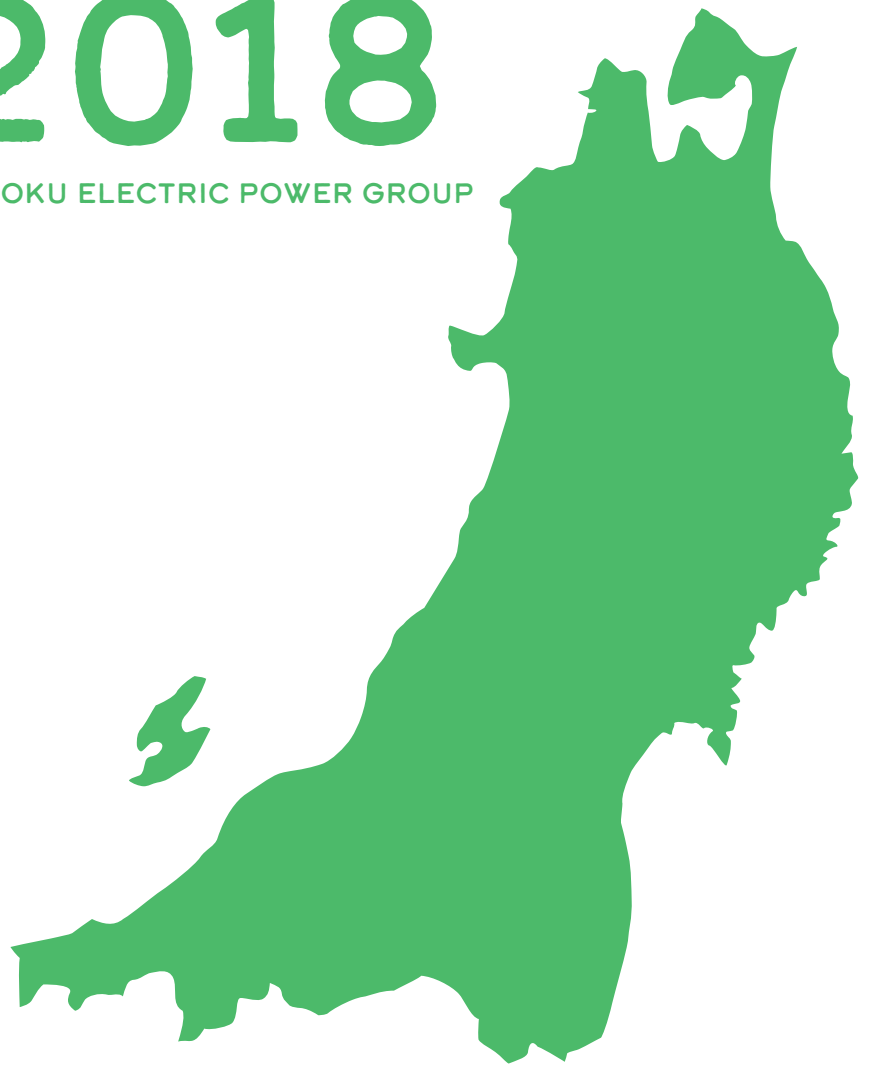




Environmental Action Report 2018

TOHOKU ELECTRIC POWER GROUP





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A Message from Our Chief Environmental Management Officer

Dear Stakeholders:

With the aim of realizing a sustainable society, our group will work together to promote environmental protection.

In recent years, interest in realizing a sustainable society has been growing rapidly.

For example, more and more actions have been taken globally to achieve the Sustainable Development Goals adopted by the Paris Agreement at COP21 (the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change). Environmental, social and governance (ESG) investing in Japan and overseas also has seen a sharp increase. It includes non-financial factors - relating to environment, society and governance - in the investment decision-making process.

Looking at domestic environmental and energy policies, the situation surrounding environmental management is changing dramatically. In response, the government revised its Basic Environment Plan in April this year and the Energy Basic Plan in July.

The Tohoku Electric Power Group, as part of its efforts to develop energy services in the six Tohoku prefectures and Niigata Prefecture, has positioned environmental conservation as one of our most important management issues, and we engage in activities related to global warming countermeasures, conservation of the region's environment, and working to achieve a recycling-oriented society.

Going forward, we will continue our efforts toward a sustainable society.

Specifically, since last year, our company group has been promoting environmental management as a team. As one of the activities, we share the basic ideas and direction of the medium-term environmental action plan with corporate group companies.

We will actively promote measures against global warming based on "S+3E"

To promote countermeasures against global warming, the Paris Agreement entered into force in 2016, and discussions on long-term strategy are gathering pace in Japan.

As a member of the Electric Power Council for a Low Carbon Society, a voluntary group of the Japanese electric power industry, we pursue an optimal energy mix based on "S+3E" (Safety, Energy Security, Economy and Environmental Conservation), and promote a multifaceted response aiming at compatibility with global warming countermeasures.

On the supply side, we are making concrete efforts,

such as working on restarting nuclear power plants with an emphasis on ensuring safety, expanding the use of renewable energy utilizing the characteristics of the region, improving the efficiency of thermal power generation, and reducing power loss during transmission and distribution.

In terms of demand, we have been promoting the efficient use of energy by our customers, such as supporting the introduction of energy-saving heat pump equipment. We are also introducing vehicles with excellent environmental performance in our business activities and practicing energy conservation in our business sites. We will continue to promote all aspects of global warming countermeasures.

We constantly strive to further enhance environmental communication and information disclosure.

Our company group actively engages in environmental communication and information disclosure, including publishing environmental reports such as this one.

Regarding specific measures related to environmental information disclosure, we have responded to questionnaires from CDP, an international nongovernmental organization that evaluates corporate information disclosure related to climate change. We also participate in the Environmental Reporting Platform Development Pilot Project conducted by the Ministry of the Environment to identify opportunities to cooperate and communicate between the ministry, corporations and investors.

Being fully aware of stakeholders' growing concern about environmental information disclosure by companies, we will continue our efforts to publicize our company group's stance on environmental issues. We will continue our efforts to disclose complete and correct information and improve communication between our stakeholders and the company group.

Sincerely,

八代 浩久

Hirohisa Yashiro

Tohoku Electric Power Co., Ltd.
Managing Executive Officer and
Chief Environmental Management Officer

October 2018

Promotion of Environmental Management

Based on the management philosophy of “prosper with local communities” and “use creativity in business management,” the Tohoku Electric Power Group positions environmental conservation as one of the most important management issues, and we are steadily promoting environmental efforts with the local community based on the “Tohoku Electric Power Group Environmental Policies” and “Medium-Term Environmental Action Plan for FY2018.”

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.

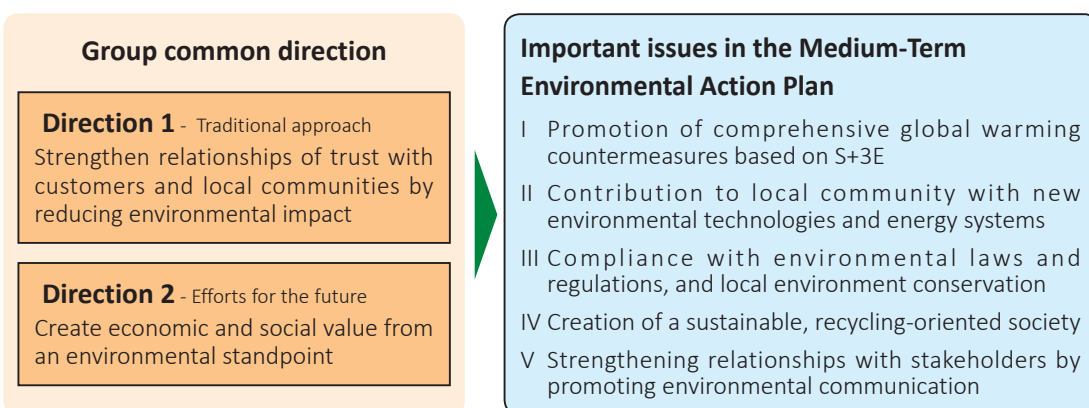
Four Principles of Conduct

- 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 FY2018 to FY2020

Based on the following two directions, the Medium-Term Environmental Action Plan for FY2018 to FY2020 will steadily and proactively advance measures for five critical issues.

