

2 Measures for Global Environmental Issues

1 Measures taken on the power supply side for greenhouse gas reduction

CO₂ comprises about 90% of the greenhouse gases emitted in Japan, and about 25% of this is attributable to the electric power industry.

- Kyushu Electric Power's CO₂ emissions in Fiscal 2002 amounted to 25.7 million tons-CO₂ or about 2% of the total in Japan.
- During the 12 years from Fiscal 1990, Kyushu Electric Power's electricity sales increased about 1.4 times; however, CO₂ emissions have remained around 103%.
- This was mainly due to the balanced development of nuclear power as the core, LNG thermal, hydroelectric, geothermal and other natural energy sources. CO₂ emissions per kWh has also been mitigated through efforts to enhance the nuclear power utilization rate and overall thermal efficiency by applying highly-efficient thermal power facilities. Above all, the development of two nuclear power stations (2.36 million kW) greatly contributed to the reduction.

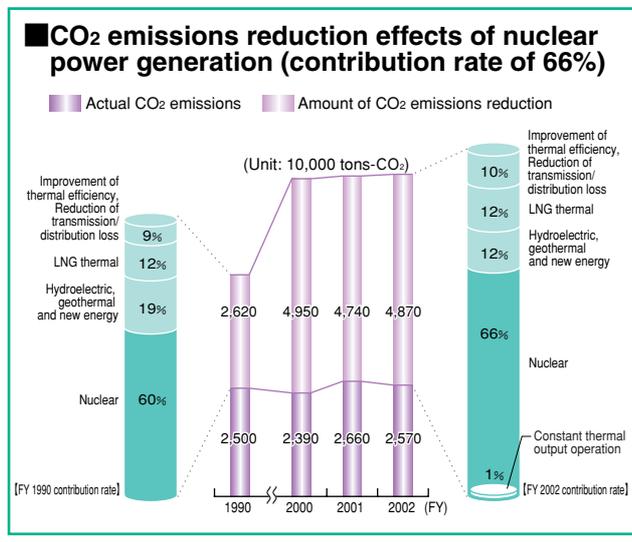
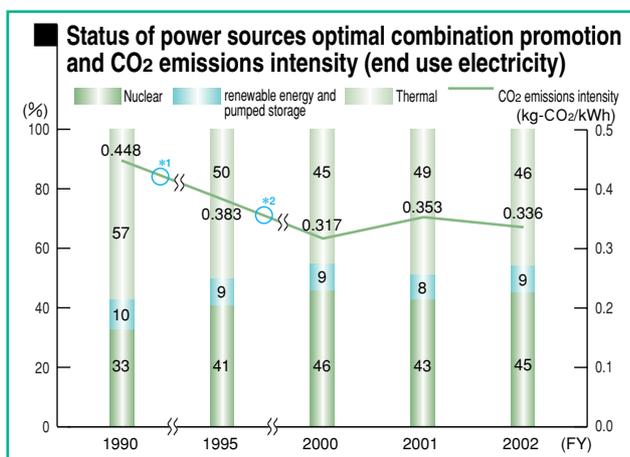
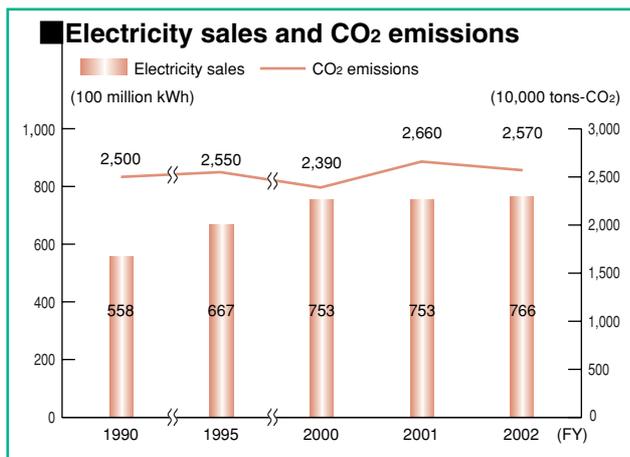
- Through these efforts, CO₂ emissions per kWh consumed by customers, i.e. CO₂ emissions intensity (end use electricity), decreased by 25% from the value in Fiscal 1990. This means that the CO₂ which was emitted from customers in regular households was reduced by approximately 380kg-CO₂ per year, from the Fiscal 1990 value.

