Three Businesses Supporting Social and Industrial Infrastructure

Consolidated Net Sales

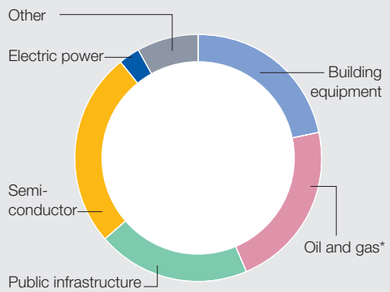
¥523.7 billion

Consolidated Operating Income

¥37.8 billion

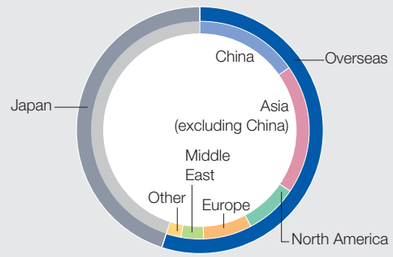
Fiscal year ended December 31, 2020 (JGAAP)

Net Sales Ratio by Industry

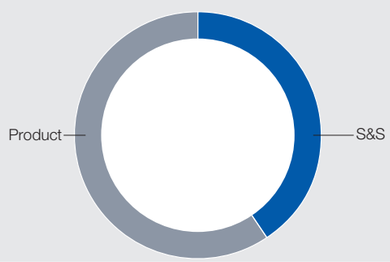


* Mostly downstream businesses

Net Sales Ratio by Region



S&S Sales Ratio

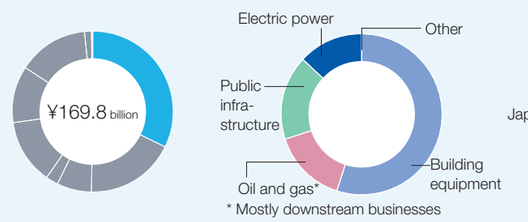


Fluid Machinery & Systems Business ➜P.27–30

Net Sales Ratio | Net Sales Ratio by Industry | Net Sales Ratio by Region | S&S Sales Ratio

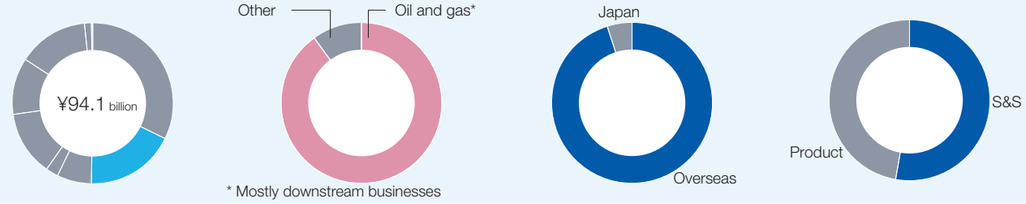
Pumps Business

Offers large-scale, high-pressure custom pumps for use in sewage facilities, rainwater drainage systems, petrochemical plants, and other facilities as well as standard pumps for use in high-rise buildings, condominiums, industrial facilities, and others



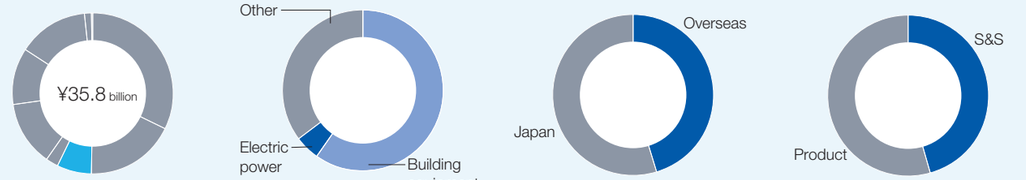
Compressors and Turbines Business

Provides compressors and turbines for oil refineries and petrochemical plants



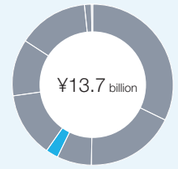
Chillers Business

Handles chillers, cooling towers, and related systems for use in the air-conditioning equipment of buildings and large-scale commercial facilities



Other Businesses

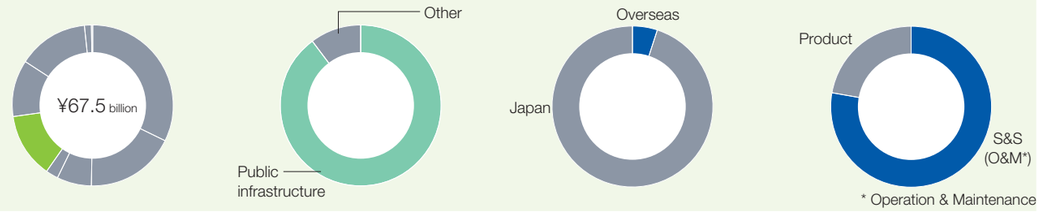
Provides fans for use in applications such as tunnel ventilation as well as electricity, telecommunications, and energy control equipment



Environmental Plants Business ➜P.31-33

Net Sales Ratio | Net Sales Ratio by Industry | Net Sales Ratio by Region | S&S Sales Ratio

Uses EBARA's incinerator and gasification plant technologies to perform processes encompassing the design, construction, operation, and maintenance of municipal solid waste incineration plants and other waste treatment facilities



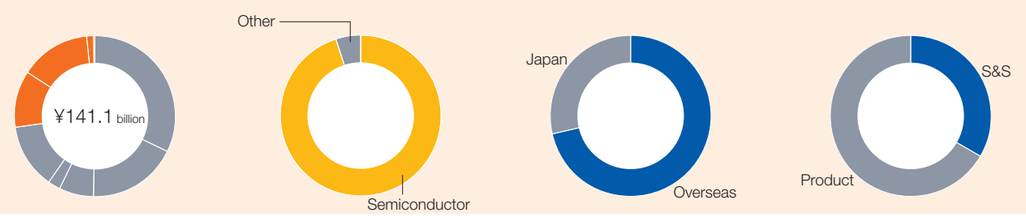
Precision Machinery Business ➜P.34-36

Net Sales Ratio | Net Sales Ratio by Industry | Net Sales Ratio by Region | S&S Sales Ratio

Net Sales

Components	¥60.5 billion
CMP Systems	¥74.2 billion
Others	¥6.2 billion

Provides products that contribute to the manufacturing processes of semiconductors, flat panel displays, and other devices indispensable to a super-smart society including the dry vacuum pumps that create the required vacuum environments and the CMP systems that can polish semiconductor wafers with nano-level precision



Fluid Machinery & Systems Business

We aim to further improve profitability and cultivate new fields and new markets.

