



Environmental Action Report 2017





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A Message from Our Chief Environmental Management Officer

Dear Stakeholders:

We are dedicated to achieving both an optimum energy mix and effective measures against global warming.

Amid today's changes of environmental management, addressing global warming is one of the major management tasks for Tohoku EPCO Group.

In November 2016, the Paris Agreement, an international framework on global warming countermeasures, entered into force, to take effect starting in 2020. The Japanese government intends to reduce greenhouse-gas emissions by 26% by 2030 from 2013 levels. Furthermore, by 2050, it aims to reduce greenhouse-gas emissions by 80%, as stated in the "Plan for Global Warming Countermeasures" decided by the Cabinet based on the Paris agreement adopted at COP21 (the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change).

As a member of the Electricity Business Council for a Low-Carbon Society, which was established as a voluntary initiative to counter global warming by electric utilities, we will steadily promote various measures to pursue the optimum energy mix and to combat global warming from the standpoint of "S+3E" (Safety, Energy Security, Economy and Environmental Conservation).

From the supply side, we are working on (1) restarting our nuclear power units with an emphasis on ensuring safety; (2) increasing the efficiency of thermal power generation including Shin-Sendai Thermal Power Station No.3 Series, which boasts the world's highest level of thermal efficiency; (3) striving to expand the use of renewable energy that fits with regional characteristics; and (4) reducing transmission and distribution losses.

From the demand side, we will support our customers' efficient use of energy and greenhouse-gas reduction by promoting the introduction of energy efficient heat pump equipment and by supplying natural gas to factories.

In our business activities, we will increase the numbers of Plug-in Hybrid Vehicles (PHVs) and Fuel Cell Vehicles (FCVs) with superior environmental performance as commercial vehicles. We also promote energy saving activities at business sites throughout the Group.

Through these efforts, we proactively promote measures against global warming.

We will strive to further enhance interactive communication.

More shareholders and investors focus on ESG (Environment, Social, Governance) investment, which incorporates appropriate consideration of and responses to issues related to the environment, society and corporate governance. ESG factors are also important for the evaluated companies to achieve sustainable growth, as they play a material role in determining risk management such as environment risk management from a medium- to long-term perspective as well as creating corporate value.

Responding to this trend, we will further enhance our environmental efforts, and we will disclose information to all stakeholders in a reasonable manner. We will revise and improve our activities by listening to our stakeholders' opinions and will strive to maintain and enhance interactive communications with them.

We will meet the challenge of "Creating Shared Value."

"Creating economic value and social value from an environmental perspective," is a pillar of our Mid-Term Environmental Action Plan for FY2017. We incorporated this concept known as "Creating Shared Value" (CSV), aimed at solving social problems through our main businesses, in addition to conventional CSR (Corporate Social Responsibility).

We will devote ourselves to tackle regional and global environmental issues by proactive use of new technologies and energy systems in addition to our efforts in environmental conservation and the formation of a recycling-oriented society.

Thank you for your continued understanding and support for Tohoku EPCO Group.

Sincerely,

Kojiro Higuchi

Managing Director and
Chief Environmental Management Officer

October 2017

Promotion of Environmental Management

We regard environmental preservation as one of the most important management issues and firmly deploy measures with the local community

based on the “Tohoku Electric Power Group Environmental Policies” and the “Medium-Term Environmental Action Plan for FY2017.”

Tohoku Electric Power Group Environmental Policies

Basic Stance

Through our environment-friendly energy service, we work together with the local communities and our customers, aiming for a sustainable society where future children can live safely and in peace.

We strive to ensure a stable supply of energy that is compatible with environmental conservation and economic efficiency, with the premise of ensuring safety as a corporate group aligning with the local communities.

This is our mission, and it will not change in any way in the future.

We appreciate the earth and its bounty, and we respect the traditional values of the people of this region as they coexist with nature. We aim for sustainable growth along with the local communities and our customers. Through good and faithful communications with them, we seriously consider our commitment to environmental issues and take actions to achieve our goal.

Four Principles of Conduct

- 1. Appreciate the bounty of the earth and carefully use its limited resources**
- 2. Minimize environmental impact**
- 3. Protect and coexist with the rich natural environment**
- 4. Think and act with the local communities and our customers**

Medium-Term Environmental Action Plan for FY2017 to FY2019

We will steadily and proactively advance measures to tackle five important issues under following two pillars for the Medium-Term Environmental Action Plan for FY2017 to FY2019.

We are facing business environment changes such as full liberalization of retail sales of electricity as well as the legal unbundling of the network sector. To transcend these challenges, we will strive for further growth by promoting efforts on environmental issues that will increase the economic and social value of our company.

Pillar 1 - Basic Measure:

Enhance trust relationships with regional communities and customers by reducing the environmental impact

Pillar 2 - Measure For Future Growth:

Create economic and social value through environment-friendly action

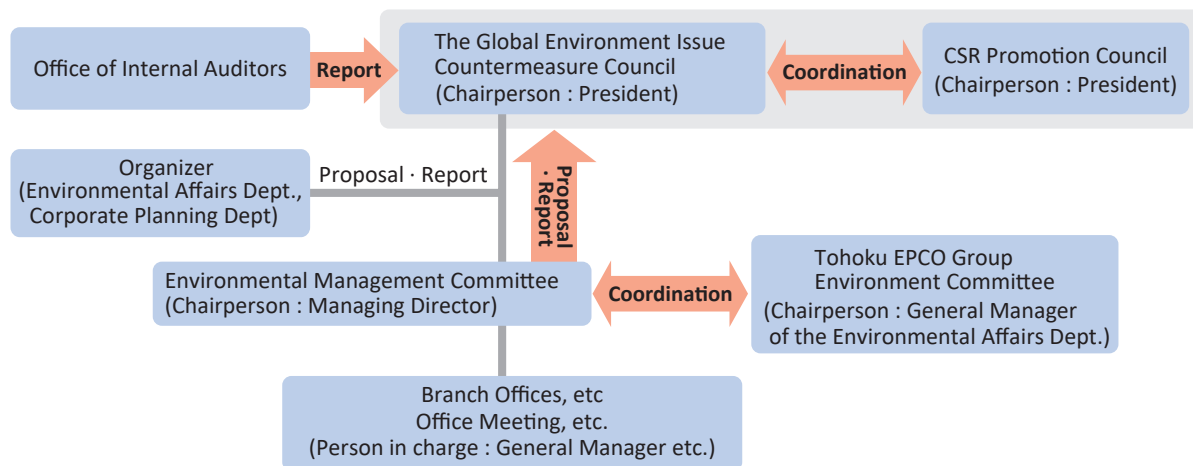
Important issues

- I) Promotion of comprehensive global warming countermeasures based on S+3E**
- II) Contribution to local community with utilizing new environmental technologies and energy systems**
- III) Compliance with environmental laws and regulations, and local environment conservation**
- IV) Creation of a sustainable, recycling-oriented society**
- V) Enhancement of the relationship of trust with stakeholders by promoting environmental communication**

