects that Takuma has delivered to date.

Lutsao Refuse Incineration Plant

Capacity
Incineration facility:
900 tons per day (450 tons per day × 2 units)
Power output: 28,000 kW

Location
Chiayi, Taiwan

Message

Naoya Akasaki

**Sales Section 2, International Department
International Division**

Waste issue offers challenges to all countries, but specific needs and conditions vary from country to country. In Asia, there has been a trend away from waste disposal, which has centered on landfill until now, and we believe that this constitutes a field in which Takuma's Energy from Waste technologies and experience can make a contribution. Continuous, stable operation is key to facilities that treat waste such as Energy from Waste plants, for example, as one type of local and environmental infrastructure. To that end, we will continue to work to ensure we can help resolve challenges in this field while deepening our understanding and pursuing cooperation with an array of local entities, companies, and other stakeholders from the "glocal" (think globally, act locally) perspective.

CSR Activities for the Future

Basic approach

To become a sustainable company while fostering and expanding a broader range of CSR activities, we began compiling a CSR activity roadmap in FY2011, which we have subsequently implemented over time. In FY2012, we chose a number of key issues based on international guidelines on corporate sustainability reporting published by the Global Reporting Initiative (GRI) as well as ISO 26000, an international standard on organizational social responsibility. We are currently working to resolve those issues.

Activity report for FY2018

Each department discussed CSR issues in line with those key issues and developed its own action program. At the end of the year, those departments then conducted self-evaluations to assess how well they had implemented their programs. (The table below outlines some of the results of that process.)

Future issues

Going forward, we plan to implement CSR activities using techniques that we consider appropriate while relying on guidance and advice from outside experts as we choose key issues and develop CSR issues and action programs.

The global business environment that characterizes the environmental and energy fields in which Takuma's business operates grows increasingly diverse day by day, and that environment remains one of intensifying competition. Our technological capabilities in the environmental and energy fields, which we have refined over many years of experience, form the basis of our CSR management as well as our greatest strength as we look to make a broad contribution to society. We will continue to draw on this strength in our activities going forward.

Sustainable Development Goals (SDGs)

Takuma is working to further progress toward the Sustainable Development Goals (SDGs) through its business activities.

Topics SDGs Initiatives

As part of a larger effort to address the Sustainable Development Goals (SDGs) by supplying environmental plants and energy plants as environmental products to customers, Takuma has launched a series of voluntary internal workshops that cut across organizational boundaries to facilitate discussions about how it can contribute to the SDGs through its business activities and in areas outside its businesses.

We look forward to pursuing the SDGs so that we can help build a sustainable society while assessing how Takuma's activities can make an even more significant contribution to the SDGs.

ISO 26000 core subjects	Key issue	CSR issue	Department		FY2018 action program: Action plan	FY2018 action program: Self-evaluation of results
Organizational governance	Corporate governance	Support for measures to increase the effectiveness of the Board of Directors	Planning Division		Conduct a questionnaire targeting directors in order to increase the effectiveness of the Board of Directors. Evaluate, analyze, and report on the results to facilitate useful discussions at Board of Directors meetings.	We conducted a questionnaire targeting directors and held interviews, evaluated and analyzed the results, and reported them to the Board of Directors.
	Compliance	Cultivation of a robust corporate culture	CSR Division		Share formulations of Takuma's basic approach, for example Management Principles, the Takuma Group Ethics Charter, and the Takuma Group Code of Conduct, and work to ensure that they permeate the organization and take hold.	We highlighted the Management Principles, the Takuma Group Ethics Charter, and the Takuma Group Code of Conduct in the CSR Report and in internal education and worked to ensure that they permeate the organization and take hold.
	Risk management	Risk management in times of disaster	General Affairs Division		Raise awareness among all employees of how to deal with actual disasters through drills involving Takuma's safety confirmation system.	We carried out drills involving Takuma's safety confirmation system in August 2018 and January 2019, achieving a response rate in excess of 95%.
	Employee training on social responsibility	Promotion of understanding (awareness) of social responsibility and recommendations of how employees can take the initiative to found their behavior on an awareness of social responsibility	Marketing Division		Have employees discuss what it means to take the initiative to found their behavior on an awareness of social responsibility internally in their own department in order to facilitate such conduct.	We held internal readings of the Takuma Group Ethics Charter and the Takuma Group Code of Conduct, worked to raise awareness of social responsibility, and sought to promote conduct that accords with ethical principles.
	Stakeholder engagement	Development of trusting relationships with customers	Marketing Division		Meet customer requirements in an appropriate manner by working to streamline communication with customers and among internal departments.	Results of the customer satisfaction survey conducted during the previous fiscal year were reported internally at the beginning of the fiscal year and relayed to the QM Committee. Evaluations of our coordinators exceeded targets.
Consumer issues	Safety and quality of products and services	Design of facilities that satisfy customers through safe, stable operation	Engineering Division		Utilize review lists and checklists, and carry out performance verifications during plant commissioning in order to achieve stable operation of facilities after handover.	We made use of reviews and checklists in the design process and verified that stable operation is possible during a performance verification carried out during the commissioning process prior to plant handover.
		Improvement of construction quality	Construction Division		Work to improve construction quality by carrying out voluntary inspections in the field and strengthening checks of the status of construction management in the field by internal coordinators.	Although we conducted at least one site construction management status check every month, additional work was added after the facility was handed over to the customer. In each case, we identified the cause and resolved it by taking steps to address it. While the number of such incidents increased compared to the previous fiscal year, all additional work was minor in nature, and we believe that we were able to effectively improve construction quality.
Fair operating practices	Compliance with the Antimonopoly Act	Assurance of understanding of, and compliance with, the Antimonopoly Act	Marketing Division		Offer training on the Antimonopoly Act and continue to implement the Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance.	We offered training on the provisions of the Antimonopoly Act and worked to ensure that employees understand the "Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance" and the "Regulations on Managing Contact with Competitors' Sales Departments" and that they will comply with those and other regulations.
Labour practices and human rights	Appropriate employment relationships and labor conditions (including safety and health, social dialog, etc.)	Enhancement and monitoring of health and safety initiatives at worksites	Safety Control Division		Prevent accidents requiring leaves of more than 30 days by worksite employees by conducting safety patrols along with construction departments, site officials, and partner companies and thoroughly implementing health and safety activities such as safety inspection planning.	A site employee responsible for marshalling traffic twisted his ankle on a grade difference at a worksite and broke a bone. It will be necessary to ensure employees exercise caution in the future regarding grade differences involving temporary equipment and the installation of suitable lighting.
		Improvement of work-life balance	Engineering Division		Improve work-life balance by encouraging employees to use alternative time off and annual leave time.	Despite being busy, we were able to foster awareness of the need to improve work-life balance and meet our targets in that area.
	Employee skill development (skill enhancement)	Training and skill development for employees	Engineering Division		Work to improve employee knowledge by sharing information about cases in which design defects have been caused by insufficient knowledge or experience at departmental and other meetings.	We worked to improve awareness by sharing information internally about examples of defects, their causes, and corrective measures, and applying that information to checklists and other tools.
Environment	Contributions to resolving environmental problems	Implementation of initiatives to reduce environmental impacts	Engineering Division		Formulate and propose plans for new technologies and businesses that would allow us to help reduce environmental impacts in the environmental and energy fields while differentiating ourselves from competitors in the same industry.	Although we achieved our goal, we will work to develop plans that will enable us to make a greater contribution to the environment.
		Initiatives to save energy and reduce CO_2 emissions	Engineering Division		Actively contribute to the resolution of environmental problems by pursuing measures to save energy and reduce CO_2 emissions at plants during the planning stage.	We actively proposed improvements incorporating measures to save energy and reduce CO_2 emissions.
Community involvement and development	Contribution to society	Contribution to the communities around our worksites	Engineering Division		Work to further beautify the neighborhoods in which worksites are located by encouraging employees to participate in local clean-up activities.	Employees have a high level of awareness of the importance of participating in volunteer clean-up activities, and many employees actively participated in such initiatives.

Corporate Governance

Corporate Governance

● Basic policy on corporate governance

In order to safeguard and steadily increase Takuma's corporate value over the long term, it is essential not only to ensure the development of the company's businesses, but also to clearly define governance in corporate operations—that is, to ensure that shareholders' oversight of operations is carried out appropriately and that officers carry out their operational responsibilities by means of a process that is clear, rational, efficient, and legally compliant. For that reason, we believe that understanding the Corporate Governance Code and putting it into practice in an autonomous and systematic manner are top-priority management issues.

● Board of Directors

As of June 26, 2019, the Board of Directors was comprised of six directors (excluding directors who are members of the Audit & Supervisory Committee) and five directors (of whom four were outside directors). The Board of Directors meets regularly once a month as a rule and whenever else it is necessary to make decisions about important issues related to business management and issues established by law and ordinances, as well as to oversee the execution of the directors' duties.

Directors	Including the following outside directors:
11 (10 men and 1 woman)	4 (3 men and 1 woman)

● Executive Officers

In order to accelerate management decision-making and clarify where management responsibilities are placed, we have adopted an executive officer system in which we appoint executive officers who are entrusted with the responsibility of executing our business activities. As of June 26, 2019, there were 15 executive officers (including those who also serve as directors). Moreover, we have also established a Committee of Executive Officers, which is chaired by the president/chief executive officer, as an organization that deliberates matters that are brought up at meetings of the Board of Directors and other important issues related to the execution of our business activities. This committee communicates and provides direction about items decided by the Board of Directors and other important items related to the execution of our business activities appropriately to the divisions that are to execute them.

● Audit & Supervisory Committee

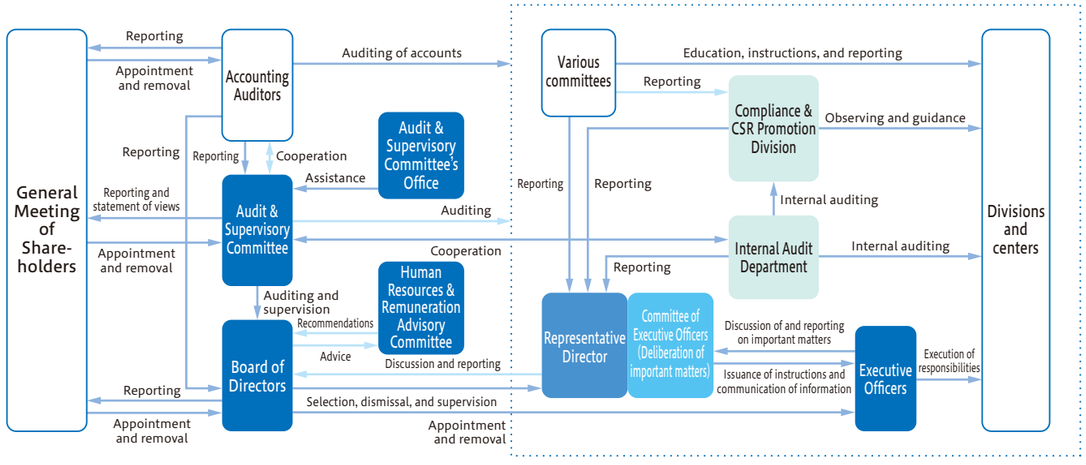
An Audit & Supervisory Committee that consists of five members, of whom four are outside directors, is responsible for accounting and operational audits. Members of the committee attend important meetings, including those of the Board of Directors and the Committee of Executive Officers, and they strive to understand and observe the status of business execution in a timely and appropriate manner. Drawing on their professional background and experience, they express their opinions as necessary from an objective perspective, and they conduct strict auditing of the business execution performed by the directors. To facilitate the effectiveness of audits carried out by the Audit & Supervisory Committee, the representative director holds regular meetings with committee members to ensure good communication.

● Audit & Supervisory Committee's Office

Takuma has established an Audit & Supervisory Committee's Office to help carry out the committee's work.

● Human Resources & Remuneration Advisory Committee

To augment the above structures, we have established a Human Resources & Remuneration Advisory Committee comprised of independent officers, representative directors, and the officer in charge of human resources. The purpose of the committee, a majority of whose membership consists of independent outside directors, is to increase transparency and objectivity in the selection of candidates for director and executive officer positions and in the determination of the compensation and other terms so as to enhance the oversight function of the Board of Directors.



Corporate governance structure (As of June 26, 2019)

Internal Control

Takuma has adopted a Basic Policy for Establishment of an Internal Control System (the full text is available on our website) in accordance with the Companies Act. We continue to review and improve this policy in response to changing circumstances.