Nobuharu Noji
Executive Officer
President, Fluid Machinery & Systems Company

Key Points behind Our Financial Performance in the Fiscal Year Ended December 31, 2020

- **Sales in the Standard Pumps Business decreased due to the COVID-19 pandemic.**
- **Sales and profit increased in the Custom Pumps Business due to strong domestic public-sector projects.**
- **Sales in the Compressors and Turbines Business declined due to lower crude oil prices and the COVID-19 pandemic.**
- **Profit in the Chillers Business increased due to improved profitability in domestic cooling towers and cost reductions.**

In the fiscal year ended December 31, 2020, although sales in the Chinese market and domestic public-sector projects were strong, sales in other markets and regions were down from the previous fiscal year due to the COVID-19 pandemic. Operating profit increased from the previous fiscal year due to improved profitability in the Custom Pumps Business and Compressors and Turbines Business.

As for the progress of our medium-term management plan, E-Plan 2022, we opened the Knock Down Center in Vietnam and are working to strengthen our global production system and supply chain. We also opened a base in Mexico to expand our coverage, and acquired Vansan,* a leading pump manufacturer in Turkey. Our diverse efforts to strengthen our overseas business included the sales launch of solar pumps in Brazil.

Going forward, we will accelerate our global market strategy in the Standard Pumps Business by establishing sales bases and launching products that meet regional needs. In the Custom Pumps Business, we will implement business reforms through digital transformation to improve profitability, reassign personnel and enhance after-sales services to strengthen overseas S&S, and accelerate collaboration with the Compressors and Turbines Business. We will continue to create high value-added products to cultivate new fields and markets, such as the hydrogen market.

* Refers to the three companies collectively known as Vansan (Çiğli Su Teknolojileri A.Ş. and its subsidiaries Vansan Makina Sanayi ve Ticaret A.Ş. and Vansan Makina Montaj ve Pazarlama A.Ş)

SWOT Analysis of Fluid Machinery & Systems (FMS) Business

Strengths

- Fluid, numerical analysis, material, analytical, and other fundamental technologies cultivated over the years (entire FMS Business)
- Capability for developing highly efficient, high-quality, and highly reliable products (entire FMS Business)
- Diverse, global employee base and network (entire FMS Business)
- Presence in Asia (entire FMS Business)

Weaknesses

- Lacking presence in Europe and the United States (pumps, chillers)
- Insufficient lineup of products matched to overseas specifications (pumps)
- Dependence on highly volatile markets (compressors and turbines)

Opportunities

- Increases in infrastructure investment in conjunction with rising water demand attributable to population growth and urbanization in emerging countries (pumps)
- New opportunities arising from industrial structure changes occurring in conjunction with progress in 5G, IoT, and other technologies (pumps, chillers)
- Growing demand for EBARA products in tandem with growth in demand for LNG, hydrogen, and other forms of clean energy (pumps, compressors and turbines)

Threats

- Intensification of price competition stemming from domestic market contraction (pumps, chillers)
- Increased competition due to maturity of technologies and improvement of technological capabilities of emerging manufacturers (entire FMS Business)

E-Vision 2030 and E-Plan 2022 Business Strategies

Business Vision (E-Vision 2030)

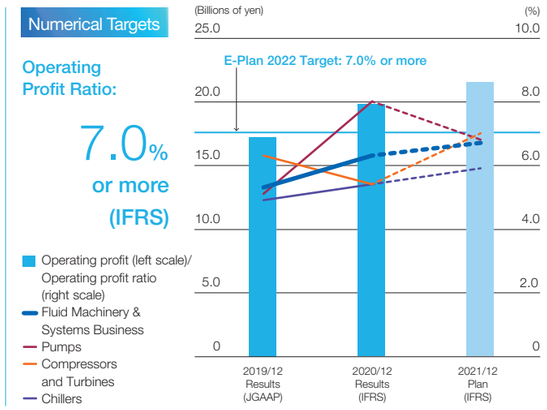
Become a top-class industrial machinery manufacturer that continues to advance into new fields supported by the fundamental technological prowess forged over years of operation

E-Plan 2022 Business Strategies

- Establish business structure that ensures reliable profits
- Improve presence in overseas markets
- Create products matched to customer needs in unexplored and other markets

Numerical Targets

Operating Profit Ratio: 7.0% or more (IFRS)



E-Plan 2022 Targets / Progress in 2020

Numerical Targets (Operating profit ratio) (IFRS)	2020/12 Results (IFRS)	2020/12 Achievements	Future Initiatives
Pumps Business 6.5% or more	**5.4%**	**Standard Pumps** • Domestic: Strengthened S&S structure • Overseas: Expanded sales bases, strengthened SCM*1 • Strengthened marketing and development functions to cultivate new markets with high profit margins	• Domestic: Expand scale of S&S sales, expand new products and sales • Overseas: Accelerate expansion of bases and launch new products that meet regional needs • Market and develop products at the top of their niche
		Custom Pumps • Undertook selective order acceptance for export projects and reassignment of personnel from products to S&S • Strengthened marketing and development functions to cultivate new markets with high profit margins	• Accelerate business reforms through digital transformation • Expand S&S sales through collaboration with Compressors and Turbines Business and by strengthening service systems at overseas bases • Develop prototype pumps for the hydrogen market
Compressors and Turbines Business 8.0% or more	**8.2%**	• Undertook selective order acceptance for products, procurement cost reduction (LCC*2 utilization), lead time shortening through automated design	• Review business scope by clarifying target markets • Complete profitable cryogenic pump and expander test stand
Chillers Business 5.0% or more	**5.4%**	• Domestic: Transferred production of chillers to China, strengthened S&S structure • Strengthened marketing and development functions to cultivate new markets with high profit margins	• Domestic: Expand S&S with refrigerant retrofit technology • China: Introduce new chiller products and expand sales of cooling towers for industrial use • Market and develop products at the top of their niche

*1. SCM: Supply chain management
*2. LCC: Low cost country

E-Plan 2022 Progress and KPIs

The Fluid Machinery & Systems Business has wide-ranging opportunities to contribute to a sustainable society. We have set KPIs for many approaches, including providing a stable water supply to diverse regions as well as contributing to energy-saving products and technologies that reduce environmental impact. The following are some of our business-segment specific KPIs.

