

# ELECTRICITY REVIEW JAPAN

2008

The Federation of  
Electric Power Companies of  
Japan



# History of Japan's Electric Power Industry

Electricity was first used in Japan on March 25, 1878 at the Institute of Technology in Toranomom, Tokyo when an arc lamp was switched on in commemoration of the opening of the Central Telegraph Office. Eight years later in 1886, Tokyo Electric Lighting commenced operations as the nation's first electric power company, and began supplying electricity to the public in the following year.

In the early days, electricity was used primarily for lighting and gradually found broader applications as a power source. By 1896, the number of electric utilities established throughout the nation reached a total of 33, and the number of electric lights with a power supply increased to 120,000.

The early 20th century marked the establishment of long-distance transmission technology. As larger power plants were introduced, generation costs fell and electric lights came into wider use throughout the country. Consequently, electricity became an indispensable power source for industry as well.

In the years that followed, the electric power industry grew in tandem with the modernization and development of Japan's industry. At the same time, the industry experienced a major restructuring that led to the dissolution of 700 electric utilities, which merged to create five major electric utilities after the First World War. During the Second World War, the electric power industry was completely state-controlled and utilities were integrated into Nihon Hatsusoden Co. (a

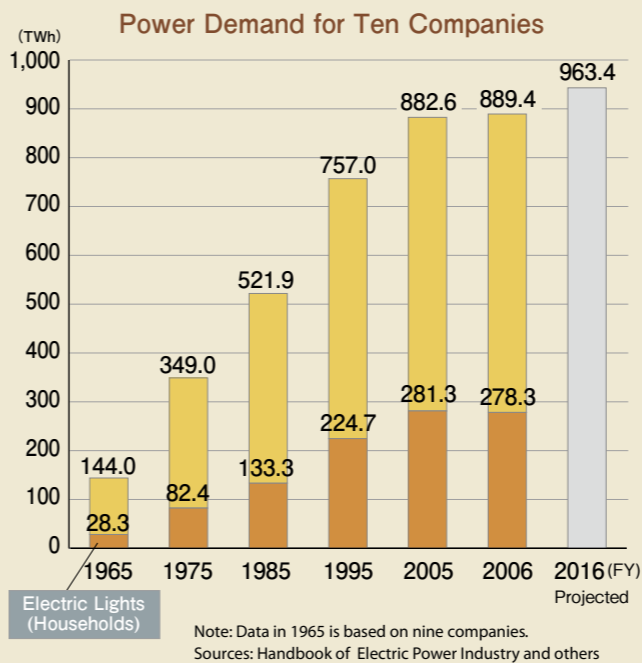
nationwide power generating and transmitting company) and nine distribution companies.

By the end of the war in 1945, Japan's electric power facilities had been destroyed by bombing during the conflict or had deteriorated from overuse. While restructuring of the industry was being discussed, the Korean War broke out in 1950. The resulting war boom allowed utilities to recover rapidly, and as a result, nine regional private electric power companies (Hokkaido, Tohoku, Tokyo, Chubu, Hokuriku, Kansai, Chugoku, Shikoku and Kyushu) were established in 1951. This structure remains to this day, and with the return of Okinawa to Japan in 1972, Okinawa Electric Power Co. joined as a tenth member.

In March 2000, partial liberalization of power retail supply for extra-high voltage users started. The Electricity Industry Committee (an Advisory Committee for Natural Resources and Energy, a consultative body to the Minister of Economy, Trade and Industry) verified the current scheme and discussed how the electric power industry should operate in the future. In conclusion, the committee proposed the establishment of a Japanese model of liberalization, which is based on fair competition and transparency while maintaining a vertical integration of generation, transmission, and distribution in the light of a stable supply of electricity. As a result, the revised Electricity Utilities Industry Law was promulgated in June 2003 and the scope of liberalization was

expanded twice, once in April 2004 and again in April 2005.

Today, the ten electric power companies that make up the membership of the Federation of Electric Power Companies (FEPC) provide reliable electricity supplies to the entire nation. As in the past, the industry continues to grow and change, with issues such as environmental preservation and market liberalization.



C O N T E N T S	
Japan's Energy Background	2
Ten Electric Power Companies & Market Liberalization	4
Electric Power Development	6
Electric Power Sources	8
Nuclear Fuel Cycle	10
Environmental Preservation	12
International Exchanges	17
Location of Power Plants	18
FEPC	20
Data	21
Business Addresses	28

Note:  
Nine Companies include Hokkaido, Tohoku, Tokyo, Chubu, Hokuriku, Kansai, Chugoku, Shikoku and Kyushu.  
Ten Companies include the above Nine Companies plus Okinawa.



Japan's Vulnerable Energy Supply Situation

Resource-poor Japan is dependent on imports for 96% of its primary energy supply; even if nuclear energy is included in domestic energy, dependency is still at 81%. Thus, Japan's energy supply structure is extremely vulnerable. Following the two oil crises in the 1970s, Japan has diversified its energy sources through increased use of nuclear energy, natural gas and coal, as well as the promotion of energy efficiency and conservation. Despite these improvements, oil still accounts for about 50% of Japan's primary energy supply, and nearly 90% of imported oil comes from the politically unstable Middle East. Moreover, prospects for importing electricity from neighboring countries are very poor because Japan is an island nation. Finally, there are growing concerns about environmental problems due to

energy use and the need to reduce carbon dioxide emissions to cope with global warming. Therefore, Japan's energy situation forces the country to focus on the two prime concerns of energy security and environmental preservation.

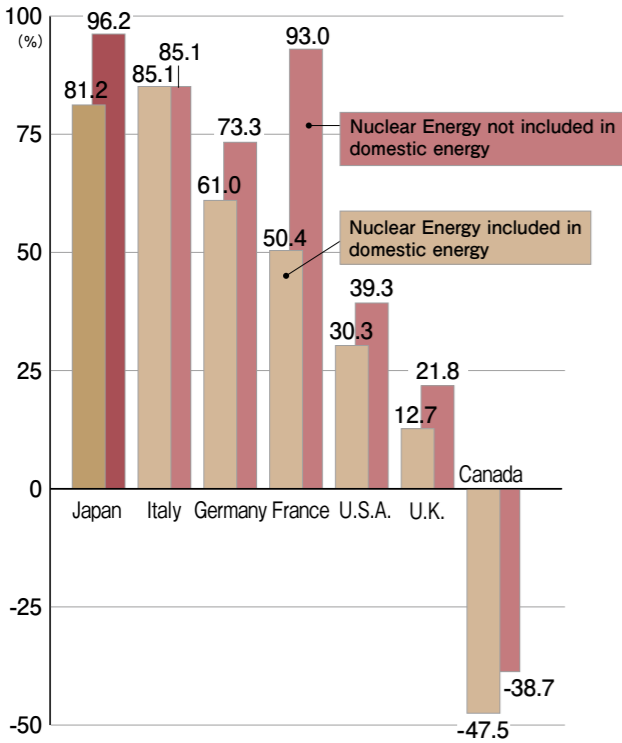


LNG Tanker



Coal Storage Yard

Dependence on Imported Energy Sources by Major Countries (2005)



Source: IEA, "Energy Balances of OECD Countries, 2004-2005"

Japan's Reliance on Middle East Crude Oil of Total Imports



Source: Petroleum Association of Japan

Japan's Energy Policy

On the basis of this energy situation, the Basic Law on Energy Policy Making was promulgated by the national government in June 2002. Such a comprehensive law had never existed before in Japan. The law has three overarching objectives on energy supply and demand:

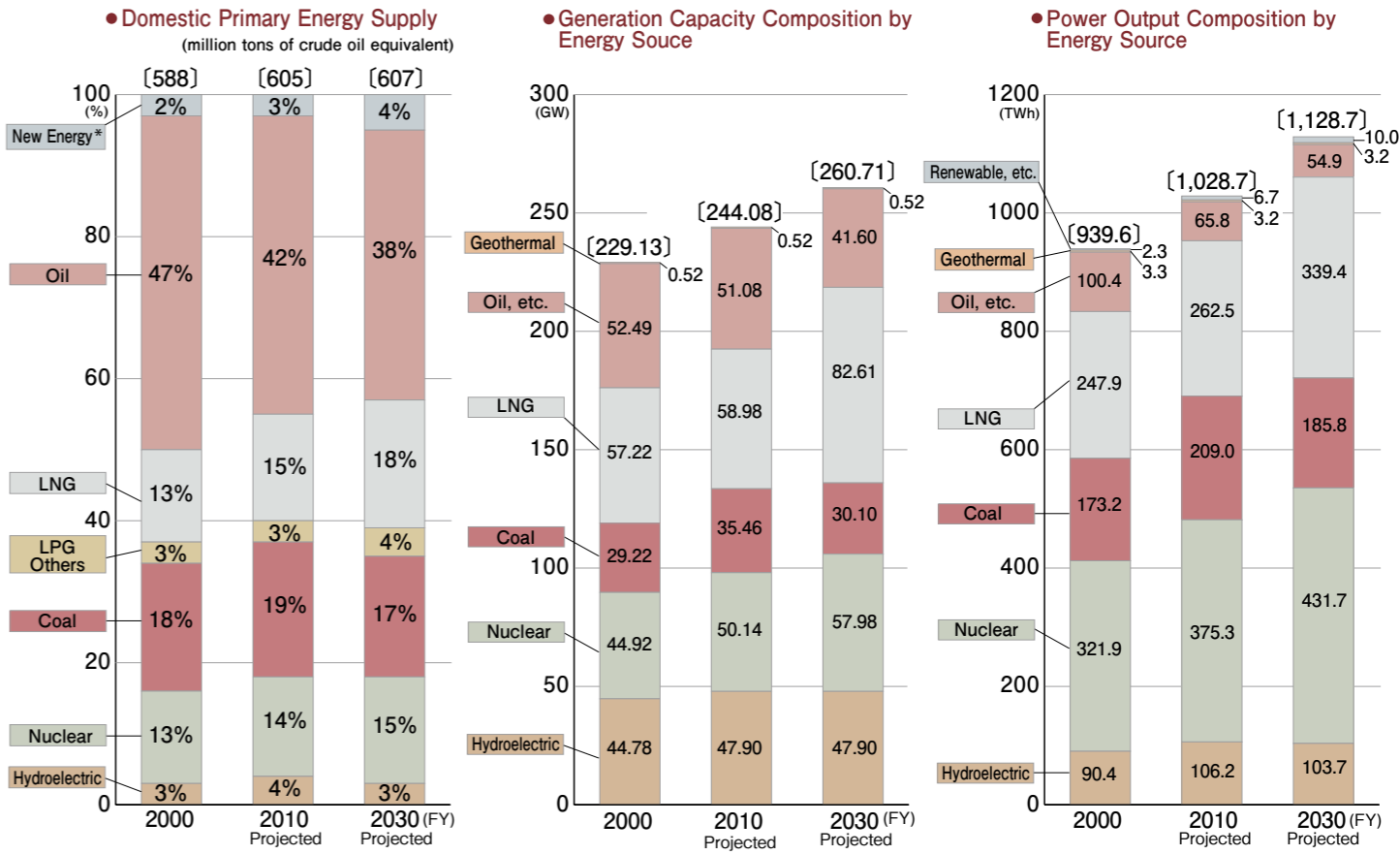
- 1) Securing a stable supply,
- 2) Ensuring environmental compatibility,
- 3) Increasing the role of market principles, which should be coordinated with the first two objectives.

In March 2005, the Energy Supply and Demand Subcommittee of the Advisory Committee for Natural Resources and Energy to the Minister of Economy, Trade and Industry (METI) announced the Long-term Energy Supply and Demand Outlook. This states that energy demand will increase at a lower rate and reach its peak in fiscal 2021, after which demand will then decrease.

According to projections, the energy supply structure will gradually change, with increased demand for natural gas due to the expansion of dispersed generators. Nuclear power, which is deemed a base-load power source, will retain a stable share of total supply.

In response to the recent changes of supply and demand structure and diversifying risks in the international energy market, METI drafted the New National Energy Strategy in May 2006. This presents Japan's long-term energy strategy centering on the reinforcement of energy security, and stipulates numerical targets such as improving energy efficiency by no less than 30% by 2030. Regarding nuclear energy, the goal is to maintain the share of power output from nuclear energy at the level at least 30% – 40% by 2030 and thereafter.

Long-term Energy Supply & Demand Outlook -Reference Case-

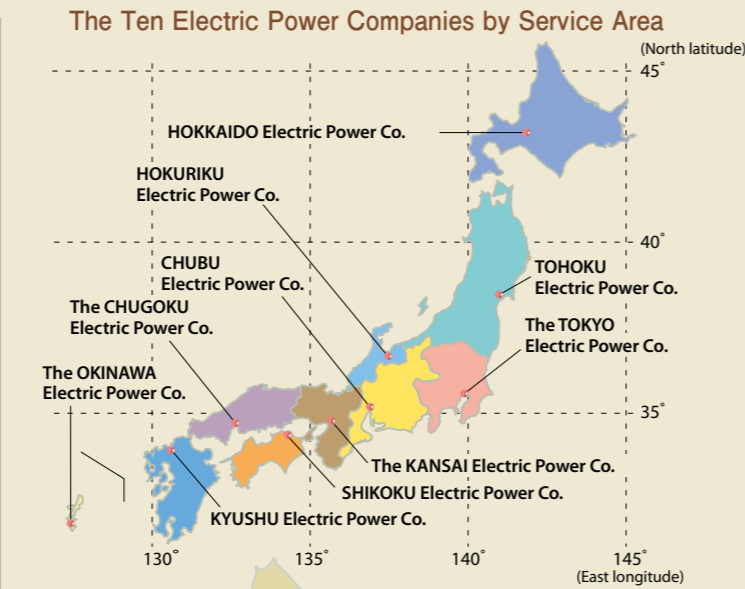


(\*)most renewable energies including waste power generation  
Note: Figures do not necessarily total to 100% due to rounded numbers.

