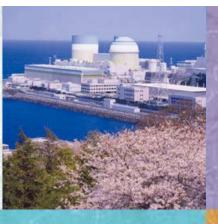
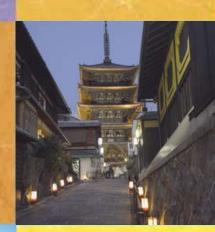
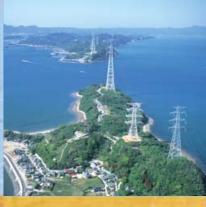
# ELECTRICITY REVIEW JAPAN



The Federation of Electric Power Companies of Japan







2007

### History of Japan's Electricity Industry

Electricity was first used in Japan on March 25, 1878 at the Institute of Technology in Toranomon, 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 protection, global warming, and market liberalization coming to the fore.Electricity was first used in Japan on March 25,



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

## The Need for a Stable Energy Supply

## 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, dependency is still at 82%. 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 protection.

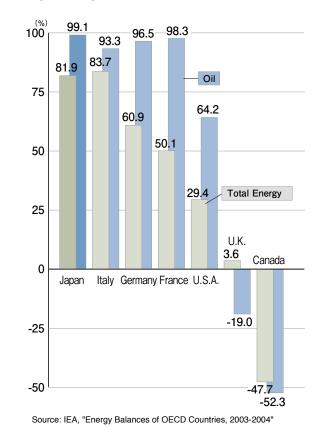


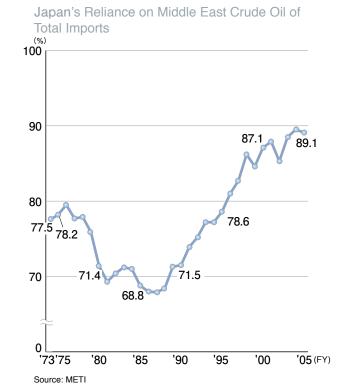
LNG Tanker



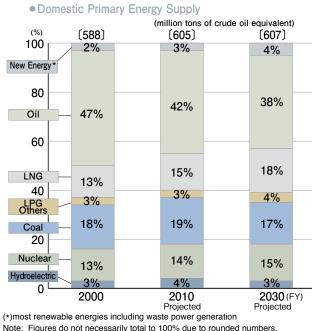
Coal Storage Yard

Dependence on Imported Energy Sources by Country (2004)

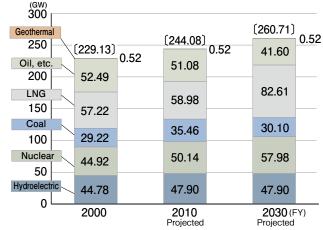




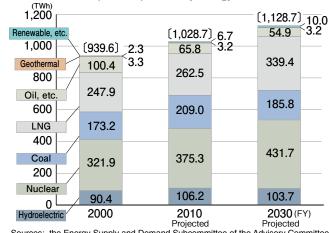
#### Long-term Energy Supply & Demand Outlook -Reference Case-

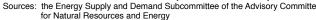


Generation Capacity Composition by Energy Souce



Power Output Composition by Energy Source





#### 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.

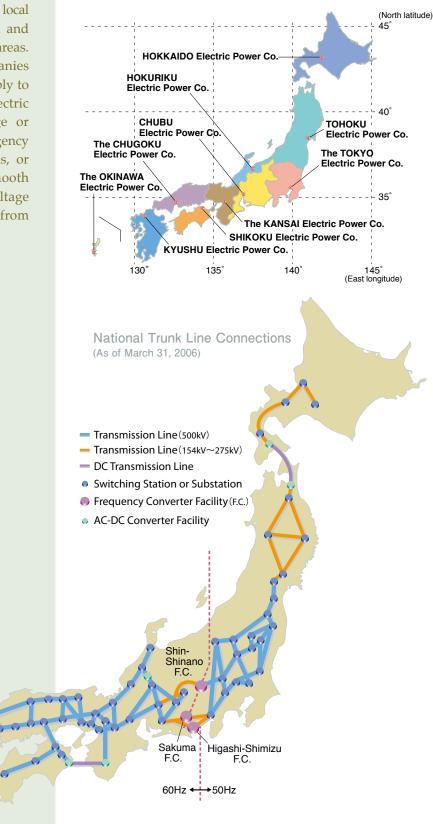
In response to the recent changes of supply and demand structure and diversifying risks in the international energy market, METI drafted the New National Energy Strategy in May 2006. This presents Japan's long-term energy strategy centering on the reinforcement of energy security, and stipulates numerical 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.

## Electricity in Japan is supplied by the dynamic activities of ten private electric power companies

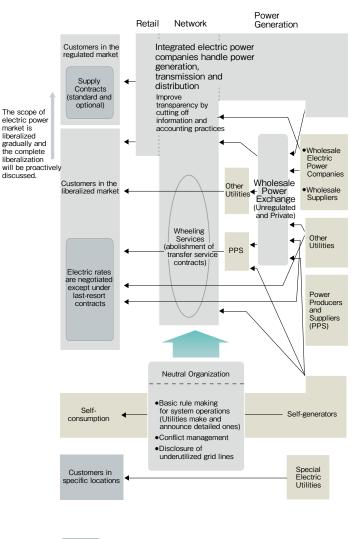
The Ten Electric Power Companies by Service Area

#### 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.



The New Electricity Supply System (from April 2005)



#### **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

#### 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 (PPS) 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. Full liberalization, including residential customers, will be proactively discussed beginning in about April 2007.