Our Environmental Management Structure

We will enhance and promote environmental management with the strong and committed involvement of our senior management. At the Global Environmental Issue Countermeasure Council, chaired by the president, companywide environmental management is discussed from a comprehensive perspective, aiming for sustainable development together with the local communities.

At the Environmental Management Committee, companywide environmental management policies and plans, individual measures, and performance evaluation are discussed across multiple departments. The Committee reports and makes proposals to the Global Environmental Issue Countermeasure Council.



Our Group-wide Environmental Committees and T-EMS

Our 27 corporate group companies have jointly established the Tohoku Electric Power Group Environmental Committee. At the Committee, we have formulated policies and made environmental action plans, and evaluate actual performance to continuously reduce our environmental impact.

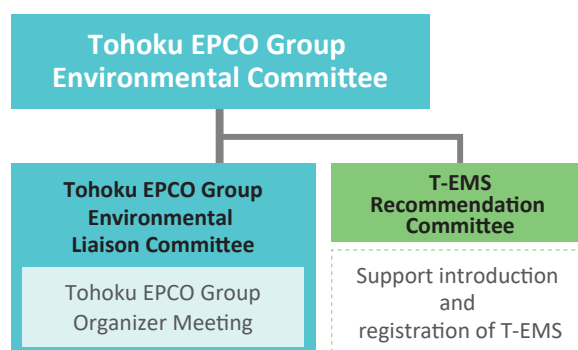
In addition, we support the introduction and operation of Tohoku EPCO Group Environmental Management System (T-EMS).

This is a unique environmental management system aimed at raising the level of environmental activities throughout the Group. We are operating based on the “T-EMS Guidelines” formulated with reference to ISO 14001, an international standard for environmental management systems, and Eco Action 21 by Japan's Ministry of the Environment.

For companies that acquire T-EMS certification, qualified persons from ISO 14001 auditors and internal auditors within our Company Group review the status of environmental initiatives.

They report the assessment review to the T-EMS Promotion Committee established as an internal organization of the Tohoku EPCO Group Environment Committee.

The T-EMS is composed of predetermined requirements. We continue to improve our environmental efforts by utilizing the PDCA cycle – Plan/implement plan (Do), confirm/evaluate the status of the initiative (Check); and evaluate and review overall (Action).



Results of environmental efforts in FY2016

Tohoku EPCO has established and is working to achieve guideline targets in line with the Medium-Term Environmental Action Plan for FY2016, our action plan for environmental conservation in

the next three years. The following are the main environmental indicators and results of measures.

Guideline	Index (Unit)	FY2015	FY2016	
		Result	Target	Result
Actions				

Global Warming Countermeasures in both supply and demand aspects due to improving energy efficiency

CO ₂ emissions control				
<p>In FY2016, we decreased our emissions of CO₂ by 3.3%, or 40.55 million tons of CO₂, and our CO₂ emission factor fell by 2.0%, to 0.548 kg of CO₂ per kilowatt-hour, compared to the previous fiscal year. Also, since the Great East Japan Earthquake of March 2011, operations of our nuclear power plants have been suspended. However, in order to improve safety to comply with new regulatory standards, we are conducting longitudinal efforts on risk management and facility construction, etc., as well as aiming for the restart of operations.</p> <p>* 1 CO₂ emissions factors that reflect CO₂ credits and adjustments by Feed-In-Tariff scheme for renewable energy (Note) Totals may not match due to rounding.</p> <p>* 2 Target was set by the Electricity Power Council for a Low Carbon Society (ELCS) as industry-wide target, not the target that each member of ELCS shall achieve.</p>	CO ₂ emission factor (Kg-CO ₂ /kWh)	0.559 * 1	0.37 in FY 2030 * 2	0.548 * 1
	CO ₂ emissions (Million t-CO ₂)	4,194 * 1	-	4,055 * 1
Efforts to enhance thermal efficiency				
<p>Our thermal efficiency rate in FY2016 increased to 46.3% from 45.6% in FY2015, due to increasing efficiency of thermal power generation with full operation of Shin-Sendai Thermal Power Station No.3 series, which boasts the world's highest level of thermal efficiency of 60%, as well as with consistent day-to-day management of each thermal power plant, etc.</p>	Gross thermal efficiency (Lower Heating Value (LHV) standard)	45.6	Increased	46.3
Reduction of power loss				
<p>We tried to suppress the transmission/distribution loss by adopting "low loss wire with fin," as well as by installing low-loss type transformers.</p>	Power transmission / distribution loss ratio (%)	5.5	Improved	5.2
Proposal for a heat pump electrification system to satisfy customers' electricity needs				
<p>We proposed heat pump equipment with excellent environmental friendliness and energy savings to meet customers' needs.</p>	Number of heat pump water heaters introduced (Units)	35,282	Increased	37,903
Energy conservation in offices, etc.				
<p>We have carried out energy-saving measures for air-conditioning, lighting and office automation equipment, etc., at each business site. Also, as some business operations were halted, energy consumption decreased.</p>	Electricity consumption (GWh)	126.9	Decreased	101.3

