

Special Feature

“Only One” and “Number One” Technologies that will be Key to Realizing a Low-Carbon Society

We contribute to reducing greenhouse gas emissions with our “Only One” and “Number One” technologies and products.

The JFE Group has developed a series of products and services that make use of “Only One” and “Number One” technologies with a view toward the reduction of greenhouse gasses, a global issue. This is part of putting into practice the Group’s corporate vision of “always contributing to society with the world’s most innovative technology.” Our aim is to contribute to the realization of a low-carbon society.

Reducing the Volume of CO₂ Emissions by Customers

14.87 million tons

(Company total in FY2008. Source: the Japan Iron and Steel Federation)

JFE Steel

Contributions to Automotive Hybrid and Electric Drive Technologies

High-Efficiency Non-Oriented Electrical Steel Sheet, a Material for Electrical Motors that Contributes to Better Fuel Economy, Higher Performance and Smaller Motors

Focusing on the Growing Popularity of Hybrid and Electric Vehicles

Hybrid cars and electric vehicles are becoming increasingly common on the back of growing environmental concerns, such as the need to reduce emissions including NO_x and CO₂, and the need for efficient utilization of petroleum energy. JFE Steel quickly identified these needs and has carried out research and development on electrical steel that is meeting the needs of electric-powered equipment for the automotive industry.

We have developed materials for traction motors for hybrid cars and electric vehicles, by drawing on our cutting-edge technologies used to improve the energy efficiency of air conditioners and refrigerators, while communicating closely with our customers.

World-Class Manufacturing Technology for Electrical Steel

Thin (0.20 to 0.35 mm) high-quality electrical steel that can efficiently use battery power is required for traction motors, which need to be compact, have high output, and be highly efficient and reliable. To efficiently manufacture electrical steel with a minimum deviation in quality, we have introduced specialized facilities (continuous cold rolling tandem mills) ahead of our competitors, and our manufacturing technology for high-quality electrical steel is world class.

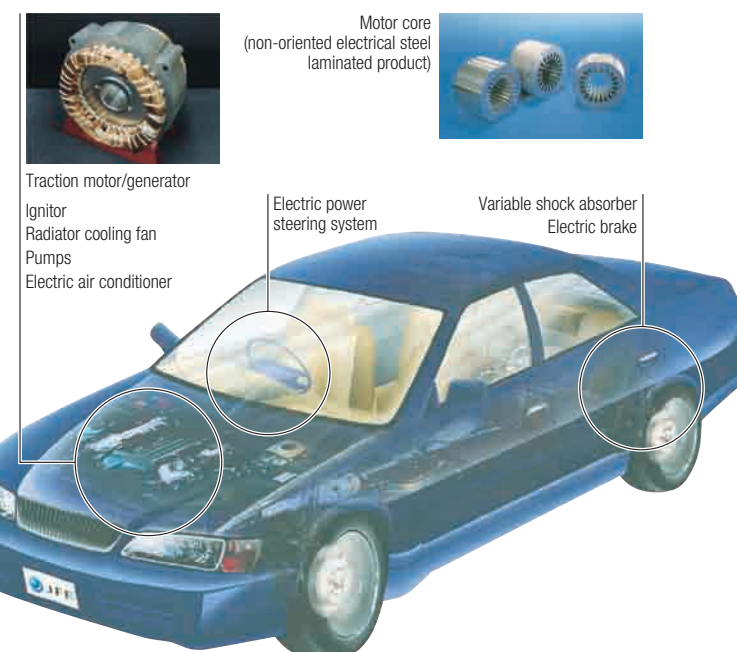
Enhancing the Performance of Steel to Further Reduce Size and Increase Efficiency

We have developed high-efficiency non-oriented electrical steel for hybrid cars and electric vehicles that contributes to better fuel economy, higher output, and smaller motors.

This product has garnered attention in Japan and overseas and is used by many automobile manufacturers worldwide.

