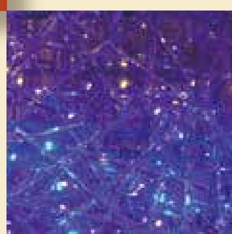
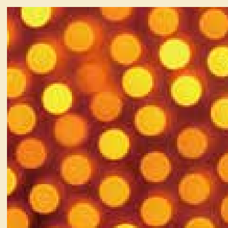
ELECTRICITY REVIEW JAPAN

The Federation of Electric Power Companies of Japan

2014





History of Japan's Electric Utility 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. In those days, electricity was still unfamiliar and uncommon not only in Japan but also in Europe and the United States. In 1886, Tokyo Electric Lighting, a private company, commenced operations as the nation's first electric power company, and began supplying electricity to the public in the following year.

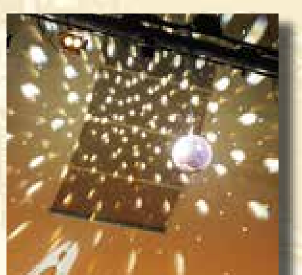
In the early days, use of electricity grew primarily for lighting because of its safety and cleanness, and gradually found broader applications as a power source to replace the steam engine. By 1896, the number of electric utilities established throughout the nation reached a total of 33. The early 20th century marked the establishment of long-distance transmission technology. As larger thermal and hydro-power plants were introduced, generation costs fell and electricity came into wider use throughout the country. Consequently, electricity became an indispensable energy source for peoples' lives and industry.

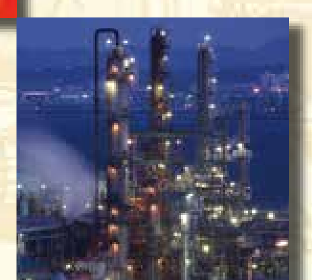
In the years that followed, the electricity utility business grew in tandem with the modernization of Japan and development of its industry. At the same time, the electric utility industry experienced a major restructuring that led to the dissolution of 700 electric utilities, which merged to create five major electric utilities after the First World War. During the Second World War, the electric utility industry was completely state-controlled and utilities were integrated into Nihon Hatsusoden Co. (a nationwide power generating and transmitting state-owned company) and nine distribution companies.

After the end of World War II in 1945, supply and demand for electricity remained very tight in Japan. A series of intense discussions were held on restructuring the electric utility industry as one of the measures for democratizing the economy. As a result, nine regional privately owned and managed General Electricity Utilities— Hokkaido, Tohoku, Tokyo, Chubu, Hokuriku, Kansai, Chugoku, Shikoku and Kyushu Electric Power Companies — were established in 1951 and assumed the responsibility of supplying electricity to each region. This fundamental structure remains to this day, and with the return of Okinawa to Japan in 1972, Okinawa Electric Power Co. joined as a tenth member.

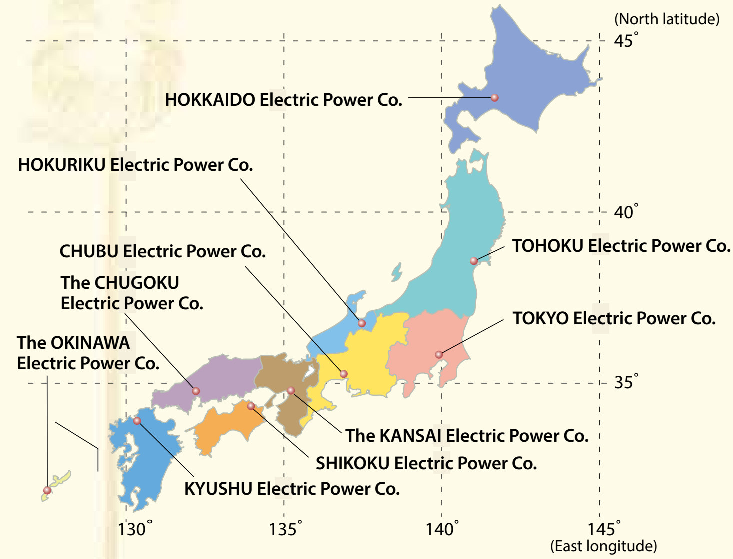
At the end of the 20th century, a trend toward deregulation and competition took hold throughout society, and the electric utility industry started to be liberalized. In December 1995, organizations such as the independent power producers (IPP) were allowed to provide electricity wholesale services and in March 2000, electricity retail supply for extra-high voltage users (demand exceeding 2MW) was liberalized. The scope of retail liberalization was then expanded in April 2004 to users of more than 500kW, and subsequently in April 2005 to users of more than 50kW. Thus, a Japanese model of liberalization based on fair competition and transparency while maintaining the vertical integration of generation, transmission and distribution to ensure a stable supply of electricity, was established.

With the Fukushima Daiichi Nuclear Power Station accident and subsequent tight demand and supply brought about by the Great East Japan Earthquake in March 2011 as a turning point, numerous discussions were held to maintain a stable supply and reduce energy costs, and in November 2013, the policy to implement three-phase reforms of the electric power system was adopted.

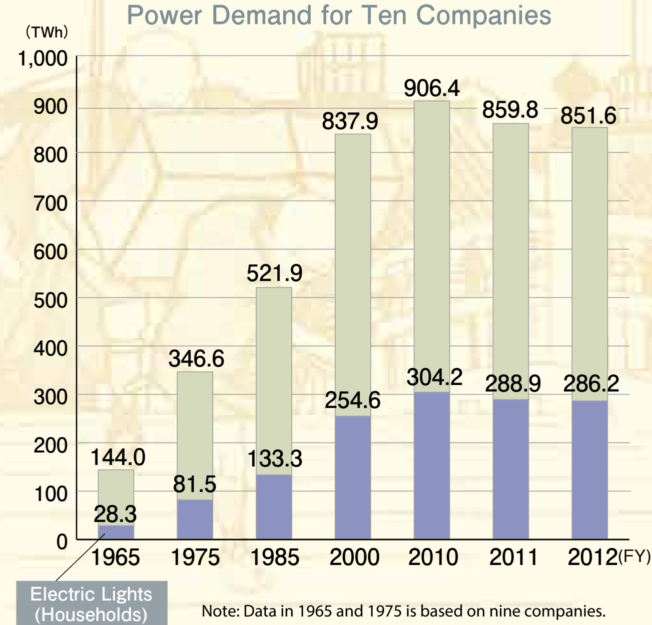





The Ten Electric Power Companies by Service Area



Power Demand for Ten Companies



Note: Data in 1965 and 1975 is based on nine companies.
Sources: Handbook of Electric Power Industry and others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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 Energy Supply Situation

Resource-poor Japan is dependent on imports for 95% of its primary energy supply; even if nuclear energy is included in domestic energy, dependency is still at 89%.

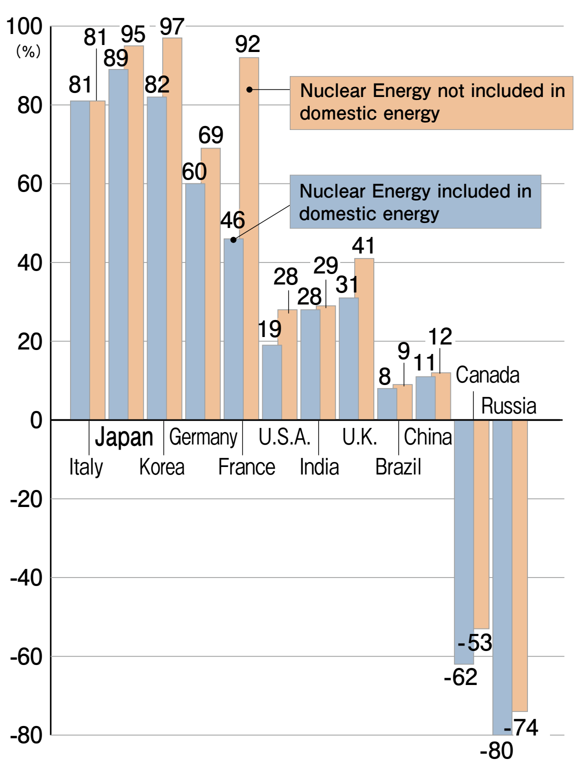
Thus, Japan's energy supply structure is extremely vulnerable. Following the two oil crises in the 1970s, Japan has diversified its energy sources through increased use of nuclear energy, natural gas and coal, as well as the promotion of energy efficiency and conservation. Despite these improvements, oil still accounts for about 40% of Japan's primary energy supply, and nearly 90% of imported oil comes from the politically unstable Middle East. Moreover, although Japan has one of the highest proportions of electricity demand in total energy demand at over 40%, prospects for importing electricity from neighboring countries are very poor because Japan is an island nation. In addition, there is an urgent need for global warming countermeasures such as reduction of carbon dioxide emissions from the use of energy. To ensure Japan's stable electricity supply, it is crucial to establish an optimal combination of power sources that can concurrently deliver energy security, economic efficiency, and environmental conservation, while making safety the top priority.

For the future, it is important for Japan's energy mix to continue to include a certain level of nuclear energy premised on ensuring safety, while maximizing the use of renewable energy and using a reasonable proportion of thermal power considering the stability of fuel supply.

The "Strategic Energy Plan" decided by the government in April 2014 also states that nuclear power is an important base load power source that can, strictly premised on safety, contribute to the stability of the supply and demand structure of energy.

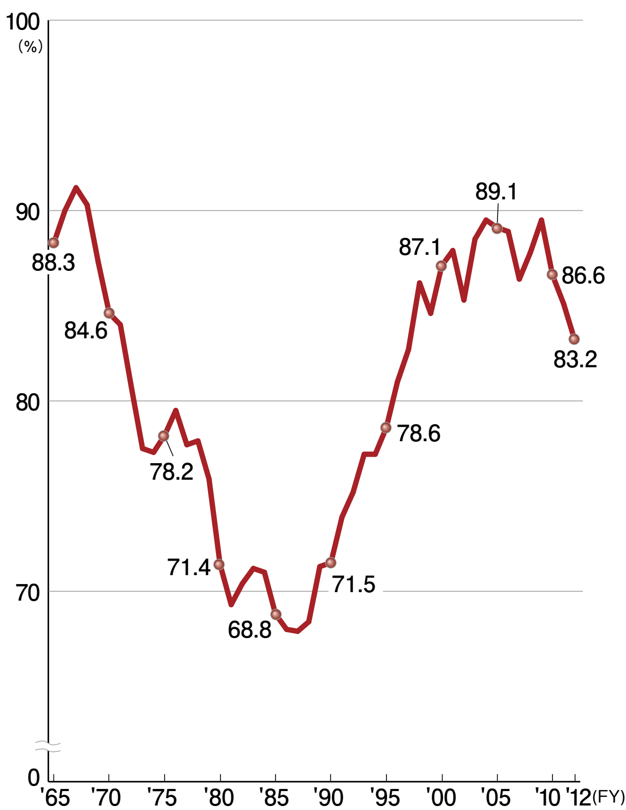
The plan further states that Japan's dependency on nuclear power shall be as low as possible. Under this policy, the proportion of nuclear power in the energy mix will be carefully examined from the view point of stable supply of energy, cost reductions, global warming issues and the maintenance of technology and human resources to secure safety, based on the future energy situation of Japan.