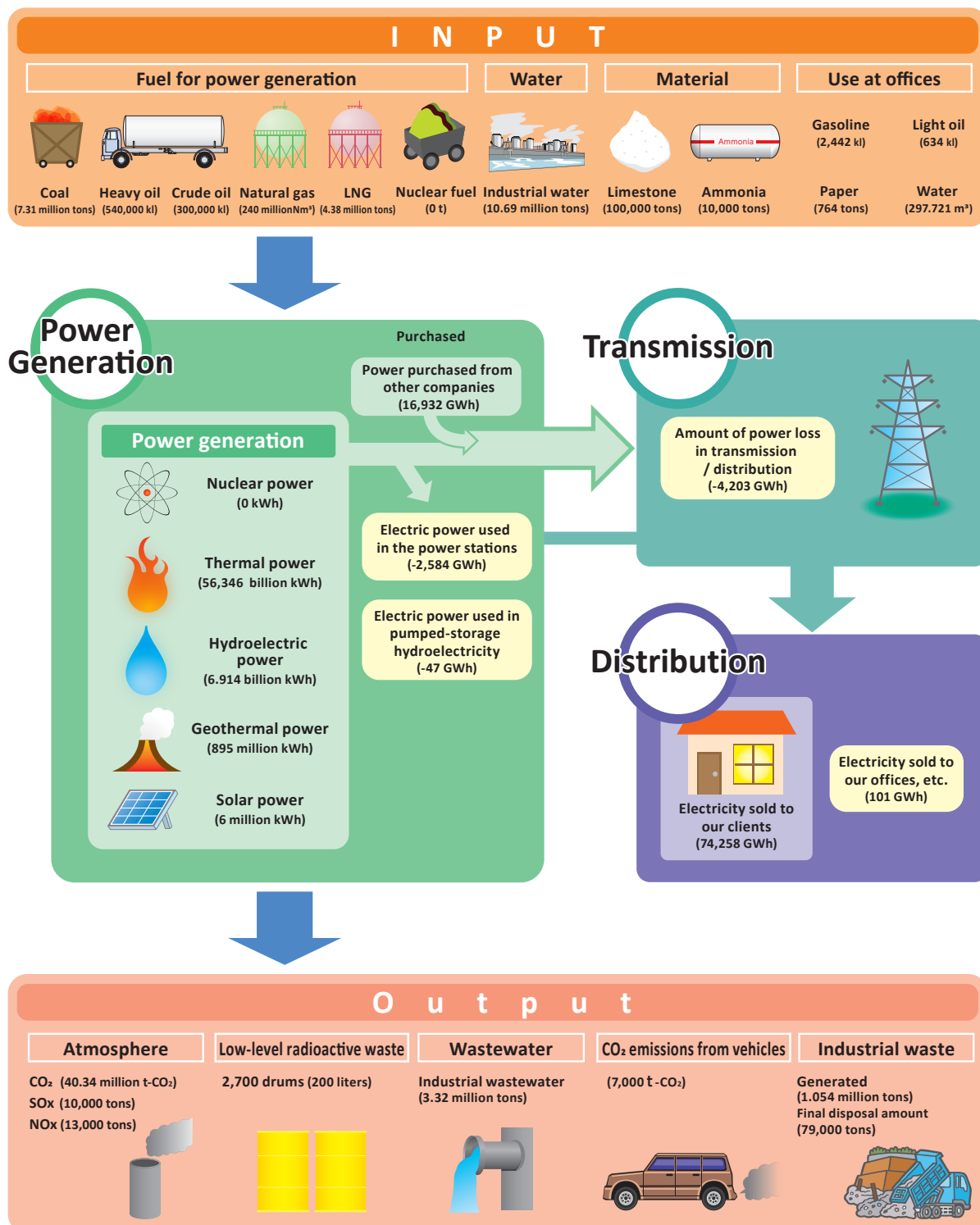
Creation of a recycling-oriented society

<p>Improvement in the effective utilization of industrial waste</p> <p>Due to the decrease in the amount of electricity generation, the amount of industrial waste decreased as well. By increasing the efficient use of coal ash, the efficiency ratio improved compared to the previous fiscal year. Besides coal ash, 100% of "rubble-type" waste, of which we generate a considerable amount, and almost 100% of metal scrap and gypsum, were effectively used.</p>	Effective utilization rate (%)	85.8	90.0	92.5
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Business activities and environmental impact (FY2016 results)

Our main business, the electric power business, inputs various resources to generate electricity and outputs environmental load such as CO₂ or wastes.

We continue our efforts to accurately understand and recognize such resource consumption and environmental burden in order to reduce the environmental impact.



*Pre-adjustment CO₂ emissions do not reflect adjustments by Feed-in-tariff scheme for renewable energy
Note: Totals may not match due to rounding.

Realization of Low-Carbon Society

We believe that the simultaneous realization of the principle of S+3Es – “Safety,” “Energy security,” “Economic efficiency” and “Environmental conservation” – is our mission as an energy business, with safety as our central premise.

Specifically, in order to realize a low-carbon society, we are working to restart nuclear power plants on the premise of ensuring safety. At the same time, we are trying to utilize renewable energy, as well as further increase and maintain the efficiency of our thermal power plants. Also, we are striving to reduce CO₂ emissions in terms

of both supply of and demand for electricity, including supporting customers’ efforts to conserve energy and reduce CO₂.