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 schedule for market liberalization is different.

## To provide stable supply into the future, we are developing and diversifying our power sources

#### **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 2015 with peak demand increasing every August by 0.8% as well.

By fiscal 2015, electric power companies will develop power generation facilities with a total capacity of 29.01GW, 42% (12.26GW) of which will be accounted for by nuclear power.

#### **Demand Outlook**

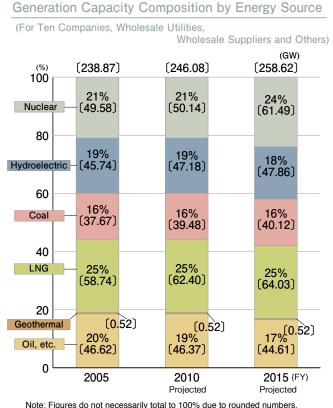
		FY2005 (Results)		FY2010 (Plan)	FY2015 (Plan)	Annual Grouth(%) 2004-2015
Electricity Demand (TWh)	(856.1) 865.4	882.6	869.7	898.2	943.0	(0.9) 0.8
Peak Demand (GW)	(170.4) 171.8	170.2	172.6	178.1	186.9	(0.8) 0.8
Annual Load Factor (%)	(60.5)	62.7	60.8	60.9	60.9	

Note: Figures in parentheses are adjusted temperature variations.

#### **Electric Power Development Capacity**

	FY2006	-FY2015	Breakdown		
	GW	%	FY2006-FY2010	FY2011-FY2015	
Nuclear	12.26	42	0.91	11.35	
Hydro	2.18	8	1.44	0.74	
Conventional	0.31	1	0.07	0.24	
Pumped-storage	1.87	7	1.37	0.50	
Thermal	14.57	50	11.27	3.30	
Coal	3.58	12	2.58	1.00	
LNG	10.70	37	8.47	2.23	
Geothermal		—	—		
Oil, etc.	0.30	1	0.23	0.07	
Total	29.01	100.0	13.63	15.39	

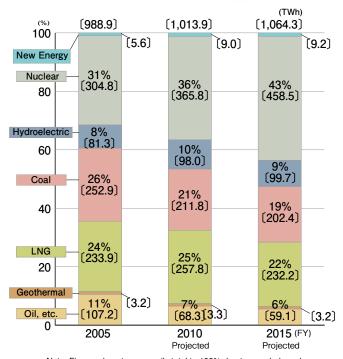
Note: Figures do not necessarily total to 100% due to rounded numbers. Source: Long-Term Electric Power Facilities Development Plan



Sources: Long-Term Electric Power Facilities Development Plan and others

Power Output Composition by Energy Source

(For Ten Companies, Wholesale Utilities, 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

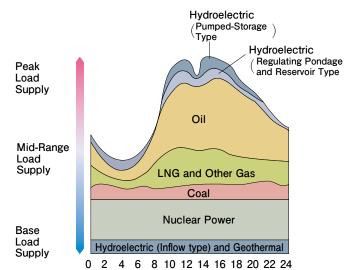


Snow removal for transmission lines



Laying operation of submarine cable

#### (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 variation and contribute to consistent stable supply of electricity

### **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.

### 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 reached 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.



Okumino Hydroelectric Power Plant (Pumped-Storage)



Higashi-Niigata Thermal Power Plant (LNG fired)



Maizuru Thermal Power Plant (Coal fired)



Tomari Power Plant (PWR)



Shimane Nuclear Power Plant (BWR)



Genkai Nuclear Power Plant (PWR)

#### Colum

Two electric power companies have received prior consent to use MOX fuel in thermal reactors

On March 26, 2006, Saga Prefecture and the town of Genkai informed Kyushu Electric Power that they granted the prior consent necessary for the company's plan to use MOX fuel (see: page 10) at the Genkai-3 nuclear power plant. On October 13, 2006, Ehime Prefecture and the town of Ikata also granted prior consent for Shikoku Electric Power's plan to use MOX fuel at the Ikata-3 nuclear power plant. Both companies aim to steadily implement the plan by fiscal 2010, winning the understanding of the local community by giving the highest priority to safety while promptly disclosing detailed, easy-to-understand information.

#### Nuclear Power

Japan's first commercial nuclear power plant started operation in Ibaraki Prefecture in 1966. As of December 2006, 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 2015, the goal is to increase the nuclear output percentage to 43 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.

## A domestic fuel cycle contributes to energy security

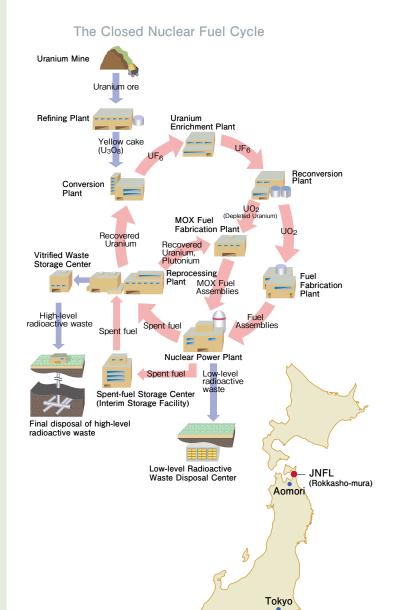
### Japan's Nuclear Fuel Cycle

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 November 2007 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 October 2012.