Dependence on Imported Energy Sources by Major Countries (2011)



Source: IEA "Energy Balances of OECD Countries 2013 Edition",
IEA "Energy Balances of Non-OECD Countries 2013 Edition"

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



Source: Petroleum Association of Japan

Electric Power Companies' Commitment to Safety Measures at Nuclear Power Plants

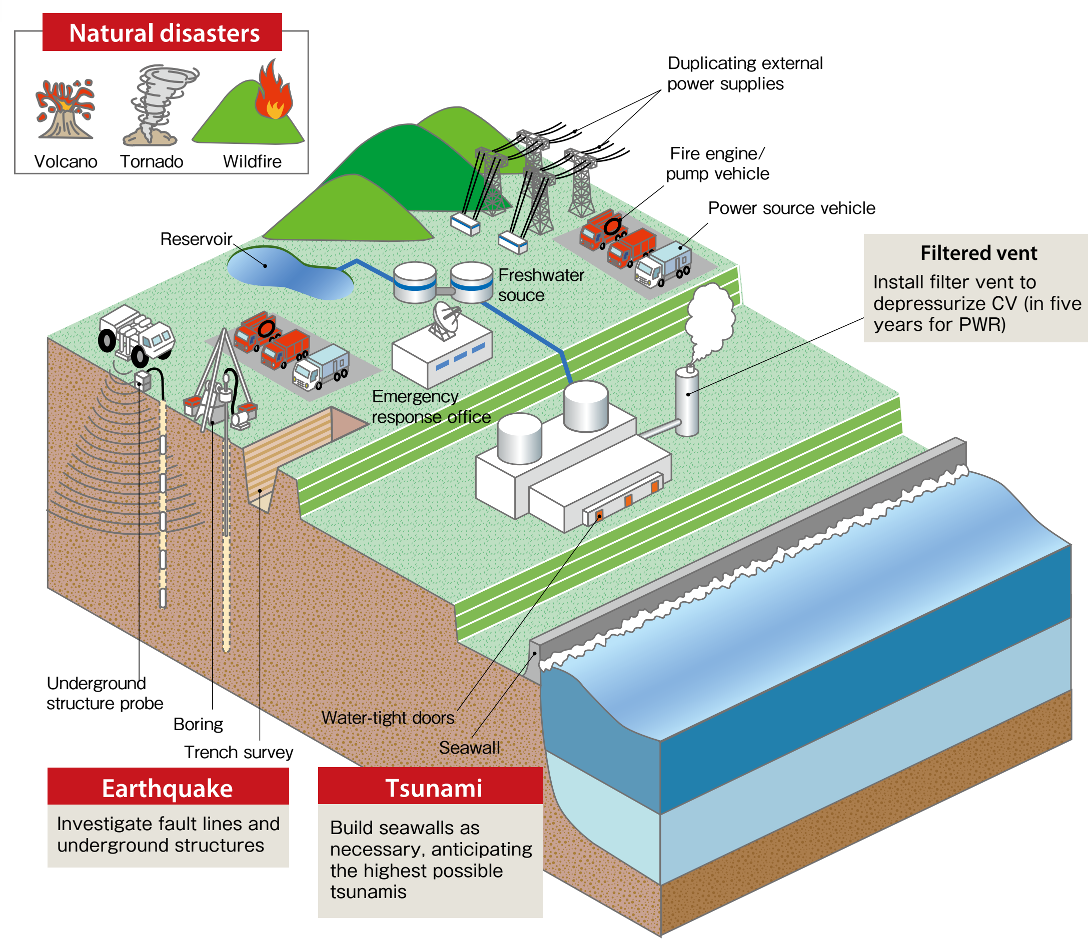
The Great East Japan Earthquake on March 11, 2011 led to a nuclear accident at the Fukushima Daiichi Nuclear Power Station, resulting in the release of radioactive materials into the environment.

Determined to avoid a repeat of this accident, the electric power companies have been taking both tangible and intangible measures since immediately after the accident, starting with emergency safety measures including the installation of additional emergency power source vehicles and fire engines, as well as upgrading procedure manuals and conducting drills.

Even after implementing the emergency safety measures, the electric power companies are making further efforts to improve safety, including installing air-cooled emergency power generators, filtered ventilation systems and earthquake-isolated emergency response centers, to achieve even higher levels of safety and reliability.

In order to improve the safety of nuclear power stations, electric power companies themselves must voluntarily make continuous efforts to improve safety and achieve the highest safety level in the world. To enable these efforts to be constantly and objectively evaluated, the Japan Nuclear Safety Institute (JANSI) was established in November 2012 to evaluate the safety improvement activities of electric power companies and to give them technical advice with strong leadership from an independent standpoint. The electric power companies take to heart the evaluations and recommendations made by the Japan Nuclear Safety Institute and are striving to achieve the highest safety level in the world.

In July 2013, the new regulatory requirements set forth by the Nuclear Regulation Authority (NRA) were put into effect. As of June 2014, all 48 nuclear reactors in Japan are shut down. However, the electric utilities have applied for a review of compliance with the new regulatory requirements for 19 units of their 12 power stations, and the reviews are currently ongoing.



Power Source Vehicle

Seawall

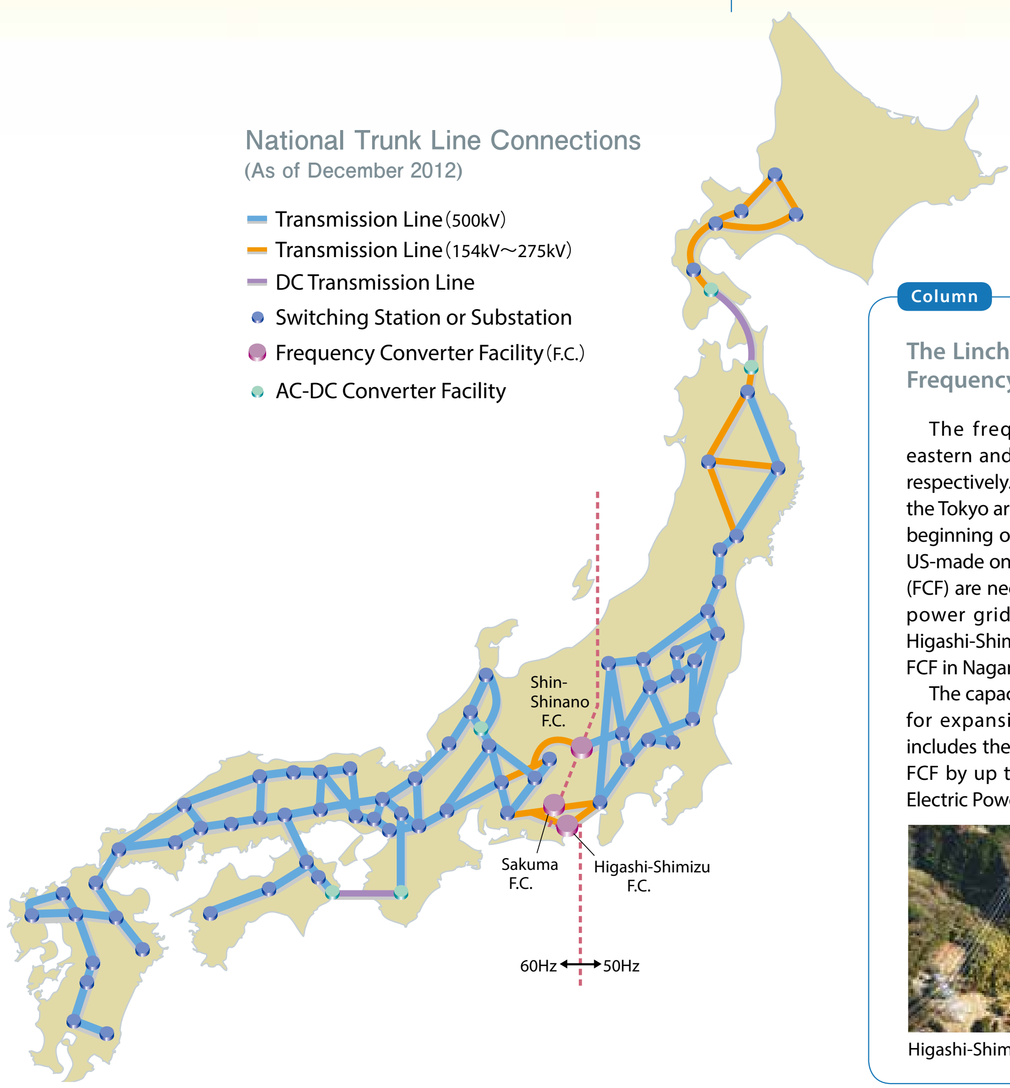
Ten Electric Power Companies as Responsible Suppliers of Electricity

Currently, the ten privately-owned electric power companies are in charge of regional power supply services as General Electricity Utilities and are responsible for supplying electricity from power generation to distribution to the consumers in their respective service area. General Electricity Utilities must obtain approval from the Japanese Government by providing supply conditions such as electricity rates as general supply provisions to those consumers who are excluded from the retail liberalization. They are also responsible for supplying electricity to consumers subject to retail liberalization, based on the provisions for last resort service, if they cannot conclude contracts with power producers and suppliers (PPSs).

The electric power companies work closely with each other to enhance the stability of the electricity supply to customers nationwide. For example, they exchange or provide electricity via extra-high voltage transmission lines linking the entire country from north to south, in order to cope with emergency situations resulting from accidents, breakdowns, or summer peak demand.

Classification of Businesses Specified in the Electricity Utilities Business Act (extract from the Act)

Business Category	Definition
General Electricity Business	Business of supplying electricity to meet general demand (license required)
Wholesale Electricity Business	Business of supplying a General Electricity Utility with electricity for use in its General Electricity Business, using the Electric Facilities with total capacity exceeding 2 GW (license required)
Specified Electricity Business	Business of supplying electricity to meet demand at a specified service point (license required)
Specified-Scale Electricity Business (Commonly called PPSs)	Business of supplying electricity (excluding licensed electricity businesses) to meet a demand exceeding 50kW from electricity users (Specified-Scale Demand), which are conducted by a General Electricity Utility in an area other than its service area, or conducted by a person other than a General Electricity Utility (notification required)
Wholesale Supply Business (Commonly called IPPs)	Supply of electricity to a General Electricity Utility for use in its General Electricity Business (excluding supply through a Cross-Area Wheeling Service) based on a contract of electricity supply exceeding 1 MW for at least 10 years or exceeding 100 MW for at least 5 years



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The Linchpins of East-West Grid Connection- Frequency Converter Facilities

The frequency of grid power differs between eastern and western Japan, namely 50 Hz and 60 Hz respectively. This difference has a historical root in that the Tokyo area adopted German-made generators at the beginning of the electricity business while Osaka chose US-made ones. Therefore, Frequency Converter Facilities (FCF) are necessary to connect the eastern and western power grids. Three FCFs, namely Sakuma FCF and Higashi-Shimizu FCF in Shizuoka Pref. and Shin-Shinano FCF in Nagano Pref., operate to convert the frequency.

The capacity of East-West Grid Connection is planned for expansion to 2100MW in total by FY2020. This includes the increase in the capacity of Higashi-Shimizu FCF by up to 300MW in February 2013 by the Chubu Electric Power Company.

Higashi-Shimizu FCF

Fair Competition and Transparency

The electric power market in Japan has been progressively liberalized to ensure competitive neutrality on the basis of a stable power supply by the existing ten General Electricity Utilities, which consistently handle all functions from power generation to distribution.

In 1995, a law was revised to enable IPPs to participate in the electricity wholesale market in addition to the conventional Wholesale Electricity Utilities. Then, in March 2000, use of the transmission/distribution network owned by the electric power companies was liberalized, and the retail market was partially liberalized to allow power producers and suppliers (PPSs) to sell electricity to extra-high voltage users requiring more than 2MW. The scope of liberalization was then expanded in April 2004 to users requiring more than 500kW, and subsequently in April 2005 to users requiring more than 50kW. Thus, by 2011, the scope of liberalization covered approximately 60% of total electricity demand in Japan. Electric power companies have responded to this trend of liberalization by increasing their business efficiency while lowering electricity prices and offering a variety of pricing plans.

To maintain fair and transparent use of the electric power transmission and distribution system, the Electric Power System Council of Japan (ESCJ) was established as the sole private organization to make rules and supervise operations from a neutral position, starting full-scale operation on April 1, 2005. In addition, Japan Electric Power Exchange (JEPX) was established in November 2003, with investments by the electric power companies, PPSs, self-generators, etc., and started business on April 1, 2005.

With the three goals of ensuring supply stability, suppressing electricity rates to the maximum extent possible and expanding the options for consumers and the business opportunities for operators, the government is planning to advance the reforms in three phases through the three key measures of enhancing nationwide grid operation, full deregulation of the electricity retail and generation sectors, and futher ensuring neutrality in the transmission / distribution sector through the legal unbundling while thoroughly inspecting each phase to solve any issues and taking necessary measures based on the results of the inspections.