N.B. the above figures are estimated on the assumption that the Kyushu's average power consumption of 285 kWh/month (Fiscal 2002 records) under lighting contracts (Residential Lighting A and B) equals the electric consumption of regular households.

Promotion of optimal combination of nuclear power and other energy sources

Kyushu Electric Power is committed to CO₂ emissions reduction through promoting balanced development of power sources to achieve the optimal combination of nuclear power, as a core, and other sources, placing the utmost emphasis on stability, economy and environmental conservation in power supply. In addition, the company works to develop and introduce new energy sources. Nuclear power generation, which contributes to 45% of the total power generated, is a CO₂ emission-free generation system and contributes greatly to reduction of CO₂ emissions. Improving the nuclear power capacity factor therefore leads to a reduction in the overall amount of CO₂ emitted from power supply. The nuclear power capacity factor for Fiscal 2002 improved by 6.2 points from the previous year, resulting in a reduction of 0.9 million tons of CO₂ emissions. This is mainly because measures were taken towards constant thermal output operation (improved by 0.9 points), and no long-period inspection was carried out* during the year.

*In Fiscal 2001, long-period inspection was carried out for Genkai Nuclear Unit 1 and 2 on replacing main equipment.



*1: Genkai Nuclear Unit 3 commissioning (Mar. 1994) *2: Genkai Nuclear Unit 4 commissioning (Jul. 1997)

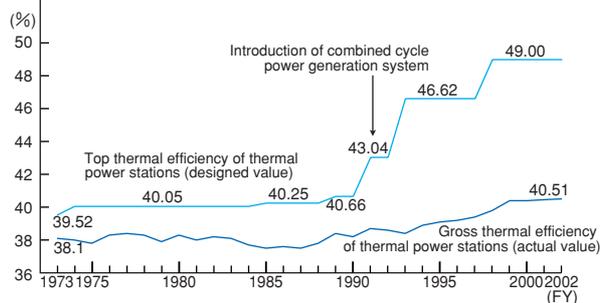
*Policy of reduction amount calculation: this amount was calculated on the assumption that electricity generated from nuclear, hydroelectric, new energy and LNG was produced only with thermal power generation excluding LNG.

Improvement of power generation facility efficiency

Kyushu Electric Power strives to improve the thermal efficiency of thermal power stations to effectively use energy resources.

- The thermal efficiency improvement of thermal power stations decreases the amount of fuel consumption, resulting in a reduction of CO₂, SO_x and NO_x emissions.
- The gross thermal efficiency for thermal power stations in Fiscal 2002 was the same as Fiscal 2001 and recorded the highest level ever. This is attributed to greater use of power stations with high thermal efficiency such as the Shin-Oita Power Station, which features the combined cycle power generation system, and Karita Power Station New Unit 1, which applies the PFBC (Pressurized Fluidized Bed Combustion) system.
- If the gross thermal efficiency at Kyushu Electric Power's thermal power stations improves by one point, the company's annual emissions can be reduced by about 450 thousand tons of CO₂ equivalent.

Changes in gross thermal efficiency at thermal power stations (generating end)



2 Promotion of use of renewable energy sources

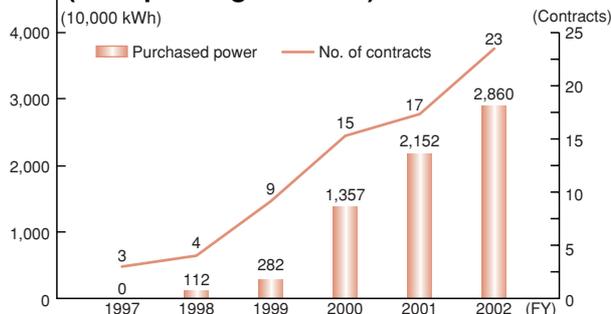
Promotion of wind and photovoltaic power generation

New energy sources such as wind and photovoltaic power are clean and inexhaustible energy, although there are still hurdles to be cleared. Obstacles include high weather-dependence; low energy density; and high generation costs.

