1 Initiatives to Address Global Environmental Issues

At Kyushu Electric Power, we pursue a range of initiatives aimed at both reducing greenhouse gas emissions in the supply and use of electricity. On the supply side, these include both making use of nuclear power (with safety as our chief consideration) and the proactive development and adoption of renewable energy, as well as ongoing efforts to improve efficiencies of thermal power generation and reduce losses in the transmission and distribution processes. On the use side, initiatives include cutting back on electricity use in offices and the use of systems like EcoDrive, which promote efficient use of energy and resources.

The Kyuden Group is determined to meet the goals of our electricity business as a whole through an array of actions set forth in our Action Plan for Achieving a Low-carbon Society through the electricity business. These include using nuclear power—again, with a heavy focus on safety—and renewable energy, improving the efficiency of thermal power generation, appropriate maintenance and management, and offering services aimed at reducing use of carbon resources, such as those that promote energy efficiency and CO_2 efficiency.

Reducing CO_2 Emissions

FY2017 Results

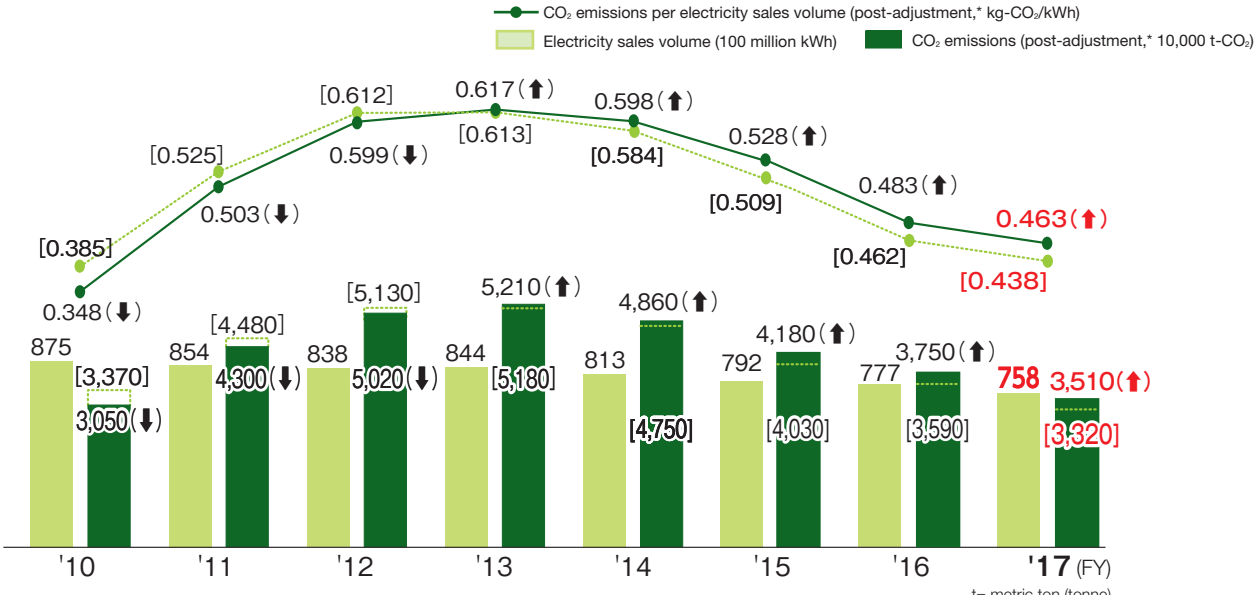
CO_2 emissions were approximately 7% (2.4 million metric tons) lower in FY2017 than FY2016

Our CO_2 emissions for FY2017 were 35.1 million metric tons, with a CO_2 emissions per electricity sales volume of 0.463 kg of CO_2 per kWh* (CO_2 emission factor). In addition to the stable, continuous operation (except during scheduled maintenance) of the Sendai Nuclear Power Station Units 1 and 2, other factors such as lower electricity sales volume and an increase in power generation derived from renewable sources have meant that compared to FY2016, CO_2 emissions have dropped by 7%, and the CO_2 emission factor by 4%.

The high emission factor is a result of the feed-in tariff system (FIT): Kyushu's more rapid uptake of solar power generation than other regions means the area's CO_2 emissions are deemed to be higher than the actual amount of CO_2 emitted when calculating FIT adjustments.

*These are provisional values; the government will officially release finalized values based on the Act on Promotion of Global Warming Countermeasures.

■ CO_2 Emissions for Kyushu Electric Power Company



Figures in [ ] are actual emission volumes and emissions factors
(⬆) and (⬇) indicate pre/post-adjustment increases/decreases, respectively, associated with CO_2 emissions credits, feed-in tariffs (FIT) and other considerations
*Adjusted in line with CO_2 emissions credits and feed-in tariffs (FIT).
Note: Calculated according to the "Calculation and Announcement of Actual Emission Factors and Post-adjustment Emission Factors for Each Power Provider" released by the national government in accordance with the Act on Promotion of Global Warming Countermeasures (includes portion due to purchasing power from other companies). Total electricity sales volume differs after FY2016 as the government's guidelines for calculating CO_2 emissions were revised to exclude electricity supplied to remote islands (excluding the Goto Islands, which are handled as part of mainland Nagasaki Prefecture).

Stable operation of nuclear power stations cuts CO_2 emissions by approx. 7 million metric tons

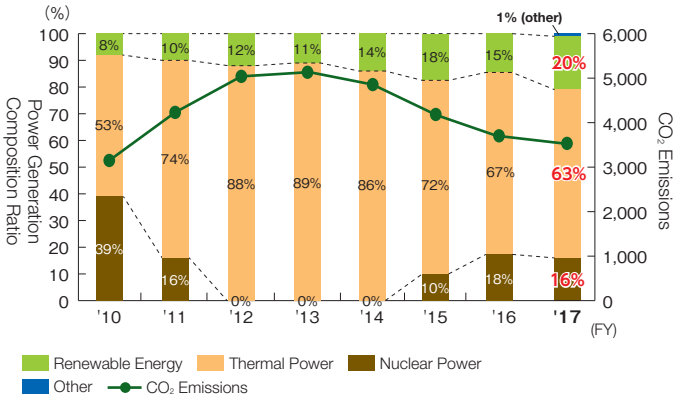
The reduction in CO_2 emissions achieved by our nuclear power stations in FY2017 is calculated to be approximately 7 million metric tons.

The shutdown of nuclear reactors in the wake of the Great East Japan Earthquake in March 2011 caused a major increase in CO_2 emissions, which peaked in 2013 and have trended downwards since then. In FY2017, stable operation of Sendai Nuclear Power Station Units 1 and 2 (except during scheduled maintenance) and the increase in renewable energy generation ensured that thermal power stations accounted for a lower share of all power generated. Consequently, emissions were down approximately 7% (2.4 million metric tons) year-on-year.

Nuclear power generation is similar to renewable energy in that it produces no CO_2 during power generation; thus, it is an excellent means of mitigating global warming and, from an energy security standpoint, remains an important energy option.

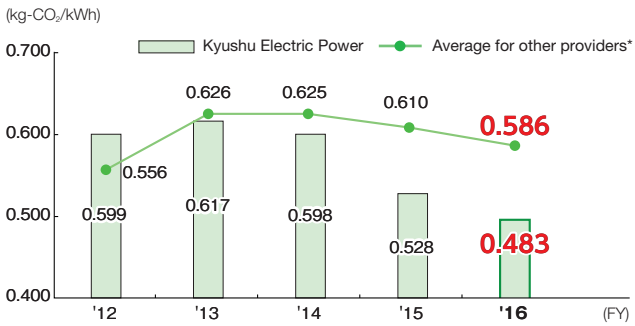
Power Generation Composition Ratio* and CO_2 Emissions Volume Change Over Time

Units: %, 10,000 t-CO_2



*Power received from other companies does not include unspecified fuel types. The composition ratio shown here differs from the power source composition ratio for electricity sales volume.

Comparison with Other Providers for CO_2 Emissions per Electricity Sales Volume (post-adjustment)

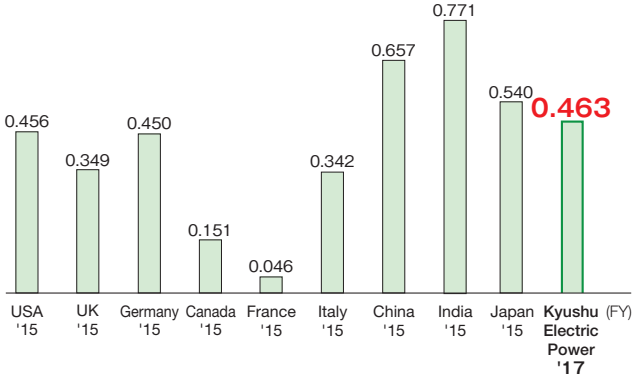


*Average CO_2 emissions volume per electricity sales volume (post-adjustment) of former general power providers (nine companies), excluding Kyushu Electric Power.