Working towards thorough compliance, Takuma built a compliance promotion organization in FY2006 in order to continuously implement enlightenment and educational activities that make corporate ethics, related laws and ordinances, and internal rules fully understood. To control the danger of loss, we have also prepared a "Risk Management Code" that determines the person in charge of each risk, and we set up our risk management organization according to that Code. When the unexpected occurs, emergency headquarters are established with the company president as the director in charge of risk management, and an organization is put in place in order to minimize and prevent further damage through prompt action.

Internal control, constructed and evaluated in order to report on and prevent misstatements in our financial reporting, is based on the Financial Instruments and Exchange Act. This internal control on financial reporting for the Group has resulted in reports that indicate this system has been effective.

In this way, we will continue to work in the future to ensure thorough compliance while carrying out business properly and efficiently while also deepening risk management.

Compliance & CSR Promotion Structure

● Basic approach

Led by the department in charge of compliance and CSR promotion (CSR Department), Takuma aims at encouraging that activity through the Compliance & CSR Promotion Organization that was installed for the purpose of enabling compliance and CSR to concretely permeate company-wide through an in-house organization.

This organization is composed of a chairman (the Executive Manager of the Compliance & CSR Promotion Division), a secretariat (positioned in the CSR Department), and an executing organization in each division, center, and department. As the person in charge of promoting compliance and CSR in his or her division, each division or center manager is appointed as a Compliance and CSR Promotion Administrator. As persons who implement awareness and education in compliance and CSR in their respective departments, department managers are appointed as Compliance and CSR Promoters. The meetings conducted within this mechanism include regular meetings and departmental meetings.

● Regular meetings

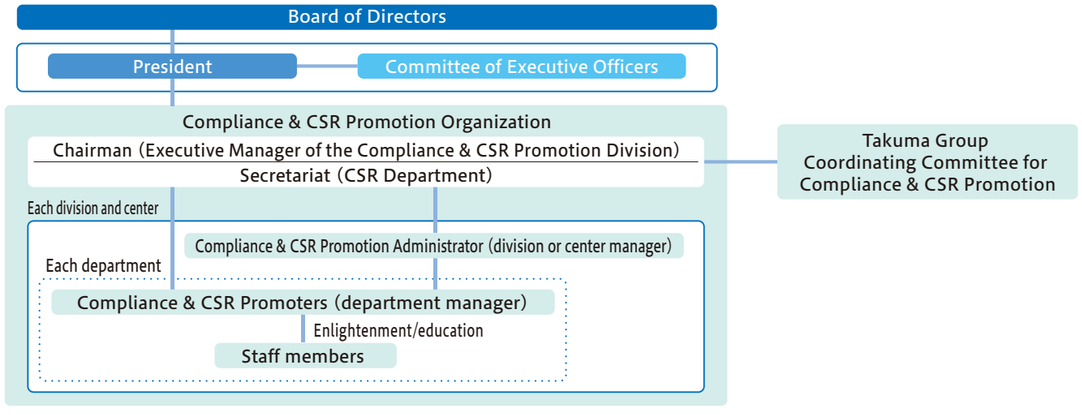
Regular meetings are held once a year. The person in charge of promotion receives reports on the status of compliance and CSR promotion company-wide, as well as on the status of the implementation of compliance and CSR promotion education for the past year, etc., and participants deliberate on a promotion plan for the current fiscal year.

● Departmental meetings

Promotion members convene departmental meetings once a quarter, with educational training aiming at the permeation of compliance and CSR in each department. After departmental meetings, promotion members implement compliance and CSR promotion education in their respective departments using training materials or in-house educational materials and report the result to the Secretariat.

● Takuma Group Coordinating Committee for Compliance & CSR Promotion

We are pursuing awareness-raising and educational activities targeting group companies through our Takuma Group Coordinating Committee for Compliance & CSR Promotion to ensure thorough compliance and risk management throughout the Group. During FY2018, we invited representatives of group companies to participate in two meetings of the committee.



Compliance & CSR promotion structure

Corporate Governance

Risk Management Structure

Takuma follows a “Risk Management Policy” that connects company-wide risks and separately classifies them into “project risks” related to our core business, i.e., plant construction; “DBO project risks” and “DBO project operation, maintenance and management risks” related to our DBO business; and “potential risks,” “actualized risks,” and “financial reporting risks” related to other corporate business activities.

We are also building a risk management organization and constructing a system of risk management and promoting the strengthening of management for group companies as well through our Takuma Group Coordinating Committee for Compliance and CSR Promotion.

Risk Management Policy

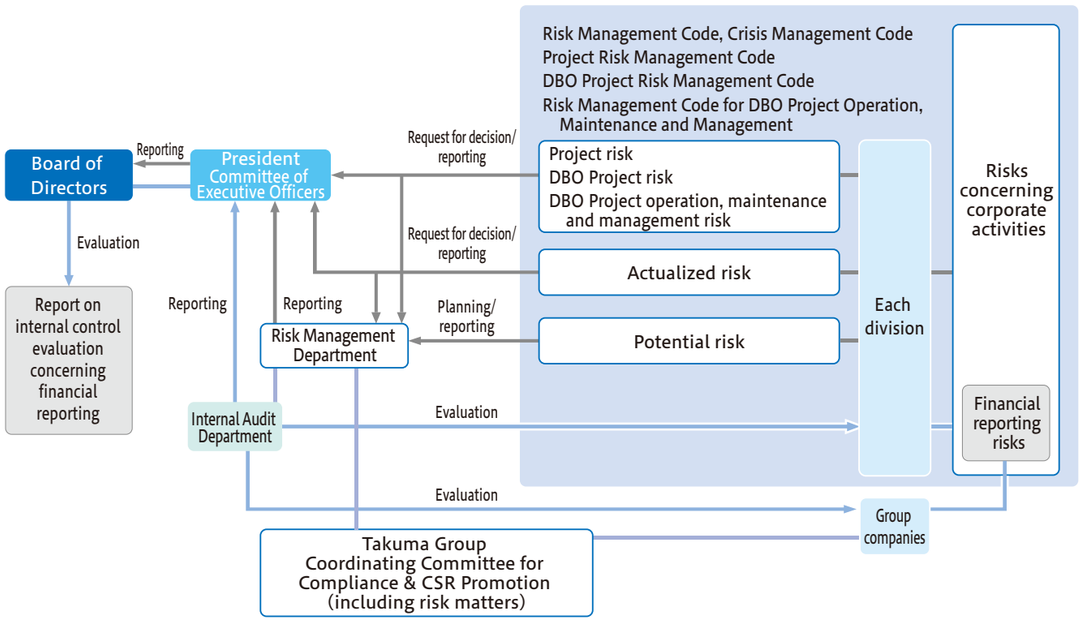
[Basic purpose of risk management]

Risk refers to all phenomena that interfere with the Group’s ability to achieve its business objectives or cause losses or harm to the interests of stakeholders.

The Takuma Group practices risk management with the goal of increasing its corporate value by working to maximize returns while minimizing the negative impacts of risk.

[Risk management action guidelines]

1. The president and CEO is responsible for risk management at Takuma.
2. All officers and employees participate in risk management activities.
3. Risk management activities are carried out in accordance with applicable guidelines such as the Risk Management Rules.
4. Risk management activities are carried out in line with the Medium-Term Management Plan and annual plan, and we work to make improvements on an ongoing basis.
5. When risk manifests itself, we respond by taking responsible action quickly to minimize any damage and creating provisional organizational entities as necessary.
6. Group companies carry out risk management activities in accordance with their own policies and plans, with support from Takuma.



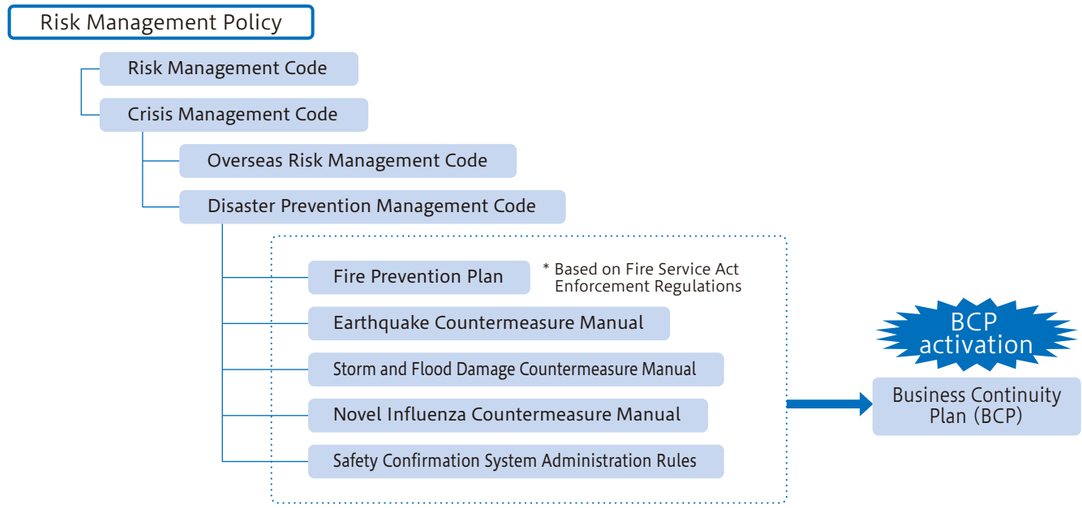
Risk management structure

Business Continuity Plan (BCP)

Takuma has formulated a “Business Continuity Plan” based on the following policies to ensure proper and appropriate continuity of business operations in the event of a large-scale disaster, pandemic, or other emergency:

1. In addition to implementing disaster-related measures to secure the safety of corporate officers and employees, maintain structures so as to enable continuity of business operations while minimizing damage in an emergency.
2. Strive to respond to customer needs and recover from damage quickly by working closely with suppliers and partner companies to continue business operations.
3. Earn the trust of numerous stakeholders, including employees, their families, shareholders, and nearby residents, and fulfill social needs by continuing business operations.

【Disaster rule system diagram】

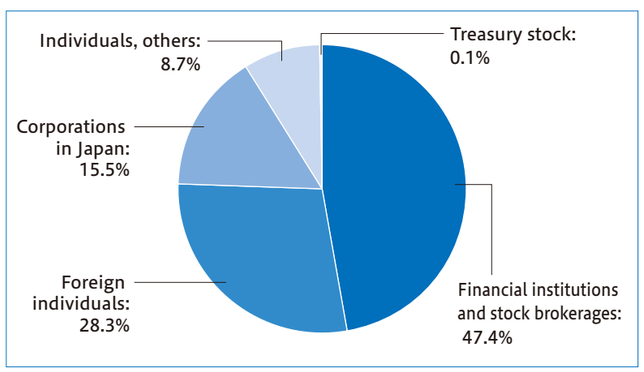


IR Activities

In keeping with the “Takuma Group Code of Conduct,” we provide our shareholders and investors with accurate corporate information in a timely and fair manner. As a part of this, we provide notifications on the convening of General Meetings of Shareholders, balance sheet information, timely disclosure information, marketable securities reports, shareholders reports, annual reports in English and other business information, all on our website.

[Takuma website > IR information]
https://www.takuma.co.jp/english/investor/index.html

Shareholders Report



Composition of shareholders (as of March 31, 2019)

Corporate Governance

Directors

(Back row, from the left)

Minoru Murata
Outside Director
(Audit & Supervisory Committee Member)

Osamu Iwahashi
Outside Director
(Audit & Supervisory Committee Member)

Tomomi Fujita
Outside Director
(Audit & Supervisory Committee Member)

Hiromichi Satake
Outside Director
(Audit & Supervisory Committee Member)

Yasushi Enomoto
Director
(Audit & Supervisory Committee Member)

Hideki Takeguchi
Director
Senior Managing Executive Officer

Kengo Numata
Director
Executive Vice President

Takaaki Kato
Director
Chairman
Executive Officer

Hiroaki Nanjo
Representative Director
President and
Chief Executive Officer

Tsuyohito Nishiyama
Director
Senior Managing Executive Officer

Koji Tanaka
Director
Executive Officer

Executive Officers

Takashi Manabe
Managing Executive Officer

Ryoji Tani
Managing Executive Officer

Norito Uchiyama
Managing Executive Officer

Mitsuaki Adachi
Managing Executive Officer

Akira Taguchi
Executive Officer

Hidetoshi Tomita
Executive Officer

Norio Maeda
Executive Officer

Kunio Hamada
Executive Officer

Keiji Nakamura
Executive Officer

Message from a New Outside Director

Tomomi Fujita

Outside Director
(Audit & Supervisory Committee Member)

I've been involved with corporate legal affairs for about 15 years as an attorney. During that time, an especially large proportion of my work has centered on legal work involving manufacturing companies (including consultations, negotiations, and lawsuits involving intellectual property rights and various domestic and international transactions). In addition to teaching a weekly class through a semester at Kyoto University Law School as a lecturer, I serve as a director of the Licensing Executives Society Japan, whose membership includes top corporate management and leaders, businesspeople, attorneys, patent attorneys, and scholars.

