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 cleanliness, 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/gas-fired 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 Electric 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 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.

### CONTENTS

- Japan’s Energy Supply Situation & Development of 2030 Energy Mix
- Nuclear Safety & Market Liberalization
- Electric Power Sources
- Nuclear Fuel Cycle
- Environmental Conservation
- International Exchanges
- Location of Power Stations
- FEPC
- Data
- Business Addresses

Notable 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 94% of its primary energy supply. 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.

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Development of 2030 Energy Mix

After the Great East Japan Earthquake, almost all nuclear power stations have been halted, and so thermal power generation now accounts for nearly 90% of the nation’s energy mix. As a result, the nation’s energy self-sufficiency ratio dropped from 20% to 6%, and the fuel cost has nearly doubled, from 3.6 trillion yen to 7.2 trillion yen. The increase in thermal power generation has also increased CO2 emissions.

In July 2015, reflecting these observations, the Government decided the “Energy Mix” of FY2030 with the basic objectives of raising the nation’s energy self-sufficiency ratio higher than that even before the earthquake, lowering the electricity cost from the current level, and setting a CO2 emission reduction target comparable to those of western nations.

The Energy Mix proposes, in addition to a firm commitment to reduce overall energy consumption, that nuclear should account for 20-22%, thermal power for 56% (27% LNG, 26% coal, and 3% oil), and renewable energy for 20-22%.

In view of the Energy Mix decided by the Government, the electric power companies will strive to achieve energy security, economic efficiency, and environmental conservation, while putting top priority on safety.
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 source vehicles, filtered ventilation systems and earthquake-isolated emergency response centers.

To enable these efforts to be constantly and objectively evaluated, the Japan Nuclear Safety Institute (JANSI), which evaluates the safety improvement activities of electric power companies and gives them technical advice, and the Nuclear Risk Research Center (NRRC), which uses Probabilistic Risk Assessment (PRA) and proposes solutions based on R&D, were established. The electric power companies take to heart the evaluations and recommendations 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 2016, the electric power companies have applied for a review of compliance with the new regulatory requirements for 26 units of their 16 power stations. 5 of these 26 units have been passed the inspection, and 2 of these 5 units have restarted commercial operation.

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 50kW, and subsequently in April 2005 to users requiring more than 50kW. Then, in April 2016, all users including individual households and retail stores were included in the scope of this liberalization so that everyone is free to choose an electric power company and price menu. 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, Electric Power System Council of Japan (ESCS) 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 these 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 further 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.

The New Electricity Supply System (from April 2016)
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 fluctuating demand, such as during the daytime in the height of summer, can always be met.

**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.

**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 CO₂ 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.

**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 adopting best practice from both Japan and overseas, while also 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.

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**Electric Power Sources**

- **Hydroelectric Power**
- **Thermal Power**
- **Nuclear Power**
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 reinserted 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 UK 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 the first half of FY 2018. 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.

Japan’s electric power companies are fully committed to implementing the closed nuclear fuel cycle and plutonium utilization 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 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.

Furthermore, 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 use 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.

Outline of JNFL’s Nuclear Fuel Cycle Facilities (as of November 2019)

<table>
<thead>
<tr>
<th>Facility</th>
<th>Reprocessing Plant</th>
<th>MOX Fuel Fabrication Plant</th>
<th>Vitrified waste storage center</th>
<th>Uranium enrichment plant</th>
<th>Low-level radioactive waste (Plutonium)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Iwate, Rokkasho-mura</td>
<td>Iwate, Rokkasho-mura</td>
<td>Iwate, Rokkasho-mura</td>
<td>Iwate, Rokkasho-mura</td>
<td>Iwate, Rokkasho-mura</td>
</tr>
<tr>
<td>Capacity</td>
<td>Radioactive waste</td>
<td>MOX fuel</td>
<td>MOX fuel</td>
<td>MOX fuel</td>
<td>MOX fuel</td>
</tr>
<tr>
<td>Storage capacity</td>
<td>100,000 ton/year</td>
<td>800 ton-U/year</td>
<td>1,500 ton-SWU/year (*)</td>
<td>1,300 ton-HM/year (*)</td>
<td>1,300 ton-HM/year (*)</td>
</tr>
<tr>
<td>Refining Plant</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
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<tr>
<td>Uranium Enrichment Plant</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
<td>Under construction</td>
</tr>
<tr>
<td>Schedule</td>
<td>Start of construction</td>
<td>Completion of construction</td>
<td>Start of construction</td>
<td>Start of construction</td>
<td>Start of construction</td>
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<tr>
<td></td>
<td>Start of construction</td>
<td>Completion of construction</td>
<td>Start of construction</td>
<td>Start of construction</td>
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<tr>
<td></td>
<td>2016</td>
<td>2019 (planned)</td>
<td>2018 (planned)</td>
<td>2019 (planned)</td>
<td>2019 (planned)</td>
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The Peaceful Use of Nuclear Energy