*See the section on environmental data (p. 50) for information on emissions of greenhouse gases other than carbon dioxide, and on greenhouse gas emissions (and reductions thereof) by Kyuden Group companies.

CO_2 Emission Factors of Major Countries

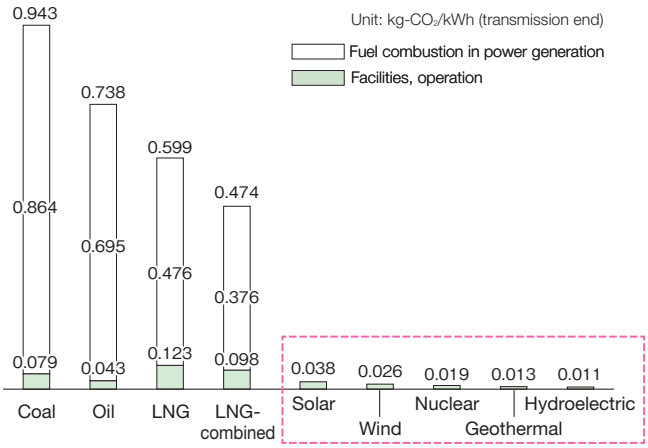
Unit: kg-CO_2/kWh



Source: Created based on CO_2 Emissions from Fuel Combustion 2017 (IEA)

Reference: CO_2 emissions over lifecycle by power source in Japan

Besides the power generation process, CO_2 is emitted not only when burning fuel, but also when using energy at other times, including when constructing the power station; extracting, transporting, and refining fuel; and disposing of spent fuel. Even when these indirect emissions are considered, nuclear power and renewable energy have lower overall CO_2 emissions than other sources.

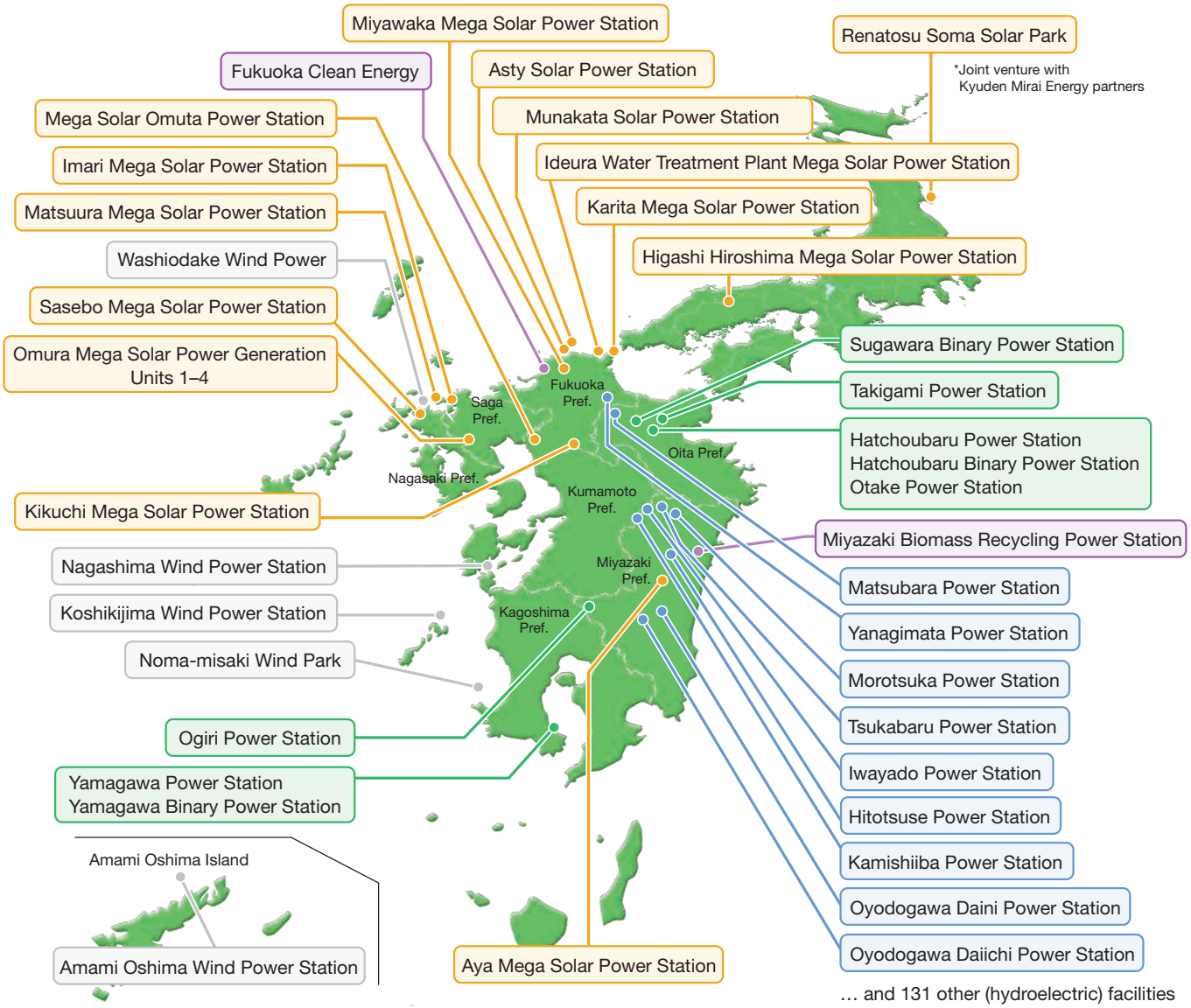


Source: Central Research Institute of Electric Power Industry report

Proactive Development and Full Adoption of Renewable Energy Options

The Kyuden Group is working to develop and incorporate renewable energy as part of our operations, recognizing its terrific potential as a source of domestically produced energy which can be effectively utilized, as well as a means of fighting global warming. We are undertaking a variety of renewable energy projects through which we seek to develop 4 million kW of renewable energy (2.04 million kW more than currently) domestically and overseas by 2030, focusing primarily on geothermal and hydroelectric energy.

Kyuden Group Renewable Energy Generation Facility Map



As of March, 2018

Renewable Energy: Advantages & Disadvantages

Advantages	Disadvantages
It produces no CO_2 during power generation.	Output susceptible to weather and other natural conditions (solar, wind).
	High generation costs (solar)
It is essentially inexhaustible.	Limited feasible locations (hydroelectric, geothermal)

Renewable energy development goal

4 million kW
by 2030

CO_2 Emission Reductions Achieved Using Renewable Energy at the Kyuden Group (FY2017)

Geothermal

We operate approx. 40% of facilities nationwide

Existing facilities updated and output increased. Surveying and development of new sites.

520,000 t less CO_2 emitted

Yamagawa Binary Power Station in Kagoshima Prefecture

Solar

Developed on disused power station sites and idle land. We purchase as much solar-generated electricity as possible.

30,000 t less CO_2 emitted

Renatosu Soma Solar Park in Fukushima Prefecture

Wind

Developed on sites identified as having ideal wind conditions. Harmonious with surrounding environments.

40,000 t less CO_2 emitted

Planned Hibiki Wind Energy windmill construction sites in Kitakyushu City

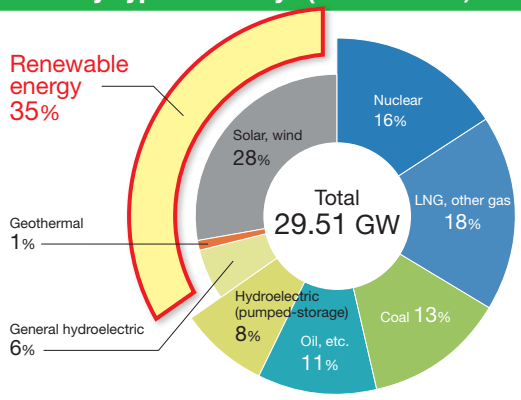
Biomass

A zero-emission power source that helps eliminate waste.