Sources: the Energy Supply and Demand Subcommittee of the Advisory Committee for Natural Resources and Energy

## Ten Electric Power Company Structure

The ten privately-owned regional electric power companies in Japan are responsible for providing local operations from power generation to distribution and supplying electricity to their respective service areas. In addition, the ten electric power companies cooperate with each other to ensure a stable supply to customers nationwide. For example, the electric power companies work together to exchange or provide electricity in order to cope with emergency situations resulting from accidents, breakdowns, or summer peak demand. To ensure the smooth operation of power exchange, extra-high voltage transmission lines link the entire country from Hokkaido in the north to Kyushu in the south.



## Fair Competition and Transparency

The electric power market in Japan is gradually being liberalized, while the existing regional ten electric power companies, as “responsible entities,” continue to handle their overall operations of generation, transmission, and distribution to ensure the stable supply of electricity.

Japan has chosen to liberalize the electric power market in stages. In March 2000, the retail market was partially liberalized to allow power producers and suppliers (PPSs) to sell electricity to extra-high voltage users whose demand is approximately over 2MW. From April 2005, the scope of liberalization was expanded to all high-voltage users whose demand exceeds approximately 50kW. All customers in the regulated market continue to receive electricity supplied by each regional electric power company that is responsible for supplying electricity within its designated service area.

From April 2007, the pros and cons of total electric power liberalization were studied by the Electricity Industry

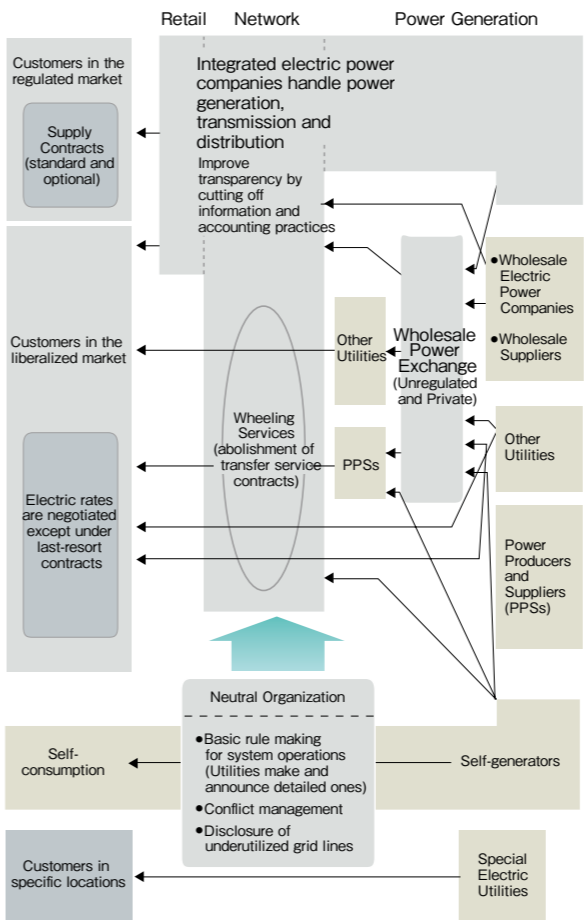
Committee (an Advisory Committee for Natural Resources and Energy, a consultative body of the Ministry of Economy, Trade and Industry). The Committee concluded that total liberalization was unlikely to benefit customers under the present situation, and so the idea of expanding the scope of liberalization was abandoned for now and will be subjected to future reviews after a certain period (approximately five years).

To ensure fair and transparent operations of electric power transmission and distribution, the Electric Power System Council of Japan (ESCJ) was established as a rule-maker and supervisor and started full-scale operation on April 1, 2005. In addition, Japan Electric Power Exchange (JEPX), which is formed by electric power companies, PPSs and self-generators, was established in November 2003 and started business on April 1, 2005.

\* In Okinawa, the scope of market liberalization is different.



### The New Electricity Supply System (from April 2005)



#### Column

##### Establishment of Electric Power System Council of Japan

In February 2004, the Electric Power System Council of Japan (ESCJ) was established in order to ensure fairness and transparency in transmission and distribution segments in which electric utilities own and operate the systems. The Council started to support power transmission and distribution from April 2005, aiming to formulate basic rules on power systems as well as to implement market oversight and dispute settlement functions.

##### Establishment of Japan Electric Power Exchange

In November 2003, a private non-profit organization, Japan Electric Power Exchange (JEPX), was established through investments by the participants including electric power companies, new entrants (power providers and suppliers) and non-utility generators, to provide electric power in both spot and forward trading. JEPX started operation on April 1, 2005, and aims to promote competition and revitalize the distribution of electricity nationwide.

Electric Power Development Plan

Electric power companies are steadily promoting the diversification of power sources for long-term stable supply, taking into consideration the high dependence on imported energy sources, the outlook for supply and demand, as well as environmental issues.

Electricity demand will be increasing annually by 0.8% on average up to fiscal 2016 with peak demand increasing every August by 0.8% as well.

By fiscal 2016, electric power companies will develop power generation facilities with a total capacity of 28.82GW, 43% (12.26GW) of which will be accounted for by nuclear power.

Demand Outlook

	FY2005 (Results)	FY2006 (Results)	FY2007 (Plan)	FY2011 (Plan)	FY2016 (Plan)	Annual Growth(%) 2005-2016
Electricity Demand (TWh)	(869.6) 882.6	889.4	903.0	926.5	963.4	(0.9) 0.8
Peak Demand (GW)	(168.9) 170.2	170.2	174.7	179.6	186.8	(0.9) 0.8
Annual Load Factor (%)	(61.9) 62.4	62.9	62.2	62.2	62.2	

Note: Figures in parentheses are adjusted temperature variations.

Electric Power Development Capacity

	FY2007-FY2016		Breakdown	
	GW	%	FY2007-FY2011	FY2012-FY2016
Nuclear	12.26	43	3.67	8.59
Hydro	2.17	8	1.27	0.90
Conventional	0.30	1	0.07	0.23
Pumped-storage	1.87	7	1.20	0.67
Thermal	14.40	49	9.74	4.66
Coal	3.58	12	1.98	1.60
LNG	10.72	37	7.73	2.99
Geothermal	—	—	—	—
Oil, etc.	0.10	0	0.03	0.07
Total	28.82	100.0	14.67	14.15

Note: Figures do not necessarily total to 100% due to rounded numbers.  
Source: Long-Term Electric Power Facilities Development Plan

Optimal Combination of Power Sources

Due to the nature of supplying electric power — a commodity that is nearly impossible to store — electric power companies generate electricity by combining various power sources based on optimal operational and economic performances to ensure that the fluctuating demand can always be met.

Nuclear power generation is the key base-load power source and will continue to play an important role in contributing to stable supply and help to deal with global environmental issues. Hydroelectric and geothermal power generation, which have excellent environmental characteristics, will be developed considering environmental impacts as well as reduction in development costs.

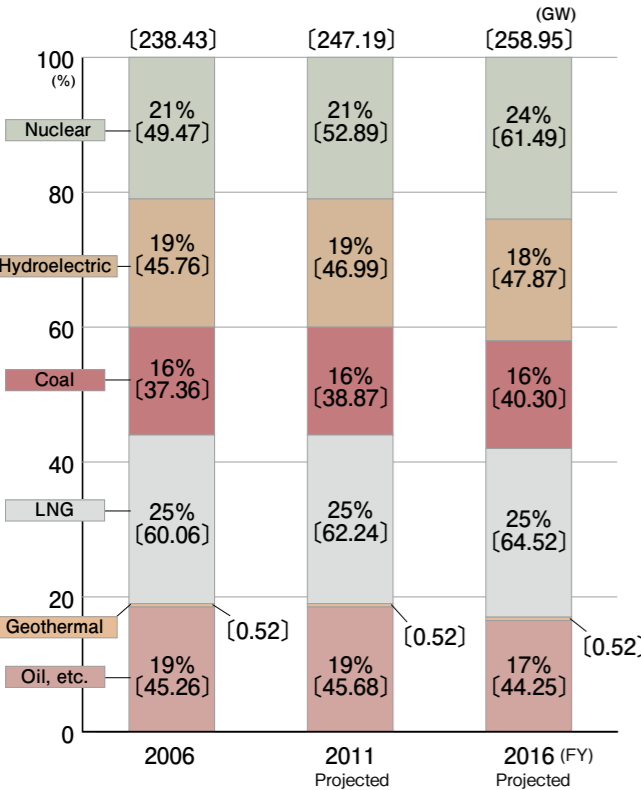
Coal-fired power generation excels in stable base-load supply and economic performance, and so electric power companies will develop it while improving thermal efficiency and considering environmental impacts. Liquefied natural

gas (LNG) fired power generation excels in high thermal efficiency and environmental characteristics, and its use will also continue to expand.

Finally, photovoltaic and wind power generation are clean, indigenous sources of energy, and electric power companies will cooperate with the national government to attain the goal for new energy (mostly renewable energy) utilization.

Generation Capacity Composition by Energy Source

(For Ten Companies, Wholesale Electric Power Companies, Wholesale Suppliers and Others)



Note: Figures do not necessarily total to 100% due to rounded numbers.  
Sources: Long-Term Electric Power Facilities Development Plan and others

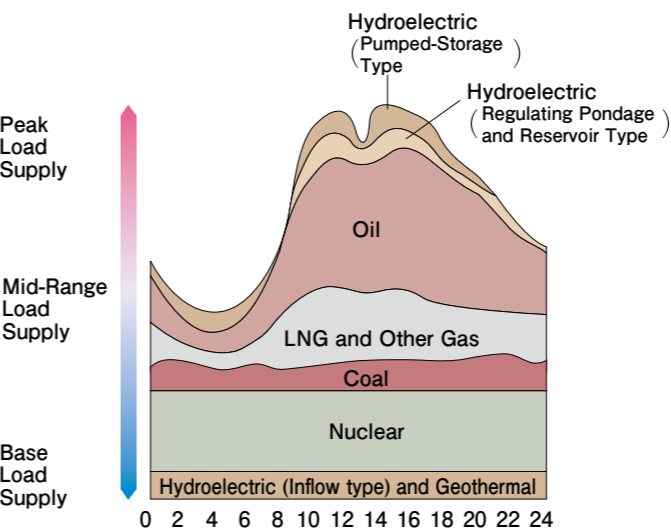
Power Output Composition by Energy Source

(For Ten Companies, Wholesale Electric Power Companies, Wholesale Suppliers and Others)



Note: Figures do not necessarily total to 100% due to rounded numbers.  
Sources: Long-Term Electric Power Facilities Development Plan and others

(Example) Combination of Power Sources



Hydroelectric and nuclear power provides base load supply, while coal and LNG are major power sources for mid-range load supply. Oil-fired and pumped-storage hydroelectric power respond to peak demand fluctuation and contribute to consistent stable supply of electricity.



Snow removal for transmission lines



Laying operation of submarine cable

# Profile of Japan's Major Power Generation Sources

## Hydroelectric Power

Hydroelectric power is one of the few self-sufficient energy resources in resource-poor Japan. Hydroelectric power is an excellent source in terms of stable supply and generation cost over the long term. Hydroelectric power saw a rebirth in development following the oil crises of the 1970s. Although steady development of hydroelectric power plants is desired, Japan has used nearly all available sites for the construction of large-scale hydroelectric facilities, and so recent developments have been on a smaller scale.

As the gap in demand between daytime and nighttime continues to grow, electric power companies are also developing pumped-storage power generation plants to meet peak demand. The share of pumped-storage generation facilities of the total hydroelectric power capacity in Japan is growing year by year.

## Thermal Power

Initially, coal was the dominant fuel for thermal power generation in Japan, but it later lost that place to oil. Today, a diverse range of fuels including coal, oil, and LNG are used for the important generating role that thermal power plants play. In particular, in response to global environmental concerns, electric power companies are promoting the introduction of LNG fired plants, as they emit less CO<sub>2</sub> and other pollutants.

To enhance thermal efficiency further, combined-cycle generating plants with both gas and steam turbines have been installed. As a result, gross thermal efficiency (maximum designed value) has exceeded 50%. In the future, we will continue to research and develop new technologies in order to increase thermal efficiency as well as the use of integrated coal gasification combined cycle (IGCC) power generation.

## Nuclear Power

Japan's first commercial nuclear power plant started operation in Ibaraki Prefecture in 1966. As of December 2007, Japan has fifty-five reactors operating around the country, usually accounting for around one-third of the country's total electric power output. By fiscal 2016, the nuclear output share is expected to reach 41 percent. Currently, there are two plants under construction, as well as another eleven that are in the advanced planning stages.

While placing the highest priority on nuclear safety and public trust, Japanese electric power companies will continue to develop nuclear power generation as a base-load power source that plays an important role in Japan's electric power supply in order to secure a steady supply of electricity and address global environmental issues.

Nuclear power makes a great contribution to energy

security for resource-poor Japan by reducing the energy-equivalent of approximately 410 million barrels of oil per year, which corresponds to about 20 percent of total annual crude imports. In addition, nuclear power generation does not emit carbon dioxide (CO<sub>2</sub>), thus mitigating growing concerns about global warming. So far, nuclear power generation has had the net effect of reducing Japan's total CO<sub>2</sub> emissions by about 20%. For these reasons, nuclear power is expected to play a major role as a central power source in the years to come.