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The Closed Nuclear Fuel Cycle

The Safeguards Program

The Closed Nuclear Fuel Cycle

The Safeguards Program

Enactment of the Spent Fuel Reprocessing Fund Act

In May 11, 2016, the Spent Nuclear Fuel Reprocessing Fund Act was passed in the Diet. The objective of the legislation is to provide a framework for pursuing the national policy of reprocessing spent fuel in a most reliable and efficient manner even under a new business environment characterized by the liberalization of electricity market and reduced dependency on nuclear energy.

The new bill is to implement a series of institutional measures, which include creating a new funding system aimed at securing adequate funds, organizing a government-authorized corporation (the spent fuel reprocessing organization) which, as a principal business entity, conducts the reprocessing business both appropriately and efficiently, and establishing an authorized corporation acting as a decision-making organization (a management committee) from a proper governance viewpoint. The law also ensures a certain level of involvement of the National Government.

Furthermore, the supplemental resolution to the legislation reaffirms the policy of possessing no plutonium reserves without specified purposes. Also, according to the bill, the Governmental instructs the nuclear operators to conduct reprocessing business while upholding this policy, and if an implementing body should make reprocessing plans that go against this policy, the Minister of Economy, Trade and Industry can withhold approval of such plans.

Status of MOX Fuel Utilization

The electric power industry in Japan intends to introduce MOX fuel in 16 to 18 nuclear reactors. So far 10 reactors have received the permission of a reactor installation license to use MOX fuel power generation, 3 of which (except Unit 3 of Fukushima Daiichi Station) have started operation with MOX fuel. The electric power companies recognize the importance of improving the transparency of the MOX fuel project. Based on the outlook of individual companies toward restarting nuclear power plants and considering the schedule and other details of the plans to start up the reprocessing plant, we shall compile and announce the MOX fuel project before restarting plutonium recovery operations.
Environmental Conservation

Measures by the Electric Utility Industry to Suppress CO2 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 December 2015, the 21st session of the Conference of the Parties (COP21) was held in Paris, where nations across the globe adopted the Paris Agreement, joining in an effort to create an international framework for dealing with global warming issues. In July 2015, the Japanese Government announced its “Intended Nationally Determined Contributions (INDC),” with the objective of reducing greenhouse gas emissions in 2030 by 26% from 2013 levels. In May 2016, in accordance with INDC, the plan for Global greenhouse gas emissions in 2030 by 26% from 2013 levels.


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Global warming and climate change, key challenges for the electric utility industry. In

Emissions of carbon dioxide (CO2), a major cause of global warming, are closely related to energy utilization in economic activities and daily life. As the reduction of CO2 emissions is expected to be a major challenge for the industry.

The electric power companies are trying to reduce CO2 emissions mainly through attaining the optimal energy mix, seeking to simultaneously achieve energy security, Economic efficiency and Environmental conservation, under the major premises of Safety (S+3Es).

In July 2015, 35 electricity utility companies jointly constructed a voluntary framework for a low carbon society and prepared an “Action Plan for a Low-Carbon Society” that laid out specific efforts to be made. In February 2016, the “Electric Power Council for a Low-Carbon Society (ELCS)” was founded to facilitate efforts toward this goal (a membership of 39 utility companies as of April 2016).