Related Materiality	Measures and KPIs	2022/12 Targets	2020/12 Results	2020/12 Achievements	Future Initiatives
1	**Stable water supply to diverse regions**				
	Expansion of solar pump sales (Standard Pumps)	Achieve a unit sales volume target of 100%	Began sales	Began sales in Brazil	Expand sales, mainly in Brazil and developing countries
	Contribution to technologies that reduce environmental impact				
	Development and market launch of products for liquid hydrogen plants (Custom Pumps)	Achieve 100% commercialization	Completed planning and design	Developing a compact prototype of a liquid hydrogen pump for hydrogen power generation facilities	Manufacture and testing of small prototypes
	Making products more energy efficient				
	Complete development and commercialization of new steam turbine series (Compressors and Turbines Business)	Achieve 100% commercialization	Started study	Started technological development of high-speed, compact, and high-efficiency steam turbine series	Commercialization and market launch
	Environmental load management				
	Reduction of GHG emissions through sales of low-GWP* products (Chillers)	Reduce annual GHG emissions by the equivalent of 33,000 tons of carbon dioxide	Reduced annual GHG emissions by the equivalent of 20,600 tons of carbon dioxide	Expansion of new refrigerant turbo chiller series Development and market launch of refrigerant retrofit technology	Expand sales of new refrigerant turbo chillers and products using retrofit technology, and further enhance product lineup

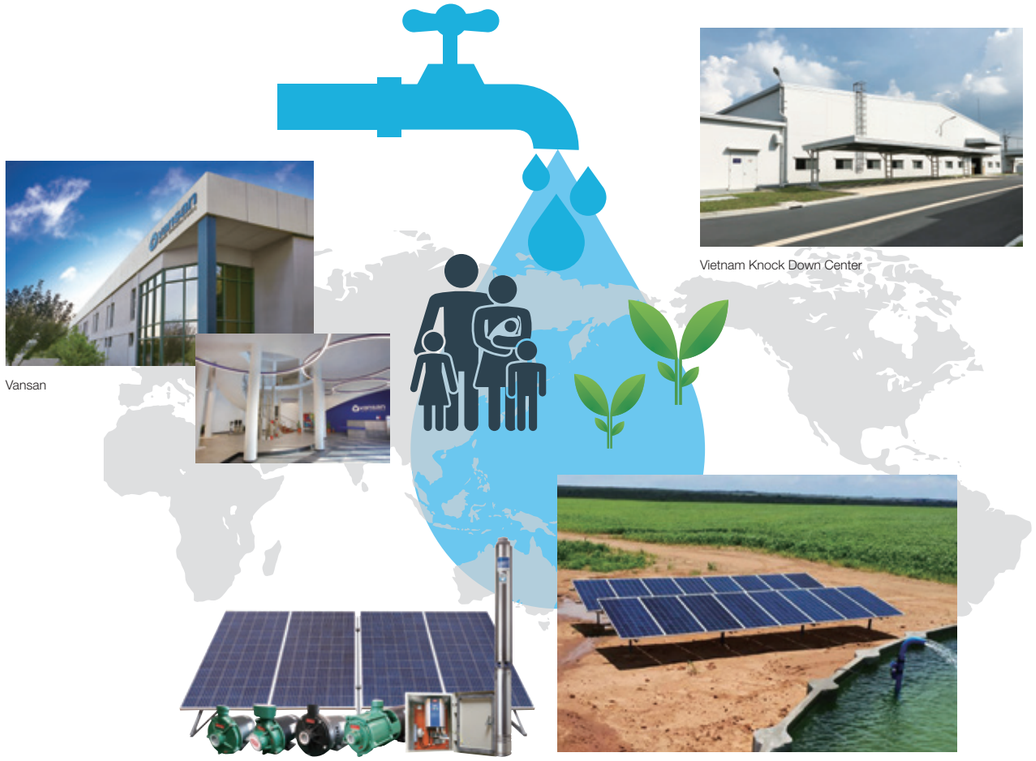
* GWP: Global warming potential

Topic 1 Standard Pumps Business: Strengthening Global Production, Sales, and Service Systems

In the Standard Pumps Business, EBARA BOMBAS AMÉRICA DO SUL LTDA. (hereinafter "EBAS"), an overseas Group company, commenced sales of solar pumps in January 2020 to help achieve the goal of "Delivering Water to 600 million People Worldwide (approx. 7% of the world's population)" as stated in E-Vision 2030, our long-term vision. There are still rural areas in Brazil where electricity is not available, so this product is designed to help fulfill basic living needs, such as access to drinking water. Solar pumps, which generate electricity converted from sunlight through solar panels, are available for centrifugal pumps and swimming pool pumps, in addition to the 220V deep well pumps that EBAS has been producing since its establishment. In the future, we will launch 380V-equivalent product capable of powering pumps with greater power consumption. We will take advantage of EBAS's extensive sales and service network to sell our products, both within Brazil and in other countries where there is a high level of interest in our products, and strengthen sales expansion.

As part of the global market strategies laid out in E-Plan 2022, we are aiming to expand our sales in regions and countries where we expect growth due to factors such as population and economy growth, as well as increasing industrial development. In May 2020, we established Ebara Pumps Mexico, S.A. de C.V. in Mexico to assemble, sell, and provide service and support for pumps. We will contribute to the development of the local economy in Mexico and elsewhere by actively investing our management resources, bolstering our products and services, and recruiting and cultivating human resources. In Vietnam, the Knock Down Center for standard pump assembly began operation in December 2020. The facility stocks a certain level of standard pump parts produced at the EBARA Group's Italy plant, and assembles them into products for shipment. Previously, each EBARA Group company in Southeast Asia managed their own inventories. By establishing the Knock Down Center, we will be able to better optimize product inventory and efficiently supply products to the Southeast Asian market according to demand, thereby shortening delivery times and reducing inventory. In addition, the acquisition of Vansan, a leading pump manufacturer in Turkey, will strengthen our access to the European, Central Asian, Middle Eastern, and African markets. We aim to increase our presence in the deep well motor pump market as well as strengthen our supply chain and enhance our product competitiveness by leveraging our technological capabilities in the global market.