We will continue to further improve steel performance and provide electrical steel that meets customers’ needs as we seek to expand our business globally.

Application of Electrical Steel in Automotive Parts



JFE Steel

Reducing the Weight of Automobiles

High-Strength Steel Sheets for Automobiles in Structural Parts that Contribute to Boosting Fuel Efficiency by Reducing Weight

Balancing Crash Safety and Fuel Efficiency through Weight Reduction

Society now demands automobiles with both better crash protection and lower weight to improve fuel efficiency and reduce CO₂ emissions. There is thus a need for thinner and higher-strength steel sheets (high tensile) for use in structural parts that contribute to the strength of the car body and safety.

Structural parts require press-forming, and press formability declines as steel sheet strength increases. JFE Steel has promoted the development of high-strength steel sheets with good formability as well as thinness and strength, and we have commercialized high-strength steel sheets that respond to the demands of the automobile industry.

Realization of High-Tensile Steel Sheets with Stable Formability through a Unique Mass Manufacturing Process

To mass-produce high-strength steel, we independently developed a water-quenching system (WQ process) that boasts the world’s top cooling rate (about 1,000°C/second) for the continuous annealing furnace used in our manufacturing process for cold-rolled steel sheets. Through this WQ process, we have commercialized extremely strong and high-quality steel sheets. These contribute to reducing the weight of structural and various other automobile parts, including seat frames and crash safety elements, such as bumpers and door impact beams.

Achieving 4.95-Million-Ton Reduction in CO₂ Emissions Since 1997

From 1997 through 2006, we have made progress in producing high strength structural parts for automobiles, increasing strength by 30% or more. In doing so, we achieved a 9% weight reduction by 2006 compared with 1997, helping reduce CO₂ emissions in Japan by 4.95 million tons. If we can further increase the application of higher-strength steel sheets, which we have more than doubled in strength since 1997, we should be able to achieve a further 9% reduction in weight compared with 2006 by 2015, thus further combating CO₂ emissions.

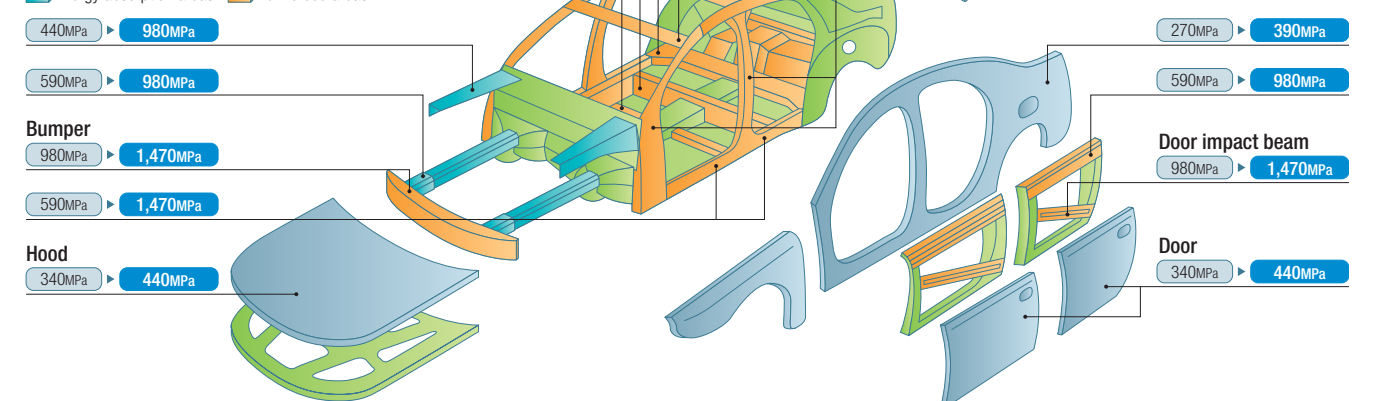
Efforts Toward the Development of Materials to Further Increase Strength and Application Technologies

We seek to expand our basic technologies to make high-strength steel for automobiles for applications other than structural parts, including exposed panel parts such as doors and hoods, and chassis parts such as suspension arms, thus widely contributing to reducing automobile weight.