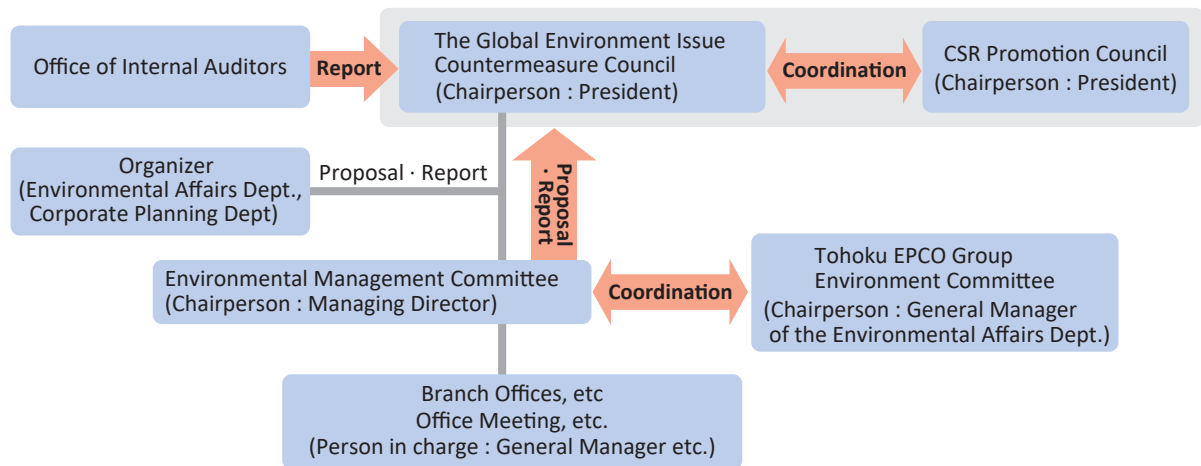
Also, starting in 2018, we share a common direction toward the formulation of the Environmental Action Plan across the entire Group, and with the same recognition and direction, we are working on environmental actions with even greater determination.



Our Environmental Management Structure

At the Global Environment Issue Countermeasure Council, chaired by the president, we deliberate company-wide environmental management from a comprehensive perspective and promote environmental management aimed at achieving sustainable development together with local communities.

In addition, the Environmental Management Committee deliberates company-wide environmental management policies and plans, individual measures, and performance evaluation across multiple departments. The Committee makes proposals and reports to the Global Environment Issue Countermeasure Council.



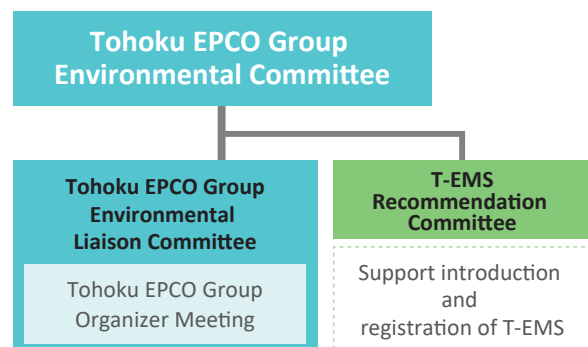
Tohoku Electric Power Group's Environmental Management System (T-EMS)

The Tohoku Electric Power Group Environmental Management System (T-EMS) is an original environmental management system aimed at raising the level of environmental activities throughout the Company 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 ISO 14001 auditors and internal auditors within the Company Group review the status of environmental initiatives, and report to the T-EMS Promotion Committee, which we set up as an internal organization of the Tohoku EPCO Group Environment Committee.

The certification expires three years from the registration date, and after that, we conduct maintenance or renewal reviews every year.

The T-EMS is composed of predetermined requirements, following the Plan-Do-Check-Action (PDCA) cycle -- Planning (Plan), implement the plan (Do), confirm/evaluate results (Check), and evaluate and review overall (Action). In this way, we work to continuously improve our environmental efforts.



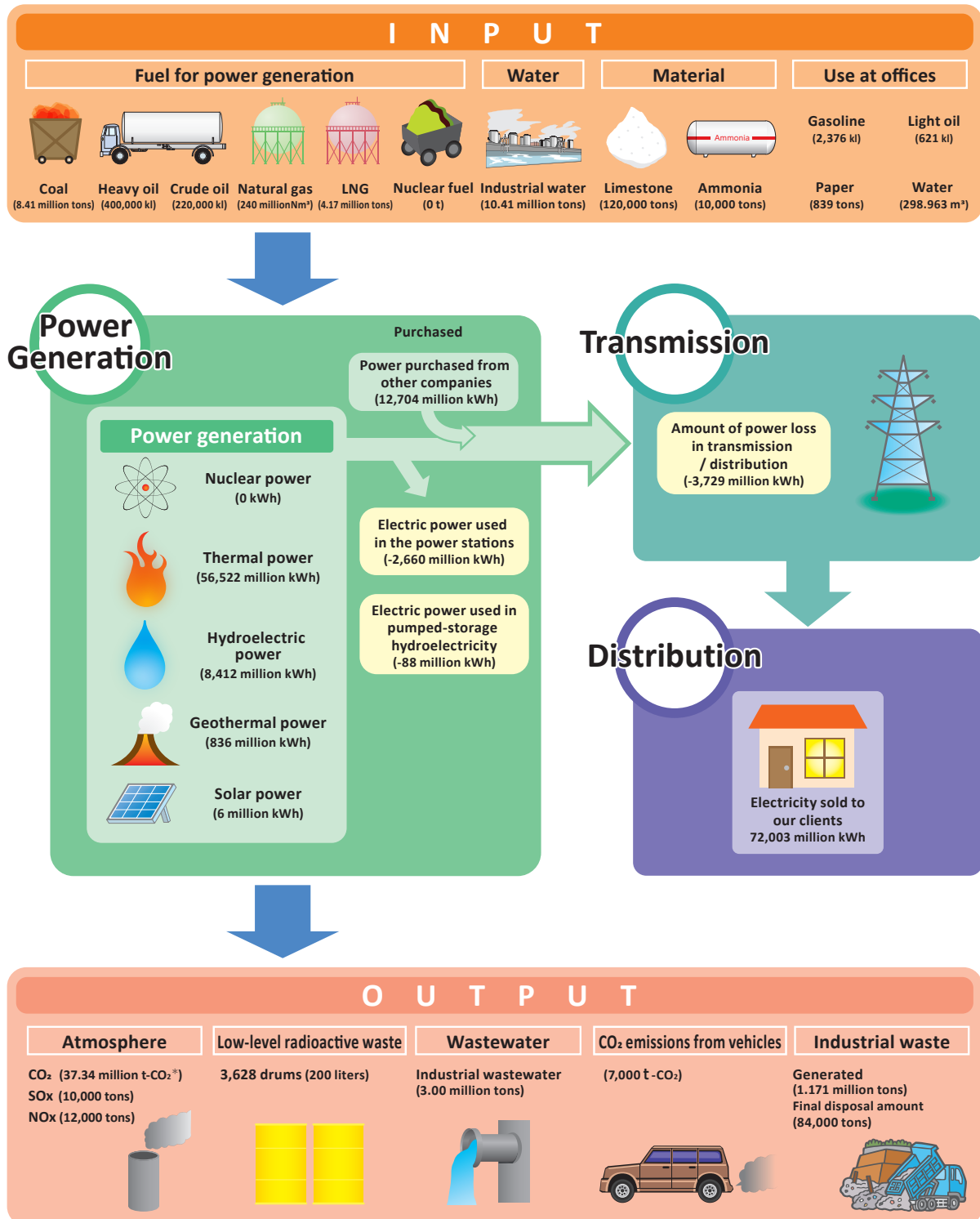
Results of environmental efforts in FY2017 and self-evaluation

Evaluations of the environmental indicators and measures listed in the Medium-Term Environmental Action Plan for 2017 are as follows.

