



Financial Results Briefing for the Second Quarter of the Fiscal Year Ending March 2023

December 2, 2022

KROSAKI HARIMA CORPORATION

(Securities Code: 5352)

1. Overview of Financial Results for the First 2Qs of the Fiscal Year Ending March 2023

2. Full-year Business Results Forecast

3. Global Strategy

4. Sales Expansion through New Technologies and Progress on the 2025 Management Plan

5. Initiatives to Promote Sustainability

[Reference] Overview of the Company

Overview of Financial Results
for the First 2Qs of the
Fiscal Year Ending March 2023
(First Half of FY2022)

Overview of Business Results

(Billions of yen)

	First half of FY2021	First half of FY2022	Year-on-year change
Net sales	65.11	80.59	+ 15.47
Operating profit	4.20	4.91	+ 0.70
Ordinary profit	4.55	5.68	+ 1.13
Profit ^{*1}	3.01	3.57	+ 0.55
ROS ^{*2}	7.0%	7.1%	+ 0.1pt
ROE ^{*3}	9.7%	10.5%	+ 0.8pt

Business Environment

- Domestic total crude steel output (first half of FY2022): 44.8 million tons (down 7.5% year on year)
- Worldwide crude steel output (January to September 2022): 1,405.2 million tons (down 4.3% year on year)
- Total crude steel output in India (January to September 2022): 93.3 million tons (up 6.4% year on year)

*1: Profit attributable to owners of parent *2: Return on sales (ordinary profit to net sales ratio)

*3: ROE (return on equity) has been calculated by doubling the profit for the first half of the fiscal year

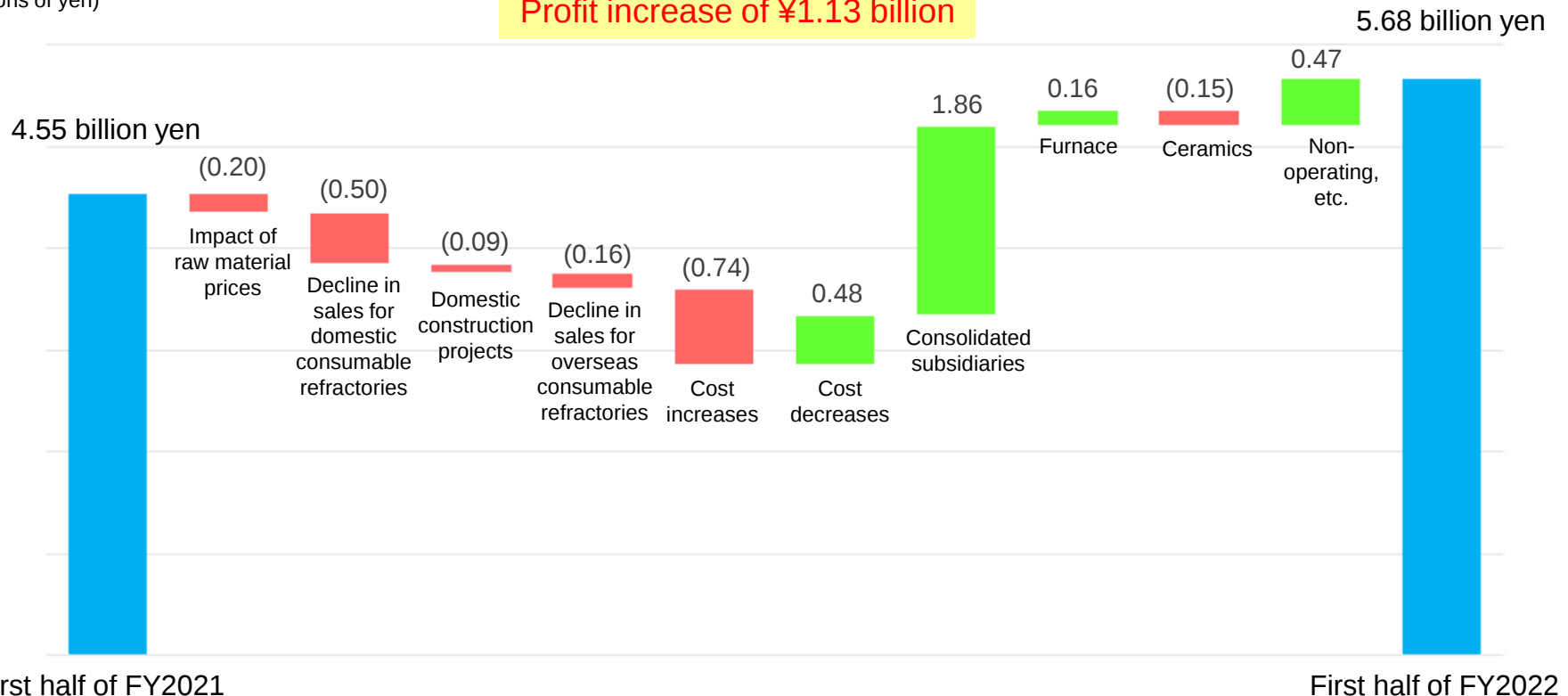
Analysis of Factors Causing Change in Ordinary Profit [First Half of FY2021 vs. First Half of FY2021] (Consolidated)

The Refractories segment in Japan faced a difficult environment caused mainly by soaring prices of raw materials, procured goods, and energy, partly due to the impact of the rapid depreciation of the yen, in addition to a decline in crude steel output, despite steady progress in passing on the rise in costs in the previous fiscal year to selling prices.

This was offset by strong business results in overseas subsidiaries in India and elsewhere, resulting in a year-on-year increase in profit of ¥1.13 billion on a consolidated basis.

(Billions of yen)

Profit increase of ¥1.13 billion



Financial Position (Consolidated)

<Balance Sheets>

(Billions of yen)

	March 31, 2022	September 30, 2022	Change	Main factors
Assets	142.69	157.59	+ 14.89	-
Current assets	91.32	103.34	+ 12.01	Increase in accounts receivable due to increase in sales
Property, plant and equipment and intangible assets	41.11	43.32	+ 2.21	Acquisition of machinery and equipment
Investments and other assets	10.25	10.91	+ 0.66	-
Liabilities	73.60	82.22	+ 8.61	Increase in interest-bearing liabilities due to increase in working capital
Net assets	69.08	75.36	+ 6.28	Increase in retained earnings and change in foreign currency translation adjustment

Balance of interest-bearing liabilities	34.19	38.11	+ 3.91
D/E ratio	0.52	0.54	+ 0.01
Equity ratio	45.8%	45.0%	- 0.7pt

<Cash Flows>

	First half of FY2021	First half of FY2022	Main factors
Cash flows from operating activities	2.84	(0.48)	Increase in working capital due to the increase in sales, despite profit before income taxes
Cash flows from investing activities	(1.87)	(2.02)	Progress of capital investment
Free cash flow	0.96	(2.50)	-
Cash flows from financing activities	(0.72)	1.94	Increase in borrowings due to increase in working capital

Business Results by Segment (Consolidated)

(Billions of yen)

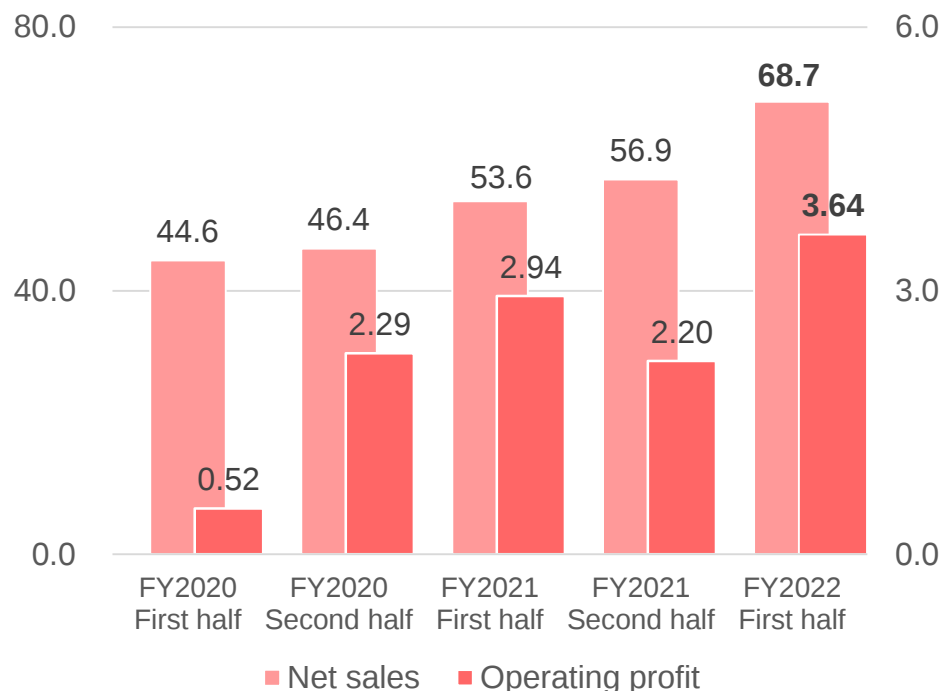
		First half of FY2021	First half of FY2022	Year-on-year change	
Refractories	Net sales	53.66	68.70	+ 15.03	+ 28.0%
	Segment profit	2.94	3.64	+ 0.69	+ 23.8%
Furnace	Net sales	6.46	6.99	+ 0.53	+ 8.3%
	Segment profit	0.25	0.41	+ 0.15	+ 62.1%
Ceramics	Net sales	4.25	4.13	- 0.11	- 2.7%
	Segment profit	0.69	0.55	- 0.14	- 20.7%
Real estate and others	Net sales	0.72	0.75	+ 0.02	+ 3.3%
	Segment profit	0.31	0.30	- 0.01	- 5.5%
Total	Net sales	65.11	80.59	+ 15.47	+ 23.8%
	Segment profit	4.20	4.91	+ 0.70	+ 16.7%

Note: The net sales of each segment represent sales to external customers and do not include inter-segment sales or transfers. The amounts of segment profit are based on operating profit.

Business Results

(Billions of yen)

	First half of FY2021	First half of FY2022	Year-on-year change	
Net sales	53.66	68.70	+ 15.03	+ 28.0%
Operating profit	2.94	3.64	+ 0.69	+ 23.8%



Review of the First Half

- We recorded our highest-ever consolidated net sales. Sales and profit both increased due to efforts to expand business in the strong Indian steel market and expand sales to non-ferrous metals fields, mainly in Europe, in addition to steady efforts to pass on the rising price of raw material and other cost increases to selling prices.

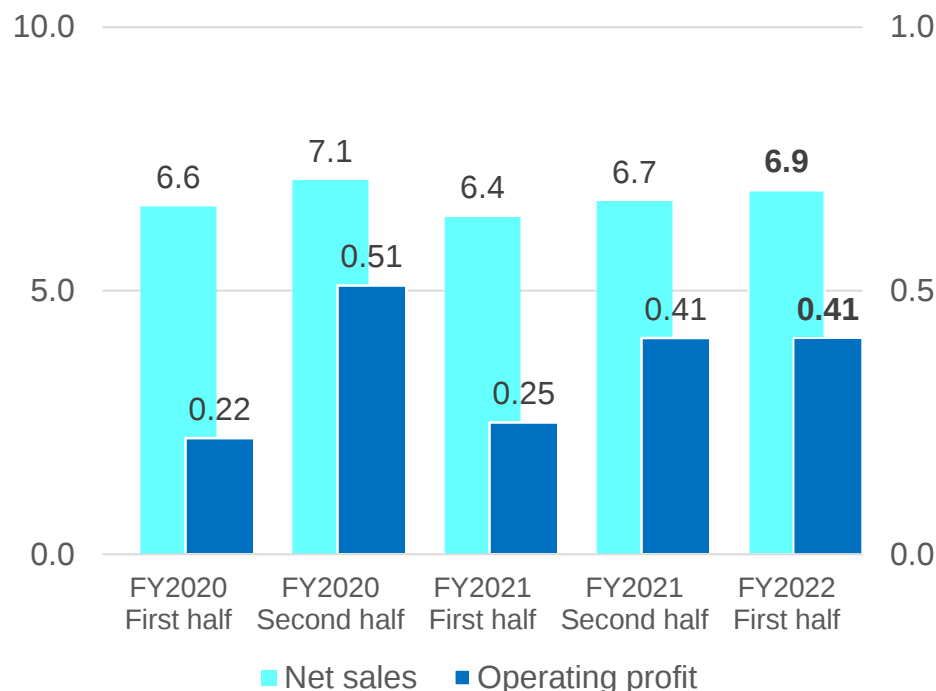
Initiatives for the Future

- Continue to invest in automation and labor saving at domestic plants and strengthen competitiveness through the digitalization of operations.
- Overseas, expand sales in the growing Indian steel market and capture demand, including in non-ferrous metals fields, through deeper cooperation by the Company's manufacturing bases with alliance partner companies in Europe and the United States, aiming to further expand businesses.