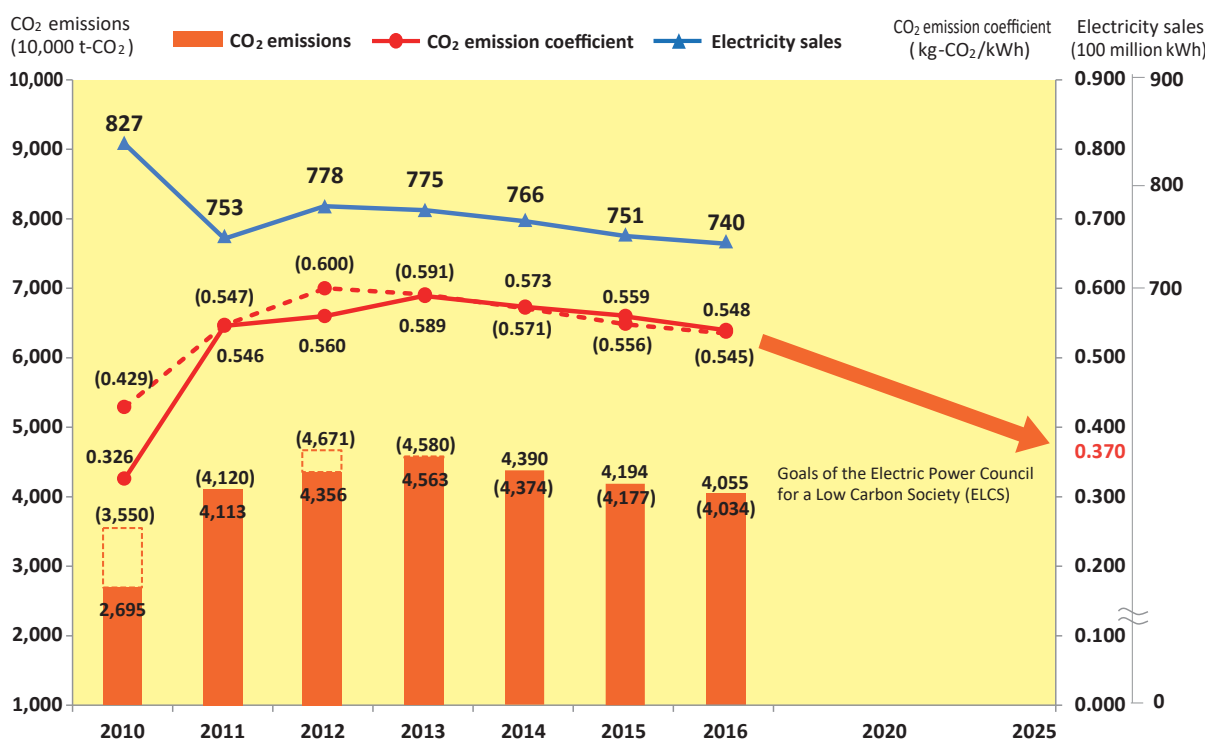
In addition, we participated in the Electric Power Council for a Low Carbon Society (ELCS), established by 42 electric power companies, including Tohoku EPCO, which aims to achieve CO₂ emission coefficient of 0.37 kg-CO₂/kWh by the electric power companies in FY2030. We will continue to promote comprehensive initiatives aimed at reducing CO₂ emissions to fulfill the Low Carbon Society Implementation Plan.

Greenhouse-gas Emissions Level for FY2016

Since the Great East Japan Earthquake in March 2011, CO₂ emissions levels have been high, due to prolonged nuclear power shutdowns and other factors. In FY2016, CO₂ emissions from thermal power generation decreased due to the start-up of high-efficiency thermal power plants and

expansion of the use of renewable energy. CO₂ emissions decreased by 3.3% from the previous year to 40.55 million t-CO₂ and the CO₂ emissions coefficient decreased by 2.0% to 0.548 kg-CO₂/kWh.

◆ Trends in CO₂ emissions results and sales volume of electricity by fiscal year



* Values in parentheses are pre-adjustment CO₂ emissions and emission factors. They do not reflect the Feed-In-Tariff scheme for renewable energy.

* Refer to the Ministry of Economy, Trade and Industry website for information about the adjustment by Feed-in-Tariff scheme for renewable energy.

Expanding the Use of Renewable Energy

Tohoku EPCO Group is engaged in research into the expansion of the use of renewable energy. At the same time, we are utilizing the rich natural environment in the Tohoku region and introducing hydroelectric and geothermal power generation, as well as expanding solar and wind power generation.

■ Hydroelectric power generation

The Company has 209* hydroelectric power stations, the largest number in the country, totaling about 2,440 megawatts. When this is combined with about 130 megawatts from 19 hydro plants owned by our Group companies, the total output is about 2,570 megawatts.

We are actively working to construct new hydroelectric Power stations. We launched commercial operations of the Tsugaru Hydroelectric Power Station in Aomori Prefecture in May 2016, and Yabukami No.2 Hydroelectric Power Station in Niigata Prefecture in June 2016. According to our calculations, we will see an annual reduction of 33,000 tons of CO₂ emissions due to the operation of these two hydroelectric power stations.

We finished large-scale construction work to upgrade our Kanose Hydroelectric Power Station started from 2011 in September 2017 and restarted commercial operation. By replacing six water turbines with two highly efficient water turbines (bulb turbines), we successfully increased the maximum output from 49.5 megawatts to 54.2 megawatts (about 10% output increase), with no increase in water usage.

* Number of hydroelectric power plants as of end of 2016.

■ Solar power generation

We operate four solar power stations with total output of 4.8 megawatts: Hachinohe (Aomori Prefecture), Sendai (Miyagi Prefecture), Haramachi (Fukushima Prefecture), and Ishinomaki-Hebita (Miyagi Prefecture), and the entire Group has approximately 15 megawatts.

Solar power generation connected to our grid reached approximately 3,205 megawatts at the end of fiscal 2016.

■ Wind-power generation

The Tohoku region is blessed with favorable wind conditions for wind power generation. We have tried to expand our use of wind power. We conducted wind power demonstration tests at the Tappi Wind Park (Aomori Prefecture) from FY1992 to FY2006, the first such demonstrations in the country. Furthermore, our Group company started operation of Noshiro Wind Power Station (Akita Prefecture) with 24 wind turbines (600 kW each, in total 14.4 megawatts) in 2001.

Wind power generations connected to our grid reached approximately 900 megawatts as the end of fiscal 2016, the highest in the country.

■ Geothermal power generation

Our Group has been proactive in introducing geothermal power generation as well. As of the end of fiscal 2016, we have six units in five sites in the Tohoku region, with total output of 247.3 megawatts. This is the largest amount of domestic geothermal power generation facilities in the country (48% of the total nationwide).

One of them, Matsukawa Geothermal Power Station (Iwate Prefecture), which started operation in 1966, was the first geothermal power station in the country. It has been operating for more than 50 years and was certified as a “mechanical heritage site” in 2016.

Furthermore, as part of our efforts to utilize geothermal energy sources that we could not use in the past, we have been conducting geothermal resource surveys in the Kijiyama and Shimonotai area in Akita Prefecture since 2010.