According to the Action Plan, an end-user CO2 emission factor of about 0.37g-CO2/kWh will be targeted in light of the Government’s 2030 energy supply and demand outlook. Moreover, as the maximum reduction potential, a reduction of about 11 million t-CO2 will be expected by using economically achievable best available technologies (BATs) in light of the construction of new thermal power plants, etc.

The member companies will make efforts towards a low carbon society by utilizing nuclear power generation premised on ensuring safety or renewable energy, raising the efficiency of thermal power plants and optimizing their appropriate maintenance and control, and promoting energy conservation or CO2 reduction services on both the supply and demand sides.

Measures by the Electric Utility Industry to Suppress CO2 Emissions

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

Nuclear power emits no carbon dioxide (CO2) in the process of power generation, and even considering CO2 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. However, because of the extended shutdown of nuclear power plants following the Great East Japan Earthquake, and subsequent increase in thermal power generation, the CO2 emission factor has remained higher than that before the earthquake.

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 power companies are also striving to maintain and improve the efficiency of thermal power plants through the introduction of highly efficient plants of the latest design or through appropriate operation and maintenance of the existing plants.

Currently operating state-of-the-art gas turbine combined cycle power plants have achieved the world’s highest level of more than 60% in thermal efficiency, by, for example, raising the combustion temperature at the gas turbines.

As to the conventional coal-fired power plants, the adoption of enhanced steam conditions (temperature and pressure) is being promoted to improve thermal efficiency. Presently, ultra-supercritical (USC) thermal power generation with the main steam temperature of 600℃ is commercially available. Moreover, research and development of the Integrated coal Gasification Combined Cycle (IGCC) are being conducted, in which gasified coal will be used in combination with gas turbines and steam turbines to generate electricity.

Decarbonization of Energy on the Supply-side

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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 (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 megasolar power plants with a total capacity of about 140 MW at around 30 sites throughout the country, and in fiscal 2015, the total capacity of megasolar power plants which had started commercial operation reached 140 MW.

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.

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).

High-efficiency plants to be introduced and the improvement of operation and maintenance technologies, coal-fired plants’ CO2 reduction potential in OECD countries and developing countries in Asia in FY 2030 is estimated to be a maximum of 900 million t-CO2/year. The electric utility industry of Japan will contribute to the reduction of global CO2 emissions with Japan’s expertise and advanced technologies.
Environmental Conservation

Demand-side Efforts for CO2 Reduction

In Japan, the energy demand for water heating constitutes about 30% of the total energy demand in the household sector, and so energy-saving and CO2 reduction measures in this area are very important. Electric power companies have been working hard to develop and promote electric appliances and systems to reduce CO2 emissions. One example is EcoCute, a water heating system with a heat pump that uses CO2 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, CO2 emissions are cut by over 66% 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).

If boilers fulfilling thermal demand in the consumer and industrial sectors are replaced with these heat pump systems, CO2 emissions in 2030 are estimated to be 48.3 million t-CO2/year less than the 2012 level, which is about 3.5% of the total CO2 emissions in fiscal 2012.

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.

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.
  1911 I Street, NW, Suite 600, Washington, D.C. 20036, U.S.A.
  Tel: (202) 466-6781 Fax: (202) 466-6758
  Established in 1994

● Chubu Electric Power Co., Inc., Washington Office
  Established in 1978
  Tel: (202) 457-0790 Fax: (202) 457-0810
  Established in 1982

● Tokyo Electric Power Company Holdings, Inc., Washington Office
  2112 K Street, NW Suite 900, Washington, D.C. 20007
  Tel: (202) 457-0790 Fax: (202) 457-0810
  Established in 1978

PARIS

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

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

BEIJING

● Chubu 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: (010) 8338-7771
  Established in 2011

LONDON

● Tokyo Electric Power Co., Inc., London Office
  Berkeley Square House, Berkeley Square, London W1J 6BH, 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 W1J 8PE, U.K.
  Tel: (020) 7409-0142 Fax: (020) 7408-0801
  Established in 1985

