

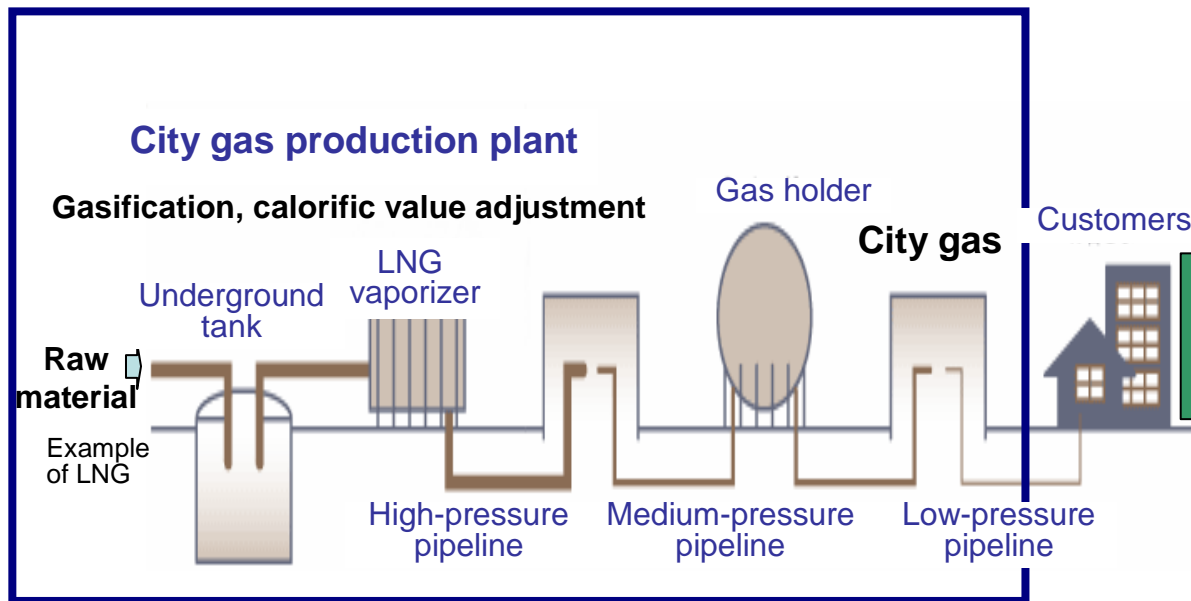
Initiatives of the City Gas Industry to Combat Global Warming

The Japan Gas Association
November 29, 2007

Initiatives of the City Gas Industry to Combat Global Warming

(1) Reduce CO₂ emissions when producing and supplying city gas

Scope of Keidanren's Voluntary Action Plan on the environment



(2) Reduce CO₂ emissions at customer-side

Residential	<ul style="list-style-type: none"> More widespread use of natural gas Development and introduction of high-efficiency equipment Co-generation systems, fuel cells, Eco-Jozu, etc.
Commercial	
Industry	<ul style="list-style-type: none"> Wider use of vehicles powered by natural gas
Transport	<ul style="list-style-type: none"> Initiatives that will lead to a national movement Support for environmental education, etc.

CO₂ emissions in fiscal 2006: 380,000 t-CO₂
(Approx. 0.03% of total CO₂ emissions in Japan)

Using natural gas to reduce CO₂ emissions on both the supply and demand sides

Initiatives at the City Gas Production and Supply Stages

Initiatives at the City Gas Production and Supply Stages

Improve efficiency of city gas production by shifting its feedstock to natural gas

- Entire industry promotes shift to natural gas -

Efficiency of gas production from coal: 70%

Fuel for coke ovens, etc., electricity for coal crushers, electrostatic samplers, scrubbers, pumps, etc.

Efficiency of gas production from oil: 85-98%

Fuel for reformers, oil heating furnaces, boilers, etc.
Electricity for oil/water pumps, coolers, etc.