- Kyushu Electric Power has systematically installed new energy facilities company-wide. The company also purchases electricity generated by its customers, and offers subsidies to people who install new energy facilities in their homes.
- Through the above efforts, the company's power generation with new energy sources will achieve 390 million kWh, the Fiscal 2003's targeted value set out under Renewables Portfolio Standard (Renewable Portfolio Standard: fully implemented in April 2003)

[See Related Information P52](#) for the details of Renewable Portfolio Standard

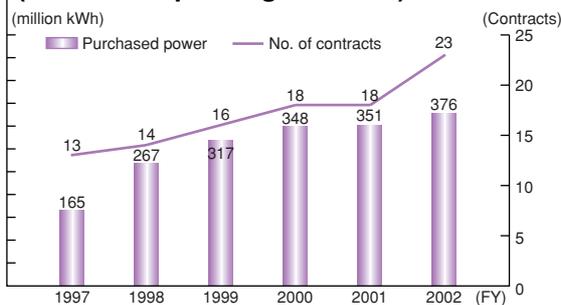
Past record of power purchase (wind power generation)



Past record of power purchase (photovoltaic power generation)



Past record of power purchase (waste-fired power generation)



C O L U M N

NO. 1

World record established at Karita Power Station New Unit 1 (PFBC) for its continuous run

Karita Power Station New Unit 1 established a world record for the length of PFBC unit's continuous run on April 3, 2003, when the boiler was stopped for a voluntary interim inspection. The number of operational hours since operation began on November 12, 2002 was recorded as

3,411 hours. This exceeded the previous world record of 2,000 hours. Karita Power Station New Unit 1 is the largest PFBC plant in the world. The steam turbine generator and gas turbine generator are 290,000kW and 75,000kW, respectively, with total output adjusted to 360,000kW.



Karita Power Station

◇ In-house installation of wind and photovoltaic power generation facilities

Kyushu Electric Power has installed power generation facilities utilizing wind and photovoltaic power within its premises. The total capacity at all facilities reached 3,575 kW by the end of Fiscal 2002.

■ Wind and photovoltaic power generation

		Installed capacity (kW)	Power generated (thousandkWh)	Utilization rate (%)
Wind power	FY 2001	1,750 (6units)	2,599	17.0
	FY 2002	3,250 (11units)	6,148*	21.6*
Photovoltaic power	FY 2001	325 (21facilities)	253	9.5
	FY 2002	325 (21facilities)	229	8.2

*The sum includes 1,500kW resulting from the trial run of five 300kW units, for which commercial operation started on March 20, 2003.

◇ Purchase of power from customers

Kyushu Electric Power purchases surplus power generated at customers' power generation facilities utilizing new energy sources, by considering its environmental value in addition to its value as electricity.

- Conditions for purchasing surplus power generated by new energy sources were reviewed on the full enforcement of Renewable Portfolio Standard.

(See the company website: www.kyuden.co.jp/company/kigyo/elec_buy/index.html for details.)

- In Fiscal 2002, Kyushu Electric Power purchased 28.60 million kWh generated by wind (23 contracts), 36.21 million kWh generated by photovoltaic methods (20,956 contracts) and 376 million kWh generated by waste-fired power generation (23 contracts).