To further improve the strength and formability of high-strength steel sheets, we are focusing on development of materials and application technologies, such as forming and jointing methods that will promote the use of high-strength steel sheets in automobile parts.

High-Strength Steel Sheet Applications and Strength Improvements

●●● MPa Current ●●● MPa 2015 (projection)
 ■ Exposed panel ■ Inner panel
 ■ Energy absorption areas ■ Reinforced areas



JFE Steel

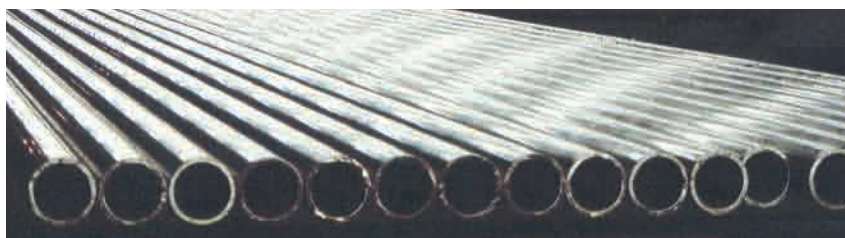
Natural Gas Thermal Power Plants

Steel Tubes for Heat Recovery Boilers Contribute to Improving Power Generation Efficiency

Responding to Demand for Heat-Resistant Steel Tubes due to the Adoption of Natural Gas at Thermal Power Plants

An increasing number of companies are constructing natural gas combined power plants to improve the energy efficiency of thermal power generation and reduce CO₂ emissions.

While the energy efficiency of conventional coal thermal power plants is about 44%, the efficiency of natural gas power plants is about 53%. The use of natural gas also reduces CO₂ emissions per kWh by over 45%. JFE Steel's 9% Cr (chrome) steel tubes are used in heat recovery boilers at natural gas combined-cycle power plants.



Long boiler pipes

Manufacturing Technology to Achieve Dimensional Precision and Improved Construction

JFE developed Super-Hot technology especially for the manufacture of steel pipes over 20 meters long in response to demand for larger boilers and progress in power generation efficiency. Using this technology, we provide long heat-resistant advanced 9% Cr steel pipes with good dimensional precision and improved construction, thus contributing to improved efficiency of natural gas combined-cycle power generation and reduced construction costs.

JFE Steel

Nuclear Power Generation

Steel Plates Used for Pressure Vessels in Nuclear Power Plants, which Contribute to Safety and Peace of Mind

For Safer and More Reliable Nuclear Power Generation with Low CO₂ Emissions

Nuclear reactors, the core components for nuclear power generation, require strong and highest-quality steel plates for their pressure vessels and containment vessels to maintain safety if the unexpected occurs.

JFE Steel is the leading manufacturer in Japan of thick steel plates for pressure vessels and containment vessels.



6,000 ton Press Forging Plant (Kurashiki District)

JFE Steel Established a Production Process for Heavy-Gauge and High-Strength Quality Steel Plates

Heavy-gauge steel plates more than 10cm thick are used for pressure vessels in nuclear power plants. The thickness and high strength allows the plates to withstand stress of six tons per square centimeter, which is an indispensable property. In addition, internal quality must be homogeneous and internal defects must be avoided. In response to such requirements, JFE Steel has developed steel plates with much higher quality than conventional materials utilizing its "Only One" technology "Continuous casting + Forging + Plate rolling." To proceed into overseas nuclear power plants markets, JFE Steel is developing technologies for the production of thicker and heavier steel plates, which contribute to the safety and reliability of nuclear reactors.

Universal Shipbuilding

Eco Ships

Encouraging Development of Eco Ships for Lower CO₂ Emissions

Researching Next-Generation Commercial Sailing Vessels that Use Natural Energy

Looking at the Effective Use of Natural Wind Energy

Using natural wind power could help to solve the issue of reducing maritime transport CO₂ emissions. With this idea in mind, research and development into next-generation commercial sailing ships is advancing, based on the construction record of more than 10 commercial sailing ships in the 1980s.