Business Results

(Billions of yen)

	First half of FY2021	First half of FY2022	Year-on-year change	
Net sales	6.46	6.99	+ 0.53	+ 8.3%
Operating profit	0.25	0.41	+ 0.15	+ 62.1%



Review of the First Half

- Sales and profit both increased due to orders received for large-scale construction projects and a reduction in costs due partly to personnel optimization in maintenance work for steel facilities.

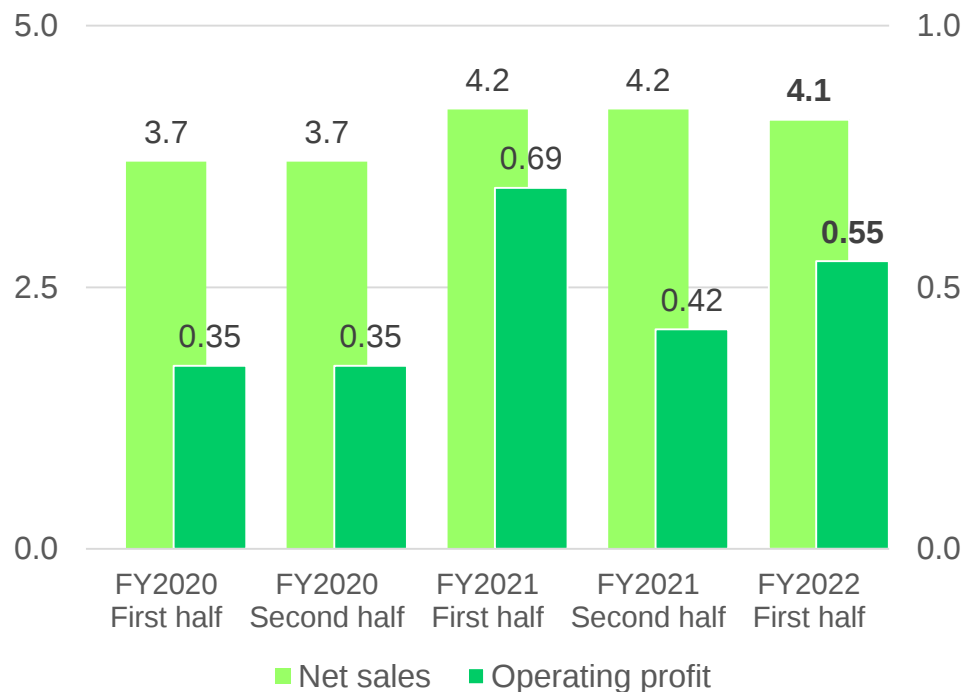
Initiatives for the Future

- Increase earning power by steadily capturing large-scale construction projects, continuing to receive orders for maintenance work for steel facilities, and reducing costs through personnel optimization, etc.
- Expand revenue through orders received for new and maintenance projects for non-ferrous metals users such as biomass and other power generation boilers and incinerators, in addition to the design and construction of energy-saving industrial furnaces.

Business Results

(Billions of yen)

	First half of FY2021	First half of FY2022	Year-on-year change	
Net sales	4.25	4.13	- 0.11	- 2.7%
Operating profit	0.69	0.55	- 0.14	- 20.7%



Review of the First Half

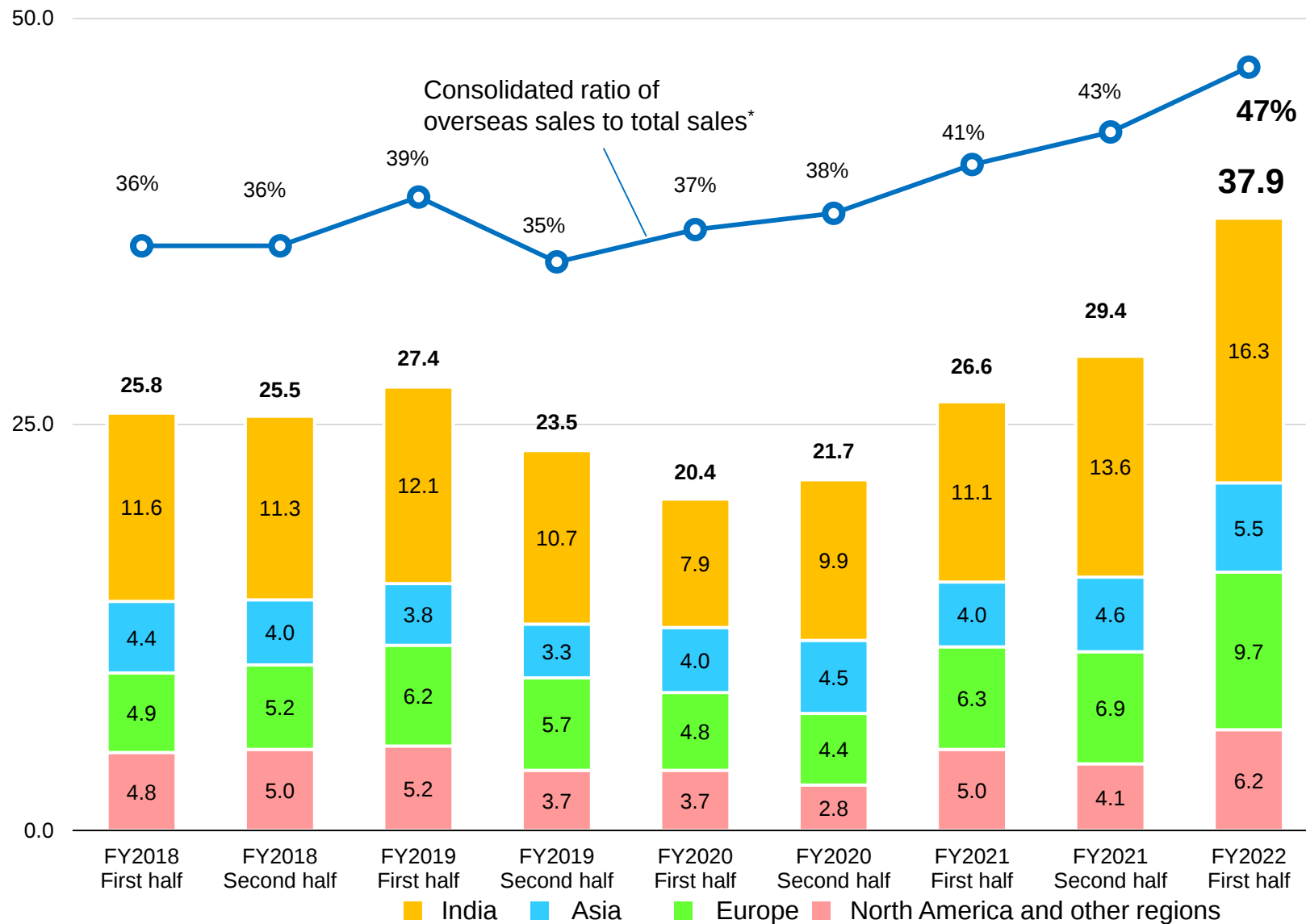
- Sales and profit both decreased, partly due to the impact of a decline in orders received for the Company's thermal insulation materials resulting from a decrease in production due mainly to customer-side components procurement issues owing to the impact of lockdowns in China, despite strong demand for ceramic materials for electronic components.

Initiatives for the Future

- The global value of semiconductor manufacturing equipment sales in 2022 is expected to surpass the record-breaking result for 2021. Negative growth is forecast in the semiconductor market in 2023, but we will steadily capture the increasing demand for ceramic materials resulting from medium- to long-term market expansion.
- In addition, we will grow revenue by driving sales expansion in each field, including products for electronic components, thermal insulation materials for the environment field, and products for new fields such as aerospace and healthcare.

Consolidated Overseas Net Sales (in Japanese Yen)

(Billions of yen)

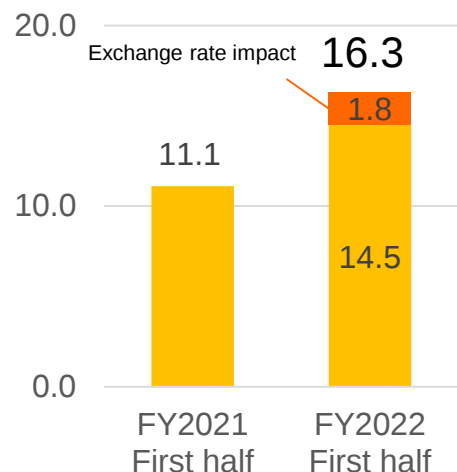


*Percentages are rounded to the nearest whole number.

Consolidated Net Sales by Region (in Billions of Yen)

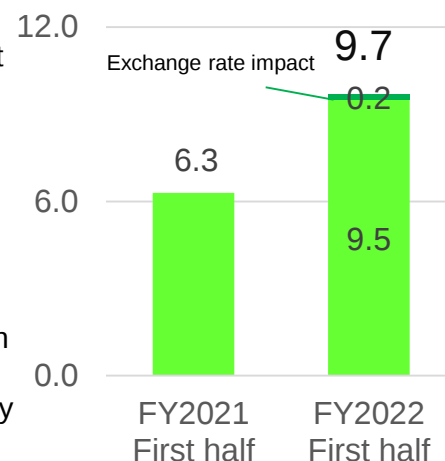


India



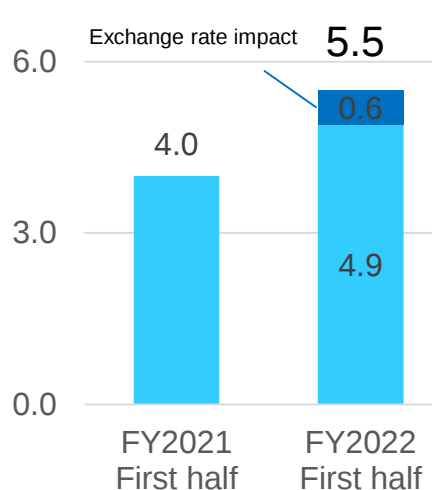
- The only major steel-producing country for which crude steel output increased year on year.
- Sales increased through efforts to pass on cost increases to selling prices and the expansion of new sales, in addition to steadily capturing the growing demand for steel.
- Completion of the nozzle production line for TRL-K continuous casting, establishing a full range of refractory production capabilities.

Europe



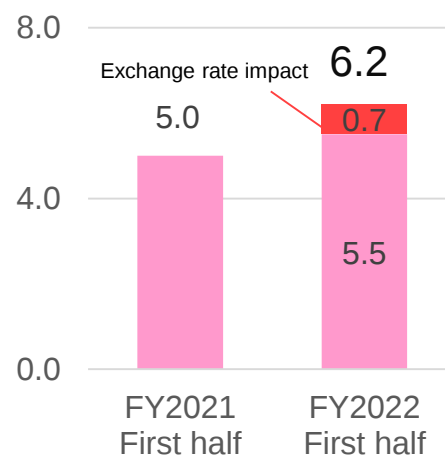
- Net sales in Europe increased by 54% amid a 10% year-on-year decline in European crude steel output.
- In the context of declining crude steel output, sales increased due to the capture of demand for cement, cooperation with alliance partners, expanded sales of furnace bricks, and efforts to pass on cost increases to selling prices.

Asia



- Demand for refractories for high-grade steel, one of our strengths, remained strong despite a decline in crude steel output and lockdowns in China.
- Sales increased due to expanded sales in Taiwan and the ASEAN region and efforts to pass on cost increases to selling prices.
- The capture of demand for cement utilizing our European manufacturing bases (KAMR, REF) was also strong.