80,000 t less CO_2 emitted

Toyosaki Biomass Power Station in Fukuoka Prefecture (scheduled to commence operations in 2020)

Composition of Output Capacity (kW) by Type of Facility* (as of Mar. 31, 2018)

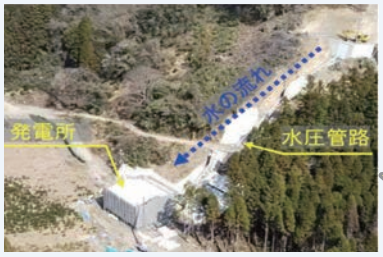


*Includes electricity received from other companies

Note: Shows power supply from Kyushu Electric Power facilities, etc. For details on percentage of each supply within electricity sold in accordance with the Guidelines Concerning the Management of the Electricity Retail Business, see the Kyushu Electric Power website.

Hydroelectricity

New developments to harness untapped energy sources and updating old facilities.



2.15 million t less CO_2 emitted

Kamoshishi Hydroelectric Power Station in Kumamoto Prefecture (scheduled to commence operations in 2018)

*See the section on environmental data (p. 49) for information on CO_2 emission reductions by generation method.

Denotes the amount of CO_2 that would have been emitted if the pertinent method of power generation had not been used

t= metric ton (tonne)

Harnessing Kyushu's Abundant Geothermal Resources

Unlike other forms of renewable energy power generation, such as solar and wind, geothermal facilities are not dependent on weather conditions and times of day. We have long sought to harness the potential of geothermal power generation, and now operate around 40 percent of all geothermal power stations in Japan, including the country's biggest facility: Hatchoubaru Geothermal Power Station in the town of Kokonoe, in the district of Kusu, Oita Prefecture, which is capable of generating 110,000 kW.

The Kyuden Group is working hard to develop facilities in areas with sustainable resources in Kyushu, throughout Japan, and around the world. To that end, we are surveying geothermal resources in the village of Minamiaso in Kumamoto Prefecture, as well as Yufu City, Oita Prefecture and the area to the south of Yamashita Lake in Kusu.

Sarulla Geothermal Power Station, the world's largest, commenced full-scale operation

The Sarulla Geothermal IPP* Project began when Kyushu Electric Power acquired the concession to extract resources in October 2007. Full-scale construction began in Sumatra, Indonesia, in May 2014, and **all three generators were brought online in May 2018, with a capacity of approximately 330,000 kW**.

This project is a prime example of how our technology and expertise, amassed through long experience in the entire geothermal power generation process from development to supply, can be applied for global benefit.

*IPP stands for "independent power producer," a business that generates power and sells it wholesale to distributors. This is in contrast to power companies, which handle all processes from generation through to retail.

Units 2 and 3 of the Sarulla Geothermal Power Station, the biggest IPP project in the world

Commenced operation of binary power stations utilizing untapped geothermal energy

In February 2018, Kyuden Mirai Energy, one of the Kyuden Group companies, commenced operation of the **Yamagawa Binary Power Station (4,990 kW)** on the site of our existing Yamagawa Geothermal Power Station in Ibusuki, Kagoshima Prefecture.

The binary power station uses energy that remains unused by the existing geothermal generation facilities and would otherwise be returned underground. We supply the heat (in the form of reinjected hot water) and Kyuden Mirai Energy operates the binary generation facilities—a real group effort!

The Yamagawa Binary Power Station uses untapped energy

Promotion of Solar Power Generation Utilizing Idle Land

Kyuden Group companies are developing our unused land and sites of disused power stations into mega solar facilities.

Commenced Mega Solar operation with a maximum output of 43,500 kW

In June 2017, Kyuden Group companies Kyuden Mirai Energy and Kyudenko teamed up with private-sector partners Orix and two other companies in a joint venture called **Renatosu Soma Solar Park, LLC.,** to build and operate **a mega solar power station** in Soma City, Fukushima Prefecture. The facility has a maximum capacity of 43,500 kW (see p. 20 for photos).

Floating solar power generation facility overseas

Kyuden Mirai Energy, a group company, has begun to make inroads overseas, including **a solar power generation system comprising an array of floating solar cell modules on a reservoir at the Tree Valley Life Science Museum in Tainan, Taiwan**. This project, too, is a joint venture with partners including Kyudenko, Tokyo Century and one other company. The facility, which began operations in April 2018, has a capacity of 1,130 kW.

The floating modules at the Tree Valley Life Science Museum in Taiwan

Promotion of Biomass Generation which Contributes to Waste Reduction

Biomass power generation is economically advantageous, and there is always a steady supply of fuel. We are working with partners concerning the construction of, and other matters related to, woody biomass power stations.

Work begins on one of Japan's largest biomass power generation projects

Buzen Biomass Power Station

In October 2016, Kyuden Mirai Energy and Kyudenko teamed up with Erex to create a joint venture, **Buzen New Energy, LLC.** Together, the participating companies are constructing one of Japan's largest woody biomass power station in Buzen City, Fukuoka Prefecture (photos on p. 20). The facility, which is scheduled to commence operations in January 2020, will have a capacity of 74,950 kW.

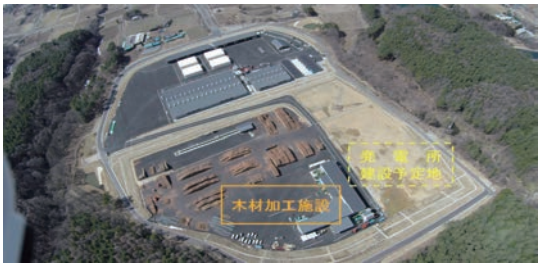
Shimonoseki Biomass Power Station

Shimonoseki Biomass Energy, LLC., a joint venture established by Kyuden Mirai Energy, Nishinippon Plant Engineering and Construction, and Kyuden Sangyo, is planning to construct another woody biomass power station to be counted among Japan's largest. The facility, which is scheduled to commence operations in January 2022, will have a capacity of 74,980 kW.

An impression of how the Shimonoseki Biomass Power Station will look upon completion

Collaboratory initiatives between industry, academia and government use biomass power generation to promote the forestry industry and reforestation

Kyuden Mirai Energy and Kyudenko, together with four partners including Soyano Kenzai, are planning to construct a woody biomass power station in **Shiojiri City**, **Nagano Prefecture**, as part of a partnership involving the prefectural and municipal governments. The facility will seek to generate new demand for wood and promote cyclical use of natural resources **by using the heretofore abandoned waste from forest thinning operations and offcuts from wood processing facilities as biomass fuel**. The facility, which is scheduled to commence operations in October 2020, will have a capacity of 14,500 kW.



The planned site of the power station on the grounds of Soyano Wood Park

Tidal Power Demonstration Project

Technologies that use the incoming and outgoing motion of tides to generate electricity are ideal for an island nation like Japan and have minimal environmental impact. This testing facility is aimed at developing this new form of renewable energy power generation.

Japan's first commercial-scale tidal power generation demonstration project

Kyuden Mirai Energy is part of a consortium with three partners including the Nagasaki Marine Industry Cluster Promotion Association that was selected for the Project for the Promotion of Practical Applications of Tidal Power Generation Technology in 2016. At present, the consortium is designing instruments based on tidal studies with the aim of developing **a commercial-scale (2,000 kW-level) tidal power generation facility at Naruseto off the coast of Goto City, Nagasaki Prefecture**. Testing is scheduled to start in 2019.

Maximal Purchasing of Electricity Generated from Renewable Resources

Configuring to maximize generation and use of renewable energy sources

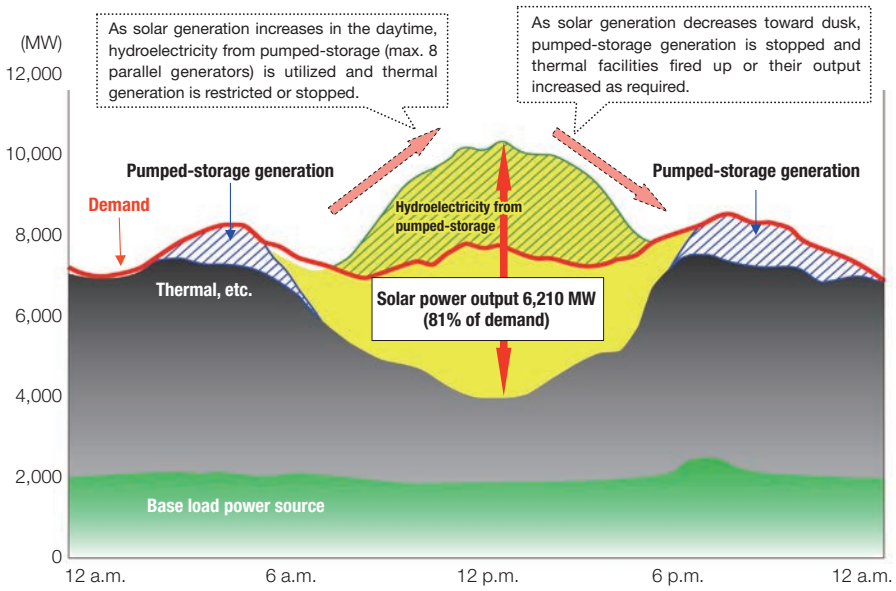
We strive to make and buy as much electricity as possible from renewable energy sources like sunlight and wind, but these are limited by weather conditions and time of day, so where necessary we augment them with in-house thermal and pumped-storage hydro power generation facilities.