Challenge of Making Sails More Compact and Easier to Store

For sailing ships currently under development, the sail will utilize wind to assist propulsion. We are addressing the issue of making sails more compact and easier to store so that they do not interfere with the ship operation at port and during cargo handling operations.

Significantly Reducing CO₂ Emissions through Integration with Navigation Support System

We look for ships to enable reduction of CO₂ emissions by about 20% from the current level by saving energy. This will be achieved by integrating the Sea-Navi® navigation support system and selecting voyage routes where the ship can harness favorable winds effectively.

Aiming to Realize Zero-Emission Ships through Various Tests for Practical Application

We will make scale models of sails for actual use and carry out verification tests. We will then test the sails on actual ships aiming for practical use of the equipment. By accelerating development of this technology, we continue our activities toward the target of realization of ships that do not emit CO₂.

Sea-Navi® Reduces Fuel Consumption by Optimizing Ship Navigation

Saving Energy by Optimizing Navigation

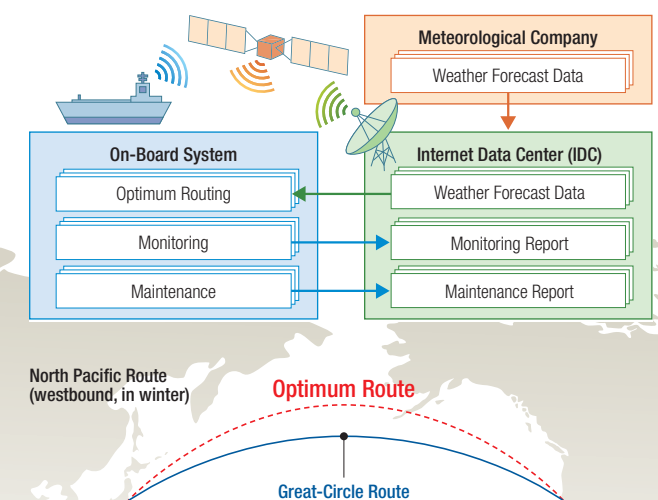
Energy-saving efforts for ships have traditionally focused on improving hardware (hull, machinery, etc.), but Universal Shipbuilding also focuses on improving software (navigation), and the company has developed Sea-Navi®, a navigation support system that allows the vessel to use less energy by optimizing navigation. Currently, we are carrying out verification tests in collaboration with two ship companies in Japan.

Application Based on Sophisticated Simulation Technology Held Only by Shipbuilders

Sea-Navi® is a system based on sophisticated simulation technology that is held only by shipbuilding companies, and the routes it suggests are highly reliable in terms of energy savings and safety. One convenient feature of the system is that navigation officers can search for optimum routes using a notebook computer on board.

Estimated Fuel Savings of About 5% per Average Year

We estimate that the use of the system on a ship on a North Pacific route will result in fuel savings (CO₂ reduction) of about 5% per average year, although the effects will differ between summer, when the weather and ocean conditions are calm, and in winter, when they are rough.



JFE Engineering

Natural Gas Conversion

Full-Range Support for Natural Gas Conversion that Reduces CO₂ Emissions

Building a Total Supply Chain for Natural Gas

Progress is being made globally in the conversion of oil to natural gas with the aim of reducing CO₂ emissions. New stations and pipelines for the storage and supply of liquefied natural gas (LNG) are to be constructed in Japan in response to the government's policy of reducing CO₂ emissions by 25%.

JFE Engineering provides cutting-edge technologies and services in all fields related to the supply of natural gas, including upstream gas treatment plants in the gas fields, LNG bases* and pipelines.

* Facilities that receive and store liquefied natural gas (LNG) and supply it as city gas, fuel for power generation and for various fuels and raw materials for industrial use.