Shift feedstock



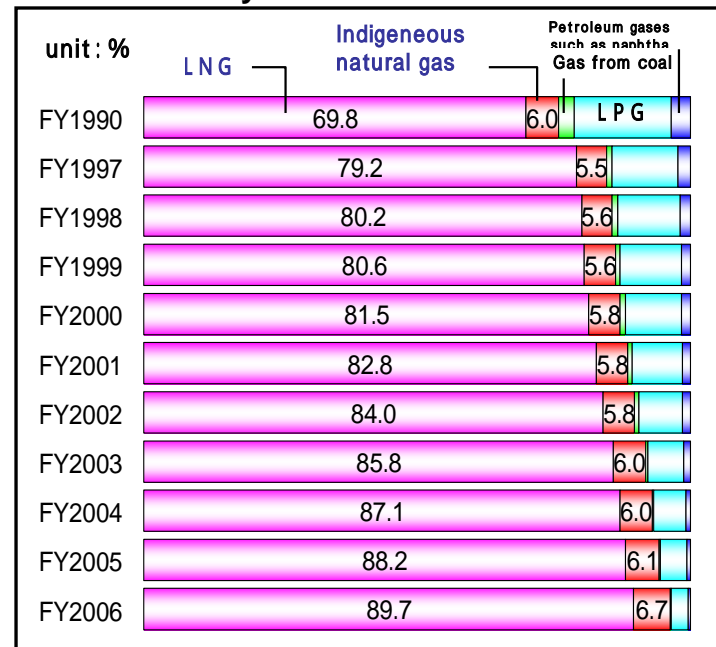
- Building the infrastructures such as LNG tanks
- Customer-by-customer adjustment of combustion for all devices
- Switch at one supplier takes up to 10 years

Efficiency of gas production from natural gas: 99%

Electricity for LNG pumps, seawater pumps for vaporizers, BOG compressors, etc.

FY2006: 9 suppliers switched
Cumulative total: 188 suppliers switched

Raw material switch is progressing steadily



Breakdown of feedstock used to produce city gas

Initiatives at the City Gas Production and Supply Stages

Promoting energy conservation even at production plants that have switched to natural gas

- Further energy savings on top of high production efficiency –

More efficient equipment

Reduce seawater volume by re-engineering vaporizer panels
Boost efficiency by improving seawater pump impellers
Introduce seawater pump revolution control
Introduce air-fin-type vaporizers that can be used even in cold climates, etc.

Greater use of LNG cold energy

Enhance cold energy power generation by optimizing coolant composition
Use cold energy in refrigerated storages, etc.