Okumino Hydroelectric Power Plant (Pumped-Storage)



Matsuura Thermal Power Plant (Coal fired)



Shimane Nuclear Power Plant (BWR, Unit No.3 under construction)



Ikata Nuclear Power Plant (PWR)



Arimine Daiichi Hydroelectric Power Plant



Nanko Thermal Power Plant (LNG fired)



Hamaoka Nuclear Power Plant (BWR & ABWR)

### Column

#### Advancement of MOX Fuel Use in Thermal Reactors

On July 4, 2007, the Ministry of Economy, Trade and Industry approved the license application filed by Chubu Electric Power Company for the use of MOX fuel (a mixture of uranium and plutonium oxides; see page 10) in the Hamaoka-4 nuclear power plant. Chubu Electric Power is the fifth company to receive such an approval, following Kansai, Tokyo, Kyushu and Shikoku Electric Power Companies.

Electric power companies are steadily making progress toward the use of MOX fuel in thermal reactors.

# Japan's Nuclear Fuel Cycle

Japan has adopted a closed nuclear fuel cycle policy. Because Japan lacks sufficient natural resources, it has decided to recycle spent nuclear fuel domestically in order to establish nuclear power as a homegrown energy source. The benefits of a closed nuclear fuel cycle for Japan are clear: it adds to long-term energy security by reducing dependence on imported fuels; it conserves uranium resources; and it reduces the amount of high-level radioactive waste that must be disposed of.

Reprocessing is a chemical process that recovers plutonium and reusable uranium from spent fuel and separates radioactive wastes into more manageable forms. Once recovered, the plutonium is ready to be re-introduced into the nuclear power plants in the form known as uranium-plutonium mixed oxide (MOX) fuel. Japan's

electric power companies remain committed to a plan to utilize recovered plutonium – in the form of MOX fuel – in 16 to 18 nuclear reactors by fiscal 2010.

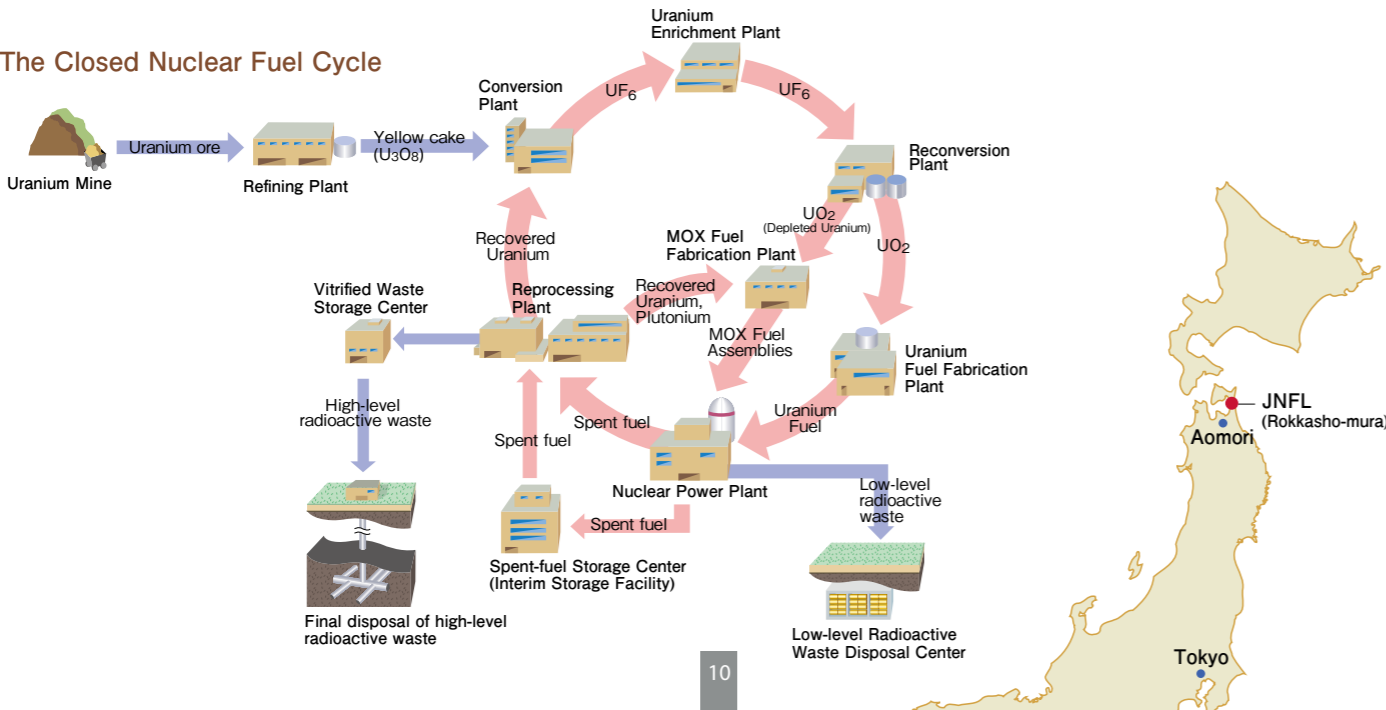
In the past, Japan has relied on countries such as the U.K. and France to reprocess most of the spent fuel it produced. However, to place Japan's domestic nuclear fuel cycle on a firmer footing, Japan Nuclear Fuel Limited (JNFL) is preparing to start the commercial operation of a reprocessing plant in 2008 at a site in Rokkasho-mura in the northern prefecture of Aomori. In addition, JNFL engages in uranium enrichment, temporary storage of vitrified waste, and disposal of low-level radioactive waste. JNFL also has plans to construct a MOX fuel fabrication plant, which is expected to start operation in 2012.

Outline of JNFL's Nuclear Fuel Cycle Facilities (As of December 31, 2007)

Facility	Reprocessing Plant	MOX fuel fabrication plant	Vitrified waste storage center	Uranium enrichment plant	Low-level radioactive waste disposal center
Site	Iiyasakatai, Rokkasho-mura, Kamikita-gun, Aomori Prefecture			Oishitai, Rokkasho-mura, Kamikita-gun, Aomori Prefecture	
Capacity	Maximum capacity: 800 ton-U/year Storage capacity for spent fuel: 3,000 ton-U	Maximum capacity: 130 ton-HM/year (*)	Storage capacity for wastes returned from overseas plants: 1,440 canisters of vitrified waste Planned to be expanded to 2,880 canisters	1,050 ton-SWU/year (*) Planned to be expanded to a maximum capacity of 1,500 ton-SWU/year	Authorized capacity: 200,000m³ (equivalent to 1 million 200 liter drums) Planned to be expanded to 600,000m³ (equivalent to 3 million 200 liter drums)
Current Status	Under construction	Applying for a business license	Cumulative number of stored canisters: 1,310	Present capacity: 300 ton-SWU/year	Cumulative number of stored drums: 199,539
Construction Cost	about 2.19 trillion yen	about 130 billion yen	about 80 billion yen(**)	about 250 billion yen	about 160 billion yen(***)
Schedule	Start of construction: 1993 Start of operation: 2008(planned)	Start of operation: 2012(planned)	Start of construction: 1992 Start of storage: 1995	Start of construction: 1988 Start of operation: 1992	Start of construction: 1990 Start of operation: 1992

(\*) "ton-HM" stands for "tons of heavy metal" which indicates the weight of plutonium and uranium metallic content in MOX. "SWU" stands for "Separative Work Unit" which is a measure of the work expended during an enrichment process of uranium  
(\*\*) Construction expense regarding 1,440 canisters of vitrified waste.  
(\*\*\*) Construction expense regarding 200,000 m³ low-level radioactive waste (equivalent to 1 million 200 liter drums)

Sources: JNFL's Brochure and others



# The Peaceful Use of Nuclear Energy

Japan's electric power companies are fully committed to implementing the closed nuclear fuel cycle and plutonium utilization program consistent with all domestic laws and international nonproliferation standards. Since 1955, the domestic laws of Japan require that all nuclear activities, including commercial activities, be conducted only for peaceful purposes. Also, since 1968, Japan has embraced the "Three Non-Nuclear Principles," which state that Japan will not possess, produce, or permit the entry of nuclear weapons into its territory.

In addition, in 1976, the Government of Japan ratified the Nuclear Non-Proliferation Treaty (NPT) and thereby obligated itself to a national policy not to produce or acquire nuclear weapons. In order to ensure the application of more extensive safeguards, Japan signed the IAEA Additional Protocol in 1998, which allows the IAEA to carry out a range of additional inspection measures. In

accordance with national laws, Japan's electric power companies submit reports on material accounting and safeguard activities to the Minister of Education, Culture, Sports, Science and Technology, and accept joint inspections by the IAEA and Japanese regulatory authorities to check the reports.

The results of each of these Japanese initiatives were reflected in the IAEA's conclusion in June 2004, which stated that all the nuclear materials in Japan are protected under IAEA safeguards and are not being diverted to the manufacture of nuclear weapons. As a result, more effective and efficient IAEA safeguards known as integrated safeguards commenced in Japan in September 2004.



JNFL's reprocessing plant

Column

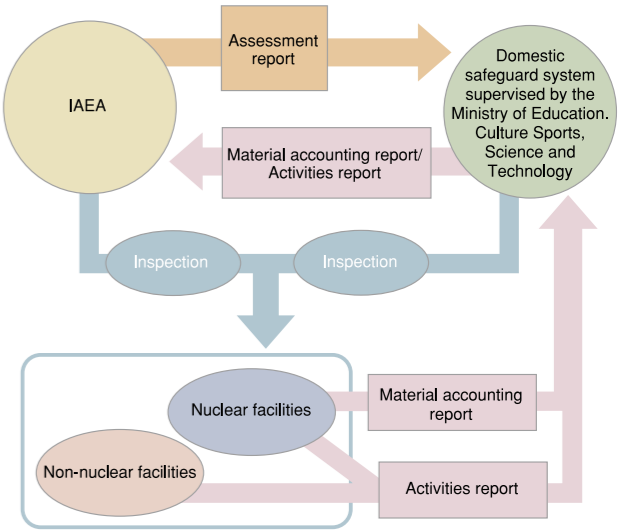
## Start of the "Active Test" and the recovery of MOX powder at Rokkasho Reprocessing Plant

On March 31, 2006, JNFL started the final-stage testing, called the "Active Test", at Rokkasho Reprocessing Plant. The Active Test processes real spent fuel and validates the plant's safety features and the performance of equipment and facilities before the start of commercial operations. On November 16, 2006, JNFL successfully recovered MOX powder through the testing. The most remarkable feature of the manufacturing technology at the Rokkasho plant is called co-denitration. The process, developed in Japan, does not yield pure plutonium, but produces MOX powder, which deters proliferation and will be fabricated into MOX fuel for reactors.



Central control room of reprocessing plant

## The Safeguard Program



Measures by the Electric Power Industry to Suppress CO2 Emissions

The compatibility between stable electric power supply and environmental preservation is one of the most important challenges for the electric power industry. In particular, emissions of carbon dioxide (CO<sub>2</sub>), a major cause of global warming, are closely related to energy utilization in economic activities and daily life, and so the reduction of CO<sub>2</sub> emissions is a major challenge for the electric power industry. Recognizing that comprehensive measures against global warming are required, electric power companies are making corresponding efforts at both the supply and demand sides of electricity, and are pursuing various projects for R&D and international cooperation.

The electric power industry is striving to achieve the voluntary goal of decreasing the CO<sub>2</sub> emissions intensity (emissions per unit of user end electricity), averaged over the five fiscal years of 2008 through 2012, by approximately 20% from the level recorded in FY1990.

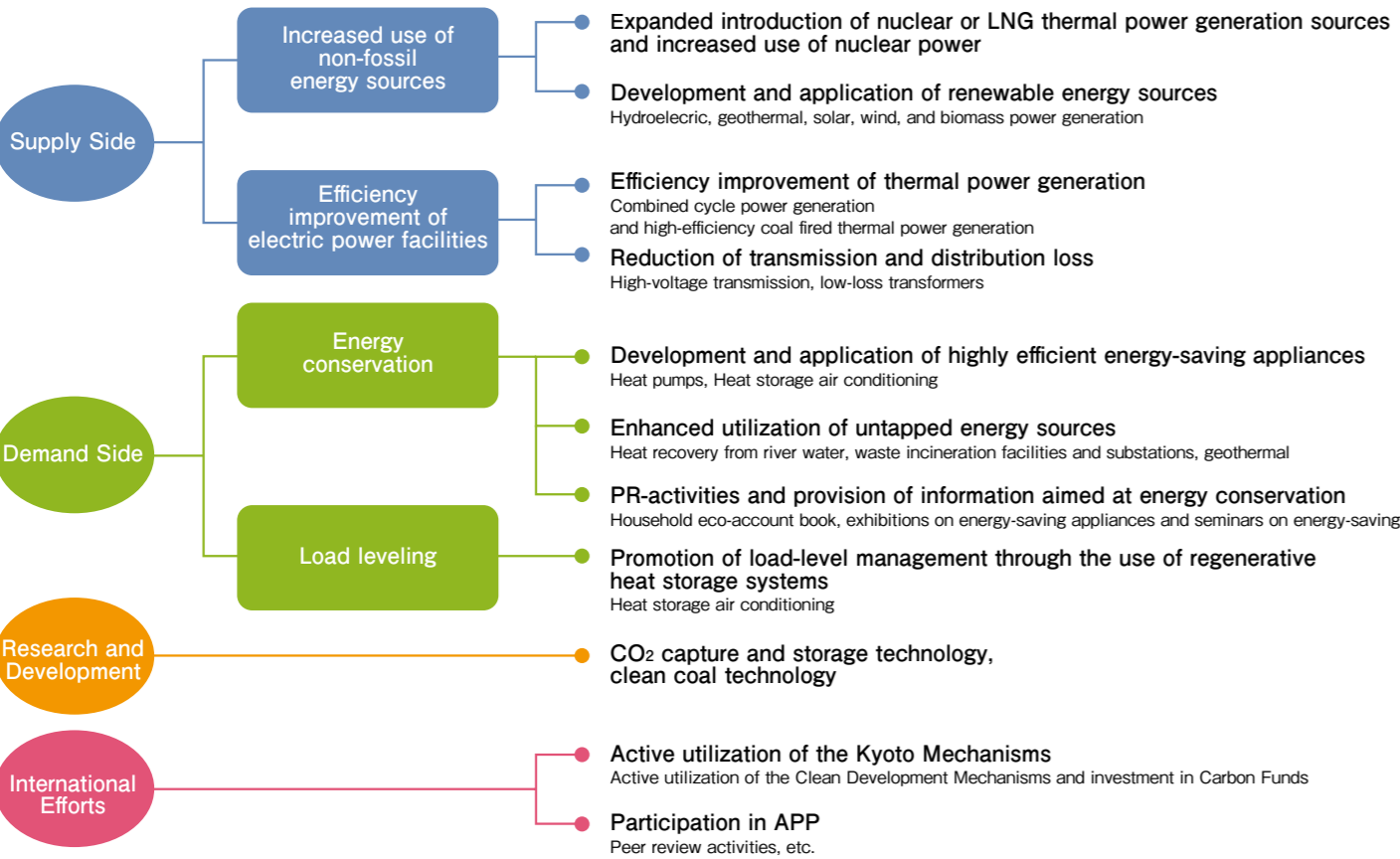
Expanding the Share of Nuclear Power and LNG-fired Thermal Power

Electric power companies have been promoting nuclear power that emits no carbon dioxide (CO<sub>2</sub>) in the process of power generation. Considering CO<sub>2</sub> emissions intensity over the entire life cycle of all available energy sources, CO<sub>2</sub> emissions from nuclear power are lower than those from thermal power, and are even lower than those from solar or wind power. Thus, nuclear power is an outstanding power source to prevent global warming.

