Ⅱ Addressing Environmental Activities

Ⅱ－1 Measures for Global Environmental Issues

1 Promoting Optimal Combination of Power Sources and New Energy Sources

Kyushu Electric Power promotes a well-balanced, optimal power source combination by placing nuclear power at its core, and by considering the reliability of power supply, economy and global environmental issues in a comprehensive manner. In addition, the company focuses on improving thermal efficiency as well as reducing CO_2 emission.

■ Power source composition target and achievement

		Composition of power source facilities	FY2002 record	Composition of electric power production	FY2002 record
Nuclear		Approx. 30%	23%	45～50%	45%
Renewable energy (geothermal, hydro, new energy)		Approx. 10%	9%	Approx. 10%	9%
Pumped storage		Approx. 10%	5%		
Thermal	Coal	Share the remaining 50 % equally	18%	Share depending on fuel situation	22%
	LNG		21%		17%
	Oil		24%		7%

1 Measures for CO_2 emission reduction by each power source

Nuclear power

Nuclear power is excellent for supply reliability and economy, and produces less environmental loads such as CO_2. The development of nuclear power generation is promoted as a base-load power source, while regarding safety with the utmost importance. To further utilize nuclear power, measures have been taken towards constant thermal output operation.

Thermal power

Kyushu Electric Power strives to increase the procured amount of LNG, for which CO_2 emission intensity is lower than other fossil fuels used for thermal power generation, while further pursuing improved overall thermal efficiency.

Renewable energy sources

◇Hydroelectric and geothermal power generation

In consideration of the environmental aspects of site selection and the economy, Kyushu Electric Power systematically promotes further R&D on hydroelectric and geothermal power generation. These methods constitute renewable, domestic energy sources of excellent environmental capability.

◇New energy sources

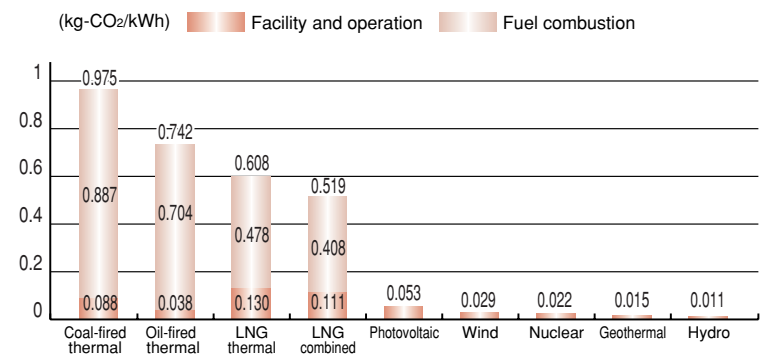
The promotion of new energy sources, such as wind and photovoltaic power, has been pushed through Renewable Portfolio Standard (RPS) system and the Green Electric Power System.

Cape Noma Wind Park Power Station

COLUMN NO.8 CO_2 emission intensity per each power source during its lifecycle

CO_2 is emitted not only during fuel combustion for power generation, but also during other energy-consuming work such as constructing power stations, mining, transporting and refining fuel, as well as waste treatment. The chart shows the figures that are obtained by dividing the CO_2 emitted during the lifecycles of the stations including combustion and construction, by the amount of power production. Nuclear power generation is noted for its advantages in addressing global warming since its comprehensive CO_2 emission is significantly lower even when such indirect CO_2 emissions are taken into account.

■ CO_2 emission intensity per power source



N.B. CO_2 emissions were calculated including all energy consumed for mining materials, constructing generation facilities, transporting and refining fuel, and operation and maintenance, in addition to burning fuels for generation. The figures for nuclear power were calculated to include current plans for domestic reprocessing of spent fuel, plutonium use in thermal reactors (assuming there is only one recycling process) and the disposal of high-level radioactive waste. CO_2 emissions from uranium enrichment were calculated based on the ratio of enrichment performed domestically and abroad. Meanwhile, if assumed that all enrichment was completed domestically, the figure 0.010 would be obtained for nuclear power CO_2 emissions. (Prepared based on a report by the Central Research Institute of Electric Power Industry)

2 Compliance with the Renewable Portfolio Standard (RPS)

Kyushu Electric Power will achieve the amount of renewable energy utilization for Fiscal 2003 required by the Renewable Portfolio Standard (fully enforced in April 2003). Continuous efforts will be made to clear the required amount, which is increased yearly until Fiscal 2010, by promoting the use of renewable energy. Measures include the development of power sources which can be used to satisfy the RPS levels, such as conducting demonstration tests of binary cycle power generation and bidding for wind power, as well as promoting purchases of power generated by other utilities from targeted power sources.

