

Environment

Priority commitment goals



Related goals



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Aiming to Realize a Sustainable Society

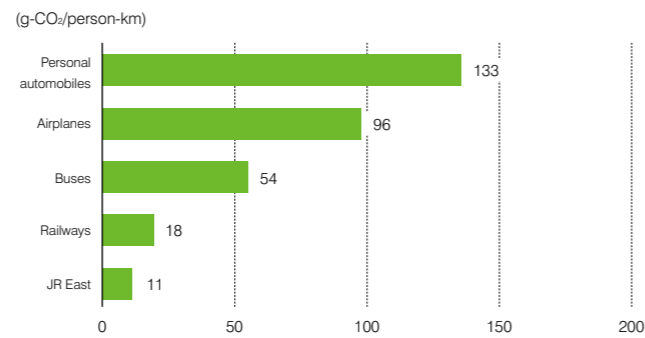
Further enhancing railways' superior environmental friendliness

As one pillar of its ESG management, on the environmental front the JR East Group aims to help realize a carbon-free society. To prevent global warming and diversify our energy use, we are introducing renewable energy, engaging in energy-saving technological innovation, and working to use hydrogen as energy when operating railways and developing cities.

Railways are one of the most energy-efficient modes of transportation. CO₂ emissions per volume transported are relatively low, making railways an eco-friendly mode of transport. That said, the environment surrounding the transportation business is changing, and technological innovation is underway that will substantially boost the environmental performance of automobiles. Meanwhile, climate change and other environmental problems are growing increasingly serious. Marine plastic and other problems related to resource recycling are emerging. Under such circumstances, companies are being called upon to assume a greater responsibility for reducing environmental impact.

Moving forward, we will strive to make railways even more environmentally friendly so they will remain the transport mode of choice. In addition, in our aim to realize a sustainable society we will work constantly to resolve social problems through our business activities.

CO₂ emissions per transportation amount (FY2019 passengers)



Source: Ministry of Land, Infrastructure, Transport and Tourism website

Note: External Assurance on environmental performance

KPMG AZSA Sustainability Co., Ltd. has been engaged in providing external assurance on a set of selected environmental performance on pages 77–85 so that the reliability of the data in this report is ensured. The particular indicators that are assured are marked with a ☆ for clarity.

Measures to Prevent Global Warming

Formulation of environmental goals

With the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) held in December 2015 adopting the Paris Agreement, JR East has set environmental goals to be achieved in FY2031.

In May 2020, we formulated a new target: achieving “net zero CO₂ emissions by FY2051. We also revised upward our targets for reducing CO₂ emissions and energy consumption in the railway business by FY2031 (compared to 2014).

When revising these targets, we have targeted only energy derived from fossil fuels (excluding hydroelectric power generation, which is a non-fossil-fuel source), in line with the report in the Act on the Rational Use of Energy. Accordingly, the standard value for energy consumption is 41.4 billion MJ, and the reduction target is 16.6 billion MJ. Our energy consumption in FY2020 was 37.8 billion MJ.

By working to meet these targets, we will contribute toward the realization of a carbon-free society.

Target Parameter	Before Revision	After Revision
CO ₂ emission volume	40% reduction	50% reduction
Energy consumption	25% reduction	40% reduction

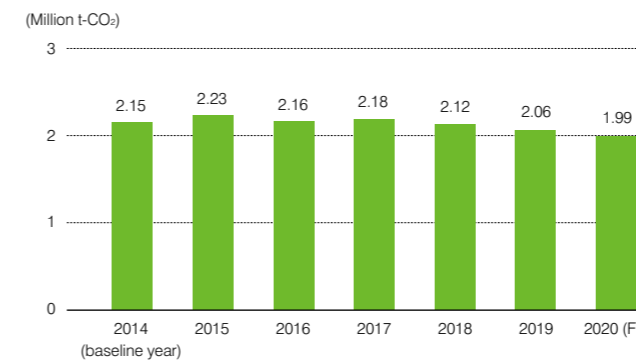
Trends in total CO₂ emissions

Our CO₂ emissions in FY2020 totaled 1.99 million tons, a decrease of 160 thousand tons compared to FY2014 (the reference year).

In this report, we are also reporting CO₂ emissions in Scopes 1, 2, and 3 in accordance with the definition of the GHG Protocol*.

*GHG Protocol
The standard for calculation and reporting of greenhouse gas emissions which was formulated by the organization which was established mainly by the WRI (World Resources Institute) and WBCSD (World Business Council for Sustainable Development).

Trends in total CO₂ emissions☆



• Boundary of data
The boundary of data for CO₂ emissions is the same as the boundary for energy consumption shown on page 80.