| Detailed measures | Index (Units) | FY2016 | FY2017 | | |
|---|---|--------------|---|----------|-----------------|
| | | Results | Targets | Results | Self-assessment |
| Measures against global warming from both supply and demand aspects due to energy efficiency improvements | | | | | |
| <p>CO₂ emissions reduction We decreased our CO₂ emissions by 7.4%, to 37.75 Million t-CO₂, and the CO₂ emission factor decreased by 4.6% to 0.523 kg-CO₂/kWh, compared with the previous fiscal year due to the increase in the water output rate and the expansion of renewable energy.</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. *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) | 0.548 *1 | Target set by the Electric Power Council for a Low Carbon Society: 0.37 in FY 2030 *2 | 0.523 *1 | — |
| | CO ₂ emissions (Million t-CO ₂) | 40.55 *1 | — | 37.55 *1 | — |
| <p>Maintenance and improvement of thermal power plants' efficiency We strove to raise the awareness of plant performance management by "visualization" of the thermal efficiency of each thermal power plant, and maintained and improved thermal efficiency by conducting daily management and performance tests after regular inspections.</p> | Gross thermal efficiency (lower heating value (LHV) standard) (%) | 46.3 | Improve over current situation | 46.2 | Mostly Achieved |
| <p>Reduction of power loss In addition to the construction of transmission lines, we regularly use "low-loss wire with fin" for replacing aging electric wires, which helps suppress transmission and distribution loss.</p> | Power transmission / distribution loss ratio (%) | 5.3 | Improve over current situation | 4.8 | Achieved |
| <p>Proposal for a heat pump electrification system to satisfy customers' electricity needs We proposed heat pump equipment with excellent environment friendliness and energy savings to meet customers' needs.</p> | Number of heat pump water heaters introduced (Units) | 37,903 | Increase from current amount | 37,552 | Mostly achieved |
| <p>Purchasing and expanding connection related to renewable energy As we tried to purchase more electricity from renewable energy sources and handle with customers' growing requests for connection to our power lines for renewable energy, the amount of customers' solar and wind power generation connected to our grid has increased.</p> | Solar power generation connected to our grid (Million kW) | 3.205 | Increase as much as possible | 4.021 | Achieved |
| | Wind power generation connected to our grid (Million kW) | 0.856 | | 0.992 | |
| Building a recycling society | | | | | |
| <p>Effective utilization of industrial waste Despite an increase in the amount of coal ash produced, we strive to maintain an effective utilization rate by securing new suppliers of coal ash. The amount of effective use of other industrial waste also increased. As a result, the effective utilization rate exceeded the previous year. In addition to the coal ash, a large amount of rubble was produced, and we achieved 100% effective use. In addition, we achieved nearly 100% effective use of metal scrap and gypsum.</p> | Effective utilization rate (%) | 92.5 | 90.0 | 92.8 | Achieved |
| Environmental management | | | | | |
| <p>Promotion of measures to strengthen environmental management system</p> <ul style="list-style-type: none"> Based on the Medium-Term Environmental Action Plan for FY2017, the PDCA cycle of environmental indicators and measures was integrated with operations, aiming at continuous improvement. We developed "eco office activities," in which each employee takes the initiative in promoting efforts to reduce the environmental burden in each office, such as energy and resource conservation activities. We introduced examples of these activities through our internal company website and in-house newsletter, and expanded the practice to each of our business sites. We strove to enhance environmental management throughout the Tohoku Electric Group's Environmental Management System (T-EMS) (23 companies in total). | | Continuation | | | Achieved |

Business activities and environmental impact (FY2017 results)

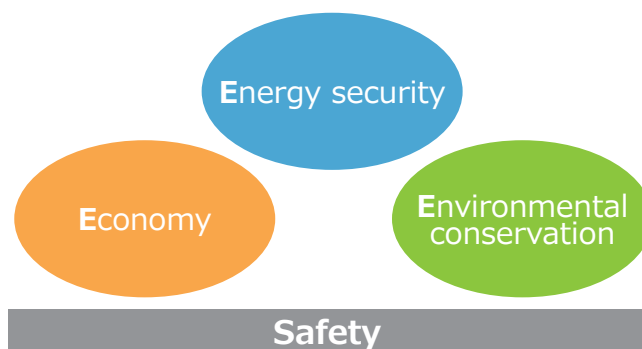
In the electric power business, which is the main focus of our business activities, we use various kinds of resources to generate electricity, and in so doing we discharge environmental burdens such as CO₂ and waste. In order to accurately understand and recognize such types of resource consumption and environmental burden and to reduce their impact, we actively address various environmental issues.



*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 give safety the highest priority, and believe that achieving the following three goals at the same time is our mission as an energy business (S+3E): Energy security, Environmental conservation, Economy. We pursue an optimal energy mix based on “S+3E”, and promote a multifaceted response aiming at compatibility with global warming countermeasures.



As part of our efforts to realize a low-carbon society, we are working to resume the operation of our nuclear power station as part of our efforts to help develop a low-carbon society, with safety as our top priority. We are also committed to harnessing renewable energy sources, enhancing the efficiency of thermal power generation, and maintaining the appropriate level of thermal efficiency.

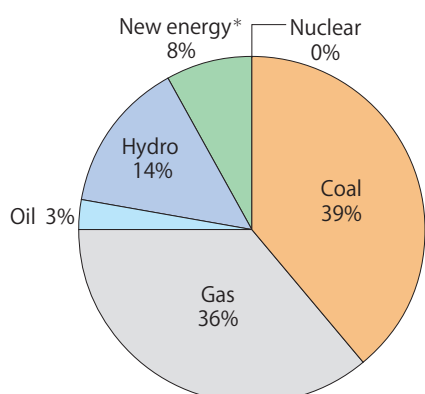
Moreover, we assist our customers with their courses of action to save energy and reduce CO₂ emissions, in order to maximize our efforts to cut CO₂ emissions on the parts of suppliers and consumers.

| Main initiatives on supply side | Major initiatives on the demand side |
|---|--|
| Efforts to restart nuclear power plants with safety as our top priority | Support for customers' energy conservation and CO ₂ reduction efforts |
| Utilizing renewable energy | Energy saving efforts at our offices |
| Increase efficiency of thermal generation | |

Furthermore, as a member of the Electric Power Council for a Low Carbon Society, we pursue action to reach the goals set in the Action Plan for Low-Carbon Society, such as achieving a CO₂ emission factor of around 0.37kg of CO₂ / kWh in FY2030 throughout the electricity business.

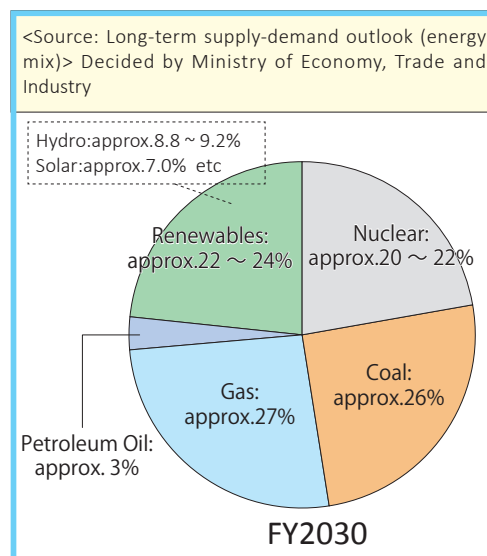
Power source portfolio of our company (FY2017)

From the viewpoint of S+3E, we have a power supply configuration that mixes various energy resources in a balanced manner.



* Solar, wind, geothermal power, etc.

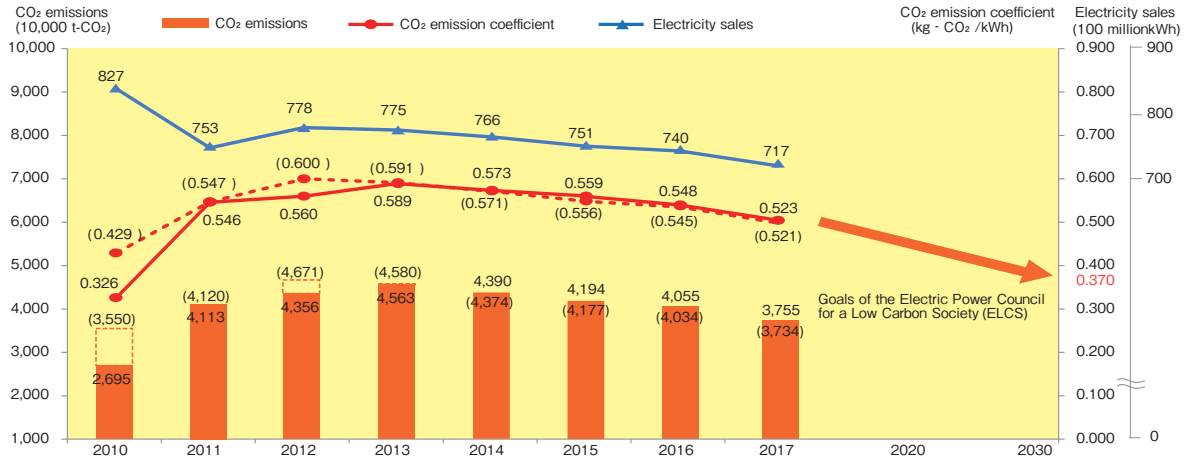
Reducing CO₂ and improving price competitiveness by restarting nuclear power plants, realizing a more optimal energy mix.



CO₂ emissions

Since the Great East Japan Earthquake in 2011, CO₂ emissions have been at a high level due to the prolonged shutdown of nuclear power stations.

In FY2017, electricity generated by thermal power decrease because the flow rate of water from dams increased and more renewable energy was put into use. Our CO₂ emissions (as a retailer) dropped by 4.6% to 37,550,000 tons of CO₂ from the previous year, and our CO₂ emission factor decreased by 2.0% to 0.523 kg of CO₂/kWh from the previous 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.

Greenhouse-gas emissions results other than CO₂

We are also working on emission controls for greenhouse gases other than CO₂, which have a large impact on global warming, such as SF₆ (sulfur hexafluoride) used in power equipment such as gas circuit breakers in our substations.

