



JFE Group

2010

ENVIRONMENTAL  
SUSTAINABILITY  
REPORT

挑戰

Challenging Spirit

柔軟

Flexibility

誠実

Sincerity

# Pursuing Business Development in Harmony with the Environment



**Kohei Wakabayashi**

Executive Vice President and Representative Director  
JFE Holdings, Inc.

Striving to “exist in harmony with the global environment” and “improve the global environment” through our business activities, as called for in the Corporate Standards of Business Conduct and Environmental Philosophy, the JFE Group is actively working to develop innovative technologies and promote international cooperation to protect the global environment.

As reflected in COP15, held in December 2009, and the passage of Japan’s Act on Promotion of Global Warming Countermeasures, public interest in, and demands regarding, actions concerning global warming continue to grow.

For its part, the JFE Group will carry on with its concerted efforts to protect the environment as it works to steadily achieve the Voluntary Action Plan reduction goals for the first commitment period for the Kyoto Protocol.

The JFE Group is striving to improve its energy efficiency, which already ranks among the best in the world, by pursuing its own energy efficiency activities and technology development, and working to develop significant new CO<sub>2</sub> reduction technologies, for example, through its participation in the CO<sub>2</sub> Ultimate Reduction in Steelmaking process by Innovative technology for Cool Earth 50 (COURSE50) project. Furthermore, by taking our pursuit of activities aimed at lowering environmental burden through the provision of environmentally friendly products and technologies to an even higher level, we will continue to play an important role in protecting the global environment.

Receiving feedback from our stakeholders as we improve our environmental initiatives is important for improving the quality of our environmental management. We, therefore, encourage you to send us your unbridled opinions on our environmental activities.

## Environmental Philosophy

The JFE Group considers improving the global environment a management priority and promotes business operations in harmony with the environment. These efforts aim to create a prosperous society.

## Environmental Policy

1. To reduce the environmental impact of all business operations
2. To make contributions through technologies and products
3. To make contributions through conservation of resources and energy
4. To promote communication with society
5. To promote international cooperation

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## Editorial Policy

The JFE Group Environmental Sustainability Report 2010 describes the Group's environmental protection activities for FY2009, as well as the results of those activities in the business operations of JFE Holdings, Inc., which is the holding company of the JFE Group. This report was edited/prepared in accordance with the “Guidelines for Environmental Reports (FY2007 edition)” issued by Japan’s Ministry of the Environment and “Sustainability Reporting Guidelines Version 3.0” Please note that this report is disclosed only on our website. If you need a brochure(s), please print this document. \*For further Group information, business descriptions, product information, and operation facilities, etc., please refer to JFE Group Business Report 2010 or our website: [www.jfe-holdings.co.jp/en/](http://www.jfe-holdings.co.jp/en/)

# JFE Steel's Activities to Prevent Global Warming

## —To Realize a Low-Carbon Society—

### Message from Senior Management



**Hiroshi Nishizaki**  
Vice President  
JFE Steel Corporation

JFE Steel is constantly working to fight global warming.

FY2009 was the second year of the first commitment period for the Kyoto Protocol\*<sup>1</sup>, and the 15th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP15) was held in Copenhagen in December 2009. Important developments, such as discussion of the Act on Promotion of Global Warming Countermeasures in the Diet in June 2010, have also taken place in Japan. While responding to these demands flow, JFE Steel will strive to take serious steps toward realizing a low-carbon society in accordance with the Group's Corporate Vision of contributing to society with the world's most innovative technology.

Examples of specific initiatives we have implemented are given below.

- Steady implementation of the Japan Iron and Steel Federation's (JISF's) Voluntary Action Program\*<sup>2</sup>
- Introduction of new processes wherever possible to reduce energy consumption and CO<sub>2</sub> emissions
- Further development and promotion of high-performance steel to reduce society's CO<sub>2</sub> emissions
- Development of Ferro-Coke production process and other innovative technologies that anticipate the future

### Initiatives for Achieving the Voluntary Action Program

Under our Second Medium-Term Business Plan (FY2006 – FY2008), we made approximately 100 billion yen in CO<sub>2</sub> emission reduction and energy-efficiency investments to achieve goals stated in the JISF's Voluntary Action Program, and have seen steady improvements as a result. We continued to make such investments in FY2009. Examples of main investments made to date include:

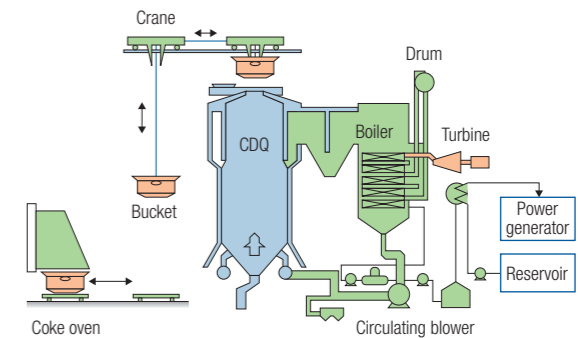
- Construction of a new CDQ (Commenced its operations in March 2009 at West Japan Works, Kurashiki)
- Construction of a new high-efficiency oxygen facility (West Japan Works, Kurashiki)
- Upgrade of blast furnace stoves to energy-efficient models (West Japan Works, Fukuyama and Kurashiki)

We are also taking energy saving actions on a continuous basis, such as conducting energy-saving patrols at our head office and business offices.



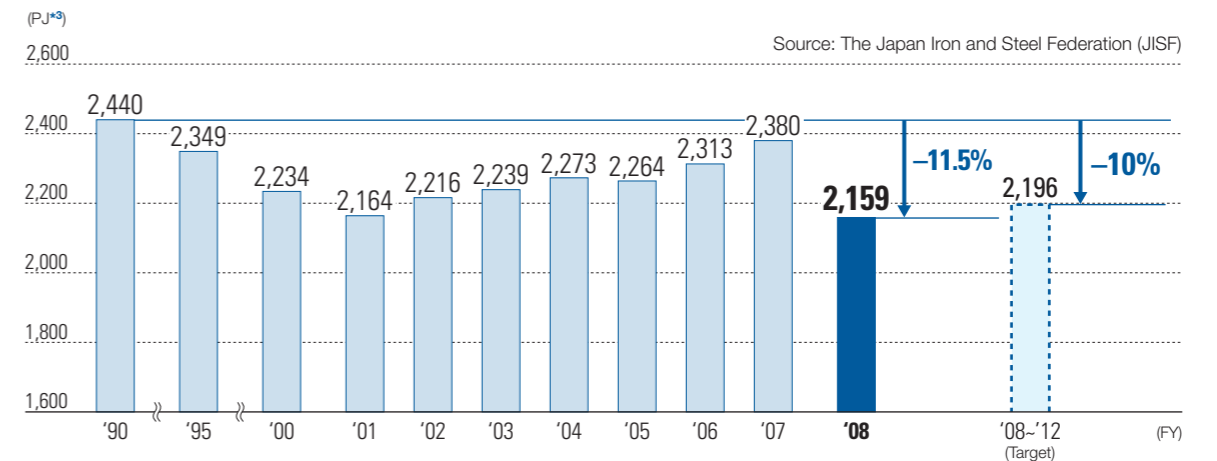
CDQ operation and exterior view

#### CDQ process



### Progress of the JISF's Voluntary Action Program

During FY2008, energy consumption was reduced 11.5% compared to FY1990. As a supplementary measure to achieve program goals, JISF has made emission reduction purchase agreements of 56 million tons of CO<sub>2</sub> in total under the Kyoto Mechanisms. Of them, 40 million tons has already been registered with the UN.



\*<sup>1</sup> First commitment period for the Kyoto Protocol  
The period FY2008 to FY2012. The world's developed countries have committed to reducing greenhouse gas emissions by 5% compared to the 1990 level during this period.

\*<sup>2</sup> JISF's Voluntary Action Program  
The goal of the JISF's Voluntary Action Program is to reduce average energy consumption during the period FY2008 to FY2012

by 10% compared to the 1990 level (premised on the production of 100 million tons of crude steel). As an additional initiative, the JISF has also established the goal of recycling 1 million tons of waste plastic, premised on the establishment of a collection system.

\*<sup>3</sup> PJ  
Petajoule (10<sup>15</sup> joules). 1PJ is equal to the amount of energy in 25,800kℓ of crude oil.

# JFE Steel's Activities to Prevent Global Warming



Unit energy consumption in comparison to FY1973

**37% cut**

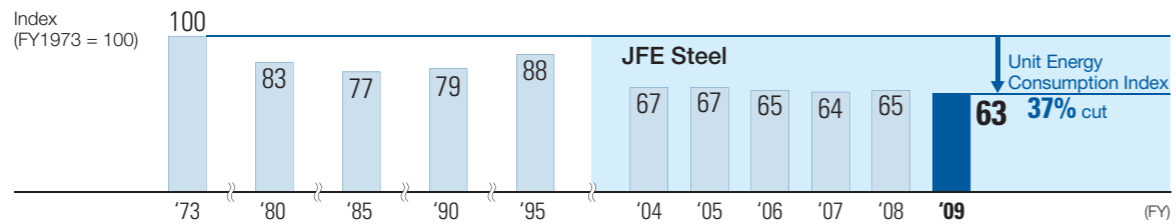
## Approaches to Energy Saving and CO<sub>2</sub> Reduction

As shown in the graph below, JFE Steel has been working for a long time to use energy more efficiently and reduce CO<sub>2</sub> emissions. Our efforts include the recovery of by-product gases generated in the process of ironmaking and steelmaking and the use of CDQ\*1 and TRT\*2 to recover waste heat and pressure.

In FY2009, we worked to achieve even greater reductions in CO<sub>2</sub> emissions, despite production cutbacks, and succeeded in lowering our unit energy consumption to 37% of what it was in FY1973. As a result, JFE Steel has achieved world-class efficiency in energy consumption.

\*1 CDQ (Coke Dry Quenching)  
\*2 TRT (Blast Furnace Top Pressure Recovery Turbine Generation)

### Unit Energy Consumption Index at JFE Steel



### History of Energy Saving Activities

#### Introduction of energy saving equipment

- Reduction of reheat furnace fuel
- Large-scale waste heat recovery equipment
- BF top pressure recovery turbine (TRT), sintering waste heat recovery, etc.
- Process continuation
- Continuous casting line, continuous annealing line, etc.

#### Further promotion of energy saving

- Waste plastics feeding into BF
- Introduction of regenerative burner
- Endless rolling
- City gas blowing technology for BF
- High efficiency oxygen plant

#### Global warming prevention measures by energy saving

- Added a new shaft furnace (commenced its operation in August 2008)
- Enhanced CDQ (commenced its operation in March 2009)
- Broader introduction of regenerative burner
- Augmentation of high efficiency oxygen plant
- BOF gas sensible heat recovery
- Introduction of Super-SINTER™
- Upgrade of blast furnace stoves

### Multiple awards for energy saving

JFE Steel's ongoing efforts with regard to energy saving have received various awards for its contributions to society. In FY2009, our technical endeavors were again acknowledged with the following awards.

- Contribution Prize of the 42nd annual Ichimura Industrial Awards for development of high-strength steel with high earthquake resistance.
- 56th Okochi Memorial Production Prize for development of nano-scale surface-treated high-performance steel sheet for automobiles.

### JFE Steel's Super-SINTER™ selected as a Low CO<sub>2</sub> Kawasaki Pilot Brand

Three JFE Group technologies, including JFE Steel's Super-SINTER™, were selected as Low CO<sub>2</sub> Kawasaki Pilot Brands by the City of Kawasaki for FY2009. This is the first year for the awarding of this designation, which recognizes technologies and products that are particularly effective in reducing CO<sub>2</sub> emissions and were researched, developed, and created in the City of Kawasaki. Super-SINTER™ is a technology for infusing hydrogen-based fuel into a sintering machine, and JFE Steel was the first company in the world to

succeed in applying this type of technology commercially. Our East Japan Works (Keihin) has been using Super-SINTER™ technology since January 2009.

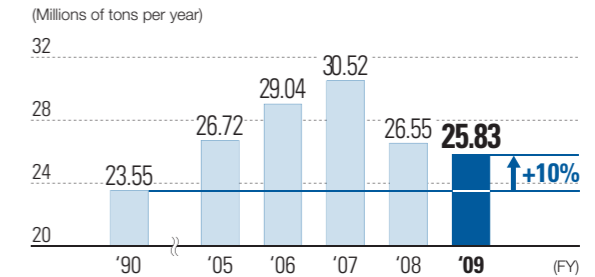


Recognition at Kawasaki International Eco-Tech Fair 2010

## Crude Steel Production for FY2009

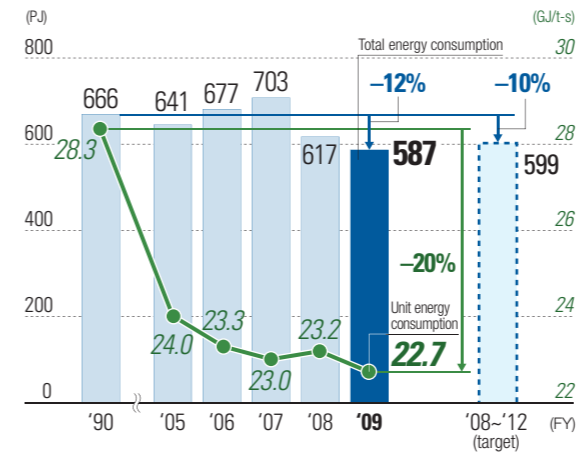
Crude steel production through the first half of FY2009 fell sharply in response to the global economic decline that began in FY2008. Second-half production, on the other hand, recovered on strong export market conditions, leaving total production for the year basically unchanged from FY2008, and 10% higher than the figure for FY1990.

### Crude Steel Production at JFE Steel



## Energy Consumption and Unit Energy Consumption for FY2009

### Energy Consumption and Unit Energy Consumption at JFE Steel (Estimates)



Even though our crude steel production for FY2009 increased by 10% compared to FY1990, our energy consumption fell by 12% in total and the amount of energy we used to produce 1 ton of crude steel (unit energy consumption) dropped by 20%.

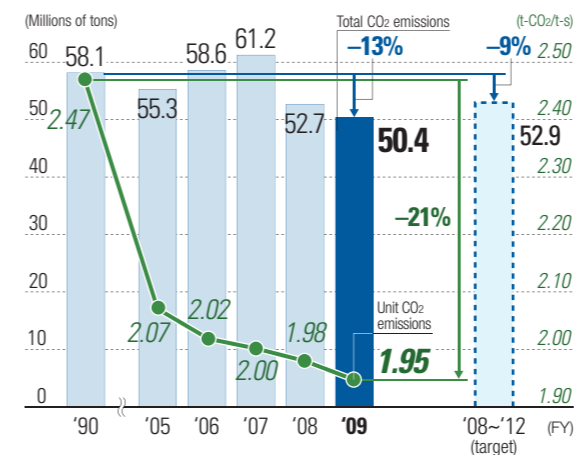
The level of energy consumption still remains lower, an 8% decrease, when compared with that of FY2005 where the production volume of crude steel was almost the same level of that of FY2009.

Unit energy consumption in comparison to FY1990

**20% cut**

## CO<sub>2</sub> Emissions and Unit CO<sub>2</sub> Emissions for FY2009

### CO<sub>2</sub> Emissions and Unit CO<sub>2</sub> Emissions at JFE Steel (Estimates)



Even though our crude steel production for FY2009 increased by 10% compared to FY1990, our CO<sub>2</sub> emissions fell by 13% in total and the amount of CO<sub>2</sub> emissions we used to produce 1 ton of crude steel (unit CO<sub>2</sub> emissions) dropped by 21%.

The level of CO<sub>2</sub> emission still remains lower, a 9% decrease, when compared with that of FY2005 where the production volume of crude steel was almost the same level of that of FY2009.