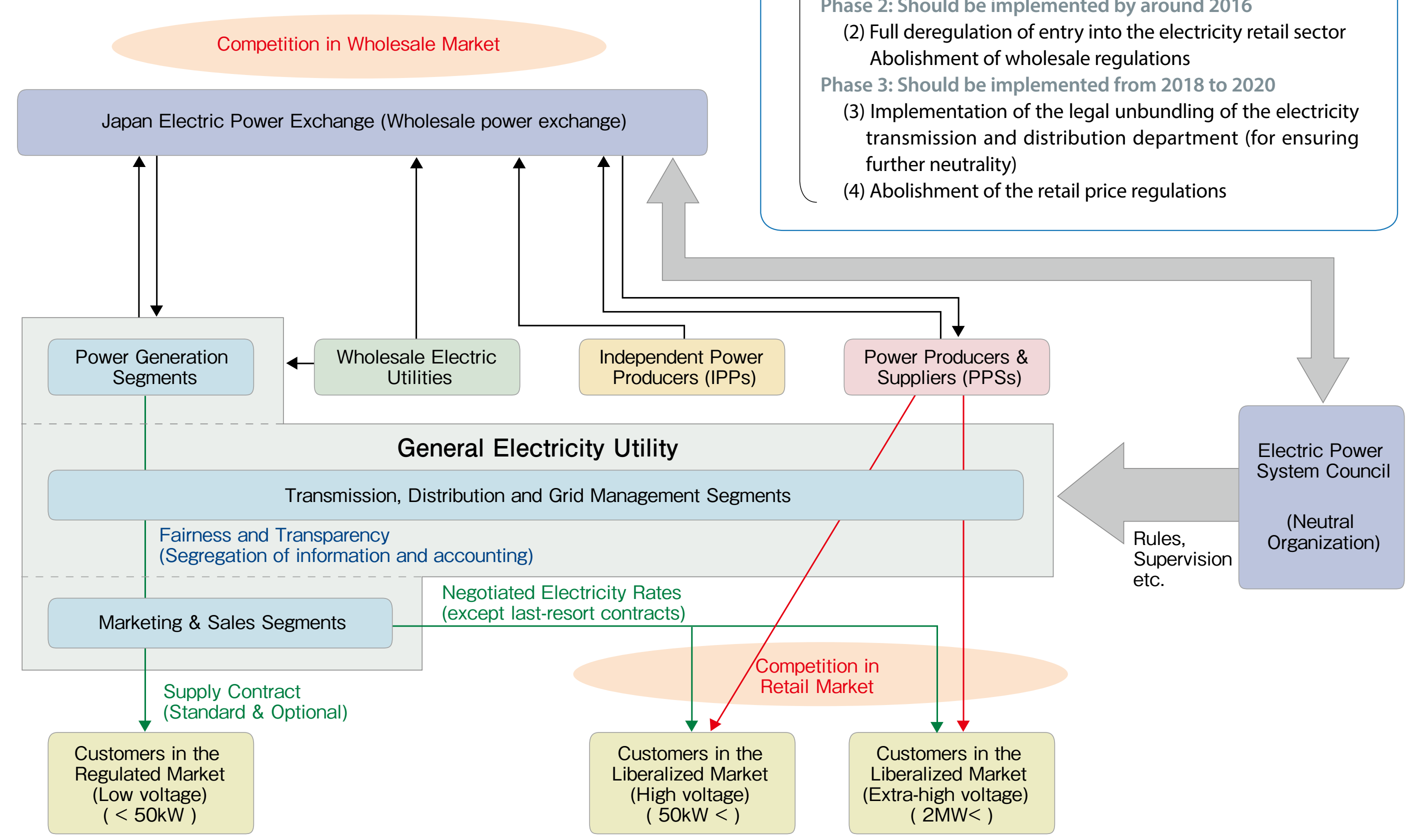
Column

Overview of the Reforms of the Electric Power System

The following revisions to the Electricity Business Act related to the reforms of the electric power system were passed into law in November 2013.

Phase 1: Should be implemented by around 2015
(1) Establishment of the "Organization for Cross-regional Nationwide Coordination of Transmission Operators" (Enhancement of nationwide grid operation)
Phase 2: Should be implemented by around 2016
(2) Full deregulation of entry into the electricity retail sector Abolishment of wholesale regulations
Phase 3: Should be implemented from 2018 to 2020
(3) Implementation of the legal unbundling of the electricity transmission and distribution department (for ensuring further neutrality)
(4) Abolishment of the retail price regulations

The New Electricity Supply System (from April 2005)

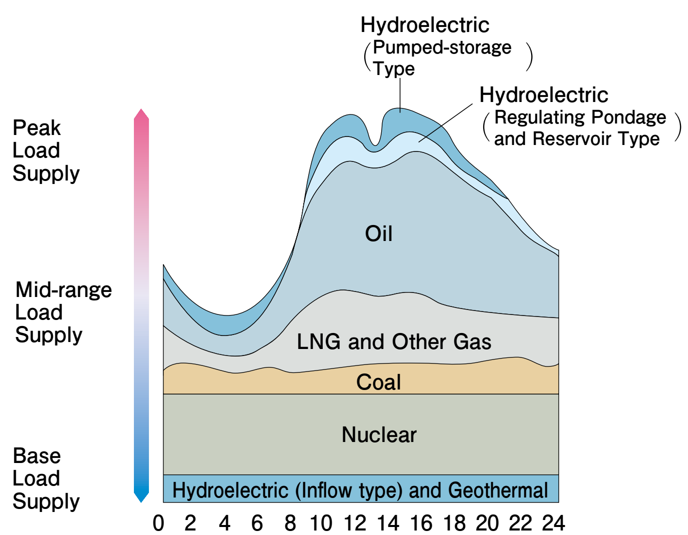


Optimal Combination of Power Sources

Electric power companies in resource-poor Japan are committed to developing an optimal combination of power sources including hydro, thermal and nuclear power in order to provide electricity, which is essential for modern living, in a stable manner at the lowest prices.

As electricity is nearly impossible to store in large quantities, electric power companies generate electricity by combining various power sources, considering optimal operational and economic performance, to ensure that the fluctuating demand, such as during the daytime in the height of summer, can always be met.

(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 the consistent, stable supply of electricity.

Hydroelectric Power

Hydroelectric power has been one of the few self-sufficient energy resources in resource-poor Japan for more than 100 years. Hydroelectric power is an excellent source in terms of stable supply and generation cost over the long term. Though it used to compare unfavorably with thermal power for some time, hydroelectric power saw a renaissance following the oil crisis.

Although the steady development of hydroelectric power plants is desired, Japan has used nearly all potential sites for constructing 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 widen, 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.

Okumino Hydroelectric Power Station (Pumped-storage)

Takami Hydroelectric Power Station

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, electric power companies are promoting the introduction of LNG fired plants in response to global environmental concerns, as they emit less CO_2 and other pollutants.

To enhance thermal efficiency further, combined-cycle power 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.

Kawasaki Thermal Power Station (LNG Combined-cycle)

Yoshinoura Thermal Power Station (LNG-fired)

Nuclear Power

Japan's first commercial nuclear power plant started operation in Ibaraki Prefecture in 1966. The electric utility industry believes that nuclear power generation will retain an important position in the optimal combination of power sources from the viewpoint of assuring energy security and mitigating global warming.

Electric utilities are firmly committed to implementing extensive voluntary safety measures by reinforcing the mechanism to reflect the latest findings from both Japan and overseas, while of course complying with the new regulatory requirements following the accident at the Fukushima-daiichi Nuclear Power Station.

We will also continue to publish the latest information to contribute to the safety of nuclear power generation throughout the world.

Ohi Nuclear Power Station (PWR)

Ohma Nuclear Power Station (ABWR, Under Construction)

Japan's Nuclear Fuel Cycle

The nuclear fuel cycle is a series of processes consisting of reprocessing spent fuel that has been used at nuclear power plants and recovering and recycling plutonium and residual uranium as nuclear fuel.

Japan has chosen a closed nuclear fuel cycle policy since the dawn of its nuclear power generation development. Having few resources, Japan 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 significant: 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. Under the policy of possessing no plutonium reserves without specified purposes, Japan's electric power companies have sincerely committed to a plan to utilize recovered plutonium – in the form of MOX fuel – as soon as possible.

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 for completion of construction of a reprocessing plant at a site in Rokkasho-mura in the northern prefecture of Aomori. JNFL has applied for a review of compliance with the new regulatory requirements, which came into effect in December 2013, and the plants are currently undergoing reviews by the Nuclear Regulation Authority. JNFL expects to be ready for operation in October 2014. In addition, JNFL engages in uranium enrichment, temporary storage of vitrified waste, and disposal of low-level radioactive waste. JNFL has also begun construction of a MOX fuel fabrication plant.

Electric utilities regard nuclear power as an important power source for Japan from viewpoints such as assuring energy security and mitigating global warming. We will make the utmost effort to establish the nuclear fuel cycle on the premise of securing thorough safety.

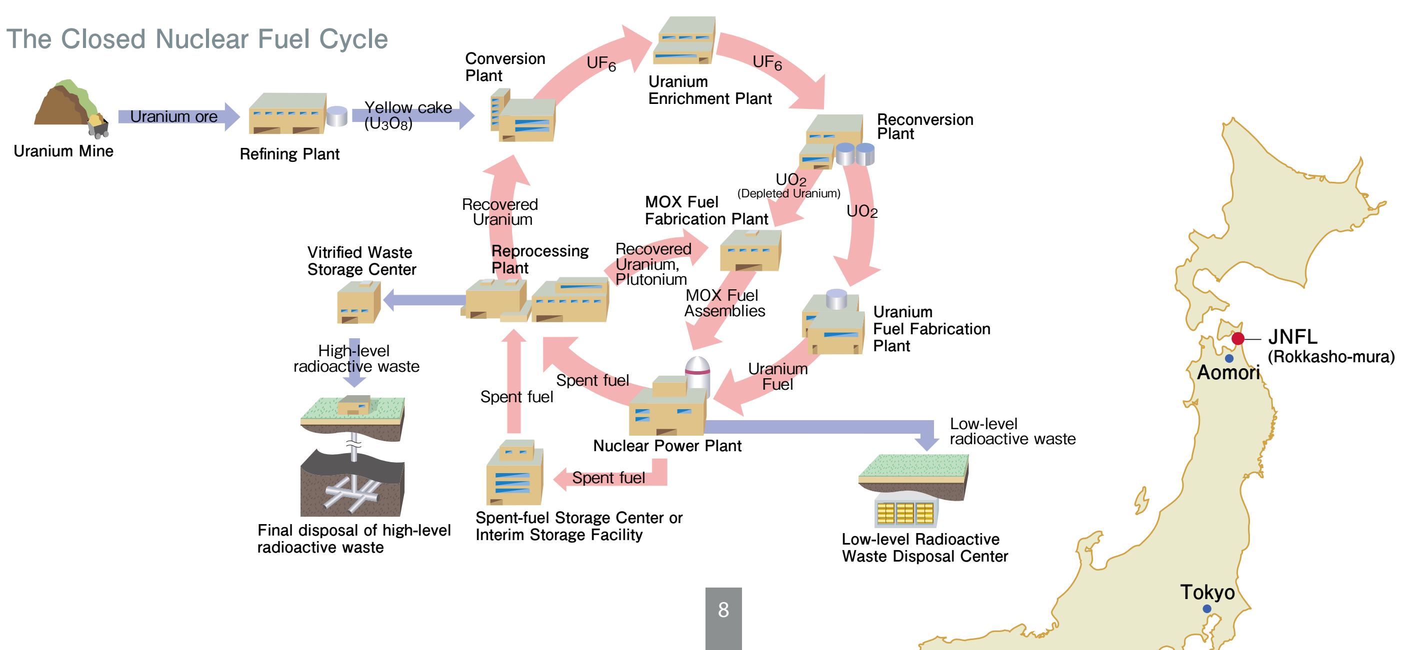
Outline of JNFL's Nuclear Fuel Cycle Facilities (as of April 2014)