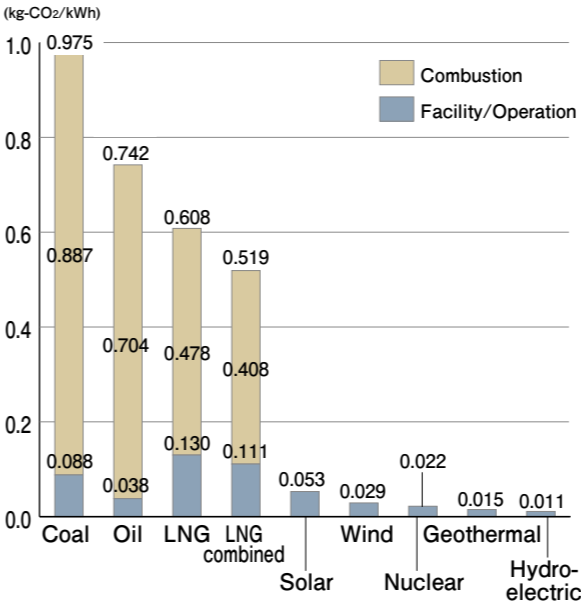
In addition, the industry has been striving to increase the share of LNG-fired thermal power which has the advantage of relatively low CO<sub>2</sub> emissions, and improve the efficiency of thermal power plants.

As a result, since the oil crises of the 1970s, electricity demand in Japan has become 3.4 times greater, yet the CO<sub>2</sub> emission intensity level (end use electricity) in fiscal 2006 was 0.410 kg-CO<sub>2</sub> per kWh, meaning that emissions per kWh used have fallen by around 31% since 1970.

Measures by the Electric Power Industry to Suppress CO2 Emissions



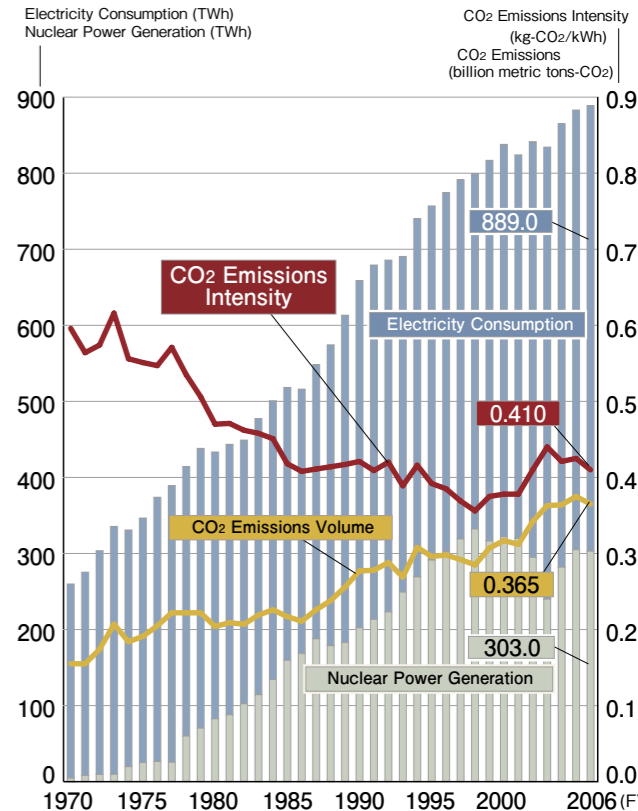
CO2 Emissions Intensity by Source



Note: (1)Based on total CO<sub>2</sub> emissions from all energy consumed in energy extraction, transportation, refining, plant operation and maintenance, etc. in addition to burning of the fuel.  
(2)Data for nuclear power includes reprocessing of spent fuel in Japan (under construction), MOX fuel use in thermal reactors (assuming recycling once) and disposal of high level radioactive waste.  
(3)CO<sub>2</sub> emissions from the uranium enrichment process are calculated according to the ratio of uranium enriched in Japan. If it is assumed that all uranium is enriched domestically, the figure for nuclear power would be 0.010kg-CO<sub>2</sub>/kWh.  
(4)In some cases, the sum of "fuel" and "equipment/operation" do not correspond exactly with the total values listed due to the rounding up of numerical data.

Source: Report of the Central Research Institute of Electric Power Industry

Historical Trends in CO2 Emissions from Power Generation (excluding self-generators)



Source: FEPC

Renewable Energy Sources

Recently, more and more photovoltaic and wind power plants have been installed across the country as clean energy sources that emit no CO<sub>2</sub>. Electric power companies are also focusing aggressively on research and development to solve the problems associated with renewable energy sources, such as low efficiency of generation, high generation cost and technical difficulties in power system interconnection. In order to promote such renewable energy, electric power companies introduced an additional power purchasing system in 1992 as well as the Green Power Fund established in October 2000, which collects donations from customers to construct photovoltaic and wind power facilities.

Electric power companies are also firmly committed to the renewable portfolio standard (RPS) system promulgated by the national government in April 2003, which requires each electric power company to generate or purchase a

designated volume of “new energy” (mostly renewable) power or its equivalent. Japan’s electric power companies are thus continuing to make efforts to expand and promote renewable energy sources.

Sharing Japan’s Top-level Environmental Technologies with the World

As a result of taking various environmental measures at thermal power plants, Japan has achieved the world’s top-level energy efficiency. Based on this achievement, the electric power industry in Japan has been making efforts to establish a mechanism for sharing such advanced technologies with electric power industries in other countries (see the column).

If these efforts improve the thermal efficiency of thermal power plants in the world to the level already achieved in Japan, it would result in a reduction of CO<sub>2</sub> emissions of about 1.7 billion tons-CO<sub>2</sub> per year, which is much greater than the total annual CO<sub>2</sub> emissions in Japan today (1.3 billion tons-CO<sub>2</sub>).

Through such cooperation between advanced and developing countries, and with the “sectoral approach” for sector-by-sector improvement of energy efficiency, it will be possible to achieve compatibility between economic growth

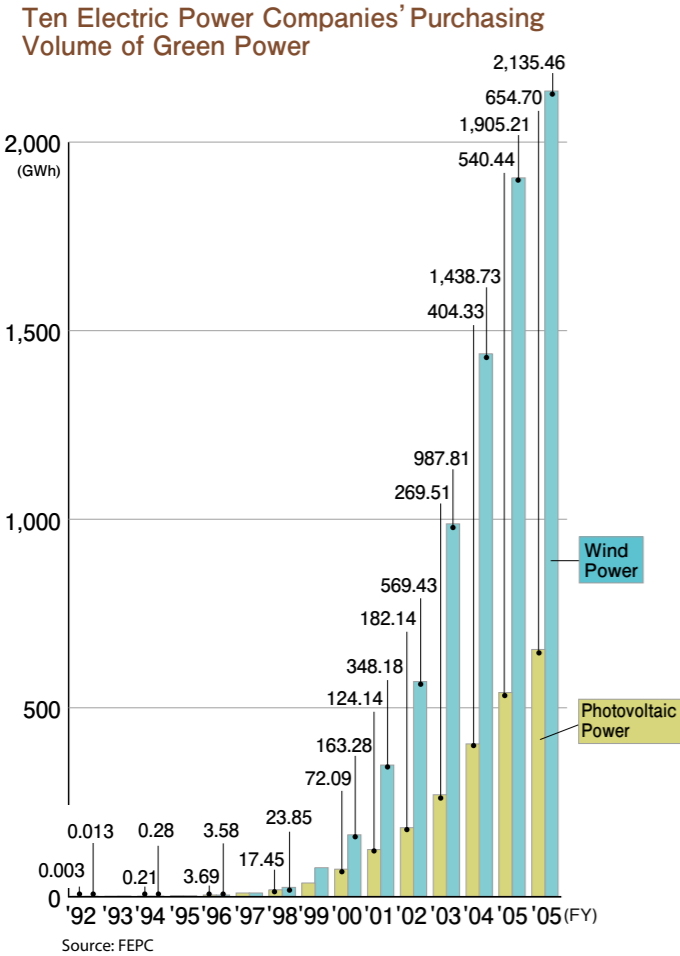
and global environmental preservation. The electric power industry of Japan has been proposing such schemes to the world as a new focus for the post-Kyoto period.

Column

Participation in Asia-Pacific Partnership (APP) on Clean Development and Climate

APP is a framework for inter-regional partnership for responding to the challenges of growing energy demand, energy security, climate change, and so on. Under this framework, the seven participating countries (United States, Australia, China, India, South Korea, Japan and Canada) are pursuing the development, transfer and spread of clean and energy-efficient technologies.

CO<sub>2</sub> emissions from the seven participating countries account for more than half of global CO<sub>2</sub> emissions, and so these seven countries’ efforts for reducing CO<sub>2</sub> emissions will have a global impact. Electric power companies in Japan are actively involved in these efforts.

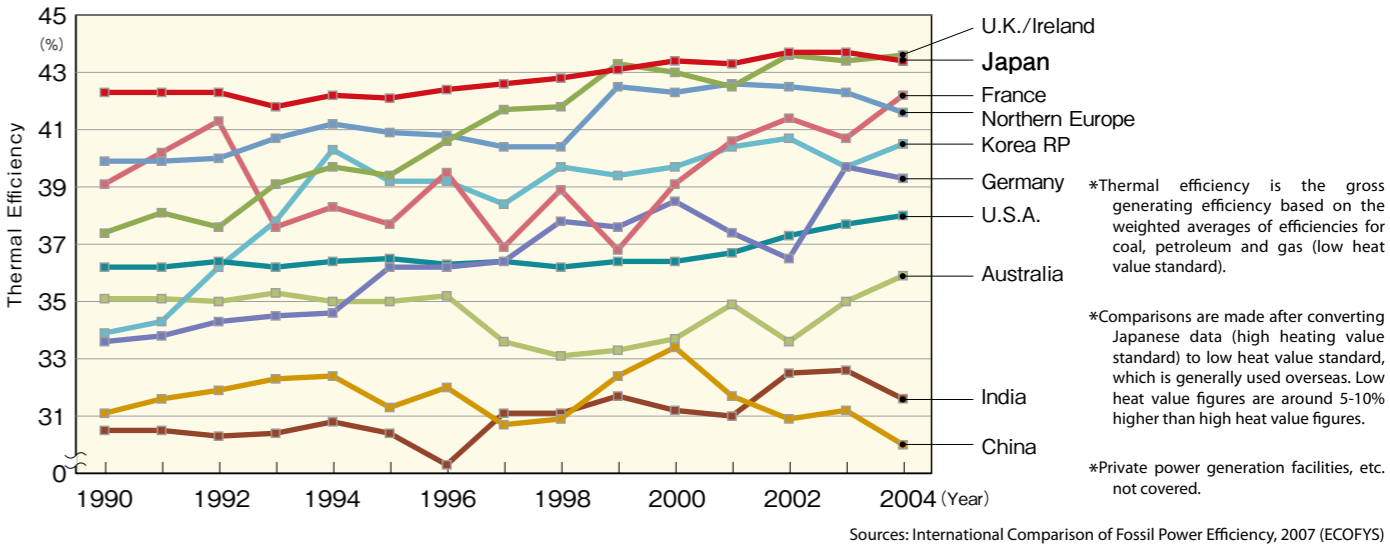


Wind Power



Photovoltaic Cells

Comparison of Thermal Power Plant Efficiency in Japan with Other Countries



Possibility for CO<sub>2</sub> Reduction through Sectoral Approach

CO <sub>2</sub> Reduction billion t-CO <sub>2</sub>	Coal	Oil	LNG	Total
	1.42	0.02	0.23	1.67

**Assumption for the estimation :**  
It is assumed that the most energy-efficient generation technology presently available in Japan (BAT: best available technology) will replace older technologies at thermal power plants in various countries by 2020. The potential for reducing CO<sub>2</sub> emissions was estimated based on the reduction in fossil fuel consumption that can be achieved by this improvement in efficiency.