Outline of JNFL's Nuclear Fuel Cycle Facilities (As of October 2006)

Facility	Reprocessing Plant	MOX fuel fabrication plant	Vitrified waste storage center	Uranium enrichment plant	Low-level radioactive waste disposal center	
Site		katai, Rokkasho-mura, a-gun, Aomori Prefectur	Oishitai, Rokkasho-mura, Kamikita-gun, Aomori Prefecture			
Capacity	Maximum capacity: 800 ton-U/year Storage capacity for spent fuel: 3,000 ton-U		Storage capacity for wastes returned from overseas plants: 1,440 canisters of vitrified waste Planned to be expanded to 2,880 canisters	Initial capacity: 150 ton-SWU/year Planned to be expanded to a maximum capacity of 1,500 ton-SWU/year	Authorized capacity: 200,000m <sup>3</sup> (equivalent to 1 million 200 litter drums) Planned to be expanded to 600,000m <sup>3</sup>	
Current Status	Under construction	Planning for construction	Cumulative number of stored canisters: 1,180	Present capacity: 1,050 ton-SWU/year	Cumulative number of stored drums: 189,267	
Construction Cost	about 2.14 trillion yen about 120 billion yer		80 billion yen(**)	about 250 billion yen	about 160 billion yen(***)	
Schedule	Start of construction: 1993 Start of operation: 2007(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.
(\*\*) Construction expense regarding 1,440 canisters of vitrified waste.
(\*\*\*)Construction expense regarding 200,000 m<sup>3</sup> low-level radioactive waste (equivalent to 1 million 200 liter drums)
Sources: JNFL's Brochure and others



#### JNFL's reprocessing plant



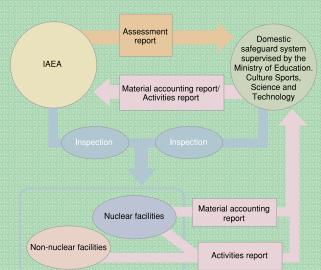
Central control room of reprocessing plant

#### Colui

### 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.

#### The Safeguard Program



#### 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.

### Electric power companies aim to reduce CO<sub>2</sub> emissions to cope with global warming, while continuing to meet growing power demand

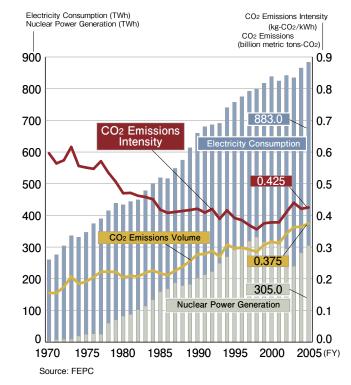
#### **Environmental Protection**

Harmonizing the natural environment with energy needs is one of the most important issues in the electric power industry. Electric power companies are therefore promoting nuclear power that emits no carbon dioxide (CO<sub>2</sub>) in the process of power generation. Considering the entire life cycle of all available energy sources, CO2 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. The industry also continues to expand the use of LNG-fired power plants, improve thermal efficiency in all thermal power plants, and reduce transmission and distribution losses to suppress CO<sub>2</sub> emissions.

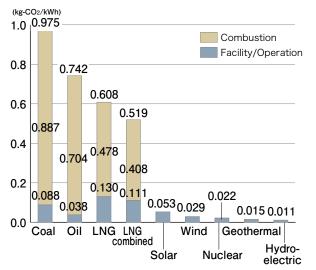
Since the oil crises of the 1970s, electricity demand in Japan has increased by approximately three-fold, but CO<sub>2</sub> emission intensity level (end use electricity) in fiscal 2005 was 0.425 kg-CO<sub>2</sub> per kWh, meaning that emissions per kWh used have fallen by around 30% since 1970.

In addition, we have combined environmental protection with stable supply of electricity by improving the quality and reliability of fossil fuels for power generating facilities. Consequently, sulfur oxide (SOx) and nitrogen oxide (NOx) emission levels per kWh of thermal power output in Japan rank among the lowest in the world.

Trend in Japan's CO<sub>2</sub> Emissions from Electricity Generation (excluding self-generators)



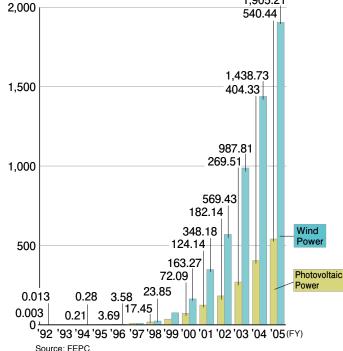




- Note: (1)Based on total CO2 emissions from all energy consumed in energy extraction, transportation, refining, plant operation and maintenance etc. in addition to burning of the fuel
  - (2) Data for nuclear power includes reprocessing of spent fuel in Japan (now in the planning stages), use of Plu-thermal technology (assumes recycling once) and disposal of high level radioactive
  - (3) CO2 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-CO2/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









Photovoltaic Cells

### **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.

## Major Power Plants

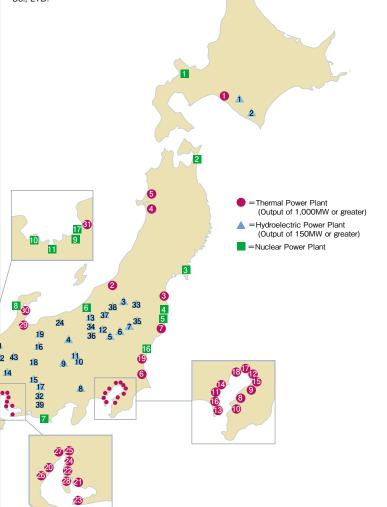
Japan's electric power industry operates some 1,800 hydroelectric, thermal, nuclear, and other power plants to meet the required demand. Here is a list and map of the country's major power plants:

Principal Thermal Power Plants (1,000MW or greater) As of March 31, 2006

				As of March 31, 2006
	Name of Plant	Company	Installed Capacity (MW)	Fuel
0	Tomato-atsuma	Hokkaido	1,650	Coal
2	Higashi Niigata	Tohoku	3,816	LNG, other Gas
3	Haramachi	Tohoku	2,000	Coal
4	Akita	Tohoku	1,300	Crude, Fuel Oil
6	Noshiro	Tohoku	1,200	Coal
6	Kashima	Tokyo	4,400	Crude, Fuel Oil
0	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
1	Yokohama	Tokyo	3,330	Crude, Fuel Oil, LNG, NGL
12	Chiba	Tokyo	2,880	LNG
B	Yokosuka	Tokyo	2,130	Crude, Fuel Oil
14	Higashi Ogishima	Tokyo	2,000	LNG
Ð	Goi	Tokyo	1,886	LNG
16	Minami Yokohama	Tokyo	1,150	LNG
-	Shinagawa	Tokyo	1,140	LNG
_	Ohi	Tokyo	1,050	Crude Oil
19	Hitachinaka	Tokyo	1,000	Coal
20	Kawagoe	Chubu	4,802	LNG
21	Hekinan	Chubu	4,100	Coal
-	Chita	Chubu	3,966	Crude, Fuel Oil, LNG
23	Atsumi	Chubu	1,900	Crude, Fuel Oil
-	Chita Daini	Chubu	1,708	LNG
-	Shin Nagoya	Chubu	1,458	LNG
-	Yokkaichi	Chubu	1,245	LNG, LPG
	Nishi Nagoya	Chubu	1,190	Crude, Fuel Oil, Naphtha
_	Taketoyo	Chubu	1,125	Crude, Fuel Oil
-	Toyama Shinko	Hokuriku	1,500	Crude, Fuel Oil, Coal
-	Nanaoota	Hokuriku	1,200	Coal
-	Tsuruga	Hokuriku	1,200	Coal
-	Himeji Daini	Kansai	2,550	LNG
-	Kainan	Kansai	2,100	Crude, Fuel Oil
-	Sakaiko	Kansai	2,000	LNG
55	Gobo	Kansai	1,800	Crude, Fuel Oil
30	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
<b>3</b> 9	Ako	Kansai	1,200	Crude, Fuel Oil
40	Aioi	Kansai	1,125	Crude, Fuel Oil
đ	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
<b>4</b> 8	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	CoalCoal

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



**Nuclear Power Plants** 

● In	· ·	Unit	Company	Installed	Type of	Start
	Name of Plant	Number	Company	Capacity (MW)	Reactor	Start
1	Tomari	1	Hokkaido	579	PWR	1989.6
		2	<b>-</b>	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
	<b>E</b> 1 1 1	3		825	BWR	2002.1
4	Fukushima	1	Tokyo	460	BWR	1971.3
	Daiichi	2		784	BWR	1974.7
		3		784	BWR	1976.3
		4		784	BWR	1978.1
		5		784	BWR	1978.4
		6		1,100	BWR	1979.1
5	Fukushima	1	Tokyo	1,100	BWR	1982.4
	Daini	2		1,100	BWR	1984.2
		3		1,100	BWR	1985.6
_		4		1,100	BWR	1987.8
6	Kashiwazaki	1	Tokyo	1,100	BWR	1985.9
	Kariwa	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	1996.1
		7		1,356	ABWR	1997.7
7	Hamaoka	1	Chubu	540	BWR	1976.3
		2		840	BWR	1978.1
		3		1,100	BWR	1987.8
		4		1,137	BWR	1993.9
		5		1,380	ABWR	2005.1
8	Shika	1	Hokuriku	540	BWR	1993.7
		2		1,358	ABWR	2006.3
9	Mihama	1	Kansai	340	PWR	1970.1
		2		500	PWR	1972.7
		3		826	PWR	1976.1
10	Takahama	1	Kansai	826	PWR	1974.1
		2		826	PWR	1975.1
		3		870	PWR	1985.1
		4		870	PWR	1985.6
11	Ohi	1	Kansai	1,175	PWR	1979.3
		2		1,175	PWR	1979.1
		3		1,180	PWR	1991.1
		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	1994.1
14	Genkai	1	Kyushu	559	PWR	1975.1
		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	1985.1
16	Tokai Daini		Japan Atomic Power Co.	1,100	BWR	1978.1
17	Tsuruga	1	Japan Atomic Power Co.	357	BWR	1970.3
		2		1,160	PWR	1987.2
Т	Fotal	55	Units	49,58	OMW	
) L Le	nder Constr	uction			(Estin	nated sta
			Hokkaido	010	PWR	
	omari	3	Hokkaido	912		2009.1
	himane	3	Chugoku	1,373	ABWR	2011.1
T	Fotal	2	Jnits	2,28	35MW	
C	osed					
T	okai		Japan Atomic Power Co.	166	GCR	1998.
_	_					
	thers	lor	n Atomio Energy Ager	107		
	ugen		n Atomic Energy Agency	165		rototype)
M	1onju	Japa	n Atomic Energy Agency	280	FBR(F	rototype)