Facility	Reprocessing Plant	MOX fuel fabrication plant	Vitrified waste storage center	Uranium enrichment plant	Low-level radioactive waste disposal center
Site	Iyasakatai, 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: 2,880 canisters of vitrified waste	Design capacity 1,500 ton-SWU/year (*)	Planned to be expanded to 600,000m³ (equivalent to 3 million 200 liter drums)
Current Status	Under construction	Under construction	Cumulative number of received canisters: 1,706	Running capacity: 1,050 ton-SWU/year	Cumulative number of received drums: 260,619(2014.3)
Schedule	Start of construction: 1993 Completion of construction: 2014.10(planned)	Start of construction: 2010 Completion of construction: 2017.10(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

Sources: JNFL's website and others

The Closed Nuclear Fuel Cycle



The Peaceful Use of Nuclear Energy

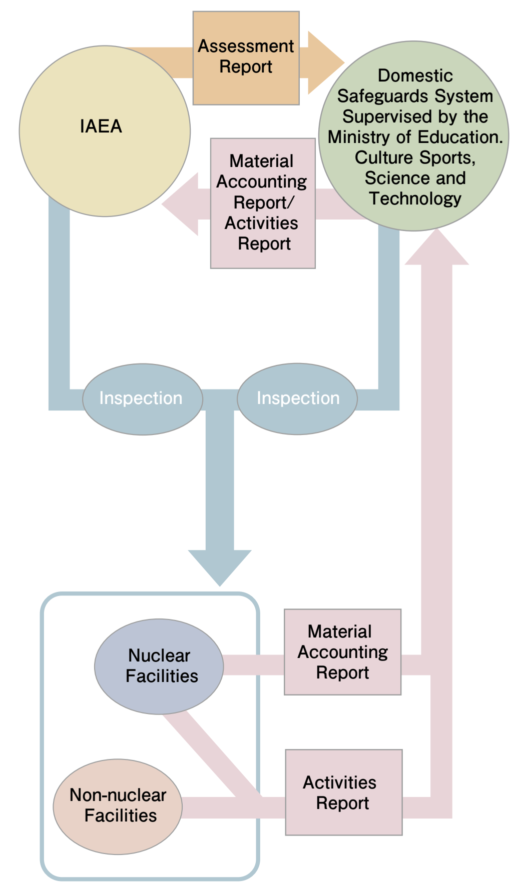
Japan's electric power companies are fully committed to implementing the closed nuclear fuel cycle and plutonium utilization program consistent with all domestic laws and international nonproliferation standards. Since 1955, the domestic laws of Japan require that all nuclear activities, including commercial 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 safeguards 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 came into effect in Japan in September 2004.

Further, concerning the handling of plutonium, the Strategic Energy Plan states that Japan will firmly maintain the policy of possessing no plutonium reserves without specified purposes and using it only for peaceful purposes, in order to steadily advance the use of plutonium while contributing to nuclear non-proliferation and gaining the understanding of the international community. To substantiate these efforts, Japan will manage and use plutonium appropriately by promoting MOX fuel power generation, while paying due consideration to the balance of plutonium collected and utilized, and advance R&D on fast breeder reactors (FBR) by strengthening ties with the US and France.

The Safeguards Program



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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. 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 MOX fuel fabrication plant will be built adjacent to the reprocessing plant.

Status of MOX Fuel Utilization

The electric power industry in Japan intends to introduce MOX fuel in 16 to 18 nuclear reactors by fiscal 2015. In December 2009, Japan's first nuclear power generation using MOX fuel started at Genkai Nuclear Power Plant Unit 3 of Kyushu Electric Power Company. On April 23, 2008, METI permitted Electric Power Development Co. Ltd. (J-Power) to construct the Ohma Nuclear Power Plant (ABWR, 1,383MW) in the town of Ohma in Aomori Prefecture. This marks the first construction of a nuclear power plant at a new site in Japan within the past ten years. Ohma Nuclear Power Plant is the world's first full-MOX nuclear power plant; it seeks to load the full core with the MOX fuel, thus playing a pivotal role in enhancing the flexibility of Japan's MOX fuel utilization program. J-Power is advancing its efforts to comply with the new regulatory safety requirements.

Interim Storage Facility of Spent Fuel

In November 2005, Tokyo Electric Power Company and the Japan Atomic Power Company jointly established the Recyclable-Fuel Storage Company (RFS) in Mutsu City, Aomori Prefecture, for the purpose of keeping spent fuel in safe custody outside nuclear power plant premises until reprocessing. The construction began in August 2010 and the building itself was completed in August 2013. In January 2014, RFS applied for a review of the facility for compliance with the new regulatory requirements that went into effect in December 2013 as a prerequisite for starting operation.

Measures by the Electric Utility Industry to Suppress CO_2 Emissions

Efforts for environmental conservation including countermeasures against global warming, creating a recycling-based society and managing chemical substances, are key challenges for the electric utility industry. In particular, emissions of carbon dioxide (CO_2), a major cause of global warming, are closely related to energy utilization in economic activities and daily life, and so the reduction of CO_2 emissions is a major challenge for the industry.

With the major assumption of a stable supply of high-quality and inexpensive electricity to customers, the electric power companies are making the necessary efforts on both the supply and demand sides of electricity including supplying low-carbon energy, and improving/promoting high-efficiency electrical devices to enhance the efficient use of electricity by customers. The companies are also conducting various projects for R&D and international cooperation.

CO_2 emissions accompanying electricity consumption may increase or decrease depending on various conditions such as weather and the status of electricity use by customers, which cannot be controlled by the utilities themselves.

Therefore, the electric utility industry is striving to achieve the voluntary target of reducing the CO_2 emissions intensity (emissions per unit of user end electricity) averaged over the five fiscal years from 2008 to 2012, by approximately 20% from the level in FY1990 (to approximately 0.34 kg-CO_2/kWh) by using the CO_2 emissions intensity that the electric utilities can affect by their own efforts.

The user-end CO_2 emissions intensity for FY 2012 was 0.487kg-CO_2/kWh, which results in an average CO_2 emissions intensity of 0.406kg-CO_2/kWh for FY 2008 to FY 2012.This is attributed to the increase in thermal power generation due to the long-term shutdown of nuclear power stations after the Great East Japan Earthquake and tsunami.

Efforts in domestic business activities

Expanding the use of non-fossil energy sources
- Using nuclear power with safety as a major premise
- Using renewable energies
  - Using hydropower, geothermal, solar and wind power, and biomass
  - Studies for dealing with the output fluctuation of renewable energies and for expanding their introduction

Improving the efficiency of power facilities
- Improving the efficiency of thermal power
  - In developing thermal power, adopting the highest level of technology suitable for the size of the plant
  - Appropriately maintaining and controlling the thermal efficiency of existing plants

Strengthening the collaboration between the supply and demand sides including customers

Energy conservation
- Promoting high-efficiency electrical devices to enhance the efficient use of electricity
  - Heat pumps (EcoCute, etc.), TES air-conditioning systems
- PR activities and providing information on energy-saving and CO_2 reduction
  - Environmental housekeeping books, exhibitions on energy-saving appliances, seminars on energy saving
- Introducing smart meters for the efficient use of electricity

Efforts by electric utility industry as users
- Efforts in office-use energy conservation and the use of company-owned vehicles
  - Reduction of amount of power consumption
  - Introduction of electric vehicles and fuel-efficient vehicles

Promoting international contributions

International efforts
- Assisting developing countries to reduce carbon through international partnership (GSEP) activities
  - Transfer and granting of Japanese electricity technologies through coal thermal facility diagnosis and CO_2 emissions reduction activities
- Reducing carbon in all parts of society through international efforts
  - Developing and introducing advanced and feasible electricity technologies through international efforts such as the "International Electricity Partnership"

Developing innovative technologies

Research and development
- Supply-side
  - Clean coal technology, CCS, next-generation power transmission and distribution technology
- Customer side
  - Ultra-high-efficiency heat pump, EV-related technologies

Decarbonization of Energy on the Supply-side

Promoting nuclear power generation while assuring safety, and improving the thermal efficiency of thermal power plants further

Nuclear power emits no carbon dioxide (CO_2) in the process of power generation, and even considering CO_2 emissions over the entire life cycle of various energy sources, those from nuclear power are lower than those from thermal power, and are even lower than those from solar or wind power.

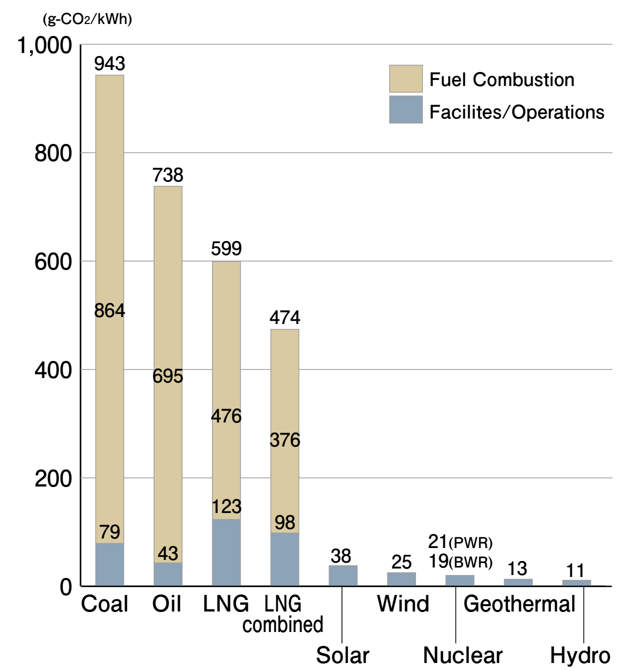
Considering that nuclear power generation will continuously play a key role in combating global warming, the industry is committed to making the utmost effort to improve the safety of nuclear power generation and to restore the trust of citizens.

The electric companies are also striving to increase the share of LNG-fired thermal power, which has the advantage of relatively low CO_2 emissions, and to improve the efficiency of thermal power plants.

Currently operating state-of-the-art gas turbine combined cycle power plants have achieved the world's highest level of 59% in thermal efficiency, by, for example, raising the combustion temperature at the gas turbines.

Since the Oil Shocks of the 1970s, electricity demand has grown approximately 3.3-fold while CO_2 emissions have grown only 2.7-fold. This was achieved through measures on both the supply and demand sides, reducing the CO_2 emissions of energy on the supply side while improving the efficiency of energy utilization by users. As a result, CO_2 emissions per unit of user-end electricity have decreased by 18% from 1970 levels.

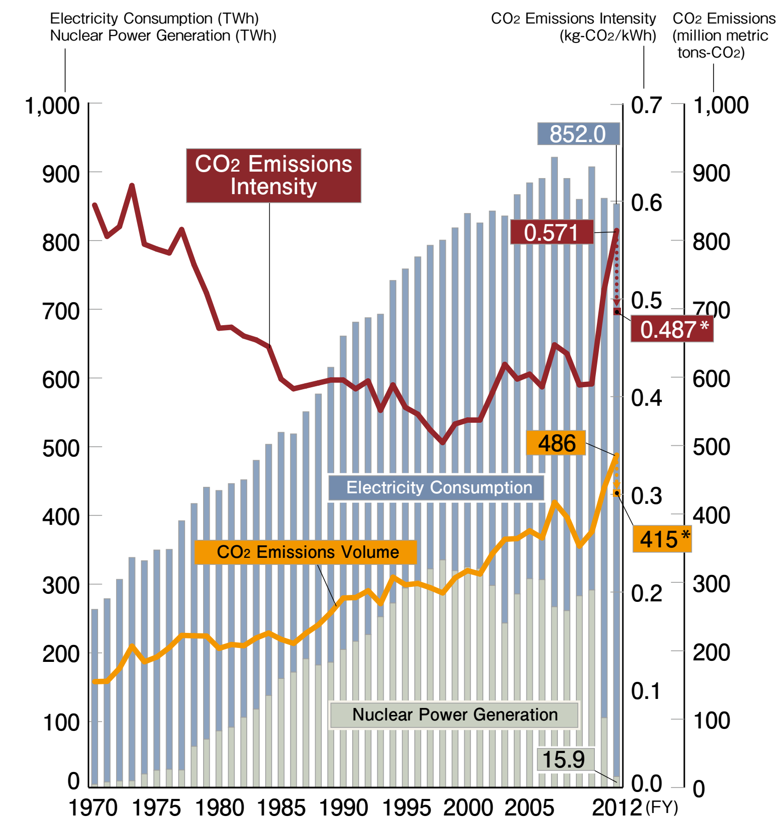
CO_2 Emissions Intensity over the Entire Lifecycle by Source



Note: (1) Based on total CO_2 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: 1) includes spent fuel reprocessing in Japan (under development), MOX fuel use in thermal reactors (assuming recycling once) and disposal of high level radioactive waste, and 2) is based on the capacity-weighted average of CO_2 emissions intensities of existing BWR and PWR plants in Japan, which are 19g-CO_2/kWh and 21g-CO_2/kWh respectively.