I'm looking forward to taking advantage of my experience and legal knowledge to contribute to the growth of Takuma, Japan's leading plant and boiler manufacturer.

Takuma has integrated many objectives related to the 17 Sustainable Development Goals (SDGs) that were adopted at a United Nations summit in 2015 into its businesses, particularly clean water and sanitation (Goal 6), affordable and clean energy (Goal 7), and protection of the natural environment (Goals 14 and 15). Takuma's business, and the role it plays in society, will likely become increasingly important going forward. It is a great honor for me to be chosen to serve as an outside director (specifically, as a member of the Audit & Supervisory Committee) at Takuma in a new era such as the one we face today, and I will do my best to fulfill my role.

Other SDGs include gender equality (Goal 5) and economic growth and productive employment (Goal 8). As a female outside officer, I hope that I will be able to further improve Takuma's corporate value by helping to tap the potential of a diverse workforce that includes woman and boosting productivity.

Respect for Human Rights and the Abolition of Discrimination

Our company sets out its respect for basic human rights and prohibition of discriminatory acts in the Takuma Group Ethics Charter, Takuma Group Code of Conduct and labor regulations. In addition, we also support respect for human rights, without contributing to human rights violations, elimination of forced labor/child labor and the abolition of discrimination through participation in the UN Global Compact. We are also working to promote employment of disabled and elderly individuals.

- **Takuma Group Ethics Charter (excerpt)**
  4. We shall respect fundamental human rights and never practice discrimination.
- **Takuma Group Code of Conduct (excerpt)**
  【Respect for basic human rights】
  9. Prohibition of discriminatory actions
  10. Respect of individuality, personal quality and privacy
  11. Safe work environment

Working with Our Employees

The 12th Medium-Term Management Plan, which began in FY2018, sets forth a series of measures to address our workforce, which is an essential resource and the foundation of all efforts to advance our businesses. Top priority is given to pursuing hiring and training, and to creating an environment in which to ensure each and every employee enjoys an engaging and motivating work experience while giving full play to all of his or her abilities over the long term.

Employee data

Number of employees	852 (including 784 men and 68 women)
Average age	43.3
Average years of service	15.4
Attrition rate	6.3% (past 3 years)

*As of March 31, 2019

Employee retention programs

Takuma is involved in a variety of employee retention programs to ensure employees remain at Takuma over the long term.

Workstyle reform initiatives

- **Initiatives to boost productivity**

In addition to working to review business processes and streamline and improve operations in individual departments, we're working to boost productivity by deploying a videoconferencing system and automating work by means of RPA.

Using RPA tools to streamline operations

Environmental Engineering Department 1 is responsible for planning municipal solid waste treatment plants. The process of planning optimal plants that align perfectly with customers' needs requires an extremely large number of complex calculations that span multiple files. Among those calculations are operations in which input parameters must be varied little by little in an effort to search for the optimal system, with the result that the process has many, simple steps. To reduce the amount of time taken up by these calculations, we have deployed robotic process automation (RPA) tools, and we succeeded in saving about 1,000 hours by means of that approach during FY2018.

- **Putting in place an environment that encourages employees to take annual leave**

As a way to promote mutual understanding and cooperation, employees announce their plans in advance for five of their annual paid time off days to their counterparts in the workplace. This initiative is conceived to allow employees to take advantage of paid time off in a well-planned manner.

Initiatives to promote the participation of female employees in the workplace

We're working to deepen women's understanding of Takuma while boosting the number of female applicants and hires through such means as including content specifically for female college students on our website and hosting information meetings just for female students.

In addition, we're working to increase the number of female employees in management positions and the number of female employees on the main career track (including individuals who have been tentatively offered positions) as of March 31, 2021, to 20, which would be double the corresponding number as of March 31, 2016, by putting in place a workplace environment that facilitates flexible workstyles and continued employment.

- **Number of newly hired graduates over the last 5 years by gender (main career track)**

	FY2015	FY2016	FY2017	FY2018	FY2019
Men	19	18	19	17	16
Women	1	1	2	2	2
Total	20	19	21	19	18

Child-raising and nursing care support measures

We offer the following work programs as measures to help employees balance work demands with their child-raising and nursing care responsibilities.

- **Nursing care leave**
- **Child-raising and nursing-care leave**
- **Reduced working hours program**
- **Flex time program**
- **Telework program**

Impressions from an employee who has taken advantage of Takuma's child-raising leave (male, 20s, engineering position)

Because our first child still requires a lot of care at age 3, I took child-raising leave for about 11 months starting one month after our second child was born so that my wife could go back to work. I consulted with my supervisor before returning to my position, and now I'm working in the same department as I was before I took the leave. Thanks to the support of my supervisor, colleagues, and the company, I've been able to participate in the same work as I did before taking the leave.

Employee health initiatives

In addition to stress checks and examinations to assess the risk of adult-onset diseases, our annual health checkups include cancer and gastric checks for employees who wish to have them.

We also hold health consultations by an occupational physician (once a month) and counseling sessions by a clinical psychologist (twice a month) as part of our commitment to facilitating employees' physical and emotional health.

We encourage employees with excessive working hours to meet with an occupational physician for guidance. The Human Resources Department also interviews such employees and their supervisors so that we can study and implement corrective measures after the cause of the excessive hours has been pinpointed.

Supporting employee skill development

Grade-specific educational programs

We're working to enhance employee ability, technological skills, and management capability by offering grade-specific educational programs, from new hires to management candidates.

New-employee training → Technical presentation by 2-year employees → Thesis discussion by 5-year employees → Presentation by 10-year employees → Mid-career training → Management training

Technical training sessions

We hold several technical training sessions a year in order to increase employees' technical knowledge, including lectures by university professors and outside researchers and presentations by Takuma engineering employees about their work responsibilities and research themes.

Support for skill development

To support employee skill development, we reimburse employees for the cost of acquiring various licenses and offer incentives for earning professional certifications.

Language education

To improve employees' language skills, we host the TOEIC test twice a year and offer incentives to employees who earn a high score.

Working with Our Employees

Systems designed to boost employee motivation

Objective management and human resources evaluation system

At the beginning of each fiscal year, operational goals are determined based on departmental policies and individual employees' work issues and expected roles. A mid-year interview in September and annual review interview the following March offer opportunities for supervisors to offer feedback to their subordinates by evaluating their job performance and to receive advice and requests from employees. In this way we strive to foster subordinates' abilities and improve their motivation through communication between supervisors and their subordinates.

Self-reporting system

We have introduced a self-reporting system that allows employees to communicate their thoughts on topics such as their future career path directly to the company every three years. Through this system we are working to assess employees' awareness, needs, and issues and to apply that information to human resources measures.

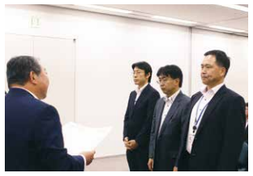
Work group transfer system

We have created a work group transfer system to facilitate movement from clerical and labor positions to the main career track so that motivated and skilled employees can make use of their abilities. We also provide opportunities for employees to be promoted to management positions.

In-house commendation system

Each year on June 10, we hold an awards ceremony to commemorate the anniversary of the company's founding.

- **Takuma Prize:**
  Employees who have helped improve operations or who have exceptional achievements in community service
- **Invention and idea commendations:**
  Employees who have earned patents or other intellectual property rights
- **Safety and Health Award in Construction Division:**
  Foremen at sites without accidents or damage
- **Takuma Technical Review Outstanding Paper Award**
- **Qualifications acquisition commendations**
- **Length-of-Service Award**
  (every 5 years of service after 20 years)



Promoting employment of senior citizens

We have put in place programs to offer employees who have left the company after reaching retirement age reemployment at Takuma and group companies up to age 65.

- **Number of reemployed individuals over the past 5 years**

	FY2014	FY2015	FY2016	FY2017	FY2018
Number of employees reaching retirement age	12	11	3	5	11
Number of employees desiring reemployment	10	10	2	5	10
Number of reemployed employees	10	10	2	5	10

Social welfare programs

We have introduced a number of social welfare programs designed to meet a diverse array of employee needs.

- **Cafeteria plan:**
  Employees receive a fixed "benefits budget" from the company to spend by choosing from a menu of options including support for self-study, child-raising and nursing care, healthy living, and asset-building.
- **Employee Shareholder Association:**
  Employees can combine contributions that are automatically deducted from their salaries and bonuses provided by the company to purchase Takuma shares.

Efforts for Occupational Safety and Health

Occupational safety and health initiatives

Since FY2006, we have introduced TK-COHSMS based on an occupational safety and health management system for the construction industry and worked actively and independently to improve our safety and health activities. We believe that among these efforts, the manner in which (1) safety inspections, (2) mandatory safety and health education (education for construction site representatives), and (3) creation of pre-work safety procedure checklists known as SSAs have been steadily adopted by all departments and used to consistently improve the level of knowledge about Takuma's safety and health is particularly noteworthy.

We have adopted the following safety and health objectives for FY2019: for construction sites, eliminating accidents that result in work stoppages (of four or more days); for branches, pursuing a thorough program of safety and health education, ensuring adherence to safety inspection guidelines, and implementing the branch safety patrol plan; and for the Safety and Health Cooperative Association, strengthening collaboration with partner companies. We will work to revitalize safety and health activities throughout the company by carrying out that role.

Rather than contenting ourselves with the status quo, we will pursue new safety and health initiatives to foster a deep awareness of the concept that underlies our safety and health policy — "understanding the need for respecting people and giving top priority to safety and health" — on the part of everyone who's involved in our operations.

Safety and health activities and their results

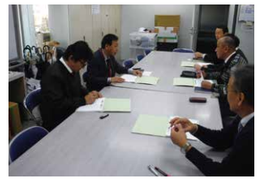
Safety inspection system

We maintain a system where any construction or installation work starts only after the safety and health manager or other responsible official in each department conducts a successful safety inspection based on safety and health plans for the construction or installation work as prepared by our primary partner companies.

We strive to ensure a safe work environment at all construction sites by eliminating potential hazards and risk factors identified by those inspections before work begins.

- **FY2018**

Number of safety inspections done: 163
(Initial inspection pass rate: 95%)



A safety inspection meeting

Safety patrols and safety talks

Based on an annual plan, safety patrols are carried out at worksites by the Safety and Health Committee (comprised of committee members and advisors), Safety Control Department, and construction division along with safety talks in a precisely targeted and efficient manner.

Safety patrols focus on identifying and eliminating risks as early as possible, while safety talks are conceived to prevent occupational accidents and raise employees' safety awareness by offering an opportunity to hand out and explain materials such as examples of accidents. Both programs help ensure safety at worksites in the field.

- **Number of safety patrols implemented in FY2018**

By Safety and Health Committee (members, advisors) : 47
By Safety Control Department : 267
By construction division : 334

Safety patrols

Safety talks

Safety and health education (education for construction site representatives)

We continuously provide specialized safety and health education at branches and worksites to increase the levels of safety awareness and knowledge of our employees and partner companies.

As indicated at right, more than 17,500 trainees have passed the completion exam. We are involved in a variety of initiatives to put in place mechanisms for preventing accidents, including by assigning workers with extensive knowledge in areas such as safety-related laws and ordinances to individual construction sites.

- **April, 2004 to March, 2019**

Cumulative number of trainees : 34,078
Number of trainees passing the completion exam : 17,621

Head Office venue

Tokyo Branch venue

Efforts for Occupational Safety and Health

Safety and Health Meeting

Takuma holds a Safety and Health Meeting to bring workers with safety- and health-related responsibilities together to improve and share their safety and health awareness with the goal of ensuring worker safety and health and promoting the development of a pleasant work environment.