Source: New Energy and Industrial Technology Development Organization (March 2005)

Demand-side Efforts for CO2 Reduction

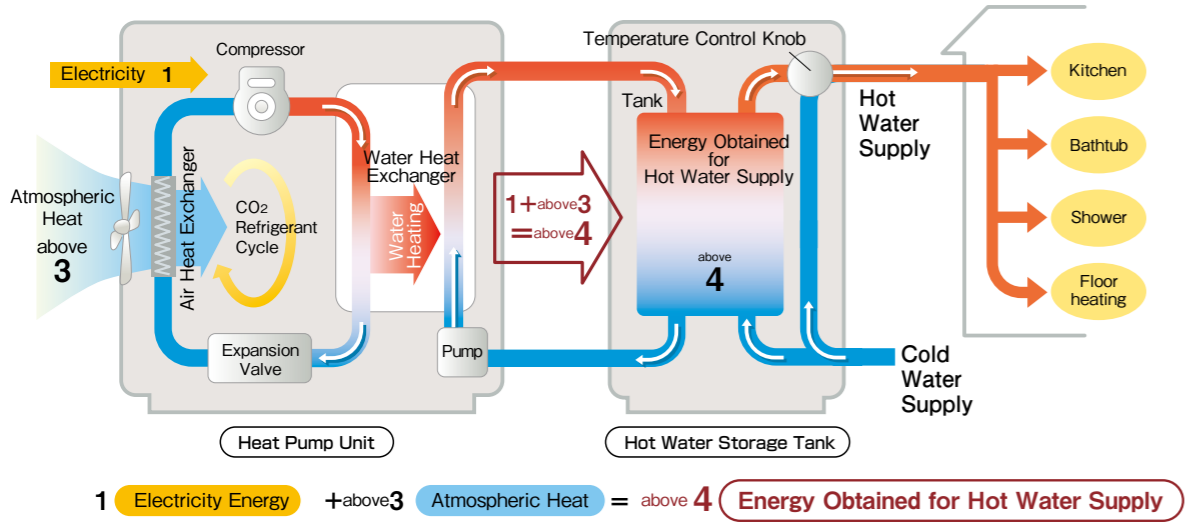
In Japan, the energy demand for water heating constitutes about 30% of the total energy demand in the household sector, and so energy-saving and CO2 reduction measures in this area are very effective. Electric power companies have been working hard to develop and promote electric appliances and systems to reduce CO2 emissions. One example is Eco-Cute, a water heating system with a heat pump that uses CO2 as refrigerant.

Eco-Cute heats water by transferring the thermal energy in air, which is freely available, to water by means of refrigerant. With a *single unit* of electric energy for heat pump operation and *three units or more* of thermal energy from air, it produces *four units or more* of thermal energy.

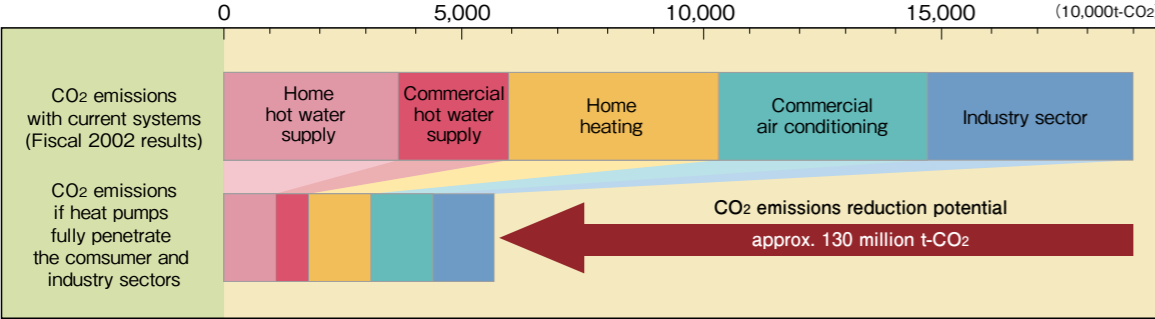
Thanks to this principle, CO2 emissions are cut by about 50% compared with conventional combustion type water heaters. Because of this advantage, the government and industry are jointly promoting the use of such heat pump

systems as a key means of preventing global warming in the consumer sector (household and commercial sectors). When such heat pump systems fully penetrate the consumer and industrial sectors, the resulting CO2 emissions reduction will amount to about 10% of the present annual CO2 emissions in Japan, which is about 1.3 billion tons-CO2.

EcoCute Hot Water Supply Structure: CO2 Retrigerant Heat Pump Hot Water Heater



CO2 Reduction Effect of Heat Pump



Source: Calculations by  
The Heat Pump &  
Thermal Storage  
Technology Center  
of Japan

Strengthening international communication and cooperation

Japan's electric power companies remain active on a worldwide basis. In order to cope with global warming and to ensure the safety of nuclear power generation, international cooperation is indispensable. Each of the electric power companies in Japan has individual agreements with overseas utilities in order to facilitate exchanges on a wide range of information such as power generation, customer relations, distribution and quality

control. The industry's top executives actively participate in international meetings such as the International Electricity Summit and the World Association of Nuclear Operators (WANO) to exchange views, while we also accept trainees from overseas. We import most of our fuel such as oil and coal from overseas countries and also keep our doors open to foreign companies on the purchase of equipment such as generators.

Overseas Offices

Please feel free to contact your nearest office.

WASHINGTON, D.C.

●The Federation of Electric Power Companies of Japan, Washington Office

The Federation's Washington Office was established in January 1994. Its principal objectives are to study U.S. energy policies and to exchange information with U.S. energy opinion leaders in order to promote a greater understanding of the Japanese electric power industry.

1901 L Street, N.W., Suite 600, Washington, D.C. 20036, U.S.A.  
Tel: (202) 466-6781 Fax: (202) 466-6758  
<http://www.japannuclear.com/>  
Established in 1994

●Tokyo Electric Power Co., Inc., Washington Office

1901 L Street, N.W., Suite 720, Washington, D.C. 20036, U.S.A.  
Tel: (202) 457-0790 Fax: (202) 457-0810  
Established in 1978

●Chubu Electric Power Co., Inc., Washington Office

900 17th Street, N.W., Suite 1220, Washington, D.C. 20006, U.S.A.  
Tel: (202) 775-1960 Fax: (202) 331-9256  
Established in 1982

LONDON

●Tokyo Electric Power Co., Inc., London Office

Berkeley Square House, Berkeley Square, London W1J 6BR, U.K.  
Tel: (020) 7629-5271 Fax: (020) 7629-5282  
Established in 1982

●Chubu Electric Power Co., Inc., London Office

Nightingale House GF, 65 Curzon Street, London W1J8PE, U.K.  
Tel: (020) 7409-0142 Fax: (020) 7408-0801  
Established in 1985

BANGKOK

●Chubu Electric Power Co., Inc., Bangkok Office

Unit 4, 18th Floor, M. Thai Tower, All Seasons Place,  
87 Wireless Road, Phatumwan, Bangkok 10330, THAILAND  
Tel: (02) 654-0688 Fax: (02) 654-0689  
Established in 2006

DOHA

●Chubu Electric Power Co., Inc., Doha Office

4th Floor, Al Salam Tower, Al Corniche P.O.Box 22470,  
Doha, Qatar  
Tel: (974) 4836-830 Fax: (974) 4834-841  
Established in 2007



Major Power Plants

Japan’s electric power industry operates some 1,800 hydroelectric, thermal, nuclear, and other power plants to meet the required demand. Here is a list and map of the country’s major power plants:

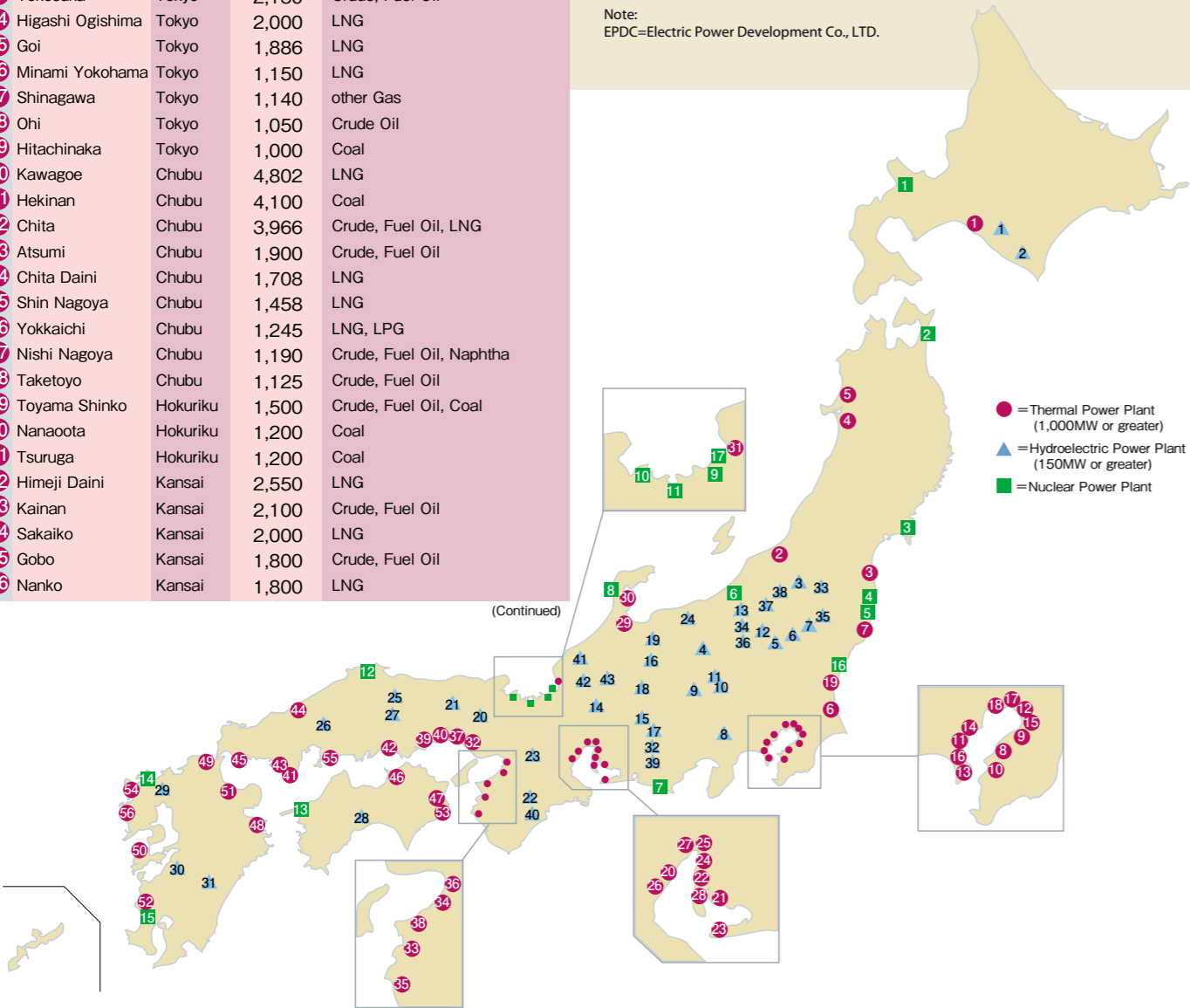
Principal Thermal Power Plants (1,000MW or greater)  
As of March 31, 2007

Name of Plant	Company	Installed Capacity (MW)	Fuel
1 Tomato-atsuma	Hokkaido	1,650	Coal
2 Higashi Niigata	Tohoku	4,600	LNG, other Gas
3 Haramachi	Tohoku	2,000	Coal
4 Akita	Tohoku	1,300	Crude, Fuel Oil
5 Noshiro	Tohoku	1,200	Coal
6 Kashima	Tokyo	4,400	Crude, Fuel Oil
7 Hirono	Tokyo	3,800	Crude, Fuel Oil, NGL, Coal, other Gas
8 Sodegaura	Tokyo	3,600	LNG
9 Anegasaki	Tokyo	3,600	Crude, Fuel Oil, LNG, LPG, NGL
10 Futtsu	Tokyo	3,520	LNG
11 Yokohama	Tokyo	3,325	Crude, Fuel Oil, LNG, NGL
12 Chiba	Tokyo	2,880	LNG
13 Yokosuka	Tokyo	2,130	Crude, Fuel Oil
14 Higashi Ogishima	Tokyo	2,000	LNG
15 Goi	Tokyo	1,886	LNG
16 Minami Yokohama	Tokyo	1,150	LNG
17 Shinagawa	Tokyo	1,140	other Gas
18 Ohi	Tokyo	1,050	Crude Oil
19 Hitachinaka	Tokyo	1,000	Coal
20 Kawagoe	Chubu	4,802	LNG
21 Hekinan	Chubu	4,100	Coal
22 Chita	Chubu	3,966	Crude, Fuel Oil, LNG
23 Atsumi	Chubu	1,900	Crude, Fuel Oil
24 Chita Daini	Chubu	1,708	LNG
25 Shin Nagoya	Chubu	1,458	LNG
26 Yokkaichi	Chubu	1,245	LNG, LPG
27 Nishi Nagoya	Chubu	1,190	Crude, Fuel Oil, Naphtha
28 Taketoyo	Chubu	1,125	Crude, Fuel Oil
29 Toyama Shinko	Hokuriku	1,500	Crude, Fuel Oil, Coal
30 Nanaoota	Hokuriku	1,200	Coal
31 Tsuruga	Hokuriku	1,200	Coal
32 Himeji Daini	Kansai	2,550	LNG
33 Kainan	Kansai	2,100	Crude, Fuel Oil
34 Sakaiko	Kansai	2,000	LNG
35 Gobo	Kansai	1,800	Crude, Fuel Oil
36 Nanko	Kansai	1,800	LNG

(Continued)

Name of Plant	Company	Installed Capacity (MW)	Fuel
37 Himeji Daiichi	Kansai	1,442	LNG
38 Tanagawa Daini	Kansai	1,200	Crude, Fuel Oil
39 Ako	Kansai	1,200	Crude, Fuel Oil
40 Aioi	Kansai	1,125	Crude, Fuel Oil
41 Yanai	Chugoku	1,400	LNG
42 Tamashima	Chugoku	1,200	Crude, Fuel Oil
43 Kudamatsu	Chugoku	1,075	Crude, Fuel Oil
44 Misumi	Chugoku	1,000	Coal
45 Shin Onoda	Chugoku	1,000	Coal
46 Sakaide	Shikoku	1,345	Crude, Fuel Oil, other Gas
47 Anan	Shikoku	1,245	Crude, Fuel Oil
48 Shin Oita	Kyushu	2,295	LNG
49 Shin Kokura	Kyushu	1,800	LNG
50 Reihoku	Kyushu	1,400	Coal
51 Buzen	Kyushu	1,000	Crude, Fuel Oil
52 Sendai	Kyushu	1,000	Crude, Fuel Oil
53 Tachibanawan	EPDC	2,100	Coal
54 Matsuura	EPDC	2,000	Coal
55 Takehara	EPDC	1,300	Coal
56 Matsushima	EPDC	1,000	Coal

Note:  
EPDC=Electric Power Development Co., LTD.