● The Federation of Electric Power Companies of Japan, London Office
  3, rue Serbo, Paris 75009, FRANCE
  Tel: (020) 7409-0142 Fax: (020) 7408-0801
  Established in 1994

● Chubu Electric Power Co., Inc., London Office
  Established in 1982
  Tel: (020) 7629-5271 Fax: (020) 7629-5282
  Established in 1982

● The Kansai Electric Power Co., Inc., London Office
  Established in 2011
  Tel: (020) 7629-5271 Fax: (020) 7629-5282
  Established in 1982

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  Established in 1982
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  Established in 1982

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  Tel: (010) 8338-7771
  Established in 2011

● Chubu Electric Power Co., Inc., Beijing Office
  Established in 2007
  Tel: (010) 8338-7771
  Established in 2007

● Tokyo Electric Power Co., Inc., Beijing Office
  Established in 2007
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  Established in 2007

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  Established in 2007

● The Kansai Electric Power Co., Inc., Doha Office
  4th Floor, Al Corniche P.O.Box 22470, Doha-QATAR
  Tel: (974) 4836-830 Fax: (974) 4834-841
  Established in 2007
### Location of Power Stations

**country's major power plants:**

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Location</th>
<th>Capacity (MW)</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kainan</td>
<td>Kansai</td>
<td>2,100</td>
<td>Heavy, crude oil</td>
</tr>
<tr>
<td>2</td>
<td>Sakakura</td>
<td>Kansai</td>
<td>2,000</td>
<td>LNG</td>
</tr>
<tr>
<td>3</td>
<td>Gago</td>
<td>Kansai</td>
<td>1,800</td>
<td>Heavy, crude oil</td>
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<tr>
<td>4</td>
<td>Nanko</td>
<td>Kansai</td>
<td>1,400</td>
<td>Coal</td>
</tr>
<tr>
<td>5</td>
<td>Malaura</td>
<td>Kansai</td>
<td>1,400</td>
<td>Oil, coal</td>
</tr>
<tr>
<td>6</td>
<td>Hinata Oga</td>
<td>Kansai</td>
<td>1,050</td>
<td>LNG</td>
</tr>
<tr>
<td>7</td>
<td>Shin Oga</td>
<td>Chiba</td>
<td>2,290</td>
<td>LNG</td>
</tr>
<tr>
<td>8</td>
<td>Shin Koka</td>
<td>Kyushu</td>
<td>1,800</td>
<td>LNG</td>
</tr>
<tr>
<td>9</td>
<td>Tachibana Sawam</td>
<td>Osaka</td>
<td>2,100</td>
<td>Coal</td>
</tr>
<tr>
<td>10</td>
<td>Shiroya</td>
<td>Shikoku</td>
<td>1,600</td>
<td>Heavy, oil, coal</td>
</tr>
</tbody>
</table>

(Continued)

---

### Nuclear Power Plants

As of September 30, 2014

<table>
<thead>
<tr>
<th>Number</th>
<th>Plant</th>
<th>Unit Number</th>
<th>Company</th>
<th>Installed Capacity (MW)</th>
<th>Reactor</th>
<th>Start</th>
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<tbody>
<tr>
<td>1</td>
<td>Toman</td>
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<td>Hokkaido</td>
<td>579</td>
<td>PWR</td>
<td>1989.6</td>
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<tr>
<td>2</td>
<td>2</td>
<td>579</td>
<td>Hokkaido</td>
<td>579</td>
<td>PWR</td>
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<tr>
<td>3</td>
<td>3</td>
<td>579</td>
<td>Hokkaido</td>
<td>579</td>
<td>PWR</td>
<td>2009.12</td>
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<tr>
<td>4</td>
<td>Higashi Doi</td>
<td>1</td>
<td>Tokushima</td>
<td>1,000</td>
<td>BWR</td>
<td>2005.12</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>825</td>
<td>Tokushima</td>
<td>825</td>
<td>BWR</td>
<td>1999.7</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>825</td>
<td>Tokushima</td>
<td>825</td>
<td>BWR</td>
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<tr>
<td>7</td>
<td>4</td>
<td>825</td>
<td>Tokushima</td>
<td>825</td>
<td>BWR</td>
<td>2005.12</td>
</tr>
</tbody>
</table>

