Environmental Protection Activities of Hokuriku Electric Power Company

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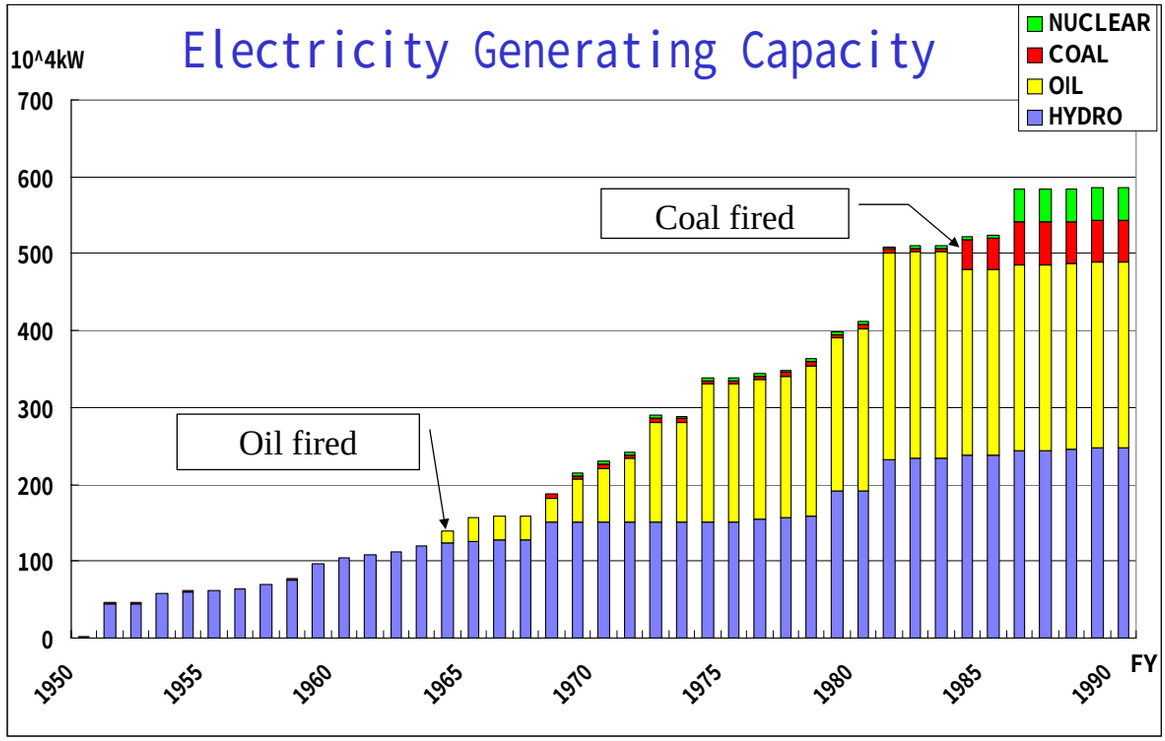
Environmental Protection Activities of Hokuriku Electric Power Company

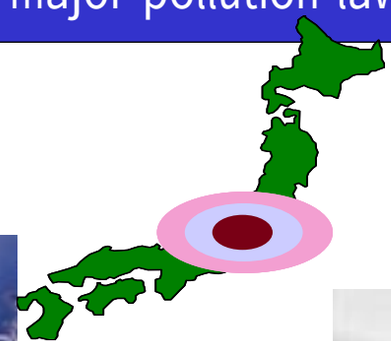
Subtopics

1. Historical efforts in the pollution control

2. Current efforts against global warming issue and activities toward recycling-oriented society



Around 1960
public movement against water and air pollution was so big a problem
to develop into major pollution lawsuits.



Water Pollution

Air pollution

Social interest

Pollution caused by heavy industries in a rapid economic growth period. (1960～1972)

→ Deterioration of urban environment in a stable economic growth period. (1973～1984)

Environmental issue

- itai itai disease
- minamata disease
- Yokkaichi Asthma

(1955～1965)

- Photo chemical smog (1970)
- Severe air pollution
- PCB contamination

Environmental protection laws and actions

- Water Control Law (1958)
- Smoke Control Law (1962)

Basic Pollution Control Law (1967)

Air Pollution Control Law (1968)

Water Pollution Control Law (1970)

Environmental Agency founded (1971)

Regulation of total SOx,COD,NOx emission (1974～1981)