Also, the Buzen Power Station is home to the Buzen Storage and Transformer Substation, one of the world's largest-capacity storage battery systems, which is capable of storing 300,000 kWh and has an output capacity of 50,000 kW. The substation was established in March 2016, and helps balance demand and supply by storing energy into the batteries or discharging it in response to solar energy output.

Moreover, in order to make more accurate predictions of generation from renewable energy sources, we use satellite images to estimate sunlight and make output projections, and are developing wind speed models.

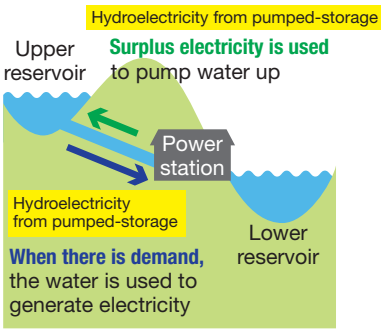
Demand and Supply Results for May 3 (Thurs), 2018

Around 80 percent of the electricity supplied to customers between 12 p.m. and 1 p.m. was solar power, the highest ratio of solar power to overall demand we have achieved so far.



Hydroelectric Pumped-Storage Generation System

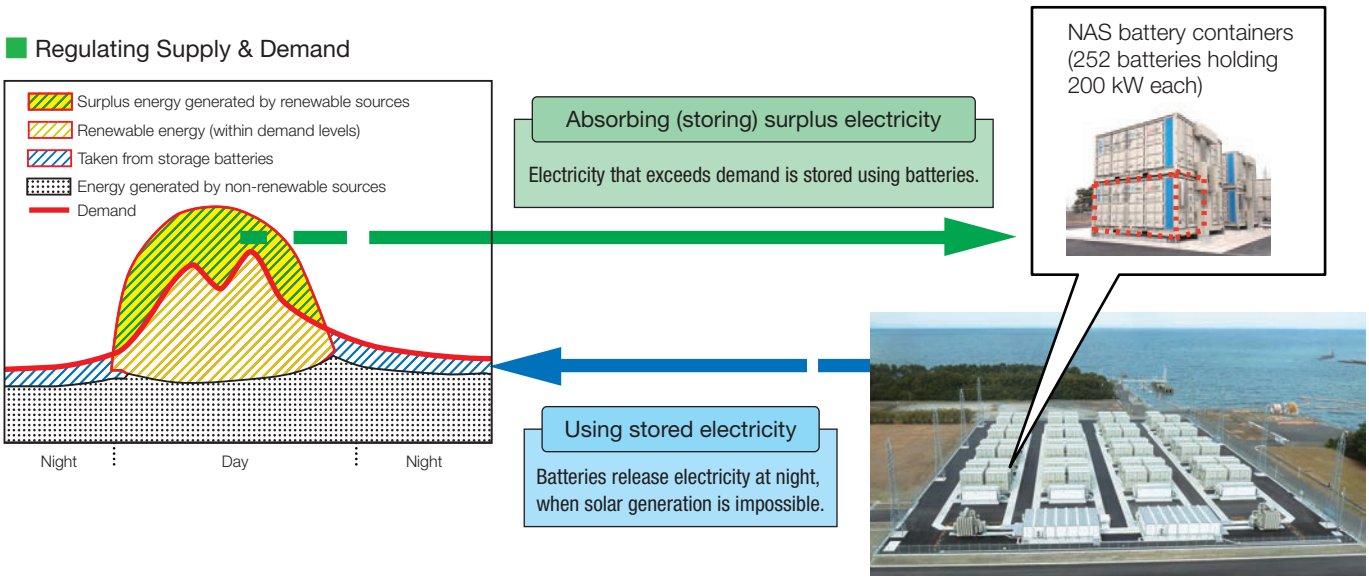
Two large regulating reservoirs are created at a power station, one above and one below the facility. When demand is high, water in the upper reservoir is released, and its momentum as it flows down into the lower reservoir is used to generate electricity. Then, when the supply of electricity is higher than demand, the surplus is used to drive the pumps that return the water to the upper reservoir.



A substation with batteries that can store enough electricity to power 1,000 homes for a month

The **Buzen Storage and Transformer Substation** was built to improve the balance between supply and demand. With 252 sodium-sulfur (NAS) batteries,* the substation is able to store enough electricity to power a thousand regular households for a month (300,000 kWh), and has an output capacity of 50,000 kW.

In practice, electricity is utilized efficiently by storing energy during the hours when solar power generation increases (between 9 a.m. and 3 p.m.), discharging it during darker hours when power consumption, such as for lighting, is higher.

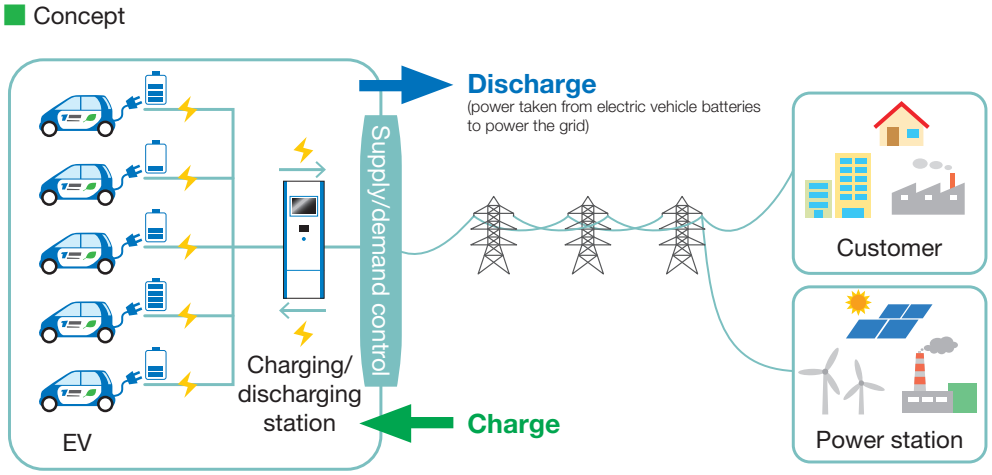


Buzen Storage and Transformer Substation

*NAS batteries are storage (secondary) batteries that use the chemical reactions between sulfur and sodium ions to charge and discharge electricity. They are smaller than lead batteries and last longer.

Demonstration Project Aimed at Improving Demand and Supply Balance

In June 2018, a group of five companies—the Central Research Institute of Electric Power Industry, Nissan Motor, Mitsubishi Motors, Mitsubishi Electric, and Kyushu Electric Power—began **testing*1 "vehicle-to-grid" (V2G)*2 technology**, which seeks to use electric vehicles as a means of regulating the balance between electricity demand and supply.



*1 The testing project is partially funded by the government through the Ministry of Economy, Trade, and Industry, Agency for Natural Resources and Energy's Project for Testing Virtual Power Plants*3 that Use Demand-Side Energy Resources.
*2 Vehicle-to-Grid systems take energy stored in electric vehicle batteries to power the grid.
*3 Virtual Power Plants are systems that use high-level aggregation technology to manage the discrete energy sources in homes, factories, and other such facilities remotely via the Internet of Things in order to regulate the balance of electricity demand and supply.

Initiatives Toward "Low-Carbon" Coal-Fired Thermal Power Generation

We continue to promote the development of technologies aimed at creating a "low-carbon" method of coal-fired thermal power generation, which remains an economically superior option and has plentiful resources available.

Utilizing State-of-the-Art Technology and Promoting Technical Development

New technologies will give our new coal-fired thermal power generator potential for further reductions in environmental impact

Matsuura Power Station Unit 2, which is currently under construction and scheduled to commence operations in December 2019, uses ultra-supercritical pressure milled coal, which involves new technology that boasts high thermal efficiency and reduces fuel consumption, thereby making it possible to reduce the facility's environmental impact.