Unit CO<sub>2</sub> emissions in comparison to FY1990

**21% cut**

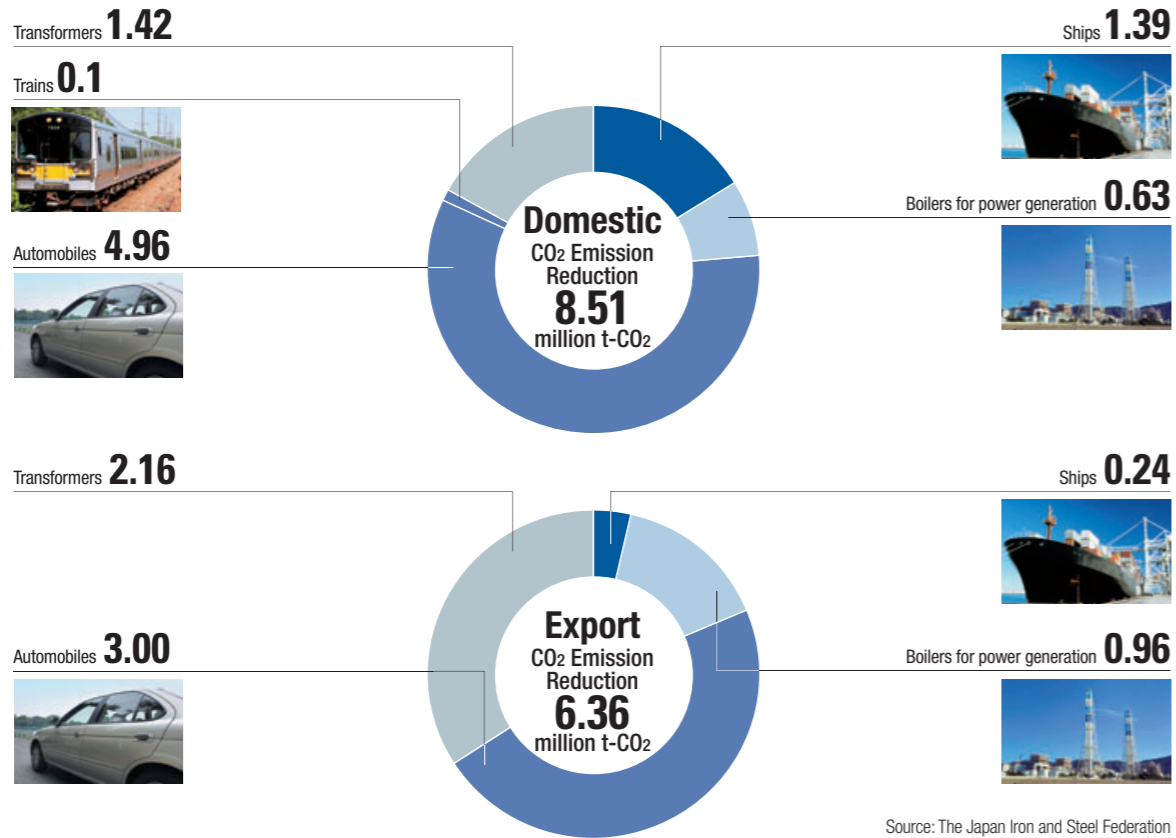
## Contributing to the Reduction of CO<sub>2</sub> through Our Products

JFE Steel works with customers to help reduce CO<sub>2</sub> emissions not only in the development, production, and supply of the high-performance steel necessary to realize a low-carbon society and pursue economic interests but also in the application of that steel in end-products used by consumers.

Institute of Energy Economics, Japan, for FY2008, Japan Iron and Steel Federation member companies, by supplying 7.97 million tons of high-performance steel, reduced CO<sub>2</sub> emissions from the usage of products by consumers by upwards of 14.87 million tons (8.51 million tons domestically, 6.36 million tons overseas).

According to figures calculated by the

### CO<sub>2</sub> Emission Reduction Effect at the Stage of Using High-Performance Steel Products (FY2008)



Source: The Japan Iron and Steel Federation

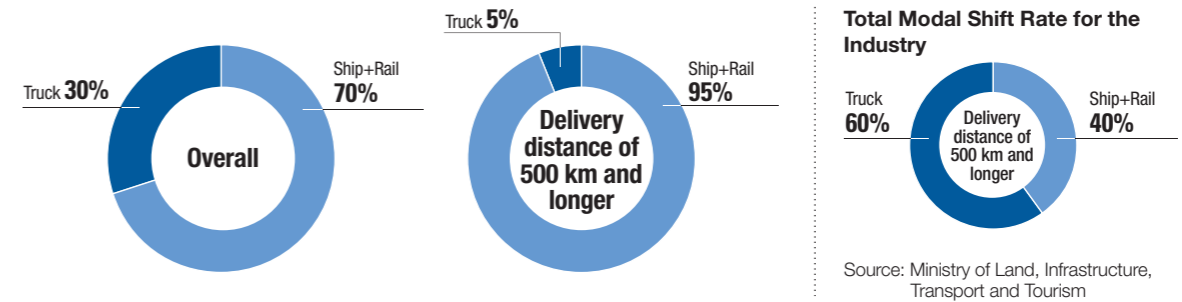
## Transportation Division's Energy-Saving Measures

To reduce CO<sub>2</sub> and NO<sub>x</sub> emissions from the transportation of steel products, JFE Steel is making a "modal shift" to relatively low-environmental impact ship and rail transportation modes. In its pursuit of efficient transport, it is also taking steps like introducing the use of

large specialized freighters for transporting raw materials from overseas.

JFE Steel achieved a modal shift of 95% in FY2009. The amount of CO<sub>2</sub> emissions for deliveries was approximately 300,000 tons.

### JFE Steel's Modal Shift Rate



Modal shift rate  
**95%**

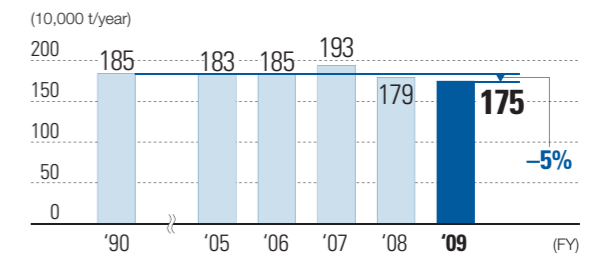
Source: Ministry of Land, Infrastructure, Transport and Tourism

## Non-Energy-Related CO<sub>2</sub> Emissions

To remove iron ore impurities, lime and dolomite are added to BF and converters. The CO<sub>2</sub> from the breaking down of these materials is non-energy-related CO<sub>2</sub>.

During FY2009, JFE Steel's non-energy-related CO<sub>2</sub> emissions were approximately 1.75 million tons.

### JFE Steel's Estimated Non-Energy-Related CO<sub>2</sub> Emissions



## Tour of the East Japan Works (Keihin) by METI Minister Naoshima

Minister of Economy, Trade and Industry Masayuki Naoshima and Masaki Koito, the Director of the Iron and Steel Division of the ministry's Manufacturing Industries Bureau toured the East Japan Works (Keihin). After explaining measures the company is taking to protect the global environment and stop global warming, JFE Steel personnel escorted Mr. Naoshima and Mr. Koito on tours of areas including the waste plastic recycling plant, blast furnace, plate mill, and hot rolling mill, as they explained the steps JFE Steel is taking to reduce CO<sub>2</sub> emissions and protect the environment.



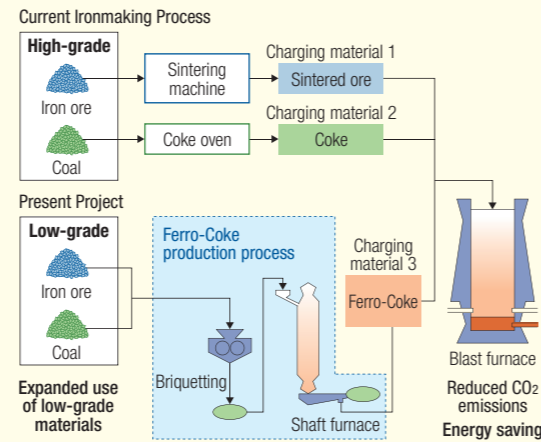
Minister Naoshima on a tour of the hot rolling mill



**Construction of a Pilot Plant for Ferro-Coke Production Process at the East Japan Works (Keihin)**

JFE Steel has decided to construct a pilot plant\* as part of its effort to develop processing technology for Ferro-Coke production, which constitutes a novel approach for greatly reducing CO<sub>2</sub> emissions. Ferro-Coke is an innovative material that promises to not only improve the efficiency of iron ore reduction inside a blast furnace but also deliver significant reductions in the proportion of reduction agent used, thereby minimizing CO<sub>2</sub> emissions and energy consumption. This construction project is being pursued by JFE Steel and three other blast furnace companies aiming to develop new, more resource-efficient iron production technologies. It is being subsidized by the New Energy and Industrial Technology Development Organization (NEDO), and the project participants hope to perfect this new technology and commercialize it as soon as possible.

**Innovative Ironmaking Technology Using Ferro-Coke**



\* Construction of the plant began in December 2009 at the East Japan Works (Keihin), with completion scheduled to take about two years.

**Fighting Global Warming through Environmental and Energy Technologies**

JFE Steel is fighting global warming by applying world-class energy-efficiency technology in global initiatives like APP\*1 and worldsteel\*2 activities, and through technical exchanges with China.

In addition, the JFE Group is contributing to international society by actively pursuing the development of technology overseas.

**Environmental Technology Exchanges with China**

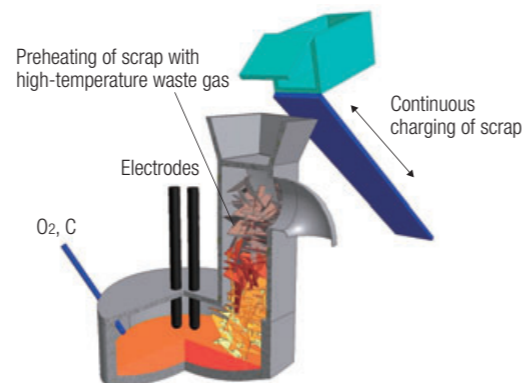
The Japan Iron and Steel Federation (JISF) and the China Iron and Steel Association (CISA) have been holding the Japan China Steel Industries Conference on Exchange of Advanced Technologies on Environmental Preservation and Energy Saving annually since 2005. The fifth meeting, held on April 27 and 28, 2010 in Anshan City in the Chinese province of Liaoning, featured active discussions focused on environmental protection technology.

\*1 APP  
The Asia Pacific Partnership on Clean Development and Climate is an international organization founded in July 2005 to address climate change, energy security, and other issues. Its members include Japan, Australia, China, India, South Korea, the US, and Canada (joined in May 2007).  
\*2 worldsteel  
The World Steel Association (worldsteel) is comprised of approximately 180 of the major iron and steel companies and industry organizations in 55 countries, including Japan, the US, EU-member states, and Russia.  
\*3 ECOARC™  
A trademark of JP Steel Plantech Co.

**JFE Group's Overseas Technology Development**

- Waste Heat Recovery System for Sintering Plant  
This work, which is being undertaken as a NEDO energy efficiency model project in India, got under way in FY2009.
- ECOARC™\*3 Ecologically Friendly and Economical Arc Furnace  
With its effectiveness recognized internationally, ECOARC™ technology is set for introduction in Korea. In addition, the feasibility studies to introduce this technology in Thailand are currently underway.

**Preheating of Scrap with ECOARC™ Technology**

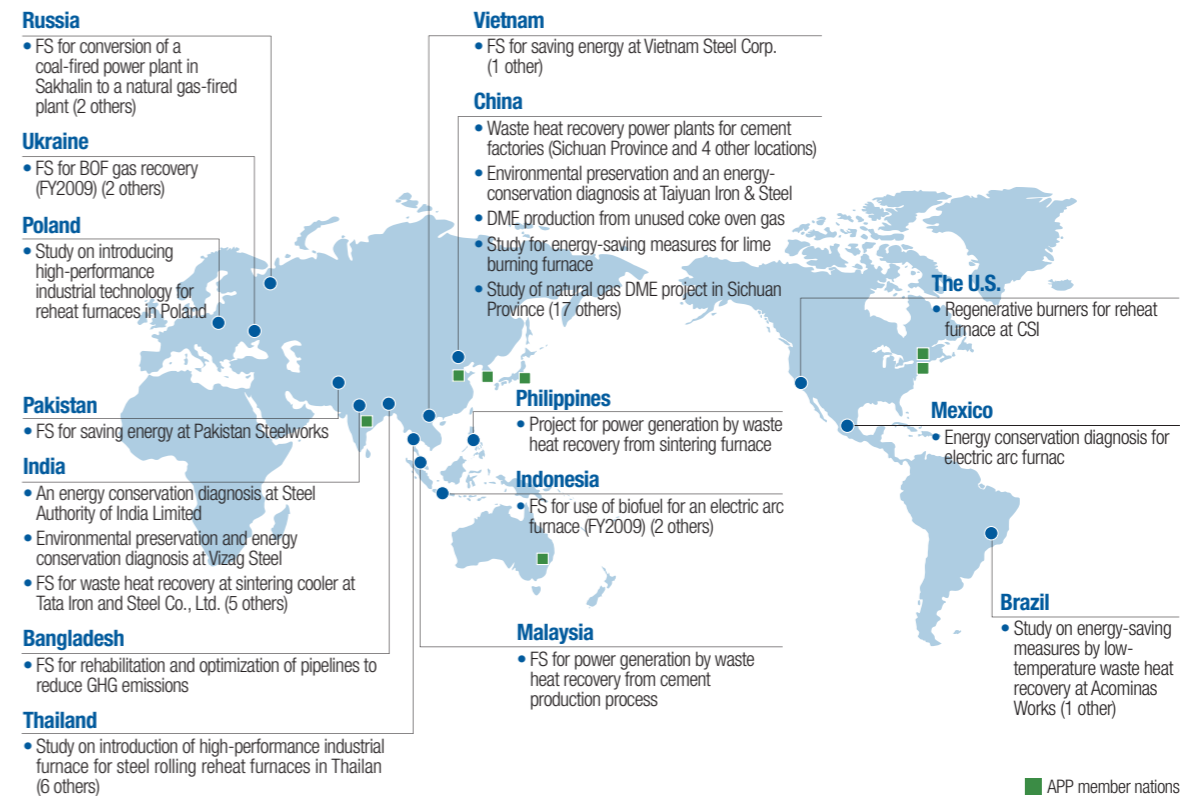


**Projects Outside Japan**

The JFE Group has used environmental preservation, energy conservation, and CO<sub>2</sub> reduction technologies in its R&D to contribute to international society by undertaking numerous technol-

ogy transfers that fight global warming and help developing and developed countries advance economically while protecting their environments.

**International Cooperation Projects by the JFE Group**



**Introduction of Regenerative Burners for CSI's No. 5 Reheat Furnace**

California Steel Industries (CSI), a joint venture of JFE Steel and Companhia Vale do Rio Doce of Brazil, is one of the largest steel re-rollers in the Western US. CSI completed construction on its No. 5 reheat furnace\* on May 18, 2010 and has since brought it on line. This is the first large reheat furnace in the US to use regenerative burners and is 20% more efficient, in terms of specific energy consumption, than traditional reheat furnaces. A regenerative burner achieves extremely high heating efficiency by using heat from exhaust gas.



CSI No. 5 reheat furnace

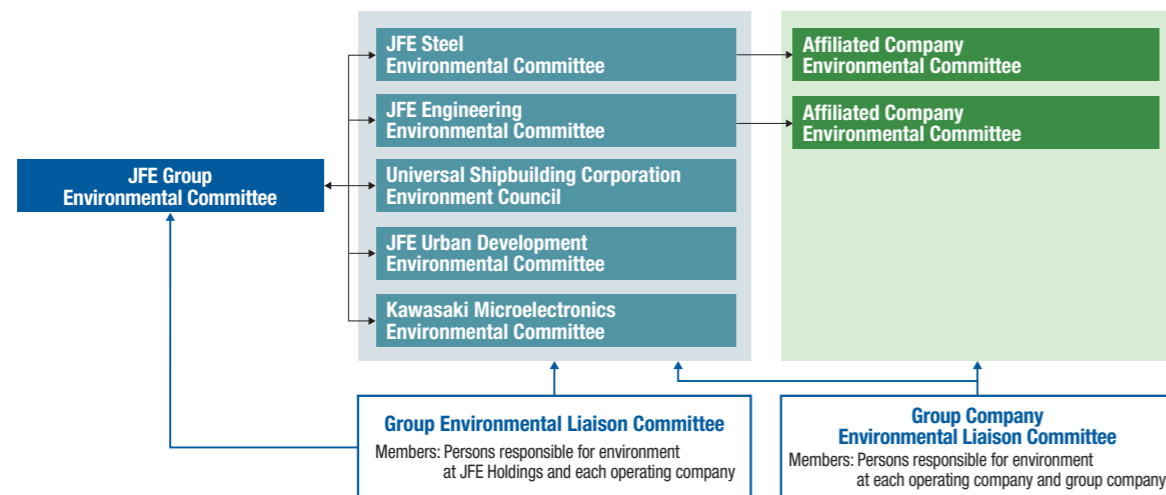
\* Reheat furnace  
Reheat furnaces are used to heat steel slabs, which are then put through hot rolling mills to produce hot-rolled steel sheets.