SOx Control facilities

1960s	1970s	1980s	1990s

【JAPAN】

- 1963 Research and Development of Wet-Type desulfurization
- 1972 Research at Test Plant → 1973 Establishment of Full-Scale Facilities
- 1963 Research into Dry-Type desulfurization
- 1966 Research at Test Plant → 1973 Establishment of Full-Scale Facilities
- Activated Carbon Method / Active Manganese Oxide Method: 1967 Research at Test Plant

【Hokuriku EPCo】

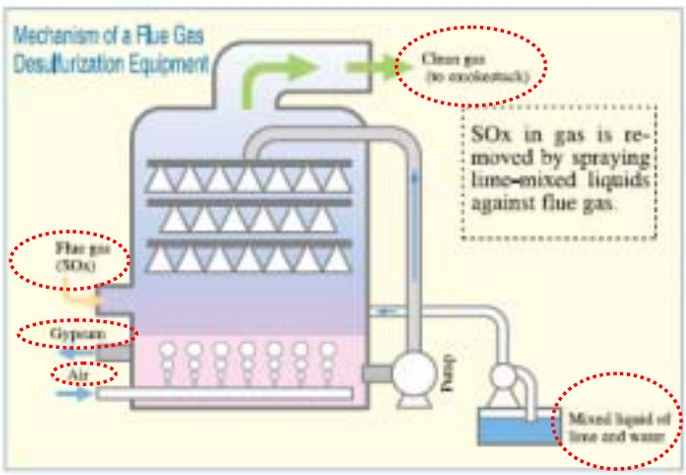
- ▼1974 Half Capacity FGD
- ▼1975 Full Capacity FGD

FGD（Flue Gas Desulfurizer）

●Measures for Reduction in SOx

Flue gas desulfurization equipment (wet type limestone-gypsum method) is installed to remove SOx.

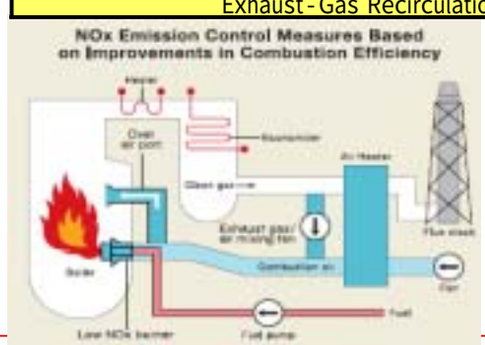
Flue gas desulfurization equipment
(Tsuruga Thermal Power Station)



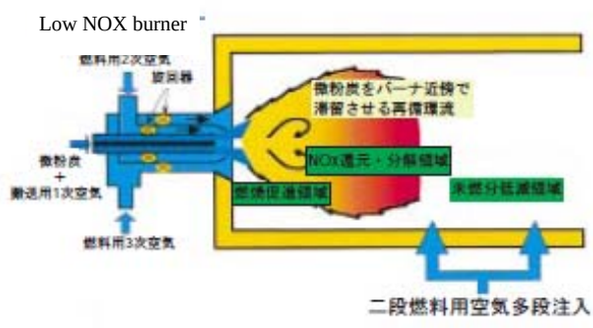
The gypsum generated from the desulfurizer as a by-product is recycled as cement material and gypsum board.

NOx Control facilities

	1970s	1980s	1990s
【JAPAN】			
1972	Use of Two-Stage Combustion and Exhaust-Gas Recirculation		
1973	Development of Low-NOx Burner Facilities		
1973	Research and Development of Flue Gas Denitrification		
1977	Beginning of Research Operation for Practical Application		
1977	Introduction of Flue Gas Denitrofication Facilities		
【Hokuriku EPCo】			
▼1973	Use of Two-Stage Combustion		
▼1974	Exhaust-Gas Recirculation		
▼1978	Low-NOx Burner Facilities		
▼1981		Flue Gas Denitrofication Facilities	