Construction of Unit 2 is well underway (photo taken May 10, 2018)

■ Overview of Matsuura Power Station Unit 2 Development

Output	1 million kW
Power generation method	Ultra-supercritical pulverized coal combustion
Fuel	Coal
Thermal efficiency at the generating end (lower calorific value standard)	45% or more

Reference: Developing technologies pave the way for "low-carbon" coal-fired power generation

Advanced ultra-supercritical (A-USC) pressure coal-fired power generation

Higher temperatures and higher steam pressures in the coal burning process result in thermal efficiency levels 4 to 6 percent higher than conventional methods. Using these methods, we can greatly reduce fuel consumption and CO_2 emissions.

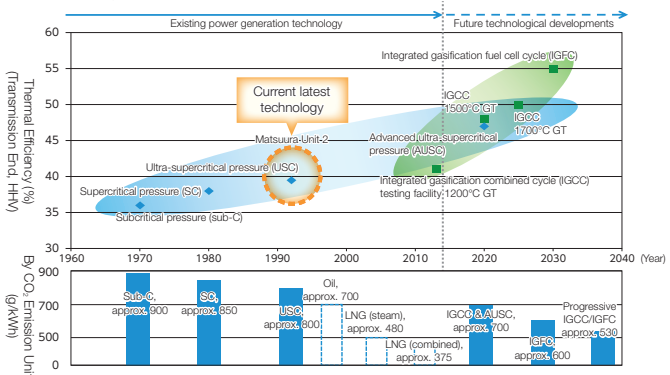
Integrated gasification combined cycle

This method combines two methods of generating electricity. First, coal is converted into gas, which is ignited to drive gas turbines. Second, the exhaust heat from the turbines is used to create high-temperature, high-pressure steam, which drives steam turbines. It is predicted that this method will achieve a generating efficiency level of between 46 and 50 percent, whereas conventional coal-fired generation reaches only about 39 to 42 percent.*

Meanwhile, work is underway to develop integrated gasification fuel cell cycle technology that combines IGCC with fuel cells to separate and recover the CO_2 prior to combustion, thus improving efficiency and environmental performance.

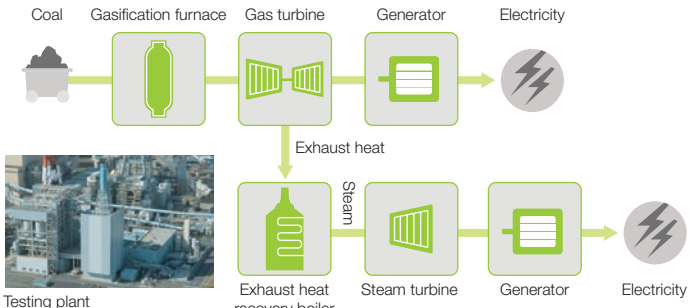
*Lower calorific value standard at the transmission end.

■ Improving Efficiency of Coal-fired Thermal Power Generation



Source: Compiled by Kyushu Electric Power based on materials from the Advisory Committee for Natural Resources and Energy, an organ of the Ministry of Economy, Trade and Industry, Agency for Natural Resources and Energy

■ IGCC system



Testing plant
(source: Central Research Institute of Electric Power Industry Review, Vol. 57)

Carbon Capture and Storage (CCS)

This is a technique for capturing the CO_2 generated by burning fossil fuels before it is released into the atmosphere, and storing it deep underground. Hopes are high that this innovative technique will be an effective weapon in the fight against global warming, but there are many challenges to overcome before it can be implemented. Research and technology development is promoted through national demonstration projects and other initiatives.

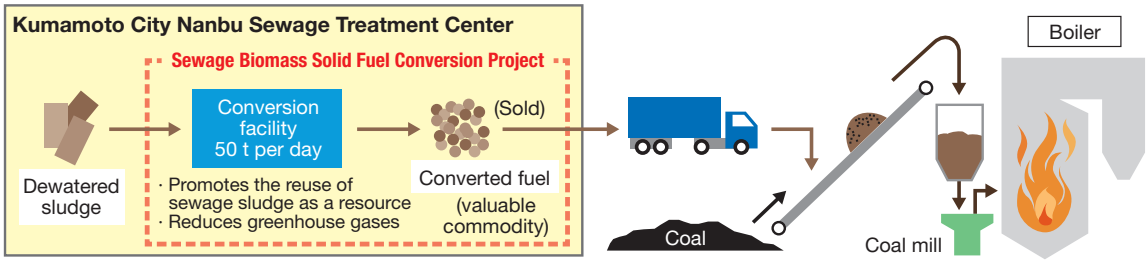
*For results of research into state-of-the-art coal-fired thermal power generation technologies, see the Central Research Institute of Electric Power Industry website.

CO_2 Emission Reduction through Operational Technology

Biomass-mixed combustion helps coal-fired thermal power stations reduce CO_2 emissions

Sewage Sludge Fuel Combustion at the Matsuura Power Station

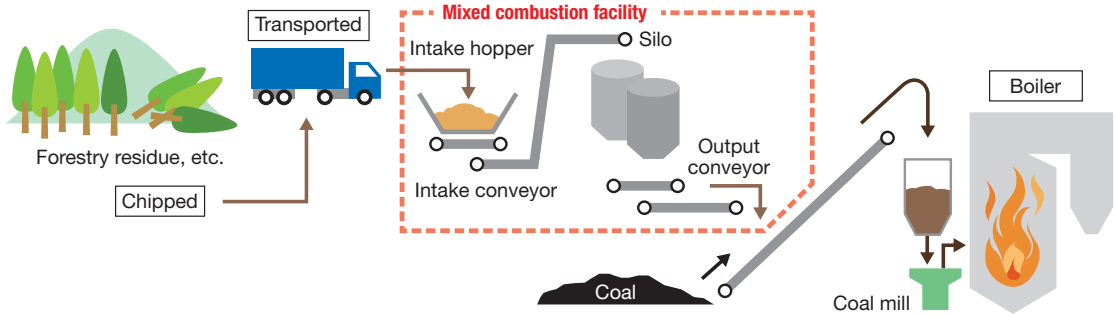
Since April 2013, dewatered sewage sludge from the sewage biomass fuel conversion project undertaken in Kumamoto City has been mixed into the coal used to generate electricity at the **Matsuura Power Station** in Matsuura City, Nagasaki Prefecture. In FY2017, the annual reduction in CO_2 emissions reached approximately 1,000 metric tons.



Woody Biomass Mixed Combustion at Reihoku Thermal Power Station

The **Reihoku Thermal Power Station** in Kumamoto Prefecture hosted a demonstration project* between FY2010 and FY2014 trialling mixed combustion featuring woody biomass (i.e., mainly unused resources such as forestry residue). Today, woody biomass is added to the coal (up to one percent of overall weight) used to generate electricity and, in FY2017, the annual reduction in CO_2 emissions reached approximately 9,000 metric tons.

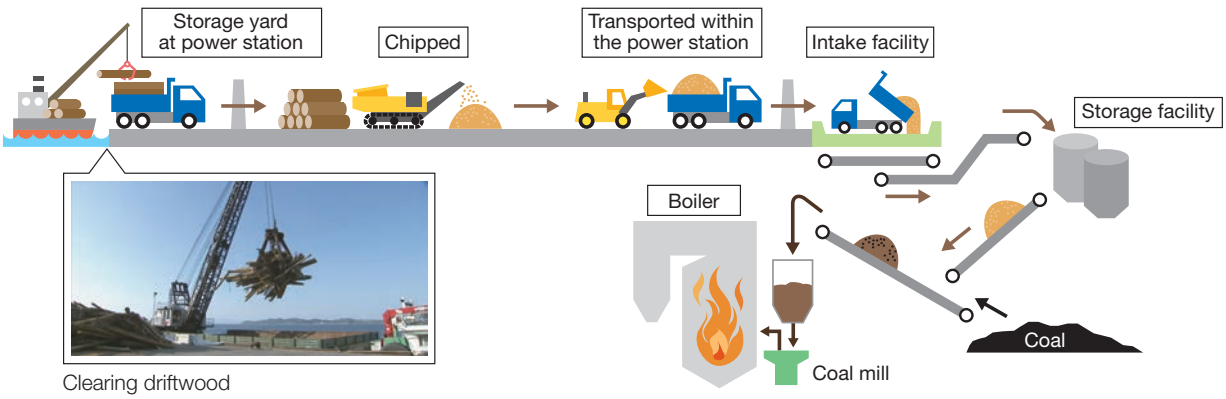
*The Demonstration Project for Testing Forestry Residue Woody Biomass and Coal Mixed Combustion Power Generation in FY2009 was the recipient of a government grant.



