



Special Feature: Measures to Prevent Global Warming

Aiming for the Realization of a Low-Carbon Society through Natural Gas

(Photo) Green space at Semboku Plant

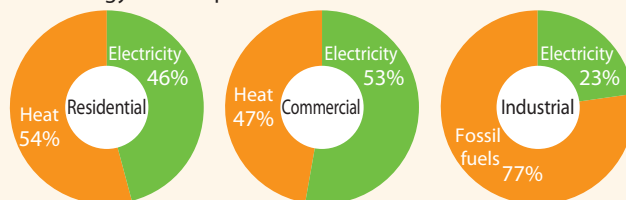
At our Semboku Plant, we manage green spaces in such a way as to reproduce the former eco-conditions there, which exhibited a high degree of biodiversity. Under our concept of a green network linked with the local community, one-fifth of the total area of the Semboku Plant has been converted to green space that functions as a habitat for natural life forms.

Aiming for the Realization of a Low-Carbon Society through Natural Gas

The Keys: Energy Conservation and CO₂ Emission Reduction in the Thermal Energy Area

Two types of energy that are used in households and factories are thermal energy (fuel) and electricity. Approximately half of the energy used by households and commercial and three-quarters of the energy used by factories and industry is thermal energy. Therefore, in order to achieve a low-carbon society, we must implement measures on the dual fronts of thermal energy and electricity.

■ Ratio of heat (or fossil fuels) and electricity as percentage of energy consumption



*Ratio of heat (or fossil fuels) and electricity as percentage of final energy consumption
Source: EDMC Handbook of Energy & Economic Statistics in Japan, 2009

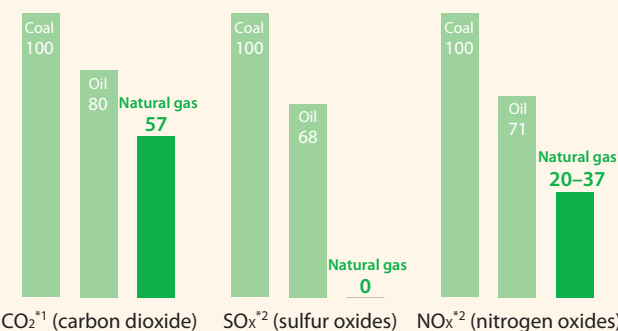
Curbing Global Warming through Increased Use of Natural Gas

Natural gas is a form of “clean energy” that releases fewer CO₂ emissions than any other fossil fuel.

In line with national energy policies, by making the use of environmentally-friendly natural gas and promoting the popularization of high-efficiency equipment and systems such as cogeneration systems and gas-powered air-conditioning systems, the Group is actively reducing the environmental footprints of its customers in the form of lower CO₂ emissions.

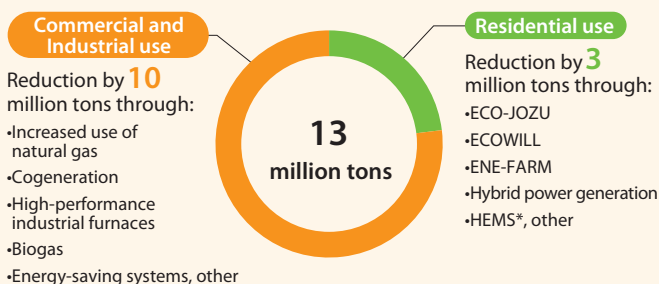
Through such initiatives, we are aiming to reduce our customers’ CO₂ emissions by three million tons in the household sector and 10 million tons in the commercial and industrial sector by the end of the fiscal year ending March 31, 2021 (cumulative).

■ Emission levels for fossil fuels (Coal = 100)



*1: Institute of Applied Energy (IAE) Report on Thermal Power Plant Atmospheric Impact Assessment Technology Demonstration Survey (1990/3)
*2: International Energy Agency (IEA) Natural Gas Prospects (1986)

■ Estimated reduction in CO₂ emissions between FY2010 and FY2021

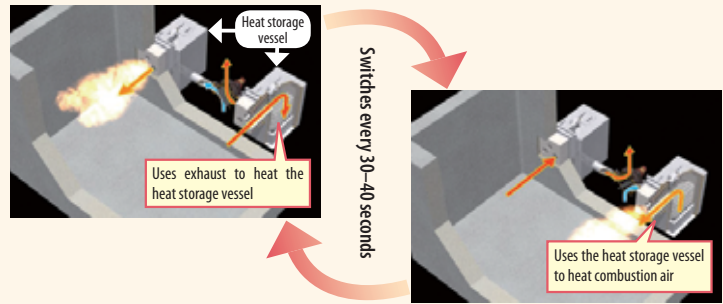


*For further details about HEMS (Home Energy Management System), please see page 15.