Low NOX burner

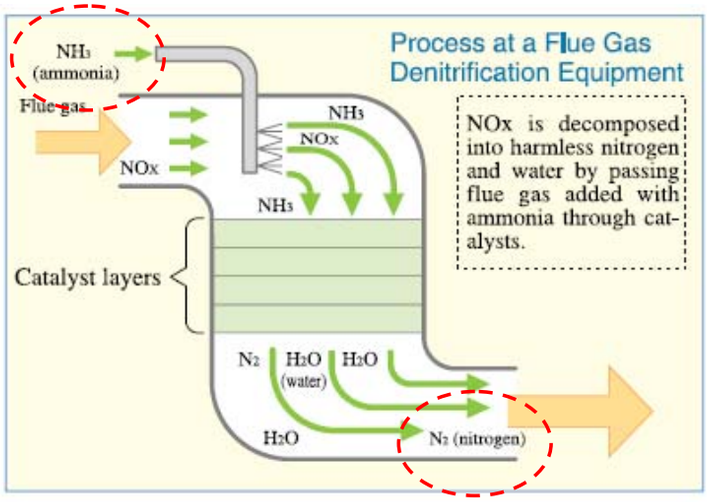


S C R (Selective Catalyst Reduction) Denitrification Equipment

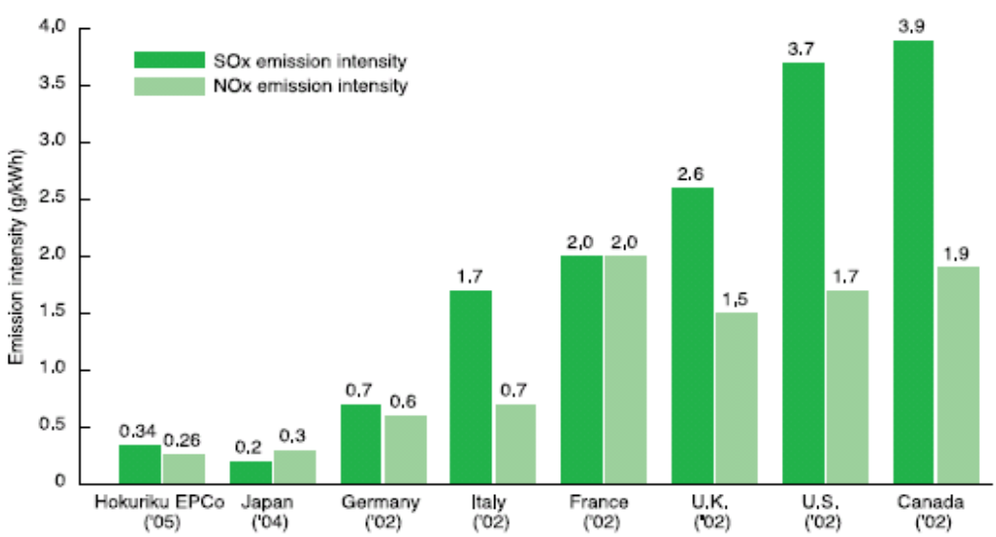
Measures to Reduce NOx

Flue gas denitrification equipment is installed to remove NOx.

Flue gas denitrification equipment
(Tsuruga Thermal Power Station)



SOx and NOx Emission Intensities in OECD Countries



SOx and NOx emission intensities: SOx and NOx emissions per 1 kWh of electricity generated by a thermal power station.
Source: Emissions = OECD Environmental Data Compendium 2004
Electricity generated = ENERGY BALANCES OF OECD COUNTRIES 2002-2003
Japan = Surveyed by the Federation of Electric Power Companies (10 electric power companies + Electric Power Development Co., Ltd.)

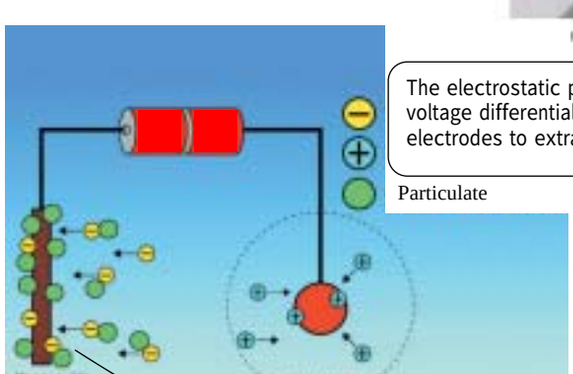
Electrostatic Precipitator

Measures to Reduce Soot and Dust

We have installed the electrostatic precipitators that use static electricity to control the production of soot and dust

We take measures not to allow airborne particulates of coal to fly away from coal-storage yards, such as water spraying and installation of wind blocking fences.