(Continued)

---

### Principal Hydroelectric Power Plants

As of March 31, 2015

<table>
<thead>
<tr>
<th>Number</th>
<th>Plant</th>
<th>Company</th>
<th>Installed Capacity (MW)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Daini Namawase</td>
<td>Tokushima</td>
<td>460</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>2</td>
<td>Shino Takashimada</td>
<td>Tokushima</td>
<td>1,280</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>3</td>
<td>Yubin Akage</td>
<td>Tokushima</td>
<td>1,200</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>4</td>
<td>Takahama</td>
<td>Tokushima</td>
<td>1,200</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>5</td>
<td>Mita</td>
<td>Tokyo</td>
<td>1,200</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>6</td>
<td>Azumino</td>
<td>Chiba</td>
<td>1,500</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>7</td>
<td>Shimizu</td>
<td>Osaka</td>
<td>940</td>
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</tr>
<tr>
<td>8</td>
<td>Shidaba</td>
<td>Tokyo</td>
<td>900</td>
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</tr>
<tr>
<td>9</td>
<td>Azumino</td>
<td>Tokyo</td>
<td>623</td>
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<td>10</td>
<td>Shimizu</td>
<td>Chiba</td>
<td>1,500</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>11</td>
<td>Okuyama</td>
<td>Chiba</td>
<td>790</td>
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</tr>
<tr>
<td>12</td>
<td>Kunitani</td>
<td>Kansai</td>
<td>1,932</td>
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<tr>
<td>13</td>
<td>Osawachi</td>
<td>Kansai</td>
<td>1,290</td>
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<td>14</td>
<td>Okuyama</td>
<td>Kansai</td>
<td>1,206</td>
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</tr>
<tr>
<td>15</td>
<td>Kainain</td>
<td>Kansai</td>
<td>466</td>
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<tr>
<td>16</td>
<td>Yamanoha</td>
<td>Chubu</td>
<td>1,390</td>
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<td>Shikou</td>
<td>Shikoku</td>
<td>615</td>
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<td>Shino Ama</td>
<td>Kyushu</td>
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<td>19</td>
<td>Shinozaki</td>
<td>Kansai</td>
<td>600</td>
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<td>Shiraki</td>
<td>Chubu</td>
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<td>Pumped Storage</td>
</tr>
<tr>
<td>21</td>
<td>Shino Tohme</td>
<td>Chubu</td>
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<td>Pumped Storage</td>
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<tr>
<td>22</td>
<td>Shimizu</td>
<td>Kansai</td>
<td>1,290</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>23</td>
<td>Shimizu</td>
<td>Kansai</td>
<td>1,200</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>24</td>
<td>Tanzou</td>
<td>Chubu</td>
<td>600</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>25</td>
<td>Shiraki</td>
<td>Chubu</td>
<td>500</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>26</td>
<td>Shino Tohme</td>
<td>Chubu</td>
<td>1,450</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>27</td>
<td>Shimizu</td>
<td>Kansai</td>
<td>1,290</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>28</td>
<td>Shimizu</td>
<td>Kansai</td>
<td>1,200</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>29</td>
<td>Tanzou</td>
<td>Chubu</td>
<td>600</td>
<td>Pumped Storage</td>
</tr>
<tr>
<td>30</td>
<td>Shiraki</td>
<td>Chubu</td>
<td>500</td>
<td>Pumped Storage</td>
</tr>
</tbody>
</table>