Source: Report of the Central Research Institute of Electric Power Industry, etc.

Historical Trends in CO_2 Emissions from Power Generation
(excluding self-generators)



Note: The numerical value of "0.487*" and "415*" reflected Kyoto Mechanism credit.
Source: FEPC

Decarbonization of Energy on the Supply-side

Development and expansion of the use of renewable energy sources

Hydroelectric, geothermal, photovoltaic, wind, and biomass energy are all clean and renewable, and the electric utilities are striving to develop them.

For example, the electric utilities are developing mega-solar power generation plants (large-scale photovoltaic power generation plants) in addition to the efforts such as utilizing woody biomass fuel at their existing coal-fired power plants. We are planning to build Mega Solar Power Plants with a total capacity of about 140 MW at around 30 sites throughout the country by fiscal year 2020, and some plants have already started commercial operation.

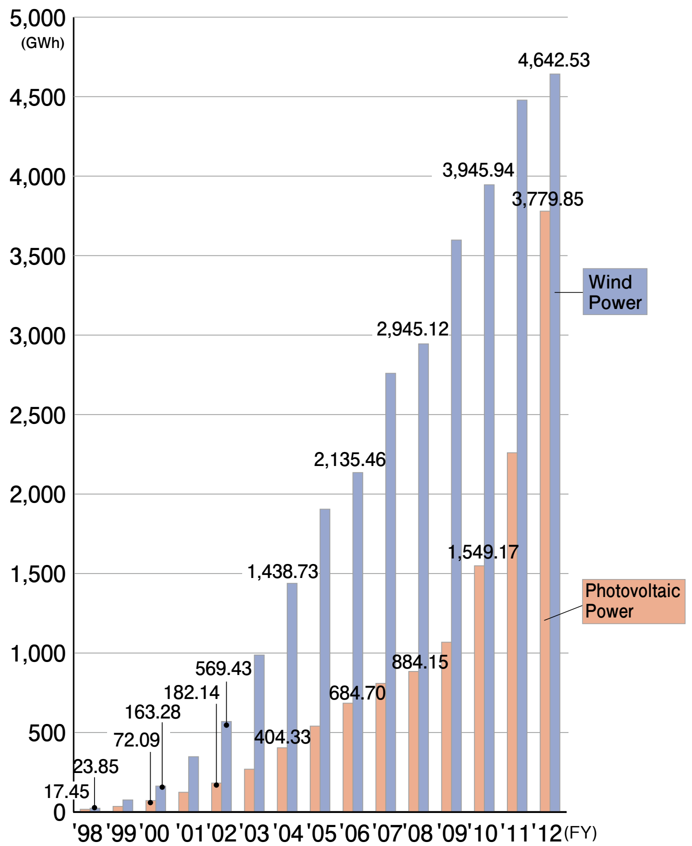
Japanese electric power companies have been purchasing electricity generated from the solar and wind power systems of our customers, and thus renewable energy sources account for about 10% of total electricity.

The feed-in tariff system for renewable energy began in July 2012, whereupon the electric power companies are obliged to buy such electricity at a fixed price for a certain period. The cost of purchasing this electricity is finally borne by customers in the form of a surcharge, which in principle is proportional to the amount of electricity consumed.

Renewable energy such as photovoltaic power has problems involving efficiency, cost of power generation and stability of output. R&D on the latest power system control technologies for combining existing power plants and storage batteries will be actively conducted to help stabilize the system, when introducing large amounts of wind and photovoltaic power, which are susceptible to the weather.

Electric utilities will keep striving to develop and improve renewable energy sources.

Ten Electric Power Companies' Purchasing Volume of Photovoltaic and Wind Power



Source: FEPC

Mikuni Solar Power Station

Wind Power

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 utility 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).

Through the cooperation between advanced and developing countries, and with the "sectoral approaches" for sector-by-sector improvement of energy efficiency, it will be possible to achieve compatibility between economic growth and global environmental preservation. The electric utility industry of Japan has been proposing the sectoral approaches to the world as a new focus for the post-Kyoto period.

It is estimated that the introduction of Japanese technologies to coal-fired power plants in three big countries alone, namely the United States, China, and India could reduce emissions by approximately 1.3 billion tons-CO_2/year, which is almost equivalent to the total annual CO_2 emissions in Japan today.

Column

Peer Review Activities by the GSEP

In January 2013, the first workshop (WS) was held in Jakarta, Indonesia to share the best practices in electricity generation, distribution and demand management technologies. Forty-seven participants from Japan, the US, China, Europe and Indonesia joined the meeting for a seminar on electricity generation, distribution and demand management technologies, as well as a Peer Review at a coal-fired thermal power plant (Suralaya Thermal Power Plant), and actively exchanged views on operation and maintenance (O&M).

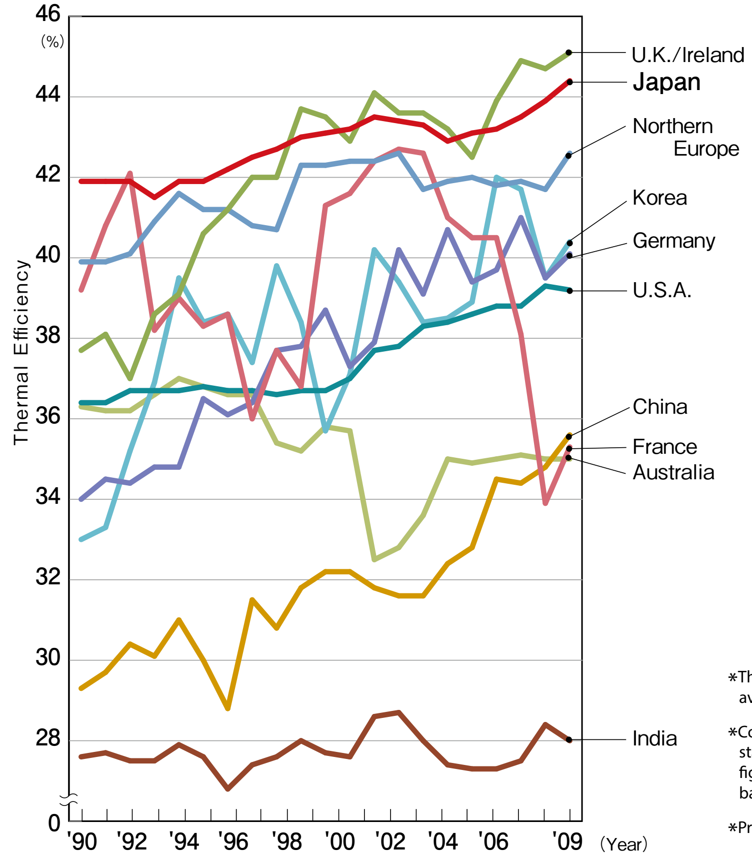
<Overview of Suralaya Thermal Power Station>

- Four 400 MW units (<Start of commercial operation> Unit 1: 1984, Unit 2: 1985, Unit 3: 1988, Unit 4: 1989)
- Three 600 MW units (<Start of commercial operation> Unit 5: 1996, Units 6 & 7: 1997)

<Result of the review>

- At least 2% of gross thermal efficiency degradation was recognized (equal to 64,000 tons of fuel loss and 150,000 tons of CO_2 emissions annually)
- Efficiency decrease in some major auxiliaries was recognized from operation data.
- Importance of regular calibration of instruments and regular inspection of drain valves were shared.

Comparison of Thermal Power Plant Efficiency in Japan and Other Countries



Source: ECOFYS「INTERNATIONAL COMPARISON OF FOSSIL POWER EFFICIENCY AND CO_2 INTENSITY August 2013」

*Thermal efficiency is the gross generating efficiency based on the weighted averages of efficiencies for coal, petroleum and gas (low heat value standard).

*Comparisons are made after converting Japanese data (higher heating value standard) to lower heating value standard, which is generally used overseas. The figures based on lower heating value are around 5-10% higher than the figures based on higher heating value.

*Private power generation facilities, etc. not covered.

Demand-side Efforts for CO_2 Reduction

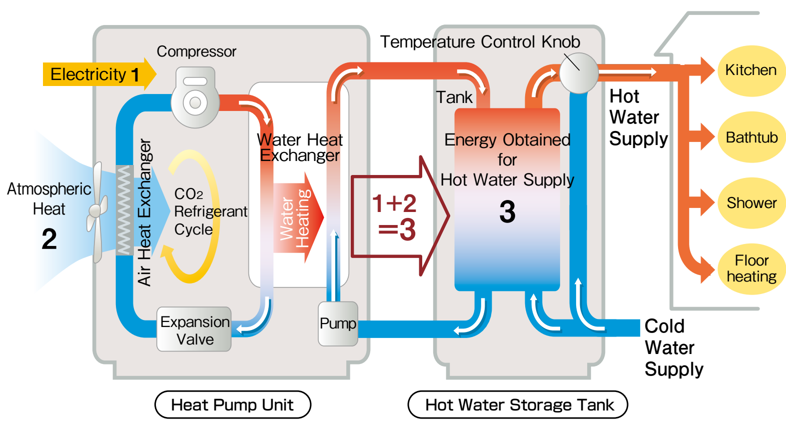
In Japan, the energy demand for water heating constitutes about 30% of the total energy demand in the household sector, and so energy-saving and CO_2 reduction measures in this area are very important. Electric power companies have been working hard to develop and promote electric appliances and systems to reduce CO_2 emissions. One example is EcoCute, a water heating system with a heat pump that uses CO_2 as refrigerant.

EcoCute heats water by transferring the thermal energy in air, which is freely available, to water by means of refrigerants. With a single unit of electric energy for heat pump operation and two units of thermal energy from air, it produces three units of thermal energy.

Thanks to this principle, CO_2 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 heat pump systems as a key means of preventing global warming in the consumer sector (household and commercial sectors).

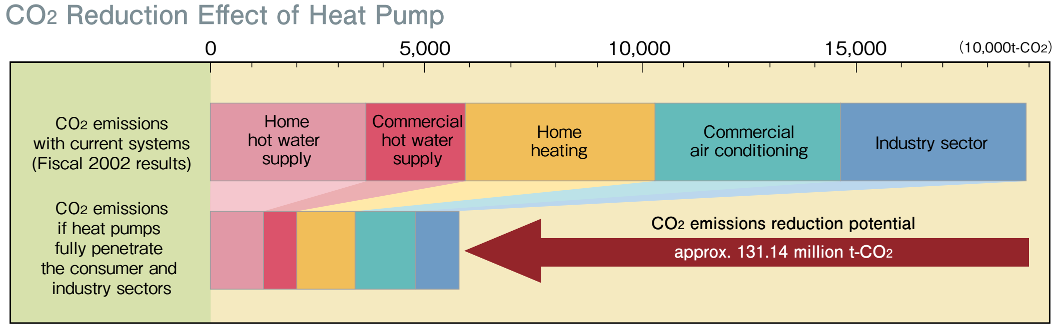
When heat pump systems fully penetrate the consumer and industrial sectors, the resulting CO_2 emissions reduction will amount to about 12% of the present annual CO_2 emissions in Japan, which is about 1.2 billion tons-CO_2.