Nuclear Power Plants

● In Operation

As of October 2007

Name of Plant	Unit Number	Company	Installed Capacity (MW)	Type of Reactor	Start
1 Tomari	1	Hokkaido	579	PWR	1989.6
	2		579	PWR	1991.4
2 Higashi-Dori	1	Tohoku	1,100	BWR	2005.12
3 Onagawa	1	Tohoku	524	BWR	1984.6
	2		825	BWR	1995.7
	3		825	BWR	2002.1
4 Fukushima Daiichi	1	Tokyo	460	BWR	1971.3
	2		784	BWR	1974.7
	3		784	BWR	1976.3
	4		784	BWR	1978.10
	5		784	BWR	1978.4
	6		1,100	BWR	1979.10
5 Fukushima Daini	1	Tokyo	1,100	BWR	1982.4
	2		1,100	BWR	1984.2
	3		1,100	BWR	1985.6
	4		1,100	BWR	1987.8
6 Kashiwazaki Kariwa	1	Tokyo	1,100	BWR	1985.9
	2		1,100	BWR	1990.9
	3		1,100	BWR	1993.8
	4		1,100	BWR	1994.8
	5		1,100	BWR	1990.4
	6		1,356	ABWR	1996.11
	7		1,356	ABWR	1997.7
7 Hamaoka	1	Chubu	540	BWR	1976.3
	2		840	BWR	1978.11
	3		1,100	BWR	1987.8
	4		1,137	BWR	1993.9
	5		1,267	ABWR	2005.1
8 Shika	1	Hokuriku	540	BWR	1993.7
	2		1,358	ABWR	2006.3
9 Mihama	1	Kansai	340	PWR	1970.11
	2		500	PWR	1972.7
	3		826	PWR	1976.12
10 Takahama	1	Kansai	826	PWR	1974.11
	2		826	PWR	1975.11
	3		870	PWR	1985.1
	4		870	PWR	1985.6
11 Ohi	1	Kansai	1,175	PWR	1979.3
	2		1,175	PWR	1979.12
	3		1,180	PWR	1991.12
	4		1,180	PWR	1993.2
12 Shimane	1	Chugoku	460	BWR	1974.3
	2		820	BWR	1989.2
13 Ikata	1	Shikoku	566	PWR	1977.9
	2		566	PWR	1982.3
	3		890	PWR	1994.12
14 Genkai	1	Kyushu	559	PWR	1975.10
	2		559	PWR	1981.3
	3		1,180	PWR	1994.3
	4		1,180	PWR	1997.7
15 Sendai	1	Kyushu	890	PWR	1984.7
	2		890	PWR	1985.11
16 Tokai Daini		Japan Atomic Power Co.	1,100	BWR	1978.11
17 Tsuruga	1	Japan Atomic Power Co.	357	BWR	1970.3
	2		1,160	PWR	1987.2
Total		55 Units	49,467MW		

● Under Construction

(Estimated start)

Tomari	3	Hokkaido	912	PWR	2009.12
Shimane	3	Chugoku	1,373	ABWR	2011.12
Total		2 Units	2,285MW		

● Closed

Tokai		Japan Atomic Power Co.	166	GCR	1998.3
-------	--	------------------------	-----	-----	--------

● Others

Fugen		Japan Atomic Energy Agency	165	ATR(Prototype)	
Monju		Japan Atomic Energy Agency	280	FBR(Prototype)	

Note: PWR=Pressurized Water Reactor, BWR=Boiling Water Reactor, APWR=Advanced Pressurized Water Reactor, ABWR=Advanced Boiling Water Reactor, GCR=Gas Cooled Reactor, ATR=Advanced Thermal Reactor, FBR=Fast Breeder Reactor

Principal Hydroelectric Power Plants (150MW or greater)

As of March 31, 2007

Name of Plant	Company	Installed Capacity (MW)	Type
1 Niikappu	Hokkaido	200	Pumped Storage
2 Takami	Hokkaido	200	Pumped Storage
3 Daini Numazawa	Tohoku	460	Pumped Storage
4 Shin Takasegawa	Tokyo	1,280	Pumped Storage
5 Tamahara	Tokyo	1,200	Pumped Storage
6 Imaichi	Tokyo	1,050	Pumped Storage
7 Shiobara	Tokyo	900	Pumped Storage
8 Kazunogawa	Tokyo	800	Pumped Storage
9 Azumi	Tokyo	623	Pumped Storage
10 Kannagawa	Tokyo	470	Pumped Storage
11 Midono	Tokyo	245	Pumped Storage
12 Yagisawa	Tokyo	240	Pumped Storage
13 Shinanogawa	Tokyo	177	
14 Okumino	Chubu	1,500	Pumped Storage
15 Okuyahagi Daini	Chubu	780	Pumped Storage
16 Takane Daiichi	Chubu	340	Pumped Storage
17 Okuyahagi Daiichi	Chubu	315	Pumped Storage
18 Mazegawa Daiichi	Chubu	288	Pumped Storage
19 Arimine Daiichi	Hokuriku	265	
20 Okutataragi	Kansai	1,932	Pumped Storage
21 Okawachi	Kansai	1,280	Pumped Storage
22 Okuyoshino	Kansai	1,206	Pumped Storage
23 Kisenyama	Kansai	466	Pumped Storage
24 Kurobegawa Daiyon	Kansai	335	
25 Matanogawa	Chugoku	1,200	Pumped Storage
26 Nabara	Chugoku	620	Pumped Storage
27 Shin Nariwagawa	Chugoku	303	Pumped Storage
28 Hongawa	Shikoku	615	Pumped Storage
29 Tenzan	Kyushu	600	Pumped Storage
30 Ohira	Kyushu	500	Pumped Storage
31 Hitotsuse	Kyushu	180	
32 Shin Toyone	EPDC	1,125	Pumped Storage
33 Shimogo	EPDC	1,000	Pumped Storage
34 Okukiyotsu	EPDC	1,000	Pumped Storage
35 Numappara	EPDC	675	Pumped Storage
36 Okukiyotsu Daini	EPDC	600	Pumped Storage
37 Okutadami	EPDC	560	
38 Tagokura	EPDC	385	
39 Sakuma	EPDC	350	
40 Ikehara	EPDC	350	Pumped Storage
41 Tedorigawa Daiichi	EPDC	250	
42 Nagano	EPDC	220	Pumped Storage
43 Miboro	EPDC	215	

● Preparing for Construction

(Estimated start)

Namie-Odaka		Tohoku	825	BWR	FY2018
Higashi-Dori	2	Tohoku	1,385	ABWR	FY2018~
Fukushima Daiichi	7	Tokyo	1,380	ABWR	2013.10
	8		1,380	ABWR	2014.10
Higashi-Dori	1	Tokyo	1,385	ABWR	2014.12
	2		1,385	ABWR	FY2017~
Kaminoseki	1	Chugoku	1,373	ABWR	FY2014
	2		1,373	ABWR	FY2017
Ohma		EPDC	1,383	ABWR	2012.3
Tsuruga	3	Japan Atomic Power Co.	1,538	APWR	2016.3
	4		1,538	APWR	2017.3
Total		11 Units	14,945MW		

# The Federation of Electric Power Companies

Electricity supply in Japan is carried out by privately-owned independent regional electric power companies and close cooperation among these companies is essential for efficient operations. In 1952, the nine electric power companies established the Federation of Electric Power Companies (FEPC) to promote smooth operations within the industry. Since then, FEPC has played an important role as a base for close communication between the electric power companies and as a forum for exchanging views to create the electric

power industry of the future. Moreover, FEPC undertakes various activities to ensure stable operations of the electric power industry, with an awareness of its role in the energy industry of Japan.

With the return of Okinawa to Japan in 1972, the Okinawa Electric Power Company rejoined Japan's electric power industry, becoming an FEPC member in March 2000.

## Board of Directors

as of June 26, 2008



Chairman  
**Shosuke Mori**



Vice Chairman  
**Hiroaki Takahashi**



Vice Chairman  
**Momoki Tokiwa**



Vice Chairman  
**Yoshihisa Morimoto**



Senior Managing Director  
**Norihisa Ito**



Director  
Secretary General  
**Yuzuru Hiroe**



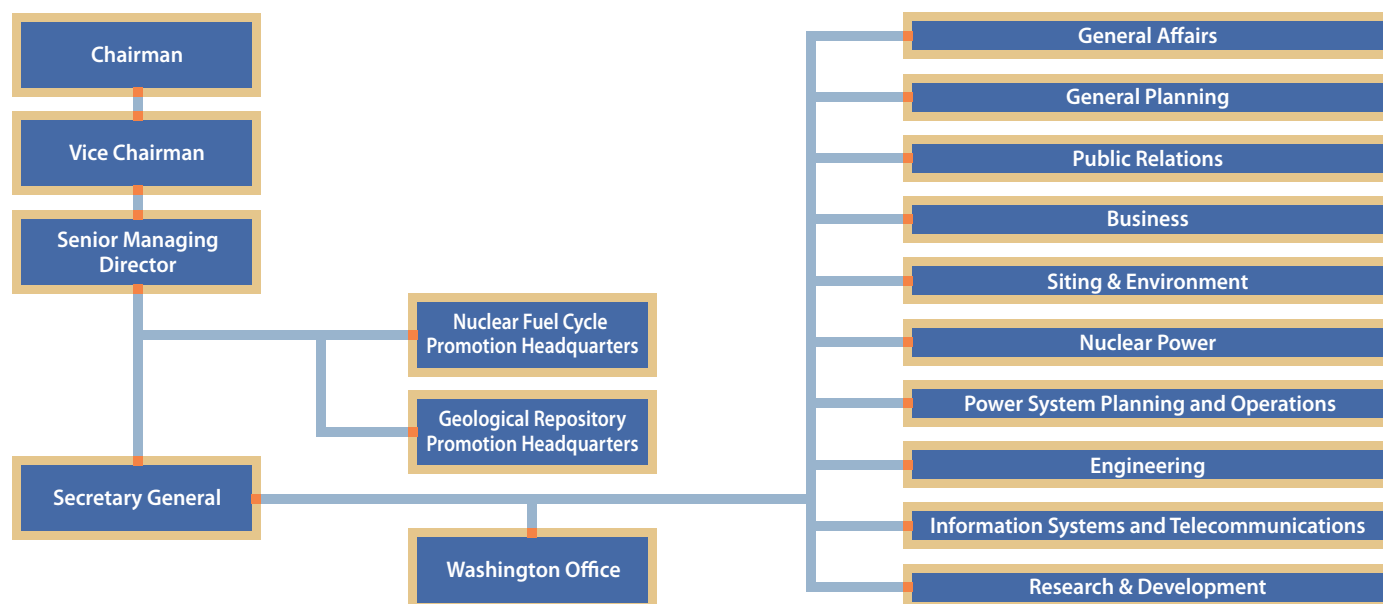
Director  
Deputy Secretary General  
**Hideaki Tanaka**



Director  
Geological Repository  
Promotion Headquarters  
**Kazuya Sugiyama**

## Organization of FEPC

as of September 2007



# Data

## contents

Company Data .....	22
Changes in Electric Power Generation .....	22
Power Generation Volume by Source in Major Countries .....	22
Changes in Electricity Sales for Ten Companies (Nine Companies) .....	23
Changes in Electricity Sales for Ten Companies (Nine Companies) (to large industrial and commercial customers) .....	23
Changes in Electricity Sales / Consumption for Major Countries .....	24
Country Comparison of Thermal Efficiency, Transmission and Distribution Loss, Annual Load Factor .....	25
CO <sub>2</sub> Emissions Intensity in Seven OECD Countries .....	25
SO <sub>x</sub> and NO <sub>x</sub> Emissions per Unit of Electricity Generated by Thermal Power in Each Country .....	26
Annual Balance Sheet for Ten Companies .....	26
Revenues and Expenditures for Ten Companies .....	27
Investment by Type of Power Facility for Ten Companies .....	27

Company Data (Fiscal year ending March 31, 2007)