The existence of a geothermal reservoir was confirmed in 2015, and from 2016, we have been working on an assessment of this resource by drilling a large-diameter survey well.

■ Wood biomass power generation

Our Group uses woody biomass fuels (wood chips) at coal-fired power plants to control CO₂ emissions.

We utilize local unused materials as wood biomass fuel at our coal-fired thermal power plants; Noshiro Thermal Power Station (Akita Prefecture) from April 2012 and Haramachi Thermal Power Plant (Fukushima Prefecture) from April 2015.



The No.2 Yabukami Power Station
(Uonuma City, Niigata Prefecture)



Noshiro Wind Power Station
(Noshiro City, Akita Prefecture)



Matsukawa Geothermal Power Station
(Hachimantai City, Iwate Prefecture)

Battery System Verification Project

We are working to verify the effects of introducing renewable energy by establishing a storage battery system at the Nishi Sendai (Miyagi Prefecture) and Minami Soma (Fukushima Prefecture) substations with the help of government subsidies.

The Nishi Sendai Substation Storage Battery System Verification Project is aimed at demonstrating the ability to adjust frequency



Minami Soma Substation Storage Battery System

Outline of storage battery system demonstration project

	Nishi Sendai Substation [Sendai, Miyagi Prefecture]	Minami Soma Substation [Minami Soma, Fukushima Prefecture]
Main purpose	Measures against frequency fluctuation	Improving supply- demand balance
Facility overview	Type: Lithium-ion battery Output: 20 megawatts (short time output: 40 megawatts) Capacity: 20 megawatt hours	Type: Lithium-ion battery Output: 40 megawatts Capacity: 40 megawatt hours
Start of operations	February 2015	February 2016

fluctuations by using storage batteries. Until now, this has been mainly done by using thermal power generation. Together with thermal energy sources, the charge/discharge function of the storage battery system acts as a measure against frequency fluctuation due to the use of renewable energy sources such as solar and wind, whose output varies depending on weather conditions.

The Minami Soma Substation Storage Battery System Project is aimed at demonstrating the possibility of increasing the acceptance of renewable energy by improving the electricity supply-demand balance. When electricity supply exceeds demand, the battery absorbs the surplus power so that during times of higher demand, the battery takes up the slack by discharging its power into the grid.

We will ascertain the effectiveness with the two verification tests and continue to make maximum efforts to expand the use of renewable energy.

Research into hydrogen production system

Our R&D Center started operation of a hydrogen production system in March 2017 to conduct research on hydrogen production. The Center will continue this research by using this system until March 2019, to further expand the introduction of renewable energy.

Adjustment of output fluctuation due to weather conditions is an ongoing challenge as we expand the introduction of renewable energy. In our study, we will verify that hydrogen production technology can be applied as a countermeasure against output fluctuations, just like a storage battery, allowing us to use energy sources with large output fluctuation to produce hydrogen.

In collaboration with other companies, this is an outsourcing project of the New Energy and Industrial Technology Development Organization (NEDO). We will jointly develop a 10,000 kW class hydrogen production system and conduct trial operations in FY2020 in Namie (Fukushima Prefecture).

Efforts to improve the safety of nuclear power plants

Nuclear power generation does not emit CO₂ at the time of power generation, and can produce a lot of electricity with much less fuel. Additionally, procurement of fuel uranium is stable. Considering these characteristics, we believe that it is necessary to use nuclear power at a certain rate in the future with the premise of securing the safety of these operations.

We believe there is a need to establish and strengthen organized and systematic “high-quality risk management” in order to further enhance nuclear safety. For this reason, we are working to improve and strengthen our internal structure to strongly promote nuclear risk management, with the commitment of top management.

Also, as a facility safety measure, Onagawa Nuclear Power Station currently is undergoing tidal bank raising work (to about 29 meters above sea level, about 800 meters back from the seashore) as a countermeasure against possible tsunami, and tidal wall installation work around the intake and drainage opening is being carried out.

Furthermore, in order to secure a water source to cool the nuclear reactors in emergency situations, we are proceeding with installation of two freshwater reservoirs (about 5,000 m³ each) at a higher-elevation site (62 meters above sea level). Similarly, at the Higashidori Nuclear Power Station, we are proceeding with installing three fresh water reservoirs (about 3,600 m³ each). Both power plants are also working on maintenance of plant facilities such as safety inspections during the suspension of operations.

In order to ensure the facility’s safety measures, we are

maintaining operational procedures of the facilities’ equipment. In addition, in keeping with established procedures, we continuously implement training and make efforts to improve our emergency response capabilities.

We will continue to comply not only with new regulatory standards enforced in July 2013, but also ongoing efforts to improve the safety of nuclear power plants.



Thermal power generation initiatives

While thermal power is an important power source in terms of stable energy supply, it comes with environmental issues as typified by CO₂ emissions. We strive to reduce CO₂ emissions from our thermal power plants through fine-tuned daily operation and maintaining and improving thermal efficiency by introducing highly efficient combined-cycle power generation.

Improvement of efficiency in thermal power generation

The improvement of thermal efficiency in power generation contributes not only to reducing the amount of fossil fuels used but also boosts the effective use of energy resources, as well as contributing to the suppression of CO₂ emissions. We are proactively introducing highly efficient power generation technology.

The Higashi Niigata Thermal Power Station No.3 Series (Niigata Prefecture), which began commercial operations in 1985, is the world's first large-capacity gas combined-cycle power generation facility. It achieved thermal efficiency of about 48%, the highest level at the time.