### 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)

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Company</th>
<th>Installed Capacity (MW)</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tomakomai</td>
<td>Hokkaido</td>
<td>1,650</td>
<td>Coal</td>
</tr>
<tr>
<td>2</td>
<td>Higashi Hiyagi</td>
<td>Hokkaido</td>
<td>5,149</td>
<td>LNG, heavy, crude oil, city gas</td>
</tr>
<tr>
<td>3</td>
<td>Haranami</td>
<td>Tohoku</td>
<td>2,000</td>
<td>Coal</td>
</tr>
<tr>
<td>4</td>
<td>Aita</td>
<td>Tohoku</td>
<td>1,633</td>
<td>Heavy, crude, light oil</td>
</tr>
<tr>
<td>5</td>
<td>Takahama</td>
<td>Tohoku</td>
<td>5,660</td>
<td>Heavy, heavy, crude oil, city gas</td>
</tr>
<tr>
<td>6</td>
<td>Futtsu</td>
<td>Tohoku</td>
<td>5,040</td>
<td>LNG</td>
</tr>
<tr>
<td>7</td>
<td>Hino</td>
<td>Tohoku</td>
<td>4,400</td>
<td>Heavy, crude oil, coal</td>
</tr>
<tr>
<td>8</td>
<td>Chiba</td>
<td>Tohoku</td>
<td>3,480</td>
<td>LNG</td>
</tr>
<tr>
<td>9</td>
<td>Aneagekai</td>
<td>Tohoku</td>
<td>3,600</td>
<td>Heavy, crude, light oil, LNG, LPG</td>
</tr>
<tr>
<td>10</td>
<td>Sodogawa</td>
<td>Tohoku</td>
<td>3,600</td>
<td>LNG</td>
</tr>
<tr>
<td>11</td>
<td>Yokohama</td>
<td>Tohoku</td>
<td>3,355</td>
<td>Heavy, oil, LNG</td>
</tr>
<tr>
<td>12</td>
<td>Yokokusa</td>
<td>Tohoku</td>
<td>2,274</td>
<td>Heavy, crude, light oil, city gas</td>
</tr>
<tr>
<td>13</td>
<td>Kawai</td>
<td>Chubu</td>
<td>2,000</td>
<td>LNG</td>
</tr>
<tr>
<td>14</td>
<td>Hachino</td>
<td>Chubu</td>
<td>2,000</td>
<td>Coal</td>
</tr>
<tr>
<td>15</td>
<td>Higashi Ogishima</td>
<td>Chubu</td>
<td>2,000</td>
<td>LNG</td>
</tr>
<tr>
<td>16</td>
<td>Gai</td>
<td>Tohoku</td>
<td>1,886</td>
<td>LNG</td>
</tr>
<tr>
<td>17</td>
<td>Kawai</td>
<td>Chubu</td>
<td>4,802</td>
<td>LNG</td>
</tr>
<tr>
<td>18</td>
<td>Habuk in</td>
<td>Chubu</td>
<td>4,100</td>
<td>Coal</td>
</tr>
<tr>
<td>19</td>
<td>Chis</td>
<td>Chubu</td>
<td>3,966</td>
<td>Heavy, crude oil, LNG</td>
</tr>
<tr>
<td>20</td>
<td>Shin-Nagano</td>
<td>Chubu</td>
<td>3,058</td>
<td>LNG</td>
</tr>
<tr>
<td>21</td>
<td>Jozukar</td>
<td>Chubu</td>
<td>2,303</td>
<td>LNG</td>
</tr>
<tr>
<td>22</td>
<td>Asanuri</td>
<td>Chubu</td>
<td>1,900</td>
<td>Heavy, crude Oil</td>
</tr>
<tr>
<td>23</td>
<td>Chita Daini</td>
<td>Chubu</td>
<td>1,708</td>
<td>LNG</td>
</tr>
<tr>
<td>24</td>
<td>Toyama Shin</td>
<td>Hokkuli</td>
<td>1,500</td>
<td>Heavy, crude oil, coal</td>
</tr>
<tr>
<td>25</td>
<td>Hinata Daini</td>
<td>Kansai</td>
<td>4,119</td>
<td>LNG</td>
</tr>
</tbody>
</table>

(Continued)
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.
### Changes in Electric Power Generation (TWh)