In the future, we will accelerate the establishment of sales bases and the market launch of products meeting regional needs. We will further strengthen our global production system and supply chain, including within Japan, to improve our presence in overseas markets and further expand our Standard Pumps Business.



Vansan

Vietnam Knock Down Center

Solar pumps and real-world site

Topic 2 Custom Pumps Business: Liquid Hydrogen Pump Development

In the Custom Pumps Business, we are working on developing a liquid hydrogen pump for hydrogen power generation facilities in order to break into the hydrogen market. This project began in 2019 and is subsidized by the New Energy and Industrial Technology Development Organization (NEDO). We plan to conduct liquid hydrogen tests on a small prototype in 2022 in collaboration with the Japan Aerospace Exploration Agency (JAXA).

Hydrogen is a clean energy source that emits no air pollutants or greenhouse gases, and can be produced from a variety of primary energy sources in a variety of ways. It can be transported and stored as a gas, liquid, or solid (absorbed in alloys), and it is expected to serve a central role in the future of secondary energy due to its high energy efficiency and potential for use during times of emergency. For Japan to become a "hydrogen society" that utilizes hydrogen in daily life and industrial activities, demand for hydrogen needs to increase through the expansion of stationary fuel cell use, development of the fuel cell vehicle market, and the introduction of full-scale hydrogen power generation. Building a hydrogen supply chain to meet this demand will be also be a requirement.

NEDO's Development of Technologies for Realizing a Hydrogen Society project aims to develop an energy system that combines hydrogen production, transportation, storage, and utilization technologies with electricity derived from renewable energy sources.

We will continue ongoing development within the Custom Pumps Business. Our future development plans include commercial demonstrations scheduled for 2025, hydrogen power generation and the commercialization of the international hydrogen supply chain scheduled for 2030.*

* According to the Strategic Road Map for Hydrogen and Fuel Cells published by the Ministry of Economy, Trade and Industry (METI) in March 2019.

Topic 3 Chillers Business: Retrofit Technology to Reduce Environmental Impact

In recent years, there has been a demand for refrigeration equipment that uses refrigerants with low global warming potential (GWP) to reduce greenhouse gas emissions. EBARA REFRIGERATION EQUIPMENT & SYSTEMS Co., LTD. (ERS) has developed and launched a new type of turbo chiller (RTBA*) that uses a new refrigerant with low GWP that also boasts improved qualities when compared to conventional refrigerants. These include non-flammability, low toxicity, and high stability. Recognized for its excellent performance and undeniable track record, this chiller received a special jury award in the 21st Ozone Protection and Global Warming Prevention Awards, and has been used in commercial and accommodation facilities, chemical plants, and various other facilities since its launch. The adoption of the new type of turbo chillers will lead to an effective reduction in environmental impact. However, turbo chillers have a very long product lifespan, so it may be 10 or 20 years before they can be replaced with the new turbo chillers. To address this issue, we have developed retrofit technology that enables the use of new refrigerants in existing turbo chillers that currently use conventional refrigerants. By utilizing this technology developed by ERS, specific parts of chillers can be replaced during regular scheduled maintenance to enable the use of low-GWP refrigerants. This technology helps customers take advantage of eco-friendly products that help combat global warming without substantial upfront investment. We are currently working to broaden the range of applications for our new turbo chillers and expand the lineup of existing products that can be updated with retrofit technology.

We will continue to develop our technology and expand sales of our new refrigerant turbo chillers for widespread use, both to meet the needs of our customers and to make a significant contribution to curbing global warming.

* RTBA is the ERS model number.

Model RTBA turbo chiller

Environmental Plants Business

As a resource circulation solutions provider, we will work toward decarbonization and the realization of a sustainable society.

Atsuo Ohi
Executive Officer
President, Environmental Engineering Company

Key Points behind Our Financial Performance in the Fiscal Year Ended December 31, 2020

- **Sales and profit decreased in EPC as construction was in between projects**
- **Sales and profit increased in plant O&M due to the expansion of business scope and cost reductions**

Under E-Vision 2030, the Environmental Plants Business aims to grow into a resource circulation solutions provider that provides a wide range of services to contribute to the building of sustainable local communities. We will develop business centered on the EPC* and O&M of waste treatment plants that primarily serve local governments.

2020 was an unprecedented year with the worldwide COVID-19 pandemic, but the waste treatment facilities we handle are necessary for maintaining standards of living. We accomplished our work with a focus on stably processing local waste and protecting the safe and secure lives of local residents.

Global awareness of environmental issues, such as greenhouse gas emissions that cause climate change and ocean pollution caused by waste plastic, has never been higher. Major countries, including Japan, have committed to carbon neutrality and are moving to decarbonize operations, and the environment surrounding corporations is undergoing major changes.

We are actively incorporating rapidly developing digital transformation technologies, such as AI-equipped cranes, to further improve the stability and energy efficiency of our waste treatment facilities and to reduce carbon dioxide emissions. In addition, we will further strengthen the practical application of waste plastic chemical recycling, and work toward decarbonization and the realization of a sustainable society.