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

6 30

36

34

38 33

35

#### Principal Hydroelectric Power Plants (150MW or greater) As of March 31, 2006

				As of March 31, 2006
	Name of Plant	Company	Installed Capacity (MW)	Туре
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
	Numappara	EPDC	675	Pumped Storage
	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

Namie-Odaka		Tohoku	825	BWR	FY2017		
Higashi-Dori	2	Tohoku	1,385	ABWR	FY2017~		
Fukushima	7	Tokyo	1,380	ABWR	2012.10		
Daiichi	8		1,380	ABWR	2013.10		
Higashi-Dori	1	Tokyo	1,385	ABWR	FY2014		
	2		1,385	ABWR	FY2016~		
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	2014.3		
	4		1,538	APWR	2015.3		
Total	Total 11 Units			14,945MW			

er 2006 tart 89.6 91.4 05.12 84.6 95.7 02.1 71.3 74.7

type)

(Estimated start)

## Improving communication and cooperation with friends and colleagues abroad

#### Strengthening international 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 contract 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

London

Chubu Elecric 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

Bangkok 🔘

International Exchange Activities of Each Electric Power Company

#### NORTH AMERICA

CANADA Ontario Power Generation Inc. TOHOKU

#### U.S.A.

Portland General Electric Co. HOKKAIDO Progress Energy Carolinas, Inc. TOHOKU Georgia Power Co. (GP) TOHOKU PJM Interconnection TOKYO Consumers Energy Co. CHUBU Florida Power & Light Co. (FPL) KANSAI New York ISO KANSAI Nuclear Management Company SHIKOKU

#### EUROPE

#### GERMANY E.ON Energie AG

TOHOKU RWE AG TOKYO / KANSAI

#### FRANCE

Électricité de France (EDF) TOKYO / CHUBU / KANSAI / SHIKOKU / KYUSHU Réseau de Transport d'Électricité (RTE) TOKYO / KANSAI / KYUSHU

#### UNITED KINGDOM

National Grid Transco plc. TOKYO British Energy plc. KANSAI Scottish Power plc. KYUSHU

SWEDEN Vattenfall AB TOKYO / KANSAI

RUSSIA Sakhalinenergo HOKKAIDO

### SWITZERLAND KANSAI

**AFRICA** 

SOUTH AFRICA ESKOM TOKYO

#### ASIA CHINA

Jilin Electric Power Company Ltd. HOKKAIDO China Electricity Council TOHOKU Heilongjiang Electric Power Co., Ltd. TOHOKU State Grid Corporation of China TOKYO/KANSAI Central China Grid Company Ltd. CHUBU Liaoning Electric Power Co., Ltd. HOKURIKU Northeast China Grid Company Ltd. HOKURIKU Beijing Guohua Electric Power Corporation KANSAI East China Grid Company Ltd. KANSAI Sichuan Electric Power Corporation CHUGOKU Northwest China Grid Company Ltd. SHIKOKU China Huadian Corporation KYUSHU Shandong Electric Power Corp. KYUSHU Sichuan Test and Research Institute KYUSHU

#### SINGAPORE

Tuas Power Ltd. KYUSHU

#### TAIWAN

Taiwan Power Company TOKYO / CHUBU / HOKURIKU / KANSAI / CHUGOKU / KYUSHU / OKINAWA

Vashington, D.C.

Nordostschweizersche Kraftwerke AG (NOK)

#### KOREA

Korea Electric Power Corp. TOKYO / KANSAI / KYUSHU Korea Power Exchange KYUSHU

#### THAILAND

Electricity Generating Authority of Thailand HOKKAIDO / TOKYO Provincial Electricity Authority KYUSHU

#### MALAYSIA

Tenaga Nasional Berhad (TNB) TOKYO

#### INDONESIA

P.T. PLN (PERSERO) TOKYO

#### VIETNAM

Electricity of Vietnam (EVN) TOHOKU / KYUSHU

#### MYANMAR

Department of Electric Power (DEP) TOHOKU Myanma Electric Power Enterprise (MEPE) TOHOKU / CHUBU

#### PHILIPPINES

The Manila Electric Co. (MERALCO) KANSAI National Power Corporation KYUSHU

#### QATAR

**Qatar General Electricity & Water Corporation** CHUBU

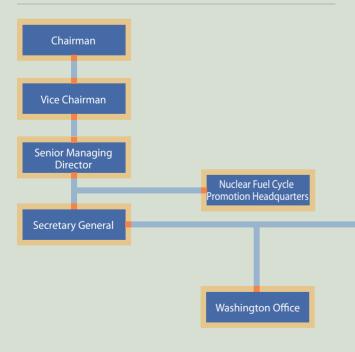
# The Federation of Electric Power Companies represents Japan's ten electric power companies

### 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 electricity 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.

#### Organization of FEPC



#### **Board of Directors**



Tsunehisa Katsumata



Vice Chairman Tatsuo Kondo



Senior Managing Director Norihisa Ito



Shosuke Mori



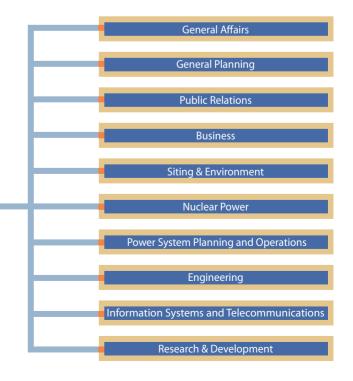
Director Secretary General **Yuzuru Hiroe** 



Vice Chairman Yoshihisa Morimoto



Director Deputy Secretary General **Hideaki Tanaka** 



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#### Company Data (Fiscal year ending March 31, 2006)