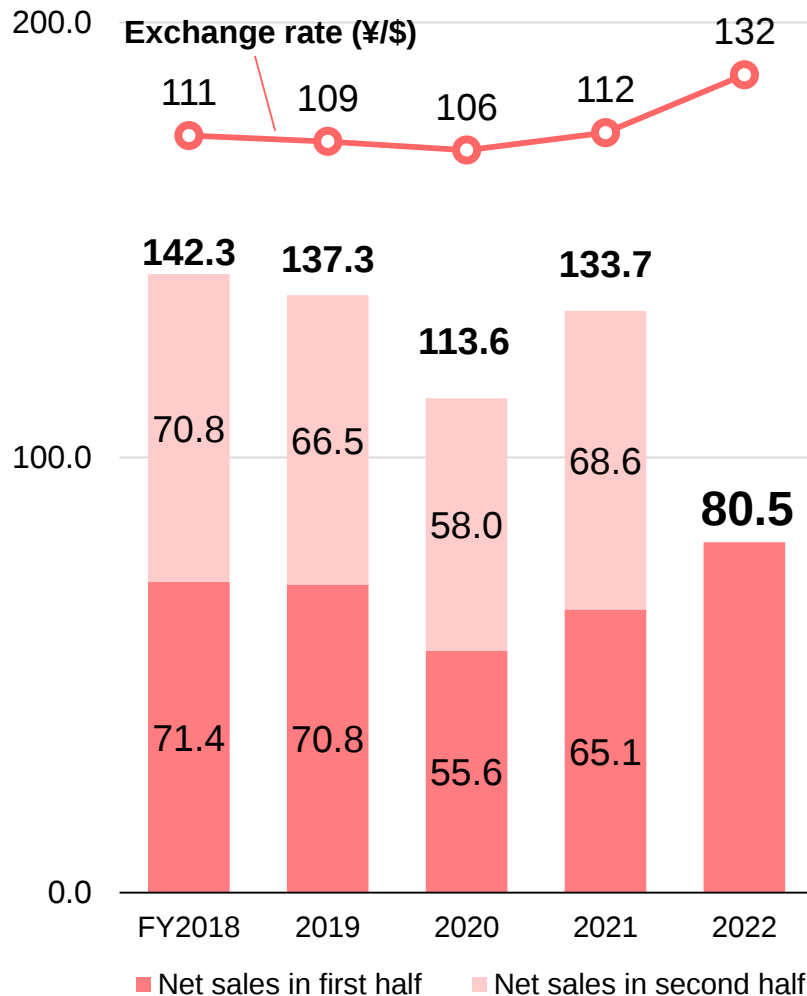
North America and Other Regions



- North America: Sales increased due to expanded sales of furnace bricks and efforts to pass on cost increases to selling prices, despite a decline in crude steel output.
- South America: Sales declined, with a temporary lull in shipments of converter spot products. We commenced technology transfer to IBAR, an alliance partner, deepening cooperation.

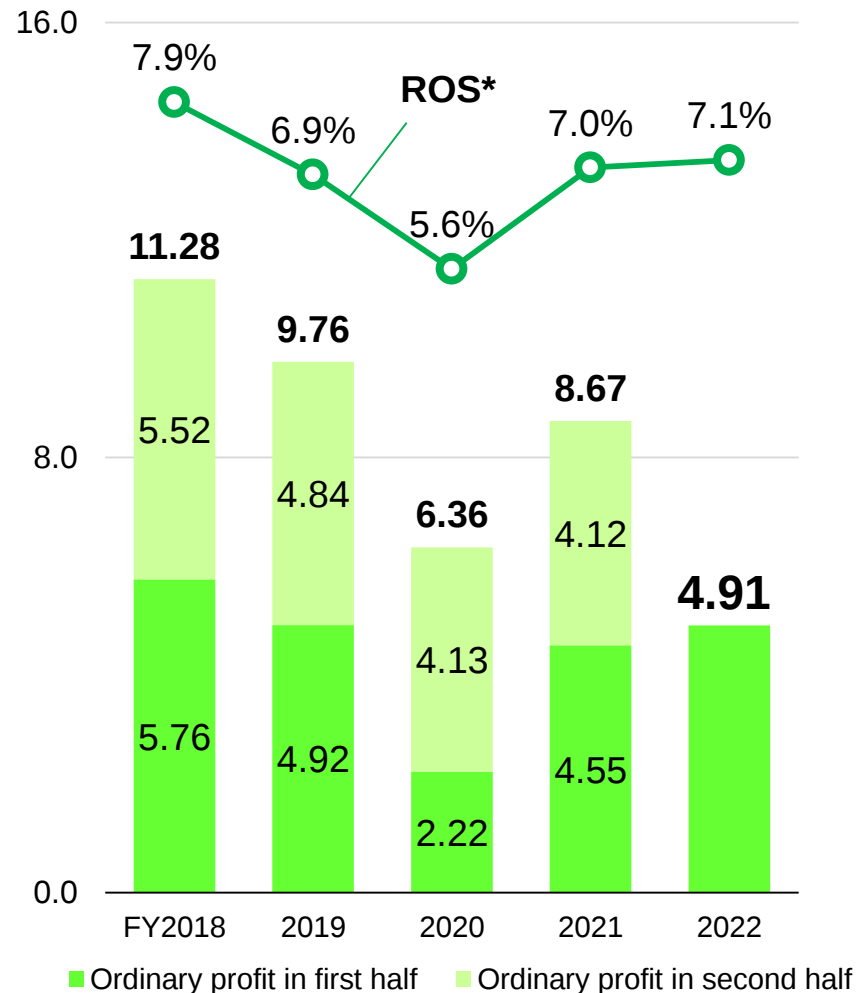
Net Sales

(Billions of yen)



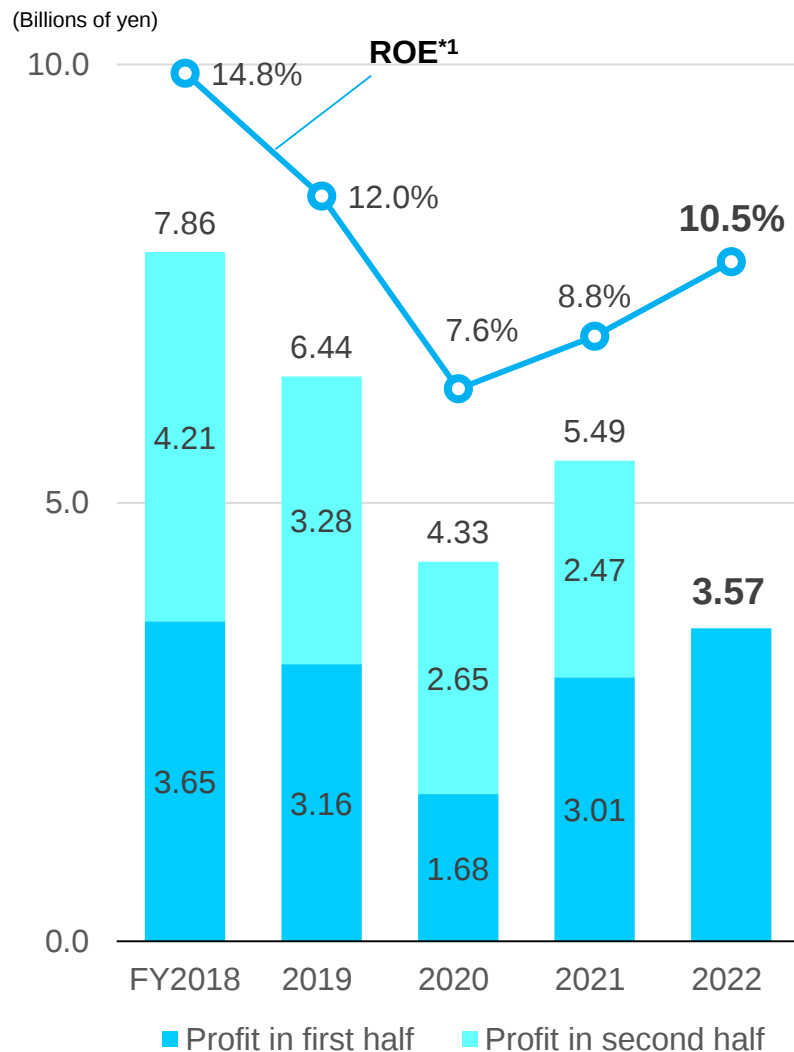
Ordinary Profit

(Billions of yen)

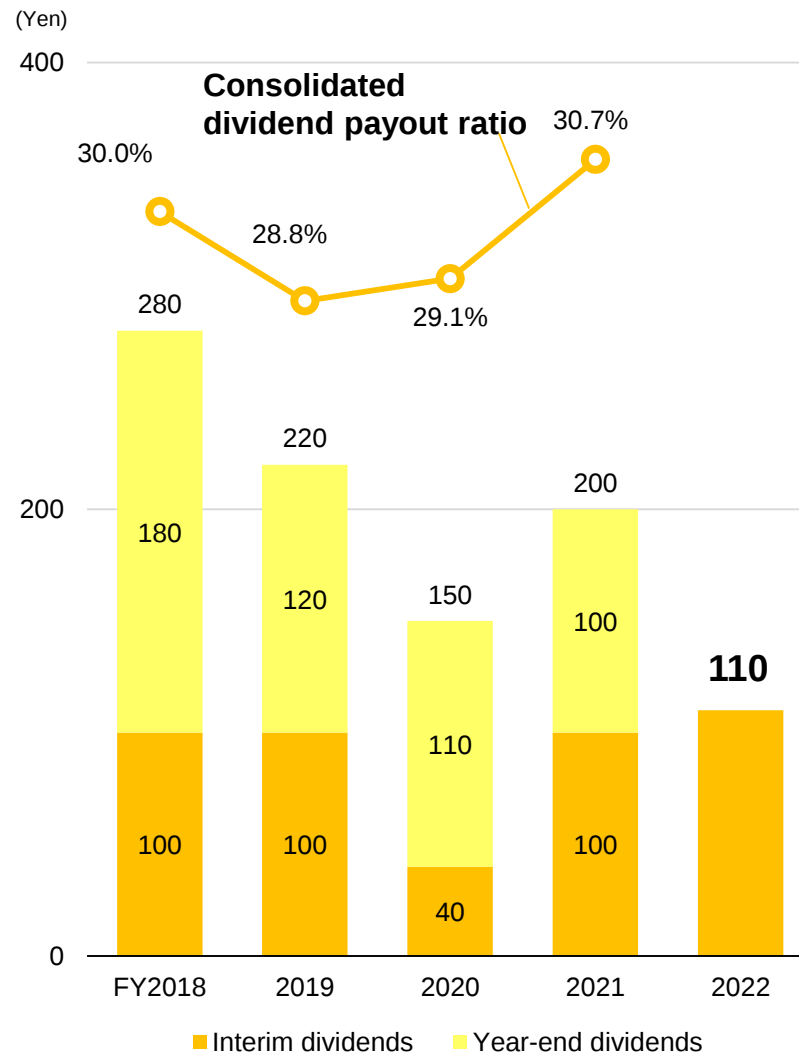


*Full-year return on sales (ordinary profit to net sales ratio). Figures for FY2022 are for the first half.

Profit



Shareholder Dividends



*1: Full-year return on equity, calculated by doubling the profit for the first half of the fiscal year for FY2022 only.

2. Full-year Business Results Forecast

FY2022 Full-year Business Results Forecast (Consolidated)

We expect year-on-year increases in sales and profit due to business expansion in the strong Indian steel market and the expansion of sales to non-ferrous metals fields, in addition to steady efforts to pass on the rising price of raw materials, procured goods, energy, and other cost increases to selling prices in the Refractories segment.

(Billions of yen)

	FY2021	FY2022*	Year-on-year change	
Net Sales	133.77	163.00	+ 29.22	+ 21.8%
Operating profit	7.56	11.00	+ 3.43	+ 45.4%
Ordinary profit	8.67	11.50	+ 2.82	+ 32.5%
Profit	5.49	7.30	+ 1.80	+ 33.0%
ROS	6.5%	7.1%	+ 0.6pt	-

*Revisions to the business results forecast were announced on October 31, 2022.