Community Activities | Landslide Debris Converted to Woody Biomass at Reihoku

The northern Kyushu area was devastated in July 2017 by torrential rains. The resulting landslides created a massive amount of driftwood. At Kyushu Electric Power, our Reihoku Thermal Power Station is helping to clear the mountains of logs by accepting these, chipping them on site, and using them for woody biomass-mixed combustion power generation.

■ Receiving, Processing, and Using Driftwood



Clearing driftwood

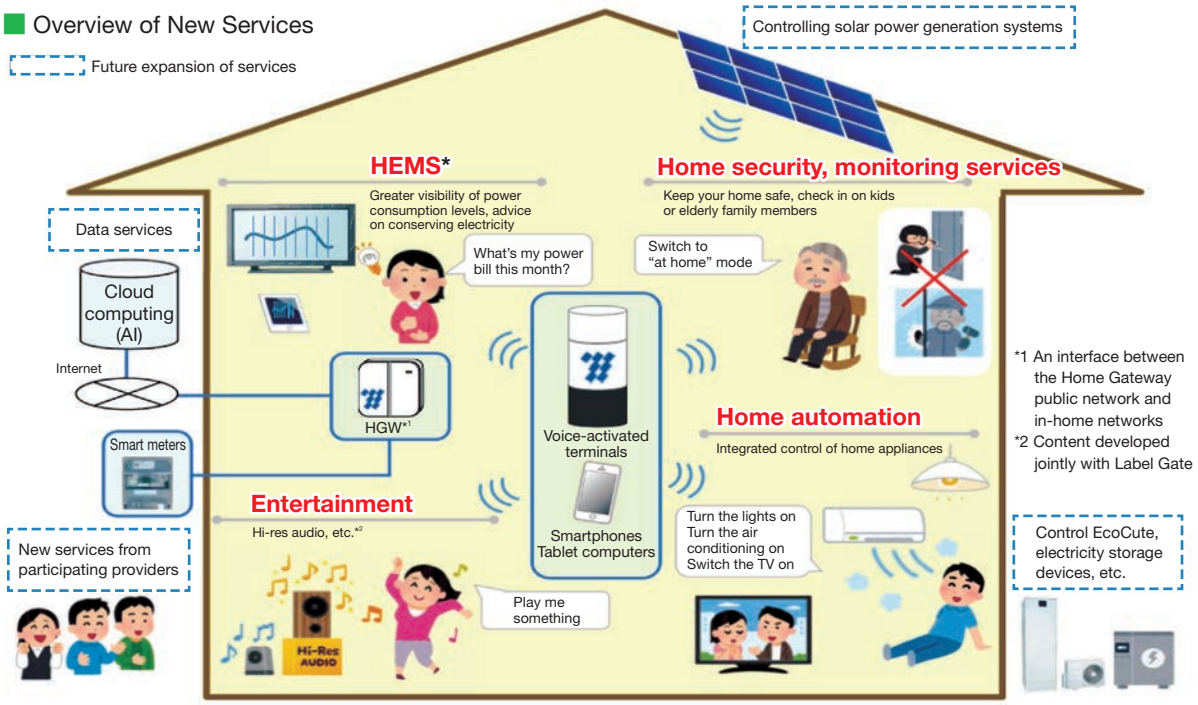
New Services to Conserve Energy and Reduce CO_2 Emissions

AI and the IoT (Internet of Things) power the development of environmentally friendly services that deliver new levels of home comfort

One example of the ways we offer eco-friendly comfort is our comprehensive, integrated support for customers to operate their HEMS,* home automation, and *Ouchi no Mimamori* monitoring services using smart speakers and smartphones.

This service enables customers to do many things, such as operating home appliances by speaking instructions to their smart speaker, or causing AI devices to learn from sensors and IoT-based data, thus enabling appliances to be operated in accordance with customers' preferences.

*HEMS stands for "home energy management system," which connects home appliance and other electric devices to, for instance, show electricity and gas usage levels or automatically control home appliances, thus promoting energy conservation in the home.

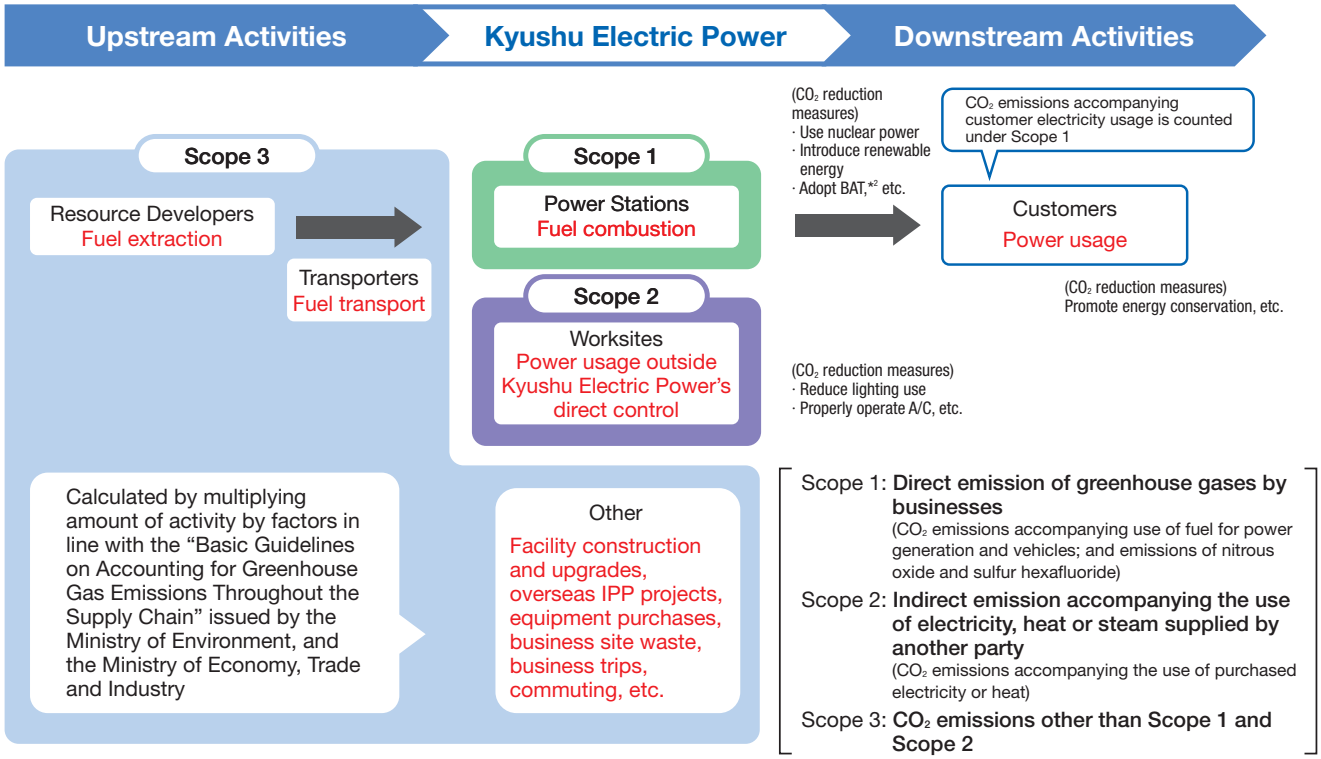


Greenhouse Gas Emissions for the Overall Supply Chain*1

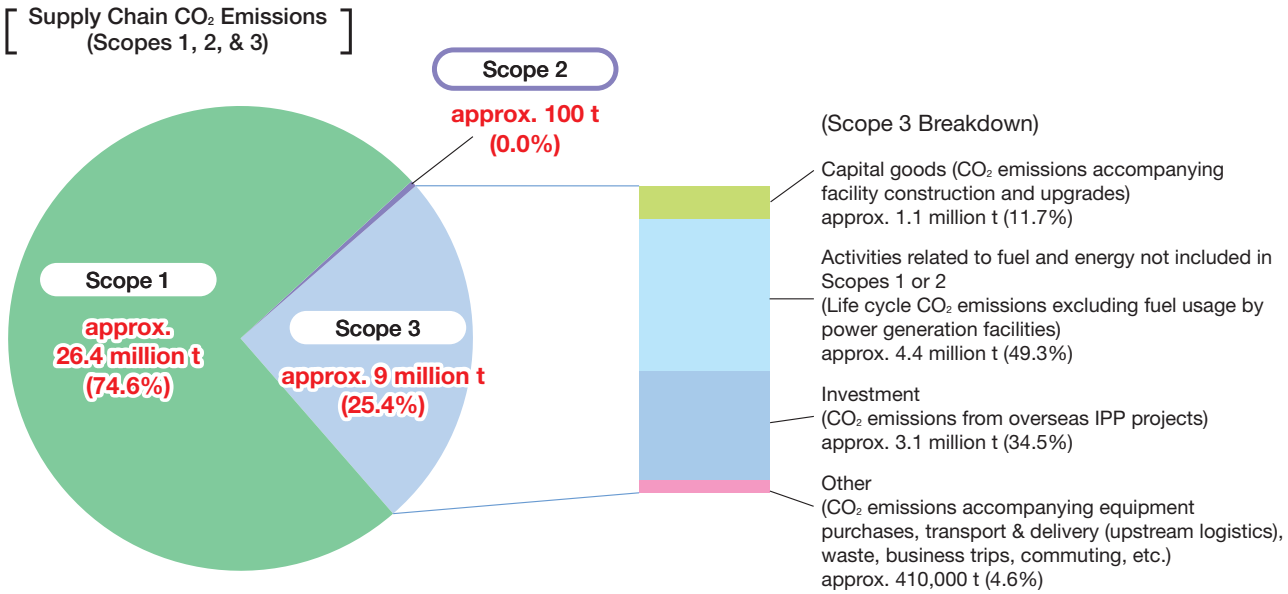
*1 All connected processes from the raw materials phase to delivery of products and services to consumers