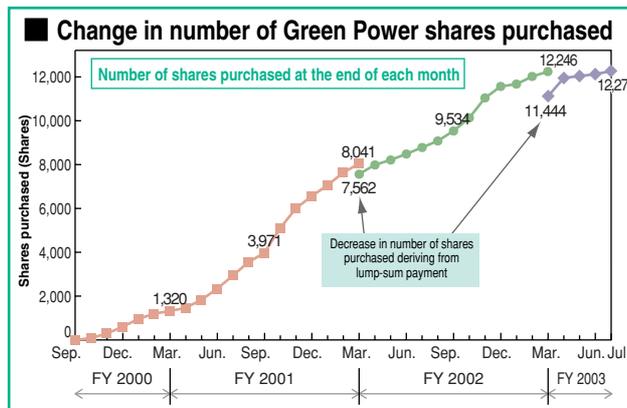
◇ Support and subsidy for wind and photovoltaic power generation Green Electric Power System (introduced in October 2000)

- This system enables customers to participate in the Kyushu Green Power Fund together with Kyushu Electric Power, thus contributing to the promotion of natural energy. Subsidies from the fund are offered to facilities employing photovoltaic or wind power generation, thereby encouraging further use of natural energy.

- The fund is managed by the Kyushu Industrial Advancement Center (KIAC).
- Kyushu Electric Power donates an amount equal to customer contributions (one share: 500 yen/month) in addition to promoting the system, receiving applications and drawing contributions from customer's bank accounts on behalf of KIAC.
- The system attracted 12,271 shares as of the end of July 2003.
- The company decided to subsidize 79,300kW from five wind power facilities and 629kW from 37 photovoltaic power facilities with a total of about 80 million yen for two years to Fiscal 2002.



Fukuro Elementary School, Minamata City (photovoltaic facility of 20kW subsidized in FY 2002)



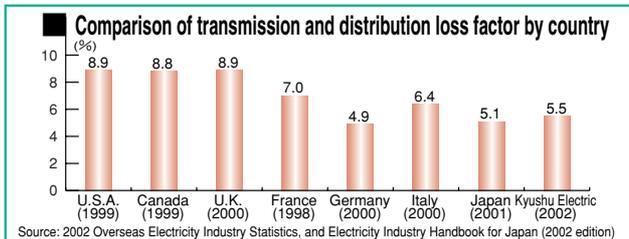
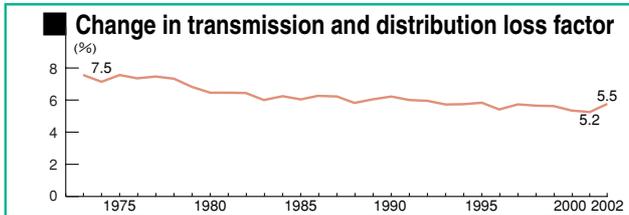
3 Measures for energy conservation

Kyushu Electric Power believes that energy conservation is not simply a matter of making choices about energy reduction, but of using energy efficiently and without waste.

Reduction of transmission and distribution loss

Kyushu Electric Power strives to conserve energy by reducing distribution and transmission loss, the energy lost, between power stations and customer premises.

- The transmission and distribution loss for Fiscal 2002 increased by 0.3 points from Fiscal 2001. However, it still maintains a high level of international standards.

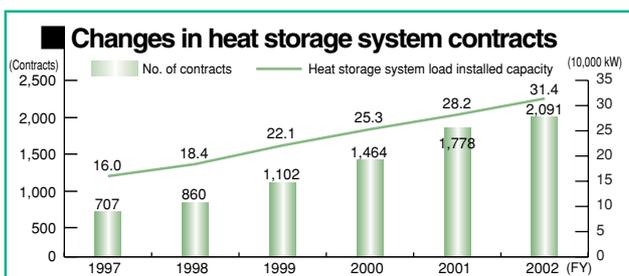


Encouragement of the use of heat storage systems and heat-pump water heaters

Kyushu Electric Power encourages the use of heat storage systems and heat-pump water heaters to make possible more efficient energy use. Increased use of the equipment, which utilizes nighttime electricity, contributes to improve operational efficiency of power stations as well as to reduce distribution and transmission loss.

◇ Heat storage system

- Through heat storage systems, the cold and thermal energy necessary for air conditioning of buildings and factories is stored in a heat storage tank in the form of ice or warm water by using cost-effective nighttime electricity, and is used during the daytime. The number of contracts for such heat storage systems at the end of Fiscal 2002 was 2,091, with a total load installed capacity of 314,000 kW.