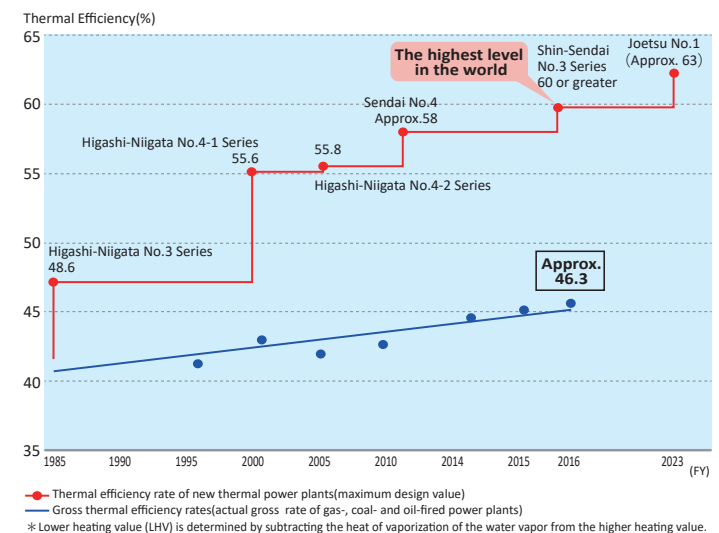
After that, Higashi Niigata Thermal Power Station No.4 series and Sendai Thermal Power Station No.4 series (Miyagi Prefecture) realized even higher thermal efficiency. In December 2015, Shin-Sendai Thermal Power Station No.3 series (Miyagi Prefecture) started half-scale operations and in July 2016 began full operations, achieving the world's highest thermal efficiency level of over 60%.

The Shin-Sendai Thermal Power Station No.3 series is expected to realize further reduction of CO₂ emissions and costs. After shutting down the existing Shin-Sendai Thermal Power Station No.1 and 2, replacement construction work was conducted on No.3. It is a

combined-cycle power generation facility using LNG as fuel, and is highly efficient compared to conventional gas-fired plants. Fuel consumption and CO₂ emissions can be reduced by about 30%. This replacement project received the Edison Award from the Edison Electric Institute.

In addition, we will introduce cutting-edge combined cycle power generation facilities to Joetsu Thermal Power Station No.1 series (Niigata Prefecture), and we plan to start operation in 2030. We expect it to achieve the world's highest thermal efficiency level of 63%.

Thermal Efficiency of Thermal Units [LHV*]

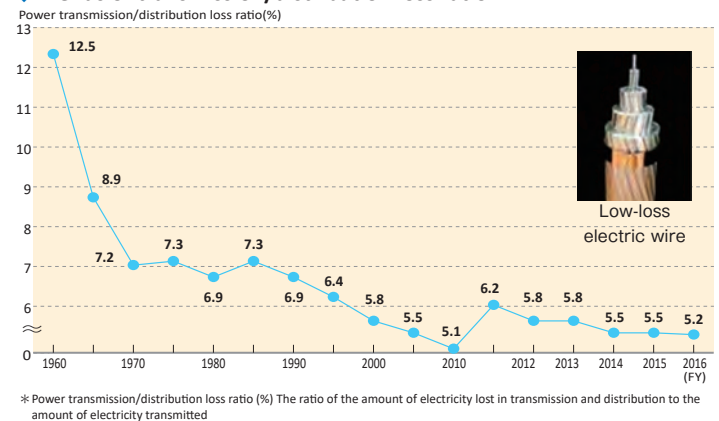


Reduction of CO₂ emissions associated with transmission and distribution

We are working to curb CO₂ emissions by reducing electric power losses associated with transmission and distribution. In collaboration with other companies, we developed a new transformer for distribution that realized reduction of power loss and longer life, in January 2016.

Also, losses during transmission via overhead transmission lines have been reduced to 5-6% in recent years by increasing the adoption of "low-loss finned wires" that can reduce electrical resistance by 20% or more.

Trends of transmission/distribution loss ratio



Development of HEATEDGE, a high-performance and heat pump highly-economical

Air-cooled heat pumps, which absorb the heat from the air with low energy and use it as a huge energy for cooling and heating, have a problem that they cannot maintain their rated performance when the outside air temperature is low, thus their capacity drastically decreases during defrosting operations.

To solve this problem, we jointly developed HEATEDGE, an air-cooled heat pump heat source device with enhanced heat performance during defrosting operations, with other company.

The HEATEDGE, equipped with the world's largest high-capacity DC inverter rotary compressor and a new defrosting control, raised the heating capability during defrosting operation when the outside temperature is -15 C. This high heating capacity can achieve low

energy consumption and comfortable indoor heating during normal operation when the outside temperature is -15 C as well.

We received the Minister of the Environment Award for Global Warming Prevention Activity* for the development of HEATEDGE.

* Established in 1998, this award honors individuals and organizations with outstanding achievements in preventing global warming in December every year (global warming prevention month).



HEATEDGE

Conservation of Local Environment

We are making efforts to conserve the local environment in order to minimize the environmental burden of our

business activities as we generate, transmit and deliver electricity to our customers.

Compliance with environmental laws and pollution control agreements

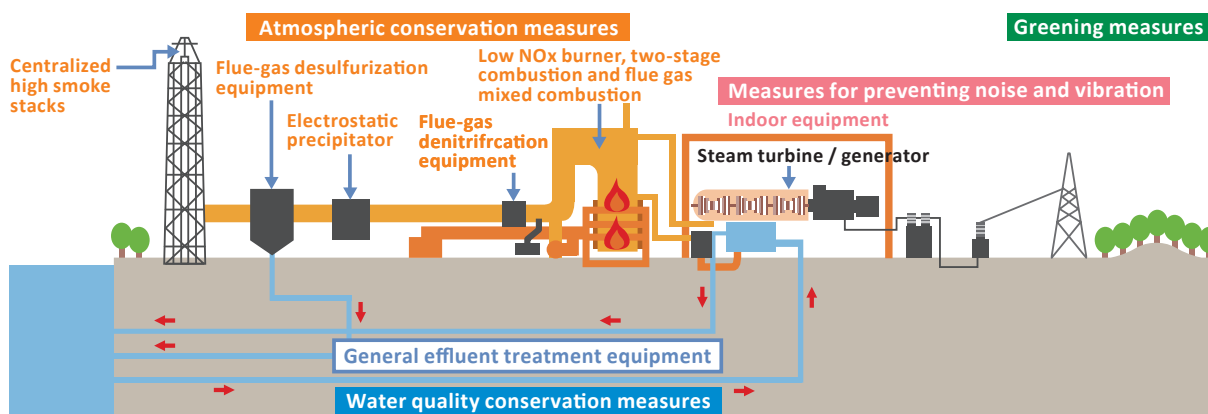
At thermal power stations and other plants, we strive to preserve the local environment by concluding a “pollution prevention agreement” with relevant local governments as well as observing laws and regulations concerning environmental conservation in our operations.