Energy Conservation and CO₂ Emission Reduction Initiatives in the Industrial Sector

In factories, various kinds of thermal energy are used for a variety of applications — from the ultra-high temperatures of melting furnaces to steam and hot water. In the usage of these types of thermal energy, the key to conserving energy and reducing CO₂ emissions lies in devising ways of eliminating the wasteful discharge of waste heat. Therefore, the Group is contributing to energy conservation and CO₂ emission reductions at the customer end by developing and popularizing various kinds of equipment, including Regenerative Burners — burners for high-efficiency industrial furnaces — and through energy conservation consulting and engineering.

Principles of the Regenerative Burner System



Natural Gas Cogeneration Systems

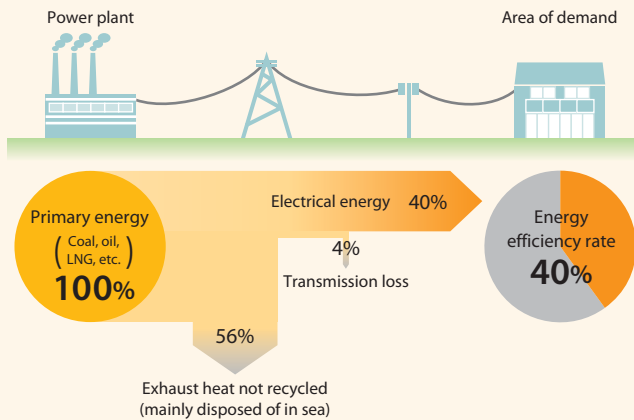
From Business to Households — Achieving Energy Conservation and Reduced CO₂ Emissions

A cogeneration system is a system which, in addition to generating power using equipment that is installed at the customer's site, recovers the exhaust heat emitted during generation and uses it for air conditioning and heat treatment.

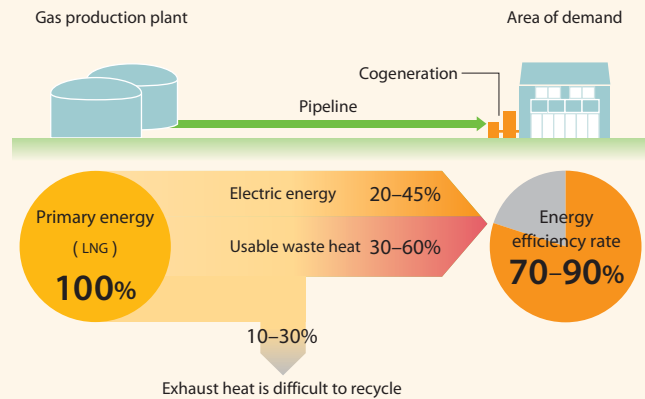
As the power is generated at the customer's site, little is lost in energy transmission. Energy utilization efficiency is also enhanced by 70-90% through the efficient use of waste heat.

General concept of cogeneration

Power generation system using conventional methods*



Cogeneration system

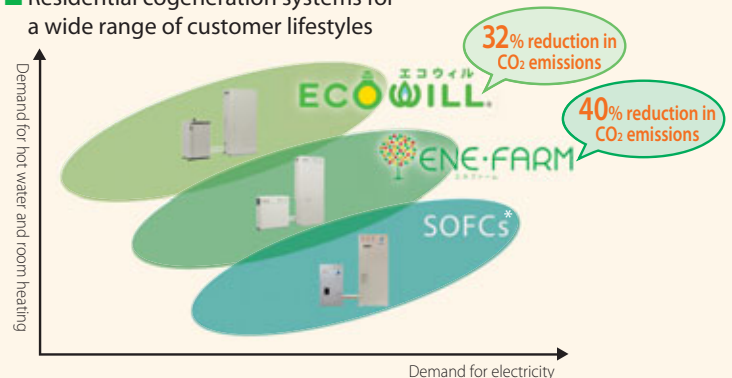


*Average for 10 power companies (fiscal 2005)
Source: "Cogeneration system" by The Japan Gas Association

Cogeneration Systems for Households

The Company also sells "ENE-FARM" residential fuel cell-powered cogeneration systems and "ECOWILL" residential gas-powered cogeneration systems, which are able to contribute to more comfortable lives for consumers and energy conservation. We also offer highly economical "hybrid power generation," which further enhances the environmental properties of "ENE-FARM" and "ECOWILL" by combining these systems with photovoltaic power generation.