◇ Heat-pump water heater and other equipment

- Kyushu Electric Power works towards promoting the widespread use of electric water heaters such as heat-pump types and multi-functional heat-pump types.
- "Eco-Cute", a heat-pump type electric water heater using CO₂ found in nature as a refrigerant, is a water heater in the 21st century which realizes energy conservation and coexistence with the natural environment. It provides three times better efficiency than conventional heaters, while achieving high economical efficiency by utilizing nighttime electricity.

Conserving energy in everyday business operations

As their contribution to reducing CO₂ emissions, all employees at Kyushu Electric Power practice energy saving in their everyday work practice.

◇ Reducing power consumption in offices

Energy conservation activities include switching off unnecessary lights as well as improving office facilities to reduce energy consumption.

- Kyushu Electric Power has set energy savings targets for the end of Fiscal 2006 (with an annual reduction of 1%), and is working towards achieving those targets.
- Office energy consumption in Fiscal 2002 was 108 million kWh, the same level as the previous year.
- Kyushu Electric Power strives to implement measures to reduce energy consumption wherever possible. Such measures include the use of highly-efficient lighting, modification of air-conditioning equipment, and more energy-conscious use of air-conditioning. In Fiscal 2002, nine offices under Kumamoto Branch Office implemented such measures whereas 42 offices are also participating in Fiscal 2003 to enhance the effects of those measures.

◇ Power consumption reduction achieved by offices under Kumamoto Branch Office

Power consumption reduced

Power consumption reduced (kWh)	Reduction rate (%)
188,758	1.8

*Power consumption reduced for nine offices is estimated from the actual value at certain offices.
 **Reduction rate is calculated by reduced kWh / power consumption in the offices for FY 2001 (participated offices: 10,602,354kWh) x 100

Participated offices

Kumamoto Branch Office, Kumamoto-higashi Customer Service Office, Kumamoto Power System Maintenance Offices, Tamana, Ohtsu, Kumamoto-nishi, Hitoyoshi and Yatsushiro Customer Service Offices, Yatsushiro Power System Maintenance Offices

Outline of measures

Air-conditioning	Lighting
① Flow rate adjustment of 8H system cool/hot water pumps	① Replacing induction lighting
② Change of water temperature sent to refrigerating machine	② Replacing partial lighting system
③ Control of 24H system hot water pumps with inverters	③ Replacing downlight apparatus (at the counter)
④ Cut off ambient air on pre-cooling/heating air-conditioning apparatus	④ Attachment of a human sensor to WC
⑤ Control of ambient air volume with CO ₂	—

◇ Introduction of low-emission vehicles

Kyushu Electric Power encourages reductions in vehicle fuel consumption levels by introducing clean-energy and fuel-efficient vehicles.

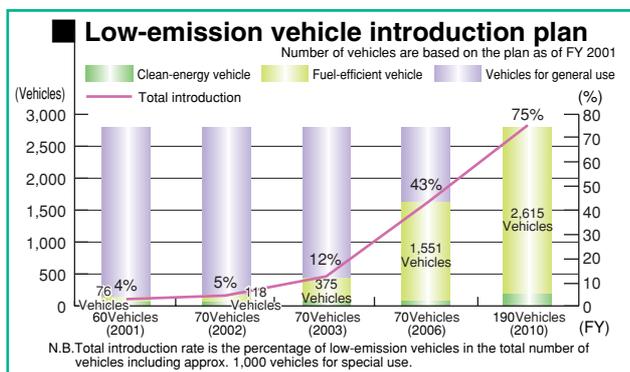
- Kyushu Electric Power plans to replace all general-use vehicles with fuel-efficient vehicles that feature both fuel savings and low emissions, by the end of Fiscal 2010. Approximately 5% of all vehicles will be clean-energy vehicles such as electric vehicles and hybrid gas-and-electric powered vehicles.
- Up to Fiscal 2002, a total of 60 electric vehicles and 10 hybrid vehicles have been introduced within the company. Among these, an electric bus designated for power-station tours developed in 1999 is one of the largest electric buses in Japan.
- In Fiscal 2002, the company started to examine CO₂ emission reductions of the hybrid vehicles in a variety of running conditions, such as urban and mountainous areas. Based on the data obtained, an effective introductory plan for clean-energy vehicles will be drafted in the second half of Fiscal 2003.