6c precipitator (Toyaga Thermal Power Station)

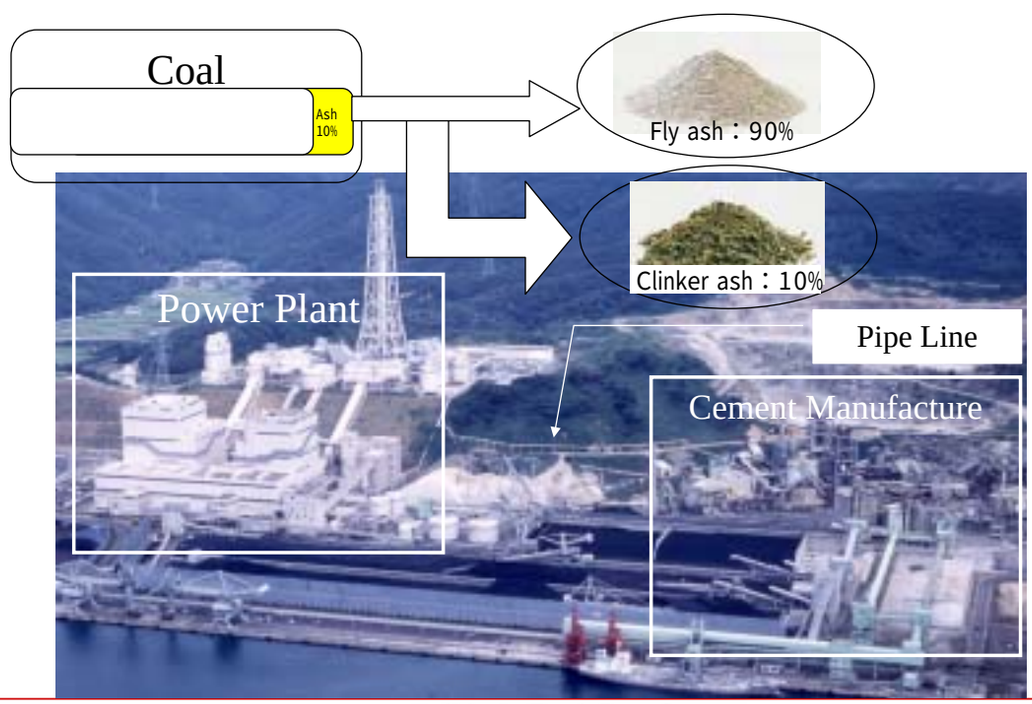


The electrostatic precipitator uses a voltage differential between two electrodes to extract and collect particulates

Particulate

Fly ash

The ash collected by electrostatic precipitator is used as cement material.