Residential cogeneration systems for a wide range of customer lifestyles



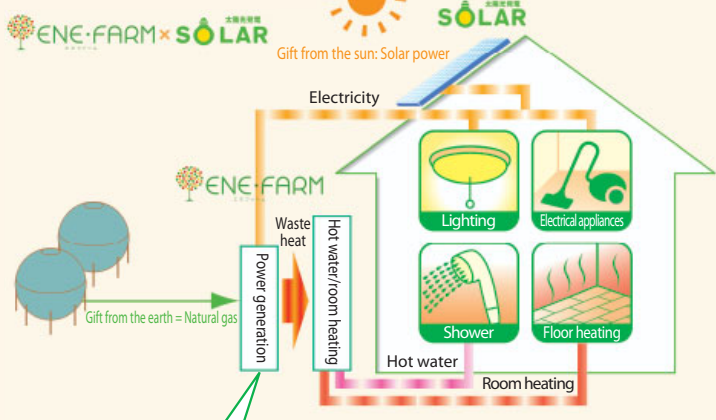
*For further details about Solid Oxide Fuel Cells (SOFCs), please refer to pages 15 and 36.

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"Hybrid power generation" offers superior environmental and economic benefits. The combination of "ENE-FARM" and "ECOWILL" with photovoltaic power generation will not only significantly reduce heating and lighting expenses in homes, surplus electricity can also be sold back to the power company. The Company therefore intends to further popularize this system in the future.

Energy efficiency of residential fuel cell cogeneration system "ENE-FARM" and hybrid power generation

"Hybrid" power generation



"ENE-FARM" alone reduces:		Hybrid with "ENE-FARM" reduces:	
Primary energy use by	CO ₂ emissions by	Primary energy use by	CO ₂ emissions by
approx. 27%	approx. 40%	approx. 45%	approx. 70%

Residential Gas Engine Cogeneration System
"ECOWILL"

"ECOWILL" is a system of generating power at a customer's site and using it to provide hot water and room heating. This system is tailored to the individual circumstances of each household and operates automatically to achieve optimal energy conservation levels. Compared to conventional systems, primary energy consumption is reduced by approximately 21% and CO₂ emissions by approximately 32%. Thus, an overall energy efficiency ratio of 85.5% is achieved. Such tremendous environmental performance has been embraced by the market and the system has gained popularity. In fiscal 2010, the cumulative number of units sold by the Company topped 64,000.



Residential gas engine cogeneration system "ECOWILL"

Residential Fuel Cell Cogeneration System
"ENE-FARM"

In June 2009, the Company released "ENE-FARM," a polymer electrolyte fuel cell (PEFC) cogeneration system for households. The "ENE-FARM" reforms natural gas into hydrogen. The hydrogen then chemically reacts with the oxygen in the air to generate electrical energy, and the heat from this reaction is used to make hot water. This system achieves a power generation efficiency of 35%, which significantly exceeds the 22.5% achieved by "ECOWILL." Furthermore, compared to conventional systems, primary energy consumption is reduced by approximately 27% and CO₂ emissions by approximately 40%.