Regarding the pollution prevention agreement, we are taking into account the characteristics of the area, concerning the entire

environment such as air, water quality, waste, noise and greening. Our values are stricter than the national regulatory standards and we regularly report the results of our environmental measurements to the relevant local governments.

As for environmental laws and regulations, in coordination with our group companies, we are working to ensure compliance by sharing up-to-date information.

◆ An example of environmental measures for thermal power plants



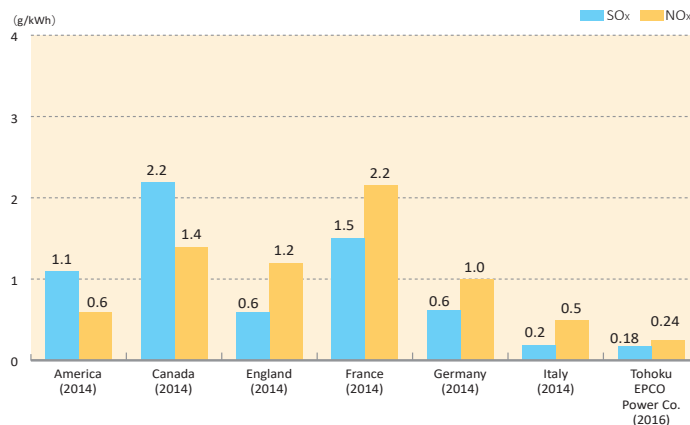
Atmospheric conservation measures

Major air pollutants emitted from thermal power plants include nitrogen oxides (NOx), sulfur oxides (SOx), soot and dust. In order to curb these emissions, in addition to installing environmental facilities*, we are working to prevent air pollution by implementing operational measures such as combustion management.

Our company's NOx emissions intensity for FY2016 was 0.24g/kWh. For SOx, the emission intensity was 0.18g/kWh. These are much lower values than in other countries.

*Flue-gas denitrification equipment, flue-gas desulfurization equipment, electrostatic precipitator.

◆ Emissions of SOx and NOx per unit of generated electric power



Sources:
Amount of emissions, OECD.StatExtracts Complete databases available via OECD's iLibrary.
Amount of electricity generated, IEA ENERGY BALANCES OF OECD COUNTRIES 2016 EDITION.

Water quality conservation measures

We are working to prevent water pollution. Drainage water from thermal power plants is treated to meet water discharge standards by coagulation sedimentation, filtration and purification.

Also, in thermal power stations and the like, seawater is used to cool the steam used in the steam turbine, and the heat-exchanged seawater is discharged into the ocean as warm wastewater.

In discharging, we adopt a discharge method according to the characteristics of the surrounding sea areas, and reduce the environmental impact.



Survey of the ocean near a power station.

Creation of a Recycling-Oriented Society

In our efforts to realize a recycling-oriented society, we manage and process waste in accordance with related laws

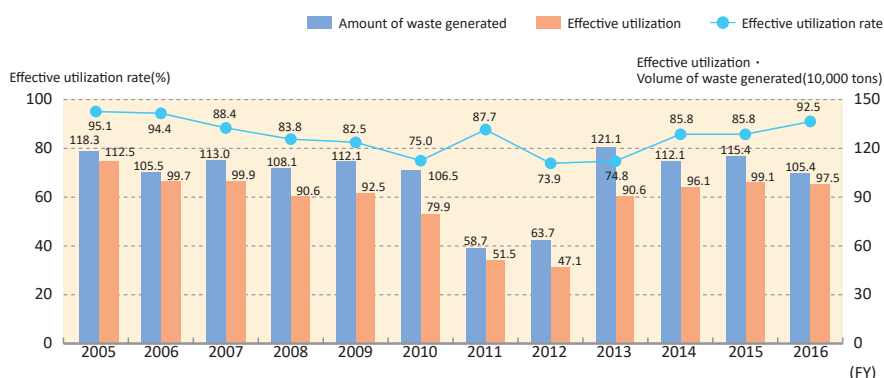
and regulations. We also actively promote the 3Rs (Reduce, Reuse, Recycle).

Appropriate management and processing of waste

The majority of our waste consists of coal ash and gypsum generated by our coal-fired power plants, as well as various types of rubble and scrap metal, which we put to effective use. This waste is properly processed under a waste management system and a digital manifest system. At the same time, we are making efforts to further promote the 3Rs – we established the Waste 3Rs Measures Review Committee.

As a result, although the amount of waste generated has increased since the restoration of facilities damaged by the Great East Japan Earthquake in 2011, the effective utilization rate has improved to the pre-disaster level. In fact, the effective utilization rate, which temporarily decreased before and after the earthquake, has improved to about 90%.

◆ Production volume and effective use of waste



Consideration for Biodiversity

Biodiversity may be affected by the environmental burden imposed by our business activities and the installation of

facilities. For this reason, we fully consider biodiversity when conducting our business activities.

Measures to conserve biodiversity

■ Measures to keep birds safe from transmission lines

In order to allow migratory birds to recognize and avoid transmission lines, we are taking measures such as attaching bird-repelling devices after investigating their flight paths.

■ Coexisting with domestic rare wild animal and plant species such as *hayabusa* (falcon)

A *hayabusa* falcon nest was confirmed on the chimney of the Shin-Sendai Thermal Power Station No.1 and 2. As a compensatory measure of replacing No.1 and 2 units by No.3 series, we set a man-made falcon nest on the chimney of the No.3 series in 2015.

In the spring of 2017, falcons nested in the man-made nest for the first time and we confirmed two young birds were fully fledged.

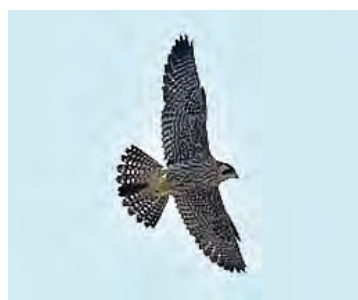
■ Developing the waterside environment at thermal power stations

At the Sendai Thermal Power Station, we are working to conserve biodiversity by rebuilding the biotopes (habitats of living things) around the reservoir damaged by the Great East Japan Earthquake.