## Construction and Operation of the Environmental Management System

Under the JFE Group CSR Council, the JFE Group has set up the JFE Group Environmental Committee chaired by the President of JFE Holdings, as well as an Environmental Committee in each of the Group's operating companies and affiliated companies. With this multi-tiered

committee system, JFE has been dealing with environment-related issues, such as setting objectives for environmental protection activities, checking progress of those activities, and improving environmental performance for the whole Group.

### Environmental Management System



## Promotion to Receive ISO 14001

Each company in the JFE Group has been aiming to receive ISO 14001 certification in order to promote voluntary and continuous environmental activities. Four operating companies with production facilities have all received ISO 14001 certification for individual works. The JFE Group will continuously extend the number of accredited companies/production facilities.

## Environmental Auditing

At the JFE Group, environmental auditing has been conducted on the basis of ISO 14001 with the aim of enhancing environmental management quality. Regarding environmental auditing on the basis of ISO 14001, inspections are made by certification authorities, while internal auditing is conducted mainly by qualified employees who not only have taken the auditor-training course offered by an external institution, but also have experience in environment-related work.

## Environmental Education

At the JFE Group is actively conducting environmental education aiming to foster a corporate culture of engaging in environmental protection activities. In each operating company, environmental education is incorporated in training programs for new employees and promotions, and also includes annual programs at each level, covering environmental protection.

## Opening of JFE Tonbo Michi

JFE Engineering and eleven other companies with business facilities in the Suehiro area of Yokohama's Tsurumi Ward signed a joint greenification pledge made to the City of Yokohama and embarked on the Keihin no Morizukuri (Forest Building in. Keihin) project. In May 2009, JFE Engineering completed and held the opening ceremony for a public green space consisting of walking paths and a biotope, and developed with a subsidy from the City of Yokohama. Named the "JFE Tonbo Michi" (JFE Dragonfly Path) based on responses to a call for name suggestions, this

green space is overseen by volunteers invited to form the Tonbo Michi Fan Club. Volunteers undertake activities like cleaning the area around the biotope's pond, trimming grass, and observing the behavior of organisms living in the biotope to protect its biodiversity. They are also taking steps to ensure maintenance of the biotope is continued by future generations. In August 2009, the Kanto Kensetsu Kousaikai and Ecosystem Conservation Society—Japan selected the "JFE Tonbo Michi" for inclusion in their list of 100 aquatic and green sites in the Kanto area of Japan.



Local elementary school students planting aquatic plants at the opening ceremony



Official recognition as one of 100 aquatic and green sites in the Kanto area of Japan

## Exchanges through Exhibitions

The JFE Group participates in various exhibitions on environmental themes in order to provide stakeholders with necessary information on its activities.

In December 2009, we participated in Eco-Products 2009, one of Japan's largest environmental fairs, presenting our environmental initiatives, along with our technologies/products that support entire society and life, and contribute to environmental preservation.



Eco-Products 2009

## Information through the Internet

The JFE Group actively offers information related to the environment through the JFE Group website. Its environmental management policy, results and activities are introduced under the title of "Environmental Activities."

Moreover, JFE has been cooperating with an environmental website "ecobeing," where general knowledge on environmental issues is presented in an easily comprehensible way. Through this linkage, the Group introduces comments of "eco people," who are innovatively involved in environmental issues. This is one example of JFE's efforts to promote environmental awareness activities among the general public.

JFE Holding's environmental initiative website at:  
[www.jfe-holdings.co.jp/en/environment](http://www.jfe-holdings.co.jp/en/environment)

Environmental website "ecobeing" at:  
[www.ecobeing.net](http://www.ecobeing.net)

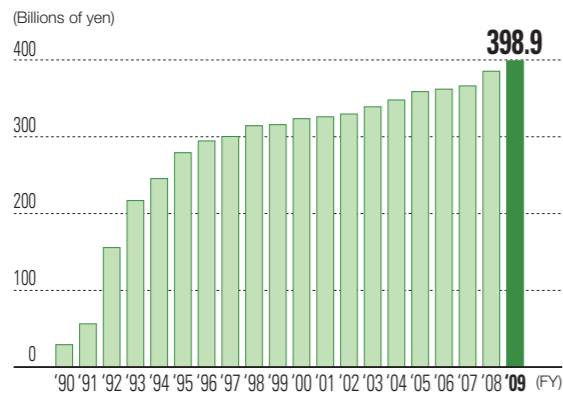
### Transition of Capital Investment

To promote energy saving and further reduce environmental loads, JFE has actively invested in plant and equipment based on R&D achievements in the Group's proprietary environmental technologies.

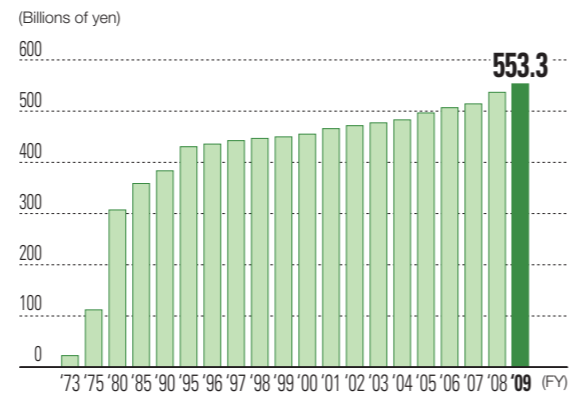
Cumulative investment in energy saving since 1990 has reached ¥398.9 billion, enabling us to achieve energy efficiencies that rank among the

highest in the world. We are planning further investment in plant and equipment to promote global warming prevention. Meanwhile, cumulative investment in environmental protection since 1973 has reached ¥553.3 billion. We will continuously invest in measures to further reduce environmental loads.

#### Cumulative Investment in Energy Saving



#### Cumulative Investment in Environmental Measures\*



\* Investment in environmental protection:  
Total investment in effective use of resources and environmental protection

### Environmental Accounting

In FY2009, environment-related capital investment totaled 30.6 billion yen and expenses amounted to 90.4 billion yen. The ratio of environment-related capital investment against

total capital investment is approximately 18%. As a result of activities during FY2009, the effects of energy conservation were valued at an estimated 0.8 billion yen.

#### Cumulative Energy-Efficiency Investments (April 1, 2009, to March 31, 2010) (Billions of yen)

Description		Investment	Expenses
Investment & expenses related to JFE's own business	Management	0.2	2.4
	Prevention of global warming	13.6	23.6
	Effective use of resources	11.9	18.2
	Environmental protection	4.4	38.0
	Miscellaneous	-	1.5
Investment & expenses related to customers and society	Research & development	0.5	6.1
	Social activities	-	0.6
<b>Total</b>		<b>30.6</b>	<b>90.4</b>

Environmental accounting data stated above was calculated on the basis of the following assumptions.  
Above costs are environment-related investments and expenses at JFE's steelworks, except the item of research & development, for which the scope is extended to cover the entire Group.  
\* The effects in environmental accounting such as expected effects and risk avoidance effect are excluded from calculations.  
\* Calculations do not include capital investments made primarily for purposes other than environmental protection, such as renovation of superannuated facilities, even if the process as a whole resulted in a net energy saving compared to the former process.

# Reducing Environmental Loads in Business Activities

By Utilizing the World's Most Advanced Technology for Reduction of Environmental Loads

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# Priority Environmental Targets and Results

\* In the column "Refer to Pages," the number preceded by BR represents the corresponding page number in the "JFE Group Business Report 2010" and the ER number in the "JFE Group Environmental Sustainability Report 2010" respectively. The "JFE Group Environmental Sustainability Report 2010" can be downloaded from our website.

[www.jfe-holdings.co.jp/en/environment](http://www.jfe-holdings.co.jp/en/environment)

Group Companies	FY2009 Priority Environmental Targets	FY2009 Results	FY2010 Priority Environmental Targets	Refer to Pages
JFE Steel	<b>Promote measures to prevent global warming</b> <ul style="list-style-type: none"> <li>Promoting measures to prevent global warming in line with the Voluntary Action Program of the Japan Iron and Steel Federation (JISF) (Compared to FY1990, we plan to achieve a 10% decrease in energy consumption for the period from FY2008 to FY2012)</li> </ul>	<ul style="list-style-type: none"> <li>Approx. 12% reduction in energy consumption, and approx. 20% reduction in unit energy consumption compared to FY1990</li> <li>Commenced Kurashiki CDQ operation in March 2009</li> <li>Built new high-efficiency oxygen facility (Kurashiki)</li> <li>Upgraded blast furnace stoves to energy-efficient types (Fukuyama and Kurashiki)</li> </ul>	<b>Promote measures to prevent global warming</b> <ul style="list-style-type: none"> <li>Promoting measures to prevent global warming in line with the Voluntary Action Program of the Japan Iron and Steel Federation (JISF) (Compared to FY1990, we plan to achieve a 10% decrease in energy consumption for the period from FY2008 to FY2012)</li> </ul>	BR53-58 ER3-10
	<b>Continuously strive to reduce environmental risks</b> <ul style="list-style-type: none"> <li>Comply with new laws and regulations</li> <li>Promote voluntary environmental conservation activities</li> </ul>	<ul style="list-style-type: none"> <li>Built new wastewater treatment facilities (in order to comply with stricter restrictions on nitrogen in Chiba region)</li> <li>Continued voluntary control measures for VOC reduction</li> </ul>	<b>Continuously strive to reduce environmental risks</b> <ul style="list-style-type: none"> <li>Comply with new laws and regulations</li> <li>Promote voluntary environmental conservation activities</li> </ul>	ER19-20
	<b>Promote byproduct recycling</b> <ul style="list-style-type: none"> <li>Continue development of recycling technology for dust and sludge and implementation of actual equipment</li> </ul>	<ul style="list-style-type: none"> <li>Commenced operation of dust recycling facilities (Fukuyama)</li> </ul>	<b>Promote byproduct recycling</b> <ul style="list-style-type: none"> <li>Continue development of recycling technology for dust and sludge and implementation of actual equipment</li> </ul>	BR60 ER21 ER39-40
	<b>Improve waste control</b> <ul style="list-style-type: none"> <li>Introduce an electronic manifest system to the entire group, targeted at 80% computerization</li> <li>Develop a group-wide waste material collection system</li> </ul>	<ul style="list-style-type: none"> <li>Introduced an electronic manifest system to over 90%</li> </ul>	<b>Improve waste control</b> <ul style="list-style-type: none"> <li>Introduce an electronic manifest system to the entire group</li> <li>Develop a group-wide waste material collection system</li> </ul>	ER17-18 ER21
JFE Engineering	<b>Promote energy-saving activities in production divisions</b> <ul style="list-style-type: none"> <li>Tsurumi Works: reduction of 13% compared to FY1997 (electric power consumption per hour of operation)</li> <li>Tsu Works: increase of 5% compared to FY1997 (electric power consumption per unit weight processed)</li> <li>Shimizu Works: a reduction of 24% compared to FY1997 (electric power consumption per unit weight processed)</li> <li>* An increase compared to FY1997 is anticipated for Tsu Works due to an increased usage of high current welding machinery.</li> </ul>	<ul style="list-style-type: none"> <li>Tsurumi Works: reduction of 5% compared to FY1997</li> <li>Tsu Works: increase of 9% compared to FY1997</li> <li>Shimizu Works: reduction of 23% compared to FY1997</li> <li>Total CO<sub>2</sub> emission of 3 works: 16,344 t-CO<sub>2</sub></li> </ul>	<b>Promote energy-saving activities in production divisions</b> <ul style="list-style-type: none"> <li>Tsurumi Works: reduction of 5% compared to FY1997</li> <li>Tsu Works: increase of 4% compared to FY1997</li> <li>Shimizu Works: reduction of 20% compared to FY1997</li> <li>* An increase compared to FY1997 is anticipated for Tsu Works due to an increased usage of high current welding machinery.</li> </ul>	BR59 ER23-24
	<b>Promote reduction of construction site waste</b> <ul style="list-style-type: none"> <li>Recycling rate of 74% or more</li> </ul>	<ul style="list-style-type: none"> <li>Recycling rate of 86.2%</li> </ul>	<b>Promote reduction of construction site waste</b> <ul style="list-style-type: none"> <li>Recycling rate of 80% or more</li> </ul>	BR59 ER24
Universal Shipbuilding	<b>Promote measures to prevent global warming</b> <ul style="list-style-type: none"> <li>Target a 10% reduction in electric power consumption in basic unit within FY2010 compared to the level of FY1990 (scope: new shipbuilding shipyards)</li> <li>Target a 1% reduction in energy consumption in basic unit compared to the previous year (scope: group-wide level)</li> </ul>	<ul style="list-style-type: none"> <li>Achieved a 22% reduction compared to the level of FY1990</li> <li>Achieved a total of 7.6% reduction in 5 shipyards compared to the previous year</li> <li>Achieved a 7.6% reduction in CO<sub>2</sub> emission at the group-wide level with the emission amount of 67,084 t-CO<sub>2</sub></li> </ul>	<b>Promote measures to prevent global warming</b> <ul style="list-style-type: none"> <li>Target a 10% reduction in electric power consumption in basic units within FY2010 compared to the level of FY1990 (scope: new shipbuilding shipyards)</li> <li>Target a 1% reduction in energy consumption in basic units compared to the previous year (scope: group-wide level)</li> </ul>	BR59 ER25
	<b>Reduce waste emissions</b> <ul style="list-style-type: none"> <li>Target the waste recycling rate to be 85% or more at the stage of production in FY2010 (scope: group-wide level)</li> </ul>	<ul style="list-style-type: none"> <li>Achieved a group-wide waste recycling rate of 84.7%, a slight decline from the previous year</li> </ul>	<b>Reduce waste emissions</b> <ul style="list-style-type: none"> <li>Target a waste recycling rate of 85% or more at the stage of production in FY2010 (scope: group-wide level)</li> </ul>	BR59 ER26
	<b>Take measures to regulate VOC emissions</b> <ul style="list-style-type: none"> <li>Aim to meet an emission standard level of less than 700 ppmC (scope: coating facilities with an air-exhaust capacity of 100,000 m<sup>3</sup>/hour or more)</li> </ul>	<ul style="list-style-type: none"> <li>Achieved a level of less than 700 ppmC of the emission standard at both the Ariake and Tsu Shipyards</li> </ul>	<b>Take measures to regulate VOC emissions</b> <ul style="list-style-type: none"> <li>Aim to meet an emission standard level of less than 700 ppmC (scope: coating facilities with an air-exhaust capacity of 100,000 m<sup>3</sup>/hour or more)</li> </ul>	ER26
	<b>Monitor chemical substances restricted under PRTR</b> <ul style="list-style-type: none"> <li>Monitor emission into the air as well as transfer to other places of the restricted chemical substances, particularly Xylene, Ethylbenzene, and Toluene (scope: 5 shipyards)</li> </ul>	<ul style="list-style-type: none"> <li>The amounts of emission and transfer regarding 3 major chemical substances under control were almost the same as the previous year</li> </ul>	<b>Monitor the chemical substances restricted under PRTR</b> <ul style="list-style-type: none"> <li>Monitor emissions into the air as well as transfer to other places restricted chemical substances, particularly Xylene, Ethylbenzene, and Toluene (scope: 5 shipyards)</li> </ul>	ER26
JFE Urban Development	<b>Promote energy-saving activities in the condominium development business</b> <ul style="list-style-type: none"> <li>Acquire Housing Performance Evaluation Reports</li> <li>Anti-degradation of structural frames measure grade: Grade 3</li> <li>Energy efficiency grade: Grade 3</li> <li>Formaldehyde emission control grade: Grade 3</li> <li>Promote the use of energy-conserving materials and facilities</li> </ul>	<ul style="list-style-type: none"> <li>Acquired for all condominiums</li> <li>Adopted latent-heat-recovery water heaters and double-glazed windows</li> </ul>	<b>Promote energy-saving activities in the condominium development business</b> <ul style="list-style-type: none"> <li>Acquire Housing Performance Evaluation Reports</li> <li>Anti-degradation of structural frames measure grade: Grade 3</li> <li>Energy efficiency grade: Grade 3</li> <li>Formaldehyde emission control grade: Grade 3</li> <li>Promote the use of energy-conserving materials and facilities</li> </ul>	ER27
	<b>Promote measures to prevent global warming in the facility management business</b> <ul style="list-style-type: none"> <li>Renew energy-conserving equipment</li> </ul>	<ul style="list-style-type: none"> <li>THINK: Renewed substations, etc.</li> </ul>	<b>Promote measures to prevent global warming in the facility management business</b> <ul style="list-style-type: none"> <li>Renew energy-conserving equipment</li> </ul>	
	<b>Reduce waste emissions in the facility management business</b> <ul style="list-style-type: none"> <li>Improve the recycling rate of targeted commercial and business waste</li> <li>THINK: Recycling rate of 56.5%</li> <li>Orto Yokohama: Recycling rate of 50%</li> </ul>	<ul style="list-style-type: none"> <li>THINK: Recycling rate of 77.7%, a 16.9% increase from the level of FY2008</li> <li>Orto Yokohama: Recycling rate of 48.2%, a 0.3% increase from the level of FY2008</li> </ul>	<b>Reduce waste emissions in the facility management business</b> <ul style="list-style-type: none"> <li>Improve the recycling rate of targeted commercial and business waste</li> <li>THINK: Recycling rate of 81.6%</li> <li>Orto Yokohama: Recycling rate of 49%</li> </ul>	
Kawasaki Microelectronics	<b>With the closure of the Utsunomiya Works, review our activity themes and implement the following</b> <ul style="list-style-type: none"> <li>Target a 100% recycling rate for the wastewater treatment-origin dehydrated sludge</li> <li>Aim to reduce consumption of PRTR substances</li> <li>In addition, further improve the chemical substance control system for LSI products under EU-REACH</li> </ul>	<p>With the closure of the Utsunomiya Works, wastewater and sludge discharges have ceased, as has the usage of PRTR substances.</p>	<b>Continue environmental protection activities at the head office building under the following themes</b> <ul style="list-style-type: none"> <li>Take preventive measures for global warming in building operations</li> <li>Conserve paper resources</li> <li>Reduce waste (construction byproducts)</li> </ul>	ER27