◆ Recovery rate of SF₆ gas and HFC holding amount · emission amount

(FY2017 result)

| | |
|-----------------|--|
| SF ₆ | <p>[Recovery rate] 99.8%</p> <p>[Applications] Mainly used for insulation materials, etc., in gas circuit breakers</p> <p>[Countermeasures] SF₆ gas recovery equipment to prevent air release</p> |
| HFC | <p>[Holding capacity] 51.2 tons</p> <p>[Emission] 947 t-CO₂</p> <p>[Application] Mainly used for refrigerants etc. in air-conditioning equipment</p> <p>[Countermeasures] Prevent leakage when modifying equipment; collect and reuse</p> |

* SF₆ : Sulfur hexafluoride; HFC: Hydrofluorocarbon

Expanding the use of renewable energy

Our company group takes advantage of the rich natural environment in the Tohoku and Niigata regions to actively utilize renewable energy sources such as hydroelectric and geothermal and expand the use of solar and wind power generation.

In 2015, we established Tohoku Sustainable & Renewable Energy Co. Inc., by merging four renewable power generation companies. The company is working on promoting the renewable energy business, as part of the entire Company group's goal of achieving output of 400,000 kW* in 2030.

We unified the organization relating to hydroelectric generation in July 2017, and we are developing plans to renew aging hydroelectric power plants, as well as a system to promote a new hydropower plan through technical assistance to Group companies.

* Adding to the existing steam-based output conversion of more than 100,000 kW, we aim to double the capacity of 150,000 kW.

► Hydroelectric power generation

Tohoku EPCO Group has the largest number of hydropower plants in Japan (209)*¹ (about 2.45 million kW in total), and together with 19 hydroelectric plants owned by group companies (about 130,000 kW), the total output is about 2.58 million kW.

In addition, our company and group companies are working on effective utilization of water resources through the establishment and renewal of hydropower stations.

At the Kanose Power Station in Niigata Prefecture, which was showing signs of age, we have undertaken a large-scale renewal of the power plant, upgraded the turbine generators, replacing the six water turbines with two highly efficient water turbines and installing a highly efficient vertical valve turbocharger. This increased output by about 10% (49,500 kW to 54,200 kW) as maximum output without changing the amount of water used. The plant resumed operations in September 2017.

As for newly established hydroelectric power plants, we started commercial operations of Tsugaru Power Station (Aomori Prefecture: maximum 8,500 kW) and 2nd Yabugami Power Station (Niigata Prefecture: maximum 4,500 kW) in 2016.

*¹ Number of hydroelectric power plants as of end of 2016.



Kanose Hydroelectric Power Station

► Solar power generation

Our company has mega solar power plants*¹ at Hachinohe, Sendai and Haramachi, and a solar power plant at Ishinomaki-Hebita.

Based on the operation of these four solar power plants, we estimate that it will lead to an annual reduction of approximately 2,600 tons*² of CO₂ emissions. This is equivalent to about 1,600 households' CO₂ emissions per year due to electricity use.

In addition, the total amount of solar power generation connected to our grid reached approximately 4.02 million kW at the end of FY2017.

*¹ Large-scale photovoltaic power plants with output of 1 MW (1,000 kW) or more

*² Model case of general household uses electric energy amounting to 260 kWh per month as the calculated value.

Our Solar Power Stations: Overview

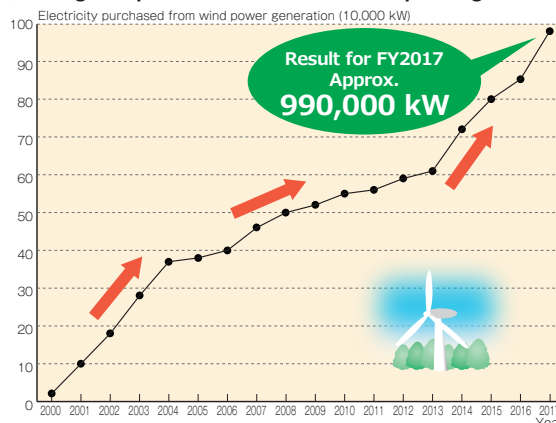
| Solar Power Station | Output | Approximate amount of generated electricity (assumption: capacity factor of 12%) | Operating since |
|---------------------|----------|---|-----------------|
| Hachinohe | 1,500 kW | 1.6 million kWh/year (equivalent to electricity used by 500 households per year* ²) | Dec. 2011 |
| Sendai | 2,000 kW | 2.1 million kWh/year (equivalent to electricity used by 700 households per year) | May 2012 |
| Haramachi | 1,000 kW | 1.05 million kWh/year (equivalent to electricity used by 300 households per year) | Jan. 2015 |
| Ishinomaki Hebita | 300 kW | 310,000 kWh/year (equivalent to electricity used by 100 households per year) | Mar. 2016 |

▶ **Wind power generation**

The Tohoku region is blessed with favorable wind conditions, and we have been working to expand the introduction of wind power generation by conducting demonstration tests of wind power generation in Tappi Wind Park (Aomori Prefecture) since 1991.

Wind power generation facilities connected to our grid reached approximately 990,000 kW as of the end of fiscal 2017, the highest amount in the country.

◆ **Changes in purchase results from wind power generation**



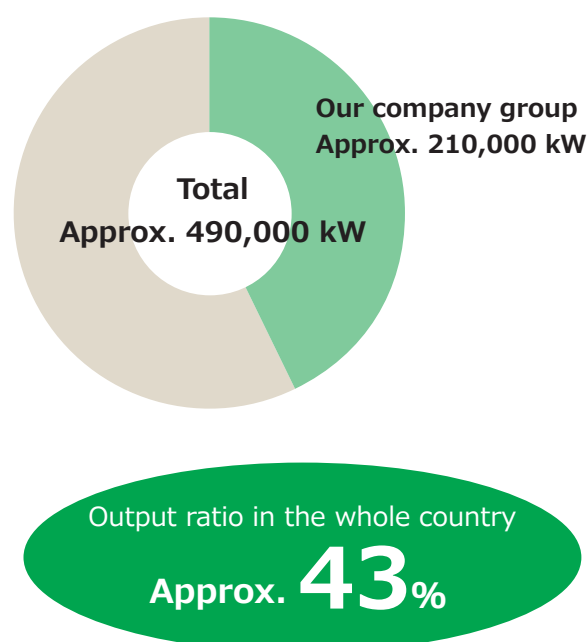
▶ **Geothermal power generation**

Since the start of operations of the Kakkonda geothermal power plant in Iwate Prefecture in 1978, we have been actively working on the introduction of geothermal electricity generation.

The company group as a whole has six plants in five sites in the Tohoku region as of the end of FY2017 and has the most geothermal generation facilities in Japan (about 40% of the whole country), with a total output of 212,300 kW. The amount of electricity generated in FY2017 is approximately 986 million kWh, enough to supply about 290,000 households per year.*

In overseas efforts, in March 2018 we participated in the Rantau Detap Geothermal Power Project in Indonesia as our first overseas geothermal power project. The commercial operation of the geothermal power plant (98,400 kW) of this project is scheduled to start in the second half of 2020. Taking advantage of knowledge and experience in geothermal power technology developed in Japan, we believe we can actively contribute to the stable operation of the power plants.

◆ **Geothermal power generation output nationwide in FY2017**



* Value is calculated by using the model case for ordinary households' electricity consumption of 260 kWh/month.

▶ **Biomass power generation**

We use woody biomass fuels such as wood chips, which are a source of renewable energy, at coal-fired plants to reduce CO₂ emissions.

Our coal-fired power plants utilize local unused materials as woody biomass fuels, starting operation in 2012 at Noshiro Thermal Power Plant in Akita Prefecture, and in 2015 at Haramachi Thermal Power Plant in Fukushima Prefecture.

► **Efforts toward a demonstration test of large-scale hydrogen energy system**

Hydrogen can store large amounts of electricity for a long period of time and can be transported over long distances. Moreover, it can be used for various purposes. In the future, it is hoped to establish a hydrogen supply system that is CO₂-free through consistent utilization of hydrogen derived from renewable energy sources, from production to the end user.

In addition, the Power-to-gas utilizing hydrogen requires not only the grid balancing function to make the maximum use of fluctuating renewable energy, but also the optimal system operation function based on the forecasting of hydrogen supply and demand.

Under such circumstances, we have started working toward the verification test of a hydrogen energy system called the “Fukushima Hydrogen Energy Research Field” (FH2R), in collaboration with Toshiba Energy Systems and Solutions Corporation, and Iwatani Corporation, with the support of NEDO* in the town of Namie, Fukushima Prefecture.