EcoCute Hot Water Supply Structure: CO_2 Refrigerant Heat Pump Hot Water Heater



1 Electricity Energy + 2 Atmospheric Heat = 3 Energy Obtained for Hot Water Supply

CO_2 Reduction Effect of Heat Pump



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

Column

Electric Vehicle Deployment Plan

The electric power companies of Japan have been working hard to achieve full-scale commercialization of environmentally-efficient electric vehicles, such as conducting driving tests and jointly developing new fast battery chargers with automobile manufacturers. To expand the use of electric vehicles, the electric power companies jointly decided to introduce about 10,000 electric vehicles (including plug-in hybrid vehicles) in total for commercial use by FY2020.

Electric Vehicle
(Mitsubishi Motors Corporation, i MiEV)

Fast Battery Charger

EcoCute Heat Pump Unit (left) and Hot Water Storage Tank

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 for 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
Established in 1994

Tokyo Electric Power Co., Inc., Washington Office
2121 K Street, NW Suite 910, Washington, DC 20037
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, 65 Curzon Street, London W1J8PE, U.K.
Tel: (020) 7409-0142 Fax: (020) 7408-0801
Established in 1985

PARIS

The Kansai Electric Power Co., Inc., Paris Office
3, rue Scribe, Paris 75009, FRANCE
Tel: (01) 43 12 81 40 Fax: (01) 43 12 81 44
Established in 2008

DOHA

Chubu Elecric Power Co., Inc., Doha Office
4th Floor, Salam Tower, Al Corniche P.O.Box 22470, Doha-QATAR
Tel: (974) 4836-830 Fax: (974) 4834-841
Established in 2007

BEIJING

Tokyo Electric Power Co., Inc., Beijing Office
Unit 4, Level 8, Tower E3, Oriental Plaza,
No.1 East Chang An Avenue, Dong Cheng District, Beijing 100738, China
Tel: (10) 8518-7771
Established in 2011

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:

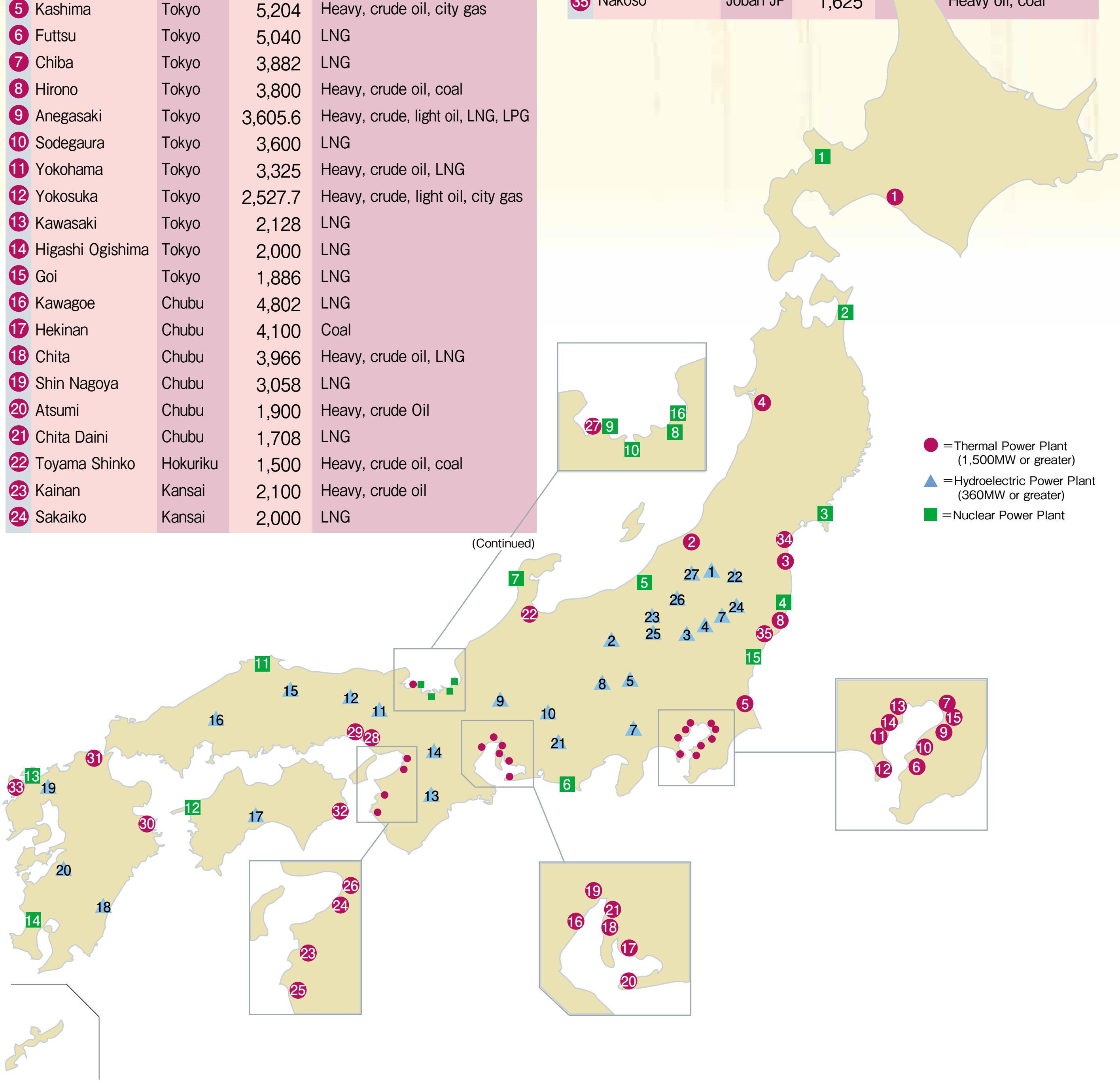
Principal Thermal Power Plants (1,500MW or greater)

As of March 31, 2013

	Name of Plant	Company	Installed Capacity (MW)	Fuel
1	Tomato-atsuma	Hokkaido	1,650	Coal
2	Higashi Niigata	Tohoku	5,203	LNG, heavy, crude, light oil, city gas
3	Haramachi	Tohoku	2,000	Coal
4	Akita	Tohoku	1,633	Heavy, crude, light oil
5	Kashima	Tokyo	5,204	Heavy, crude oil, city gas
6	Futtsu	Tokyo	5,040	LNG
7	Chiba	Tokyo	3,882	LNG
8	Hirono	Tokyo	3,800	Heavy, crude oil, coal
9	Anegasaki	Tokyo	3,605.6	Heavy, crude, light oil, LNG, LPG
10	Sodegaura	Tokyo	3,600	LNG
11	Yokohama	Tokyo	3,325	Heavy, crude oil, LNG
12	Yokosuka	Tokyo	2,527.7	Heavy, crude, light oil, city gas
13	Kawasaki	Tokyo	2,128	LNG
14	Higashi Ogishima	Tokyo	2,000	LNG
15	Goi	Tokyo	1,886	LNG
16	Kawagoe	Chubu	4,802	LNG
17	Hekinan	Chubu	4,100	Coal
18	Chita	Chubu	3,966	Heavy, crude oil, LNG
19	Shin Nagoya	Chubu	3,058	LNG
20	Atsumi	Chubu	1,900	Heavy, crude Oil
21	Chita Daini	Chubu	1,708	LNG
22	Toyama Shinko	Hokuriku	1,500	Heavy, crude oil, coal
23	Kainan	Kansai	2,100	Heavy, crude oil
24	Sakaiko	Kansai	2,000	LNG

(Continued)

	Name of Plant	Company	Installed Capacity (MW)	Fuel
25	Gobo	Kansai	1,800	Heavy, crude oil
26	Nanko	Kansai	1,800	LNG
27	Maizuru	Kansai	1,800	Coal
28	Himeji Daini	Kansai	1,650	LNG
29	Himeji Daiichi	Kansai	1,507.4	LNG
30	Shin Oita	Kyushu	2,295	LNG
31	Shin Kokura	Kyushu	1,800	LNG
32	Tachibanawan	J-Power	2,100	Coal
33	Matsuura	J-Power	2,000	Coal
34	Shinchi	Soma JP	2,000	Coal
35	Nakoso	Joban JP	1,625	Heavy oil, coal



Nuclear Power Plants

● In Operation

As of January 31, 2014

	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
		3		912	PWR	2009.12
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 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
5	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
6	Hamaoka	3	Chubu	1,100	BWR	1987.8
		4		1,137	BWR	1993.9
		5		1,380	ABWR	2005.1
7	Shika	1	Hokuriku	540	BWR	1993.7
		2		1,206	ABWR	2006.3
8	Mihama	1	Kansai	340	PWR	1970.11
		2		500	PWR	1972.7
		3		826	PWR	1976.12
9	Takahama	1	Kansai	826	PWR	1974.11
		2		826	PWR	1975.11
		3		870	PWR	1985.1
		4		870	PWR	1985.6
10	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
11	Shimane	1	Chugoku	460	BWR	1974.3
		2		820	BWR	1989.2
12	Ikata	1	Shikoku	566	PWR	1977.9
		2		566	PWR	1982.3
		3		890	PWR	1994.12
13	Genkai	1	Kyushu	559	PWR	1975.10
		2		559	PWR	1981.3
		3		1,180	PWR	1994.3
		4		1,180	PWR	1997.7
14	Sendai	1	Kyushu	890	PWR	1984.7
		2		890	PWR	1985.11
15	Tokai Daini		Japan Atomic Power Co.	1,100	BWR	1978.11
16	Tsuruga	1	Japan Atomic Power Co.	357	BWR	1970.3
		2		1,160	PWR	1987.2
	Total	48 Units		44,264MW		

● Others

Name of Plant	Company	Installed Capacity (MW)	Type of Reactor
Fugen	Japan Atomic Energy Agency	165	ATR(Prototype) End of Operation
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 (360MW or greater)

As of March 31, 2013

	Name of Plant	Company	Installed Capacity (MW)	Type
1	Daini Numazawa	Tohoku	460	Pumped Storage
2	Shin Takasegawa	Tokyo	1,280	Pumped Storage
3	Tamahara	Tokyo	1,200	Pumped Storage
4	Imaichi	Tokyo	1,050	Pumped Storage
5	Kannagawa	Tokyo	940	Pumped Storage
6	Shiobara	Tokyo	900	Pumped Storage
7	Kazunogawa	Tokyo	800	Pumped Storage
8	Azumi	Tokyo	623	Pumped Storage
9	Okumino	Chubu	1,500	Pumped Storage
10	Okuyahagi Daini	Chubu	780	Pumped Storage
11	Okutataragi	Kansai	1,932	Pumped Storage
12	Okawachi	Kansai	1,280	Pumped Storage
13	Okuyoshino	Kansai	1,206	Pumped Storage
14	Kisenyama	Kansai	466	Pumped Storage
15	Matanogawa	Chugoku	1,200	Pumped Storage
16	Nabara	Chugoku	620	Pumped Storage
17	Hongawa	Shikoku	615	Pumped Storage
18	Omarugawa	Kyushu	1,200	Pumped Storage
19	Tenzan	Kyushu	600	Pumped Storage
20	Ohira	Kyushu	500	Pumped Storage
21	Shin Toyone	J-Power	1,125	Pumped Storage
22	Shimogo	J-Power	1,000	Pumped Storage
23	Okukiyotsu	J-Power	1,000	Pumped Storage
24	Numappara	J-Power	675	Pumped Storage
25	Okukiyotsu Daini	J-Power	600	Pumped Storage
26	Okutadami	J-Power	560	
27	Tagokura	J-Power	400	

● Under Construction

(Estimated start)

Higashi-Dori	1	Tokyo	1,385	ABWR	U.D
Shimane	3	Chugoku	1,373	ABWR	U.D
Ohma		J-Power	1,383	ABWR	U.D
Total	3 Units		4,141MW		