# Reducing Environmental Loads in Business Activities

## Energy/Material Flow in the Steelmaking Process

JFE Steel Corporation has endeavored to reduce environmental loads through R&D on energy saving and environmental protection technologies and aggressive investment in facilities. As a result, our steel production processes now boast the world's

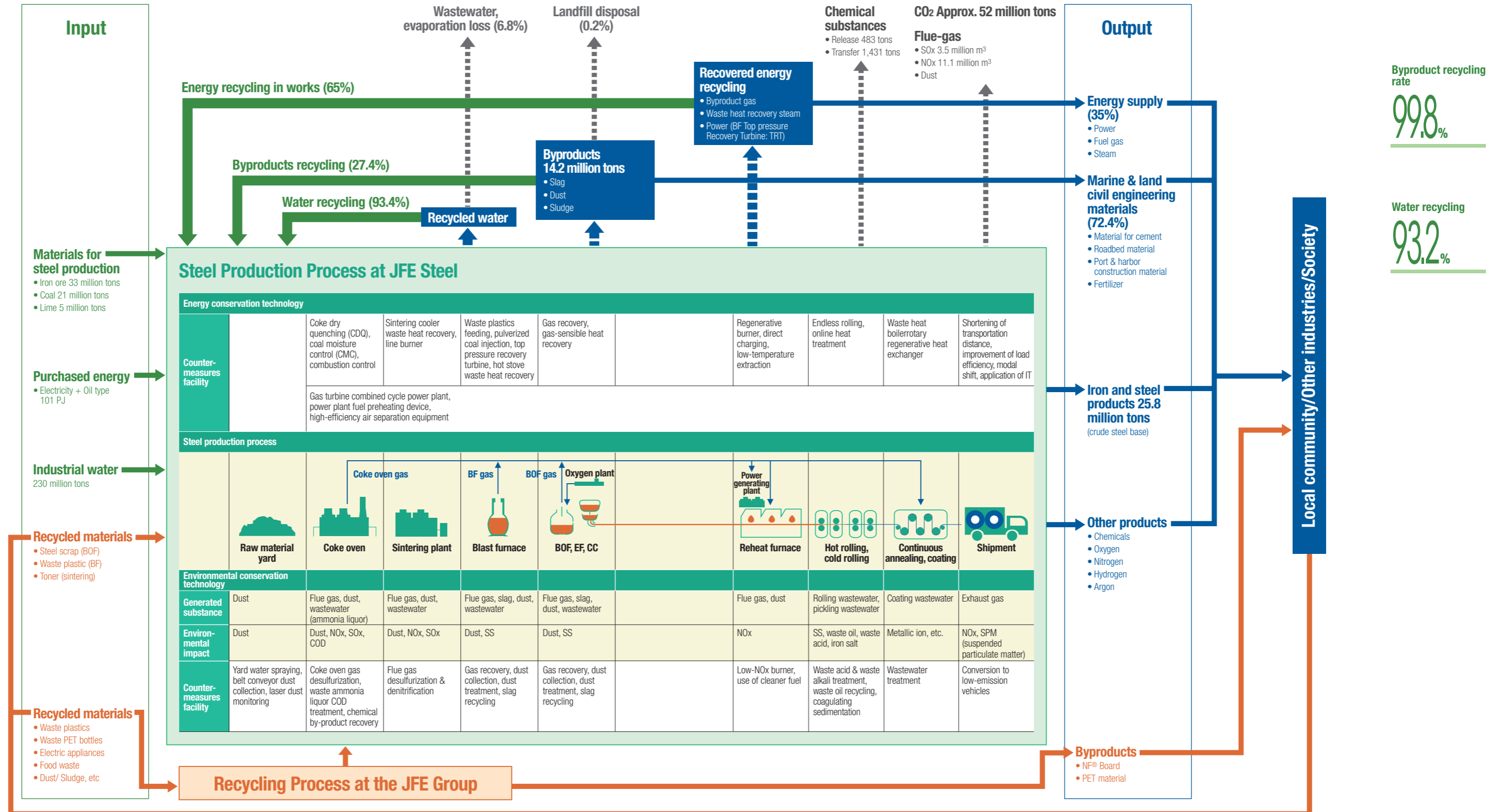
highest energy efficiency and recycling rates. Far from becoming complacent with its achievements, JFE Steel still continues to conduct R&D and introduce equipment to further reduce environmental loads in each steel production process.

JFE Steel helps to reduce society's waste by taking in approximately 50,000 tons of waste plastic containers and packaging — an amount greater than that sent for disposal.

Energy recycling in works  
**65%**

Byproduct recycling rate  
**99.8%**

Water recycling  
**93.2%**





# Reducing Environmental Loads in Business Activities at JFE Steel

## Air Quality Preservation

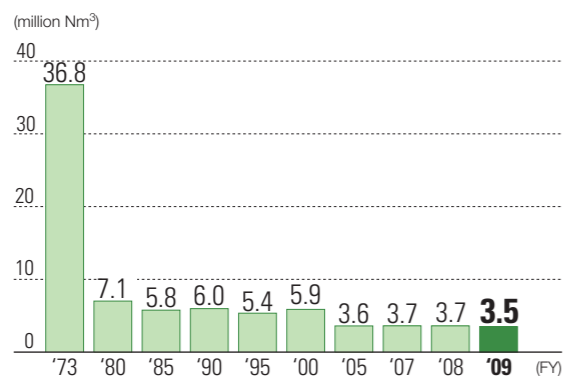
### Reducing Sulfur Oxide (SOx) and Nitrogen Oxide (NOx) Emissions

In an effort to control emissions of SOx and NOx, JFE Steel is actively pursuing the installation and usage of desulfurization equipment and denitrification equipment for major emissions sources.

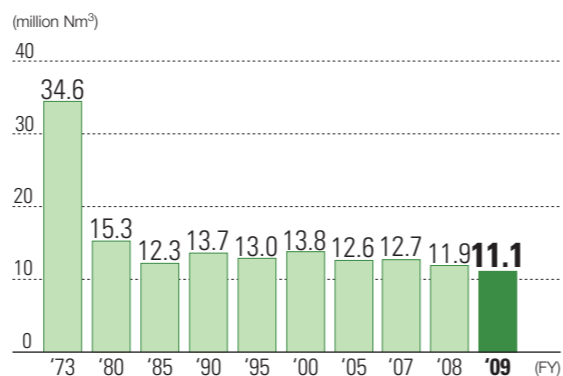


Exhaust gas treatment equipment for sintering machine: an example of the activated coke method at the West Japan Works (Fukuyama)

#### SOx Emissions

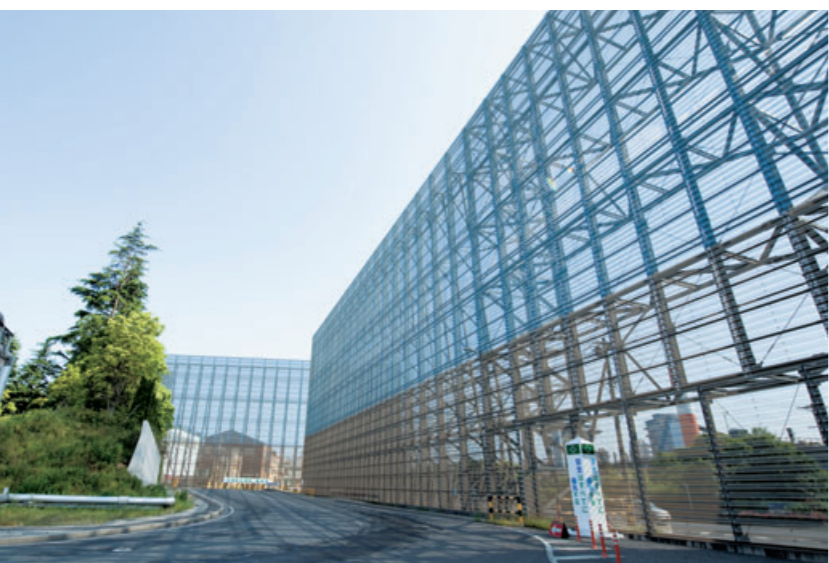


#### NOx Emissions



### Reducing Dust

Since dust is generated from various sources in the steel production process, JFE Steel has been promoting appropriate reduction measures by identifying individual sources and designing specific measures for each source.



Dust prevention fence at East Japan Works (Chiba)

## Water Quality Preservation

JFE Steel has been earnestly promoting circulation/recycling of industrial water consumed in the steel production process, with its industrial water circulation rate\* maintained at as high a level as about 93%. For release into public waters, wastewater is given appropriate purification treatment so that its pollution loads can be reduced.

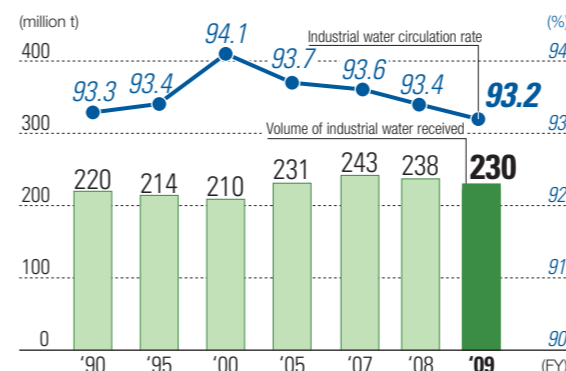
\* Industrial water circulation rate

Industrial water circulation rate = (Total consumption - Received industrial water) / Total consumption

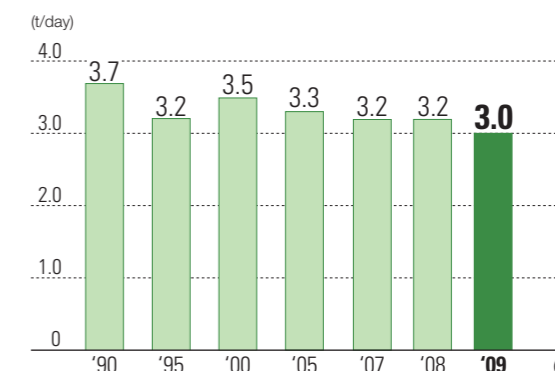


Wastewater treatment equipment: Example of denitrification equipment for wastewater at the East Japan Works (Chiba)

#### Received Industrial Water and Circulation Rate



#### COD (Chemical Oxygen Demand)



## Environmental Surveillance

To prevent environmental abnormalities, JFE Steel constantly monitors the load on air and on water quality through a combination of methods like periodic batch analyses, continuous analyses by an automatic analyzer, and ITV-based remote monitoring.



Exhaust gas sampling



Automatic wastewater analyzer: an example from East Japan Works (Chiba)



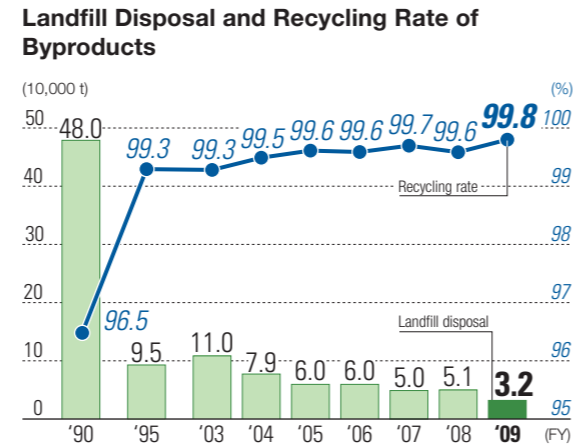
Remote surveillance of environmental data: an example from East Japan Works (Keihin)



### Effective Utilization of Byproducts

JFE Steel has been recycling byproducts (i.e., iron and steel slag\*1, dust, and sludge\*2) in the steel production process in the works as raw materials for steel manufacturing and has been promoting effective utilization of byproducts as resources. In FY2009, JFE Steel started up a dust recycling facility in the Fukuyama area as a further step to recycle site dust.

\*1 **Iron and steel slag:** Material consisting of non-iron rock components in iron ore and lime, etc. It separates from the molten metal. Slag is mainly used as material for cement.  
 \*2 **Sludge:** Mud-like substance remaining after wastewater treatment.



### Appropriate Processing of PCB Waste

We practice appropriate storage of PCB waste in accordance with the law as well as disposal of such waste based on the schedule directed by the Japan Environmental Safety Corporation (JESCO).

In addition, the group company, JFE Techno-Research, finished putting together a PCB analysis system in April 2010. This system employs a simplified method for measuring minute amounts

of PCB, which is based on a manual specified by the Ministry of the Environment. JFE Techno-Research offers JFE Group companies and outside entities services for accurately, economically, and rapidly testing for the presence of PCB in insulating oil used in electrical devices.

**JFE Techno-Research's simplified approach for measuring minute amounts of PCB**  
[www.jfe-tec.co.jp/envi-ene](http://www.jfe-tec.co.jp/envi-ene)



High resolution GCMS for measuring PCB



PCB extraction and isolation work



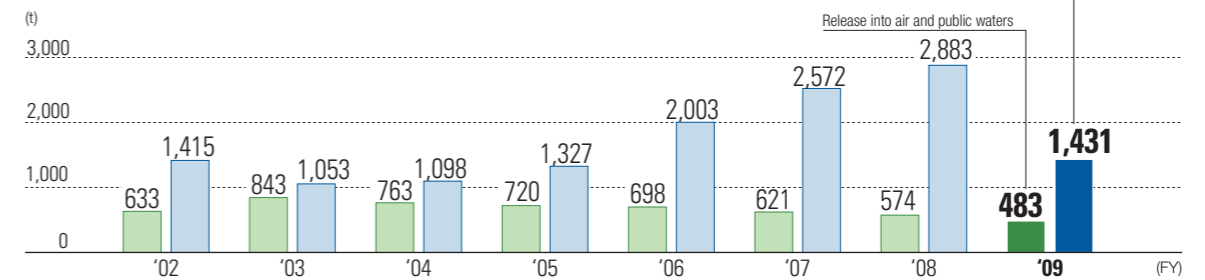
Example of a sample collection kit

### Control/Release Reduction of Chemical Substances

JFE Steel has been promoting voluntarily release reduction program, which gives the first priority to chemical substances having higher toxicity

and larger release amounts. Since FY2001, total release into air and public waters has been reduced continuously.