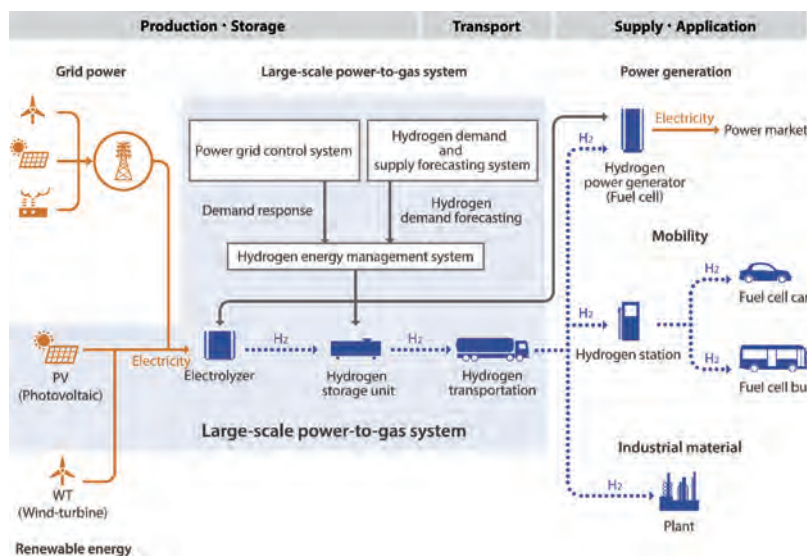
This system will have a 10,000 kW class hydrogen production facility with world

largest electrolysis. We plan to start operating it for verification and transporting hydrogen by July 2020.

Hydrogen produced at FH2R will be used to power fuel cell vehicles and to support factory operations.

We aim to help develop a CO₂-free, hydrogen-driven society through this project.

* NEDO: New Energy and Industrial Technology Development Organization



► **Utilization of large storage battery system**

Taking advantage of government subsidies, we have installed and now operate a large-scale storage battery system at the Nishi Sendai Substation in Miyagi Prefecture and the Minami Soma Substation in Fukushima Prefecture.

The Nishi Sendai Substation Storage Battery System’s function is to adjust frequency fluctuations. Until now, thermal power generation facilities have been used as a countermeasure against frequency fluctuation caused by the expansion of renewable energy, whose output varies with weather conditions. The system combined the function to adjust frequency fluctuations with battery system’s charge/discharge function to enhance the ability to stabilize frequency.

At the Minami Soma Substation, the storage battery system will contribute to greater acceptance of renewable energy by improving the supply-demand balance. As we expand the use of renewable energy, power supply will sometimes exceed demand, in which case surplus electric power can be absorbed by the storage batteries,

then discharged into the grid when demand rises again. Eventually, it will help increase the amount of renewable energy we accept.

We will utilize two storage battery systems and make maximum efforts to expand the introduction of renewable energy.



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 |

▶ **Starting “Virtual Power Plant Verification Project”**

As part of our efforts to utilize new information technologies such as internet of things (IoT) and artificial intelligence (AI), we are implementing a “Virtual Power Plant (VPP) Verification Project”, which will last three years starting in FY2018.

A VPP is a system that aggregates several types of power sources to function as a power station. It integrates distributed energy resources (DER) including power generating facilities, storage batteries, and electric vehicles, whose owners are local communities, companies and general households, and controls remotely those DER with new information technology.

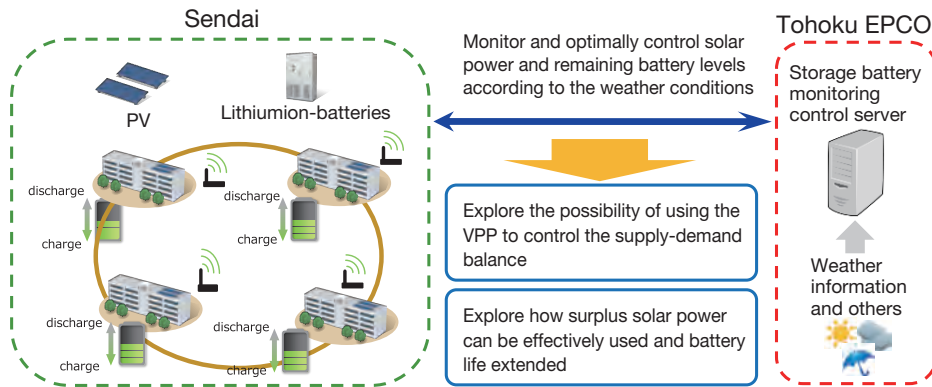
Sendai City is one of our business partners in this Project*. We signed the Master Agreement on the Development of Disaster-Resilient and Environment-Friendly Energy Management Driven

by VPP Technologies.

In accordance with this agreement, we will integrate solar power facilities and storage batteries at Sendai’s 25 designated shelters as the energy resource for the VPP to enhance the region’s ability to respond to disasters and reduce regional environmental burdens. We will also remotely monitor and optimize control over the facilities’ operation, thereby seeing if the VPP can help control the supply-demand balance.

* Sendai had difficulty securing power sources when the Great East Japan Earthquake occurred. Based on this experience, and with an aim to secure power sources at the time of disaster and to reduce carbon emissions, Sendai has installed photovoltaic facilities and storage batteries in designated evacuation spots, including all elementary and junior high schools in the city.

VPP Verification Project with Sendai City



Sendai Mayor Kazuko Kori, right, and President Hiroya Harada pose after signing the Master Agreement.

Enhancing the Safety of Nuclear Power Stations

We believe it will be necessary to use a certain amount of nuclear power in the future -- with security and safety as a precondition -- because nuclear power does not emit CO₂ at the time of generation. In addition, nuclear can generate a lot of electricity from a small amount of fuel, and procurement of uranium is stable.

▶ Nuclear risk management

To further enhance the safety of nuclear power in the future, we believe it is necessary to systematically establish and strengthen high-quality risk management. For this reason, our

top management is committed to improving and strengthening our internal structure to strongly promote nuclear risk management.

▶ Strengthening safety measures in both facilities and operations

At Onagawa Nuclear Power Station, as an earthquake countermeasure, we are strengthening resistance to prevent damage to important facilities from the design-basis earthquake ground motion S_s (up to 1,000 Gal). Additionally, construction work to raise the seawall (up to about 29 meters above sea level and about 800 meters in length) is in progress to protect the station from tsunami. We are also proceeding with installing venting equipment with filters for the containment vessel* inside the nuclear reactor building.

At Higashidori Nuclear Power Station, we are proceeding with the installation of three freshwater reservoirs (about 3,600 m³ each) to ensure sufficient cooling water in an emergency. In addition, both power plants are diligent about

maintaining and managing plant facilities, and conduct numerous inspections, including safety maintenance inspections during the current suspension of operations.

Along with these efforts, to ensure that the facility's safety measures work reliably, we maintain operational procedures for the equipment. Based on established procedures, we continuously conduct drills such as operation of the power plant's countermeasure headquarters, communications, water injection into the reactor and securing of emergency power supplies.

* The release of radioactive material is inhibited when this equipment is used for venting that is done to prevent damage to the containment vessel from overpressure.



Construction work to raise the seawall (Onagawa Nuclear Power Station)

Thermal power generation initiatives

Thermal power generation is an important power source from the viewpoint of stable energy supply, since it can play an important role in adjusting fluctuations in solar and wind power generation. However, it also poses environmental problems such as consumption of fossil fuels and discharge of CO₂.

The Company and its group companies strive to control CO₂ emissions from thermal power plants by maintaining and improving thermal efficiency through precisely detailed daily operation management and the introduction of highly efficient combined-cycle power generation.

► Reduction of CO₂ emissions by improving thermal efficiency

Improvement of thermal efficiency in thermal power generation contributes not only to reducing the amount of fossil fuels used but also the effective use of energy resources, as well as contributing to the suppression of CO₂ emissions. Therefore, we are actively engaged in developing highly efficient thermal power generation technology.

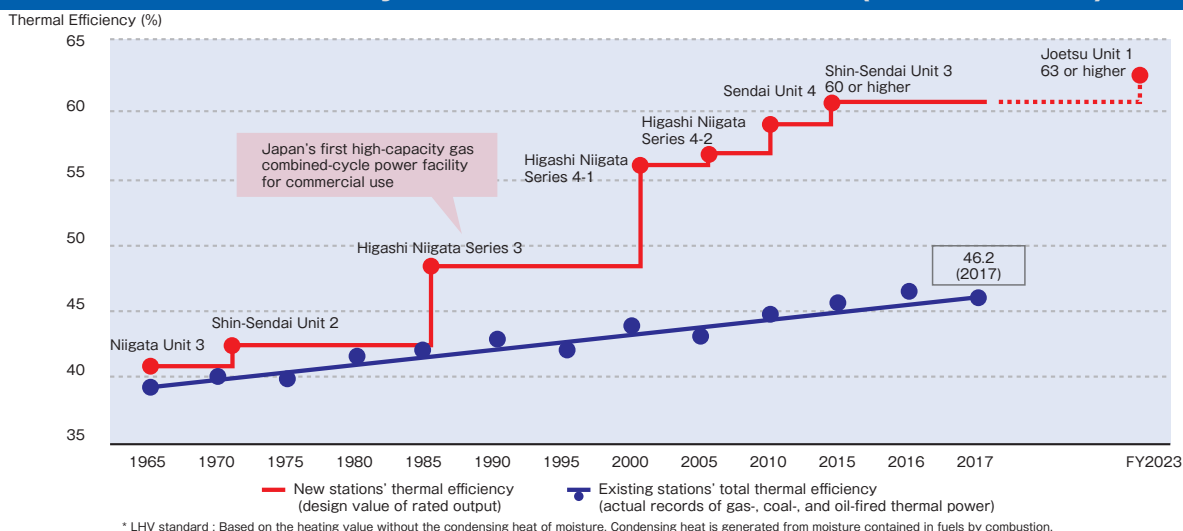
The Higashi Niigata Thermal Power Station No.3 series, which began operating in 1985, was Japan's first large-capacity combined-cycle power generation facility for commercial use, achieving the world's highest thermal efficiency, approximately 48%, at that time. After that, Higashi Niigata Thermal Power Plant No.4 series and Sendai Thermal Power Plant No.4 series realized even higher thermal efficiency. Later, the Shin-Sendai Thermal Power Station No.3 series,

which started full-scale operation in July 2016, achieved the world's highest thermal efficiency of over 60% at that time.