● Preparing for Construction

(Estimated start)

Higashi-Dori	2	Tohoku	1,385	ABWR	U.D
Higashi-Dori	2	Tokyo	1,385	ABWR	U.D
Hamaoka	6	Chubu	1,400	ABWR	U.D
Kaminoseki	1	Chugoku	1,373	ABWR	U.D
	2		1,373	ABWR	U.D
Sendai	3	Kyushu	1,590	APWR	U.D
Tsuruga	3	Japan Atomic Power Co.	1,538	APWR	U.D
	4		1,538	APWR	U.D
Total	8 Units		11,582MW		

● End of Operation

(End)

Fukushima Daiichi	1	Tokyo	460	BWR	2012.4
	2		784	BWR	2012.4
	3		784	BWR	2012.4
	4		784	BWR	2012.4
	5		784	BWR	2014.1
	6		1,100	BWR	2014.1
Hamaoka	1	Chubu	540	BWR	2009.1
	2		840	BWR	2009.1
Tokai		Japan Atomic Power Co.	166	GCR	1998.3
Total	9 Units		6,242MW		

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

Chairman
Makoto Yagi

Vice Chairman
Akira Chiba

Vice Chairman
Susumu Kyuwa

Vice Chairman
Yuzuru Hiroe

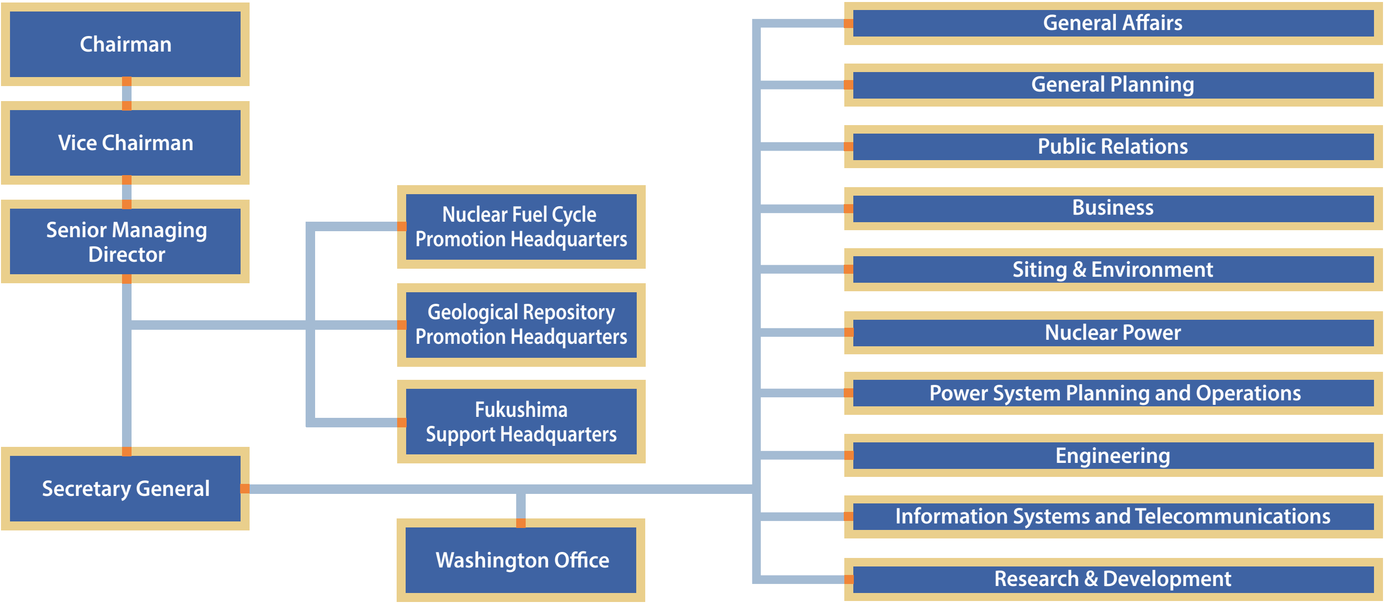
Senior Managing Director
Head of Fukushima Support Headquarters
Satoshi Onoda

Director
Secretary General
Hirohisa Yashiro

Director
Deputy Secretary General
Yasuhiro Tejima

Director
Head of Nuclear Fuel Cycle Promotion Headquarters
Susumu Tanuma

Organization of FEPC



Data

contents

Data

Company Data (Fiscal year ending March 31, 2013)

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	1,607,002	7,549	34,938	31,184	558,860	4,007	5,689
Tohoku	251,441	3,996,559	17,766	85,106	77,833	1,578,135	7,668	12,872
Tokyo	1,400,975	14,619,772	65,581	289,704	269,033	5,660,091	28,869	37,142
Chubu	430,777	5,592,806	34,032	137,140	126,552	2,429,840	10,519	17,277
Hokuriku	117,641	1,366,144	8,061	30,989	28,075	477,750	2,097	4,861
Kansai	489,320	6,757,662	34,958	153,320	141,754	2,439,435	13,560	22,554
Chugoku	185,527	2,715,200	11,989	63,984	58,647	1,089,109	5,223	9,884
Shikoku	145,551	1,318,731	6,963	30,099	27,410	488,195	2,844	6,163
Kyushu	237,304	4,201,704	20,137	90,302	83,787	1,408,339	8,558	13,089
Okinawa	7,586	415,087	2,183	8,313	7,314	158,754	859	1,609
Total	**3,380,413**	**42,590,667**	**209,219**	**923,895**	**851,590**	**16,288,508**	**84,204**	**131,140**

Source: Handbook of Electric Power Industry

Changes in Electric Power Generation

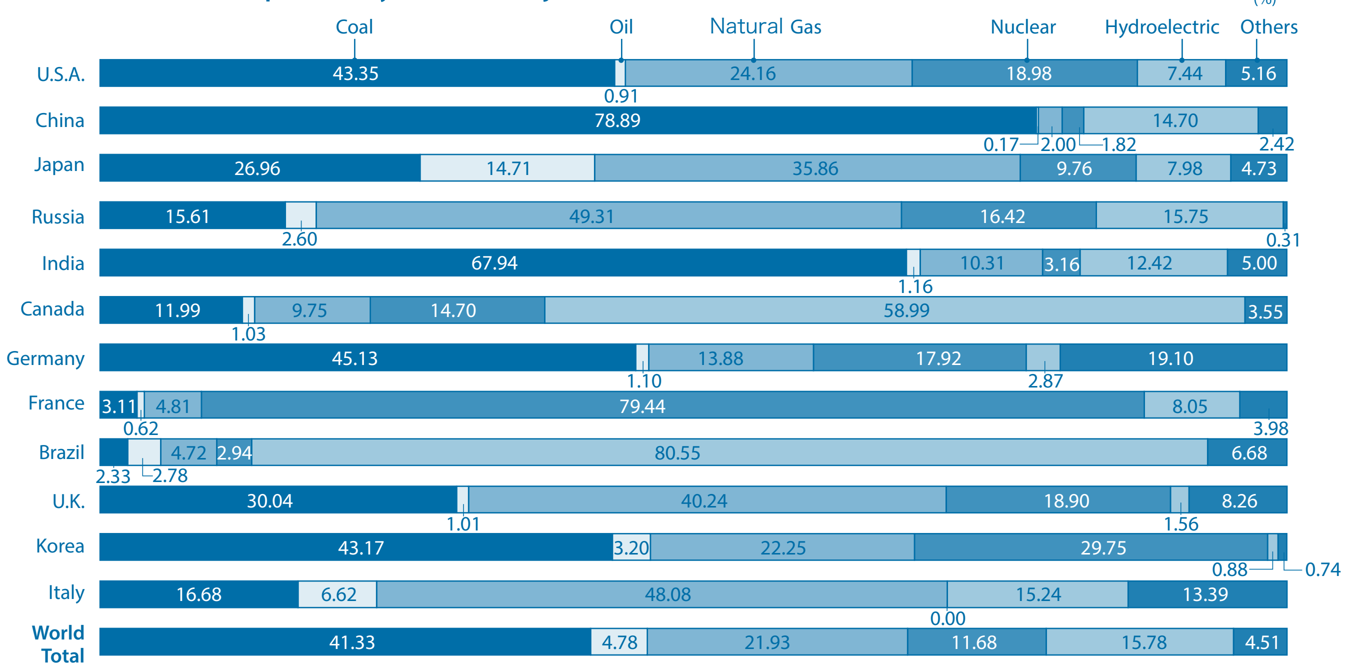
(TWh)

Fiscal Year		1990	1995	2000	2005	2009	2010	2011	2012
Ten Companies	Hydro	65.4	62.3	66.5	60.0	57.7	62.9	62.8	57.0
	Thermal	392.0	401.1	426.4	459.3	456.6	485.4	610.7	666.8
	Geothermal	1.4	2.8	3.0	2.9	2.6	2.4	2.5	2.4
	Nuclear	181.1	271.4	302.5	287.0	266.1	271.3	100.7	15.9
Subtotal		639.9	737.6	798.4	809.2	783.0	822.0	776.8	742.3
Industry-Owned and Others		217.4	252.3	293.1	348.7	329.6	334.9	331.1	351.7
Total		**857.3**	**989.9**	**1,091.5**	**1,157.9**	**1,112.6**	**1,156.9**	**1,107.8**	**1,094.0**

Source: Handbook of Electric Power Industry

Power Generation Composition by Source in Major Countries (2011)

(%)



Sources: Energy Balances of OECD Countries 2013 Edition, Energy Balances of Non-OECD Countries 2013 Edition

Changes in Electricity Sales for Ten Companies

(TWh)

Fiscal Year	1990	1995	2000	2005	2009	2010	2011	2012
Residential (Lighting)	177.4	224.6	254.6	281.3	285.0	304.2	288.9	286.2
Commercial and Industrial	481.5	532.3	583.3	601.2	573.5	602.2	570.9	565.4
Commercial	116.3	152.8	157.9	—	—	—	—	—
Low Voltage	100.1	108.0	115.8	39.4	33.1	35.5	33.1	32.1
Large Industrial	248.1	254.7	74.8	—	—	—	—	—
Others	17.0	16.8	15.0	13.4	12.0	12.0	11.8	11.6
Eligible Customers' Use	—	—	219.8	548.4	528.4	554.7	525.9	521.7
Total	**658.9**	**757.0**	**837.9**	**882.5**	**858.5**	**906.4**	**859.8**	**851.6**

Source: Handbook of Electric Power Industry

Changes in Electricity Sales for Ten Companies

(to large industrial and commercial customers)

(TWh)

Fiscal Year		1990	1995	2000	2005	2009	2010	2011	2012
Mining and Industry	Mining	1.5	1.4	1.3	1.0	0.8	0.9	0.9	0.9
	Foodstuffs	11.3	13.2	15.3	15.4	17.2	17.7	17.4	17.5
	Textiles	6.8	5.1	3.9	3.1	4.0	4.5	4.3	4.0
	Pulp and Paper	11.9	9.5	10.5	10.3	9.4	9.9	9.2	8.5
	Chemicals	27.4	25.4	25.9	27.7	26.1	27.9	27.0	26.2
	Oil and Coal Products	2.4	2.6	1.5	1.5	1.8	2.1	2.1	2.2
	Rubber	3.5	3.4	3.5	3.4	2.8	3.1	3.0	2.9
	Clay and Stone	15.0	14.4	11.9	11.0	10.3	11.5	11.5	11.1
	Iron and Steel	41.3	38.3	36.5	36.2	29.7	36.3	36.4	35.9
	Non-ferrous Metals	12.3	13.1	14.2	14.1	14.7	16.0	15.7	15.1
	Machinery	57.3	62.9	69.8	74.0	69.0	74.0	71.1	68.5
	Others	22.1	24.4	27.0	27.6	27.4	29.0	27.9	27.1
Subtotal		212.7	213.8	221.2	225.2	213.1	232.9	226.5	219.8
Railways		16.4	17.9	18.1	19.0	18.1	18.1	17.2	17.3
Others		19.0	23.0	27.7	29.6	29.6	29.4	27.9	28.0
Total		**248.1**	**254.7**	**267.0**	**273.8**	**260.9**	**280.4**	**271.5**	**265.1**