Company	Capital Stock (Million yen)	Total Assets (Million yen)	Generating Capacity (MW)	Electricity Supplied (GWh)	Electricity Sales (GWh)	Revenues from Electricity Sales (Million yen)	Number of Customers (Thousands)	Number of Employees
Hokkaido	114,291	1,428,780	6,505	35,234	31,512	534,680	3,899	5,794
Tohoku	251,441	3,709,377	17,141	88,952	80,950	1,541,362	7,665	12,148
Tokyo	676,434	12,924,022	61,835	312,721	287,622	4,952,306	28,067	38,111
Chubu	430,777	5,287,281	32,473	144,061	132,687	2,086,340	10,388	15,973
Hokuriku	117,641	1,478,880	8,114	31,342	28,200	472,401	2,082	4,638
Kansai	489,320	6,188,913	34,864	159,982	147,257	2,349,760	13,282	22,164
Chugoku	185,527	2,479,046	12,201	67,112	61,259	981,600	5,206	10,445
Shikoku	145,551	1,380,425	6,859	31,565	28,161	521,733	2,847	6,045
Kyushu	237,304	3,790,112	19,417	92,244	84,399	1,310,169	8,349	12,660
Okinawa	7,586	354,113	1,924	8,359	7,376	146,930	808	1,570
Total	2,655,872	39,020,949	201,333	971,571	889,423	14,897,281	82,592	129,548

Source: Handbook of Electric Power Industry

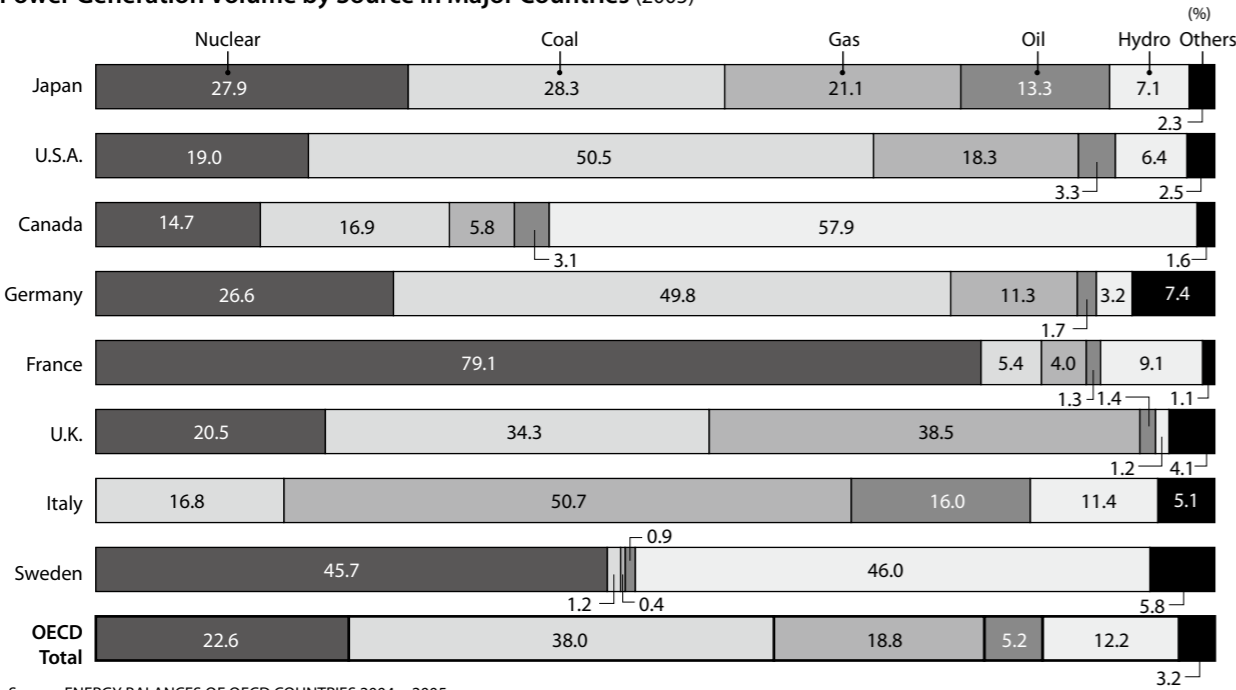
Changes in Electric Power Generation

(TWh)

Fiscal Year	1985	1990	1995	2000	2004	2005	2006
Ten Companies Hydro	61.0	65.4	62.3	66.5	70.9	60.0	66.0
Thermal	295.2	392.0	401.1	426.4	454.7	459.3	465.2
Geothermal	1.2	1.4	2.8	3.0	3.0	2.9	2.8
Nuclear	148.0	181.1	271.4	302.5	262.5	287.0	287.1
Subtotal	505.5	639.9	737.6	798.4	791.2	809.2	821.1
Industry-Owned and Others	166.4	217.4	252.4	293.1	346.2	348.7	340.0
Total	672.0	857.3	990.0	1,091.5	1,137.3	1,157.9	1,161.1

Source: Handbook of Electric Power Industry

Power Generation Volume by Source in Major Countries (2005)



Source: ENERGY BALANCES OF OECD COUNTRIES 2004—2005

Changes in Electricity Sales for Ten Companies (Nine Companies)

(TWh)

Fiscal Year	1985	1990	1995	2000	2004	2005	2006
Residential (Lighting)	(131.9)	177.4	224.6	254.6	272.5	281.3	278.3
Commercial and Industrial	(386.4)	481.5	532.4	583.3	592.9	601.3	611.1
Commercial	(77.1)	116.3	152.8	157.9	125.0	—	—
Small Industrial	(88.2)	100.1	108.0	115.8	112.9	—	—
Large Industrial	(203.5)	248.1	254.7	74.8	—	—	—
Others	(17.6)	17.0	16.9	15.0	12.8	13.4	12.8
Eligible Customers' Use	—	—	—	219.8	342.2	548.4	561.7
Total	(518.3)	658.9	757.0	837.9	865.4	882.6	889.4

Source: Handbook of Electric Power Industry

Changes in Electricity Sales for Ten Companies (Nine Companies)

(to large industrial and commercial customers)

(TWh)

Fiscal Year	1985	1990	1995	2000	2004	2005	2006
Mining and Industry Mining	(1.7)	1.5	1.4	1.3	0.9	1.0	1.0
Foodstuffs	(7.5)	11.3	13.2	15.3	15.4	15.4	16.1
Textiles	(6.2)	6.8	5.1	3.9	3.0	3.1	3.2
Pulp and Paper	(12.8)	11.9	9.5	10.5	9.9	10.3	10.5
Chemicals	(27.3)	27.4	25.4	25.9	26.9	27.7	29.3
Oil and Coal Products	(2.6)	2.4	2.6	1.5	1.5	1.5	1.6
Rubber	(2.7)	3.5	3.4	3.5	3.5	3.4	3.3
Clay and Stone	(13.3)	15.0	14.4	11.9	10.7	11.0	11.8
Iron and Steel	(38.7)	41.3	38.3	36.5	36.6	36.2	38.9
Non-ferrous Metals	(11.0)	12.3	13.1	14.2	13.3	14.1	15.1
Machinery	(38.0)	57.3	62.9	69.8	71.8	74.0	78.6
Others	(13.9)	22.1	24.4	27.0	27.1	27.6	29.3
Subtotal	(175.7)	212.7	213.8	221.2	220.5	225.2	238.8
Railways	(13.4)	16.4	17.9	18.1	18.8	19.0	18.7
Others	(14.4)	19.0	23.0	27.7	29.8	29.6	29.7
Total	(203.5)	248.1	254.7	267.0	269.1	273.8	287.2

Source: Handbook of Electric Power Industry

Changes in Electricity Sales\* / Consumption\*\* for Major Countries

(TWh)

		1999	2000	2001	2002	2003	2004	2005
U.S.A. (*)All electric utilities	Residential	1,144.9	1,192.4	1,201.6	1,265.2	1,275.8	1,292.0	1,359.2
	Commercial and Industrial	2,060.2	2,119.5	2,079.7	2,094.7	2,211.1	2,248.3	2,294.2
	Others	107.0	109.5	113.2	105.6	6.8	7.2	7.5
	Total	3,312.1	3,421.4	3,394.5	3,465.5	3,493.7	3,547.5	3,661.0
U.K. (*)All electric utilities	Residential	110.3	111.8	115.3	114.5	115.8	115.5	116.8
	Commercial and Industrial	185.2	189.9	192.1	192.1	195.0	194.7	198.6
	Others	12.9	12.9	13.6	13.1	13.6	13.5	13.7
	Total	308.4	314.7	321.1	319.8	324.3	323.7	329.1
Germany (**)Electricity consumption	Residential	131.3	130.5	134.4	136.5	139.1	140.4	141.7
	Commercial and Industrial	295.6	307.5	308.3	313.5	317.7	323.3	324.8
	Others	61.6	63.5	65.0	66.2	68.2	69.0	69.2
	Total	488.5	501.5	507.7	516.2	525.0	532.7	535.7
Canada (*)All electric utilities	Residential	133.3	138.2	140.2	142.6	147.6	151.0	151.0
	Commercial and Industrial	175.7	183.6	182.4	181.1	183.7	179.8	188.5
	Others	135.0	138.9	136.3	141.9	145.2	147.6	148.2
	Total	443.9	460.7	459.0	465.6	476.5	478.4	487.7
France (**)Electricity consumption	High voltage	243.8	250.9	252.3	254.2	259.9	266.1	265.4
	Low voltage	157.2	159.7	166.4	165.0	174.7	181.7	185.4
	Total	401.0	410.7	418.6	419.2	434.7	447.8	450.8
Italy (*)All electric utilities	Residential	60.7	61.1	61.5	63.0	65.0	66.6	66.9
	Commercial and Industrial	169.9	184.0	191.1	195.3	202.8	205.7	210.1
	Others	10.0	10.4	10.6	10.6	10.9	11.1	11.5
	Total	240.6	255.5	263.2	268.8	278.7	283.4	288.5
Japan (*)Ten companies	Residential	248.2	254.6	254.5	263.4	259.7	272.5	281.3
	Commercial and Industrial	568.7	583.3	569.6	578.0	574.7	592.9	601.3
	Others	-	-	-	-	-	-	-
	Total	816.9	837.9	824.1	841.5	834.3	865.4	882.6

Sources: Overseas Electric Power Industry Statistics (2007)

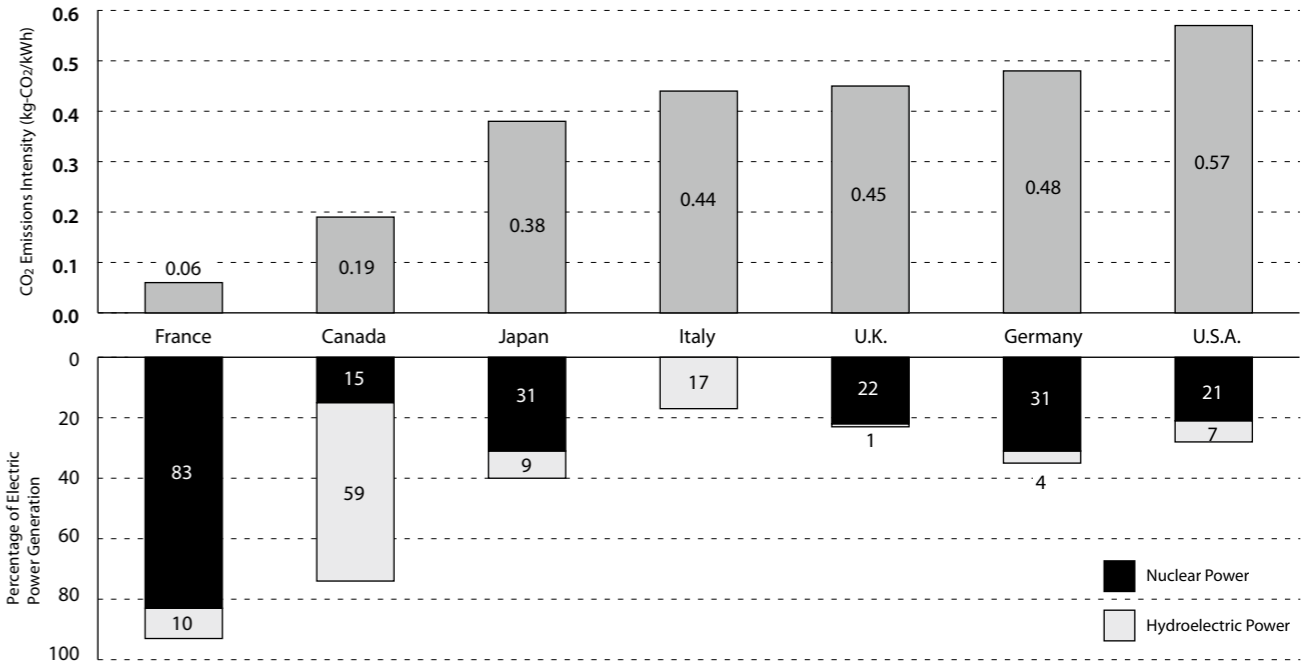
Country Comparison of Thermal Efficiency, Transmission and Distribution Loss, Annual Load Factor

(%)