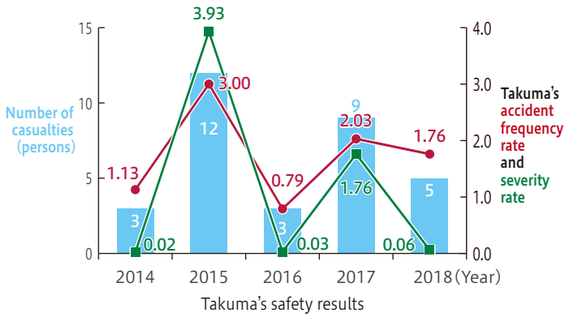
During FY2018, we recognized subcontractors that helped achieve our zero-accident record at worksites, held a lecture entitled "Key Revisions to Safety Belt Standards," and hosted a talk by a guest lecturer entitled "Health and Safety Activities Incumbent upon Managers: Considering Risk Assessment and Human Error." In addition, safety and health partner companies gave presentations on their safety and health policies and goals, and all participants closed the meeting by chanting the FY2018 slogan and pledging to continue to work toward thorough safety and health management by utilizing TK-COHSMS.

Presentation of a zero-accident record award


Pointing and chanting of the slogan by all participants

Takuma's safety results in recent years

In 2018, the total number of worked hours fell by about 64% compared to 2017. In addition, the total number of occupational accidents and accidents leading to missed workdays fell about 60% of the 2017 level. However, the total number of occupational accidents held constant in the two-digit range for the five-year period starting in 2014. In addition to enhancing our safety and health management structures in order to halt this trend, we will work to ensure even more thorough risk management through a unified effort by all involved so that we can redouble our resolve to eliminate occupational accidents.



Takuma's safety results

Year	Accident frequency rate	Accident severity rate
2014	0.91	0.07
2015	0.92	0.21
2016	0.64	0.11
2017	0.81	0.18
2018	1.09	0.30

* Accident frequency rate
Indicates the frequency with which accidents occur as the number of fatalities caused by occupational accidents per 1 million actual working hours.

$$\frac{\text{Number of casualties}}{\text{Total actual working hours}} \times 1{,}000{,}000$$

* Accident severity rate
Indicates the seriousness of accidents as the number of work-days lost per 1,000 actual working hours.

$$\frac{\text{Total work-days lost}}{\text{Total actual working hours}} \times 1{,}000$$

Reference: Nationwide accident frequency and severity rates for the construction industry (general construction)

Topics **Takuma receives Outstanding Construction Contractor Award and Outstanding Engineer Award**

In November 2018, Takuma was recognized as an Outstanding Construction Contractor for the Imabari New Waste Treatment Facility Maintenance and Operation Project/Imabari City New Waste Treatment Facility Construction Project, which was completed in FY2017. In addition, Takuma's site manager for the work was recognized as an Outstanding Engineer.

The pair of awards, which the City of Imabari offers to recognize outstanding construction contractors and engineers that serve as a model for others in construction technology, site superintendence, and other areas of their performance in construction work ordered by the City, are conceived to help ensure construction projects are carried out in an appropriate manner and to improve associated technologies.


Conferment of the awards by Mr. Ryoji Kan, Mayor, Imabari City

Message from a partner company

Mr. Yuichi Nakayama
General Manager
Tobu Crane Service Center
Hitachi Plant Mechanics Co., Ltd.

We're a general manufacturer of industrial cranes. Our goal is to supply products that meet customer needs with an integrated system that encompasses design, manufacture, and after-sales service, and we've been responsible for manufacturing and providing after-sales service for the ceiling-mounted waste feed cranes in Takuma's Energy from Waste plants for many years.

Recently, from August through October 2018 we replaced the traveling rails of the waste feed cranes and the fall prevention safety net at the Shinkoto Waste Treatment Plant operated by the Clean Authority of Tokyo.

As their name suggests, ceiling-mounted traveling cranes are installed near the ceiling, making construction potentially hazardous due to the need to work at a height. Consequently, construction guidelines that value safety are critically important. For this project, we reduced the risk of falls by holding study group meetings before work started with partner subcontractors, installing a temporary handrail and multiple safety ropes on the runway, installing two man lifts on the hopper floor, and ensuring that all workers used two safety belts.

The work we carried out required great care and compliance with safety standards based on Takuma's safety inspection program, and we were able to complete it without incident or accident thanks to Takuma's guidance, which the company offered in the form of daily meetings, joint safety patrols, and other means.

We look forward to working to ensure safety in a way that meets Takuma's expectations in the future based on our safety slogan: "Build an uncompromising safety culture that does not accept unsafe conditions based on thoughtfulness toward coworkers' safety."

Message from Takuma's Purchasing Department

Shinobu Takahashi
Associate Director
Purchasing Department
Takuma Co., Ltd.

Hitachi Plant Mechanics Co., Ltd., supplies products including waste cranes, which are a key component at our waste incineration plants. We're deeply grateful for the company's excellent record of cooperation with our health and safety activities at construction sites, including new installations as well as overhauls and other work.

Work involving cranes at waste incineration facilities is associated with an extremely high level of risk due to the fact that the work must be carried out in constricted areas and at a height. The magnitude of this risk is borne out by the accident record, and we require subcontractors to take a rigorous approach to safety management at sites. In asking Hitachi Plant Mechanics to handle replacing the traveling rails for the waste feed cranes and the fall prevention safety net at the Shinkoto Waste Treatment Plant last year, we imposed numerous requirements at a worksite where worker tension was aggravated by the effects of an accident that had occurred the previous year. The company took those requests seriously and complied appropriately.

The sequence of work required by the project was completed without accident thanks to an approach that included a variety of measures, for example applying the characteristics of the site as assessed in advance surveys into safe work procedures. I'm confident that Hitachi Plant Mechanics developed a shared understanding of Takuma's approach to health and safety.

Going forward, I hope that Hitachi Plant Mechanics will join Takuma in working to continue our zero-accident record by cooperating to implement thorough risk management at all sites where the two companies work together and by further deepening our shared awareness of health and safety.

The Environment

Basic Environmental Policy

Our company has established the “Basic Environmental Policy” as follows, aiming to ensure employees contribute to global environmental conservation. This basic policy applies to the activities of all company departments.

Environmental Philosophy

Takuma is committed to preserving the environment and realizing an affluent society through business activities under the Company Motto: “Value Technology, Value People, Value the Earth.”

Operational Guidelines

1. All Takuma Group companies will recognize the importance of maintaining a balance between preservation of the environment and business activities.
2. Continuously develop activities to preserve the environment that comply with applicable environmental laws and ordinances, and ensure environmental control and assessment systems conform to international environmental standards.
3. Promote development of improved technologies and products for society that preserve the environment.
4. Address resource conservation, energy efficiency, recycling, and minimization of waste generated by all business activities.
5. Improve employee awareness and understanding about the importance of preserving the environment through environmental education and internal promotional activities.
6. Provide the community with information on the activities of Takuma to preserve the environment.

Environmental Management

● The situation concerning the acquisition of ISO 14001

Our Harima Factory has acquired ISO 14001 certification and has been implementing environmental management activities based on an environmental management system established to comply with international standards.

Our group companies Nippon Thermoener Co., Ltd., Takuma Technos Co., Ltd., Hokkaido Sanitary Maintenance Co., Ltd., and Dan-Takuma Technologies Inc. have also acquired ISO 14001 certification.

Harima Factory

Takuma’s CO_2 Emission Reduction Technologies

We convert waste/biomass into energy and reduce CO_2 emissions!

In 1 year, Takuma products cut about 5 million tons!

Equivalent to the CO_2 absorbed by about 350 million Japanese cedar trees*: Assuming one Japanese cedar tree absorbs 14 kg of CO_2 per year.
(*Equivalent to a cedar forest the size of 7,500 Tokyo Domes, assuming each tree takes up about 1 square meter of space.)

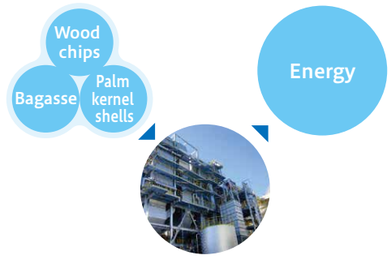
Reducing CO_2 emission with biomass power plants

The sugar industry is an example of an industry that generates power using biomass. Factories that make sugar produce large quantities of residue from sugarcane, the raw material used to make sugar. Sugarcane is crushed into a pulp, and sugar is extracted in a mill. The remaining fiber is called bagasse and can be used as plant fuel. The steam and electricity generated by the plant are used as sources of heat for the milling process and of power for plant operations, while surplus power is sold back to a power company. The amount of power generated at sugar factories has grown greatly, with examples of single plants that generate 50,000 kW.

In 1 year, down about 4 million tons!
CO_2 emission reduction achieved by Takuma’s biomass power plants
(as of end of FY2018)

● What is biomass?

Biomass is any recyclable organic material derived from a living organism, but does not include fossil fuels, such as oil and coal. For example, even though CO_2 is emitted if wood chips are incinerated, when trees grow again, they absorb CO_2 to offset the emissions from incineration, so there is no increase in CO_2 in the atmosphere. Biomass power generation helps reduce the amount of electricity generated from fossil resources, helping lower CO_2 emissions.



Biomass power plant

CO_2 emission reduction from waste incineration plants

Garbage, or waste, is an important source of energy. About 500 kW** of power can be generated from one ton of garbage. In Europe and the Americas, waste incineration plants are often called Energy from Waste (EfW) plants, and recovering energy from garbage has become the norm. Waste must be seen as a “resource,” so Takuma is seeking to be the best in the world with our technologies to convert waste into energy and reduce CO_2 emissions.

In 1 year, down about 1 million tons!
CO_2 emission reduction achieved by Takuma’s municipal solid waste incineration plants
(as of end of FY2018)

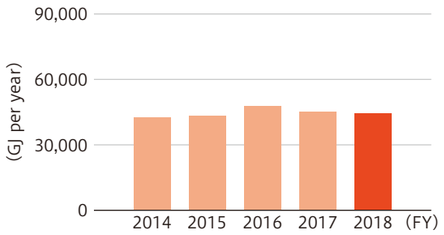
** Presumes waste with a calorific value of 8,800 kJ per kg and a power generation efficiency of 20%

Environmental Reporting

Takuma reports the environmental impact of its business activities as well as the manner in which it takes environmental considerations into account in accordance with the Environmental Reporting Guidelines (issued by the Ministry of the Environment). This environmental reporting program includes not only environmental information extracted from our overall business activities from an environmental standpoint, but also information about related economic and social aspects of those activities.

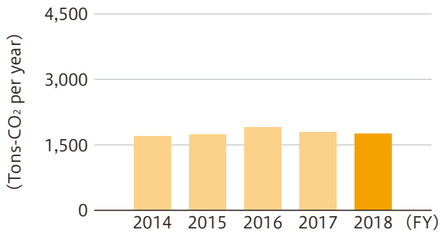
Environmental data (non-consolidated)

Total energy consumption



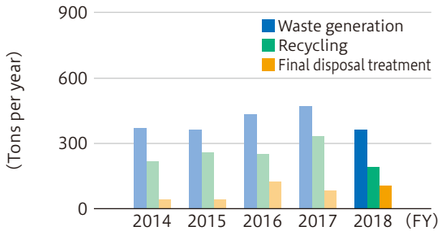
The total energy consumption of the fuel and the electricity consumed at Takuma during FY2018 fell slightly compared to FY2017 levels. We will continue to promote energy savings from here on out.

Greenhouse gas emissions



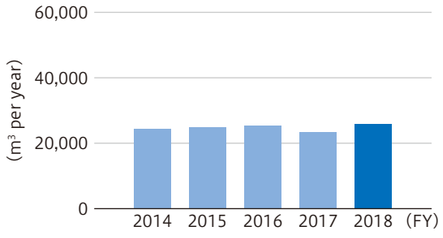
The greenhouse gas emissions created by our company are limited to carbon dioxide (CO_2). The amount of CO_2 emissions in FY2018 fell slightly compared to FY2017 levels. We will continue striving to reduce CO_2 emissions.

Waste generation



Our company sells recyclables and reusables from the waste generated through its business activities to scrap dealers, while outsourcing the treatment of non-recyclables and non-reusables to haulers, processors and final disposal dealers, in accordance with the Industrial Waste Control Manifest system.

Water usage



Water consumption during FY2018 rose slightly compared to FY2017. Going forward, we will work to lower our water use.

PRTR target substance emissions

Although our business activities do not involve a wide variety of chemical substances on a massive scale, we use a few designated chemical substances. Consequently, we report and register such chemical substances designated under the Pollutant Release and Transfer Register (PRTR), in accordance with relevant laws and ordinances, with the local government.