In addition to securing a stable supply of electric power, we are steadily promoting construction work on Noshiro Thermal Power Plant No.3 and work on Joetsu Thermal Power Station No.1 to achieve both high economic efficiency and a reduction in environmental impact.

Noshiro Thermal Power Plant No.3 is expected to achieve higher thermal efficiency than the existing Units 1 and 2 by introducing the ultra-super critical pressure method (USC). Joetsu Thermal Power Station No.1 has the highest thermal efficiency at 63%. The combined-cycle power generation facility will achieve high efficiency and a reduction of its environmental impact.

Thermal Efficiency at Thermal Power Stations (LHV standard)



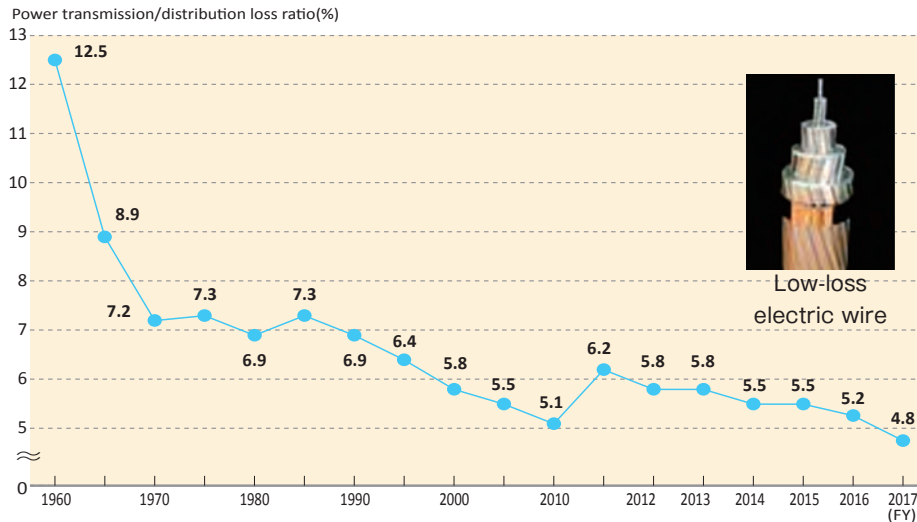
Reduction of CO₂ emissions in transmission and distribution

In overhead power transmission lines, we implemented measures such as expanding the adoption of “low-loss finned wires” that can reduce electrical resistance by 20% or more. In recent years, due to the power transmission network being operated by a supervisory control system that minimizes power loss, we have reduced our distribution loss rate to about 5%.

In January 2016, in collaboration with other companies, we developed a new transformer for distribution that reduces power loss and is longer-lasting.

Compared to conventional “environmentally harmonized” transformers, the new transformer reduces the power loss in its operation by 15%. It also boasts a life expectancy in rated continuous operation of 60 years, up from 30 years for the previous model.

◆ Trends of transmission/distribution loss ratio



* Power transmission/distribution loss ratio (%) The ratio of the amount of electricity lost in transmission and distribution to the amount of electricity transmitted

Support for efficient use of energy by customers

In addition to introducing energy-saving electrical system equipment, we support improvement of customers’ energy use efficiency by proposing equipment that is environment-friendly, effective in saving energy and able to meet our customers’ diverse needs.

▶ HEATEDGE wins the energy conservation award

Air-cooled heat pumps have excellent energy-saving performance because they collect heat from the air using little energy and use it as huge thermal energy for cooling and heating. On the other hand, when the temperature is low outside, the rated heating performance cannot be maintained. Furthermore, there was an issue with the heating capacity dropping considerably during defrosting.

To address this problem, we jointly developed an air-cooled heat pump heat source device, HEATEDGE, with enhanced heating performance during defrosting.

The HEATEDGE device is equipped with the world’s largest high-capacity DC inverter rotary compressor, and includes a new defrosting control, thereby enhancing the heating capability during defrosting when the outside temperature

is -15°C. Even during normal operation with outside temperatures of -15C, its superior heating capability realizes both energy savings and comfortable indoor temperatures.

HEATEDGE received the Minister of the Environment Award for Global Warming Prevention Activity in FY2017 and the Energy Conservation Grand Prize from the Commissioner of the Natural Resources and Energy Agency.

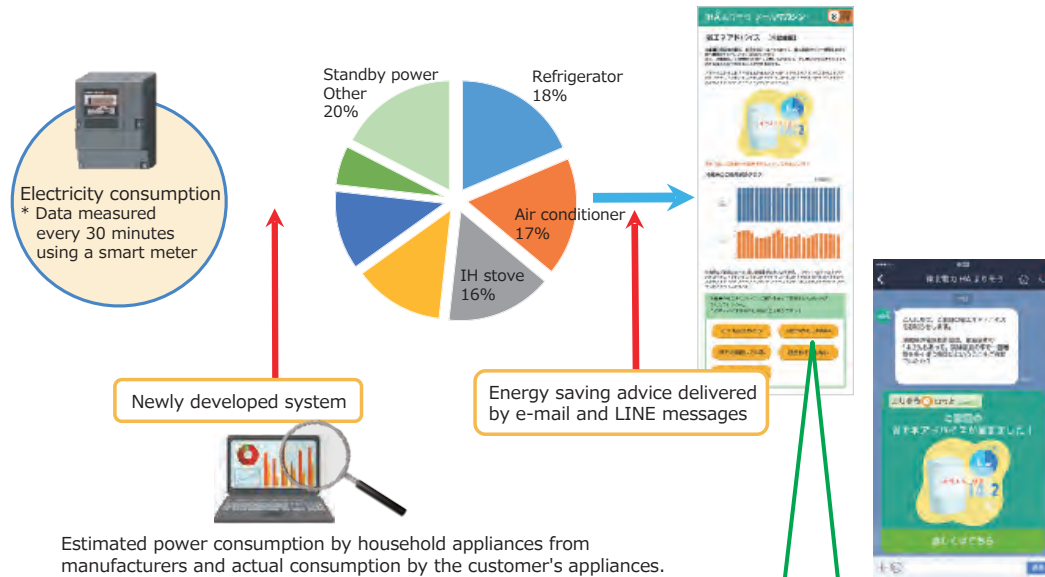


HEATEDGE

▶ **Yorisou Smart Project for the development of new services**

In our Yorisou Smart Project, we are verifying life assistance services using the communication robot BOCCO and energy conservation assistance services tailored to specific home appliances over the period from July 2018 to late August 2019. The energy conservation assistance service estimates electricity consumption by household appliances

from electricity consumption measured every 30 minutes by a smart meter. Then, it presents the results on a graph, and advises customers on the most appropriate energy saving method, as well as how much money they will save with the method, by e-mail or LINE (one of major SNS.)



[Advice example]

- Washing an appropriate amount of laundry according to the capacity of the washing machine leads to energy and water saving, compared to washing a small amount of laundry many times.
- Washing all the clothes together will save about 6 kWh of electricity and about 17m³ of water in a year-- you can save about 150 yen in electricity bills and about 4,280 yen in water bills-- about 4,430 yen in total.

Conservation of the Local Environment

We make continual efforts to conserve the local environment, in order to minimize the environmental impact of our business activities — power generation, power transmission/distribution, and delivery to customers.