Revised operating procedures

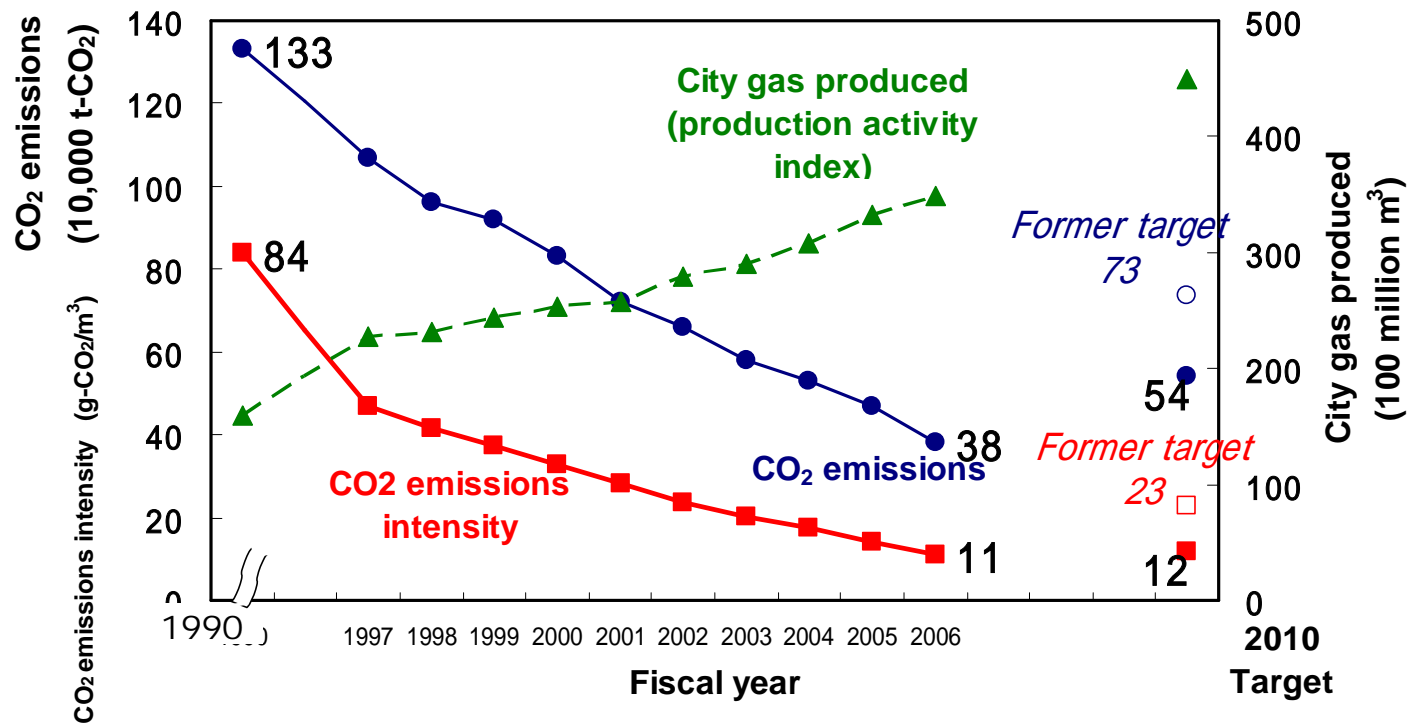
Reduce vaporizer seawater spray volume
Revise number of operating units
Reduce heat loss by changing vapor line steam traps, augmenting insulation, etc.

Reduction in volume of LPG used

Reduce volume of steam used in LPG vaporization

Results and Forecasts of Voluntary Action Plan

Substantial reductions in CO₂ emissions achieved compared to fiscal 1990, the base year



Although demand for environmentally friendly city gas is expected to increase, ongoing efforts to reduce CO₂ emissions are predicted to enable achievement of the new targets

Voluntary Action Plan Targets

Carry out changes and raise FY2010 targets for CO₂ emissions intensity and overall CO₂ emissions

Targets for city gas production and supply processes

		FY1990	FY2010
New targets	CO ₂ emissions intensity [g-CO ₂ /m ³]	84	<u>12</u>
	Percentage reduction	(23%)	<u>86%</u>
	CO ₂ emissions [10,000 t-CO ₂]	133	<u>54</u>
	Percentage reduction	(45%)	<u>59%</u>

1. CO₂ emissions per 1m³ of city gas produced

Figures in parentheses are old targets
Figures in **red** are new targets

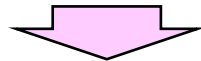
Customer-Side Initiatives

The Switch to Natural Gas

Reduce CO₂ emissions by switching from other fuels to natural gas

Effect of shift to gas

Switching from other fuels such as coal to natural gas



Reduction in CO₂ emissions: approx. 25%

Note: Effect of shift resulting from subsidies to promote switching to natural gas in high-energy-use facilities

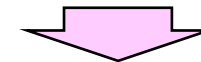
(FY2002–2006)

-2.5 million t-CO₂ p.a.

(Reduction of approx. 2,400 t-CO₂ per facility on average)

Effect of boosting efficiency

Introduction of high-efficiency equipment at time of fuel switch

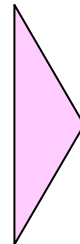


Even greater reduction of CO₂ emissions

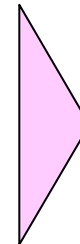
Example: Switching of forging furnace to natural gas