Source: Handbook of Electric Power Industry

Investment by Type of Power Facility for Ten Companies

(Billion yen)

Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012
Generation	449	499	654	816	771	887	1,100	1,098
Distribution,others	1,048	1,029	1,199	1,308	1,262	1,235	1,023	989
Total	**1,497**	**1,529**	**1,854**	**2,124**	**2,034**	**2,123**	**2,123**	**2,087**

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

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

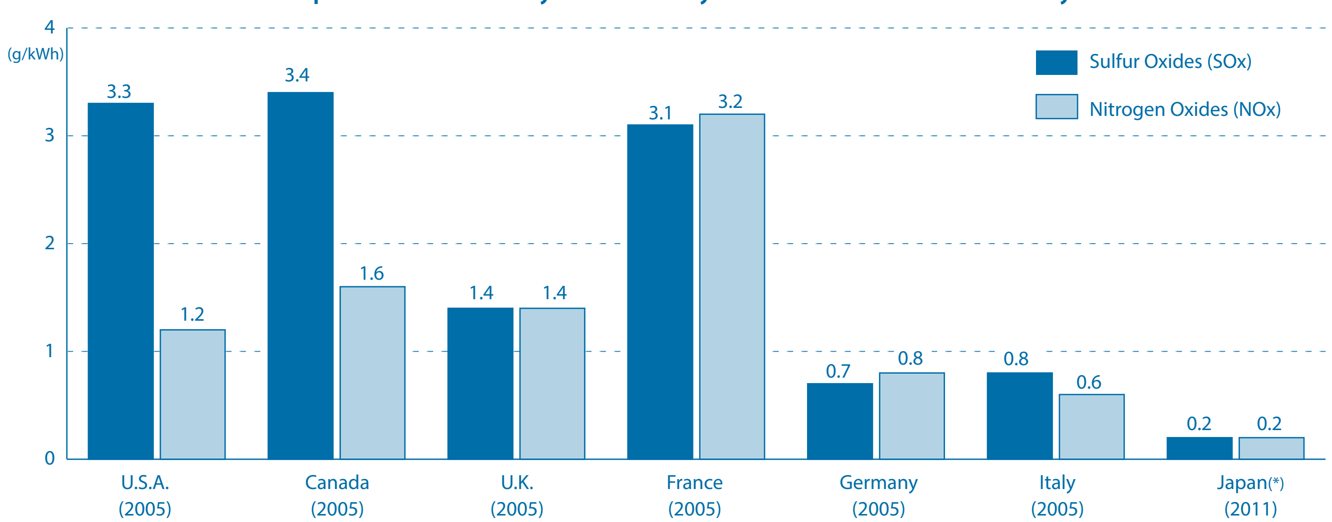
(TWh)

		2005	2006	2007	2008	2009	2010	2011
U.S.A. (*)All electric utilities	Residential	1,359.2	1,351.5	1,392.2	1,380.0	1,364.5	1445.7	1,422.8
	Commercial and Industrial	2,294.2	2,311.0	2,364.1	2,345.3	2,224.6	2,301.1	2.319.4
	Others	7.5	7.4	8.2	7.7	7.8	7.7	7.7
	Total	**3,661.0**	**3,670.0**	**3,764.6**	**3,733.0**	**3,596.9**	**3,754.5**	**3,749.8**
U.K. (*)All electric utilities	Residential	116.8	116.4	122.8	119.8	118.5	118.8	111.5
	Commercial and Industrial***	198.6	198.1	194.6	198.1	185.4	191.0	186.6
	Others	13.7	13.8	13.5	14.3	9.9	9.9	9.9
	Total	**329.1**	**328.3**	**330.9**	**329.2**	**313.8**	**319.9**	**308.0**
Germany (**)Electricity consumption	Residential	141.3	141.5	140.2	139.5	139.2	141.0	—
	Commercial and Industrial	323.8	328.6	330.6	331.5	282.6	297.8	—
	Others	69.1	69.5	70.4	71.2	69.3	70.2	—
	Total	**534.2**	**539.6**	**541.2**	**542.2**	**491.1**	**509.0**	
Canada (*)All electric utilities	Residential	151.0	147.3	157.8	160.0	148.3	146.8	153.0
	Commercial and Industrial	188.5	182.5	181.6	164.7	141.0	149.6	149.7
	Others	148.2	145.4	158.8	168.6	154.9	156.4	160.1
	Total	**487.7**	**475.3**	**498.3**	**493.4**	**444.2**	**452.8**	**462.8**
France (**)Electricity consumption	High voltage	265.8	258.1	261.3	263.0	250.8	259.3	248.8
	Low voltage	185.7	188.9	187.0	198.0	202.3	216.9	195.4
	Total	**451.5**	**447.0**	**448.3**	**461.0**	**453.1**	**476.1**	**444.3**
Italy (*)All electric utilities	Residential	66.9	67.6	67.2	68.4	68.7	69.2	69.1
	Commercial and Industrial	210.1	217.9	219.5	218.3	201.7	207.7	209.0
	Others	11.5	11.9	11.6	12.0	11.9	11.9	11.8
	Total	**288.5**	**297.4**	**298.3**	**298.7**	**282.4**	**288.8**	**289.9**
Japan (*)Ten companies	Residential	281.3	278.3	289.7	285.3	285.0	304.2	288.9
	Commercial and Industrial	601.3	611.1	629.8	603.7	573.6	602.2	570.9
	Others	—	—	—	—	—	—	—
	Total	**882.6**	**889.4**	**919.5**	**888.9**	**858.5**	**906.4**	**859.8**

(***) Including public facilities

Source: Overseas Electric Power Industry Statistics (2012)

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



Note: (*) = 10 Electric Power Companies + Electric Power Development Company

Sources: Estimate based on "OECD Environmental Data Compendium 2006/2007" and IEA "Energy Balances of OECD Countries 2008 Edition"
FEPC (for Japan)

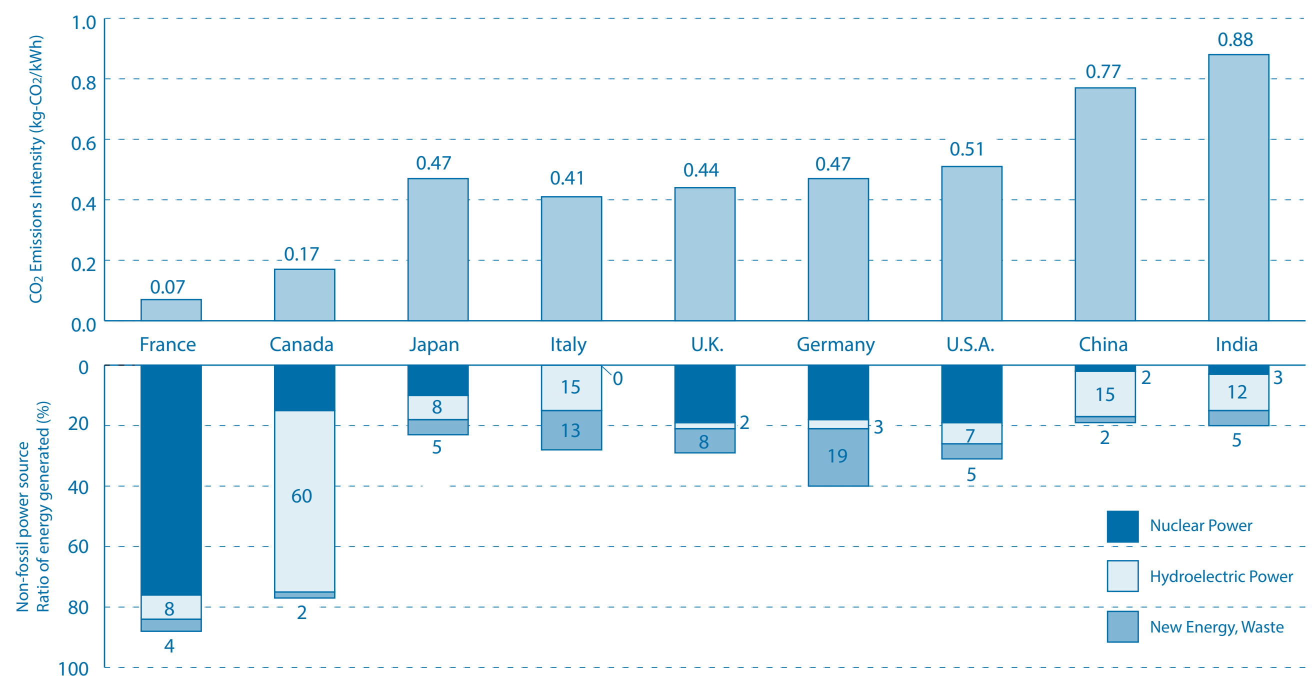
Country Comparison of Thermal Efficiency, Transmission and Distribution Loss, and Annual Load Factor

(%)

		1990	1995	2000	2005	2009	2010
U.S.A.	Thermal Efficiency	36.4	36.8	36.7	38.4	39.3	39.2
	Transmission and Distribution Loss	5.7	7.0	6.6	6.6	6.5	6.4
	Annual Load Factor	60.4	59.8	61.2	58.7	63.3	59.7
U.K. / Ireland	Thermal Efficiency	37.7	40.6	43.5	43.2	44.7	45.1
	Transmission and Distribution Loss	8.1	8.6	9.0	8.7	8.2	7.8
	Annual Load Factor	62.2	65.4	67.4	66.3	64.5	64.7
Germany (Former W. Germany)	Thermal Efficiency	(34.0)	36.5	38.7	40.7	39.4	40.1
	Transmission and Distribution Loss	(4.3)	5.0	4.7	5.7	5.4	5.0
	Annual Load Factor	(68.6)	(71.9)	74.5	77.0	72.5	71.6
Canada	Thermal Efficiency	34.5	32.6	32.9	33.4	32.2	—
	Transmission and Distribution Loss	7.7	6.8	8.0	7.1	11.5	10.3
	Annual Load Factor	65.7	66.0	68.5	69.2	66.0	64.4
France	Thermal Efficiency	39.2	38.3	41.3	42.1	42.0	35.3
	Transmission and Distribution Loss	7.5	7.4	6.8	6.6	6.9	7.2
	Annual Load Factor	62.9	67.9	69.5	64.1	60.1	60.6
Italy	Thermal Efficiency	37.7	38.6	39.0	42.7	44.3	—
	Transmission and Distribution Loss	7.0	6.7	6.4	6.2	6.4	6.2
	Annual Load Factor	52.4	50.3	59.0	58.4	60.6	58.8
Japan Ten Companies (Nine Companies)	Thermal Efficiency	41.9	41.9	43.1	42.9	43.9	44.4
	Transmission and Distribution Loss	5.7	5.5	5.2	5.1	5.2	4.8
	Annual Load Factor	56.8	55.3	59.5	62.4	66.7	62.5

Source: Overseas Electric Power Industry Statistics (2013) , Ecofys[INTERNATIONAL COMPARISON OF FOSSIL POWER EFFICENCY AND CO_2 INTENSITY 2013], Handbook of Electric Power Industry

Comparison of CO_2 Emissions Intensity by Country (2011)



Sources: Energy Balances of OECD Countries 2013 Edition, Energy Balances of Non-OECD Countries 2013 Edition

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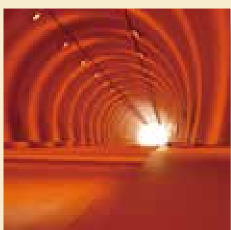

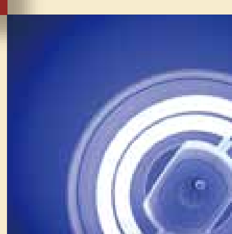

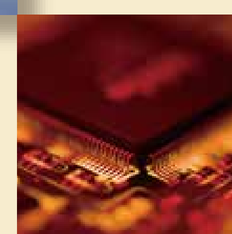

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