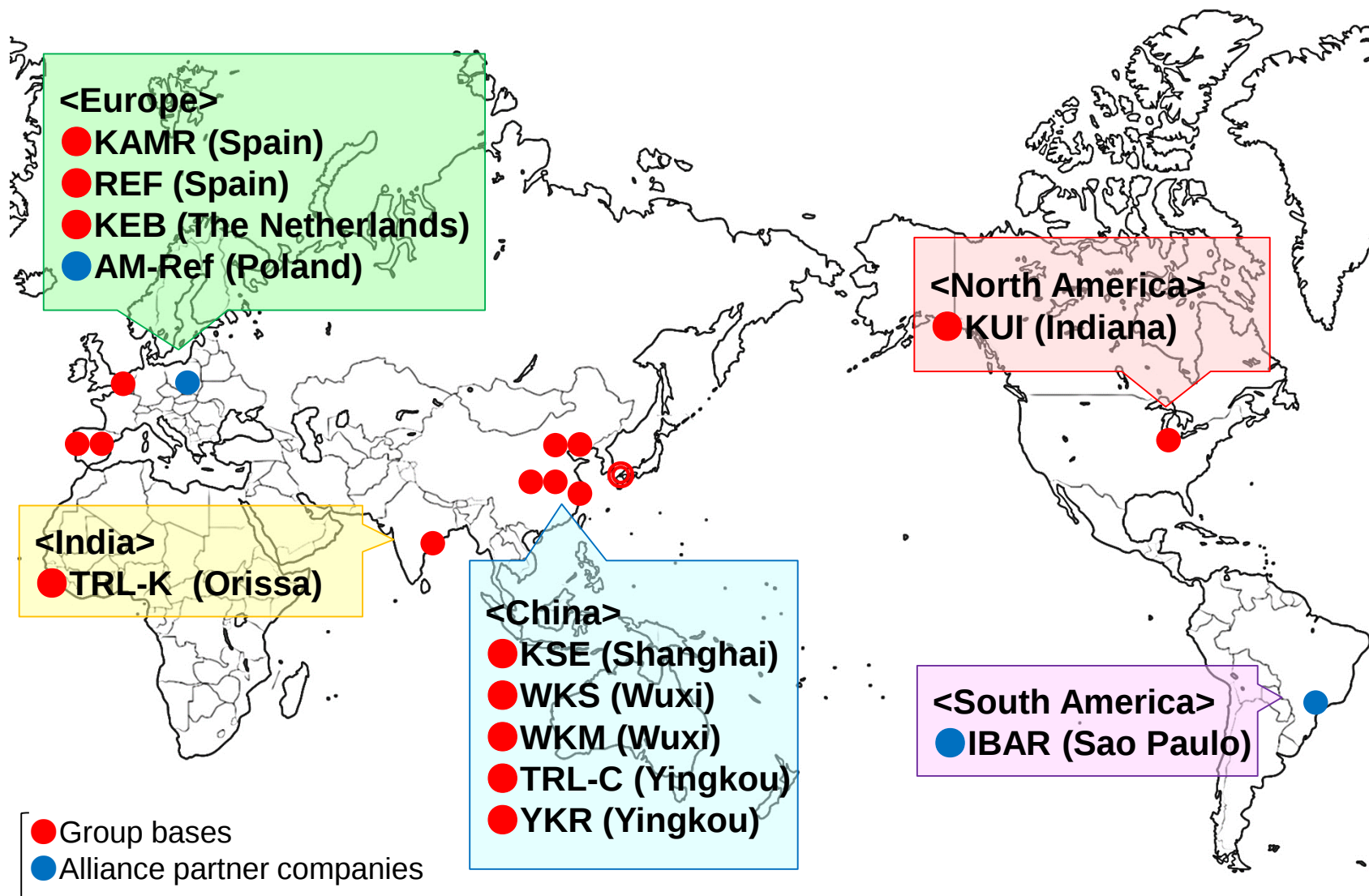
We will determine the forecast amount of year-end dividend for FY2022 based on the scrutiny of trends in business results, and we will disclose this forecast as soon as such a disclosure becomes possible.

	FY2020	FY2021	FY2022
Interim	40 yen	100 yen	110 yen
Year-end	110 yen	100 yen	Undetermined
Total	150 yen	200 yen	Undetermined

Note: As a general rule for profit distribution, we employ a consolidated dividend payout ratio of around 30%.

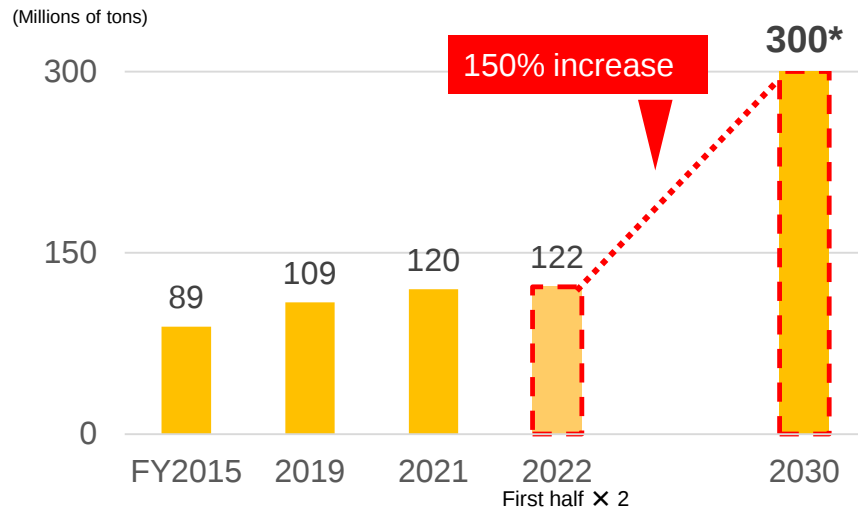


3. Global Strategy



TRL-K has established a top-class share of the domestic market in India, doing business with approximately 50 companies including major steelmakers such as TATA, AM/NS, JSW, and SAIL.

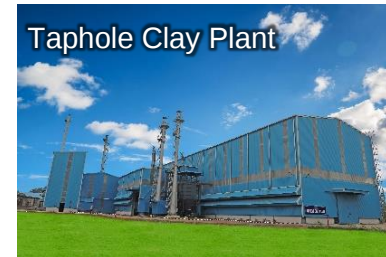
Total Crude Steel Output in the Indian Market



Annual Production by Indian Steelmakers

TATA	JSW	AM/NS
19.06 million tons (2021 result)	20.92 million tons (2021 result)	7.39 million tons (2021 result)
25.00 million tons (2025 plan)	37.00 million tons (2025 plan)	15.00 million tons (2026 plan)

Full Range of Production Capabilities for TRL-K



*Annual crude steel output targeted by the Indian government by 2030.

On November 7, 2022, TRL-K received this award from Tata Steel at the “Tata Steel Partners Meet 2022.”

Tata Steel Partners Meet 2022

- TRL-K received the “Supplier Partner of the Year – Materials” Award
- TRL-K was selected for the award from among all the suppliers from which Tata Steel procures materials, including refractories.
- We will continue to leverage our customer-recognized technical strength and quality to develop a dominant position in the Indian steel market.

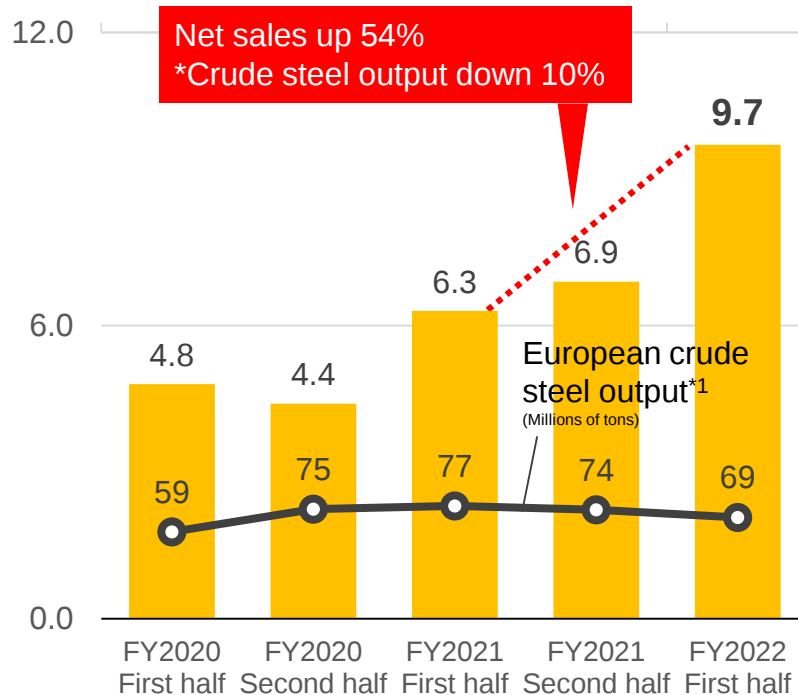


In addition to leveraging the effect of cooperation with our alliance partners, we will capture demand for non-ferrous metals and cement to expand net sales, even amid declining crude steel output in Europe and South America.

Net sales in European Markets

Concluded an alliance agreement with ArcelorMittal Refractories (May 2021)

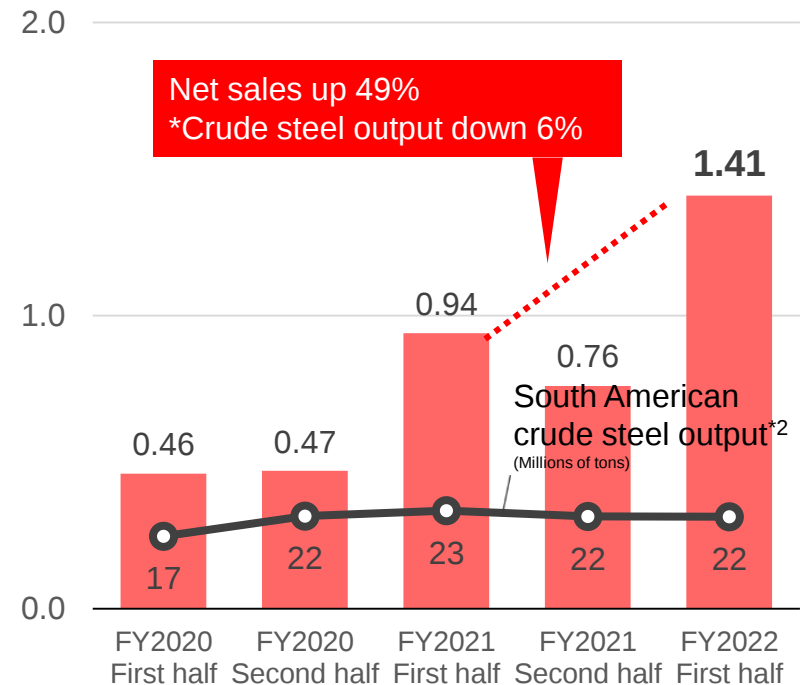
(Billions of yen)



Net sales in South American markets

Concluded an alliance agreement with IBAR (October 2021)

(Billions of yen)



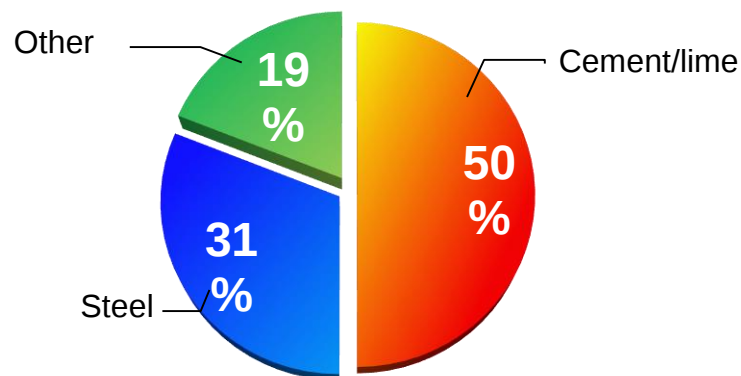
*1: Crude steel output in the 27 EU countries.

*2: Crude steel output in the nine main South American countries.

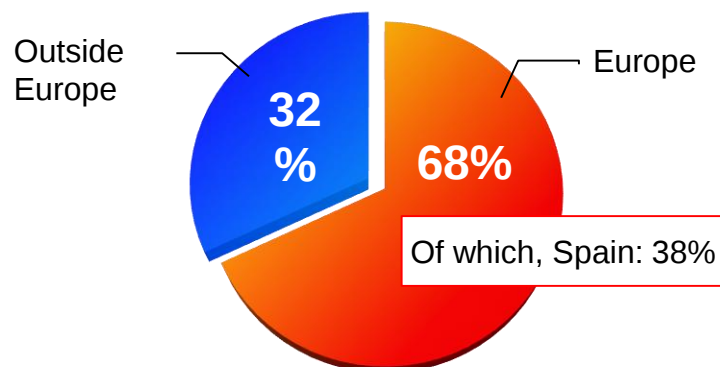
We will maximize synergies within the Group to capture wide-ranging demand for refractories, not only for steel but also non-ferrous metals and cement, and steadily strengthen our earning power.