Dichloromethane (CAS No. 75-09-2)

FY	2014	2015	2016	2017	2018
Emissions (tons per year)	0.3	0.4	0.4	0.5	0.3

Xylene (CAS No. 1330-20-7)

FY	2014	2015	2016	2017	2018
Emissions (tons per year)	3.4	2.2	2.9	1.2	1.1

Toluene (CAS No. 108-88-3)

FY	2014	2015	2016	2017	2018
Emissions (tons per year)	0.08	0.26	0.09	0.07	0.06

These materials are used for antirust painting of boiler structures and so on.

Environmental accounting

Environmental accounting is the process by which companies and other entities recognize the cost of environmental conservation in their business activities as well as the effects of those activities and measure and communicate them in as quantitative a manner as possible (either in terms of monetary amounts or amounts of materials) with the goal of pursuing environmental conservation initiatives in an efficient and effective manner while maintaining a good relationship with society so as to facilitate sustainable development. In FY2006, we introduced and disclosed our own environmental accounting system based on the "Environmental Accounting Guidelines 2005" issued by the Ministry of the Environment. As our business activities mainly involve environmental conservation plants and their equipment, Takuma Group employees have a significant awareness of the need for environmental conservation, and we have been implementing approaches toward such issues within the Takuma Group.

Environmental conservation cost

According to the "Environmental Accounting Guidelines," environmental conservation costs measure on a monetary basis investments and expenditures on preventing, controlling, or avoiding environmental impacts, eliminating their effects, recovering from associated damage, and initiatives to aid in the same.

Item	Investment (thousand JPY)	Costs (thousand JPY)
Business area costs		
Pollution prevention costs	2,655	21,035
Global environmental conservation costs	16,003	20,271
Resource recycling costs	—	13,479
Management activity costs	—	41,584
Research and development costs	38,598	1,478,605
Social activity costs	—	11,808
Total	57,256	1,586,782

Environmental conservation effect

According to the "Environmental Accounting Guidelines," environmental conservation effects measure on a material basis the effects of preventing, controlling, or avoiding environmental impacts, eliminating their effects, recovering from associated damage, and initiatives to aid in the same.

Item	FY2017	FY2018
(1) Environmental conservation effect concerning resources input for business activities		
Total energy input (GJ)	97,416	95,047
Water resources input (m³)	45,460	48,034
(2) Environmental conservation effect concerning environmental loads and wastes created by business activities		
Greenhouse gas emission volume (tons-CO_2)	4,131	3,977
Waste generation (tons)	1,028	934
Final disposal volume (tons)	131	150
Total drainage volume (m³)	45,460	48,034
BOD emissions (kg)	2,448	2,565
COD emissions (kg)	2,613	2,747
T-N emissions (kg)	645	693
T-P emissions (kg)	111	121

Scope of data collected

- Period covered: April 1, 2018, to March 31, 2019
- Companies targeted:

12 domestic companies

- Takuma Co., Ltd. (Head Office, other offices including overseas sites and the Harima Factory)
- NIPPON THERMOENER CO., LTD.
- Takuma Technos Co., Ltd.
- Hokkaido Sanitary Maintenance Co., Ltd.
- Takuma Technos Hokkaido Co., Ltd.
- SUNPLANT Co., Ltd.
- Takuma Engineering Co., Ltd.
- Takuma System Control Co., Ltd.
- Dan-Takuma Technologies Inc.
- Kyoritsu Setsubi Co., Ltd.
- Kankyo Sol-Tech Co., Ltd.
- Takuma Plant Service Co., Ltd.

2 overseas subsidiaries

- Taiden Environtech Co., Ltd.
- Siam Takuma Co., Ltd.

Environmental efficiency

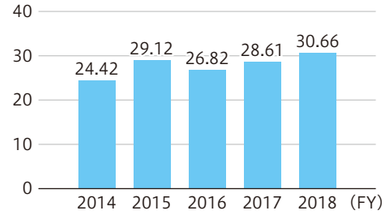
Even as total environmental impacts must be reduced, it is necessary from a business management standpoint to pursue environmental initiatives that are characterized by a high degree of economic efficiency. We report environmental efficiency using an index calculated in accordance with examples provided by the Ministry of the Environment in its Environmental Performance Indicators Guidelines for Organizations.

At the Takuma Group, we calculate environmental efficiency as the ratio of consolidated net sales to greenhouse gas emissions. In FY2018, this value improved slightly compared to FY2017.

The Takuma Group's definition of environmental efficiency

$$\frac{\text{Consolidated net sales (million JPY)}}{\text{Greenhouse gas emissions (tons-CO}_2\text{)}}$$

Environmental efficiency



Fair Business Practices

Compliance & CSR Promotion Education

Takuma offers compliance and CSR promotion education through the Compliance & CSR Promotion Organization (see page 42), which was established in order to spread awareness of compliance and CSR issues among employees. During FY2018, we implemented education focusing on compliance and CSR promotion in four separate stages (see below) in keeping with our policy of pursuing a sustained and thorough program of spreading and improving compliance and CSR awareness and risk management. This effort, through which we sought to live up to society's requirements and expectations, while taking into account internal circumstances and the characteristics of group companies, was based on the Compliance & CSR Promotion Division's medium-term policy of continuing to practice compliance-focused management in accordance with the 12th Medium-Term Management Plan.

- 1st term: Effect of Japanese-style plea bargaining on corporate operations
- 2nd term: Corporate disaster prevention and mitigation, SDGs (Sustainable Development Goals), Takuma's CSR comprehension test
- 3rd term: Corporate scandals, security export control
- 4th term: Compliance and internal reporting system (lecture), forward-looking CSR activities: CSR issues and an action program

4th term lecture
(Speaker: Mr. Kiyoshi Endo, Attorney at Law, Endo Kiyoshi Law Office)

Sessions: 4 per year (May, August, November, and January)
Number of participating departments: 45
Total number of attendees: 4,026

CSR lectures for management-level employees

In September 2018, attorney Yusaku Kurahashi of the law firm Nakamura, Tsunoda & Matsumoto gave a talk for managers entitled "Risk Management in Ordinary Times and in Times of Emergency."

In the talk, Mr. Kurahashi addressed the job responsibilities and operational response of executives from the standpoint of risk management in ordinary times and in emergencies. The lecture offered a valuable opportunity to think anew about conventional risks as well as special risks that are more likely to go unnoticed.

Compliance Measures

- **Initiatives to ensure compliance with the Antimonopoly Act**

Towards ensuring permanent compliance with the Antimonopoly Act, Takuma enacted "Regulations Concerning Management of the Pledge of Antimonopoly Act Compliance," which provides for the submission of a written oath in regard to observing the Antimonopoly Act.

"Rules on Controlling Contact with Competitors' Sales Departments, Etc.," defines the procedure for an employee to contact the sales department, etc., of a competitor and specifies that an application should be made to and an approval should be obtained from the affiliated division or center manager in advance to ensure fair business contact.

- **Holding training sessions about the Antimonopoly Act**

We hold regular training sessions about the Antimonopoly Act to deepen participants' understanding of the act and to ascertain the latest information about it.

- **Introducing a Legislation Information Service**

In order to allow its employees to gain a continuous grasp of the latest changes to laws and ordinances, Takuma introduced a Legislation Information Service. In this system, legislation alerts highlighting revisions to, and abolition of, laws and ordinances are sent by e-mail in advance to employees, who can also review detailed information about the corresponding law or ordinance on the system's website as needed.

In addition to current laws and ordinances, the system lets users search for legal precedents and public comments to facilitate an even greater understanding of relevant laws and ordinances.

CSR Awareness Survey

As a means of understanding the level of awareness of compliance and CSR and the level of permeation of education that promotes these priorities, and employing that data as reference for the integrated activities carried out during each fiscal year and for the following fiscal year's action plan, we have conducted the "CSR Awareness Survey" every year since FY2008 with the end goal of utilizing that information for future compliance and CSR promotion activities. The survey has included group companies since FY2013.

We actively use survey results in our activities, for example by offering additional education in areas that received lower scores than in the previous survey. In FY2018, responses indicated that 921 (of 942) employees are conducting themselves in accordance with standards such as the company's Management Principles and the Takuma Group Code of Conduct, indicating that awareness of the importance of compliance and CSR have spread widely among employees.

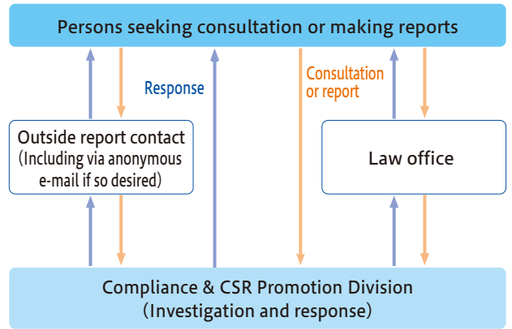
We will continue to offer this survey and use its results to improve compliance and CSR promotion education on an ongoing basis.

Internal Reporting System

Takuma has been operating an internal reporting system since FY2006, with the aim of promoting compliance management by uncovering illegal or unfair acts as early as possible and undertaking corrective measures.

Reporting contacts are set up at our Compliance & CSR Promotion Division and at an outside law office, as well as a dedicated outside report contact for anonymous e-mail reporting. Our "Internal Reporting Code" and the Takuma Group Code of Conduct further declare that no informant shall be subjected to disadvantageous treatment simply due to his or her having filed a report.

Furthermore, in order for this system to be correctly understood and utilized, we distribute a card to all employees with information on the reporting contacts and regularly publicize the system. Although awareness of this system exceeded 90% according to the results of the FY2018 CSR awareness survey, some respondents indicated that they were unaware of the system or uninterested in utilizing it, suggesting that issues remain for the reporting system.



Internal reporting process

Material Procurement Policy

Our Purchasing Department carries out procurement activity in accordance with its Material Procurement Policy.

We provide fair opportunities for all suppliers, irrespective of nationality, company size, or transaction history. Suppliers are selected based on our comprehensive evaluation of their reliability and safeness in terms of quality, price, delivery, etc., as well as their abilities in technological development and supply capabilities.

Long-term stable transactions with dependable suppliers result in improved product reliability and greater corporate value. We, therefore, seek to establish relationships of mutual trust and mutual development with our suppliers.

While also respecting relevant laws and regulations as well as social norms, we strictly control and maintain any confidential information that we obtain through our business transactions.

【Material Procurement Policy】

1. Treat all candidates fairly when selecting a supplier.
2. Strive to discover new manufacturers.
3. Strictly control confidential information.
4. Strive to acquire new and pertinent information.
5. Promote green procurement.
6. Comply with laws and ordinances related to business dealings.
7. Always keep VA and VE in mind.
8. Strive for self-development.

More information about the procurement procedures used by our Purchasing Department is available on the following website:
[Takuma website > Material Procurement] https://www.takuma.co.jp/procurement/ (content in Japanese)

Activities Involving Product Quality

The amount of attention paid by consumers (stakeholders) to quality in a wide range of fields, including manufacturing and services, has been growing in recent years. This section introduces Takuma initiatives that are designed to provide safe, confidence-inspiring products and plants.

Takuma's Head Office, branch companies, and other business offices have earned certification under the ISO 9001 international standard on quality management systems, and the Harima Factory has earned certification under the ISO 9001 and ISO 14001 international standards on quality management systems and environmental management systems, respectively. In December 2017, we completed a transition to ISO 9001:2015, the latest edition of that standard. In addition to working to improve the quality of our products in accordance with our Quality Policy and quality management system, we are pursuing activities that emphasize customer satisfaction.

In order to produce products and plants that customers truly appreciate, it is necessary not only to boost the quality of the product itself, but also to improve the operations and quality as well as each individual's ability to create a good plant in each process from planning up to delivery (sales, planning, design, procurement, manufacture, construction, and management).

Quality Policy

Takuma Co., Ltd. has adopted the following Quality Policy in order to provide satisfying products that meet customer expectations and earn a high level of trust while continuously improving the effectiveness of its quality management system.

Quality Policy
"Manufacturing products that result in customer satisfaction"

Based on that Quality Policy and the three priority items described below, Takuma is working to improve the quality of its products and services through a variety of initiatives that address every process, including in sales, planning, design, procurement, manufacture, construction, and management.