#### Release and Landfill Disposal of Chemical Substances



#### Substances Reported under PRTR (FY2009)

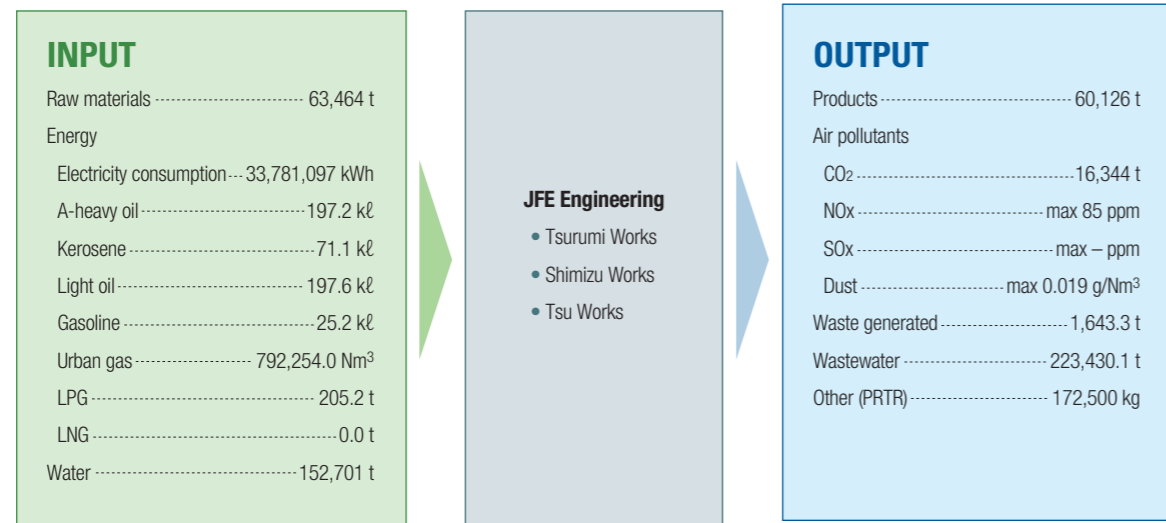
(Unit: tons/yr; dioxins: g-TEQ/yr)

No.	Substance	Release				Transfer	
		Air	Public waters	Soil on-site	Landfill on-site	Sewerage	Off-site
1	Zinc compounds (water-soluble)	0	5.4	0	0	0	0
16	2-aminoethanol	0.1	0.05	0	0	0	0
25	Antimony and its compounds	0	0.4	0	0	0	5.2
26	Asbestos	0	0	0	0	0	11
30	Bisphenol A type epoxy resin (liquid)	0	0	0	0	0	0
40	Ethylbenzene	26	0	0	0	0	4.9
43	Ethylene glycol	1.6	0.06	0	0	0	5.6
63	Xylene	166	0	0	0	0	8.5
68	Chromium and chromium (III) compounds	0.03	0.6	0	0	0	489
69	Chromium (VI) compounds	0	0.1	0	0	0	1.4
85	HCFC-22	0	0	0	0	0	2.2
100	Cobalt and its compounds	0	0.05	0	0	0	0.3
132	HCFC-141b	47	0	0	0	0	0
144	HCFC-225	12	0	0	0	0	0
145	Dichloromethane	26	0	0	0	0	0
177	Styrene	0.3	0	0	0	0	0
178	Selenium and its compounds	0	0.3	0	0	0	1.8
179	Dioxins	4.8	0.0002	0	0	0	0
198	Hexamethylenetetramine	0	0	0	0	0	0
200	Tetrachloroethylene	22	0	0	0	0	0
207	Copper salts (water-soluble)	0	0.04	0	0	0	0
224	1,3,5-Trimethylbenzene	3.9	0	0	0	0	0
227	Toluene	62	0	0	0	0	1.6
230	Lead and its compounds	0	0.01	0	0	0	52
231	Nickel	0	0	0	0	0	8.3
232	Nickel compounds	0.01	2.2	0	0	0	46
253	Hydrazine	0	0	0	0	0	0
283	Hydrogen fluoride and its water-soluble salts	0	21	0	0	0	15
299	Benzene	25	0	0	0	0	0
304	Boron and its compounds	0	31	0	0	0	2.2
309	Poly (oxyethylene) nonylphenyl ether	0	9.2	0	0	0	3.3
310	Formaldehyde	0	0	0	0	0	0
311	Manganese and its compounds	0.07	15	0	0	0	672
345	Mercaptoacetic acid	0.0001	0	0	0	0	0
346	Molybdenum and its compounds	0.001	5.6	0	0	0	101
<b>Total</b>		<b>392</b>	<b>91</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,431</b>
		<b>Total release 483</b>				<b>Total transfer 1,431</b>	



# Reducing Environmental Loads in Business Activities at JFE Engineering

## Material Balance for FY2009

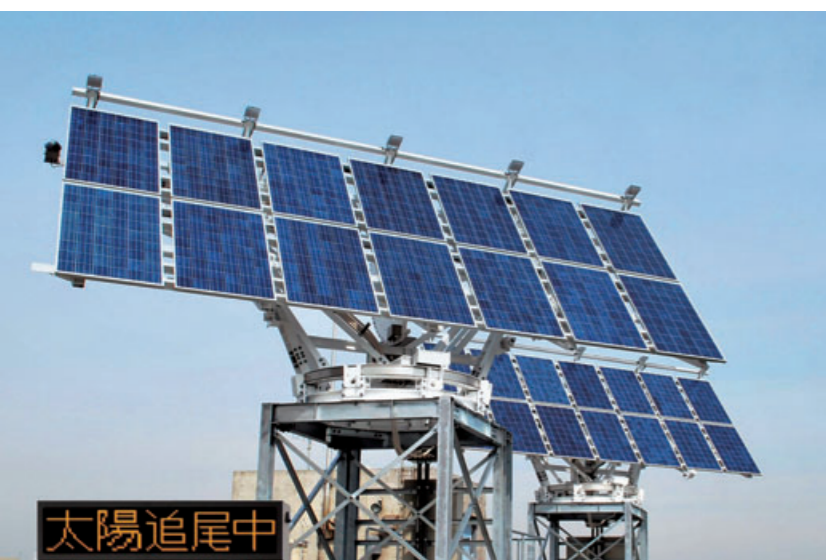


JFE Engineering has established environmental management systems in line with the function and activities of each production center and is promoting activities to reduce environmental loads.

## Global Warming Prevention

In 1997, the Japan Society of Industrial Machinery Manufacturers, of which JFE Engineering is a member, embarked on its voluntary action plan to cut CO<sub>2</sub> emissions by 12.2% relative to FY1997 level by the end of FY2010.

To help achieve that goal, JFE Engineering has begun using Clathrate Hydrate Slurry (CHS) Heat Storage Air Conditioning Systems, turning off lights during break times, and actively taking other steps to reduce its energy usage in its office divisions. In the spring of 2010, it installed a large 50kW solar power system and a 6kW solar-tracking power system at its Tsurumi Works. It is also working to reduce electric power consumption and use of cutting and welding gas, and to increase the efficiency of compressed air usage, in its production department. In FY2009, total office and plant CO<sub>2</sub> emissions of JFE Engineering were 16,300 tons, a figure 3% below that for the prior fiscal year and 13.3% below the level for FY1997 though it merged four of its group companies.



Solar-tracking power system installed at JFE Engineering's Tsurumi Works

## Recycling

JFE Engineering is actively working to recycle waste generated in its business activities.

To promote recycling in its offices, it is clarifying waste separation rules and implementing recycling patrols.

And at its construction and manufacturing sites, it is continuously promoting reduction and recycling of industrial waste by means of thorough separation and revising recycling approaches.

Meanwhile, JFE Engineering's planning and design divisions are incorporating recycled materials, using energy-efficient equipment, and

taking other such steps that are friendly to the environment.



Recycling patrols under way at the Tsurumi Works

### Reduction of Waste (FY2009)

Waste recycling in offices		
Recycling rate in offices	Target	Actual
Tsurumi Works (%)	97	98.7
Tsu Works (%)	82	85.8
Shimizu Works (%)	97.6	98.8

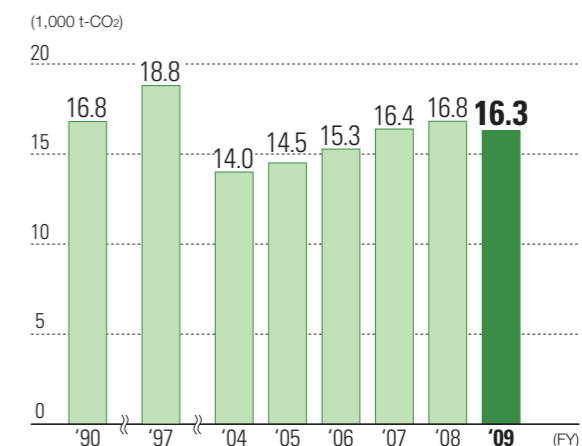
  

Waste recycling in the manufacturing sites		
Recycling rate in the manufacturing sites	Target	Actual
Tsurumi Works (%)	52	47.7
Tsu Works (%)	29	22.2
Shimizu Works (%)	16	16.7

Waste recycling at construction sites		
Recycling rate at construction sites	Target	Actual
Construction sites (%)	74	86.2

### CO<sub>2</sub> Emissions



## Control and Reduction of Chemical Substances

In compliance with the Pollutant Release and Transfer Register (PRTR) Law, JFE Engineering controls release and transfer volumes of the designated chemical substances and reports those figures to the national government through local governing bodies. The company has been promoting activities to reduce controlled substances, including paints, solvents, and gasoline.

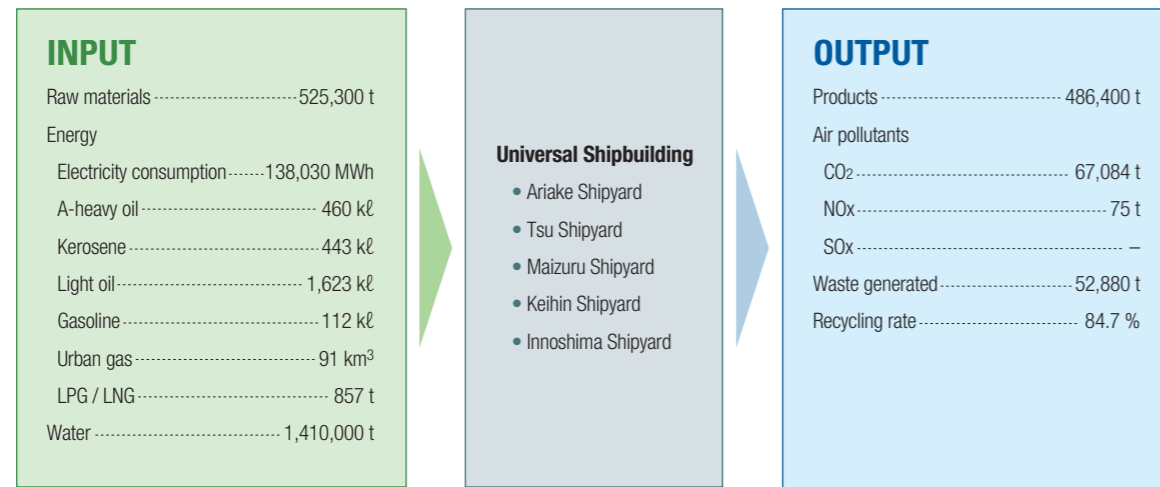
### Substances Reported under PRTR (FY2009) (kg)

No.	Substance	Release				Transfer	
		Air	Public waters	Soil on-site	Landfill on-site	Sewerage	Offsite
30	Bisphenol A type epoxy resin	0.0	0.0	0.0	0.0	0.0	12,787.0
40	Ethylbenzene	22,436.8	0.0	0.0	0.0	0.0	1,680.4
63	Xylene	55,904.0	0.0	0.0	0.0	0.0	4,800.9
177	Styrene	1,807.6	0.0	0.0	0.0	0.0	475.7
227	Toluene	36,486.9	0.0	0.0	0.0	0.0	7,386.4
230	Lead and its compounds	0.0	0.0	0.0	0.0	0.0	3,680.0
311	Manganese and its compounds	0.0	0.0	0.0	0.0	0.0	25,099.2
<b>Total</b>		<b>116,635.3</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>55,909.6</b>
							<b>172,544.9</b>



# Reducing Environmental Loads in Business Activities at Universal Shipbuilding

## Material Balance for FY2009



Universal Shipbuilding has built environmental management systems tailored to the functions and operations of individual shipyards in an effort to lower its environmental burden.

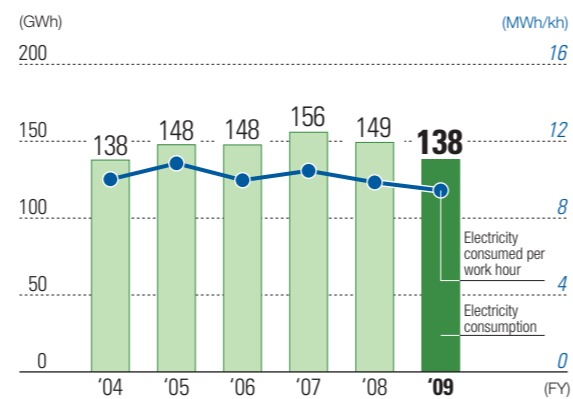
## Global Warming Prevention

A breakdown of Universal Shipbuilding's energy-origin CO<sub>2</sub> emissions shows that 86% are associated with electricity usage, 10% with petroleum usage, and 4% with gas usage. These figures remained unchanged over the past several years.

The company's most pressing concern is to lower its electricity consumption, the greatest source of its energy-origin CO<sub>2</sub> emissions. Toward that end, the production divisions are taking steps like turning off lights during lunch hours, reducing electricity consumed by welding equipment standing by for use, and replacing electrical equipment with energyconserving options. The office divisions are promoting such activities as turning off lights during lunch hours, turning off computers when not in use, and adjusting thermostats to use air conditioners and heaters less.

Total electricity consumption of production and office divisions for FY2009 came to 138,030 MWh, 11,207 MWh less than in the previous year. Electricity consumption per work hour (MWh/1,000 hours) also declined on a year-to-year basis. Simultaneously with efforts to reduce electricity consumption, the company is also proactively engaged in activities such as turning off the engines of shipyard vehicles and trucks when idling, shutting off gas mains at the completion of work, etc. in order to reduce wastage of petroleum and gas.

## Power Consumption



## Reducing Generation/Discharge of Waste

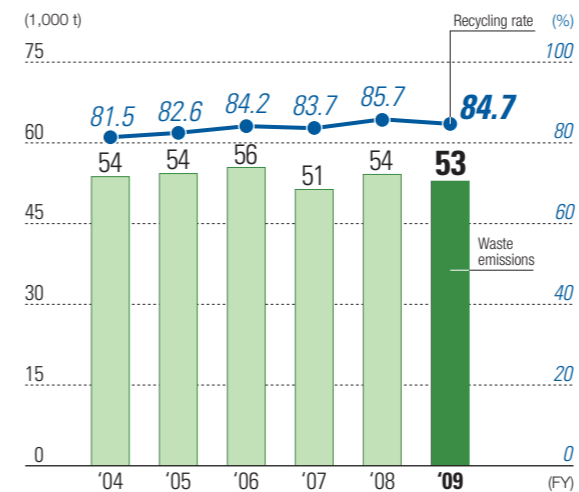
Universal Shipbuilding is working to reduce the generation and discharge of waste.

For this purpose, the production divisions are putting out more garbage receptacles for separated waste, conducting patrols, and taking other steps to help ensure that garbage is properly separated, reused, and recycled. The office divisions are reusing wastepaper and thoroughly separating garbage in a bid to dispose of less and recycle more.

As a result of such activities, production and office divisions cut their combined discharge of waste for FY2009 to 52,880 tons, a decrease of 1,141 tons compared to the prior fiscal year.

As for recycling, results were slightly disappointing as the recycling rate declined to 84.7%, from 85.7% in the previous fiscal year.

## Waste Disposal Volume



## Control and Reduction of Chemical Substances

In compliance with the Pollutant Release and Transfer Register (PRTR) Law, Universal Shipbuilding controls release and transfer volumes of the designated chemical substances and reports those figures to the national government through local governing bodies. The company has been promoting activities to reduce controlled substances, including paints, solvents, and gasoline. As a shipbuilder, Universal Shipbuilding pays particular attention to monitoring releases and transfers of three key substances, namely ethylbenzene, xylene, and toluene that are important for painting work.

## Conditions of Three Key Substances

Three key substances	Atmospheric releases		Transfers to off-site locations	
	FY2008	FY2009	FY2008	FY2009
Ethylbenzene	298	254	20	19
Xylene	968	723	70	54
Toluene	404	577	29	35
<b>Total</b>	<b>1,670</b>	<b>1,554</b>	<b>119</b>	<b>108</b>

## Zero Fuel Leak Campaign

Universal Shipbuilding considers fuel leaks to be a significant source of marine environmental pollution and conducts regular training to prevent accidents and minimize damage.