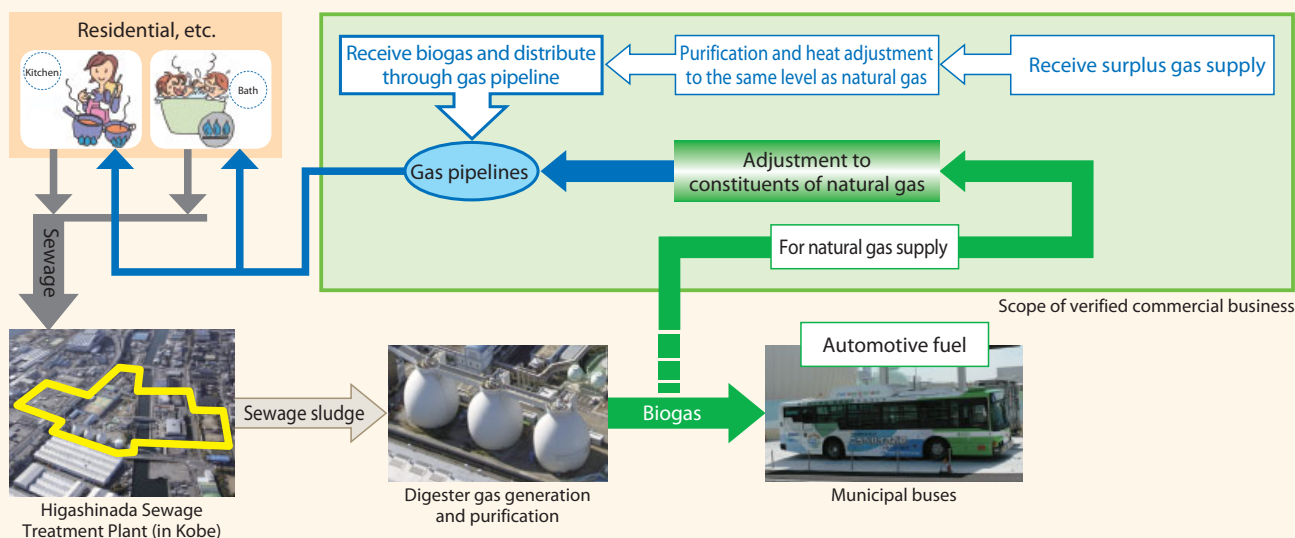


Residential fuel cell cogeneration system "ENE-FARM"

Renewable Energy Usage Initiatives — Biogas Usage

The Company has joined forces with the City of Kobe and Kobelco Eco-Solutions Co., Ltd. to embark on a pilot project which will mix biogas produced by the Higashinada Sewage Treatment Plant (in Kobe City) with natural gas and then supply it to customers. This biogas is highly-refined gas derived

from sewage sludge, and this initiative represents the first attempt in Japan to supply biogas directly to the gas supply network. Through this pilot project, operational methods and economic feasibility will be verified to ensure the efficient usage of biomass resources and CO₂ emission reductions.



Efforts to Develop Next-Generation Environmental Systems

► Solid Oxide Fuel Cells (SOFCs)

The Company is currently developing solid oxide fuel cells (SOFCs) as the next generation of fuel cells. As these SOFCs have high overall power generation efficiency, even among cogeneration systems, they offer substantial environmental and economic benefits, even in residences with relatively lower thermal demands. Furthermore, having a compact design, they can also be installed in housing complexes and detached homes where space is limited. Therefore, by around 2015, we plan to commercialize SOFCs as a new strategic product that will expand the market for residential cogeneration systems, and demonstration tests are currently underway.

► “Solar Cooling” — Industrial Air-Conditioning System that Uses Solar Energy

The “Solar Cooling” industrial air-conditioning system is a system that efficiently uses solar energy to provide cooling in summer and heating in winter. The system heats water by efficiently gathering solar energy and uses the heated water as a thermal energy source for a high-efficiency gas absorption chiller heater. A demonstration test that commenced in June 2009 at the Company is currently underway. As solar energy is used as the preferential thermal source, the system is able to achieve high energy-saving heating and cooling.

► Smart Energy Houses and HEMS

The Company has joined forces with major home builders and is currently conducting verification experiments on “smart energy houses,” which combine residential fuel cells, solar cells and rechargeable batteries and optimally operates them to further enhance energy conservation properties, in order to develop systems aimed at optimizing the overall energy consumption of households. One such initiative is the Home Energy Management System (HEMS), an energy conservation service that “visualizes” the energy consumption within homes for our customers. We are continuing to verify how the information provided by this system can be translated into energy-saving actions on the part of our customers and confirming its feasibility.

► Smart Energy Networks

Smart energy networks are systems where several power sources, including renewable energy and cogeneration systems, are combined over a wide area to mutually accommodate electricity and heat. Information communications technology is used to optimally control the energy supply and demand. This facilitates significant energy saving and CO₂ emission reductions within the areas linked by the network. The pilot project has been underway since May 2010.

(For further details about all these initiatives, please refer to “Technological Development” on pages 36 and 37).