State of Greenhouse Gas Emissions for Scopes 1–3

We approach relevant suppliers (partners, group companies, etc.) on how to properly manage direct emissions of greenhouse gases (Scope 1), as well as indirect emissions (Scopes 2 and 3)



*2 Best Available Technology (from an economic standpoint)



Note: FY2017 results. Totals may not match due to the effects of rounding.
t = metric ton (tonne)

Reference: Benchmark indicators under the Energy Conservation Law, non-fossil power source ratio under the Act on Sophisticated Methods of Energy Supply Structure

(Efficiency Improvements of Thermal Power Generation [Benchmark Indicators])

The Energy Conservation Law calls on energy producers to achieve a specified energy mix by FY2030 with thermal efficiency standards for installing new power generation equipment, as well as by decommissioning aging equipment and improving the overall thermal efficiency of facilities.

In response, we have worked to improve the thermal efficiency of thermal power plants and are responding appropriately to achieve the 2030 targets. The efforts include: the development of Matsuura Power Station Unit 2 through use of the latest technology; lower capacity utilization, planned shutdowns, and decommissioning of oil-fired thermal power plants with low thermal efficiency; commencement of operation at Shin-Oita Power Station No. 3x4 using the high-efficiency combined-cycle power generation system; a gas turbine upgrade at Shin-Oita Power Station Unit 1 (using an LNG combined-cycle power generation system).

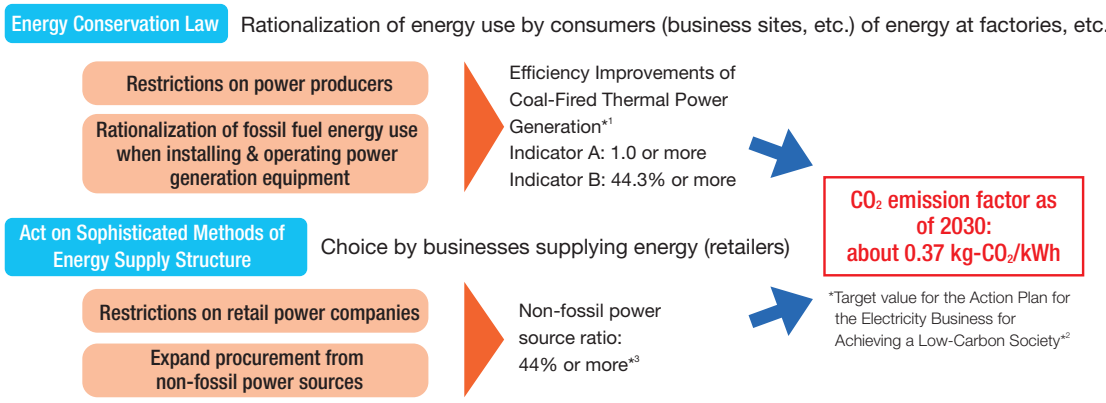
(CO_2-Free Power Supply Structure [Non-Fossil Power Source Ratio])

The Act on the Use of Non-Fossil-Fuel Energy Sources by Energy Suppliers and the Promotion of the Effective Use of Fossil Energy Sources (Act on Sophisticated Methods of Energy Supply Structure) calls on electricity retailers*1 that supplied 500 million kWh or more of electricity in the previous business year to use non-fossil-fuel sources*2 to supply at least 44% of their electricity in FY2030.

In response we are taking appropriate action to achieve FY2030 targets by working to raise the percentage of non-fossil fuel sources as a proportion of power sold. These efforts include the use of nuclear power generation with a heavy focus on safety and the proactive development and introduction of renewable energy.

*1 Electricity retailers, general electricity transmission and distribution utilities, and registered specified electricity transmission and distribution utilities under the Electricity Business Act
*2 Nuclear power, renewable energy, and large-scale hydroelectricity

■ Role of Energy Conservation Law and Act on Sophisticated Methods of Energy Supply Structure Toward Achieving the Energy Mix



*1 Indicator A: expresses success rate of performance efficiency for generating efficiency target for each fuel type: coal, LNG, oil, etc.
Indicator B: total generating efficiency of thermal power generation considering the power source structure of, and conformity to, the national energy mix (see p. 30)
*2 Medium-to-long-term plan for independent action by the electric power industry to mitigate climate change, formulated in 2015 by 12 Federation of Electric Power Companies and proposed new entrants
*3 Target procurement share for electricity generated with non-fossil fuels (nuclear power, renewable energy, large hydropower) by retailers for a power source structure that conforms to the national energy mix

Efficient Facilities Operation

Sustain and Improve Efficiency of Coal-Fired Thermal Power Generation

Coal-fired thermal power generation thermal efficiency (both at the generating end and the transmission end) was sustained at the same level as the previous year

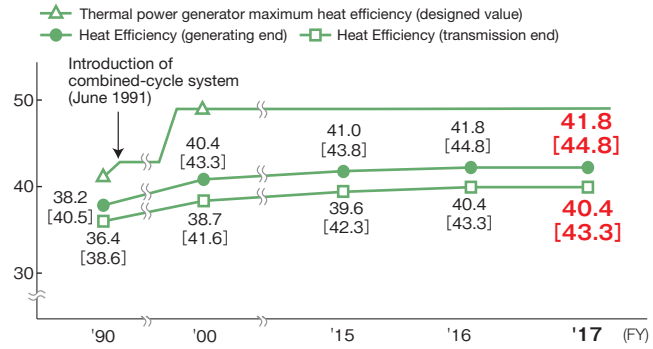
In terms of the amount of fuel consumed and the limiting of CO_2 emissions, we are working to sustain and improve the total thermal efficiency of coal-fired thermal power generation.

In FY2017, performance was equal to FY2016 at 41.8% (at the generating end) due to two factors: a reduced capacity utilization rate of oil-fired thermal power plants with low thermal efficiency that was attributed to the Sendai Nuclear Power Station's steady operation (excluding routine inspections); and the completion of a gas turbine upgrade at Shin-Oita Power Station Unit 1.

High calorific value: calorific value where water vapor produced by combustion is condensed and the latent heat held within recovered.
Low calorific value: calorific value where heat held in water vapor is not condensed and recovered but instead remains.

■ Thermal Power Total Heat Efficiency (Higher Calorific Value Base)

Unit: %



Note: [ ] are lower calorific value base-converted values for which Comprehensive Energy Statistics conversion factors, etc., have been used.

Reducing Transmission & Distribution Loss

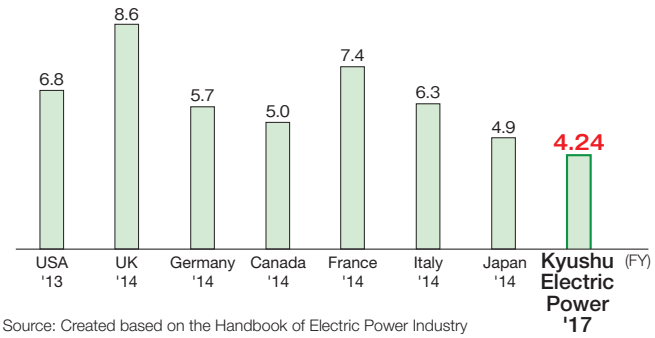
T&D loss ratio steady at a low rate of 4.24%

If we can deliver electricity efficiently through efforts to reduce electricity lost along transmission and distribution lines that leads to lower fuel usage and limits CO_2 emissions at coal-fired thermal power stations.