Compliance with environmental laws and pollution control agreements

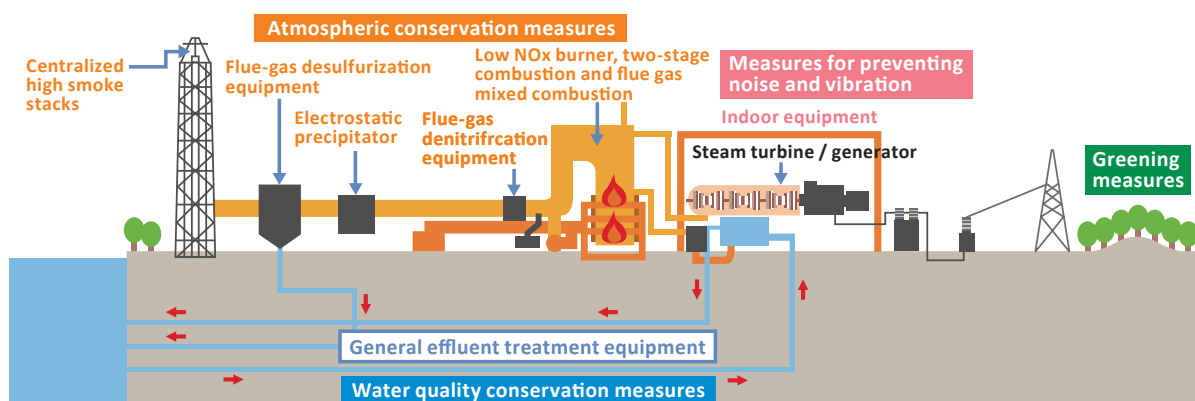
Regarding environmental laws and regulations, we strive to ensure compliance with laws and regulations by sharing the latest information with our group companies.

In addition, at thermal power stations and other facilities, we strive to preserve the local environment by concluding pollution prevention agreements with local governments as well as observing laws and regulations concerning

environmental preservation during our operations.

In pollution control agreements, we consider the characteristics of the area concerning the entire environment such as air, water quality, waste, noise, 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.

◆ An example of environmental measures for thermal power plants



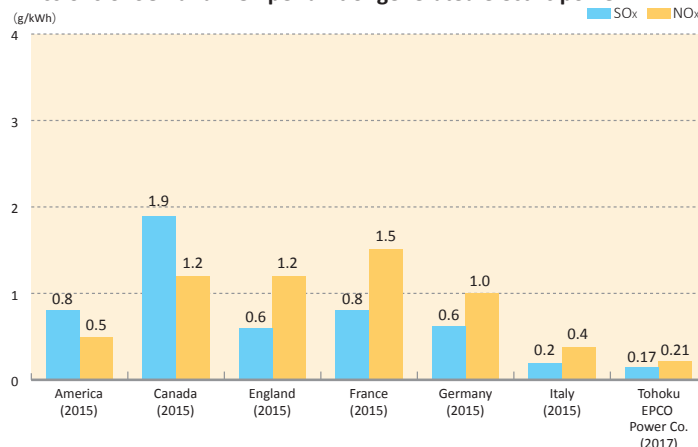
Atmospheric conservation measures

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

Our company's NOx emissions intensity for FY2017 was 0.21 g/kWh, and SOx emissions intensity was 0.17 g/kWh. These are much lower values than in other countries.

* Flue gas denitrification equipment, flue gas desulfurization equipment and electrostatic precipitators

◆ 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

Drainage at thermal power plants is treated to conform to wastewater standards by coagulation sedimentation, filtration and purification, and we are working to prevent water pollution.

At thermal power stations and the like, seawater is used to cool the steam used in the steam turbines, and the heat-exchanged seawater

is discharged into the sea as warm wastewater.

When discharging this wastewater, we manage the temperature of the discharged water and adopt a discharge method according to the characteristics of the surrounding ocean, to reduce the environmental impact.



Survey of the ocean near a power station.

Creation of a Recycling-Oriented Society

Our company group conducts proper management and treatment of waste based on all related laws and regulations. We also actively promote the 3Rs (Reduce, Reuse, Recycle).

Appropriate management and processing of waste

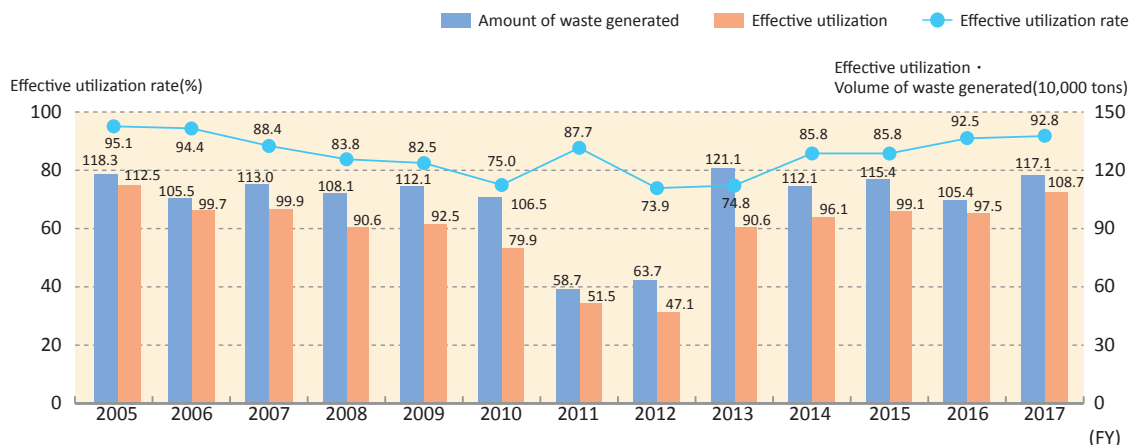
Our main waste is coal ash and gypsum generated from coal-fired power plants, accounting for over 90% of the total, of which about 80-90% is effectively used. We also produce various kinds of rubble and scrap metal, which we put to effective use.

We process these waste products correctly under a waste management system and electronic manifest and regularly hold Waste 3R Measures

Review Committee meetings to further promote the 3Rs.

As a result, the effective utilization rate, which declined in the aftermath of the Great East Japan Earthquake, has improved to about 90%. In FY2017, the actual result exceeded the target at 92.8% against the targeted effective utilization rate of 90%.

◆ Production volume and effective use of waste



Consideration for Biodiversity

Our company group has been blessed with biodiversity in the installation and operation of electric power facilities. Meanwhile, we are concerned about the environmental burden caused by our business activities. For this reason, we are promoting various measures to protect biodiversity.

Measures to conserve biodiversity

▶ Measures to keep birds safe from transmission lines

We have implemented countermeasures to prevent birds from colliding with cables. For example, we investigate flight paths of migratory birds and attach tags to our transmission lines so that they can recognize and avoid the lines.

▶ Coexisting with domestic rare wild animal and plant species such as Hayabusa (falcon)

We are striving to preserve the habitat of the Hayabusa falcon, a rare bird species in Japan, at Sendai Thermal Power Station and Shin-Sendai Thermal Power Station.

At the Sendai plant, we adjusted the construction process so the replacement work of No.4 does not affect the falcon's habitat. The birds have been using the facility's new chimney as a "perch tree," even after the start of No.4's operations.

At the Shin-Sendai plant, since falcon nests were confirmed in the collective chimney of No. 1 and 2, as a compensatory measure for the removal of machinery from No. 1 and 2 in accordance with replacement with the No. 3 series, since 2015 we have set up an artificial nest for falcons in the No. 3 series' new chimney.

▶ Developing the waterside environment at our thermal power stations

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

Valuable creatures such as musujiito tomo dragonflies and medaka, or Japanese rice fish, have been confirmed in the Maejima wild bird pond, at the center of the biotope.

▶ Protecting wetlands around nuclear power plants

Many rare animals and plants such as Gomashijimi butterflies and Nikkokisuge have been confirmed in the wetlands around the Higashidori Nuclear Power Station, and to protect them, it is necessary to prevent the overgrowth of plants such as reeds. For this reason, regular grass cutting is carried out so that the habitat and growing environment of rare animals and plants can be maintained.



Tags attached to transmission lines



Hayabusa(falcon)



Musujiito tomo dragonflies



Gomashijimi butterflies

Active Disclosure and Publication of Environment-Related Information

Since 1995, we have been actively working on disclosures of environment-related information, including publication of environmental action reports. In addition, taking into account movements such as the growing attention to ESG (Environment, Society, Governance) investment, we will make further efforts on enhancement of environmental initiatives, striving for appropriate disclosure of information to stakeholders and interactive communication.

Answering CDP Climate Change Questionnaire

We have participated in CDP (the Carbon Disclosure Project), and responded to the 2018 Climate Change Questionnaire.