Sales by subsidiaries in Spain (KAMR+REF) in FY2021 (90,610 thousand euros)

By application: Capturing wide-ranging demand for refractories



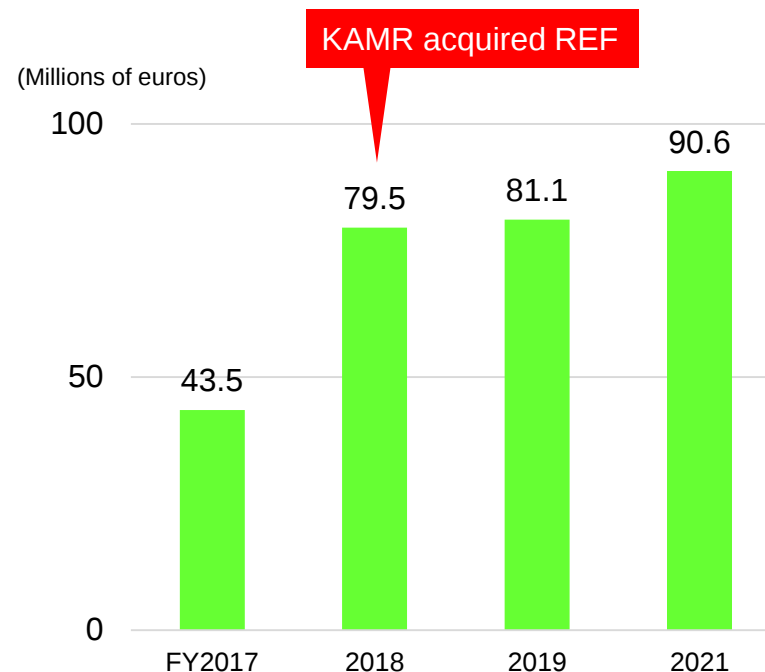
By market: From Spain to the global market



Annual sales

Synergies

– Integrated sales activities by KAMR and REF –



REF has received an order for a large-scale industrial furnace project in the Portuguese market, contributing a combination of materials and work to a customer project aimed at reducing CO₂ emissions.

Providing integrated engineering, materials, and construction services

This is the first order for a large-scale project combining materials and work that we have received overseas.

Contributing to energy-saving and the reduction of CO₂ emissions

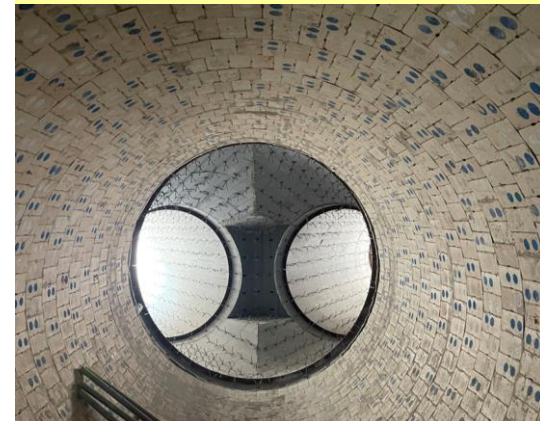
We contribute to promoting the reduction of CO₂ emissions and more efficient energy consumption by expanding customer usage of non-fossil fuels and alternative fuels.

Contributing to building a sustainable society
Achieving further business expansion through enhanced capabilities to provide a combination of materials and work in overseas markets

Cement kiln: Exterior



Cement kiln: Interior using refractories





4. Sales Expansion through New Technologies and Progress on the 2025 Management Plan

Blast furnace manufacturers shift to the electric arc furnace method, aiming for carbon neutrality



Blast furnaces



Electric arc furnaces

High-quality sheet steel manufacture

24-hour, full-capacity operation

Need for refining to eliminate impurities through a secondary refining process

Increase in demand

High-quality, long-life refractories with the durability to withstand 24-hour operation

Our internal design technologies
(See page 52 for an enlarged diagram)

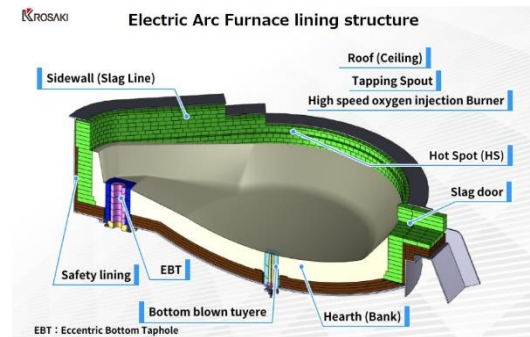
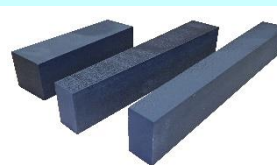
Porous plugs



Magnesia-chrome
refractories



Magnesia-carbon
refractories



Hybrid and electric vehicle manufacturing

Requires lightweight, durable sheet steel

The needs of steel manufacturers

- Technologies to regulate the flow of molten steel (control drift)
- Tubular refractories that do not impede the flow of molten steel due to blockages from accumulated impurities



Our technology solutions

Patents

Developed a uniquely shaped immersion nozzle for steel sheets (thin slabs) that enables a substantial reduction in drift

Developed nozzle material for continuous casting that prevents the accumulation of impurities

Our Technological Superiority Drives Orders for Domestic Construction Projects



The demand for furnace maintenance is forecast to continue to increase

<Completed works>

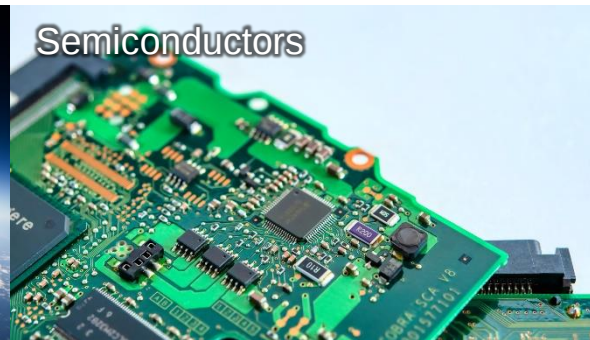
	FY2019	FY2020	FY2021	FY2022	FY2023 and onward
Blast furnaces		NIPPON STEEL CORPORATION Muroran No.2		NIPPON STEEL CORPORATION Nagoya No.3	
Hot-blast stoves		NIPPON STEEL CORPORATION Nagoya No.33		NIPPON STEEL CORPORATION Tobata No.14	<u>Furnace A</u>
Coke ovens	NIPPON STEEL CORPORATION Muroran No.5 West	NIPPON STEEL CORPORATION Nagoya No.3			<u>Furnace B</u> <u>Furnace C</u>

We leverage our advanced technologies and insight in the Ceramics segment to contribute broadly to various industries around the world

Providing ceramic components to the aerospace field



Providing fine ceramic heaters



Providing setters for electronic component firing



Providing ceramic components to the healthcare field

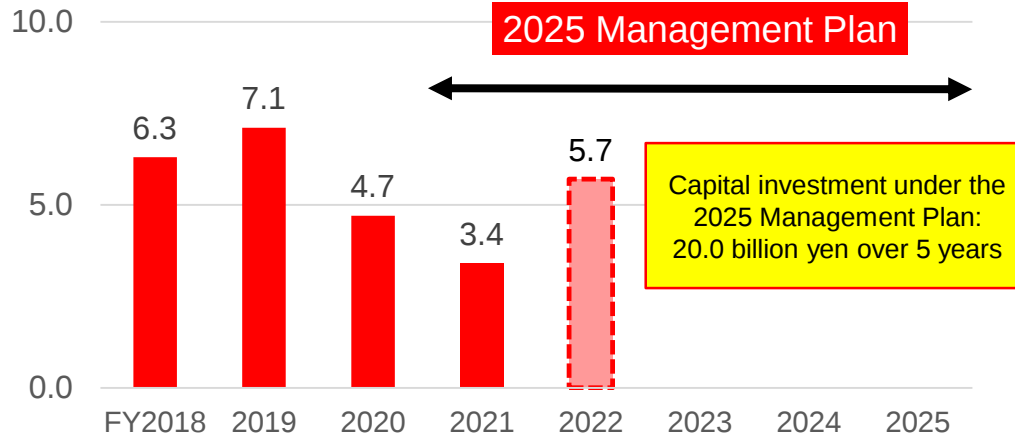


Providing thermal insulation materials for Ene-farms

Thoroughly Promoting Greater Manufacturing Capabilities and Productivity

Capital investment*

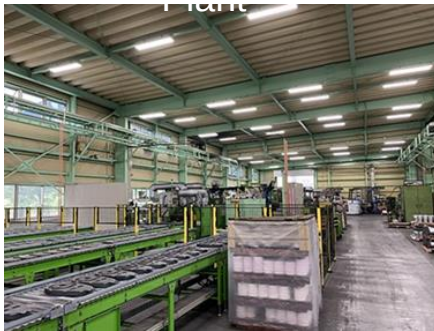
(Billions of yen)



- Accelerating capital investment decision-making to achieve ROS of 8%

- The Management Plan does not include M&A and other strategic investments: we will plan and implement these separately.

Investment in upgrading material handling for processing at the SN Plant



Investment in refreshing the Setouchi Plant (Bizen City)





5. Initiatives to Promote Sustainability



The KROSAKI HARIMA Group contributes to creating a society that leaves no one behind by working to achieve all 17 Sustainable Development Goals (SGDs)

Contributing to Society through technologies to control **heat**

Through stable, high-quality production, we will provide a broad range of products to **industries worldwide** and **contribute to saving energy** by providing environmentally-friendly technologies.



A company that values **people**

As a cosmopolitan company that values all people, we promote the **development of global human resources** as well as **women's empowerment** and other **diversity and inclusion** initiatives.



Sustainability targeted by the KROSAKI HARIMA Group

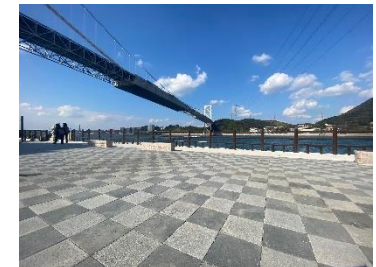
Living together with the **community**

We contribute to **creating livable cities** by providing landscaping materials and actively promote **community revitalization** through participation in community events and the activities of our track and field club.



Continuing to protect the **global environment**

We implement measures to **protect the future for people and the planet** through the **effective use of the Earth's resources**, such as reusing waste water from our plants and developing recycled landscaping materials.



Push forward with reducing CO₂ emissions to achieve carbon neutrality by 2050

◆ Reductions up to now

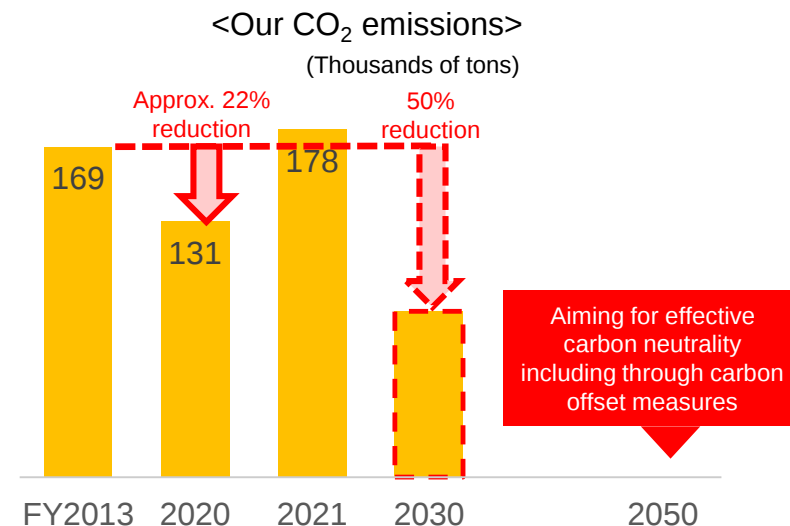
Reduced our CO₂ emissions in FY2020 by **approx. 22%** compared to FY2013.

Although emissions in FY2021 increased slightly from FY2013 due to increased production, the intensity of emissions improved compared to FY2013.

◆ Future reduction targets

Achieve **a 50% reduction** from FY2013 levels by FY2030.

Aim for effective carbon neutrality by FY2050, including through carbon offset measures.