• Calculation methods
Our calculation of CO₂ emissions is based on the methods set forth in the Act on Promotion of Global Warming Countermeasures. However, for CO₂ emissions on energy provided from external sources and used as electric power in railway transport, our calculations use adjusted emission factors for each electric power company. Using basic emission factors, CO₂ emissions for FY2020 were 2.01 million t-CO₂ (down 0.08 million t-CO₂ year on year).

CO₂ emissions, by scope (non-consolidated)

Item	Scope 1☆	Scope 2☆☆	Scope 3☆☆
CO ₂ emissions in FY2020	1.29 million t-CO ₂	1.21 million t-CO ₂	4.74 million t-CO ₂

* Scope 1 All CO₂ emissions directly attributable to fuel consumed in the operation of diesel railcars, operation of JR East thermal electric power plant, etc.
* Scope 2 CO₂ emissions indirectly emitted from the use of electricity purchased from electric power companies.
* Scope 3 CO₂ discharged by the other companies which are related to our business activities.
* The sum of the Scope 1 and Scope 2 emissions and the total CO₂ emissions do not match, since the former includes emissions associated with the production of electricity supplied to other companies.

Calculation standards for each category are as follows.
Category 1: Calculated as the amount spent on the purchase of products and services (only JR East) in relation to repairs or for system use x emission factor*1 for each product and service
Category 2: Calculated as the amount of capital expenditure (only JR East) x emission factor*2 per unit price of capital goods in the railway transport department
Category 3: Calculated as purchased fuel, electricity, and heat used (only JR East) x emission factor*3 for each type of energy by amount used
Category 13: Calculated as total floor area of buildings owned by JR East x emission factor*2 per building used and unit of total floor area for food and beverage shops

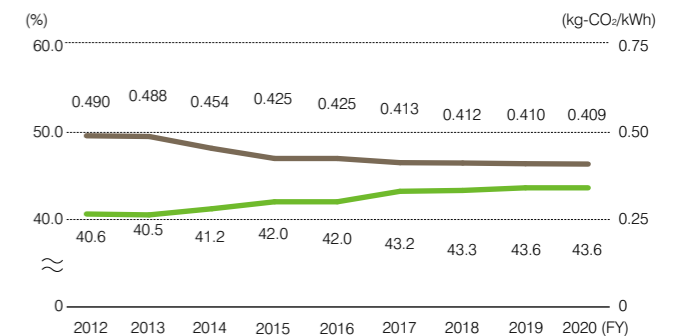
*1 Uses emission factor data from the Embodied Energy and Emission Intensity Data for Japan Using Input-Output Tables (3EID) (2005 edition)
*2 Uses emission factor data from the Emission Intensity Database for the Calculation of an Organization's Greenhouse Gas Emissions Generated by the Supply Chain (Ver. 2.6) (March 2019), Ministry of the Environment
*3 For fuel, uses intensity data from the Basic Database for the Carbon Footprint Communication Program, Ver. 1.01, Ministry of the Environment; for electricity and heat, uses emission factor data from *2

Thermal power plant of JR East

JR East operates a thermal power plant in the city of Kawasaki, Kanagawa Prefecture, fueled by city gas and natural gas with a total capacity of 741 thousand kW. In the plant's update, it is being equipped with combined-cycle power generation units* with improved efficiency and renovated to reduce CO₂ emissions. Unit 1 is undergoing construction update, targeting operation in 2021.

* A combined-cycle power generation unit is a power generation unit that combines gas turbines propelled by combustion of gas with steam turbines driven by steam from the exhaust heat.

CO₂ emission factor and power generation efficiency at thermal power plant of JR East☆



— Generation efficiency (left) — Emission factor (right)

• Calculation method
CO₂ emissions from the thermal power plant of JR East are calculated based on the method stipulated in the Act on Promotion of Global Warming Countermeasures, and power generation efficiency is based on the method stipulated in the Energy Saving Act.

• CO₂ emission factor of all power generated by JR East (thermal power and hydraulic power) The emission factor adjusted in FY2020 was 0.286 (kg-CO₂/kWh).

Measures to Prevent Global Warming

Specific environmental targets

JR East is working to resolve global environmental problems by setting numerical targets for each basic unit and policy.

Figures in parentheses are in comparison to FY2014.