Responding to Demand for the Construction of Domestic LNG Bases

The construction of LNG bases in Japan has been ramped up to handle an increasing volume of LNG imports, and as of March 2010, nationwide there are 28 LNG installations in operation. Many more LNG installations are being planned or are under construction, and further construction and expansion is forecast.

Since constructing an LNG base for the Higashi-Ogishima Thermal Power Station (Kawasaki City) in 1984, we have been deeply involved in the construction of LNG storage bases at 16 locations in Japan. We are making use of our rich experience and ad-

vanced technological capabilities in current construction projects, and we provide comprehensive engineering services covering preliminary study, environmental assessments, design, procurement, on-site construction and test operations.

Expanding the Natural Gas Pipeline Network

With an increasing amount of LNG being imported, pipeline networks are being rapidly developed as supply infrastructure. We are a pioneer in the construction of high-pressure gas pipelines that safely send large volumes of natural gas over long distances, and we have a track record of having constructed more than 60% of the pipelines in Japan for city gas, industrial use and fuel for thermal power stations. We will use our cutting-edge technologies to support the expansion of the natural gas network as the leading company in this field.



Offshore Pipelines for Natural Gas

Cogeneration Systems With 80% Energy Efficiency

As one of our solutions for reducing CO₂ emissions, we provide fuel conversion together with cogeneration systems that handle natural gas fuel for plants, port facilities and so on. This system, which drives reciprocating engines with natural gas, achieves energy efficiency of 80%—twice that of thermal power generation—through superior generating efficiency and the ability to use waste heat.



LNG Terminals

JFE Engineering

Use of Energy from Waste Products

Garbage Treatment Plants as Energy Supply Bases

Hyper Z Stoker Furnace Combining Cutting-Edge Technologies

We have made use of our experience and the technologies we have accumulated as the top manufacturer of garbage incinerators to develop an advanced plant called the “Hyper Z Stoker Furnace,” which is optimally designed for handling capacity. This is an “Only One” product, in which high-temperature air combustion and waste gas recirculation technology have been applied to a garbage incinerator for the first time. It improves the efficiency of power generation accompanying garbage incineration by 17% through stabilizing burning even with a small amount of combustible air.



Hyper Z Stoker Furnace

Gasification and Melting Plant Garnering Attention in Europe

Generating power from waste products has seen increasing interest in Europe, where regulations are being incrementally strengthened regarding the landfill disposal of waste. JFE Engineering has applied its blast furnace technologies to the in-house development of gasification and melting plants that generate power by gasifying and melting garbage, and we are carrying out sales activities in the environmentally advanced European market. Currently, we are moving forward with the construction of a plant ordered by the SCA Group, one of the leading waste processing businesses in Rome, Italy.



Gasification and melting plant in Italy

JFE Engineering

Renewable Energy

Geothermal Power and Photovoltaic Power Generated from the Earth and the Sun

From Geothermal Power Plants to the Use of Geo Heat

Despite Japan being ranked third in the world in geothermal resources, the country is using only 3% of this potential asset. Meanwhile, there are increasing expectations for geo heat as a domestically produced energy that has a low environmental impact and can be obtained stably over the long term. JFE Engineering undertook the design and construction of the piping system at Japan's first commercial geothermal power plant that went into operation in 1966. Since then, we have been involved in the construction of nine geothermal power plants—half of those constructed in Japan—and have led technological innovations in geothermal steam production designs. Based on our abundant experience



Geothermal Power Plants

and technologies, we are also moving forward with air-conditioning systems that use geo heat.

Photovoltaic Power Generation Business Utilizing Our Areas of Expertise

In FY2009, we entered the photovoltaic power generation engineering business targeting public and private sector industrial facilities. We support the construction of photovoltaic power generation systems from planning and design to construction for water processing plants, city garbage incineration facilities, other industrial plants, and large-scale commercial facilities, which are within our areas of expertise.

Construction of Geothermal Power Plants