Note: Scope of targets

- KROSAKI HARIMA CORPORATION (non-consolidated)
- SCOPE 1: Direct CO₂ emissions from our own fuel usage and production processes
- SCOPE 2: Indirect CO₂ emissions from the usage of electricity and heat we purchase

<Course toward achieving our reduction targets>

- (1) Reduce CO₂ emissions through **productivity improvements, energy-saving measures, and product shifts** in our manufacturing processes
- (2) Provide products and solutions that contribute to **reducing CO₂ emissions across the whole of society**

Offering total refractories solutions integrating development, manufacture, supply, design, construction, inspection, and maintenance to contribute to sustainable power generation and incinerator projects

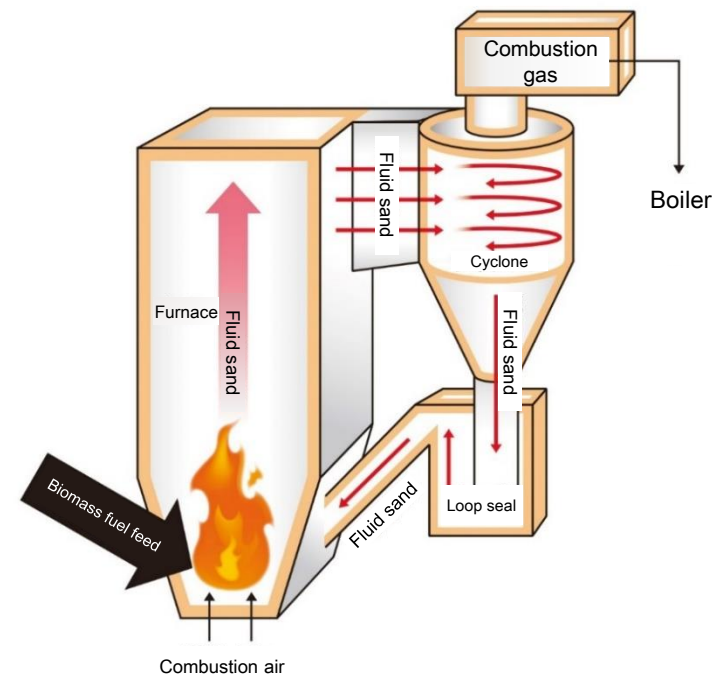
Contributing to sustainable power generation projects

- Biomass power generation is gaining attention around the world as an environmentally-friendly method of power generation
- We have already delivered a total of 57 units, contributing to a reduction of 870 thousand tons of CO₂ emissions since FY2020
- We will continue to expand orders received for new projects and maintenance projects

Contributing to sustainable incinerator projects

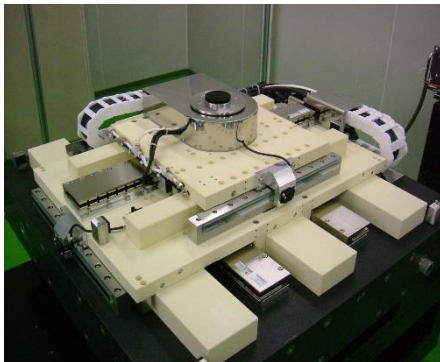
- We have already delivered a total of 249 units for use in urban waste, industrial waste, and petrochemical waste incineration.

<Biomass power generation boiler>

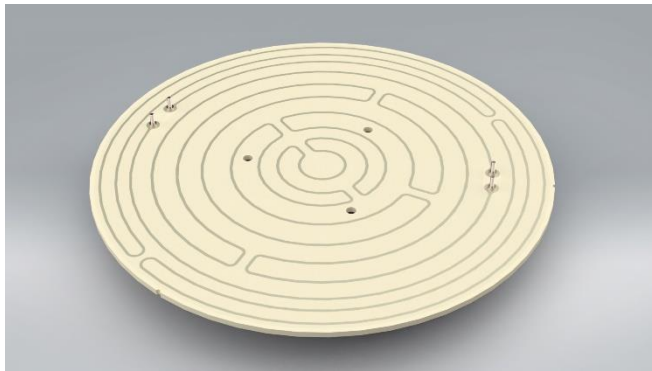


The market for semiconductor manufacturing equipment is forecast to grow over the long term. We will continue to steadily capture expanding demand for our products in Japan and overseas.

Fine ceramics for semiconductor manufacturing equipment

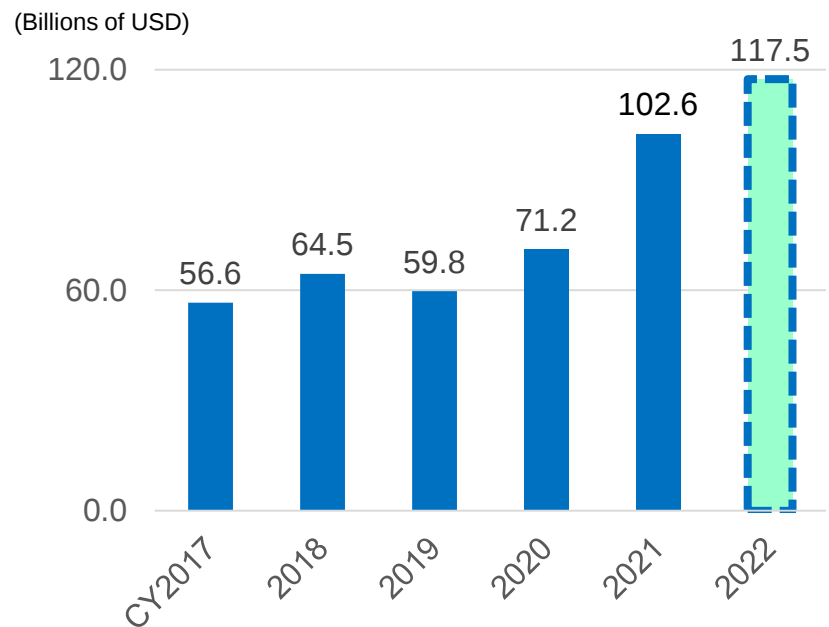


Heater for semiconductor manufacturing equipment (aluminum nitride heater)



<Total global sales of semiconductor manufacturing equipment*>

Expected to set a new record high for the third consecutive year



*Statistics compiled by Semiconductor Equipment and Materials International (SEMI)

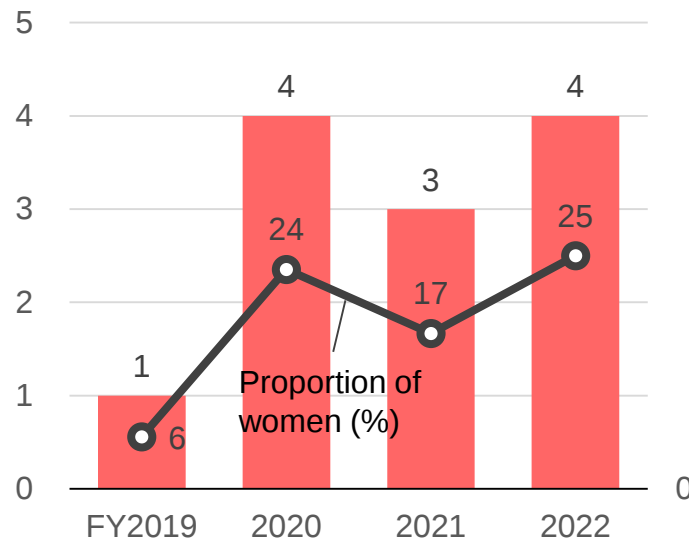
Empowering women

Female graduates recruited to the main career track

By FY2025 20% or more

By FY2030 30% or more

(Persons)

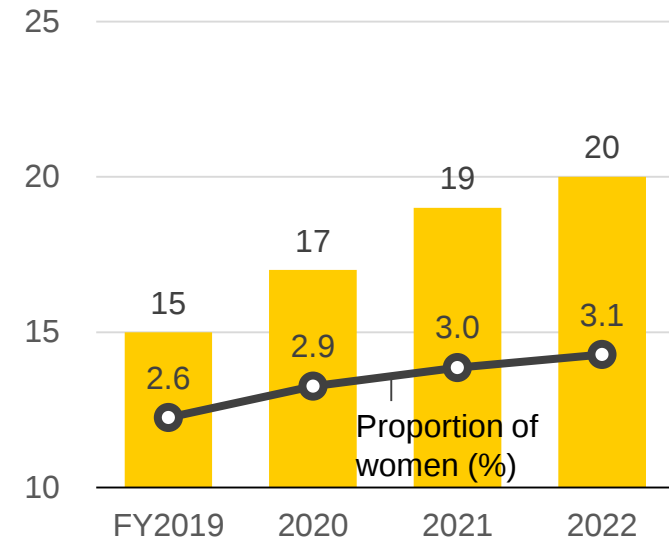


Proportion of management positions occupied by women

By FY2030 Increase by 1.5 times or more

Soon after Increase by 2 to 3 times

(Persons)



<Other examples of diversity and inclusion initiatives>

- One woman was elected as a director at the General Meeting of Shareholders held on June 29, 2022.
- Between April and September 2022, 56% of eligible men took childcare leave or other leave.

Strengthening our global management framework

Actively appointing local employees to top positions at overseas subsidiaries

Appointing local managers to operate our overseas subsidiaries and develop sales activities focused on the local region



The Netherlands/KEB



China/KSE



China/WKM

The Netherlands

Spain



Spain/KAMR, REF

India



India/TRL-K

China

Shanghai
Taiwan



Japan/
KROSAKI HARIMA
CORPORATION

The United
States

Global personnel exchange



Contributing to creating a livable city



Recycling landscaping bricks at the Former Residence of Yasukawa (a tangible cultural property designated by the City of Kitakyushu)



Supporting the “creation of a beautiful, flowering city” promoted by the City of Kitakyushu as a corporate flowerbed sponsor

Developing the next-generation human resources to lead our business activities



[Track and field club] Participating in an endurance running improvement workshop in Hofu City



Supporting the noticeboards set up in elementary schools in the City of Kitakyushu

Our track and field club achieves its first ever victory at the 59th Kyushu Business Group Mainichi Ekiden (held on November 3)



Single stage winners: Yusuke Tamura in stage 1, Tomonobu Tamura in stage 4, Kyohei Hosoya in stage 5, Masami Nagakura in stage 6

We have already qualified for the 2023 New Year Ekiden and we will aim to be victors for the second consecutive year



[Reference] Overview of the Company

Company name:	KROSAKI HARIMA CORPORATION
Share capital	5,537 million yen
Founding	October 14, 1918
Establishment	June 1, 1919
Main business	Manufacture and sale of refractories
Number of employees ^{*1}	Consolidated, 4,681; non-consolidated, 2,362
Number of consolidated subsidiaries ^{*2}	13 (3 in Japan, 10 overseas)

^{*1} As of March 31, 2022.

^{*2} Including companies accounted for by the equity method.

1919	Established as KUROSAKI REFRACTORIES CO., LTD. (in what is now Yahatanishi-ku, Kitakyushu City, Fukuoka)
1949	Listed on the Tokyo Stock Exchange
1956	Capital participation from Yawata Iron & Steel Co., Ltd (presently NIPPON STEEL CORPORATION)
2000	Merged with Harima Ceramic Co., Ltd. and changed the name to KROSAKI HARIMA CORPORATION
2002	Made Kyushu Refractories Co., Ltd. a subsidiary (merged in 2012)
2011	Made TATA REFRACTORIES LIMITED (presently TRL KROSAKI REFRACTORIES LIMITED) in India a subsidiary
2019	Became a consolidated subsidiary of NIPPON STEEL CORPORATION (April) 100th anniversary of establishment (June 1)
2021	Business integration of KROSAKI HARIMA CERA CORPORATION (April) Business integration of Ariake Materials Co., Ltd. (October)

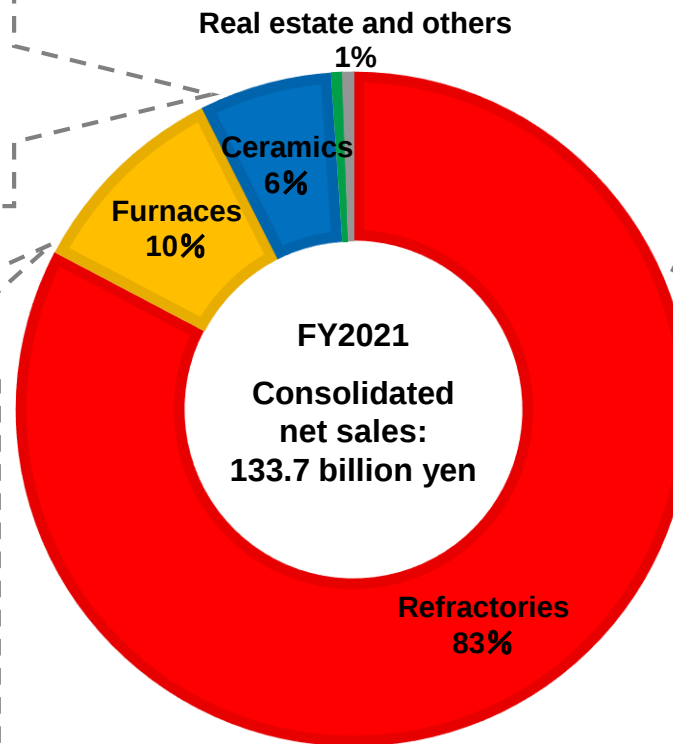
Refractories-related businesses (refractories + furnaces) account for at least 90%