CO₂ emissions

Heavy fuel oil A + conventional burner
100



Natural gas + conventional burner
75

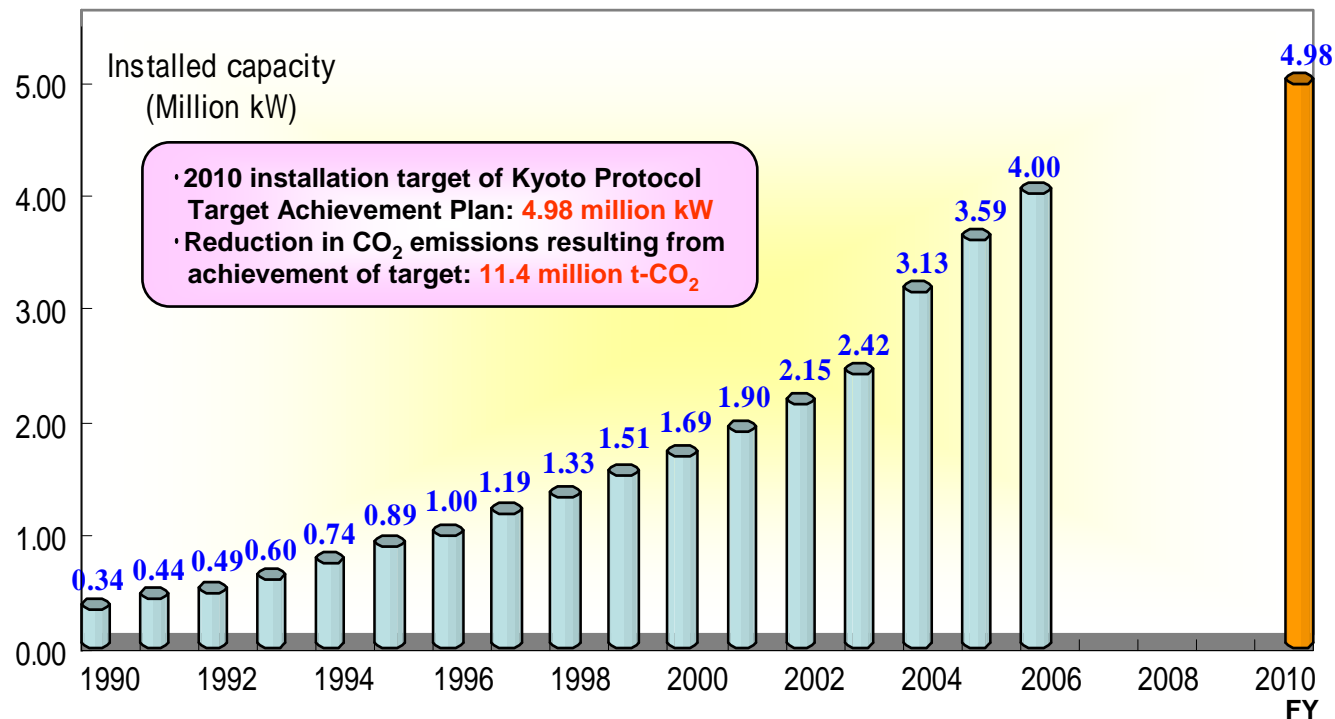


Natural gas + regenerative burner
45



Promoting Natural Gas Cogeneration

Total installed kW figures are rising steadily—on track to achieve 2010 target set forth in Kyoto Protocol Target Achievement Plan



Ongoing promotion of cogeneration and introduction of more efficient equipment

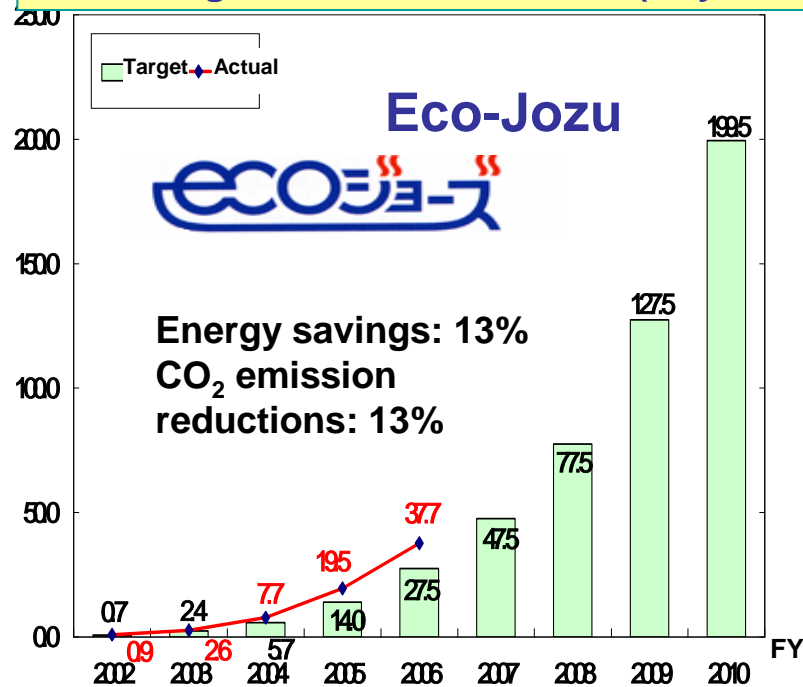
Introduction of More Efficient Equipment