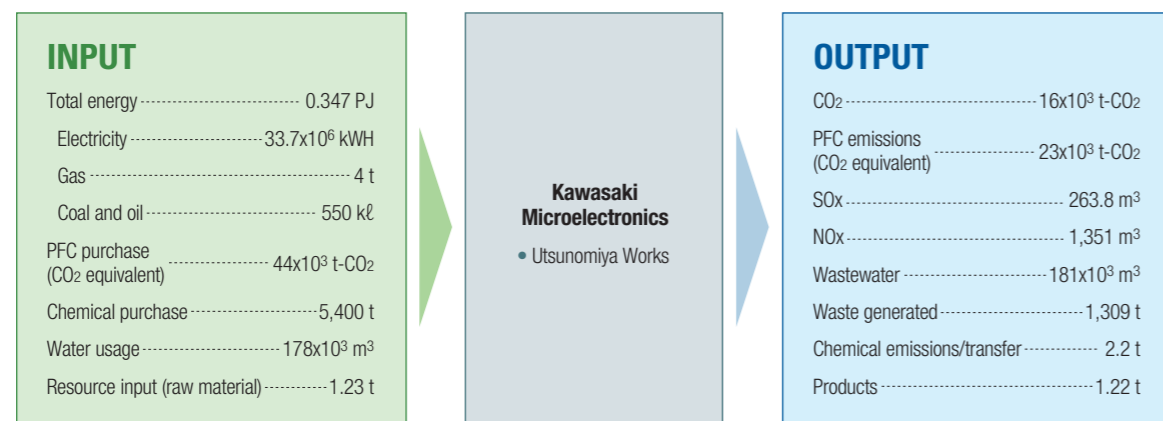


Training to respond to fuel leaks



# Reducing Environmental Loads in Business Activities at Kawasaki Microelectronics

Material Balance for FY2009



## Stopping Global Warming and Reducing Chemical Substance Emissions

During FY2009, production operations at the Utsunomiya Works were gradually shut down, lowering discharges of greenhouse gases and other environmentally-harmful substances at Kawasaki Microelectronics. That testing procedures, which consume large amounts of electricity, remained in operation until the beginning of calendar year 2010,

meant that CO<sub>2</sub> emissions related to energy consumption declined only slightly. Kawasaki Microelectronics ceased usage of three Freon-substitute PFC gases that have extremely potent greenhouse effects in October 2009, lowering emissions for FY2009 to a level 30% below that for FY1995. In the area of chemical substance management, Kawasaki Microelectronics, after discontinuation of the use of toluene, was using five PRTR substances. Usage of all five of these substances was halted in October 2009.

# Reducing Environmental Loads through Products and Technologies

Providing Society with Steel Products, Engineering Technologies, and Recycling Businesses, All of Which Contribute to Global Environmental Protection

R&D of Environmental Conservation Technology ..... 29

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Recycling Technology Supporting a Sustainable Society ..... 37



# Reducing Environmental Loads in Business Activities at JFE Urban Development

## Reducing CO<sub>2</sub> Emissions Related to Condominiums

The Real Estate Companies Association of Japan adopted its voluntary action plan for reducing CO<sub>2</sub> emissions related to new condominiums in February 2009. The aim of this plan is to reduce condominium life cycle CO<sub>2</sub> emissions—emissions related to everything from construction through demolition—to a level below that for general construction.

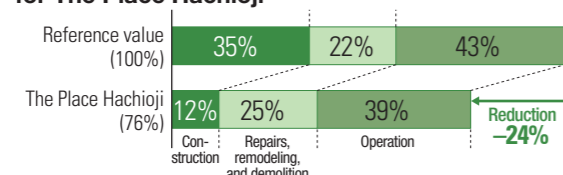
Condominiums sold by JFE Urban Development already boast environmental performance above

what is necessary to achieve the association's goal.

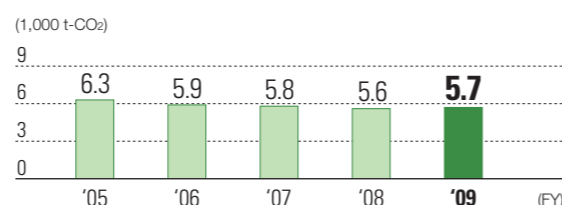
## Cutting Waste Generation and Energy Consumption at Facilities under Management

The waste generated by the THiNK (Techno Hub innovation Kawasaki) science park, the Globo shopping center, and other facilities managed by JFE Urban Development Group is all separated and measured. Steps are taken to reduce and recycle waste, as well as cut energy consumption.

Calculation example: Life Cycle CO<sub>2</sub> Comparison for The Place Hachioji



CO<sub>2</sub> Emissions at THiNK





**Jiro Hiramoto**  
Thin-Sheet Processing  
Technology Research  
Department  
JFE Steel Research  
Laboratory

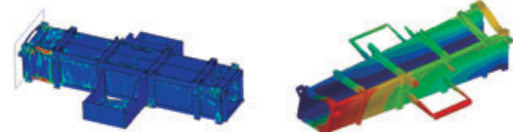
**Development of Technology for Making Lighter Automobiles:  
Lowering CO<sub>2</sub> Emissions with Lightweight, High-Tensile-Strength Steel Frames**

Efforts to reduce automobile CO<sub>2</sub> emissions by developing electric vehicles and using high-tensile-strength steel to make lighter car bodies are underway.

JFE Steel is using computer simulation to develop technology that uses high-tensile-strength steel for creating car bodies that weigh less. As part of that effort, we worked with Keio University's Electric Vehicle Laboratory (supervised by Prof. Hiroshi Shimizu of the University's Faculty of Environment and Information Studies) to develop and fabricate an automobile frame with built-in components\*. For use with an extremely compact electric vehicle, this frame is made out of lightweight, high-tensile-strength steel.

\* "Automobile frame with built-in components" means a frame complete with batteries, motors, tires, and other components necessary for mobility.

**Structural design applying computer analysis**



Rigidity analysis results

Impact analysis results



Extremely compact electric vehicle developed by Keio University



Automobile frame with built-in components for extremely compact electric vehicle



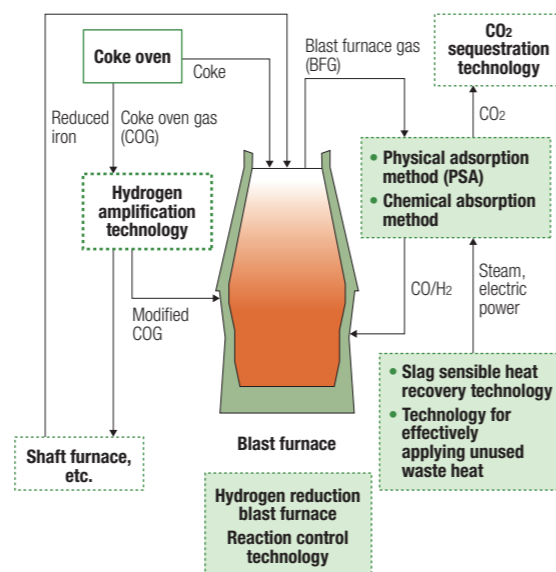
**Hitoshi Saima**  
Environmental Process  
Research Department  
JFE Steel Research  
Laboratory

**Development of Environmentally Friendly Steel Processing  
Technologies: Aiming to Cut CO<sub>2</sub> Emissions by 30%**

JFE Steel is a participant in the COURSE50 project launched by the New Energy and Industrial Technology Development Organization (NEDO). The COURSE50\* project aims to use modified coke oven gas (modified COG) to reduce iron ore and recover CO<sub>2</sub> from blast furnace gases, and cut CO<sub>2</sub> emissions by approximately 30% compared to the existing steelmaking process. JFE Steel's role in the COURSE50 project is to study the behavior of iron ore once modified COG has been introduced into the blast furnace and to develop a pressure swing adsorption method for recovering and separating CO<sub>2</sub> and fuel gases from blast furnace gases, ultimately reducing CO<sub>2</sub> emissions and putting the fuel gases to effective use. We are also developing technology for recovering heat from slag and using it to recycle the chemical absorption fluid used to recover and isolate CO<sub>2</sub>.

\* COURSE50 = CO<sub>2</sub> Ultimate Reduction in Steelmaking Process by Innovative Technology for Cool Earth 50.

**COURSE50 Overview**



**Shiro Watakabe**  
Ironmaking Research  
Department, JFE Steel  
Research Laboratory



**Hiroyuki Tobo**  
Slag and Refractory  
Research Department  
JFE Steel Research  
Laboratory

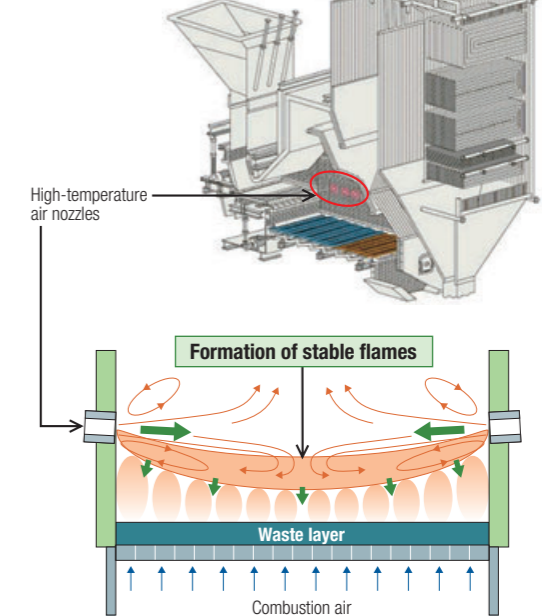
**Development of High-Efficiency Waste-to-Energy Technology:  
Helping to Reduce CO<sub>2</sub> Emissions**

Waste incineration facilities can generate electricity from the heat of waste incineration, to avoid using fossil fuels altogether.

JFE Engineering is a technology leader in the field of waste power generation. We are helping to reduce CO<sub>2</sub> emissions by using this technology to provide society with waste incinerators that can generate electricity very efficiently.

JFE Engineering worked to improve upon its own high-temperature air combustion technology, to both minimize air used for incineration and achieve stable combustion, and develop a technology that does not require catalytic denitration equipment, which consumes energy intensively. In return for our efforts, we succeeded to boost electricity generation efficiency by 17% compared to existing technology while keeping the NO<sub>x</sub> concentration in waste gas below 50ppm.

**Stoker-Type Waste Incinerator**



Combustion based on the use of high-temperature air combustion technology (Conceptual image)

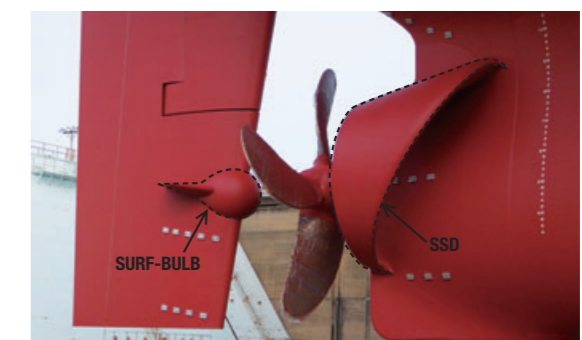


**Tsuyoshi Nakayama**  
Environmental  
Technology Research  
Department  
Engineering Research  
Center  
JFE Engineering

**Energy-Saving Devices for Ships**

Universal Shipbuilding equips nearly all of the ships it builds with energy-saving devices SSD (Super Stream Duct) and SURF-BULB (Swept-back Up-thrusting Rudder Fin with BULB) to reduce greenhouse gas emissions and improve operation economy. SSDs are installed in front of screws to recover the energy from vortices created when ships move forward and use that energy as thrust. SSDs also create a more organized flow of water into screws to take greater advantage of the work performed by the screw. SURF-BULBs are installed on rudders to reduce resistance.

Measurements have shown that installation of both devices improves propulsion efficiency by 6-13%. For a more concrete illustration, a 10% propulsion efficiency improvement for a VLCC (Very Large Crude Oil Carrier) at sea 200 days a year would reduce CO<sub>2</sub> emissions by approximately 6,000 tons.



SSD and SURF-BULB, energy-saving devices, installed on a ship



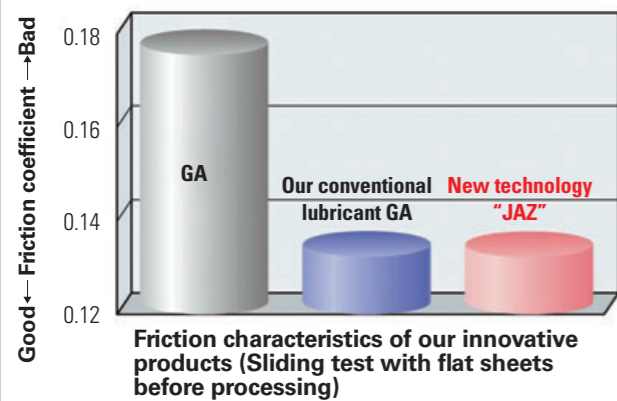
**Seiji Masuda**  
Hydrodynamics  
Engineering Lab  
Technical Research  
Center  
Universal Shipbuilding



# JFE's Technologies Contribute to Global Environmental Protection



Side panel made with JAZ steel sheet



## Achieved the World's Highest Level of Energy Conversion Efficiency

### Silicon Wafer for Solar Batteries

#### POINT

- A material used for solar batteries, critical for fighting against global warming
- Total volume shipped would generate as much electricity as one nuclear plant

JFE Steel, using electron-beam smelting, high temperature plasma melting\*1, and other sophisticated metallurgical technologies, has created the world's most advanced solar grade (SOG) silicon\*2. It has also used this SOG silicon to manufacture multicrystalline silicon ingots and processed them into wafers. These wafers are used in solar cells that, at around 17%, have achieved an energy conversion ratio among the world's highest. The volume of wafers shipped since 2001 is enough to generate 750,000kW of electricity, an amount equal to the output of one nuclear power plant.

## Protecting the Environment with Heavy Metal-Free Products

### Highly-lubricated automotive galvanized (GA) steel sheets "JAZ" (JFE Advanced Zinc)

Named a winner of a Fiscal 2009 Okochi Memorial Production Prize

#### POINT

- Offer excellent press formability
- Use no substances that would hurt the environment

JFE Steel's highly-lubricated\*1 automotive galvanized (GA) steel sheets\*2 "JAZ" (JFE Advanced Zinc), improved press formability through the formation of a layer of nano-scale thickness on the surface of each galvanized steel sheet. This product is ideal for stamping the exposed panels such as side panels, fenders, doors, wheel housings, and unexposed panels that are normally difficult at press-forming.

In addition, this new product is easy on the environment as it includes none of the environmentally harmful substances found in previous galvanized steel sheets offering exceptional lubrication properties.

\*1 "Excellent lubrication properties" mean there is good frictional behavior between the die and the material to be formed, making for excellent formability.  
 \*2 Galvanized steel sheet is a corrosion-resistant steel sheet product that is made by reheating steel sheet plated with molten zinc and then adding a layer of zinc to the steel sheet.

[www.jfe-steel.co.jp/products/car/products/surface/jaz](http://www.jfe-steel.co.jp/products/car/products/surface/jaz)



Example of a solar panel installation (Ina No. 2 Plant of Nihon PISCO Co. Ltd.)

\*1 "High temperature plasma melting" refers to the use of plasma to melt metal within a vacuum.  
 \*2 Solar grade (SOG) silicon is silicon for use in solar cells. The purity of this silicon is lower than that used in semiconductors.

[www.jfe-densei.co.jp/products/solar\\_photovoltaics](http://www.jfe-densei.co.jp/products/solar_photovoltaics)



Pipeline being laid

## Contributing to the Low-Environmental-Burden Transportation of Natural Gas

### HIPER® Steel Pipe for pipeline

Named a winner of the Fiscal 2007 Iwatani Naoji Memorial Prize

JFE Steel's HIPER® is a UOE steel pipe\* product that resists wrinkling when subjected to high levels of axial and bending force. HIPER is used to build pipelines for transporting natural gas over long distances.

\* UOE steel pipe is made by expanding from the inside steel pipe that has been formed into "U" and "O" configurations with U and O steel pipe presses.

[www.jfe-steel.co.jp/products/koukan](http://www.jfe-steel.co.jp/products/koukan)

## Helping to Lower Environmental Burden by reducing weight

### HBL®385 Structural Steel

Named a winner of the Contribution Prize of the Fiscal 2010 Ichimura Industrial Awards

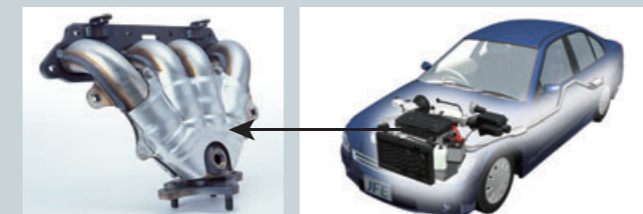
HBL®385 structural steel applies JFE Steel's own accelerated cooling system\*. Exceptionally high strength makes it possible to use less steel. HBL®385 is high-tensile strength, high earthquake-resistant steel suited for use in mid-to-high rise buildings.