* EPC: Engineering, Procurement, and Construction

SWOT Analysis of Environmental Plants Business

Strengths
- Integrated system for providing services ranging from engineering and construction to operation and maintenance
- Track record of constructing more than 400 plants worldwide utilizing a wide range of incinerator technologies
- O&M expertise founded on industry-leading operation contracting track record
- Cutting-edge plant operation initiatives employing AI and ICT
- Gasification technologies related to chemical recycling

Weaknesses
- Dependence on public infrastructure industry in Japan
- Geographic overconcentration of customers
- Labor-intensive facility operation businesses

Opportunities
- Reconstruction and upgrade demand stemming from aging of waste treatment plants
- Increased outsourcing of plant operation to the private sector
- Increased demand for renewable energy
- Growing need for waste plastic processing

Threats
- Consolidation of plants in response to domestic population decline
- Workforce contraction
- Intensification of cost competition

E-Vision 2030 and E-Plan 2022 Business Strategies

Business Vision (E-Vision 2030)

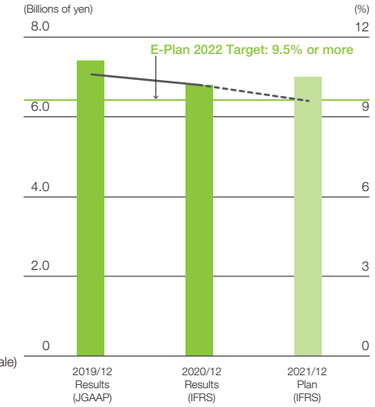
Expand business to become a resource circulation solutions provider with operations centered on waste treatment plant construction and operation that provides integrated EPC services primarily to local governments

E-Plan 2022 Business Strategies

- Reinforce core operations
- Develop new businesses
- Step up waste treatment equipment liquidation and sales activities in China and promote offshore trading
- Improve non-price evaluation of design, build, and operate (DBO) projects

Numerical Targets

Operating Profit Ratio:
9.5% or more (IFRS)



E-Plan 2022 Targets / Progress in 2020

Numerical Targets (Operating profit ratio) (IFRS)	2020/12 Results (IFRS)	2020/12 Achievements	Future Initiatives
9.5% or more	10.2%	• Received contracts for DBO projects for municipal governments as well as EPC projects for the private sector as a result of customer-oriented proposals	• Improve profitability of receiving new EPC/DBO projects by improving non-price related elements of proposals
		• Received contracts for facility life-extension projects for municipal governments due to our highly-evaluated, long-term track record in maintenance, management, and operation	• Continue efforts to incorporate peripheral operations of the comprehensive, long-term service projects and propose lifespan extensions
		• Increased the number of facilities equipped with AI cranes and the number of facilities eligible for remote monitoring support by implementing digital transformation	• Further R&D towards reduction of O&M costs by making full use of digital transformation technologies and improvement of plant performance
		• Signed a process license agreement for chemical recycling*	• Implement demonstration tests for implementing chemical recycling in society

* In September 2020, Ebara Environmental Plant Co., Ltd., JGC CORPORATION, and Ube Industries, Ltd. signed a license agreement for the Ebara Ube Process (EUP) pressurized two-stage gasification process.

E-Plan 2022 Progress and KPIs

We are working to provide high-quality services by implementing digital transformation at facilities with operational support. In addition to utilizing our incinerator operation know-how, we are also working on the further improvement of power generation efficiency and reduction of carbon dioxide emissions with the help of digital transformation technologies. We have set KPIs for each of our initiatives, some of which are introduced below.

Related Materiality	Measures and KPIs	2022/12 Targets	2020/12 Results	2020/12 Achievements	Future Initiatives
1	**Environmental load management**				
	Generation of renewable energy from waste	130,000 MWh	140,163 MWh	Exceeded volume target for contracted power as a result of positive municipal responses to our initiatives to generate power locally for local consumption	Conduct proposal activities to sign long-term contracts for the generation of renewable energy from waste
	Stable operation of social infrastructure				
	Long-term comprehensive contracts for DBO projects (cumulative total)	19	14	Conducted proposal-based sales activities that take into account the individual circumstances of customers to ensure the stable operation of municipal solid waste treatment facilities, an essential part of the social infrastructure	Focus on facility design as well as local power production for local consumption to make our facilities into symbols of a recycling-oriented society
	Crane upgrades and AI crane installation	Achieve 100% installation target	Installation target 33% achieved	Introduced AI cranes to municipal facilities for their labor-saving and stable incinerator functions	Implement crane upgrades and widespread adoption of AI cranes based on the needs of the domestic public and private sectors
	Contribution to technologies that reduce environmental impact				
	Practical application of Internally circulating fluidized-bed gasification system (ICFG)*	Construction of demonstration units Achieve an order target of 100%	Began basic trials	Established ICFG test facilities to extract products from waste plastics and obtain various data	Commence basic trials and activities to acquire contracts with potential users to build demonstration units

* ICFG is a system to recover high-calorific fuel gas, consisting mainly of hydrocarbons, from low-grade materials like biomass. The product gas can be used as an alternative energy to fossil fuels, thus reducing new fossil fuel usage. ICFG is a chemical recycling technology that can be integrated into existing industrial processes with massive energy consumption to realize innovative systems that utilize biomass and waste energy as alternative fuel for manufacturing industries. ICFG is a registered trademark in Japan of Ebara Environmental Plant Co., Ltd.

Topic 1 Implementing Chemical Recycling

In September 2020, Ebara Environmental Plant Co., Ltd. and Ube Industries, Ltd. signed a license agreement to provide the Ebara Ube Process (EUP)* pressurized two-stage gasification process technology to JGC Corporation. EUP is a waste plastic chemical recycling technology developed with the aim of realizing advanced recycling of waste plastics amid the accelerating global movement toward the realization of decarbonization.

The chemical recycling of waste plastic contributes to the improvement of the waste plastic recycling rate and the significant reduction of carbon dioxide emissions. The method consists of decomposing various kinds of plastics and impurities, which is one of the difficulties of plastic recycling, into various chemicals such as ammonia, methanol, and olefins, which can then be reused as raw materials for plastics, rubber, and synthetic fibers.

Jointly developed by Ebara Environmental Plant, Co. Ltd. and Ube Industries, Ltd., EUP is a technology that produces a synthesis gas of carbon monoxide and hydrogen by thermally decomposing waste plastic. This technology was put to practical use in early 2000, and ammonia has been continuously produced at the Showa Denko K.K. Kawasaki Plant since 2003. Today, about 60,000 tons of waste plastic is processed annually with EUP to produce ammonia using the hydrogen obtained from the process.