- Promoting Widespread Use of High-Efficiency Water Heaters -

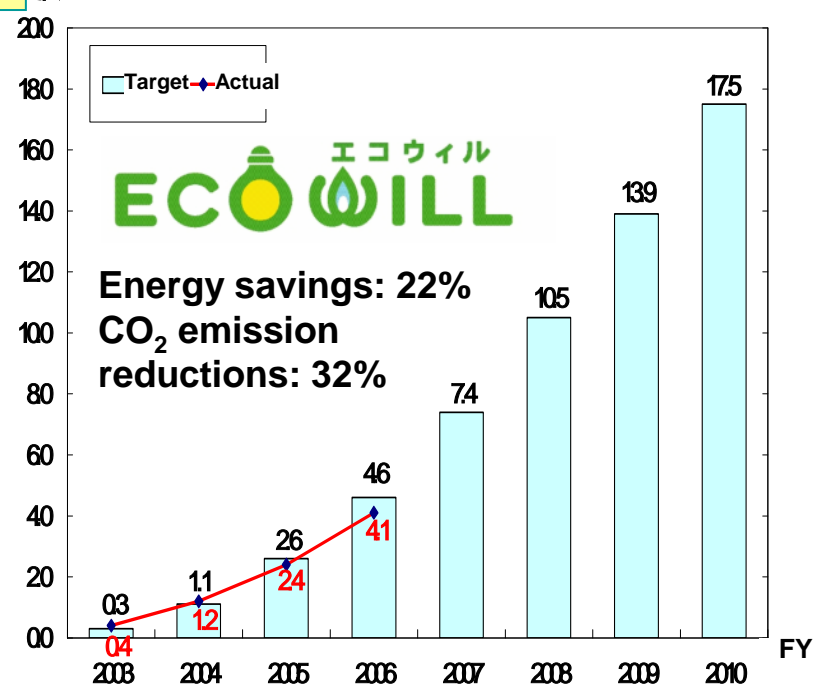
Installation of high-efficiency water heaters is steadily increasing thanks to active promotion—on track to reach 2010 targets for total number of units installed