\* The accelerated cooling system rapidly cools rolled steel plates with continuous water quenching.



Welded box column made with HBL385

[www.jfe-steel.co.jp/products/building/items/hbl385/index01.html](http://www.jfe-steel.co.jp/products/building/items/hbl385/index01.html)



An automobile exhaust manifold

[www.jfe-steel.co.jp/products/stainless/02prototype.htm](http://www.jfe-steel.co.jp/products/stainless/02prototype.htm)

## Conserving Resources Without Using Rare Metals

### JFE-TF1, Highly Heat-Resistant Stainless Steel Sheet

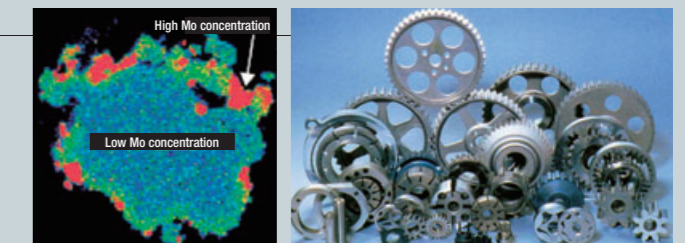
JFE Steel's "JFE-TF1", highly heat-resistant stainless steel, helps resource conservation without using molybdenum, a rare metal. JFE-TF1 is suitable perfect for components such as automobile exhaust manifolds, which could be exposed to extremely hot high temperatures. With JFE-TF1, such components can be made 20% thinner and lighter than is possible with conventional steel materials.

## Helping to Protect Resources by Not Using Rare Metals

### High-Strength Hybrid Mo Alloy Powder

Named a winner of the Fiscal 2008 Japan Society of Powder and Powder Metallurgy's Technology Advancement Award

JFE Steel manufactures high-strength hybrid Mo (molybdenum) alloy powder\*. That it does not use the rare metal, nickel, as is commonly done, helps to protect precious resources. JFE Steel's high-strength hybrid Mo alloy powder is used to manufacture sintered automobile components, one of the characteristics of which is high strength.



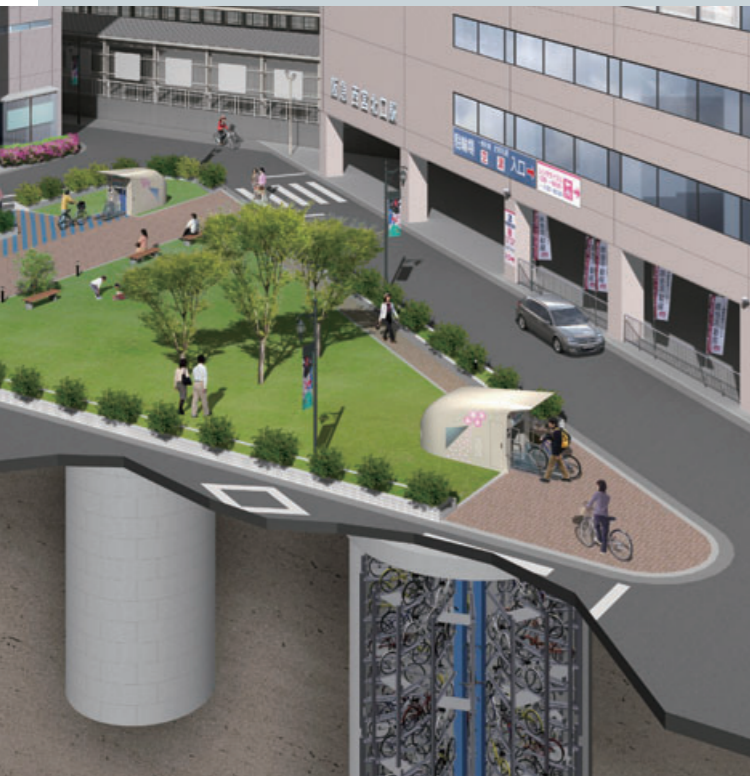
Mo distribution within a cross-section of hybrid Mo alloy powder

Sintered products

\* Alloy powder is a steel alloy powder (includes elements other than iron).

[www.jfe-steel.co.jp/products/tetpun/youto.html](http://www.jfe-steel.co.jp/products/tetpun/youto.html)

JFE's Technologies Contribute to Global Environmental Protection



Rendering of a multi-level mechanical bicycle parking system under construction in front of Hankyu Nishinomiya Kitaguchi Station in Nishinomiya City, Hyogo

Infrastructure for a Low-Carbon Society

**CYCLE TREE (Multi-level mechanical bicycle parking system)**

Named a winner of the Fiscal 2007 Japan Society of Mechanical Engineers Excellent Product Award

**POINT**

- Efficiently stores bicycles in a limited amount of space
- Advances the realization of a low-carbon society by promoting the usage of bicycles

The CYCLE TREE is a mechanical bicycle parking system that makes it possible to compactly park bicycles even in small areas such as the spaces in front of train stations, where spaces are limited due to the concentration of buildings and other structures. The abandonment of large numbers of bicycles near train stations has become a significant problem in many urban areas, and the CYCLE TREE offers a solution. By using effectively the limited space around train stations, the cutting-edge technology promotes cycling-oriented lifestyles.

[www.jfe-eng.co.jp/product/machinery/machinery5421.html](http://www.jfe-eng.co.jp/product/machinery/machinery5421.html)

Sufficient Energy-Saving and CO<sub>2</sub> Emission Reductions

**Clathrate Hydrate Slurry (CHS) Heat Storage Air Conditioning System**

Named a winner of the Prime Minister's Award at the 36th Japan Industrial Technology Awards (FY2005)

**POINT**

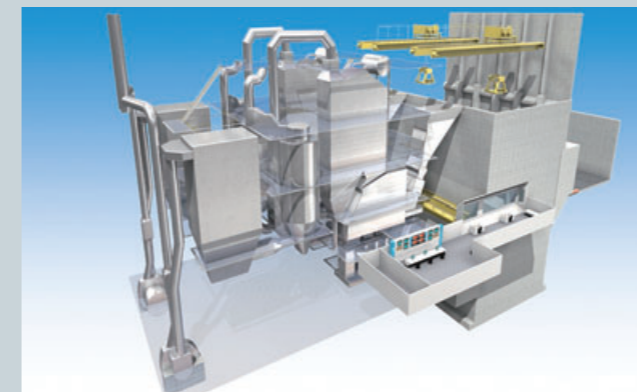
- Uses a fluid with cold storage capacity twice as that of water to realize energy savings and reduced CO<sub>2</sub> emissions
- Suited for use in underground shopping malls, commercial buildings, and a wide variety of other facilities
- Reduces CO<sub>2</sub> emissions from air conditioning by 40% (Azalea underground shopping mall in Kawasaki)

[www.jfe-eng.co.jp/product/environment\\_energy/environment\\_energy1211.html](http://www.jfe-eng.co.jp/product/environment_energy/environment_energy1211.html)



Azalea underground shopping mall in Kawasaki City, Kanagawa

The CHS air conditioning system uses a hydrate slurry that can store over twice the amount of cold energy as water used in conventional air conditioning systems. Having first been introduced in office buildings in FY2005, this system is now being used in underground shopping malls, large commercial buildings, factories, and a wide variety of other facilities.



Hyper Z Series Stoker-Type Waste Incineration Plant

State-Of-The-Art Waste Disposal Facilities

**Hyper Z Series**

The Hyper Z series is a line of state-of-the-art waste incineration facilities that lower environmental burden during construction, greatly reduce gas emissions, NO<sub>x</sub> concentrations, and other forms of environmental burden related to operation, and maximize electric power generation efficiency, all relative to traditional waste incineration facilities.

[www.jfe-eng.co.jp/product/environment/environment2111.html](http://www.jfe-eng.co.jp/product/environment/environment2111.html)

Helping to Cut CO<sub>2</sub> Emissions

**Biomass Boiler System**

This system uses a circulating fluidized bed boiler in which air is injected to increase combustion efficiency. This system efficiently converts carbon-neutral biomass fuel into electricity and thermal energy.

[www.jfe-eng.co.jp/product/environment\\_energy/environment\\_energy1111.html](http://www.jfe-eng.co.jp/product/environment_energy/environment_energy1111.html)



Kishu Paper (Kihochō, Mie)

From Sewage to Energy

**Sewerage Sludge Digestive Gas Power Generation**

The high-efficiency engine of this system converts digestive gases, generated from sludge digestion tanks at sewerage treatment plants, into electricity and thermal energy.

[www.jfe-eng.co.jp/product/environment/environment2246.html](http://www.jfe-eng.co.jp/product/environment/environment2246.html)



North Sludge Recycling Center (City of Yokohama, Kanagawa)

Using the Earth's Energy

**Geothermal Power Facilities**

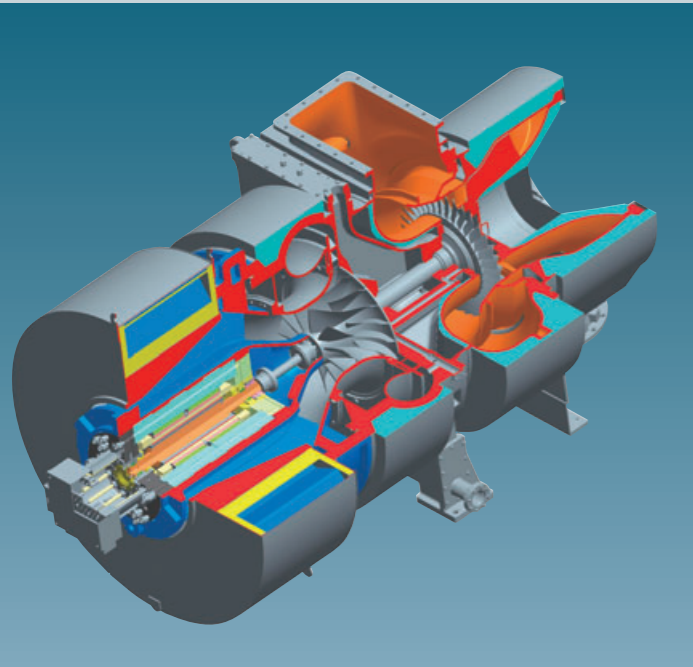
Geothermal power, which is created using high-temperature steam from below ground, is characterized by lower CO<sub>2</sub> emissions than those associated with thermal power, wind power, and solar power. JFE Engineering has supplied the power-generating facilities for 9 of the 18 geothermal power plants in Japan and 2 overseas.

[www.jfe-eng.co.jp/product/environment\\_energy/environment\\_energy1322.html](http://www.jfe-eng.co.jp/product/environment_energy/environment_energy1322.html)



Yamakawa Geothermal Power Station (Ibusuki City, Kagoshima)

JFE's Technologies Contribute to Global Environmental Protection



Cross-section of a hybrid supercharger (Source: Mitsubishi Heavy Industries)

Reducing Fuel Costs for Ships

Hybrid Supercharger Power Supply System

POINT

- Can generate electricity while ships are underway and reduces fuel usage
- Can also be installed on small ships

Hybrid turbocharger is a turbocharger with a small, high-speed generator and is installed on marine diesel engines. Universal Shipbuilding, working with another company, developed the power supply system used on these turbochargers. Use of this power supply system while a ship is underway enables the production of electric power even without running the ship's diesel generator, and, therefore, reduces fuel usage and cost.

In addition, compared to turbo compound systems, which recovers the waste heat energy through an exhaust gas boiler to drive a steam turbine and/or partially recovers exhaust gas energy and feed it to a turbine as driving force of an electric generator, a hybrid turbocharger requires less space and, therefore, can be installed even on small ships, where it has so far been difficult to use generating systems that take advantage of engine exhaust.

Performance verification on board of this system is being subsidized by the Ministry of Land, Infrastructure, Transport and Tourism and has won the support of the Nippon Kaiji Kyokai. It will be installed on bulk carriers scheduled for launch in 2011 and will be subjected to energy-efficiency tests.

\* Tupercharger  
Device that feeds compressed air into an engine.

Voyage Support System

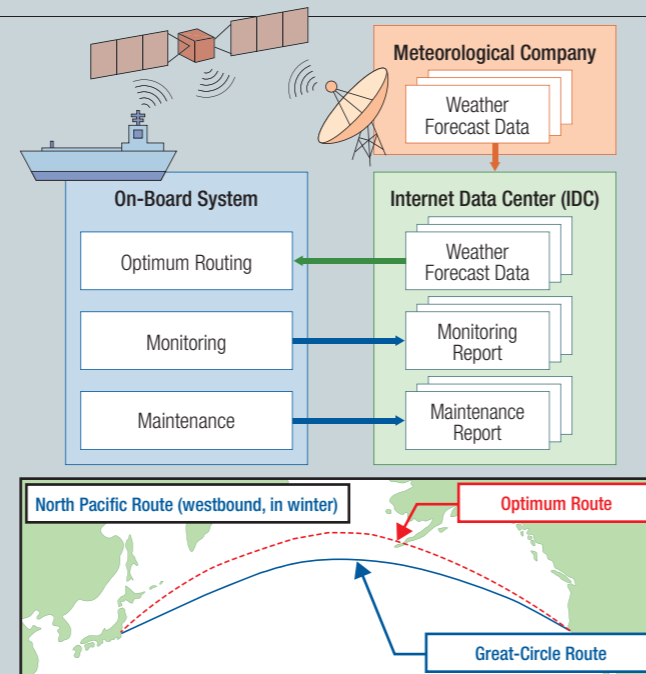
“Sea-Navi®”

POINT

- Optimizes ship navigation to reduce fuel consumption
- Recommends optimum routes based on the weather
- Two-year test under actual operating conditions in progress

Optimizing shipping routes can effectively reduce the fuel consumption, as well as by improving vessel shapes and propulsion performance. Sea-Navi®, a voyage support system that takes its name from a car navigation system, is designed for this purpose. Before leaving port, the system provides the best routing plan considering fuel consumption, punctuality, and safety. While the vessel is underway, the system can adjust the plan depending on the conditions which are always changeable, as well as displaying the results of fatigue life evaluation of the hull structure and a recommended maintenance plan.

[www.u-zosen.co.jp/giken/review02.html](http://www.u-zosen.co.jp/giken/review02.html)



Promoting the Use of Renewable Energy

Solar Power System Integration

POINT

- Optimizes power generation through everything from architectural design to construction and electrical work
- Outstanding technical capabilities validated by the receipt of a New Energy Award

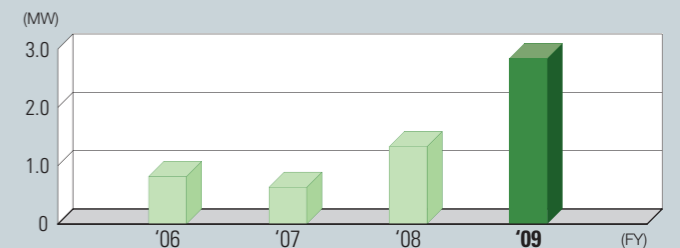
Since entering the business of installing solar power systems in 1999, JFE Electrical & Control Systems has been involved in promoting the use of solar power in public and industrial settings and to date has installed systems that could generate a cumulative 8.5MW of electricity. Furthermore, mastering the capabilities of the JFE Group, JFE Electrical & Control Systems has lead the industry in the development of everything from technologies for connecting energy-efficient digital inverters and lithium-ion batteries to electric power facilities, to module installation hardware and high-durability frames.

Applying its comprehensive technical capabilities, JFE Electrical & Control Systems develops recommendations for installing solar power systems in areas where they have not previously been used and performs the gamut of construction, electrical, and maintenance work to optimize system performance. It is also helping to lower society's environmental burden through its involvement in the field of mega solar power systems.