As a result of efforts to increase transmission voltage, introduce low-loss transformers, and other initiatives, the transmission and distribution loss rate for FY2017 was 4.24%, among the best in the world.

■ Country Comparison for Transmission/Distribution Loss Rates

Unit: %



Source: Created based on the Handbook of Electric Power Industry

Contribution to International Global Warming Mitigation Measures

Each year, we release the Kyushu Electric Power Company Group Environmental Action Plan (issued in June 2017 last fiscal year; renamed the Kyuden Group Environmental Action Plan from FY2018 onward). This plan is the basis of efforts to prevent global warming in Japan and abroad through such action as our overseas energy business and consulting.

Limiting CO_2 Emissions with the Overseas Energy Business

Limiting of approx. 1.3 million metric tons of CO_2 emissions accompanying the overseas power generation business

In FY2017, high-efficiency thermal power plants overseas and the steady operation of wind power and geothermal power stations*1 contributed to the suppression of approximately 1.3 million metric tons*2 of CO_2 emissions. This is equivalent to roughly 4% of our CO_2 emissions in Japan.

*1 Investments in nine IPP projects in eight countries; equity ownership in output of 1.5 million kW (as of the end of FY2017)
*2 Figures for CO_2 emissions are independent estimates by our company based on emission factors by country and region listed in "World Energy Balances 2017."

Overseas Power Generation Business (see the Sarulla Geothermal IPP Project in Indonesia on p. 21)

Participation in combined-cycle* power plant construction in the USA

This project will build and operate a new thermal power plant with a combined-cycle power generation system for the Birdsboro gas-fired thermal power plant in Pennsylvania. The system will use a high-efficiency gas turbine with cutting-edge performance. The plant will have an output of 488,000 kW. Our participation in the project was finalized in December 2017. Construction is now underway, with operations to commence in 2019.

In Connecticut, we have become involved in a power generation project by obtaining a roughly 20% equity share in Kleen Energy Holdings, LLC, which operates the Kleen Energy gas-fired power plant.

*A power generation system that combines a gas turbine with a steam turbine. Latent heat from the gas turbine's gas emissions boil water that turns to steam and spins a steam turbine.

Birdsboro gas-fired thermal plant under construction

Overseas Consulting

Contributions to international solutions with the group's combined strength

We apply the combined strength of the Kyuden Group to apply the technology and knowledge we have built up in the electricity power business both in Japan and abroad to work on a wide array of solutions for the energy sector, from the formulation of basic energy plans to solutions for power generation, transmission, and distribution, as well as renewable energy and the environment. We thus help countries provide a stable power supply and improve the earth's environment.

Technological prowess cultivated in power supply and geothermal generation on remote islands applied abroad

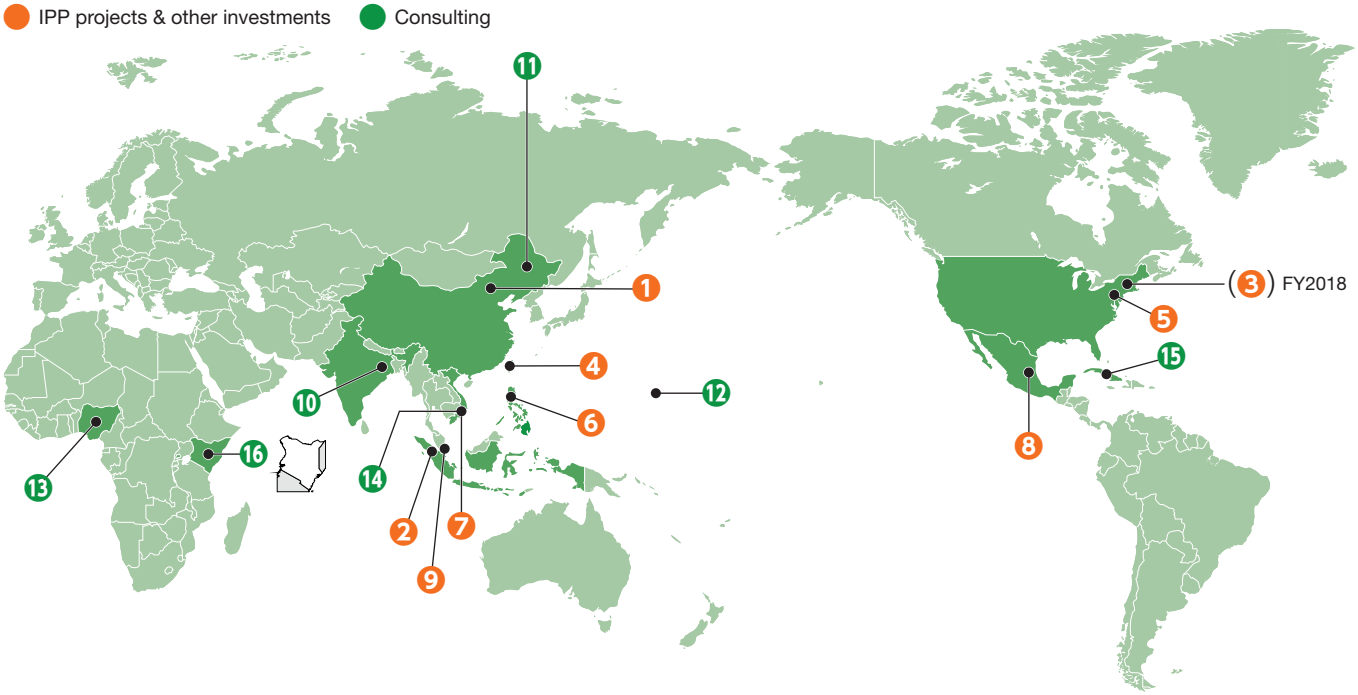
In FY2017, we used the engineering skill built up from our work in supplying power to remote islands and in geothermal power generation—both distinctive strengths of the Kyuden Group—to provide consultation on the installation and expansion of solar power stations in Cuba and the Marshall Islands, as well as improving the operational performance of the Olkaria Geothermal Power Station (output: 430,000 kW) in Kenya, which is one of the largest such plants in East Africa.

In future, Kyuden will continue to promote environmentally friendly energy use through proposing effective solutions for the countries we support.

Survey at the Olkaria Geothermal Power Station in Kenya (a JICA survey to assess operational status)

Overseas Project Implementation (FY2017)

IPP projects & other investments　Consulting



		Country	Project	Overview
IPP projects & other investments	Renewable Energy ❶	China	Inner Mongolia Wind Power	Output: 50,000 kW, commenced operation in September 2009
	Renewable Energy ❷	Indonesia	Sarulla Geothermal	Output: approx. 330,000 kW, operation of all units commenced in May 2018 (see p. 21)
	Natural Gas (Combined) (❸)	USA	Kleen Energy Gas-Fired Thermal Power Project	Output: 620,000 kW, operation commenced in July 2011, equity shares acquired in May 2018 (see p. 31)
	Natural Gas (Combined) ❹	Taiwan	Shin Tao Power Corporation	Output: 600,000 kW, operation commenced in March 2002, equity shares acquired in November 2010
	Natural Gas (Combined) ❺	USA	Birdsboro	Output: 488,000 kW, operation to commence in 2019 (see p. 31)
	Natural Gas (Combined) ❻	Philippines	Ilijan	Output: 1.2 million kW, operation commenced in June 2002
	Natural Gas (Combined) ❼	Vietnam	Phu My III	Output: 744,000 kW, operation commenced in March 2004
	Natural Gas (Combined) ❽	Mexico	Tuxpan Unit 2	Output: 495,000 kW, operation commenced in December 2001
			Tuxpan Unit 5	Output: 495,000 kW, operation commenced in September 2006
	Natural Gas Oil ❾	Singapore	Senoko Energy Pte. Ltd.	Output: 3.3 million kW, equity shares acquired in September 2008
Consulting	❿	India	Feasibility Survey on Installation of Environmental Equipment at Coal-Fired Thermal Power Plant	———
	⓫	China	Textile Industry Energy Conservation Promotion Scheme Development	———
	⓬	Marshall Islands	Ebeye Island Solar Power Generation System Development	Plan preparation survey, solar power plant construction (see p. 31)
	⓭	Nigeria	Electrical Power Master Plan	Creation project in-country support studies and personnel training
	⓮	Vietnam	LNG Thermal Power Generation Project	Feasibility study
	⓯	Cuba	Data Collection and Identification Survey on Introducing Renewable Energy (see p. 31)	———
	⓰	Kenya	Data Collection and Identification in Support of Olkaria Geothermal Power Plant Operation and Maintenance (see p. 31)	———