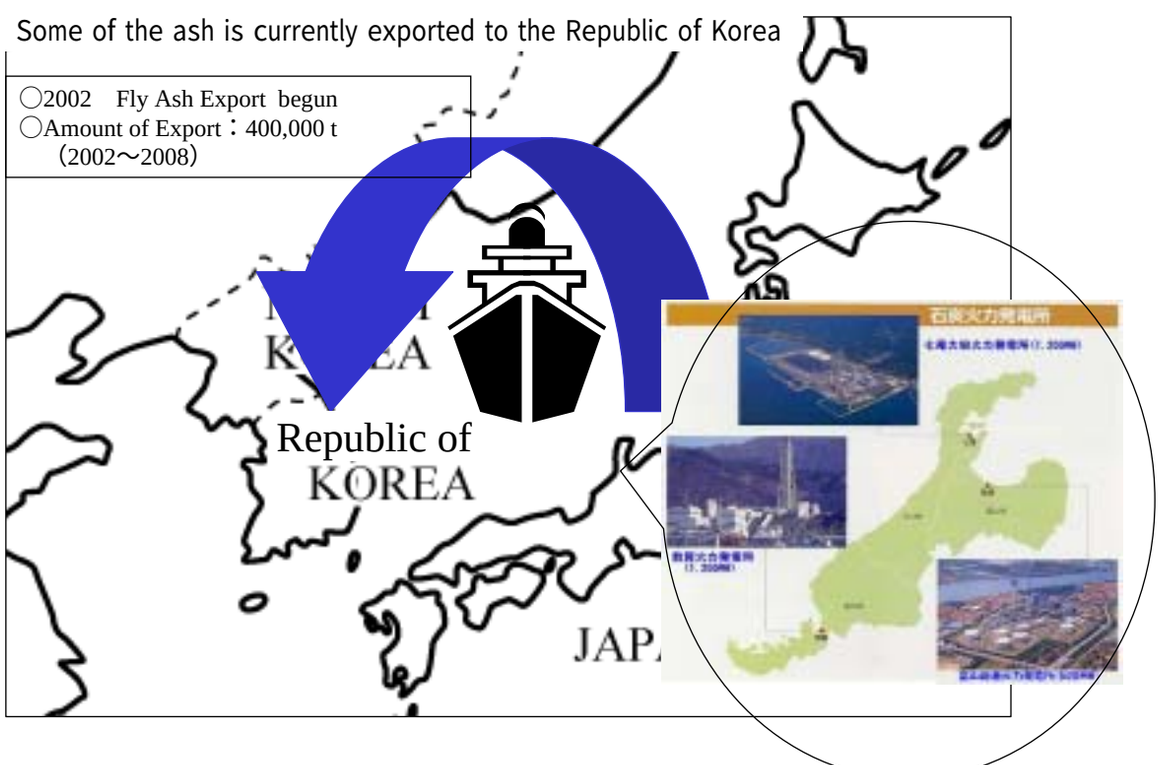


Fly ash

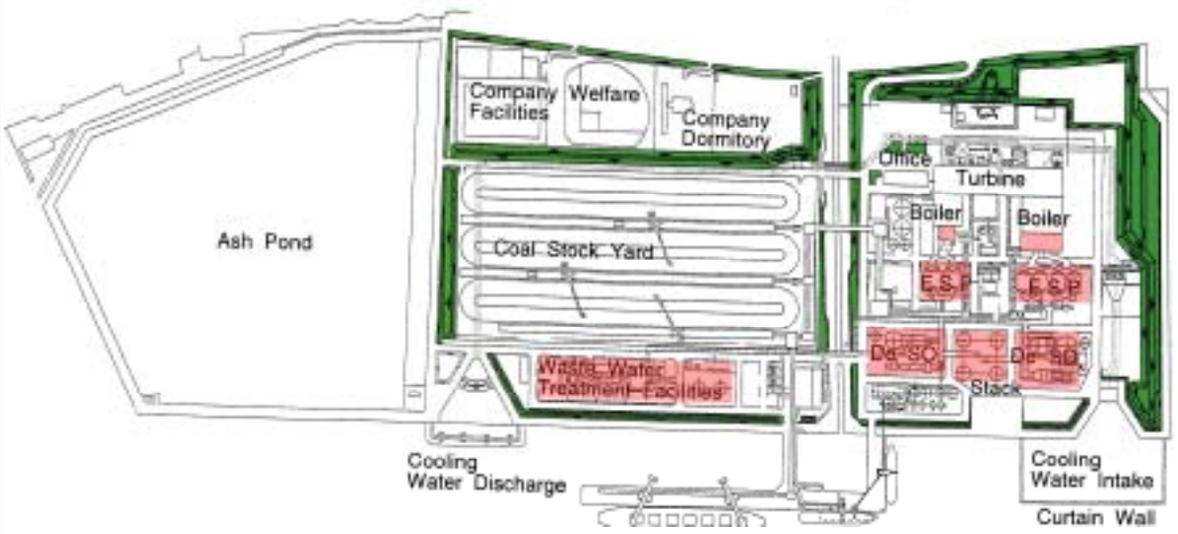
Clinker ash：10%

Some of the ash is currently exported to the Republic of Korea

○2002　Fly Ash Export begun
○Amount of Export：400,000 t
（2002～2008）



Environment Protection Facilities and Tree-Planted Zone at Nanao



Nanao No.1 500MW

Nanao No.2 700MW