Solar power system installed on a holding pond in Kameyama City, Mie Prefecture

Solar Power System Installation



[www.jfe-densei.co.jp/business/env-energy/solar-cell](http://www.jfe-densei.co.jp/business/env-energy/solar-cell)

Helping to Build a Low-Carbon Society

Biogas Tank

POINT

- Development of various applications for core technology in high-pressure gas tanks
- Development and successful testing of a biogas transport vehicle



Lightweight trailer capable of transporting large volumes of biogas



Lightweight carbon tanks holding up to 540m3 of biogas

[www.jfecon.jp/data/press](http://www.jfecon.jp/data/press)

JFE Container, having received a commission from the Kyushu Bureau of Economy, Trade and Industry to identify technical leads for the development of a low-carbon society and develop related model systems, developed both a lightweight carbon tank (150L, 20MPa (30m<sup>3</sup> at 1 atmosphere)) and a biogas transport vehicle that can carry 18 of these tanks. This vehicle was successfully used to transport gas on a test basis in Yamaga City, Kumamoto Prefecture.

JFE Container is helping to build a low-carbon society through the varied application of its core technology in high-pressure gas tanks.

# Recycling Technology Supporting a Sustainable Society

Amount of fluorescent tubes processed in FY2009 (total tube length is calculated in terms of straight 40W tubes)

20 million tubes

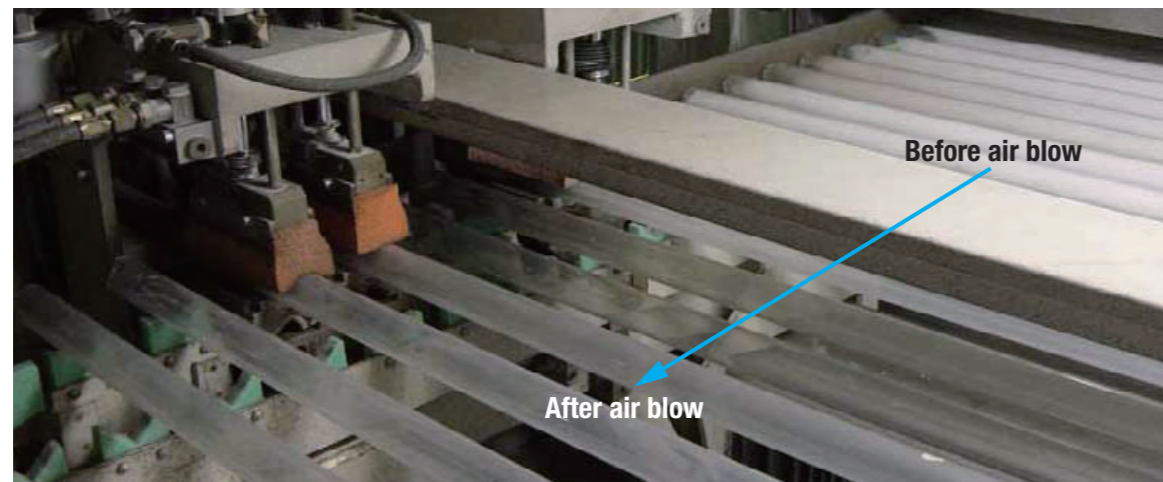
## Recycling Fluorescent Tubes

JFE is moving forward with the recycling of fluorescent bulbs and tubes at three recycling plants located in the cities of Yokohama, Sendai, and Fukuyama. Fluorescent bulbs and tubes have tiny amounts of mercury in them for light emission, which we safely remove, and recover along with glass, metal caps, and other parts. Recycling is performed for not only cylindrical fluorescent tubes but also for circular tubes, and other types of fluorescent lamps such as mini tubes used as backlights for liquid-crystal displays—production of which has skyrocketed in recent years.

Fluorescent bulbs and tubes are carefully packed into special-purpose cargo boxes and cardboard containers and transported to the processing plant with attention paid to every detail. Once at the plant, bulbs and tubes are sorted by size and shape and fed into the processing equipment. The fully automated

processing equipment then cuts off the metal caps, recovers the fluorescent powder from inside the bulbs and tubes, recovers 99.9% pure mercury from the recovered fluorescent powder, and pulverizes and washes the glass. To prevent mercury vapor and fluorescent powder from escaping to the outside environment, inside of the processing equipment is kept at negative pressure relative to the external environment.

All materials are recycled. Metal caps, crushed glass, and other materials are automatically separated and recycled into raw material for new products of glass, metal, and plastics. Fluorescent powder from which mercury has been removed is processed into ground cover materials, etc. and the mercury itself is transported to a special plant in Germany where it is refined for use in inorganic chemicals, and other products.



Blowing air into a fluorescent bulb to recover fluorescent powder



Glass recovered from fluorescent bulbs and tubes



Metal recovered from fluorescent bulbs and tubes

## RECO Board

JFE recycles waste plastic containers and packaging as RECO Board (NF Board®, KG Panel) products.

### NF Board® Concrete Forming Mold

Since they came into production in 2002, 2.2 million NF Boards® (12mm thickness) have been used instead of wooden molds on construction sites. NF Boards® are much more durable than conventional wooden molds and can be used approximately 20 times. They reduce CO<sub>2</sub> emissions (about 45% lower than the conventional wooden molds), and were selected in 2009 as a Low CO<sub>2</sub> Kawasaki Pilot Brand. In addition, by reducing the need to harvest trees, they also help to protect tropical rain forests.

### Thin, Lightweight KG Panels

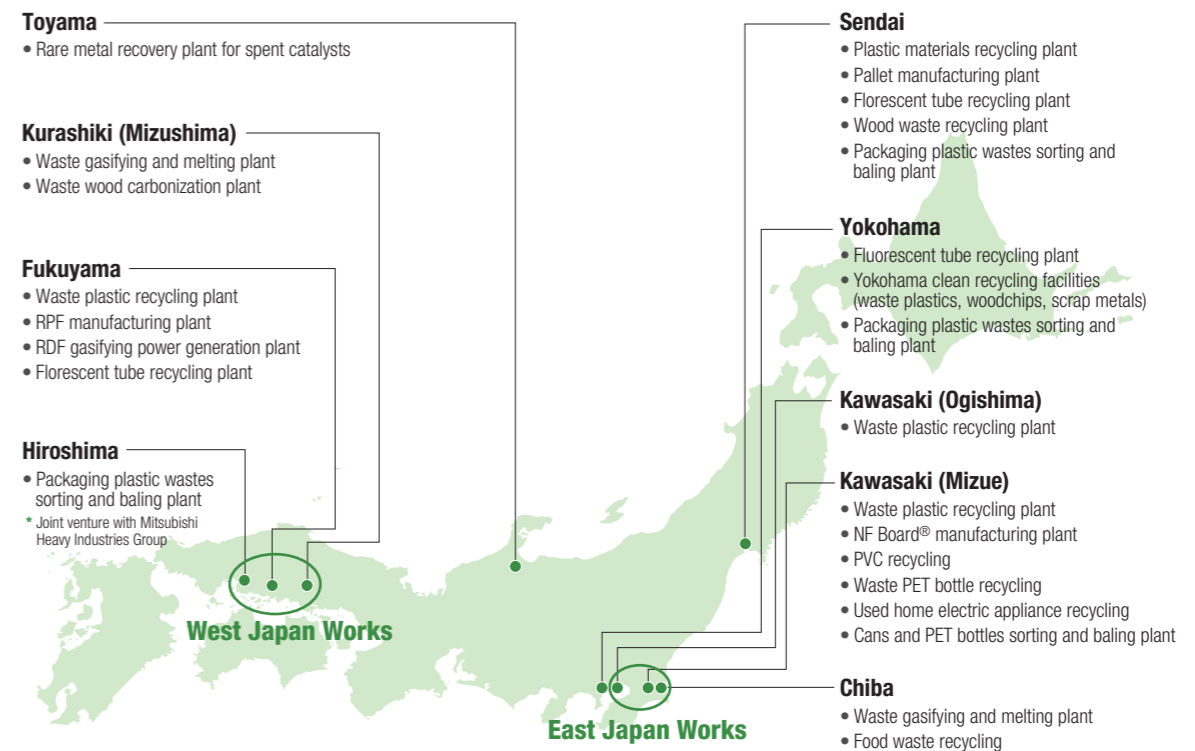
5.5mm KG Panels were introduced in 2008 and even thinner 4mm KG Panels, in 2010. KG Panels are presently being used, for example, to display election posters. New applications, including as cargo space liners for freight trucks, are under considerations.



## Recycling Different Used Products

JFE is also involved in recycling various waste materials.

### JFE Group's Recycling Businesses



Amount of discarded home electronic appliances processed in FY2009

1.08 million products

Amount of container and packaging plastic (other plastics) successfully bid on in FY2010

100 thousand tons



Reef restoration test in Indonesia (Photo provided by Professor Okamoto, the Tokyo University of Marine Science and Technology)

### Restoring Marine Environments with a Steel Byproduct

JFE is developing and expanding the use of steel manufacturing byproducts, taking advantage of their unique function in restoring coastal ecosystems, in order to protect marine environments.

### Demonstrating the Restoration of Coral with Artificial Reefs and Implantation Devices

JFE Steel is working to develop technologies for restoring coral reefs that are declining throughout the world due to problems like bleaching.

Marine Blocks®, developed by JFE Steel, are made of calcium carbonate, which results from a reaction between CO<sub>2</sub> and the calcium portion of steel slag, and are used to make artificial reefs. Calcium carbonate is the primary material from which reefs are formed, and the tiny irregularities on the surfaces of objects made of this substance make it easy for coral to take hold and grow. In developing technologies for protecting and promoting the growth of coral larvae, JFE Steel has also used steel slag to make implantation devices with the hard surfaces coral larvae attach themselves to.

Marine Blocks® and implantation devices were used in a test at a coral reef near the Japanese island of Miyakojima. In this test, coral at the larval stage matured to spawning size, confirming that these products can be used to support a complete coral reproduction cycle.

The Tokyo University of Marine Science and Technology has begun a coral restoration project using Marine Blocks® in Indonesia.



Fish together with coral growing on a Marine Block®

Coral growing on a Marine Block®



Maturation from larvae up to the maximum diameter of 35cm (Upper right)

### Using Seaweed Beds to Help Create Thriving Marine Environments and a Low-Carbon Society

Seaweed serves as an important habitat as well as spawning area for sea life and plays a big part in absorbing CO<sub>2</sub> and emitting oxygen.

JFE Steel has proposed a project that would use Marine Blocks®, which are conducive to the growth of seaweed, to cultivate seaweed beds.

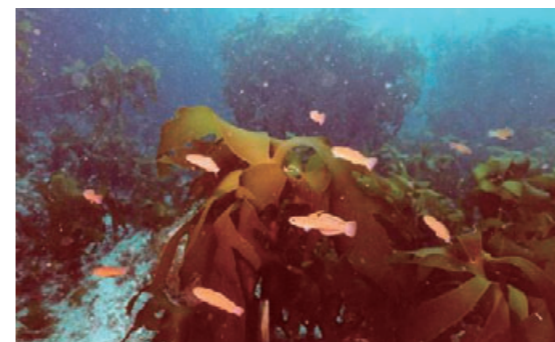
JFE Steel is working to develop technologies that will help to improve the fundamental marine productivity and bring about a low-carbon society by restoring lost seaweed beds to create thriving marine environments.



Seaweed *Ecklonia Cava* growing on a Marine Block®



Seaweed *Ecklonia Cava* used as an experimental control



Fish together with seaweed *Ecklonia Cava* thriving on a Marine Block®

### Employee Voice

I want to help protect the global environment by informing people about Marine Blocks® and other marine environment restoration technologies made of steel byproducts.



Kumi Oyamada (Right) Slag Business Planning & Control Department

### Ballast Water Management System Helping to Maintain Marine Ecosystems

Ships with no cargo carry ballast water (seawater) to maintain their balance. When they enter a port and take on cargo, they release the ballast water, which includes plankton and other organisms the ship took in at the port of unloading. Therefore, such releases impact marine ecosystems around the port of loading, and have become an international problem.

JFE Engineering has developed the JFE Ballast Ace, a compact, high-performance onboard ballast water management system applying the water treatment, mechanical, and shipbuilding technologies of the JFE Group. In March 2010, this system received the IMO's (International Maritime Organization) final approval for operation at 1,000m<sup>3</sup>/h, the world's highest processing volume.

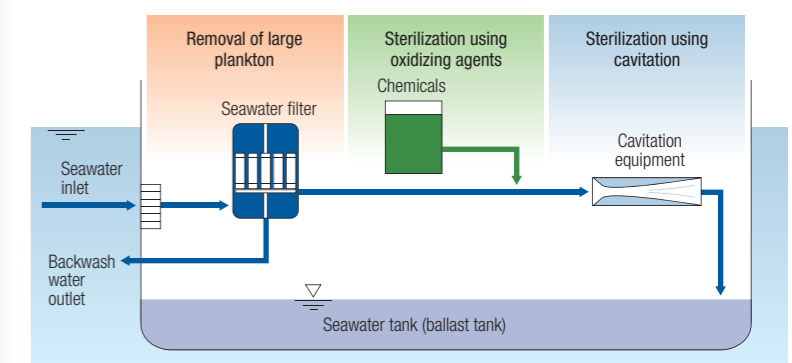
Moving ahead, JFE engineering is planning to introduce a model with a processing volume of 3,500m<sup>3</sup>/h and looking forward to helping to preserve marine ecosystems through sales of JFE Ballast Ace products.



The SAGA PIONEER (NYK Line) on which the JFE Ballast Ace system was tested

### Ballast Water Processing System

Pumping ballast water into the ballast tanks (when unloading at ports)



# JFE Group Social and Environmental Efforts



**Yoshinao Kozuma**

Professor, Faculty of Economics,  
Sophia University

## 1. Climate Change and Business Strategies

This business report definitively sets out the change in JFE Group's policy of tackling climate change. Although previous reports explained the environmentally friendly versions of its "Only One" and "Number One" technologies and products, it now shows us its intention to make these competencies more strategic, considering the trends of tightening environmental regulations in developed countries, and also the emerging markets that are being created by such developments. As a result the report explicitly details JFE's perspective on business opportunities related to climate-change issues. It seems that there has been a clear shift from treating climate change as a risk factor to incorporating it as a basic aim of business strategy, which represents a true integration of CSR into the JFE Group's core business.

Regarding JFE Engineering's initiatives in fiscal 2010, for example, the report says: "Countries are beginning to take serious action in response to global environmental problems. Seizing on this development as a prime opportunity for taking a great leap, we are actively developing our businesses, mainly in the areas of the environment and energy." JFE Steel actively discloses information about business related to Ferro-Coke, a technology with high potential for saving energy and resources, which four blast furnace companies are jointly promoting with aid from NEDO. It also discloses information about products for electric vehicles that are compliant with automotive CO<sub>2</sub> emissions regulations in the European Union.

In addition, in line with the trend in recent years to assign corporate responsibility to greenhouse gases as defined by Scope 3 emissions, the report provides quantitative information about the CO<sub>2</sub> emissions cuts when customers use JFE products.

The JFE Group also appears to be making progress in energy efficiency and CO<sub>2</sub> emissions reduction in the phase of production. JFE Steel has reduced its energy consumption 12% since 1990 and has slashed unit-

energy consumption 20%, resulting in a 13% reduction in CO<sub>2</sub> emissions from 1990 levels and a 21% decrease in unit emissions. I look forward to seeing the JFE Group further link its business strategies to CSR management through its production technologies, which are some of the most energy efficient in the world.

## 2. Start of Social Reporting

The biggest change this year is the preparation and presentation of a social report that can be accessed via the Internet. The JFE Group has now started to include this document in the detailed version of its business report, which had consisted of only financial reporting and environmental reporting until this year. The result is an integrated annual report with full corporate responsibility reporting.

Nevertheless, there is still plenty of room for improving social reporting compared with environmental reporting. As an international business enterprise, much more material information about its workforce breakdown in terms of region and gender, as well as turnover rates, for example, should be provided. To improve social reporting, the JFE Group should identify material information to the extent necessary to meet social expectations, and disclose information in a way that is as quantitative as possible. Considering that the business report is a primary source of information on the company, it also should disclose the rate of hiring persons with disabilities and annual changes in the number of employees taking childcare and nursing leave, which are becoming increasingly common practices in corporate responsibility reporting in Japan.

## 3. Adherence to the Antitrust Act

The JFE Group has reported some cases of antitrust violations almost every year. Following the implementation of six preventative measures in fiscal 2006 and then eight in fiscal 2007, the report noted that in fiscal 2009 the company introduced an additional four measures, including the inclusion of disciplinary measures in the corporate rules of employment. This suggests that the problem is very serious and that the JFE Group has been struggling to manage it. Antitrust violations occur in a corporate climate that is permissive to infringement in everyday business operations, so it requires a persistent effort to thoroughly change the thinking of employees throughout the organization to overcome such problems. The JFE Group should continue to make steadfast efforts to prevent further antitrust violations.



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