Through this license agreement, we will promote the use of EUP as a plastic waste gasification chemical recycling system, and will actively work to further the decarbonization of society in Japan and overseas.

* EUP is a registered trademark in Japan of Ube Industries, Ltd.

Topic 2 Received the Prize of Director General of Small and Medium Enterprise Agency at the 2020 Energy Conservation Awards

Chubu Recycle Co., Ltd., a subsidiary of Ebara Environmental Plant Co., Ltd., won the Prize of Director General of Small and Medium Enterprise Agency (hereinafter, the Prize) in the Energy Conservation Best Practices at workplaces of the 2020 Energy Conservation Awards (hereinafter, the Awards) sponsored by the Ministry of Economy, Trade and Industry (METI).

The Awards were established by the Energy Conservation Center, Japan to honor the products and business models of companies that excel in energy conservation. The information dissemination and public relations activities of this awards program contributes to the building of an energy-saving society by raising awareness about energy-saving and relevant products throughout Japan.

The Prize was awarded to Chubu Recycle for its continuous efforts in energy conservation activities under the theme of “promoting energy conservation by raising awareness,” and for its achievements as an “excellent” rated business (S Class*1) for five consecutive years.

Since its establishment in 1999, Chubu Recycle has been engaged in the resource recycling business, also known as “urban mining.*2” Under its corporate philosophy of “Zero Emissions Factory,” incinerator ash generated from waste incineration plants is melted and recycled into construction materials and valuable metals.

In the fiscal year ended December 31, 2020, we achieved a 9.8% reduction in energy consumption per unit of production and a 1,619-ton reduction in carbon dioxide emissions compared to the fiscal year ended March 31, 2017.

Chubu Recycle staff with the Energy Conservation Award (Prize of Director General of Small and Medium Enterprise Agency)

The Environmental Engineering Company will continue to contribute to the building of a sustainable society through recycling-oriented business, continuous energy-saving activities, and environmental load reduction activities.

*1. All businesses that submit periodic reports under the Energy Conservation Law are classified into four classes (S, A, B, and C), and the S class is recognized as an “excellent” business on the Ministry of Economy, Trade and Industry’s (METI) website.
*2. Because incinerated ash contains useful metals such as gold and zinc, it is referred to as an “urban mine,” a source of usable metals from the city.

Topic 3 Received Order for Incinerator for Municipal Solid Waste Treatment Facility in China

Ebara Qingdao Co., Ltd. (hereinafter “Ebara Qingdao”), a subsidiary of Ebara Environmental Plant Co., Ltd., has received an order for an incinerator for a municipal solid waste treatment facility for Beijing, the capital of the People’s Republic of China. With this contract, the total number of contracts received by Ebara Qingdao throughout Asia, including in China, has reached a cumulative total of 49, with a cumulative processing capacity of 48,007 tons/day.

Ebara Qingdao is a manufacturing base for waste incinerators and waste heat boilers for municipal solid waste treatment facilities for the Japanese market, and also operates a business (EP + SV*1) in China that designs, manufactures, installs, and provides guidance on the commissioning of waste incinerators and other major equipment.

The contract we received this time is for the third phase of the waste-to-energy generation plant in Shunyi District, Beijing. Ebara Qingdao will supply the High Pressure Combustion Control (HPCC)*2 stoker-type incineration system (processing capacity 800 tons x 1 furnace = 800 tons/day) to be used for the waste incinerator and provide safe, reliable waste treatment. In addition, the heat generated from waste incineration will be recovered by a steam boiler and used for power generation, thus reducing the need for electricity generated from fossil fuels and reducing carbon dioxide emissions.

Rendering of the completed third phase waste-to-energy generation plant in Shunyi District, Beijing

Based on more than 60 years of experience and technological capabilities in the solid waste treatment business in Japan, the Environmental Engineering Company is aiming to expand its business to become a resource circulation solutions provider. In China and other neighboring countries, we will also contribute through Ebara Qingdao to global decarbonization by providing designs and products tailored to each region based on our experience and technological capabilities.

*1. EP + SV: Engineering Procurement + Supervisor
*2. HPCC, or High Pressure Combustion Control, is a registered trademark in Japan of Ebara Environmental Plant Co., Ltd.

We will strengthen our ability to provide solutions and develop products with reduced environmental impact.

Tetsuji Togawa
Executive Officer
President, Precision Machinery Company

Key Points behind Our Financial Performance in the Fiscal Year Ended December 31, 2020

- **Sales in chemical mechanical polishing (CMP) systems increased due to growing demand**
- **Sales in S&S parts and overhaul increased**
- **Operating profit increased in line with increased sales**
- **Fixed costs related to the automated dry vacuum pump plant increased**

In the fiscal year ended December 31, 2020, capital investment and demand for semiconductors remained strong, reflecting the spread of ICAC5* as well as the widespread adoption of remote work and stay-at-home lifestyles, resulting in increased sales and profit compared to the previous fiscal year.

In the Precision Machinery Company, in line with the growth strategy set forth in E-Plan 2022, we strengthened our ability to provide solutions by developing an exhaust system for EUV lithography equipment and conducting joint development with international research organizations. To promote global business development, we strengthened systems to increase our market share in China and opened a dry vacuum pump overhaul center in Germany. In addition to implementing measures to increase efficiency, we began operation of an automated dry vacuum pump plant on our Fujisawa District premises.

During the fiscal year ending December 31, 2021, to meet growing demand, we will expand the CMP production lines at the Kumamoto District plant, complete construction and start operation of a dry vacuum pump overhaul center in China, and begin construction of a new equipment development building to further strengthen our ability to provide solutions. In addition, we are promoting development aimed at energy and resource conservation in our products from a sustainability perspective, and are striving to help reduce the environmental impact of our customers’ business activities.

We will contribute to the realization of a more enriched world by cultivating partnerships with our customers and providing solutions based on our unique technology.

* ICAC5 stands for IoT, cloud, artificial intelligence (AI), self-driving cars, and 5G.