<table>
<thead>
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<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>857.3</td>
<td>989.9</td>
<td>1,095.1</td>
<td>1,157.9</td>
<td>1,156.9</td>
<td>1,094.0</td>
<td>1,090.3</td>
<td>1,053.7</td>
</tr>
<tr>
<td>Source: Handbook of Electric Power Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Power Generation Composition by Source in Major Countries (2013)

<table>
<thead>
<tr>
<th>Country</th>
<th>Coal</th>
<th>Natural Gas</th>
<th>Oil</th>
<th>Nuclear</th>
<th>Hydroelectric</th>
<th>Other</th>
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<tbody>
<tr>
<td>China</td>
<td>6.4%</td>
<td>44%</td>
<td>2%</td>
<td>3%</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>U.S.</td>
<td>39%</td>
<td>22%</td>
<td>12%</td>
<td>17%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Russia</td>
<td>15%</td>
<td>30%</td>
<td>15%</td>
<td>4%</td>
<td>31%</td>
<td>31%</td>
</tr>
<tr>
<td>India</td>
<td>32%</td>
<td>43%</td>
<td>38%</td>
<td>38%</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>Japan</td>
<td>10%</td>
<td>19%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>France</td>
<td>40%</td>
<td>39%</td>
<td>39%</td>
<td>39%</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>Brazil</td>
<td>63%</td>
<td>27%</td>
<td>27%</td>
<td>27%</td>
<td>27%</td>
<td>27%</td>
</tr>
<tr>
<td>Korea</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
<td>37%</td>
</tr>
<tr>
<td>U.K.</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Italy</td>
<td>16%</td>
<td>16%</td>
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<td>16%</td>
</tr>
<tr>
<td>World Total</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
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</table>

Source: Handbook of Electric Power Industry

### Changes in Electricity Sales for Ten Companies

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<tbody>
<tr>
<td>Total</td>
<td>658.9</td>
<td>757.0</td>
<td>837.9</td>
<td>882.3</td>
<td>906.4</td>
<td>851.6</td>
<td>848.5</td>
<td>823.0</td>
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Source: Handbook of Electric Power Industry
Changes in Electricity Sales / Consumption** for Major Countries


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<td>U.S.A.</td>
<td>1,392.2</td>
<td>1,380.0</td>
<td>1,364.5</td>
<td>1,447.5</td>
<td>1,422.8</td>
<td>1,374.5</td>
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<td>2,345.3</td>
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<td>2,301.1</td>
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<td>2,293.2</td>
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<tr>
<td>Others</td>
<td>13.2</td>
<td>7.7</td>
<td>7.8</td>
<td>7.6</td>
<td>7.7</td>
<td>7.6</td>
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<tr>
<td></td>
<td>3,764.6</td>
<td>3,733.0</td>
<td>3,596.9</td>
<td>3,754.5</td>
<td>3,749.8</td>
<td>3,694.7</td>
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<td>3,691.8</td>
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Sources: Estimate based on OECD "StatExtracts" and IEA "Energy Balances of OECD Countries 2014 Edition"

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

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

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<tbody>
<tr>
<td>Japan</td>
<td>0.69</td>
<td>1.0</td>
<td>0.88</td>
<td>0.7</td>
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<td>France</td>
<td>0.60</td>
<td>0.53</td>
<td>0.47</td>
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<td>Germany</td>
<td>0.87</td>
<td>0.73</td>
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<td>Canada</td>
<td>0.70</td>
<td>0.58</td>
<td>0.50</td>
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Country Comparison of Thermal Efficiency, Transmission and Distribution Loss, and Annual Load Factor


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<tbody>
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<tr>
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<td>37.7</td>
<td>40.6</td>
<td>43.5</td>
<td>43.1</td>
<td>46.1</td>
<td>45.6</td>
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<td>Europe</td>
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<td>75.4</td>
<td>80.3</td>
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Comparaison of CO2 Emissions Intensity by Country (2013)

History of Japan's Electric Utility Industry

Business
Addresses

The Federation of Electric Power Companies of Japan (FEPC)
Kedannen-ku, 1-3-2, Otemachi, Chiyoda-ku, Tokyo 100-8118, Japan
Tel: (03) 525-1440 URL: http://www.feipc.or.jp