CASOX FGD Process (Demonstration Test)

1. Specification

- **Flue Gas Flow Rate : 500m^{3}N/h**
- **SO2 Removal Efficiency : 90 %**
- **Reactor Size : 280mmφ**
- **Max. Catalyst Bed Height : 6000mm**

2. Test Period

February, 1999～March, 2001

3. Location

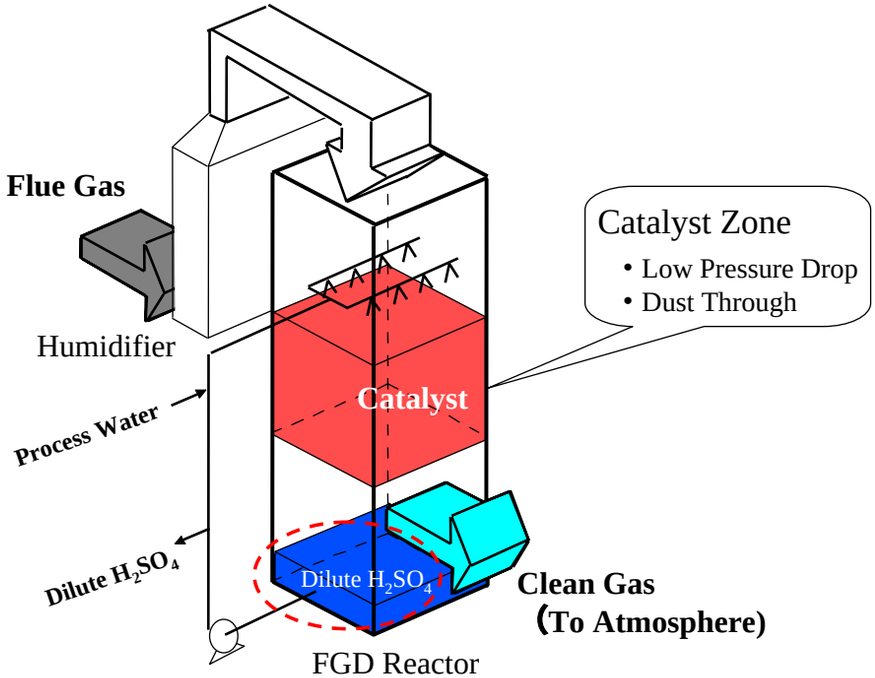
Toyama Shinko Thermal Power Station
Hokuriku Electric Power Company