		1985	1990	1995	2000	2004	2005
U.S.A.	Thermal Efficiency	32.7	32.9	33.4	33.3	34.2	34.0
	Transmission and Distribution Loss	6.1	5.7	7.0	6.9	7.0	6.7
	Annual Load Factor	62.0	60.4	59.8	61.2	61.5	59.3
U.K.	Thermal Efficiency	32.9	33.9	36.2	36.2	36.2	35.9
	Transmission and Distribution Loss	8.7	8.1	8.6	9.0	9.5	8.9
	Annual Load Factor	57.8	62.2	65.4	67.4	67.4	66.6
Germany (Former W. Germany)	Thermal Efficiency	(39.3)	(39.8)	38.2	39.8	40.1	41.0
	Transmission and Distribution Loss	(4.8)	(4.3)	5.0	4.6	5.5	5.7
	Annual Load Factor	(63.2)	(68.6)	(71.9)	79.3	82.9	N/A
Canada	Thermal Efficiency	32.0	34.5	32.6	32.9	33.2	33.4
	Transmission and Distribution Loss	9.2	7.7	6.8	8.0	5.1	6.1
	Annual Load Factor	65.1	65.7	66.0	68.5	66.2	69.2
France	Thermal Efficiency	33.1	35.8	34.5	40.0	35.6	N/A
	Transmission and Distribution Loss	7.7	7.5	7.4	6.8	6.6	6.7
	Annual Load Factor	57.6	62.9	67.9	69.5	67.1	64.1
Italy	Thermal Efficiency	37.1	37.7	38.6	39.0	41.7	42.7
	Transmission and Distribution Loss	9.0	7.0	6.7	6.4	6.4	6.2
	Annual Load Factor	53.7	52.4	50.3	59.0	59.4	58.4
Japan Ten Companies (Nine Companies)	Thermal Efficiency	(38.2)	38.8	38.9	40.6	40.9	40.9
	Transmission and Distribution Loss	(5.8)	5.7	5.5	5.2	5.2	5.1
	Annual Load Factor	(60.4)	56.8	55.3	59.5	60.7	62.4

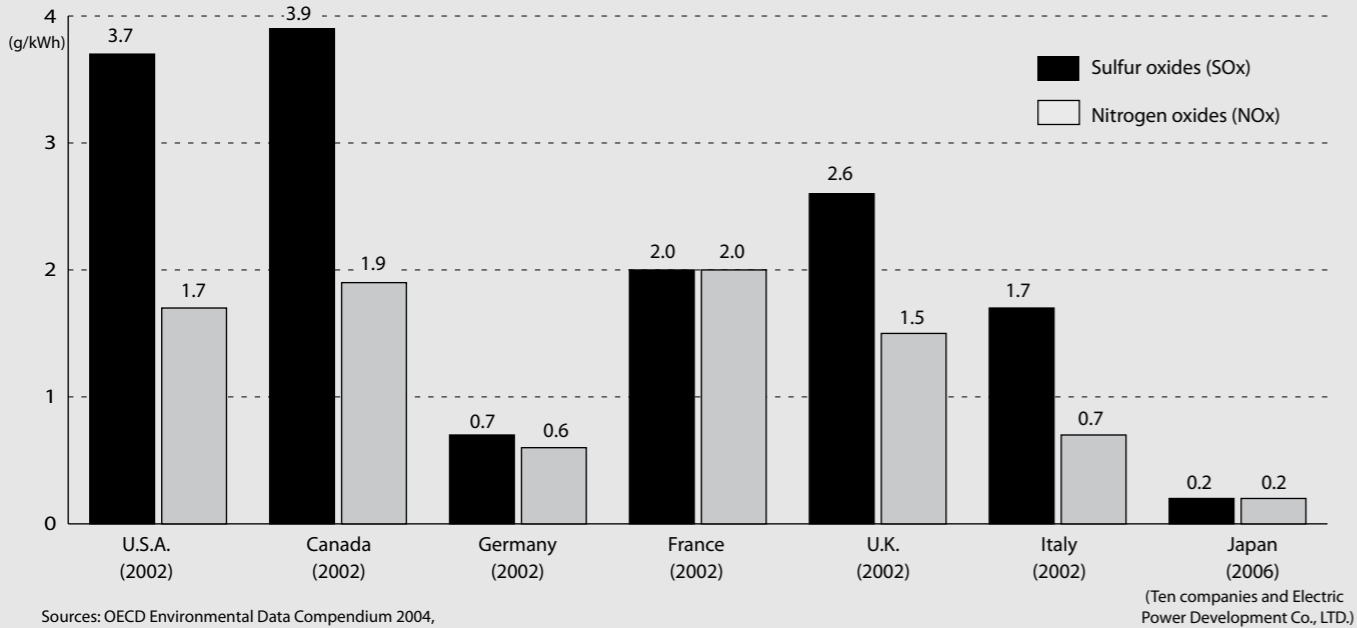
Sources: Overseas Electric Power Industry Statistics (2007)

Comparison of CO<sub>2</sub> Emissions Intensity by Country (2005)



Sources: FEPC estimate based on Energy Balances of OECD Countries 2004-2005

SOx and NOx Emissions per Unit of Electricity Generated by Thermal Power in Each Country



Annual Balance Sheet for Ten Companies

Fiscal Year		2001	2002	2003	2004	2005	2006
Assets	Fixed Assets	41,110	40,149	39,075	37,836	37,742	36,967
	(Operating Fixed Assets)	(31,855)	(30,514)	(29,529)	(28,719)	(28,317)	(27,139)
	(Investments, etc.)	(3,210)	(3,315)	(3,508)	(3,669)	(4,949)	(5,281)
	Current Assets	1,635	1,534	1,493	1,616	1,827	2,053
	Deferred Assets	0	0	0	0	0	—
	Total Assets	42,746	41,684	40,570	39,453	39,570	39,020
Liabilities and Net Assets	Fixed Liabilities	27,390	26,930	26,177	24,789	23,890	23,096
	(Long-term Debt)	(8,843)	(7,953)	(7,197)	(6,298)	(5,944)	(5,608)
	Current Liabilities	7,727	6,951	6,116	5,934	6,245	6,095
	Reserves	32	29	61	95	65	81
	Total Liabilities	35,151	33,911	35,355	30,819	30,201	29,273
	Capital	2,599	2,599	2,599	2,599	2,655	—
	Paid-up Advances on New Stocks	—	—	—	—	—	—
	Capital Surplus	270	270	271	271	331	—
	Retained Earnings	4,563	4,868	5,211	5,643	6,102	—
	Unrealized Gain on Securities	172	84	222	227	409	—
	Treasury Stock	-11	-50	-90	-108	-130	—
	Total Shareholder's Equity	7,594	7,772	8,214	8,633	9,368	—
	Shareholder's Equity	—	—	—	—	—	9,292
	(Common Stock)	—	—	—	—	—	(2,655)
	(Capital Surplus)	—	—	—	—	—	(332)
	(Retained Earnings)	—	—	—	—	—	(6,452)
	(Treasury Stock)	—	—	—	—	—	(-147)
	Valuation and Translation Adjustments, etc	—	—	—	—	—	454
	Total Net Assets	—	—	—	—	—	9,747
	Total Liabilities and Net Assets	42,746	41,684	40,570	39,453	39,570	39,020

Note: Figures rounded down to nearest digit  
Source: Handbook of Electric Power Industry

Revenues and Expenditures for Ten Companies

Fiscal Year		2001	2002	2003	2004	2005	2006
Revenues	Residential	5,799	5,751	5,582	5,783	5,848	5,768
	Commercial and Industrial	8,804	8,318	8,088	8,154	8,124	8,321
	Subtotal	14,604	14,070	13,670	13,938	13,972	14,090
	Intercompany Power Sales	615	528	477	448	485	503
	Power Sales to Other Utilities	19	22	34	48	72	88
	Other Revenues	282	305	296	360	479	584
	Total	15,521	14,927	14,478	14,796	15,010	15,266
Expenditures	Personnel	1,758	1,883	1,796	1,665	1,502	1,389
	Fuel	1,911	2,021	2,044	2,178	2,755	3,117
	Maintenance	1,588	1,392	1,362	1,422	1,410	1,509
	Interest	883	737	616	574	474	442
	Depreciation	2,761	2,617	2,477	2,376	2,302	2,136
	Taxes and Public Charges	1,052	1,041	1,017	1,020	1,003	998
	Intercompany Power Purchases	615	528	477	448	484	514
	Power Purchases	1,231	1,297	1,277	1,360	1,420	1,444
	Drought Reserves	-7	-3	32	33	-29	10
	Corporate Taxes	364	339	348	416	436	426
	Other Expenditures	2,713	2,477	2,398	2,575	2,494	2,608
	Total	14,873	14,332	13,849	14,074	14,256	14,603
	Net Income	647	595	628	722	754	663

Note: Figures rounded down to nearest digit  
Source: Handbook of Electric Power Industry

Investment by Type of Power Facility for Ten Companies

Investment by Type or Power Facility for Ten Companies							(Billion yen)				
Fiscal Year			1999	2000	2001	2002	2003	Fiscal Year	2004	2005	2006
Expansion	Generation Source	Hydro	113	89	77	67	64	Generation	516	449	499
		Thermal	492	491	481	260	236				
		Nuclear	212	224	233	199	153				
		Subtotal	819	805	792	526	453				
	Other	Transmission	477	357	237	199	146	Distribution, others	996	1,048	1,029
		Transformation	233	172	96	71	58				
		Distribution	302	271	223	174	161				
		Supply, etc.	46	50	45	42	37				
Total			1,878	1,657	1,395	1,014	856	Total	1,512	1,497	1,529
Improvement			887	841	782	596	606				
Survey Fees			46	50	17	16	23				
Combined Total			2,812	2,549	2,194	1,627	1,486				
Nuclear Fuel			445	377	437	448	283				
Grand Total			3,258	2,927	2,632	2,075	1,770				

Note: Figures rounded down to nearest digit  
Source: Handbook of Electric Power Industry

## Business Addresses

### **The Federation of Electric Power Companies of Japan (FEPC)**

Keidanren-kaikan, 1-9-4, Otemachi, Chiyoda-ku, Tokyo 100-8118, Japan  
Tel: (03) 3279-2182 URL <http://www.fepc.or.jp>

### **Hokkaido Electric Power Co., Inc.**

2, Higashi 1-chome, Odori, Chuo-ku, Sapporo, Hokkaido 060-8677, Japan  
Tel: (011) 251-1111 URL <http://www.hepco.co.jp>

### **Tohoku Electric Power Co., Inc.**

1-7-1 Honcho, Aoba-ku, Sendai 980-8550, Japan  
Tel: (022) 225-2111 URL <http://www.tohoku-epco.co.jp>

### **The Tokyo Electric Power Co., Inc.**

1-3, Uchisaiwai-cho 1-chome, Chiyoda-ku, Tokyo 100-8560, Japan  
Tel: (03) 4216-1111 URL <http://www.tepco.co.jp>

### **Chubu Electric Power Co., Inc.**

1, Higashi-shincho, Higashi-ku, Nagoya 461-8680, Japan  
Tel: (052) 951-8211 URL <http://www.chuden.co.jp>

### **Hokuriku Electric Power Co., Inc.**

15-1, Ushijima-cho, Toyama 930-8686, Japan  
Tel: (076) 441-2511 URL <http://www.rikuden.co.jp>

### **The Kansai Electric Power Co., Inc.**

6-16, Nakanoshima 3-chome, Kita-ku, Osaka 530-8270, Japan  
Tel: (06) 6441-8821 URL <http://www.kepco.co.jp>

### **The Chugoku Electric Power Co., Inc.**

4-33, Komachi, Naka-ku, Hiroshima 730-8701, Japan  
Tel: (082) 241-0211 URL <http://www.energia.co.jp>

### **Shikoku Electric Power Co., Inc.**

2-5, Marunouchi, Takamatsu 760-8573, Japan  
Tel: (087) 821-5061 URL <http://www.yonden.co.jp>

### **Kyushu Electric Power Co., Inc.**

1-82, Watanabe-dori 2-chome, Chuo-ku, Fukuoka 810-8720, Japan  
Tel: (092) 761-3031 URL <http://www.kyuden.co.jp>

### **The Okinawa Electric Power Co., Inc.**

2-1, Makiminato 5-chome, Urasoe, Okinawa 901-2602, Japan  
Tel: (098) 877-2341 URL <http://www.okiden.co.jp>

### **Electric Power Development Co., LTD. (EPDC)**

15-1, Ginza 6-chome, Chuo-ku, Tokyo 104-8165, Japan  
Tel: (03) 3546-2211 URL <http://www.jpower.co.jp>

### **The Japan Atomic Power Company (JAPC)**

1-1, Kanda-Mitoshiro-cho, Chiyoda-ku, Tokyo 101-0053, Japan  
Tel: (03) 4415-5200 URL <http://www.japc.co.jp>

### **Japan Nuclear Fuel Limited (JNFL)**

4-108 Aza Okitsuke, Oaza Obuchi, Rokkasho-mura, Kamikita-gun, Aomori 039-3212, Japan  
Tel: (0175) 71-2000 URL <http://www.jnfl.co.jp>

### **Japan Atomic Energy Agency (JAEA)**

4-49, Muramatsu, Tokai-mura, Naka-gun, Ibaraki 319-1184, Japan  
Tel: (029) 282-1122 URL <http://www.jaea.go.jp>

### **Central Research Institute of Electric Power Industry (CRIEPI)**

6-1, Ohtemachi 1-chome, Chiyoda-ku, Tokyo 100-8126, Japan  
Tel: (03) 3201-6601 URL <http://criepi.denken.or.jp/jp/index.html>

### **Japan Electric Power Information Center, Inc. (JEPIC)**

15-33, Shibaura 4-chome, Minato-ku, Tokyo 108-0023, Japan  
Tel: (03) 4511-3210 URL <http://www.jepic.or.jp>

### **World Association of Nuclear Operators Tokyo Centre (WANO-TC)**

11-1, Iwado-kita 2-chome, Komae, Tokyo 201-8511, Japan  
Tel: (03) 3480-4809 URL <http://www.wano.info>

**The Federation of  
Electric Power Companies of Japan**

Keidanren-kaikan,  
1-9-4, Otemachi, Chiyoda-ku, Tokyo  
100-8118, Japan

<http://www.fepec.or.jp/english/index.html>