SWOT Analysis of Precision Machinery Business

Strengths
- Rotating machinery, fluid equipment, machine control systems, gas decomposition and abatement, and energy conservation technologies
- Sophisticated technological capabilities and manufacturing technologies that contribute to resource conservation
- Bases positioned near customers worldwide
- Flexible, high-quality customer support capabilities
- Long-term employee retention contributing to technology accumulation and transfer
- Diverse base of technically skilled employees around the world
- Robust supply chain

Weaknesses
- Lack of optimization of production systems (i.e., fully automated plants, etc.)
- Faltering share expansion in growth-promising Chinese market
- Slow launches to new business initiatives

Opportunities
- Spread of IoT, AI, and automated driving technologies
- Diversification of work styles through teleworking and other methods utilizing cloud and communications technologies
- Growth in semiconductor demand in conjunction with the technological development of a super-smart society
- Aggressive semiconductor investment in China
- Consistent capital investment demand in Taiwan, South Korea, and Japan

Threats
- Fluctuations in semiconductor demand and inconsistent pace of semiconductor capital investment following slowed pace of semiconductor complexity increases
- Diminishment of market share due to supply chain issues and other factors leading to insufficient production capacity
- Impacts of trade dispute between the United States and China

E-Vision 2030 and E-Plan 2022 Business Strategies

Business Vision (E-Vision 2030)

Contribute to the development of society through partnerships and distinctive technologies centered on the semiconductor field while helping create a more enriched world through endeavors in new fields

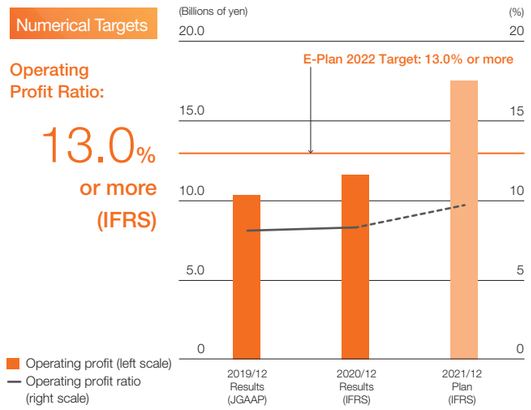
E-Plan 2022 Business Strategies

- Transition from a supplier of standalone equipment to a solutions provider
- Create new businesses with new technologies at their core
- Pursue highly efficient management and develop operations on a global scale

Numerical Targets

Operating Profit Ratio:

13.0% or more (IFRS)



E-Plan 2022 Targets / Progress in 2020

Numerical Targets (Operating profit ratio) (IFRS)	2020/12 Results (IFRS)	2020/12 Achievements	Future Initiatives
13.0% or more	8.3%	• Conducted joint development with international research organizations • Opened dry vacuum pump overhaul centers in Germany and China • Began operation of the automated dry vacuum pump plant	• Strengthen production systems to meet growing demand and further enhance our ability to provide solutions

E-Plan 2022 Progress and KPIs

We are further improving energy conservation and weight reduction in our products, and are promoting joint development with partners whose products and services support the realization of next-generation semiconductors. We will realize E-Vision 2030 by reducing GHG emissions through our products and ensuring stable operations for our customers through the expansion of S&S. We have set more than ten categories of KPIs and are monitoring the progress of all of our initiatives.

Related Materiality	Measures and KPIs	2022/12 Targets	2020/12 Results	2020/12 Achievements	Future Initiatives
1	**Environmental load management**				
	Reduction of GHG emissions through gas abatement systems	Achieve 100%	40%	Contribute to the reduction of GHG emissions by detoxifying the gases generated in the semiconductor manufacturing process	Develop and expand sales of products that are more beneficial to customers
	Product weight reduction				
	Weight reduction of target products (Per unit compared to 2019)	Achieve 12% reduction	13%	Reduce the weight of target products to decrease raw materials and energy used in distribution; reduced weight also makes products easier for customers to use	Continue to develop models that take into account weight reduction as well as changing market trends
2	**Development of manufacturing equipment to meet the evolutionary roadmap for semiconductors**				
	Development of new models arising from priority projects	Achieve 100%	88%	Completed roughly the number of models targeted for completion by the end of FY2020	Further increase the number of models developed
	Development of elemental technologies for the next generation of target products	Achieve 100%	97%	Development progressing roughly on schedule	Continue development

Topic 1 Completed Construction of Dry Vacuum Pump Overhaul Centers in Germany and China

Demand for semiconductors is growing with the worldwide adoption of remote work and the acceleration of digital transformation. As our customers in the semiconductor industry continue to increase factory operations, demand for S&S of semiconductor manufacturing equipment and component equipment to support production is increasing. In particular, dry vacuum pumps require periodic overhauls to maximize performance and prevent breakdowns. For this reason, it is important to enhance customer-oriented field support, strengthen the S&S system in Japan and overseas, and cultivate human resources.

In April 2021, overseas Group company EBARA Precision Machinery Europe GmbH (headquartered in Germany; hereinafter referred to as EPME) completed construction of its second dry vacuum pump overhaul center in Weixdorf, Dresden, where EPME is located, complementing the 10 similar facilities already in operation around the world. As Dresden is a high-tech city known as “Silicon Saxony,” the EPME’s new overhaul center will enable us to meet the demands of the European market more quickly, serving an important role for EBARA’s Precision Machinery Business.

In addition, in order to quickly meet demand for semiconductors in the Chinese market, we completed construction of the third dry vacuum pump overhaul center in China in July 2021 at HEFEI EBARA PRECISION MACHINERY (headquartered in China), an overseas Group company.

With the establishment of the new overhaul centers, we will contribute to the advancement of semiconductor products that will support a smart society, one of the goals set forth in E-Vision 2030, through S&S of manufacturing equipment and devices.

EBARA Precision Machinery Europe overhaul center

HEFEI EBARA PRECISION MACHINERY overhaul center

Topic 2 New Dry Vacuum Pump Automated Plant at Fujisawa District Premises

In the new world of ICAC5, demand for semiconductors is expected to keep growing, and we will need to respond with strong capital investment in the semiconductor industry as a whole. Therefore, in order to strengthen our production system for dry vacuum pumps and CMP systems, for which we have a large share of the global market, we are automating and expanding production lines at our plants in Kanagawa and Kumamoto Prefecture.