Commercial Plant

1. Specification
   - Flue Gas Flow Rate
     37,000 m3N/h
   - Inlet SO2 Concentration
     1,500 ppmw
   - SO2 Removal Efficiency
     more than 99.7%
2. Scale-up ： about 74 Times
3. Operation Start ： 2002
4. Application ： Refinery Industry
5. Location ： Osaka

No.1 Plant , where CASOX was first installed

CASOX FGD Process



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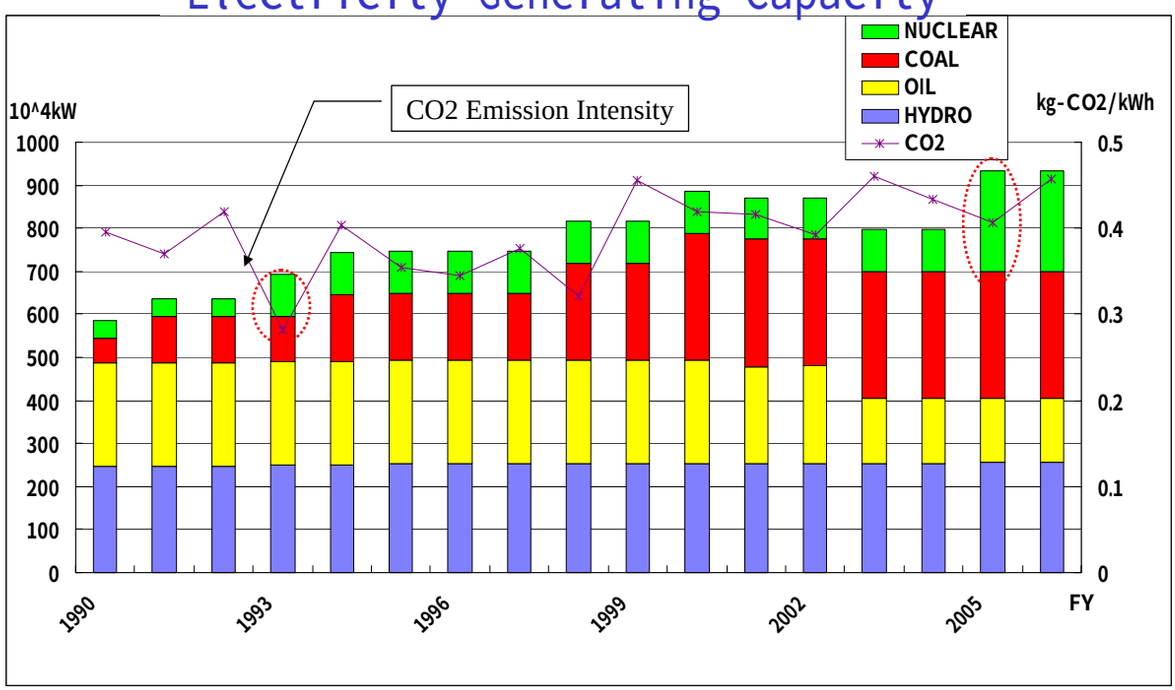
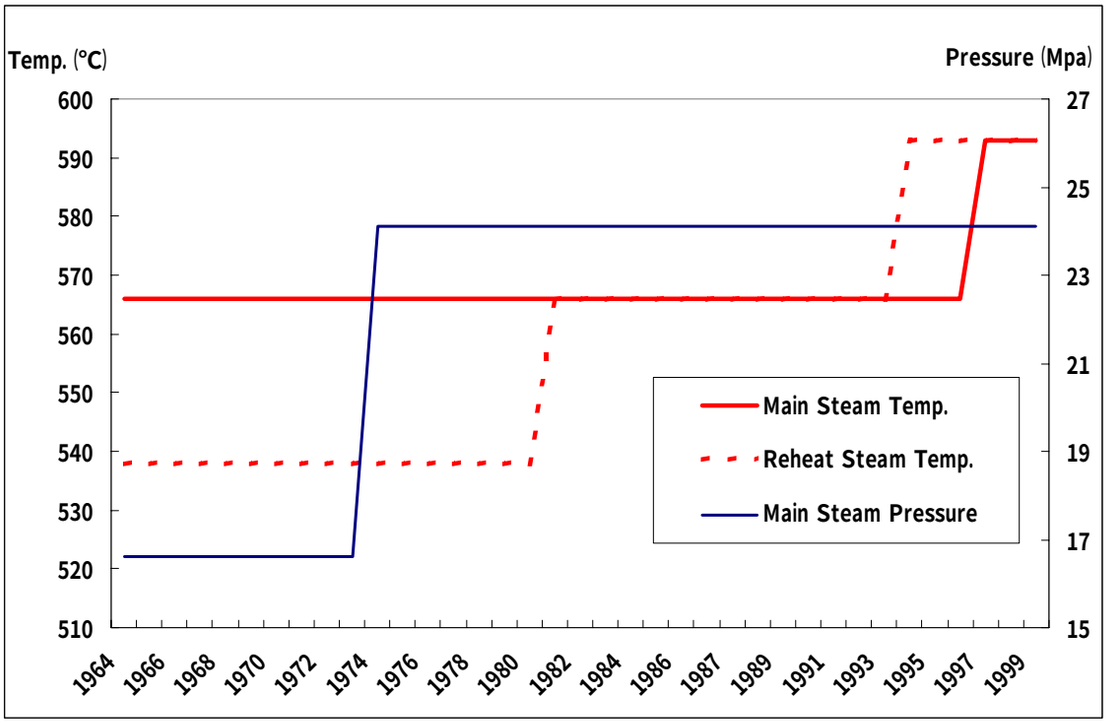
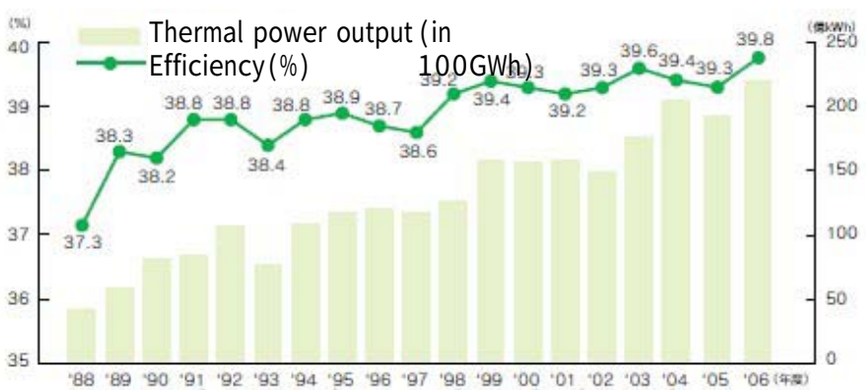
Electricity Generating Capacity