■ Examination results of hybrid and other vehicles

		Energy consumed per running distance (kcal/km)	CO ₂ emissions intensity (kg-CO ₂ /km)	CO ₂ emissions reduction rate compared to gas-powered vehicle	Fuel efficiency (km/ℓ)
Urban area	Hybrid vehicle	420	0.115	45%	20.0
	Electric vehicle	248	0.102	52%	
	Gas-powered vehicle	769	0.211	—	10.9
Mountainous area	Hybrid vehicle	503	0.138	25%	16.7
	Electric vehicle	307	0.126	32%	
	Gas-powered vehicle	670	0.184	—	12.5
Long distance	Hybrid vehicle	271	0.075	63%	31.0
	Electric vehicle	263	0.108	46%	
	Gas-powered vehicle	726	0.200	—	11.6
Total	Hybrid vehicle	422	0.116	42%	19.9
	Electric vehicle	262	0.108	47%	
	Gas-powered vehicle	731	0.201	—	11.5

※ Calculated from the operational records between July 2002 and March 2003.

※ Gas-powered vehicles refer to small-sized passenger vehicles used by Kyushu Electric Power other than fuel-efficient and clean-energy vehicles.



4 Reduction of SF₆ (sulfur hexafluoride) gas emissions

Kyushu Electric Power uses the greenhouse gas SF₆ for insulation in some of its electric equipment, and takes care not to release this gas into the atmosphere when the equipment is overhauled.

- The use of SF₆, which provides excellent insulation, is essential because there are no effective insulating gases that can be used as a substitute.

- Due to the introduction of gas recovery equipment, the SF₆ gas recovery rate (reutilization rate) during overhauls improved from 40% in Fiscal 1997 to 98% in Fiscal 2001 and 2002. In Fiscal 2002, SF₆ of the equivalent of 432,000 tons of CO₂ was recovered.
- The SF₆ gas recovery rate on the equipment dismantlement recorded 99% for Fiscal 2002, and SF₆ of the equivalent of 48,000 tons of CO₂ was recovered.

■ SF₆ gas recovery during overhauls in FY 2002 (CO₂ equivalent*)

	Total SF ₆ gas (CO ₂ equivalent)	Recovered SF ₆ gas (CO ₂ equivalent)	Recovery rate
At equipment introduction	18.37tons (439,000 tons)	18.05tons (432,000 tons)	98%
At equipment dismantlement	2.0tons (49,000 tons)	2.0tons (48,000 tons)	99%

※ Figures are obtained by converting the weight of SF₆ gas to the weight of CO₂ by applying the global warming potential for SF₆ (23,900).

5 Towards Kyoto Mechanism utilization

The Kyoto Mechanism is expected to complement greenhouse gas reduction measures in Japan. Kyushu Electric Power has joined the World Bank's Prototype Carbon Fund, aiming to obtain expertise in the use of the Kyoto Mechanism in advance.

[See Related Information P53](#)

6 Ozone layer protection

Kyushu Electric Power takes measures to avoid disruption of the ozone layer through reducing specific Freons emissions.

- Kyushu Electric Power's specific Freons and other emissions (specific Freons and carbon tetrachloride) have been zero, except for a minute amount of natural leakage, since Fiscal 2000. These achievements were made possible by measures such as washing work clothing with water instead of dry-cleaning, and changing generator refrigerant.
- Future tasks include ensuring the collection of regulated Freons upon equipment inspections and removals, as well as installing regulated Freon-free equipment upon replacing or newly introducing the equipment.