Hokuriku	117,641	1,535,393	8,114	31,074	27,966	466,346	1,996	4,692
Kansai	489,320	6,268,884	35,761	160,209	147,108	2,368,909	13,160	22,229
Chugoku	185,527	2,453,331	12,200	65,441	59,501	968,829	5,183	10,690
Shikoku	145,551	1,404,443	6,862	31,349	27,968	515,961	2,843	6,043
Kyushu	237,304	3,857,316	19,409	90,813	82,956	1,314,393	8,286	13,066
Okinawa	7,586	356,659	1,926	8,327	7,346	143,383	797	1,552
<b>Total</b>	<b>2,655,872</b>	<b>39,570,514</b>	<b>201,803</b>	<b>965,026</b>	<b>882,559</b>	<b>14,727,080</b>	<b>81,848</b>	<b>130,598</b>

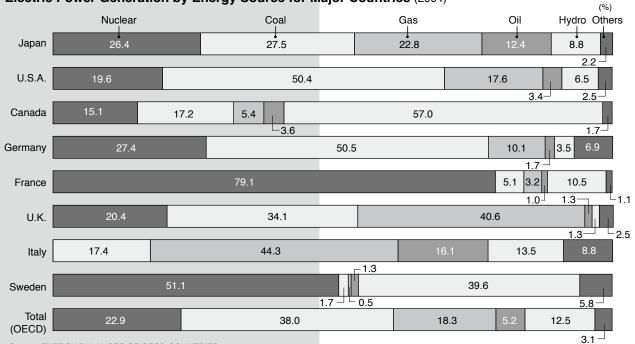
Source: Handbook of Electric Power Industry

#### **Changes in Electric Power Generation**

Changes in Electric Power Generation							(TWh)	
Fiscal Year		1985	1990	1995	2000	2003	2004	2005
Ten Companies	Hydro	61.0	65.4	62.3	66.5	72.4	70.9	60.0
	Thermal	295.2	392.0	401.1	426.4	462.9	454.7	459.3
	Geothermal	1.2	1.4	2.8	3.0	3.1	3.0	2.9
	Nuclear	148.0	181.1	271.4	302.5	220.5	262.5	287.0
Subtotal		505.5	639.9	737.6	798.4	759.0	791.2	809.2
Industry-Owned and Others		166.4	217.4	252.4	293.1	335.0	346.2	348.7
Total		672.0	857.3	990.0	1,091.5	1,094.0	1,137.3	1,157.9

Source: Handbook of Electric Power Industry

#### Electric Power Generation by Energy Source for Major Countries (2004)



Source: ENERGY BALANCES OF OECD COUNTRIES 2003-2004

#### Changes in Electricity Sales for Ten Companies (Nine Companies)

Changes in Electricity Sales for Ten Companies (Nine Companies)								
Fiscal Year	1985	1990	1995	2000	2003	2004	2005	
Residential (Lighting)	(131.9)	177.4	224.6	254.6	260.0	272.5	281.3	
Commercial and Industrial	(386.4)	481.5	532.4	583.3	574.6	592.9	601.3	
Commercial	(77.1)	116.3	152.8	157.9	162.9	125.0	_	
Small Industrial	(88.2)	100.1	108.0	115.8	110.3	112.9	_	
Large Industrial	(203.5)	248.1	254.7	74.8	72.8	_	_	
Others	(17.6)	17.0	16.9	15.0	13.5	12.8	13.4	
Eligible Customers' Use	_	—	—	219.8	215.1	342.2	548.4	
Total	(518.3)	658.9	757.0	837.9	834.3	865.4	882.6	

Source: Handbook of Electric Power Industry

#### Changes in Electricity Sales for Ten Companies (Nine Companies)

	_		-	(to large i	(TWh)			
Fiscal Ye	ar	1985	1990	1995	2000	2003	2004	2005
Mining	Mining	(1.7)	1.5	1.4	1.3	0.9	0.9	1.0
and Industry	Foodstuffs	(7.5)	11.3	13.2	15.3	15.4	15.4	15.4
,	Textiles	(6.2)	6.8	5.1	3.9	3.1	3.0	3.1
	Pulp and Paper	(12.8)	11.9	9.5	10.5	10.1	9.9	10.3
	Chemicals	(27.3)	27.4	25.4	25.9	25.9	26.9	27.7
	Oil and Coal Products	(2.6)	2.4	2.6	1.5	1.4	1.5	1.5
	Rubber	(2.7)	3.5	3.4	3.5	3.6	3.5	3.4
	Clay and Stone	(13.3)	15.0	14.4	11.9	10.9	10.7	11.0
	Iron and Steel	(38.7)	41.3	38.3	36.5	35.2	36.6	36.2
	Non-ferrous Metals	(11.0)	12.3	13.1	14.2	13.1	13.3	14.1
	Machinery	(38.0)	57.3	62.9	69.8	68.4	71.8	74.0
	Others	(13.9)	22.1	24.4	27.0	26.2	27.1	27.6
Subtotal		(175.7)	212.7	213.8	221.2	214.2	220.5	225.2
Railways		(13.4)	16.4	17.9	18.1	18.4	18.8	19.0
Others		(14.4)	19.0	23.0	27.7	29.3	29.8	29.6
Total		(203.5)	248.1	254.7	267.0	261.9	269.1	273.8