Improvements in Temperature & Pressure at the inlet of Turbines



Thermal power plant efficiency improved



↑ Tsuruga 1 500MW

↑ Nanao1 500MW

↑ Nanao 2 700MW

↑ Tsuruga 2 700MW

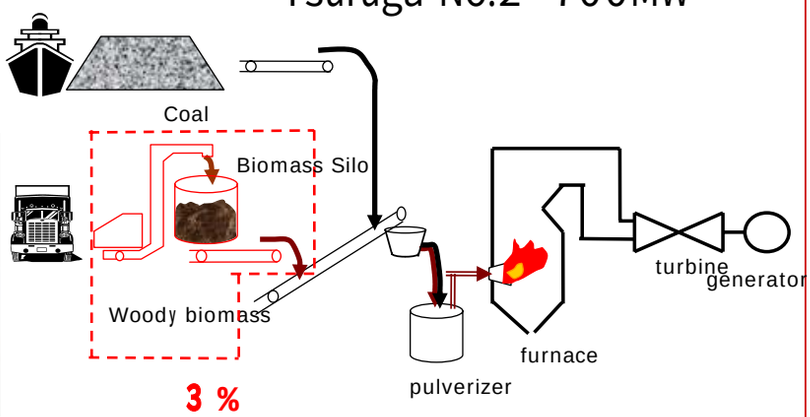
High efficiency plants in commission

※Efficiency：higher heating value standard

Introduction of Renewable Energy

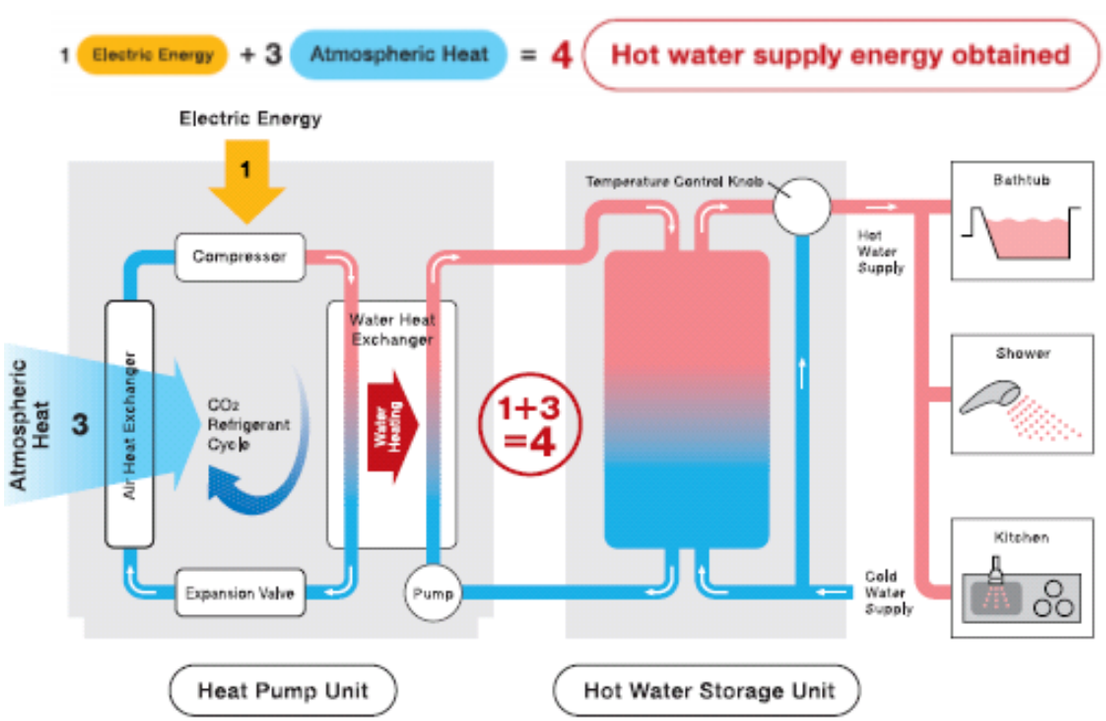
•Start-up co-combustion of woody biomass in the coal-fired power Plant

Tsuruga No.2　700MW



•Develop a wind farm and purchase power from wind projects

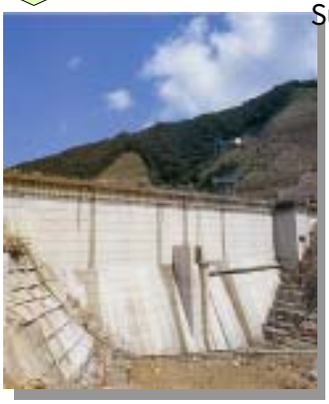
Heat Pump with high COP



Promoting 3R (Reduce, Reuse, Recycle)

Ash

Subbase fillings



Cement Material

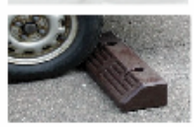
Used Insulator

Subbase fillings

Safety cover

Recycle

Plastic Products



Promoting 3R (Reduce, Reuse, Recycle)

(t)

Item	Quantity generated	Efficiently used amount	Efficiently used rate
Coal ash	757,566	757,566	100.0%
Ashes of fuel and oil	1,160	1,160	100.0%
Gypsum	196,905	196,905	100.0%
Waste plastics for power distribution	7,412	6,976	94.1%
Scrapped wires and scrap iron	11,070	11,015	99.5%
Insulator scraps	342	237	69.3%
Scrapped concrete poles	4,350	4,350	100.0%
Others	38,645	32,403	—
Total	1,017,450	1,010,612	99.3%

Recycling plastics

プラスチック製容器包装

wraps, bottles…etc
from households

再生プラスチック（左：ペレット と 右：フレーク）

Recycled plastics

Since 2002

Recycling paper

In the course of paper recycling, document confidentiality is guaranteed.

Erasing

Recycling

Secure
storage

Pick up
from offices

Products

since 2000

Thank you

Hokuriku Electric Power Company