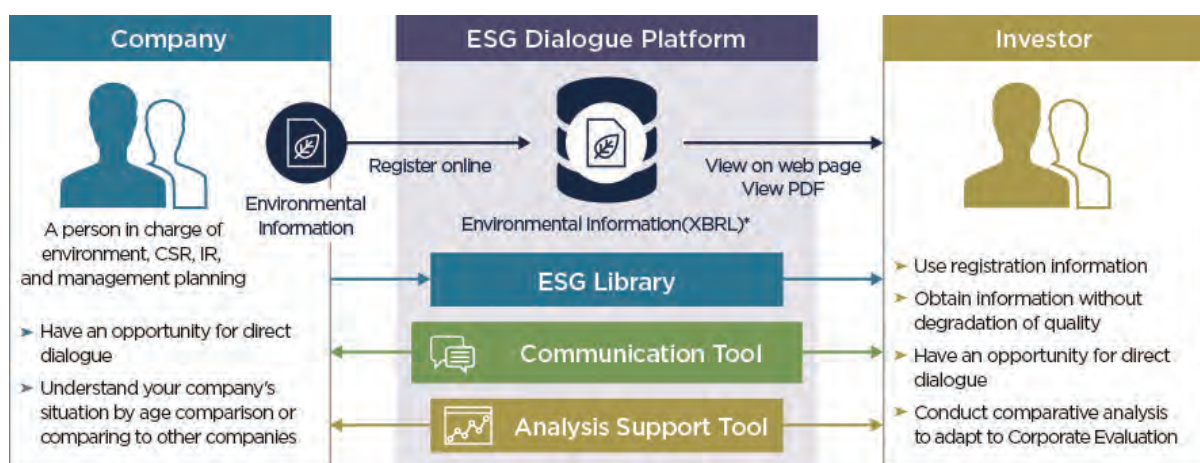


Participation in the Environmental Reporting Platform Development Pilot Project

We have been participating in the the Environmental Reporting Platform Development Pilot Project of the Ministry of the Environment starting FY2017.

participating in the project can view the ESG Dialogue Platform where we post environmental information about the company. In FY2017, we participated in the Step Up Program, in which participants practice the disclosure of ESG information and dialogue.

This is a demonstration project to provide a forum for companies and investors to communicate with each other. Investors



Being selected for the SNAM sustainability index

We have been selected as a constituent of the SNAM Sustainability Index in FY2018. This index is used by Sampo Japan Nippon Koa Asset Management Co., Ltd. (SNAM) as an index for SNAM sustainable operation, which focuses on ESG evaluation by an investigation company and SNAM's own decision.



Environmental Initiatives Communication "Ecolog"

There are many initiatives that contribute to environmental conservation in an electric power company's daily business, such as making electricity, transmitting it, and delivering it to the consumer.

"Ecolog" is a feature on our company's website with which we share our efforts in ongoing environmental initiatives, such as reduction of CO₂ emissions from thermal power plants, increasing the use of renewable energy, and tree planting activities in which we work together with local residents.



[Environmental Initiatives Communication "Ecolog"]

<http://www.tohoku-epco.co.jp/enviro/ecolog/index.html>

Promotion of Environmental Communication

To build relationships of trust with local communities and customers, our company group actively discloses environment-related information and promotes "environmental communication" with them through considering and conducting environmental activities together.

Green Curtain campaign

One energy-saving measure that takes advantage of nature's power is "green curtain", a natural shade over the outside of a building window or wall created by growing creeping vines such as goya (bitter melon). Since 2010, we have been working on a campaign to spread the "green curtain" to the local area.

In FY2018, we recruited people who can participate in this activity on our website and

distributed goya and morning glory seeds. In addition, we offered tips on growing the plants via e-mail magazine. Updates on growing activities are posted on our website in the "Growing Report."

We worked on growing the green curtains with children at local nursery schools. Also, our offices and business sites of group companies had the green curtains.



Recovery of the coastal disaster prevention forest

Our company group is working on restoring a coastal disaster prevention forest devastated by the tsunami following the Great East Japan Earthquake.

This activity was started in 2013 as volunteer activity connecting the wish of the local people for restoring the rich coastal disaster forest lost by the earthquake, with the passion of our employees to support the reconstruction of Tohoku. For the

activity, we mainly participated in tree-planting festivals in Iwanuma City, Miyagi Prefecture, and Minami Soma City, Fukushima Prefecture.

Starting in FY2016, in our efforts to further contribute to regional reconstruction from the environmental aspect, we implemented the tree-planting activity we call the Tohoku Electric Power Group Soma Hope Forest.



Performance Data

| Classification | Data item | Unit | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|-----------------------------|------------------|------------------|------------------|------------------|------------------|
| Electricity-generating capacity | Nuclear power | 100 million kWh | 0 | 0 | 0 | 0 | 0 |
| | Thermal power | 100 million kWh | 610 | 566 | 572 | 563 | 565 |
| | Hydroelectric power | 100 million kWh | 74 | 82 | 79 | 69 | 84 |
| | Renewable Energy, etc. | 100 million kWh | 9 | 9 | 9 | 9 | 8 |
| Purchased electric power | Purchased electricity from other companies | 100 million kWh | 159 | 181 | 162 | 169 | 127 |
| Amount of power used / lost | Used within power plants | 100 million kWh | 29 | 26 | 27 | 26 | 27 |
| | Used for pumped-storage power generation | 100 million kWh | 0.5 | 0.6 | 0.6 | 0.5 | 0.9 |
| | Used in offices | 100 million kWh | 1.3 | 1.3 | 1.3 | 1.0 | 0.9 |
| | Lost in transmission/distribution | 100 million kWh | 49 | 46 | 45 | 42 | 37 |
| Amount of electricity sales | | million kWh | 77,452 | 76,623 | 75,057 | 74,258 | 72,003 |
| Fuel consumption to generate electricity | LNG | 10,000 tons | 428 | 408 | 432 | 438 | 417 |
| | Natural gas | 100 million Nm ³ | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| | Coal | 10,000 tons | 890 | 771 | 814 | 731 | 814 |
| | Heavy oil | 10,000 kl | 99 | 89 | 43 | 54 | 40 |
| | Crude oil | 10,000 kl | 33 | 31 | 33 | 30 | 22 |
| | Nuclear fuel | t | 0 | 0 | 0 | 0 | 0 |
| Water usage | Industrial water | 10,000 tons | 1,160 | 1,174 | 1,111 | 1,069 | 1,041 |
| Vehicle fuel | Gasoline | kl | 2,669 | 2,397 | 2,541 | 2,442 | 2,376 |
| | oil | kl | 775 | 672 | 656 | 634 | 621 |
| Other usage | Limestone | 10,000 tons | 12 | 10 | 12 | 10 | 12 |
| | Ammonia | 10,000 tons | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| CO ₂ emissions* | CO ₂ emissions | 10,000 t-CO ₂ | 4,563 (4,580) | 4,390 (4,374) | 4,194 (4,177) | 4,055 (4,034) | 3,755 (3,734) |
| | CO ₂ emission coefficient | kg-CO ₂ / kWh | 0.589 (0.591) | 0.573 (0.571) | 0.559 (0.556) | 0.548 (0.545) | 0.523 (0.521) |
| Greenhouse-gas emissions other than CO ₂ | SF ₆ recovery rate | % | 99.7 | 99.3 | 99.4 | 99.6 | 99.8 |
| | HFC holding capacity | t | 41.5 | 47.7 | 52.6 | 51.7 | 51.2 |
| | HFC emissions | t-CO ₂ | 1,638 | 563 | 1,349 | 538 | 947 |
| Waste | Amount of waste generated | 10,000 tons | 121.1 | 112.1 | 115.4 | 105.4 | 117.1 |
| | Final disposal amount of waste | 10,000 tons | 30.5 | 15.9 | 16.4 | 7.9 | 8.4 |
| | Industrial waste recycling volume | 10,000 tons | 90.6 | 96.1 | 99.1 | 97.5 | 108.7 |
| | Effective waste utilization rate | % | 74.8 | 85.8 | 85.8 | 92.5 | 92.8 |
| Other emissions | SOx emissions | 10,000 tons | 1.3 | 1.2 | 1.0 | 1.0 | 1.0 |
| | SOx emission intensity | g / kWh | 0.22 | 0.21 | 0.17 | 0.18 | 0.17 |
| | NOx emissions | 10,000 tons | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 |
| | NOx emission intensity | g / kWh | 0.27 | 0.27 | 0.25 | 0.24 | 0.21 |
| | Industrial wastewater | 10,000 tons | 324 | 326 | 332 | 332 | 300 |
| | CO ₂ emissions from vehicles | 10,000 t-CO ₂ | 0.8 | 0.7 | 0.8 | 0.7 | 0.7 |
| Prevention of global warming | Total thermal power integrated efficiency (lower heating value (LHV)) | % | 44.7 | 45.3 | 45.6 | 46.3 | 46.2 |
| | Power purchased from solar power generations | 10,000kW | 81.2 | 152.9 | 245.4 | 320.5 | 402.1 |
| | Power purchased from wind power generations | 10,000kW | 61.4 | 71.9 | 80.1 | 85.6 | 99.2 |
| | Trends of transmission/distribution loss ratio | % | 5.8 | 5.5 | 5.5 | 5.2 | 4.8 |
| | Trend in popularity of heat pump water heaters within Tohoku EPCO (cumulative) Individual | Individual units | 295,675 | 332,47 | 367,757 | 405,660 | 443,212 |

*Values in parentheses are basic CO₂ emissions and CO₂ emission coefficients that do not reflect adjustments by the renewable energy fixed price purchase system. Values reflect retail electricity supply after FY2016 and do not include general transmission and distribution businesses such as remote island supply.

Tohoku Electric Power Group Environmental Action Report 2018

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