Estimated figures of required renewable energy utilization

Unit: 100 million kWh

FY	2003	2004	2005	2006	2007	2008	2009	2010
Japan	32.8	35.7	38.6	41.5	44.4	64.2	88.9	122.0
Kyushu Electric	3.9	4.2	4.5	4.7	5.0	6.4	8.3	11.0

*Figures for FY 2003 are required amount
Source: Agency of Natural Resources and Energy materials

COLUMN NO.9 What is the Renewable Portfolio Standard (RPS: enforcement in April 2003)?

The Renewable Portfolio Standard (RPS) is a regulation established to further enhance the use of renewable energy such as wind and photovoltaic power. Under the regulation, electric utilities are required to utilize a certain amount of electric power generated from renewable energy.

○Targeted energy sources
Wind, photovoltaic, and geothermal power with the generation systems that do not significantly reduce the amount of hot water (thermal power source); hydroelectric power generation of under 1,000kW without use of dams; biomass (power generation from organic materials derived from plants and animals).

○Required amount
For each fiscal year, electric utilities are required to utilize a certain amount of renewable energy set by the Minister of Economy, Trade and Industry. The amount is decided as a ratio to each electric utility's electric sales for the fiscal year by taking into account each electric utility's targeted figures. The required amount for Kyushu Electric Power in Fiscal 2003 is 390 million kWh.

○Options to clear the required amount
- Generate and supply electric power generated from renewable energy by each electric utility.
- Purchase and supply electric power generated from renewable energy by other electric utilities
- Purchase "Renewable Energy Credits (a certificate of proof that one kWh of electricity has been generated by a renewable-fueled source)" from other electric utilities.

○Advice and order
If the electric utility fails to implement the duty without good reason, the Minister of Economy, Trade and Industry can order them to fulfill its duty in a certain period. Penal regulations (a fine of max. one million yen) are applied to those which fail to comply with the order.

Promotion of binary cycle power generation

Kyushu Electric Power actively promotes the binary cycle power generation, a new generation system utilizing geothermal energy.

◇Outline of binary cycle power generation

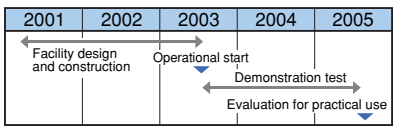
In the binary cycle power generation system, Pentane or other mediums which have a low boiling point are heated by steam/hot water (geothermal energy) obtained from steam wells. Steam generated from the heated Pentane, or other mediums, then rotate the turbine to generate electricity. The system uses two cycles: the steam/hot water cycle which collects thermal energy from the steam well, and the medium cycle which rotates the generator turbine with the steam produced by the steam generator. The system is thus called "binary" cycle power generation system. Conventional thermal power generation system, on the other hand, consists of only one cycle which rotates the generator turbine with the steam obtained directly from steam/hot water. The binary cycle power generation system enables effective use of geothermal energy by utilizing steam/hot water of low temperature, which cannot produce enough steam for rotating generator turbine.

◇Outline of binary cycle power generation experimental study

Kyushu Electric Power is conducting an experimental study on the binary cycle power generation system at its Hachobaru Geothermal Power Station, (Kokonoe Town, Oita), aiming to establish the reliability of equipment for the system.

- Study period: Fiscal 2001-05 (5 years)
- Output: 2MW

Experimental study schedule for binary cycle power generation at Hachobaru Power Station



Hachobaru Geothermal Power Station

Comparison of binary cycle and conventional power generation systems