Standards for the calibration of precision measurement devices



Components for electronic component firing



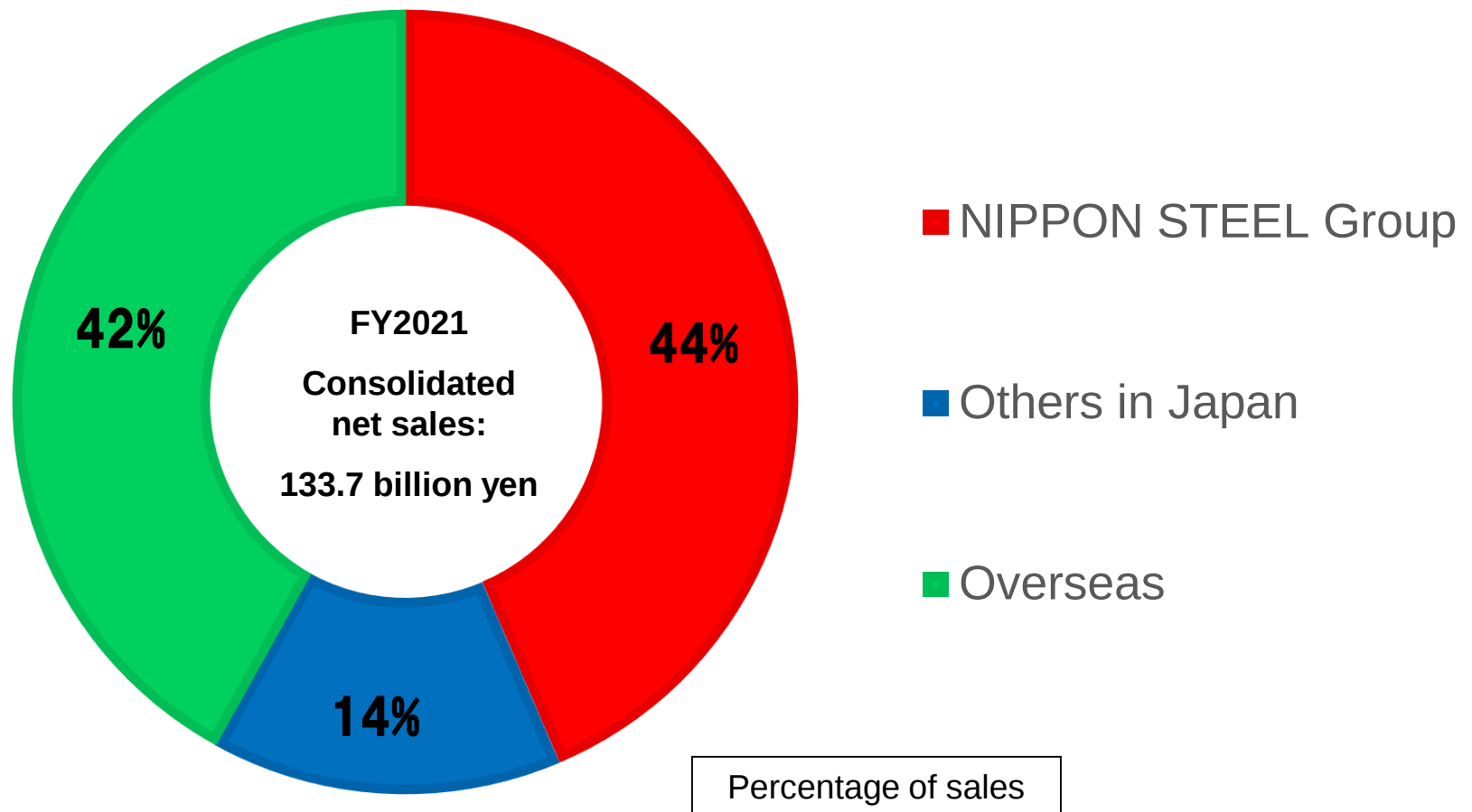
Percentage of sales



Refractories

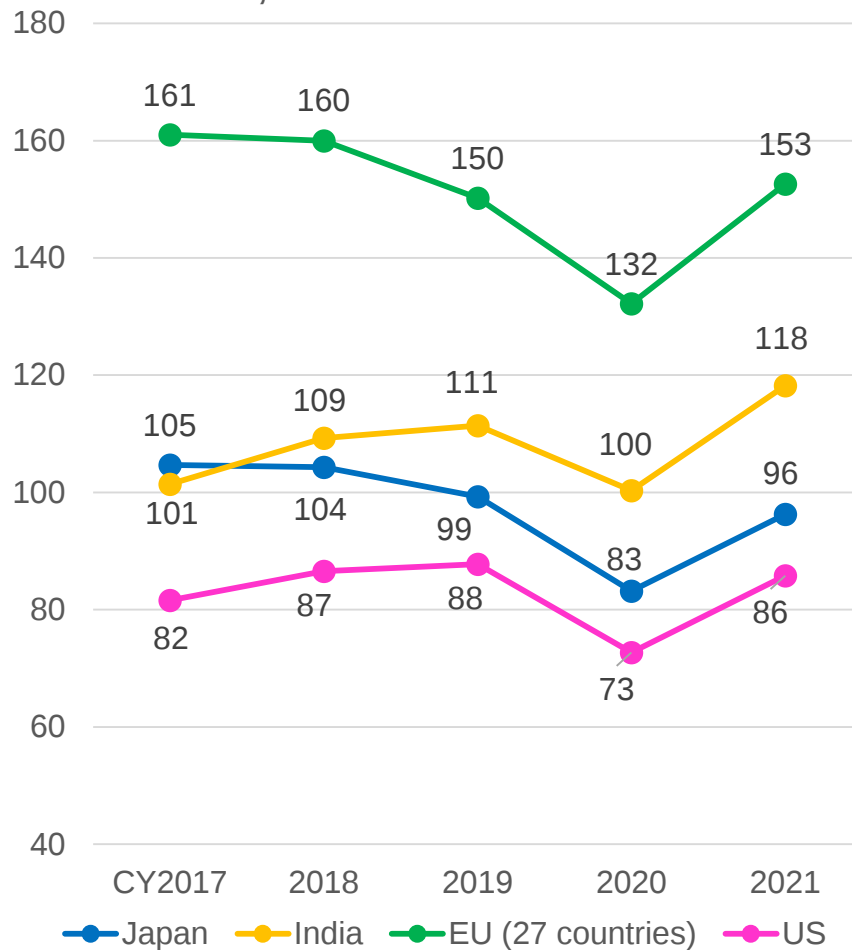


Example of construction work: pusher type billet continuous hot rolling heating furnace



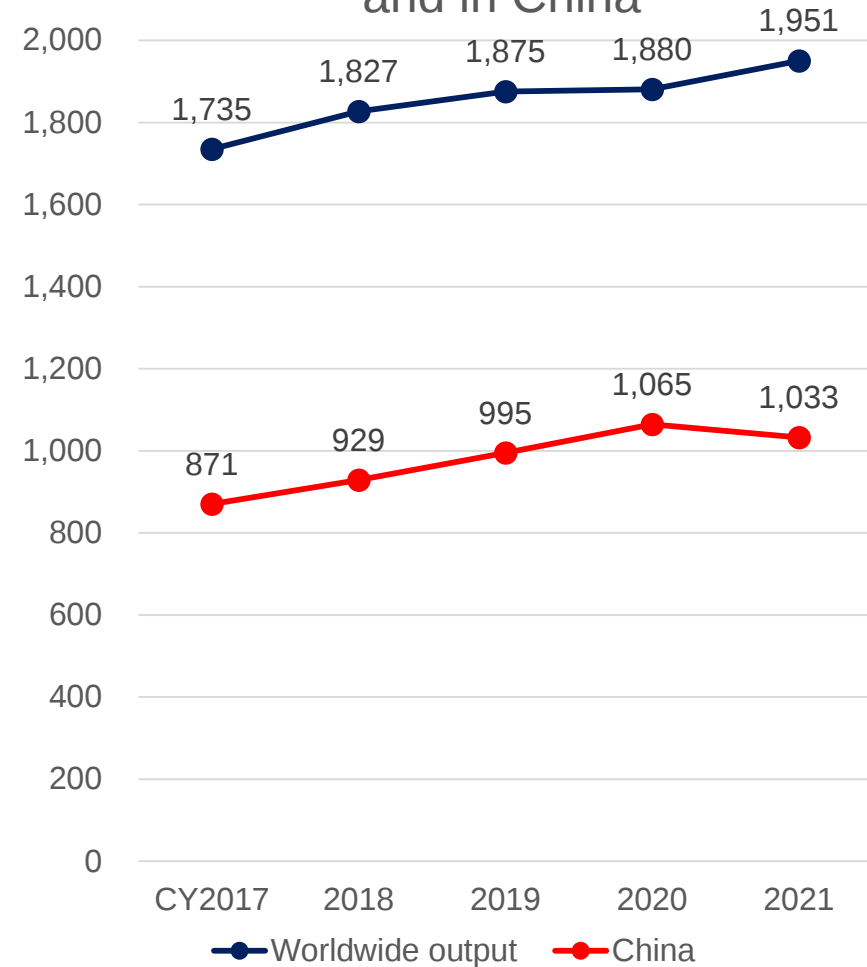
Crude steel output in Japan, India, the EU and the US

(Millions of tons)



Crude steel output worldwide and in China

(Millions of tons)



<Steelmaking process>



Coke ovens /
hot-blast
stoves

Life of refractories
Approx. 40 to 50 years



Coke oven refractories



Blast
furnaces

Life of refractories
Approx. 20 years



High alumina
refractories for
blast furnaces



Torpedo
ladles

Life of refractories
Approx. 3 to 4 months



Al₂O₃-SiC-C refractories for torpedo
ladles



Converters

Life of refractories
Approx. 3 to 4 months



Magnesia-carbon
refractories for oxygen
converters



Unshaped refractories for converter blowing
(The blowing is shown in the photograph above)

