

Environmental Solution Products

Energy-Related Products

We have numerous high-performance products, including gas turbines, gas engines and various types of boilers, and we are providing a range of energy systems that incorporate these products to locations around the world. We are also working on renewable energy technologies (woody biomass power generation, photovoltaic power generation, small-scale hydraulic power generation, etc.) and clean energy technologies (hydrogen and LNG facilities, etc.).

CO₂ emissions reduction effect from major energy-related products (products delivered in FY2009)

[1,000 t-CO₂/year]

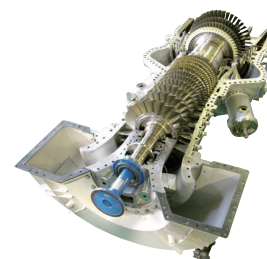
Field	CO ₂ emissions reduction effect	Major products
High-efficiency power generation/effective use of energy	120	Gas turbine cogeneration system, etc.
Use of exhaust heat and exhaust energy	203	Waste heat recovery power generation (WHRPG) in cement plant, top pressure recovery turbine (TRT) system, etc.
Total	323	—

- ① The manual of the Law Concerning the Promotion of Measures to Cope with Global Warming was consulted to set CO₂ emission factor for electricity, heat, fuel, etc.
- ② All energy derived from the use of disposed energy was counted as part of the CO₂ reduction effect.

1 M7A-03 Gas Turbine for Highest Level of Energy Efficiency in the World

Development of the M7 gas turbine began in 1992 with the M7A-01, followed in 2007 by the 7,000 kW-class M7A-03, which provides world-leading efficiency of 33% on the generating end (and overall efficiency of 82% using heat exhaust). To clean up the turbine's gas emissions, we equipped it with a newly developed DLE combustors in 2009. The combustors mix fuel with air to thin it before combustion, helping to achieve the world's lowest NO_x emissions of 15 ppm (O₂ = 15%). With this performance, the M7A-03 gas turbine can deeply reduce emissions of CO₂ and NO_x. As of June 2010, we have taken orders for or delivered more than ten units.

The new DLE combustor won a Technology Award from the Gas Turbine Society of Japan.



Interior of M7A-03 gas turbine

High-efficiency energy use (82% efficiency)

Low NO_x (15 ppm)

2 Binary Power Generation System Begins Proving Tests at Kobe Works

Uses heat exhaust from independent power generation facility running on Kawasaki Green Gas Engine

A small binary power generation system (250 kW) developed by Kawasaki began proving operation in May 2010, using heat exhaust from an independent power generation facility utilizing a 5,000 kW-class Kawasaki Green Gas Engine installed at the Kobe Works. A binary power generation system is an energy conserving system that recovers energy from previously unused lower-temperature heat sources, such as heated effluent and exhaust gas, to run turbine generators and create electric power. Because it uses substitute fluorocarbons with low global warming potential and ensures that heat exchangers work at high performance, the compact system is eco-friendly and efficient.



Kawasaki Green Gas Engine



Binary power generation system

High-efficiency energy use

Use of unutilized energy

3 Delivery of Sakaide LNG* Terminal with One of World's Largest Above-ground Tanks

Shikoku Electric Power cuts CO₂ annual emissions by 500,000 tons

In March 2010, we completed the Sakaide LNG Terminal, the first terminal in Shikoku to accommodate large LNG carriers. It has since begun operating to supply Shikoku Electric Power. We took the order and built the entire facility on a full turnkey basis. With a capacity of 180,000 m³, the terminal's LNG tank is one of the largest above-ground LNG tanks in the world. LNG is stored at about -160°C, and its natural daily boil-off rate of no more than about 0.05% is a particularly excellent property. It is also a clean fuel, causing low CO₂ emissions. Shikoku Electric Power is introducing the use of LNG in two of its four power generation facilities and expects to cut CO₂ emissions by about 500,000 tons, about 5% of its annual total.

* LNG: Liquefied natural gas

Clean energy technology



Sakaide LNG Terminal

4 High-Efficiency Ifrit-Beat Drumless Water Tube Boiler

Development of World's First 10:1 Turndown* Control System

We have developed the world's first Drumless Water Tube Boiler with a 10:1 turndown control system that greatly increases the range of adjustable load with continuous combustion in the Ifrit-Beat lineup of gas-fired Drumless Water Tube Boiler. The system controls burner combustion to one-tenth of the maximum firing rate to enable the boiler to keep firing without turning off, resulting in up to 13% lower fuel consumption and CO₂ emissions than boilers currently in use. An optional exhaust O₂ concentration control system makes further boiler efficiency improvements possible by ensuring that combustion is always at the optimal air-fuel ratio.

Kawasaki Thermal Engineering Co., Ltd.

High-efficiency energy use
13% improvement

The Ifrit series won a Technology Award from the Japan Gas Association in FY2009.

* Turndown: A ratio between a burner's maximum and minimum firing rates that can be controlled



Ifrit-Beat Drumless Water Tube Boiler

Waste Treatment and Environmental Pollution Prevention Products

We began developing waste treatment technologies early on, and we currently have various such technologies for treating urban refuse, including stoker-type furnaces, fluidized bed gasification and melting furnaces and direct gasification and melting furnaces. We have delivered leading-edge waste treatment systems all over Japan, and are also providing various types of industrial waste incineration systems (for power generation).

To prevent pollution, we have worked with a number of technologies to protect and improve air and water quality. We have addressed boiler and other combustion gases since the 1970s by developing flue gas de-SO_x systems, and have delivered a number of these in Japan and abroad, where they are improving air quality.

5 Advanced Refuse Incineration Plant Delivered to Hirakata City, Osaka Prefecture

We delivered a state-of-the-art refuse incineration plant with capacity of 240 t/day to Hirakata City, Osaka Prefecture. Aiming to achieve the world's highest standards for mitigating environmental impact, this facility consists of refuse incineration system using the advanced stoker-type furnace, together with a fuel-type ash melting system and other equipment. The plant is also equipped with a steam turbine with output of 4,500 kW that utilizes heat from incineration to generate power, which is then used to operate plant facilities or sold to the power company. The plant furthermore reduces environmental impacts by meeting strict standards for dioxins, exhaust gas, effluent emissions and leachate from fly ash and other sources.

Waste power generation

Reduced environmental impacts



Refuse incineration plant (Hirakata City, Osaka Prefecture)

6 Flue Gas De-SO_x Systems Utilized in Japan and Abroad

Flue Gas De-SO_x Systems remove sulfur oxides from the exhaust gas emitted by power generation boilers and various types of industrial boilers for the purpose of preventing air pollution. We have accumulated over 30 years of research and improvements to complete the development of technologies that offer high performance, outstanding energy-saving and reliability. Kawasaki has delivered 37 flue gas de-SO_x plants to various industries and electric power companies in Japan and 56 plants abroad, including China, Southeast Asia and Europe. We also supply technologies abroad. In recent years, we have developed compact absorption towers for industrial boilers and otherwise created plants that save energy and resources while ensuring excellent reliability and easy maintenance.

Air quality improvement



Flue gas de-SO_x system (Saudi Arabia)