A new automated dry vacuum pump V7 plant was constructed in December 2019 on the Fujisawa District premises in Kanagawa Prefecture. Full-scale operation is scheduled to begin in August 2021. The automated V7 plant replaces production work that used to be done manually with IoT technology to manage production and operation status in real time. This enables efficient processing, assembly, and distribution processes in accordance with demand fluctuations, tripling production capacity.

With the establishment of this new automated plant, we will be able to produce products that meet our customers’ needs in a timely manner even as demand continues to grow. After the new plant begins operation, we will continue to utilize the latest automation and other technologies to further improve productivity.

We are aiming to increase the number of CMP system production lines in the existing plant at the Kumamoto District location, from the current two lines to three lines halfway through 2021. This will increase production capacity to 1.5 times the current level. We are also planning to increase the number of personnel in accordance with this facility expansion.

We are enhancing our dry vacuum pump and CMP system production facilities, and by improving production efficiency, we will be able to supply products that meet the needs of our customers in a timely manner.

Fujisawa District V7 plant

New Businesses

The EBARA Group aims to develop and create new businesses by recognizing issues based on realistic future forecasts and integrating a global market-in approach while contributing to solving material issues by leveraging its unique strengths. Here, we will present some of our new businesses already under way.

Furthering Decarbonization Collaboration with Spiber

Spiber Thailand

In January 2020, the EBARA Group invested 1.0 billion yen in Spiber Inc. (hereinafter “Spiber”). Spiber is developing and manufacturing Brewed Protein materials that are expected to become sustainable next-generation key materials and do not depend on petroleum or other finite resources as their main raw material. Since the initial investment, we have conducted joint research with Spiber to improve the heating and cooling processes in the manufacturing (cultivation) process.

We delivered industrial process pumps (Model GSO* pumps), one of our core global products, to the Brewed Protein mass production plant that opened in Thailand in March 2021. The Model GSO pumps are used mainly for industrial processes in the Chinese and Southeast Asian markets. The pumps, which are one of our core global products boasting high efficiency, comply with the international standards ISO2858 and ISO5199 required in chemical and general industries. In addition to the Model GSO pumps, we also delivered pumps for cooling water, fire extinguishing, and water supply.

We will be dispatching mechanical engineers to Spiber to explore a wide range of manufacturing process efficiencies that integrate biology with mechanical engineering. Specifically, we will deepen our understanding of cutting-edge fermentation processes, develop new added functions and equipment, and proceed with development aimed at scaling up manufacturing. We will further our collaboration with Spiber with the goal of realizing a society that can break free from its dependence on fossil fuels.

* Model GSO is an EBARA model number.

Our Inland Recirculating Aquaculture System (RAS) Testing Site is Now in Operation

A tank of tiger puffer fish at the inland recirculating aquaculture experimental farm

EBARA entered into a capital and business alliance in 2019 with Regional Fish Institute, Ltd. (hereinafter “Regional Fish”), a food-tech start-up established as the core proponent of the efforts of Kyoto University and Kindai University, among others. In October 2020, we constructed and began operation of an inland recirculating aquaculture experimental farm in collaboration with Regional Fish, where we are conducting growth tests of tiger puffer fish by combining Regional Fish’s breeding technology with EBARA’s fluid and heat control technologies, as well as other technologies that we have fostered since our founding. We are striving for the swift implementation of a labor-saving inland recirculating aquaculture system that reduces pump power costs and more precisely controls required water volume as well as purification functions.

Along with technological development, we aim to raise the value of farmed fish by taking a market-oriented perspective and conducting activities such as utilizing outside companies’ networks of top chefs in Japan and abroad to work towards visualization of taste, adaptation to cuisine, and creation of processed foods.

We aim to industrialize the next generation of inland recirculating aquaculture, which will be less burdensome on the environment and provide a safe, secure, stable supply of products in both quality and quantity. We also aim to enable visualization of taste and production of seafood products in line with consumer preferences.

Borderless Business Creation in Southeast Asia and Cultivation of Intrapreneurs

In July 2020, we invested 500 million yen in the “Real Tech Fund Investment Partnership Global I” established by Real Tech Holdings Co., Ltd. (hereinafter “Real Tech Holdings”), a fund that invests in and fosters real tech startups in Southeast Asia.

“Real tech” refers to R&D-based innovative technologies that contribute to solving deep-rooted, global issues such as climate change, energy issues, and food problems. Although Southeast Asia is in the midst of remarkable economic development, there are still many inherent issues that need to be addressed, and we will work together with local startups and university research institutions to create new businesses that solve these issues. We have also dispatched personnel to Real Tech Holdings with the aim of fostering intrapreneurs within EBARA, exploring new opportunities, and jointly developing business creation and evolution.

Message from an employee dispatched to Real Tech Holdings

Sho Kosaka

EBARA CORPORATION
Marketing Division
New Business Architecture Department, Marine Solution Section

The thing that surprised me the most about Real Tech Holdings was each member’s passion. We all have a venture-first attitude. Everyone remains highly focused on how to quickly implement technology in society and how to collaborate with the people who can support that technology. It was clear to me that these people all share the top priority of changing the world through technology. This opportunity to work alongside entrepreneurs my same age and to be directly involved with cutting-edge technology in Southeast Asia is invaluable to me.

New Business Idea Competition “E-Start 2020”

The Marketing Division’s New Business Architecture Department carried out “E-Start 2020,” an internal competition to produce new business ideas. We also needed to create an internal culture that would go beyond the collection of ideas to ensure the ideas get considered and nurtured.

We set up a special website for the event and announced it on the Company intranet. President Asami himself sent out a video with the message, “Nurturing plans that embody the founding spirit of ‘Netsu to Makoto’ (Passion and Dedication).” This was followed by a video thread of supportive messages from all of the Executive Officers. As a result of the increased internal communication, we were able to receive 120 new business idea submissions. Despite a short employee voting period of just two days, 884 votes were cast, and we succeeded in creating an atmosphere that supports new business development throughout the Company.

Two external judges participated in the final judging panel, which was held online. Nine proposals in fields such as medicine, space, environment, and energy were discussed, and the five winning proposals have now advanced to the phase of preparation for commercialization.

The winning team and President Asami (center)