■ Protecting marshes around nuclear power station

Numerous rare animals and plants have been sighted in the wetlands at the Higashidori Nuclear Power Station (Aomori Prefecture). To protect them, controlling the growth of reeds or other plants is required.

For this reason, regular grass cutting is carried out so that the habitat and growing environments of rare animals and plants can be maintained.



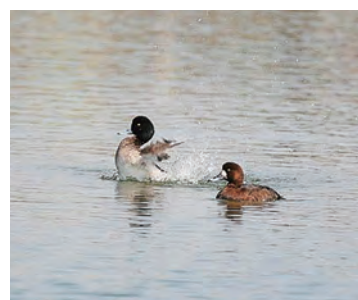
A young falcon over the power station



Shin-Sendai Thermal Power Station No.3 series (Sendai City, Miyagi Prefecture)



Rare Gomashijimi butterflies



Suzugamo ducks on the reservoir

Promotion of Environmental Communication

To build relationships of trust with local communities and customers, the Company Group actively discloses environment-related information and promotes

“environmental communication” with local communities through planning and conducting environmental activities with them.

Green Curtain campaign

One energy-saving measure that takes advantage of nature’s power is the Green Curtain, a natural shade over the outside of a building window or wall created by growing creeping vines such as goya (bitter melon). We have been promoting Green Curtains since 2010. In FY2017, we were delighted to have many local members to participate in our Green Curtain campaign. We grew

Green Curtains at our 109 office sites and business sites of our nine group companies. We also work with elementary school students and local residents.

The progress of the Green Curtains at our offices, and our activities with the community can be found on our website.



Tohoku Electric Power Group recovery activity for the coastal disaster prevention forest

Our Company Group is working to restore the coastal disaster prevention forest, which was devastated by the tsunami that accompanied the Great East Japan Earthquake on March 11, 2011. This activity was started in 2013 as our employees’ volunteer activity. It has

connected the wish of the local people, eager to revive the beautiful and lush forest that protects the coast from high winds and waves, with the passion of our employees to rebuild the communities.



Performance Data

Major item	Classification	Data item	Unit	2012	2013	2014	2015	2016
Environment	Electricity-generating capacity	Nuclear power	100 million kWh	0	0	0	0	0
		Thermal power	100 million kWh	528	610	566	572	563
		Hydroelectric power	100 million kWh	60	74	82	79	69
		Renewable Energy, etc.	100 million kWh	9	9	9	9	9
	Purchased electric power	Purchased electricity from other companies	100 million kWh	255	159	181	162	169
	Amount of power used / lost	Used within power plants	100 million kWh	24	29	26	27	26
		Used for pumped-storage power generation	100 million kWh	0.7	0.5	0.6	0.6	0.5
		Used in offices	100 million kWh	1.3	1.3	1.3	1.3	1.0
		Lost in transmission/distribution	100 million kWh	49	49	46	45	42
	Amount of electricity sales		million kWh	77,833	77,452	76,623	75,057	74,258
	Fuel consumption to generate electricity	LNG	10,000 tons	466	428	408	432	438
		Natural gas	100 million Nm ³	2.4	2.4	2.4	2.4	2.4
		Coal	10,000 tons	438	890	771	814	731
		Heavy oil	10,000 kl	144	99	89	43	54
		Crude oil	10,000 kl	44	33	31	33	30
		Nuclear fuel	t	0	0	0	0	0
	Water usage	Industrial water	10,000 tons	1,055	1,160	1,174	1,111	1,069
	Vehicle fuel	Gasoline	kl	2,673	2,669	2,397	2,541	2,442
		oil	kl	794	775	672	656	634
	Other usage	Limestone	10,000 tons	6	12	10	12	10
		Ammonia	10,000 tons	0.5	1.0	1.0	1.0	1.0
	CO ₂ emissions	CO ₂ (before adjustment)	10,000 t-CO ₂	4,671	4,580	4,374	4,177	4,034
		CO ₂ (after adjustment)	10,000 t-CO ₂	4,356	4,563	4,390	4,194	4,055
		CO ₂ emission coefficient (before adjustment)	kg-CO ₂ / kWh	0.600	0.591	0.571	0.556	0.545
		CO ₂ emission coefficient (adjusted)	kg-CO ₂ / kWh	0.560	0.589	0.573	0.559	0.548
	Greenhouse-gas emissions other than CO ₂	SF ₆ recovery rate	%	99.6	99.7	99.3	99.4	99.6
		HFC holding capacity	t	42.7	41.5	47.7	52.6	51.7
		HFC emissions	t-CO ₂	1,019	1,638	563	1,349	476
	Waste	Amount of waste generated	10,000 tons	63.7	121.1	112.1	115.4	105.4
		Final disposal amount of waste	10,000 tons	16.6	30.5	15.9	16.4	7.9
		Industrial waste recycling volume	10,000 tons	47.1	90.6	96.1	99.1	97.5
		Effective waste utilization rate	%	73.9	74.8	85.8	85.8	92.5
	Other emissions	SOx emissions	10,000 tons	1.1	1.3	1.2	1.0	1.0
		SOx emission intensity	g / kWh	0.22	0.22	0.21	0.17	0.18
		NOx emissions	10,000 tons	1.6	1.6	1.5	1.4	1.3
		NOx emission intensity	g / kWh	0.31	0.27	0.27	0.25	0.24
		Industrial wastewater	10,000 tons	278	324	326	332	332
		CO ₂ emissions from vehicles	10,000 tons	0.8	0.8	0.7	0.8	0.7
	Prevention of global warming	Total thermal power integrated efficiency (lower heating value (LHV))	%	44.8	44.7	45.3	45.6	46.3
		Power purchased from solar power generations	10,000kW	37.5	81.2	152.9	245.4	320.5
		Power purchased from wind power generations	10,000kW	59.1	61.4	71.9	80.1	85.6
		Trends of transmission/distribution loss ratio	%	5.8	5.8	5.5	5.5	5.2
Trend in popularity of heat pump water heaters within Tohoku EPCO (cumulative) Individual		Individual units	253,493	295,675	332,474	367,757	405,660	

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