Hokkaido Electric Power Co., Inc.
2-8, Higashi 1-chome, Odori, Chuo-ku, Sapporo, Hokkaido 060-8777, Japan
Tel: (011) 251-1111 URL: http://www.hepco.co.jp

Tohoku Electric Power Co., Inc.
1-2-1, Honcho, Aoba-ku, Sendai-shi, Miyagi 980-8550, Japan
Tel: (022) 225-2111 URL: http://www.tohoku-epco.co.jp

Tokyo Electric Power Company Holdings, Inc.
1-1-3 Ichigaya, Chiyoda-ku, Tokyo 100-8981, Japan
Tel: (03) 5373-1111 URL: http://www.tepco.co.jp

Chubu Electric Power Co., Inc.
1, Higashi-shinbashi, Higashi-ku, Nagoya, Aichi 461-8660, Japan
Tel: (052) 951-8211 URL: http://www.chuden.co.jp

Hokuriku Electric Power Co., Inc.
15-1, Ushijima-cho, Toyama, Toyama 930-8896, Japan
Tel: (076) 441-2511 URL: http://www.rikuden.co.jp

The Kansai Electric Power Co., Inc.
3-4-16, Nakanoshima, Kita-ku, Osaka, Osaka 530-8270, Japan
Tel: (06) 6441-8821 URL: http://www.kepco.co.jp

The Chugoku Electric Power Co., Inc.
4-3-3, Komachi, Naka-ku, Hiroshima, Hiroshima 730-8701, Japan
Tel: (082) 241-0211 URL: http://www.energia.co.jp

Shikoku Electric Power Co., Inc.
2-5, Manemuochi, Takamatsu, Kagawa 760-8573, Japan
Tel: (087) 821-5881 URL: http://www.yonden.co.jp

Kyushu Electric Power Co., Inc.
1-42, Watanabe-dori 2-chome, Chuo-ku, Fukuoka, Fukuoka 810-8720, Japan
Tel: (092) 761-0011 URL: http://www.kyuden.co.jp

The Okinawa Electric Power Co., Inc.
2-1, Makimuno 5-chome, Urasoe, Okinawa 901-2602, Japan
Tel: (098) 3546-2211 URL: http://www.riepco.co.jp

Electric Power Development Co., LTD. (J-Power)
15-1, Ginza 6-chome, Chuo-ku, Tokyo 104-8165, Japan
Tel: (03) 6373-1111 URL: http://www.tepco.co.jp

The Japanese Atomic Power Company (JAPC)
10-1, Kanda-Mitsui-bashi-cho, Chiyoda-ku, Tokyo 101-0015, Japan
Tel: (03) 6373-7400 URL: http://www.japc.co.jp

Japan Nuclear Fuel Limited (JNFL)
4-108, Aza Oshibusu, Oaza Oshibusu, Rikuzetsu-ku, Iwate-ken, 029-3212, Japan
Tel: (0175) 71-2000 URL: http://www.jnfl.co.jp

Japan Atomic Energy Agency (JAEA)
4-49, Muramatsu, Totsuka-mura, Naka-gun, Ibaraki 319-1184, Japan
Tel: (028) 282-1122 URL: http://www.jaea.go.jp

Central Research Institute of Electric Power Industry (CRIEPI)
6-1, Ohmi-machi 1-chome, Chiyoda-ku, Tokyo 100-8126, Japan
Tel: (03) 3201-6601 URL: http://www.criepi.denken.or.jp

Japan Electric Power Information Center, Inc. (JEPIC)
15-33, Shibaura-4-chome, Minato-ku, Tokyo 106-0023, Japan
Tel: (03) 5361-8210 URL: http://www.jepic.or.jp

World Association of Nuclear Operators Tokyo Centre (WANO-TC)
6F Igarashi Bldg., 2-11-5, Shibaura, Minato-ku, Tokyo 108-0023, Japan
Tel: (03) 6722-9900 URL: http://www.wano.info