10,000 units

2010 Targets and Actual Results (City Gas Only)



10,000 units



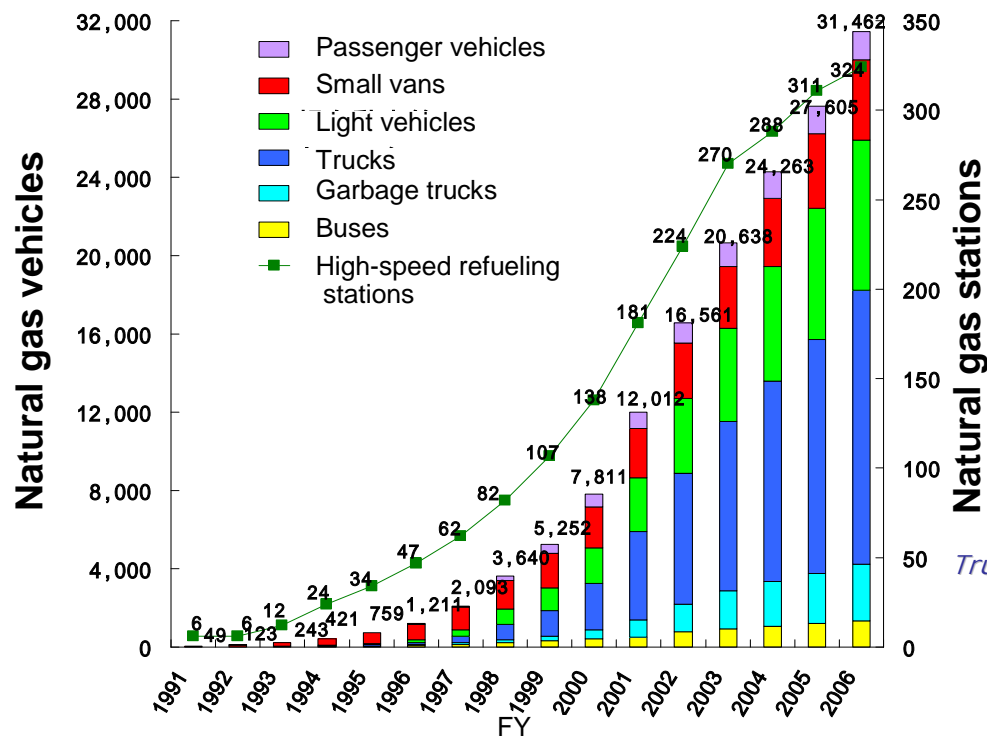
- The community gas utility industry and the liquefied petroleum gas (LPG) utility industry launched the Japan Gas Group Energy Popularization Promotion Council (Collabo) to jointly promote widespread use of high-efficiency water heaters.
- As well as shipping latent heat recovery water heaters and gas engine water heaters, the council funds afforestation projects (in Vietnam). For every 500,000 units installed, 500,000 trees are planted.

Promoting Natural Gas Vehicles

Vehicles powered by natural gas make a major contribution to reducing CO₂ emissions and oil dependency

31,500 vehicles in Japan as of March 31, 2007

Natural Gas Vehicles and Stations in Japan



Approx. 20% reduction in CO₂ emissions compared to gasoline vehicles

- Promoting use of natural gas vehicles as alternative to diesel vehicles, particularly as commercial trucks and garbage trucks
- Launch of bi-fuel vehicles: light vehicles and small vans powered by compressed natural gas (CNG) with gasoline as supplementary fuel

Future development of commercial vehicles for inter-city transport

- Potential as alternative to large diesel vehicles

Trucks equipped with "idle stop" function Bi-fuel vehicles



Initiatives Aimed at Further CO₂ Emission Reductions

Fuel Cells

Sample initiatives

- Large-scale trial projects were implemented to promote introduction of residential-use fuel cells (polymer electrolyte fuel cells: PEFC) offering 37% in generation efficiency and 45% reduction in CO₂ emissions. Approx. 300 new units installed in fiscal 2006.
- From this fiscal year, large-scale trials of solid oxide fuel cells (SOFC) offering highly efficient generation will start.

Area Energy Networks

Highly efficient energy use through pooling of power and heat among neighboring buildings

Sample initiative

- Subsidies for model projects installing natural gas area energy networks are being offered from this fiscal year and will be used to introduce such networks.

Promoting Use of Biogas

Promoting highly efficient energy use through cogeneration systems that burn a mix of city gas and biogas

Sample initiative

- Established biogas promotion center within the Japan Gas Association in April this year—promotes widespread use of biogas by gathering information on technologies, projects, and systems related to use of biomass energy and supports efforts by small and medium-sized gas suppliers.