Source: Handbook of Electric Power Industry

#### Changes in Electricity Sales for Major Countries

	scincity Sales for Ma							(TWI
		1998	1999	2000	2001	2002	2003	2004
	Residential	1,127.8	1,140.7	1,183.1	1,206.1	1,267.0	1,285.0	N/A
U.S.A.	Commercial and Industrial	2,008.9	1,988.4	2,018.6	2,079.6	2,088.4	2,195.3	N/A
All electric utilities	Others	103.5	106.8	107.8	110.1	107.1	6.7	N/A
	Total	3,240.2	3,235.9	3,309.6	3,395.8	3,462.5	3,487.0	N/A
	Residential	109.6	110.4	111.8	115.3	114.5	115.8	115.5
U.K.	Commercial and Industrial	182.8	165.0	189.8	192.8	192.1	178.0	194.7
All electric utilities	Others	12.9	32.7	12.9	13.6	13.1	31.2	13.5
	Total	305.3	308.1	314.6	321.8	319.8	325.0	323.7
	Residential	179.0	179.8	175.0	169.1	N/A	N/A	N/A
Germany	Commercial and Industrial	268.3	270.9	284.7	340.0	N/A	N/A	N/A
All electric utilities	Others	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	447.3	450.7	459.7	509.0	N/A	N/A	N/A
Canada All electric utilities	Residential	129.3	133.3	138.2	N/A	142.6	147.6	151.0
	Commercial and Industrial	175.5	175.7	183.6	N/A	181.1	183.7	179.8
	Others	184.4	135.0	138.9	N/A	132.5	145.2	147.6
	Total	489.2	443.9	460.7	N/A	465.6	476.5	478.4
	Residential	154.8	157.1	N/A	N/A	N/A	N/A	N/A
France EDF and municipal	Commercial and Industrial	226.8	232.4	N/A	N/A	N/A	N/A	N/A
power utilities	Others	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	381.6	389.5	N/A	N/A	N/A	N/A	N/A
	Residential	50.1	60.7	61.1	61.5	N/A	N/A	N/A
Italy	Commercial and Industrial	162.1	159.7	184.0	191.1	N/A	N/A	N/A
ENEL	Others	14.0	10.0	10.4	10.6	N/A	N/A	N/A
	Total	226.2	230.5	255.5	263.2	204.5	186.3	257.6
	Residential	240.9	248.2	254.6	254.5	263.4	259.7	272.5
Japan	Commercial and Industrial	558.0	568.7	583.3	569.6	578.0	574.7	592.9
Ten Companies	Others	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	799.0	816.9	837.9	824.1	841.5	834.3	865.4

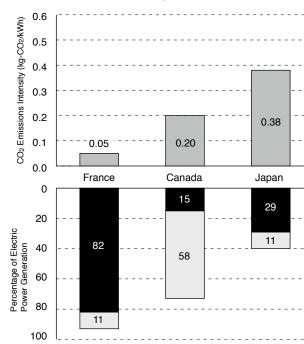
Source: Overseas Electric Power Industry Statistics (2006)

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

·····, ····	son or merinar Emelency,				,		(%
		1985	1990	1995	2000	2003	2004
	Thermal Efficiency	32.7	32.9	33.5	36.4	33.5	34.0
U.S.A.	Transmission and Distribution Loss	6.1	5.7	7.9	6.3	6.3	6.5
	Annual Load Factor	62.0	60.4	59.8	61.2	59.7	61.5
	Thermal Efficiency	32.9	33.9	36.2	36.2	36.0	36.2
U.K.	Transmission and Distribution Loss	8.7	8.1	8.6	9.0	8.6	9.1
	Annual Load Factor	57.8	62.2	65.4	67.4	67.0	66.3
	Thermal Efficiency	(39.3)	(39.8)	39.9	40.4*	40.4*	40.1
Germany (Former W. Germany)	Transmission and Distribution Loss	(4.8)	(4.3)	5.0	4.6	5.2	5.5
(Former W. Germany)	Annual Load Factor	(63.2)	(68.6)	(71.9)	74.5**	82.3	82.3***
Canada	Thermal Efficiency	32.0	34.5	32.6	32.3	33.2	33.2
	Transmission and Distribution Loss	9.2	7.7	6.8	8.0	5.4	5.4
	Annual Load Factor	65.1	65.7	66.8	69.7	68.4	68.4***
	Thermal Efficiency	33.1	35.8	34.5	37.6**	41.2	41.2***
France	Transmission and Distribution Loss	7.7	7.5	7.4	7.0*	6.9	6.6
	Annual Load Factor	57.6	62.9	67.9	69.3	66.4	66.8
	Thermal Efficiency	37.1	37.7	38.6	39.0	40.6	40.5
Italy	Transmission and Distribution Loss	9.0	7.0	6.7	6.4	6.5	6.4
Ā	Annual Load Factor	53.7	52.4	50.3	59.0	57.6	59.4
Japan	Thermal Efficiency	(38.2)	38.8	38.9	40.6	41.1	40.9
Ten Companies	Transmission and Distribution Loss	(5.8)	5.7	5.5	5.2	5.3	5.2
(Nine Companies)	Annual Load Factor	(60.4)	56.8	55.3	59.5	61.2	60.7