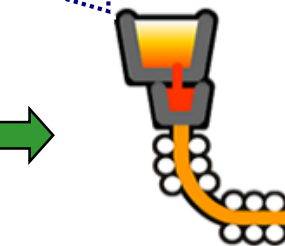


Direct-bonding
magnesia-chrome
refractories for degassing furnaces



Secondary
refining
furnaces

Life of refractories
<Upper part> Approx. 1 year
<Lower part> Approx. 1 month



Steel ladles / continuous
casting equipment

Life of refractories
Replaced every day or
every few days



Gas bubbling
plugs



AG tubes for
continuous
casting

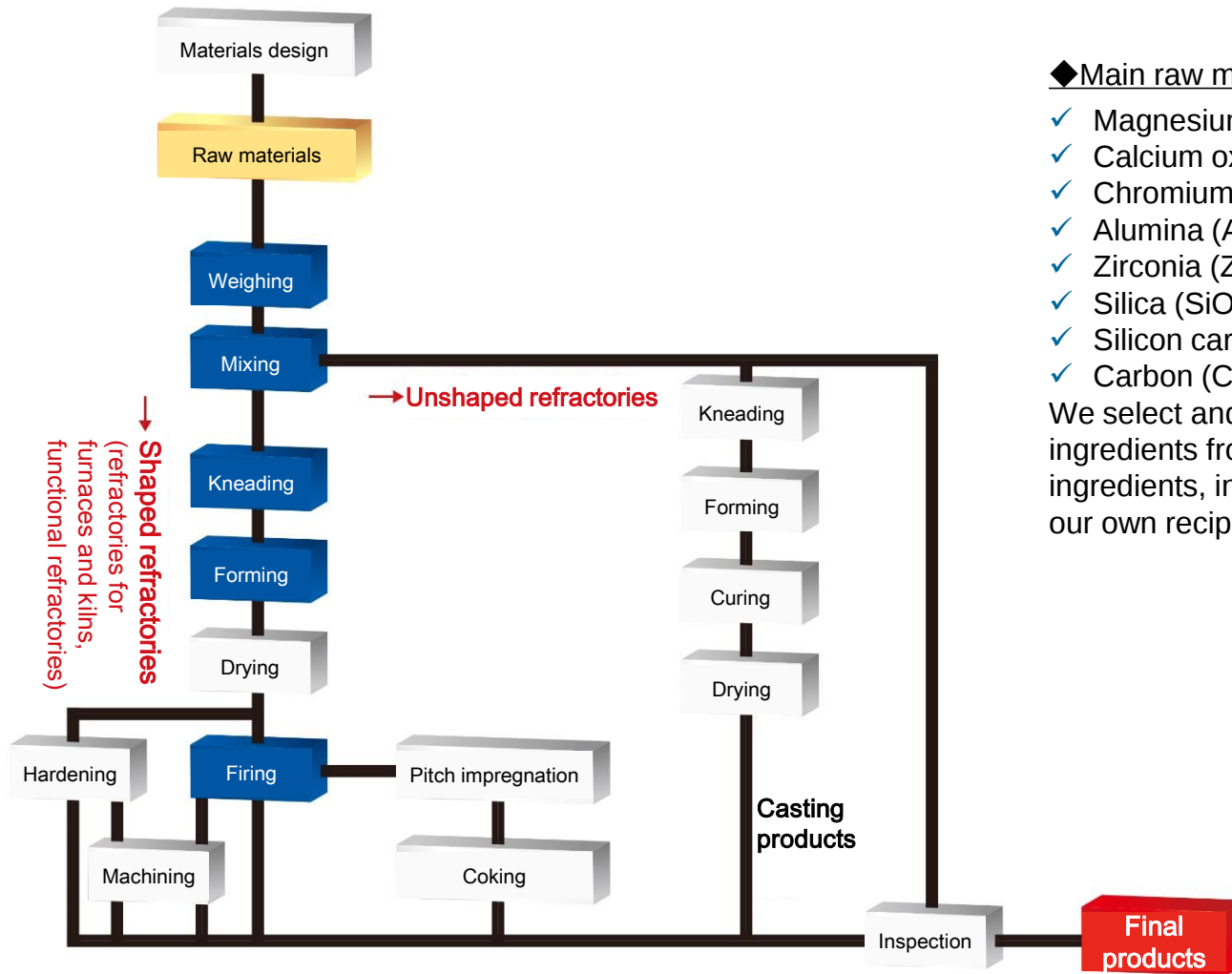


Slide gate plate operating
device



Slide gate plates
for continuous
casting

Type of refractory	Refractories for furnaces and kilns 	Functional refractories			Unshaped refractories	
		AG nozzles 	SN nozzles and plates for continuous casting 	Gas babbling plugs 	Repair materials / casting materials 	Mud materials 
Main steelmaking equipment and facilities	Blast furnaces, hot-blast stoves, coke ovens, torpedo ladles, converters, secondary refining furnaces	Continuous casting equipment	Continuous casting equipment	Steel ladles	Blast furnaces, converters, steel ladles	Blast furnaces
Applications (functions)	Inner lining of equipment	Regulating the flow of molten steel	Controlling the flow of molten steel	Agitating the molten steel	Repairs and inner lining of equipment	Blocking blast furnace tap holes
The KROSAKI HARIMA Group's main production bases	•Japan •China •Spain •India	•Japan •China •India	•Japan •Spain •India •China	•Japan •India •China	•Japan •China •India •Spain	•Japan •India
The KROSAKI HARIMA Group's main markets	•Japan •Asia •Europe •North America •India •South America •China	•Japan •Asia •Europe •North America •Australia •China •India	•Japan •Asia •Europe •North America •Australia •China •India	•Japan •Europe •North America •Asia	•Japan •India •Asia •Australia •North America •Europe	•Japan •Asia •North America •Australia •India



◆ Main raw materials used in refractories ◆

- ✓ Magnesium oxide (MgO)
- ✓ Calcium oxide (CaO)
- ✓ Chromium oxide (Cr₂O₃)
- ✓ Alumina (Al₂O₃)
- ✓ Zirconia (ZrO₂)
- ✓ Silica (SiO₂)
- ✓ Silicon carbide (SiC)
- ✓ Carbon (C), etc.

We select and combine the optimal ingredients from over 1,000 types of ingredients, including particle size, to create our own recipes.

Upkeep and maintenance

We undertake the construction, repair and maintenance of refractories in equipment at steel mills, cement plants, and other facilities.



Refractories work in a coke oven



Refractories work inside a rotary cement kiln

Design and construction of industrial furnaces (heating furnaces, environmental industry furnaces, etc.)

We mainly engage in the design and construction of industrial furnaces (heating furnaces, incinerators, power generation boilers, etc.). We also design and construct only the locations where refractories are used, and provide engineering for ancillary machinery and equipment.

We also contribute to addressing energy and environmental problems by achieving energy savings.



Exterior of a walking beam furnace (heating furnace)



Refractories work inside a heating furnace

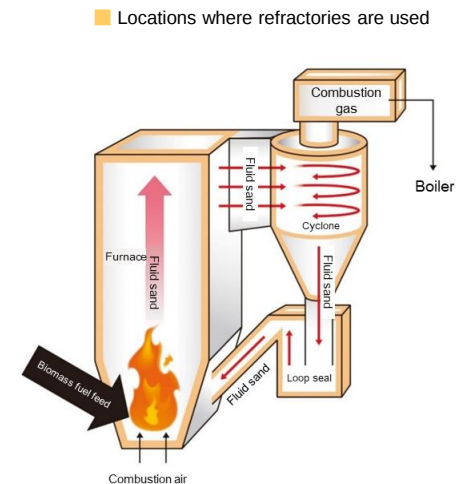
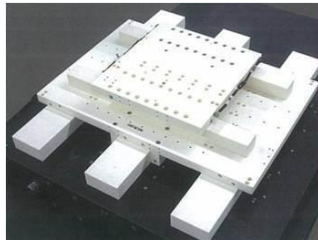


Illustration of a biomass power generation boiler

Contributing to constant performance enhancement for our customers

● Ceramics for precision components

- Semiconductor manufacturing equipment, measurement devices, and optical devices



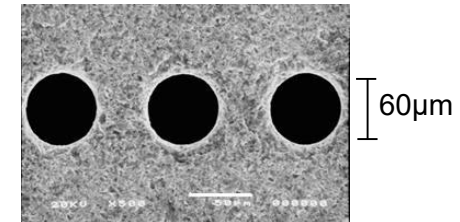
Fine ceramics for applications such as precision machinery and semiconductor manufacturing equipment, utilizing our strengths in large-sized and precision processing, as well as assembly techniques.



We have begun to utilize the outstanding dimensional stability and environmental robustness of NEXCERA™ zero-expansion ceramics in applications such as standards and corrections for precision measuring devices.

● Machinable ceramics

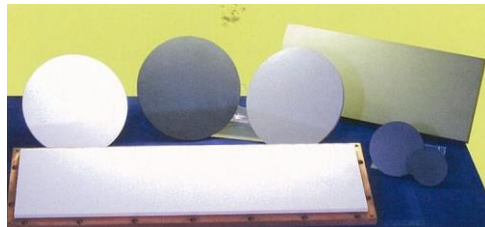
- Electronic component manufacturing, industrial machinery, and semiconductor manufacturing



Our machinable ceramics can be processed in the same way as metals, achieving precision processing on the scale of microns. The photograph shows a Macerite HSP probe card (an IC chip inspection jig formed on a silicon wafer) drilled with tiny holes (60μm in diameter).

● Sputtering target materials

- Electronic components and semiconductor devices



High-purity ceramic sputtering target materials that form a film to protect electronic components and semiconductor devices from heat and abrasion. Used in applications such as thermal printer heads.

● Components for electronic component firing

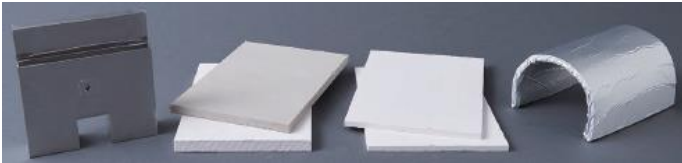
- Electronic component manufacturing



Indispensable components, mainly for ceramic electronic component firing. We boast the No. 1 market share globally in the ceramic capacitor field.

Contributing to society in the fields of energy saving and environment

- High-performance thermal insulation materials
 - Steel and non-ferrous metals manufacturing, various industrial furnaces, aircrafts, automobiles



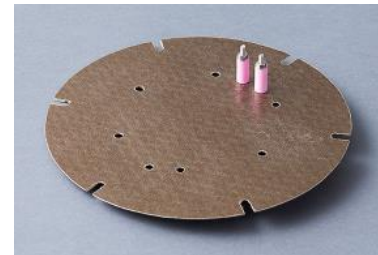
We utilize the thermal insulation characteristics of these products, which provide better thermal insulation than still air and are markedly superior to existing insulation materials, to contribute to saving energy and improving productivity through thinner, smaller, and lighter components.

- High-performance thermal storage materials
 - Regenerative heaters



Our ceramic materials with outstanding thermal storage features are used for applications such as regenerative heaters and underfloor heaters. They contribute to the effective use of electrical energy through nighttime power usage.

- Heaters
 - Liquid crystal manufacturing, semiconductor manufacturing, high-performance heater units



Our slim, flat heaters are notable for their excellent heat uniformity and heat responsiveness. They contribute to enhancing productivity in a wide range of industrial fields. We can respond to customer needs from design onward and provide heaters of various sizes.

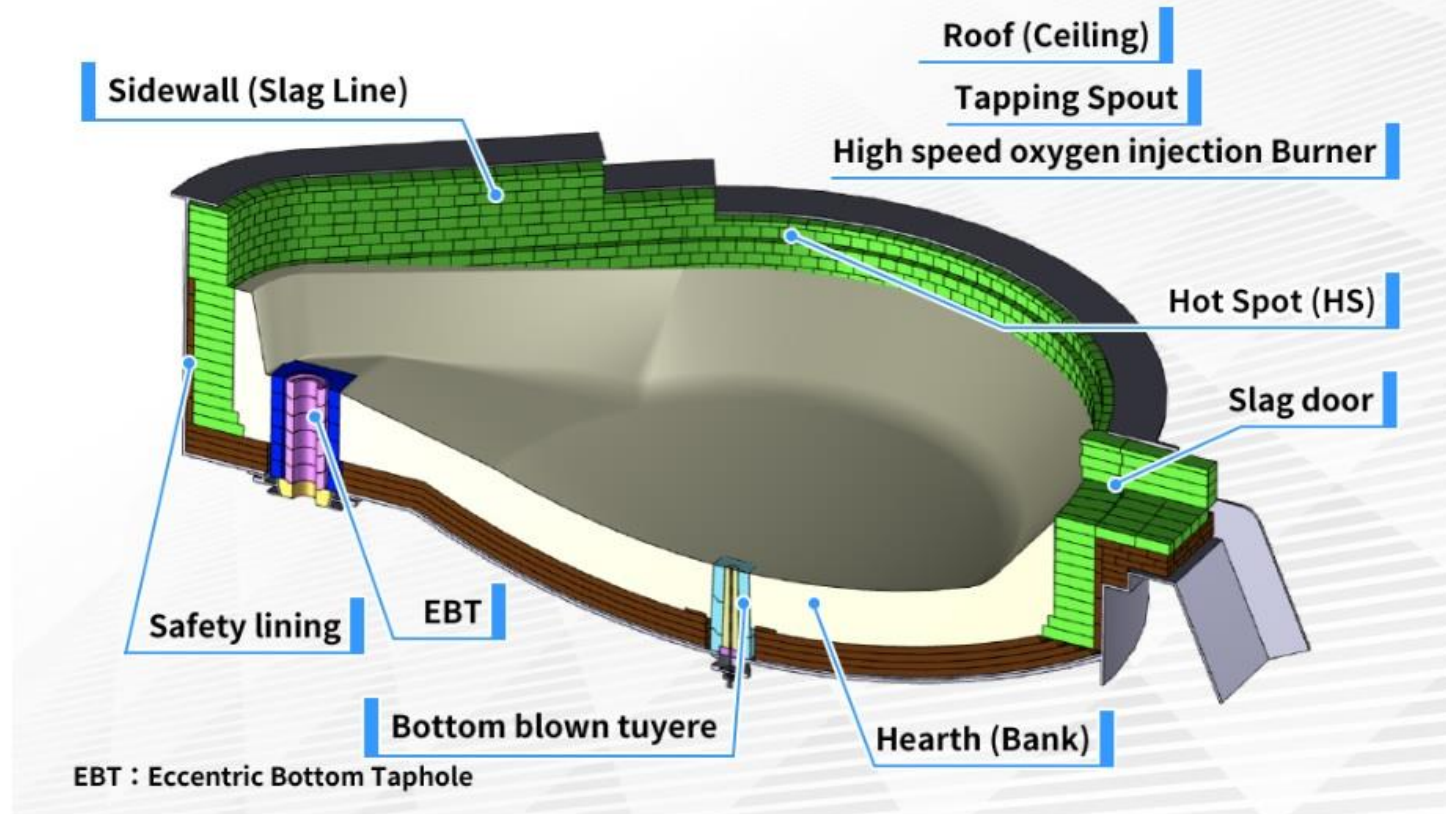
- Eco-construction materials
 - Construction materials such as bricks for paving and external walls



Our construction materials serve environmental functions such as permeability and water retention, and feature both texture and design. They contribute to creating recycling cities through technologies using raw materials recycled from urban construction materials.



Electric Arc Furnace lining structure



PDCA proposals for the trial use of refractories in electric arc furnaces

At the KROSAKI HARIMA Group, we hope to contribute to stable operations for customers by working together with them using the PDCA method to analyze the issues they currently face, proposing countermeasures, and implementing improvements.



<https://www.krosaki.co.jp/en>

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