Initiatives Leading to a National Movement - Support for Environmental Education -

Promoting eco-cooking

Recommending environmentally friendly food culture covering all aspects from shopping to cooking and disposing of waste

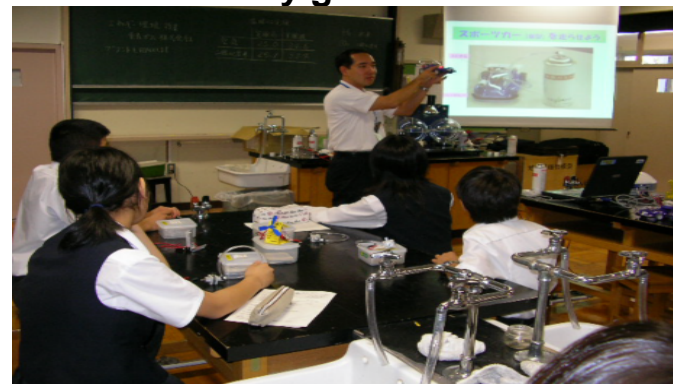


Sample initiatives

- Example of sessions run by gas utilities: 1,123 in fiscal 2006, with approx. 31,100 participants
- Tokyo Gas and JGA cooperating to expand the initiative through measures such as running instructors' courses open to other gas utilities

Supporting environmental and energy lessons in schools

Lessons on environmental and energy issues offered by guest instructors



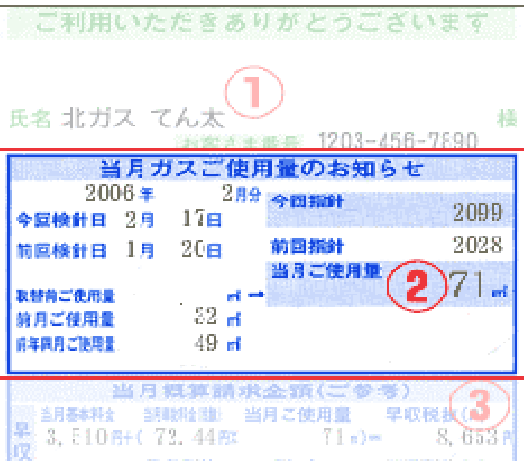



Sample initiatives

- Example of lessons offered by gas utilities: 3,813 in fiscal 2006, with 114,390 students taking part
- “Earth-friendly seminars” based on noodle-cooking lesson
- Production of educational support materials for gas utilities in order to expand the initiative

(Jointly produced with the Information Center for Energy and Environment Education)

Providing Information on Energy Conservation

Energy-saving information via website/pamphlets	Energy-conservation checks
 <p>Energy-saving information provided on “Hints for Smart Living” section of website.</p> <p>30,000 copies of <i>Ultra Energy-Saving Book</i> distributed, outlining energy-saving behavior/appliances and reduction of CO₂ emissions.</p> <p>860,000 leaflets produced and distributed for widespread use throughout the gas industry.</p> <p>(All in Japanese)</p>	 <p>System whereby users can register for monthly emissions data, comparisons with similar households, etc. Approx. 30,000 members.</p> <p>Green monitoring scheme for remote gathering of energy usage data from offices, hotels, etc. and feedback to users.</p>
Information on monthly gas meter reading slips	Support for energy-saving operation of equipment
 <p>Monthly meter reading slips include data on gas usage in the previous month and the same month of the previous year</p>	 <p>Introduction of “energy-look” control panels for Eco-Will and Eco-Jozu systems, fuel cells, etc. Energy-saving navigation function helps users to efficiently conserve energy and gives daily/monthly data on matters such as volume of power generated.</p> <p>➤ According to a survey of Eco-Will users, some 70% of customers think the panels have raised their awareness of energy conservation</p>

High-efficiency equipment promoted in conjunction with the Team Minus 6% campaign aimed at encouraging energy consumers to reduce CO₂ emissions by 1 kg per person per day.

Summary

Initiatives at the City Gas Production and Supply Stages (Voluntary action plan on the environment)

- Raise targets and work to meet them.
- If targets are achieved, CO₂ emissions intensity will be reduced by 86% and total volume of CO₂ emissions will be reduced by 59% compared to FY1990 figures.

Customer-Side Initiatives

- Promote more widespread use of natural gas and installation of high-efficiency systems such as Eco-Jozu, Eco-Will and natural gas cogeneration.
- Push ahead with initiatives that generate synergy for reduction of CO₂ emissions by contributing to the national movement, such as environmental education and diffusion of information on energy conservation.

**Using natural gas as the key,
combat global warming from both the supply and demand sides**