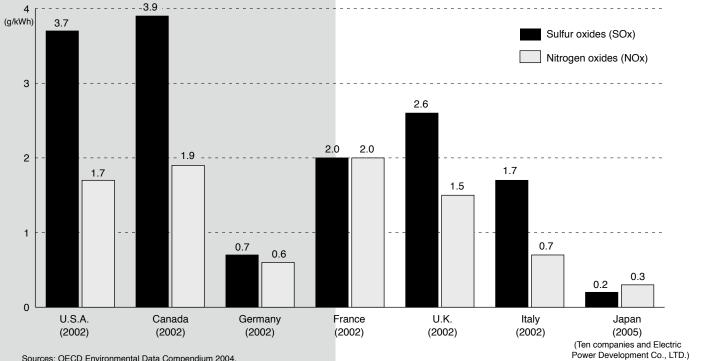
\* Actual figures for 1998 \*\*Actual figures for 1999 \*\*\*Actual figures for 2003 Source: Overseas Electric Power Industry Statistics (2006)

#### CO<sub>2</sub> Emissions Intensity in Seven OECD Countries (2004)



Sources: Energy Balances of OECD Countries 2003-2004 and others

 0.45	· · · · · · · · · · · · · · · · · · ·	0.46	0.48		0.57	· ·
Italy		U.K.	Germany	y	U.S.A.	
 19		22 1	32		21	
 					lear Powe	



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

Sources: OECD Environmental Data Compendium 2004, Energy Balances of OECD Countries and others

#### Revenues and Expenditures for Ten Companies

evenues a	and Expenditures for Ten	Companie	S				(Billion yer
Fiscal Year		2000	2001	2002	2003	2004	2005
Revenues	Residential	5,875	5,799	5,751	5,582	5,783	5,848
	Commercial and Industrial	9,008	8,804	8,318	8,088	8,154	8,124
	Subtotal	14,883	14,604	14,070	13,670	13,938	13,972
	Intercompany Power Sales	618	615	528	477	448	485
	Power Sales to Other Utilities	20	19	22	34	48	72
	Other Revenues	235	282	305	296	360	479
	Total	15,758	15,521	14,927	14,478	14,796	15,010
Expenditures	Personnel	1,816	1,758	1,883	1,796	1,665	1,502
	Fuel	2,008	1,911	2,021	2,044	2,178	2,755
	Maintenance	1,701	1,588	1,392	1,362	1,422	1,410
	Interest	1,052	883	737	616	574	474
	Depreciation	2,791	2,761	2,617	2,477	2,376	2,302
	Taxes and Public Charges	1,063	1,052	1,041	1,017	1,020	1,003
	Intercompany Power Purchases	618	615	528	477	448	484
	Power Purchases	1,186	1,231	1,297	1,277	1,360	1,420
	Drought Reserves	-0	-7	-3	32	33	-29
	Corporate Taxes	359	364	339	348	416	436
	Other Expenditures	2,528	2,713	2,474	2,398	2,575	2,494
	Total	15,125	14,873	14,329	13,849	14,074	14,256
	Net Income	633	647	595	628	722	754

Note: Figures rounded down to nearest digit

Source: Handbook of Electric Power Industry

### Annual Balance Sheet for Ten Companies

	Balance Sheet for Ten Comp				1	1	(Billion ye
Fiscal Yea	ır	2000	2001	2002	2003	2004	2005
Assets	Fixed Assets	41,822	41,110	40,149	39,075	37,836	37,742
	(Operating Fixed Assets)	(32,188)	(31,855)	(30,514)	(29,529)	(28,719)	(28,317)
	(Investments, etc.)	(3,230)	(3,210)	(3,315)	(3,508)	(3,669)	(4,949)
	Current Assets	1,602	1,635	1,534	1,493	1,616	1,827
	Deferred Assets	_	0	0	0	0	0
	Total Assets	43,425	42,746	41,684	40,570	39,453	39,570
Liabilities, Capital	Fixed Liabilities	27,630	27,390	26,930	26,177	24,789	23,890
	(Long-term Debt)	(9,401)	(8,843)	(7,953)	(7,197)	(6,298)	(5,944)
	Current Liabilities	8,293	7,727	6,951	6,116	5,934	6,245
	Reserves	40	32	29	61	95	65
	Total Liabilities	35,963	35,151	33,911	35,355	30,819	30,201
	Capital	2,599	2,599	2,599	2,599	2,599	2,655
	Paid-up Advances on New Stocks	_	_	_	_	_	_
	Capital Surplus	270	270	270	271	271	331
	Earned Surplus	4,271	4,563	4,868	5,211	5,643	6,102
	Unrealized Gain on Securities	320	172	84	222	227	409
	Treasury Stock	_	-11	-50	-90	-108	-130
	Total Capital	7,461	7,594	7,772	8,214	8,633	9,368
	Total Liabilities and Capital	43,425	42,746	41,684	40,570	39,453	39,570

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

#### Investment by Type of Power Facility for Ten Companies

Fiscal Year			1999	2000
	Generation Source	Hydro	113	89
	Source	Thermal	492	491
		Nuclear		224
Expansion		Subtotal	819	805
Expansion	Other	Transmission	477	357
		Transformation	233	172
		Distribution	302	271
		Supply, etc.	46	50
Total			1,878	1,657
Improveme	nt		887	841
Survey Fee	S		46	50
Combined	Total	2,812	2,549	
Nuclear Fu	el	445	377	
Grand Tota	al		3,258	2,927

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

(Billion yen) 2002 2003 2004 2005 2001 Fiscal Year 77 67 64 481 260 236 Generation 449 516 233 199 153 792 526 453 237 199 146 96 58 71 223 174 161 Distribution, 996 1,048 45 42 37 others 1,395 1,014 856 782 606 596 17 16 23 2,194 1,627 1,486 437 448 283 Total 1,512 1,497 2,632 2,075 1,770

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