Priority items

- **Creating value to earn customer satisfaction (ascertaining customer needs and making improvements based on past experience)**
- **Carrying out risk management (addressing changes in the business environment and human error)**
- **Implementing human resources management (implementing human resources development and ensuring skills are passed down to younger employees)**

Specific initiatives for improving quality

Organizational initiatives for improving quality

As an organizational initiative that's designed to boost product quality, we have each department establish quality targets at the beginning of the year and then provide regular reports (twice a year) on progress towards achieving those goals at QM Committee meetings (quality management reviews).

As part of the transition to ISO 9001:2015, we're working to further improve quality by identifying an effort to clarify and address risks and opportunities as a key quality goal and evaluating the effectiveness of that effort.

Internal quality audits

In addition to increasing the precision of operations by standardizing operating procedures in each department's processes, we are improving operations as necessary by carrying out an internal quality audit of each department to verify the status of quality management system operation.

Internal quality audits are carried out regularly by employees who have been certified as internal auditors after completing internal quality auditor training seminars offered by instructors from an outside organization. At the training seminars, employees master content ranging from basic knowledge about ISO 9001 to specific methods for conducting internal audits.

Improving the employees' individual operational skills

To improve employees' individual operational skills, we have created an operational skill achievement checklist that identifies the skills required by personnel in each process for use in regular assessments, and we are reviewing the targets we have chosen.

Quality control and process reviews

Quality control is an important measure that allows us to provide exceptional products and plants.

We take action (improvement measures) as outlined by a manual (standard) in the event a non-conforming product is discovered, but even if an issue doesn't lead to a non-conforming product, we conduct a review as a preventive measure if there are processes that could have caused the issue.

Furthermore, we actively offer training to new business partners and retraining (instruction) for existing business partners to prevent defects in the products we purchase.

Customer satisfaction survey

We carry out the following quality improvement initiatives:

(1) Conducting a customer satisfaction survey every year since FY2007

(2) Applying customer feedback with regard to delivered products and Takuma employees to quality and service

The figure to the right illustrates how the survey is administered.

First, we administer questionnaires targeting customers who had construction work done by asking them to assess the overall experience after the work is completed, including the nature of the work performed, suitability of delivered equipment, and the level of service provided by Takuma staff.

Next, the QM Committee calculates a score for each item based on the survey results as well as a report and explanation from the responsible department. The committee then analyzes the resulting data.

If we find a problem, for example an item receiving an evaluation score of less than 70 out of 100 or a score of 1 (dissatisfied) or 2 (rather dissatisfied) on a 4-point scale, the QM Committee analyzes the cause of the problem and studies measures to prevent recurrence based on interviews with the department in question. We also evaluate aspects of our products and services that receive especially high praise from customers and work to further enhance customer satisfaction by combining problem areas and praiseworthy areas and applying them horizontally across involved departments at the company.

For customers targeted for problem analysis and consideration of preventive measures based on the survey results, we also conduct a follow-up survey to discern whether those measures were reliably implemented and whether their level of satisfaction has indeed improved.

With scores averaging higher than 80 points every year since its second year, the questionnaire demonstrates the effectiveness of our initiatives.

In this way, we work to improve product and plant quality so that all customers are satisfied.

Customer satisfaction survey process

Decide where to conduct the questionnaire survey

↓

Conduct the questionnaire survey

↓

Investigate the questionnaire results

Analyze problem factors and investigate recurrence prevention countermeasures
(if results are lower than our standard)

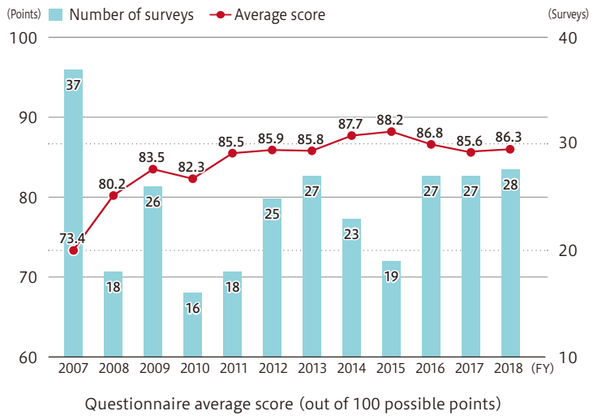
Analyze praiseworthy factors
(particularly for praiseworthy aspects)

↓

Apply recurrence prevention measures and praiseworthy factors across the organization

↓

Follow up with recurrence prevention measures
Follow up on results



Questionnaire average score (out of 100 possible points)

Permits and registrations

Head Office, branch offices and other business offices

Construction license (Minister of Land, Infrastructure, Transport and Tourism license, Special 27-6129, Special 29-6129)

Construction consultant registration (Minister of Land, Infrastructure, Transport and Tourism registration, Construction 26-10202)

First-class architect office registration (01A02903)

ISO 9001 quality management system certification

Harima Factory

ISO 9001 quality management system certification

ISO 14001 environmental management systems certification

Manufacture of thermal equipment for power generation (Ministry of Economy, Trade and Industry)

Permission to manufacture boilers and pressure vessels, permission to manufacture cranes (Ministry of Health, Labour and Welfare)

Manufacture of specific high-pressure gas facilities (Ministry of Economy, Trade and Industry)

Manufacture of refrigerators (Governor of Hyogo Prefecture)

JQA-1952
ISO 9001 certification
Head Office, Osaka Office, Tokyo Branch, Chubu Branch, Kyushu Branch, Hokkaido Branch and Harima Factory

JQA-EM0313
ISO 14001 certification
Harima Factory

Participation in the Community

Reflecting their dedication to providing safe, reliable facilities that inspire peace of mind on the part of local residents, Takuma and its group companies work actively to disclose information in an appropriate manner, keep the areas around plants clean, participate in regional activities, and engage in exchanges with local residents.

This section introduces some of those efforts.

Imabari High Trust Co., Ltd.

Imabari High Trust is a special-purpose company that was established to operate and maintain Imabari City Waste Management Center (known as "Bari Clean"), which was constructed to connect residents, their community, and the future through safe operation that inspires peace of mind. The company has promoted exchanges with residents through a variety of events every month since it began operating in April 2018.

The facility is able to serve as an evacuation center in the event of a natural disaster, and it has enough space and emergency supplies to accommodate 320 people for one week. It can also generate electricity for use in such scenarios. In September 2018, the facility joined local residents and the city in conducting an evacuation center drill.

Work to open the evacuation center

Before the festival venue doors opened

Flea market

A tour of the waste treatment facility

In December 2018, the facility held the Imabari Environmental Festival to prompt exchanges with local residents and environmental education. Numerous residents attended the event, which was cosponsored by Imabari High Trust, and enjoyed activities including a flea market, environmental learning booths, and tours of the waste treatment facility.

The company will continue to operate the facility in an appropriate manner so that it can earn the understanding of residents in ordinary times as well as in times of emergency as a facility that treats waste in a safe, stable manner in line with the Imabari Model (a model for 21st-century waste treatment facilities) while earning a place in the hearts of local residents and safeguarding the community, and as a place that offers environmental awareness-raising and hands-on learning opportunities while communicating related information.

Takuma Energy Co., Ltd., and Fujisawa High Trust Co., Ltd.

In August 2018, Takuma and group companies Takuma Energy and Fujisawa High Trust manned a joint booth at the Recycle Plaza Fujisawa Fair, an event that is held every year in the city of Fujisawa to promote and raise awareness of issues such as 3R initiatives and use of renewable energy. This year, we promoted local production and consumption of surplus electricity from Energy from Waste plants. Numerous local residents, especially families, visited Takuma's bicycle-driven hands-on power generation area, which attracted crowds for the duration of the event.

Bicycle-driven hands-on power generation area

Eco classroom support guide

Takuma's Harima Factory has registered as an eco classroom as part of its ongoing sponsorship of environmental learning in the city of Takasago. In October 2018, a coordinator from one of Takuma's engineering departments visited Takasago Municipal Amida Elementary School to teach an environmental learning class entitled "Thinking about Waste." The instructor used slides and other learning materials to explain topics such as waste generation, sorting, treatment, and recycling in an easy-to-understand manner to a group of about 90 third-graders. The children listened with interest as the teacher happily answered their questions.

Eco classroom

Contribution to Society

This page introduces some examples of Takuma's community service activities.

Takuma Group coordinated cleanup activities

The Takuma Group orchestrates coordinated clean-up activities in the areas around its worksites each year as a way for volunteers to beautify the environment and contribute to society. During FY2018, a total of 570 employees participated in two such activities. The activities provided an opportunity for employees to think afresh about waste-related issues and their connection to the community. Going forward, the Takuma Group will continue this initiative.

Participation in the "Osaka Marathon 'Cleanup' Campaign"

In November 2018, volunteers from Operation & Maintenance Services Department 2 participated in the "Osaka Marathon 'Cleanup' Campaign," a cleanup activity that is held every year as part of the Osaka Marathon.

The activity brought together organizational, group, and individual volunteers to beautify public spaces throughout the city.

Blood donation campaign

Takuma supports blood donation activities through the Japanese Red Cross Society. During FY2018, a total of 122 donors participated in blood drives at the Head Office and Harima Factory. Donors can simultaneously register as bone marrow donors at the Head Office, and this year eight employees did so. We plan to continue this activity in the future.

WFP fundraising activities

Takuma serves on the Board of Trustees of the Japan Association for the World Food Programme, the official supporting partner of the World Food Programme in Japan. Each year, we display WFP posters at the entrances to company buildings and in cafeterias during a campaign that lasts from June through August. The campaign serves both to increase employee interest in the world's food problems and to collect donations to address them.

Contributions to NPOs

Purchasing UNICEF Christmas cards

Takuma purchases UNICEF Christmas cards. A portion of the proceeds is used to fund UNICEF in their work to help children around the world.

Donating unused calendars

Each year, Takuma donates unused calendars to a non-profit organization. The proceeds from selling the calendars at a charity calendar market sponsored by the NPO Nippon Volunteer Network Active in Disasters are used to provide aid for victims of natural disasters and other crises. We also donate calendars to the NPO Community Support Center Kobe's Gift On Heart Calendar project for delivery to local residents' associations and other groups, elderly residents, and individuals with disabilities.

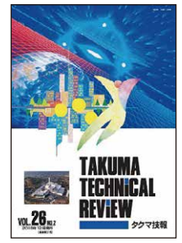
Publications

Publication of the Takuma Technical Review

We publish the Takuma Technical Review twice a year to introduce technologies that Takuma has developed.

Contents in FY2018 included an explanation of how power can be locally produced and consumed based on examples from Takuma Energy, operational reports on plant equipment, observations from visits to overseas facilities, and profiles of delivered projects. Abstracts are available on Takuma's website.

[Takuma top page > Technical Information > Technical Review]
https://www.takuma.co.jp/english/gijutu/gihou.html



Financial Data

Trend in Principal Management Indicators and Other Financial Data

Fiscal year	110th (Millions of yen)	111th (Millions of yen)	112th (Millions of yen)	113th (Millions of yen)	114th (Millions of yen)	115th (Millions of yen)	115th (Thousands of U.S. dollars)
End of fiscal year	March 2014	March 2015	March 2016	March 2017	March 2018	March 2019	March 2019
Net sales	¥ 96,334	¥ 103,875	¥ 113,088	¥ 116,309	¥ 118,199	¥ 121,951	$ 1,098,753
Operating income	¥ 8,424	¥ 8,223	¥ 9,189	¥ 10,974	¥ 10,030	¥ 11,604	$ 104,551
Ordinary profit	¥ 9,449	¥ 9,116	¥ 9,646	¥ 11,606	¥ 10,670	¥ 12,334	$ 111,128
Profit attributable to owners of parent	¥ 8,835	¥ 8,030	¥ 7,817	¥ 8,551	¥ 7,847	¥ 8,854	$ 79,772
Comprehensive income	¥ 9,935	¥ 9,398	¥ 7,149	¥ 9,937	¥ 10,177	¥ 7,325	$ 66,000
Net assets	¥ 43,889	¥ 52,516	¥ 58,809	¥ 67,727	¥ 76,726	¥ 83,088	$ 748,603
Total assets	¥ 108,520	¥ 123,127	¥ 132,614	¥ 140,201	¥ 151,489	¥ 155,989	$ 1,405,431
Net assets per share (JPY or USD)	¥ 527.50	¥ 631.53	¥ 708.18	¥ 815.77	¥ 924.25	¥ 1,000.34	$ 9.01
Net income per share (JPY or USD)	¥ 106.86	¥ 97.12	¥ 94.55	¥ 103.43	¥ 94.93	¥ 107.10	$ 0.96
Diluted net income per share (JPY or USD)	-	-	-	-	-	-	-
Capital adequacy ratio (%)	40.2	42.4	44.1	48.1	50.4	53.0	53.0
Return on equity (%)	22.7	16.8	14.1	13.6	10.9	11.1	11.1
Price-to-earnings ratio	6.9	9.7	10.7	10.5	12.3	12.3	12.3
Cash flows from operating activities	¥ 8,270	¥ 21,727	¥ 6,728	¥ 9,590	¥ 5,141	¥ 10,817	$ 97,460
Cash flows from investing activities	¥ (1,430)	¥ (160)	¥ (445)	¥ 143	¥ (328)	¥ (1,382)	$ (12,453)
Cash flows from financing activities	¥ (5,867)	¥ (3,707)	¥ (2,900)	¥ (1,787)	¥ (1,670)	¥ (9,120)	$ (82,164)
End-of-year balance of cash and cash equivalents	¥ 27,030	¥ 45,008	¥ 48,335	¥ 57,132	¥ 60,283	¥ 61,027	$ 549,844
Number of employees	3,315	3,266	3,366	3,447	3,609	3,619	3,619

Note:
1. U.S. dollar amounts are shown solely for the convenience of readers and are translated at the rate of ¥110.99 to U.S.$1.00, the exchange rate prevailing at March 31, 2019.
2. Ordinary profit is a measure of accounting profit that equals operating income plus other income minus other expenses, except for extraordinary items under Japanese GAAP.

Business Performance During the Fiscal Year Under Review

Demand for products such as Energy from Waste plants and biomass power plants remained robust during the fiscal year under review as growth in orders for construction and operation of such facilities led to order volume of 179,829 million yen, up 2,713 million yen from the previous year. In addition, smooth progress in the construction of ordered plants led to sales of 121,951 million yen, an increase of 3,752 million yen. As a result, the backlog rose 57,879 million yen to 330,939 million yen.

As growth in sales was augmented by improved profitability thanks to progress in efforts to cut costs, operating income rose 1,574 million yen to 11,604 million yen, ordinary profit rose 1,664 million yen to 12,334 million yen, and profit attributable to owners of parent rose 1,007 million yen to 8,854 million yen.

Performance by segment was as follows:

(Millions of yen)

Segment	Orders received	Sales amount	Operating income	Backlog
Domestic Environment and Energy Business	153,628	93,724	12,405	322,292
Overseas Environment and Energy Business	799	3,057	163	525
Package Boiler Business	17,476	16,955	904	3,872
Equipment and Systems Business	8,567	8,836	361	4,502
Sub-total	180,472	122,572	13,835	331,192
Adjustment	(642)	(621)	(2,231)	(252)
Total	179,829	121,951	11,604	330,939

Consolidated Balance Sheets

TAKUMA CO., LTD. and Consolidated Subsidiaries
As of March 31, 2019 and 2018

ASSETS	Millions of yen 2019	Millions of yen 2018	Thousands of U.S. dollars 2019
Current assets:			
Cash and time deposits	**¥ 61,769**	¥ 60,864	**$ 556,529**
Notes and accounts receivable:			
Trade	**49,046**	50,049	**441,899**
Unconsolidated subsidiaries and affiliated companies	**764**	380	**6,884**
Other	**281**	381	**2,526**
Less allowance for doubtful accounts	**(28)**	(38)	**(252)**
Total	**50,063**	50,772	**451,057**
Inventories	**4,356**	4,307	**39,246**
Other	**1,732**	1,372	**15,606**
Total current assets	**117,920**	117,315	**1,062,438**
Property, plant and equipment:			
Land	**3,013**	3,011	**27,145**
Buildings and structures	**11,905**	12,287	**107,267**
Machinery, equipment, l ease assets and construction in progress	**8,969**	10,653	**80,805**
	23,887	25,951	**215,217**
Less accumulated depreciation	**(15,593)**	(17,450)	**(140,491)**
Total property, plant and equipment	**8,294**	8,501	**74,726**
Investments and other assets:			
Investment securities	**15,138**	16,885	**136,387**
Investments in:			
Unconsolidated subsidiaries and affiliated companies	**4,163**	5,015	**37,506**
Other	**5,460**	1,823	**49,201**
Less allowance for doubtful accounts	**(109)**	(471)	**(986)**
Total	**9,514**	6,367	**85,721**
Deferred tax assets	**4,810**	2,081	**43,335**
Other	**313**	340	**2,824**
Total investments and other assets	**29,775**	25,673	**268,267**
Total assets	**¥ 155,989**	¥ 151,489	**$ 1,405,431**

LIABILITIES AND NET ASSETS	Millions of yen 2019	Millions of yen 2018	Thousands of U.S. dollars 2019
Current liabilities:			
Short-term loans payable	**¥ 645**	¥ 7,675	**$ 5,811**
Current portion of long-term debt	**117**	470	**1,052**
Notes and accounts payable:			
Trade	**37,587**	34,913	**338,651**
Unconsolidated subsidiaries and affiliated companies	**334**	234	**3,006**
Other	**1,227**	979	**11,057**
Total	**39,148**	36,126	**352,714**
Accrued income taxes	**3,628**	281	**32,690**
Advances received	**9,798**	13,592	**88,276**
Allowance for guarantees on completed work	**149**	86	**1,344**
Allowance for losses on sales contracts	**1,739**	373	**15,672**
Provision for loss on liquidation of subsidiaries and associates	**999**	-	**9,001**
Other	**6,023**	5,709	**54,265**
Total current liabilities	**62,246**	64,312	**560,825**
Long-term liabilities:			
Long-term debt	**342**	459	**3,083**
Allowance for directors' and executive officers' retirement benefits	**185**	183	**1,664**
Net defined benefit liability	**9,746**	9,406	**87,808**
Other	**382**	403	**3,448**
Total long-term liabilities	**10,655**	10,451	**96,003**
Total liabilities	**72,901**	74,763	**656,828**
Contingent liabilities			
Net assets:			
Common stock	**13,367**	13,367	**120,438**
Authorized: 321,840,000 shares			
Issued: 83,000,000 shares			
Capital surplus	**3,768**	3,768	**33,951**
Retained earnings	**60,866**	52,949	**548,390**
Treasury stock, at cost	**(235)**	(235)	**(2,122)**
331,644 shares in 2019 and 331,385 shares in 2018			
Total shareholders' equity	**77,766**	69,849	**700,657**
Unrealized gains on securities	**5,390**	7,161	**48,558**
Deferred gains and losses on hedges	**8**	(46)	**75**
Foreign currency translation adjustments	**(4)**	2	**(37)**
Remeasurements of defined benefit plans	**(463)**	(559)	**(4,170)**
Total accumulated other comprehensive income	**4,931**	6,558	**44,426**
Non-controlling interests in consolidated subsidiaries	**391**	319	**3,520**
Total net assets	**83,088**	76,726	**748,603**
Total liabilities and net assets	**¥ 155,989**	¥ 151,489	**$ 1,405,431**

Financial Data

Consolidated Statements of Operations

TAKUMA CO., LTD. and Consolidated Subsidiaries
For the years ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	**2019**
Net sales	**¥ 121,951**	¥ 118,199	**$ 1,098,753**
Cost of sales	**94,491**	93,372	**851,340**
Gross profit	**27,460**	24,827	**247,413**
Selling, general and administrative expenses	**15,856**	14,797	**142,862**
Operating income	**11,604**	10,030	**104,551**
Other income (expenses):			
Interest and dividend income	**419**	367	**3,776**
Interest expense	**(59)**	(66)	**(535)**
Foreign currency exchange loss	**(57)**	(157)	**(509)**
Gain on sales of investment securities	**-**	111	**-**
Gain on liquidation of subsidiaries and associates	**-**	90	**-**
Provision for loss on liquidation of subsidiaries and associates	**(999)**	-	**(9,001)**
Loss on valuation of investment securities	**(155)**	(60)	**(1,396)**
Loss on disposal of property, plant and equipment	**(58)**	(44)	**(527)**
Provision for doubtful accounts	**(49)**	-	**(446)**
Equity in earnings of affiliated companies	**473**	461	**4,265**
Other, net	**21**	79	**189**
Other income (expenses), net	**(464)**	781	**(4,184)**
Income before income taxes	**11,140**	10,811	**100,367**
Income taxes:			
Current	**4,179**	1,352	**37,649**
Deferred	**(1,991)**	1,581	**(17,936)**
Total income taxes	**2,188**	2,933	**19,713**
Profit	**8,952**	7,878	**80,654**
Profit attributable to non-controlling interests in consolidated subsidiaries	**98**	31	**882**
Profit attributable to owners of parent	**¥ 8,854**	¥ 7,847	**$ 79,772**
Per share:	Yen		U.S. dollars
Net income	**¥ 107.10**	¥ 94.93	**$ 0.96**
Diluted net income	**-**	-	**-**
Cash dividends applicable to the year	**22.00**	16.00	**0.20**

Consolidated Statements of Comprehensive Income

TAKUMA CO., LTD. and Consolidated Subsidiaries
For the years ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	**2019**
Profit	**¥ 8,952**	¥ 7,878	**$ 80,654**
Other comprehensive income:			
Unrealized gains (losses) on securities	**(1,772)**	2,275	**(15,966)**
Deferred gains and losses on hedges	**58**	(3)	**519**
Foreign currency translation adjustments	**(9)**	(4)	**(77)**
Remeasurements of defined benefit plans	**96**	31	**870**
Total other comprehensive income	**(1,627)**	2,299	**(14,654)**
Comprehensive income	**¥ 7,325**	¥ 10,177	**$ 66,000**
Comprehensive income attributed to:			
Owners of the parent	**¥ 7,227**	¥ 10,125	**$ 65,114**
Non-controlling interests	**98**	52	**886**

Consolidated Statements of Changes in Net Assets

TAKUMA CO., LTD. and Consolidated Subsidiaries
For the years ended March 31, 2019 and 2018

For the year ended March 31, 2019	Common stock	Capital surplus	Retained earnings	Treasury stock, at cost	Total shareholders' equity	Unrealized gains on securities	Deferred gains and losses on hedges	Foreign currency translation adjustments	Remeasurements of defined benefit plans	Total accumulated other comprehensive income	Non-controlling interests in consolidated subsidiaries	Total net assets
	Millions of yen				Millions of yen							
Balance at the beginning of current period	¥ 13,367	¥ 3,768	¥ 52,949	¥ (235)	¥ 69,849	¥ 7,161	¥ (46)	¥ 2	¥ (559)	¥ 6,558	¥ 319	¥ 76,726
Cash dividends (¥19.00 per share)	-	-	(1,571)	-	(1,571)	-	-	-	-	-	-	(1,571)
Profit attributable to owners of parent	-	-	8,854	-	8,854	-	-	-	-	-	-	8,854
Change in scope of consolidation	-	-	657	-	657	-	-	-	-	-	-	657
Change in scope of equity method	-	-	(23)	-	(23)	-	-	-	-	-	-	(23)
Purchase of treasury stock	-	-	-	(0)	(0)	-	-	-	-	-	-	(0)
Other changes during the year, net	-	-	-	-	-	(1,771)	54	(6)	96	(1,627)	72	(1,555)
Balance at the end of current period	¥ 13,367	¥ 3,768	¥ 60,866	¥ (235)	¥ 77,766	¥ 5,390	¥ 8	¥ (4)	¥ (463)	¥ 4,931	¥ 391	¥ 83,088

For the year ended March 31, 2018												
	Millions of yen				Millions of yen							
Balance at the beginning of current period	¥ 13,367	¥ 3,768	¥ 46,258	¥ (234)	¥ 63,159	¥ 4,886	¥ (21)	¥ 6	¥ (591)	¥ 4,280	¥ 288	¥ 67,727
Cash dividends (¥14.00 per share)	-	-	(1,156)	-	(1,156)	-	-	-	-	-	-	(1,156)
Profit attributable to owners of parent	-	-	7,847	-	7,847	-	-	-	-	-	-	7,847
Purchase of treasury stock	-	-	-	(1)	(1)	-	-	-	-	-	-	(1)
Other changes during the year, net	-	-	-	-	-	2,275	(25)	(4)	32	2,278	31	2,309
Balance at the end of current period	¥ 13,367	¥ 3,768	¥ 52,949	¥ (235)	¥ 69,849	¥ 7,161	¥ (46)	¥ 2	¥ (559)	¥ 6,558	¥ 319	¥ 76,726

For the year ended March 31, 2019												
	Thousands of U.S. dollars				Thousands of U.S. dollars							
Balance at the beginning of current period	$ 120,438	$ 33,951	$ 477,057	$ (2,119)	$ 629,327	$ 64,523	$ (419)	$ 21	$ (5,040)	$ 59,085	$ 2,874	$ 691,286
Cash dividends ($0.17 per share)	-	-	(14,152)	-	(14,152)	-	-	-	-	-	-	(14,152)
Profit attributable to owners of parent	-	-	79,772	-	79,772	-	-	-	-	-	-	79,772
Change in scope of consolidation	-	-	5,919	-	5,919	-	-	-	-	-	-	5,919
Change in scope of equity method	-	-	(206)	-	(206)	-	-	-	-	-	-	(206)
Purchase of treasury stock	-	-	-	(3)	(3)	-	-	-	-	-	-	(3)
Other changes during the year, net	-	-	-	-	-	(15,965)	494	(58)	870	(14,659)	646	(14,013)
Balance at the end of current period	$ 120,438	$ 33,951	$ 548,390	$ (2,122)	$ 700,657	$ 48,558	$ 75	$ (37)	$ (4,170)	$ 44,426	$ 3,520	$ 748,603

Consolidated Statements of Cash Flows

TAKUMA CO., LTD. and Consolidated Subsidiaries
For the years ended March 31, 2019 and 2018

	Millions of yen		Thousands of U.S. dollars
	2019	2018	**2019**
Cash flows from operating activities:			
Income before income taxes	**¥ 11,140**	¥ 10,811	**$ 100,367**
Adjustments to reconcile income before income taxes to net cash provided by operating activities:			
Depreciation	**798**	790	**7,187**
Impairment loss	**40**	-	**364**
Loss (gain) on sales of investment securities	**7**	(111)	**67**
Loss (gain) on liquidation of subsidiaries and associates	**-**	(90)	**-**
Loss (gain) on valuation of investment securities	**155**	60	**1,396**
Increase (decrease) in allowance for doubtful accounts	**(5)**	20	**(45)**
Increase (decrease) in allowance for bonuses	**4**	307	**33**
Increase (decrease) in allowance for losses on sales contracts	**1,367**	(3,205)	**12,315**
Increase (decrease) in provision for loss on liquidation of subsidiaries and associates	**999**	-	**9,001**
Increase (decrease) in net defined benefit liability	**470**	441	**4,235**
Interest and dividend income	**(419)**	(367)	**(3,776)**
Interest expense	**59**	66	**535**
Equity in losses (earnings) of affiliated companies	**(473)**	(461)	**(4,265)**
Net decrease (increase) in notes and accounts receivable and advances received	**(2,229)**	200	**(20,083)**
Decrease (increase) in inventories	**3**	(387)	**25**
Decrease (increase) in other current assets	**(27)**	(305)	**(243)**
Net increase (decrease) in notes and accounts payable and advance money	**1,865**	1,959	**16,801**
Increase (decrease) in other current liabilities	**431**	(426)	**3,888**
Other	**(3,192)**	(798)	**(28,761)**
Subtotal	**10,993**	8,504	**99,040**
Interest and dividend received	**647**	456	**5,832**
Interest paid	**(60)**	(66)	**(541)**
Income taxes received (paid)	**(763)**	(3,753)	**(6,871)**
Net cash provided by operating activities	**10,817**	5,141	**97,460**
Cash flows from investing activities:			
Net decrease (increase) in time deposits	**(14)**	4	**(126)**
Purchase of property, plant and equipment	**(482)**	(343)	**(4,347)**
Purchase of intangible fixed assets	**(51)**	(125)	**(462)**
Purchase of investment securities	**(802)**	(561)	**(7,221)**
Sale of investment securities	**105**	230	**944**
Disbursement for loans receivable	**-**	(151)	**-**
Collection of loans receivable	**112**	550	**1,011**
Other	**(250)**	68	**(2,252)**
Net cash used in investing activities	**(1,382)**	(328)	**(12,453)**

	Millions of yen		Thousands of U.S. dollars
	2019	2018	**2019**
Cash flows from financing activities:			
Net increase (decrease) in short-term bank loans	**(7,030)**	-	**(63,339)**
Payment of long-term debt	**(470)**	(468)	**(4,233)**
Purchase of treasury stock	**(0)**	(1)	**(3)**
Payment of cash dividends	**(1,571)**	(1,157)	**(14,152)**
Dividends paid to non-controlling interests	**(28)**	(21)	**(250)**
Other	**(21)**	(23)	**(187)**
Net cash used in financing activities	**(9,120)**	(1,670)	**(82,164)**
Effect of exchange rate changes on cash and cash equivalents	**(11)**	8	**(103)**
Net increase in cash and cash equivalents	**304**	3,151	**2,740**
Cash and cash equivalents at beginning of year	**60,283**	57,132	**543,141**
Increase (decrease) in cash and cash equivalents resulting from change in scope of consolidation	**440**	-	**3,963**
Cash and cash equivalents at end of year	**¥ 61,027**	¥ 60,283	**$ 549,844**

Outside Expert Opinion

Outside Expert Opinion

Kazuhiko Takano

Professor, Ph.D. in Law (LL.D.)
Graduate School and Faculty of Safety Science, Kansai University
Senior Director
Japan Society for Business Ethics Study
Senior Researcher
Business Ethics Research Center

1. Characteristics of the Takuma CSR Report and differences with last year's edition

There is no question that the Takuma Group is one of Japan's leading plant engineering companies. In last year's Outside Expert Opinion, I noted that the group is pursuing excellent initiatives in the areas of corporate governance, risk management, and compliance.

A review of this year's edition of the CSR Report reveals three key differences from last year's edition.

The first difference centers on penetration of the Management Principles. Newly appointed President and CEO Nanjo mentions them in his "Message from Top Management" while describing his approach to management, which respects those principles even as he returns to the idea of "Service to the nation through boiler manufacturing," the motto espoused by founder Tsunekichi Takuma at the time of the company's founding. Some research findings suggest that a shared understanding of management principles and values on the part of managers and employees is a characteristic of companies that endure over long periods of time. I believe that President Nanjo's approach to management will be important for Takuma as a company whose plant engineering business has underpinned the very foundations of Japanese industry and whose continued existence is considered essential by society.

The second difference lies in gender equality. While the nature of the plant engineering business means that it would difficult to characterize Takuma has having a large number of female employees, the CSR Report includes information about gender equality initiatives, indicating how the company is working toward the goal of increasing the number of female employees in key management and main career track positions. Takuma welcomed a female outside director this fiscal year, and I think we can expect that change to lead to further pursuit of those initiatives.

The third difference involves initiatives addressing the Sustainable Development Goals (SDGs). With its core businesses of waste treatment plants, water treatment plants, and energy plants, Takuma has a high level of affinity with the SDGs. In a topic entitled "SDGs Initiatives," this year's CSR Report describes how the company launched a series of voluntary workshops that cut across departmental lines, and I look forward to seeing how that effort develops in the future.

In this way, I am pleased to see that the Takuma CSR Report 2019 demonstrates the continued evolution of the company's programs.

2. Areas where Takuma can do more

The Takuma Group is already pursuing CSR activities on a sophisticated level, but I believe that it could take its initiatives to a new level in two ways.

The first lies in initiatives to improve the company's resilience. Takuma's risk management structures are robust. It seems to me that by conducting regular drills to simulate a complex, wide-area disaster such as a large earthquake or storm and flood damage with an associated large-scale power outage, the company could boost the validity of its business continuity plan (BCP).

The second lies in carrying out specific measures to share Management Principles and values. Many companies create opportunities for dialog between management and employees with the goal of sharing such principles and values while creating a corporate culture that fosters good communication. I think it would be productive for Takuma to consider how it can create opportunities for dialog between management and employees, for example through traveling CSR "caravans," under its new leadership.

In his "Message from Top Management," President Nanjo described the importance of ESG initiatives from the standpoint of increasing corporate value over the long term. ESG investment in Japan has been rapidly growing since 2014, and such investment can help increase corporate value over the long term by driving up evaluations of a company's CSR. I expect to see Takuma's corporate value grow even further and for the company to enjoy continued growth as it works to improve its resilience and ensure that its Management Principles and values are shared.

Response to the Outside Expert Opinion

Koji Tanaka

Director & Executive Officer
Executive Manager
Compliance & CSR Promotion Division
& Corporate Services Division

I would like to thank Professor Takano of Kansai University for offering his valuable insights on the CSR Report 2019.

In compiling this report, we have worked to offer stakeholders an easy-to-understand introduction to a variety of activities carried out by the Takuma Group with the goal of resolving social issues and increasing corporate value by achieving sustainable growth as well as to the Group's 12th Medium-Term Management Plan, and we have focused on inviting involved parties to express their thoughts on related subjects in their own words.

In "1. Characteristics of the Takuma CSR Report and differences with last year's edition," Professor Takano noted the importance of the penetration of Management Principles, along with his expectations concerning gender equality and SDGs initiatives. I'm grateful that he offered his views on the direction of future initiatives. We will move forward with those initiatives in order to meet the expectations and requirements of our stakeholders and to achieve sustainable growth of the group going forward.

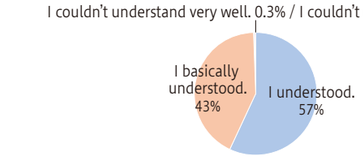
In "2. Areas where Takuma can do more," Professor Takano described measures with the potential to increase corporate value and facilitate continued growth. We will work to strengthen our ability to deal with change by improving resilience and ensuring that Management Principles and values are shared.

We value Professor Takano's observations and take them seriously, and I would request stakeholders' continued support and encouragement as we work to practice CSR management and enhance our CSR Report.

Takuma CSR Report 2018 Questionnaire Survey Results

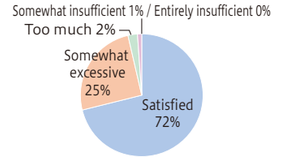
Survey period: July 2018 to June 2019
Number of respondents: 976

Q1 Did you understand the activities of our company?

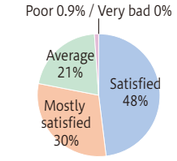


Q2 What is your level of satisfaction regarding this Report?

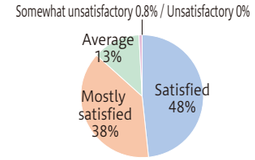
(1) Volume of information



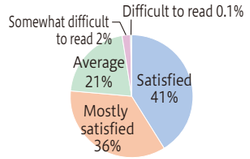
(2) Design



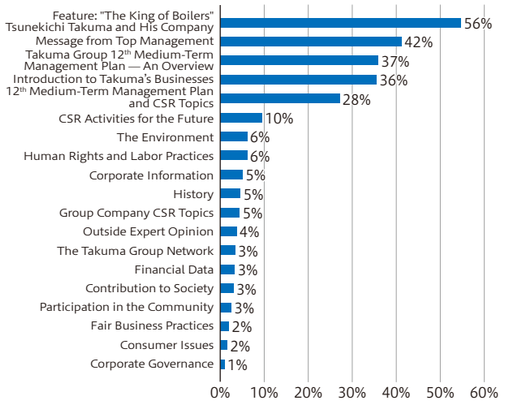
(3) Quality of information



(4) Readability



Q3 Which items were you interested in? (Select up to 3.)



Editorial Policy
We have prepared this document as a CSR Report that details our CSR activities.

Publisher and Contact for Inquiries
CSR Department, Compliance & CSR Promotion Division
TEL: +81-6-6483-2673
FAX: +81-6-6483-2620

Data Collection Period
From April 1, 2018, to March 31, 2019, in principle.
In addition, some activities in FY2019 are included.

Coverage
This report applies to Takuma Co., Ltd. and its affiliates in principle.

Time of Issue
Current issue: July 2019
Next issue: Scheduled for July 2020
Last issue: July 2018

TAKUMA CO., LTD.
2-2-33 Kinrakuji-cho, Amagasaki, Hyogo 660-0806, Japan
Website: https://www.takuma.co.jp/english/

This publication features an environmentally friendly,
universal design that is made possible by the following initiatives and programs:

■Printing

Printed using “waterless printing,” which does not generate hazardous waste.

Printed using environmentally friendly vegetable oil ink.

■Paper

Printed on FSC™-certified paper (made from trees from responsibly managed forests).

Printed on paper made with wood from forest thinning. “Morino Chonai-Kai” (Forest Neighborhood Association)- Supporting sound forest management.

■Fonts

This publication uses universal design fonts that are easy to read.