	Performance indicators	Unit	Reference value (FY2014)	FY2021 goal	FY2020 result
Measures to prevent global warming	Energy consumption from railway business activities	Billions of MJ	51.7	48.5 (6.2% reduction)	48.0* (7.2% reduction)
	Electricity consumption for train operation (Shinkansen lines)	kWh/car-km	2.49	2.36 (5.1% reduction)	2.39* (3.7% reduction)
	Electricity consumption for train operation (conventional lines)	kWh/car-km	1.59	1.46 (8.3% reduction)	1.49* (6.4% reduction)
	Energy consumption at branch offices, etc.	kL/m ²	0.0407	0.0366 (10.0% reduction)	0.0341* (16.2% reduction)

Progress of Environmental Measures

	Performance indicators	FY2021 goal	FY2020 result
Measures to prevent global warming	Implementation of more ecoste model stations	Total of 12 Stations	Total of 12 Stations
	Switching platform and concourse lighting to LEDs	Total of 62,000 units	Total of 69,000 units (reduction of 146 million MJ)
	Improving efficiency of large-scale air-conditioning systems	Total of 10 Locations	Total of 9 Locations (reduction of 78 million MJ)

Annual Targets through FY2021

	Performance indicators	FY2021 goal	FY2020 result
Measures to prevent global warming	Reduction rate of energy consumption intensity of each JR East subsidiary	Every year 1% reduction in each Group company	1% reduction by all Group companies
Measures for resource circulation	Recycling rate for waste generated at stations and on trains	94%	93%
	Recycling rate for waste generated at General Rolling Stock Centers, etc.	96%	95%
	Recycling rate for waste generated in facility construction projects	96%	93%
	Implementation rate of recycling by subsidiaries	100%	100%
Environmental management	Setting of numeric targets by each JR East subsidiary	Targets to be revised continually	Established

■ Targets for Group companies

Ecoste

Through our "ecoste" initiative, we are introducing a variety of energy conservation, renewable energy, and other eco-friendly technologies at stations. In FY2020, 12 stations completed their target of becoming "ecoste" model stations. In addition, Takanawa Gateway Station opened as an "ecoste" station. We plan to use the knowledge we have accumulated to continue developing "ecoste" stations.



Nobeyama Station (ecoste)



Maebashi Station (ecoste)

Effective use of regenerative power

We are attempting to utilize effectively the regenerative electric power that is produced when trains stop.

This regenerative electric power is stored temporarily in a power storage apparatus that contains a battery. We have introduced this system at eight locations to date. We are also developing a new storage medium, a superconducting flywheel power storage system.



Superconducting flywheel power storage system

Diesel-powered, electric-motor-driven hybrid railcars and the accumulator railcar train

In addition to the world's first diesel hybrid railcar, the KiHa E200 (Koumi Line), we have introduced the HB-E300 (Nagano, Aomori, Akita, and Niigata regions), which has the same hybrid system. The rate of fuel consumption on these trains is approximately 10% lower than for conventional rolling stock. Also, the sound they emit when starting and stopping at stations is 20–30 dB lower.



EV-E801 series Accumulator railcar train for use on alternating current (AC) section

We are introducing a battery power train system as a new environmental impact reduction measure for non-electrified sections. We have deployed an EV-E301 (nicknamed ACCUM) using this system as the EV-E801 on the Oga Line. This system eliminates the exhaust gas emitted from steam trains' engines and reduces CO₂ emissions and sound.

Reducing energy consumed for train operations

We are putting into service more new-generation energy-efficient railcars, with features such as regenerative brakes, which can convert kinetic energy during deceleration into electric energy, and Variable Voltage Variable Frequency (VVVF) inverters, which control motors without wasting electricity. By the end of March 2020, JR East had 12,221 energy-efficient railcars in operation. This accounts for 98.4% of our railcar fleet.



E235 series: Conventional line equipped with a state-of-the-art train information management system



E7 series: Shinkansen railcars that incorporate cutting-edge technology



E233 series: VVVF inverter cars for commuter and suburban transportation

Environmentally friendly and energy-efficient office buildings

We have pursued energy-saving initiatives through hard measures such as introducing LED lighting and high-efficiency devices into office buildings and by soft measures such as implementation of "cool-biz" initiatives and thermal control of air conditioners. Thanks to its superior performance in reducing CO₂ emissions, JR SHINJUKU MIRAINA TOWER has been certified as an Office Taking Excellent Specific Global Warming Countermeasures (top-level office building) under the Tokyo Metropolitan Ordinance on Environmental Preservation. This brings JR East's total to eight, including one at the secondary level. During the first planning period under the ordinance (FY2011 to FY2015), we were able to reduce CO₂ emissions substantially more than the obligatory amount. We used the excess reduction for emission trading within the Group and others as stipulated in the ordinance. We also plan to exceed the CO₂ reduction requirement by more than the required amount during the second planning period (FY2016 to FY2020).

Top-Level Offices	Semi-Top-Level Office
Sapia Tower, JR Shinagawa East Building, GranTokyo South Tower, GranTokyo North Tower, JP Tower, JR Minami-Shinjuku Building, and JR SHINJUKU MIRAINA TOWER	JR Tokyu Meguro Building



JR SHINJUKU MIRAINA TOWER, ranked "S" in the CASBEE



Top-level workplace certification logo in the CASBEE

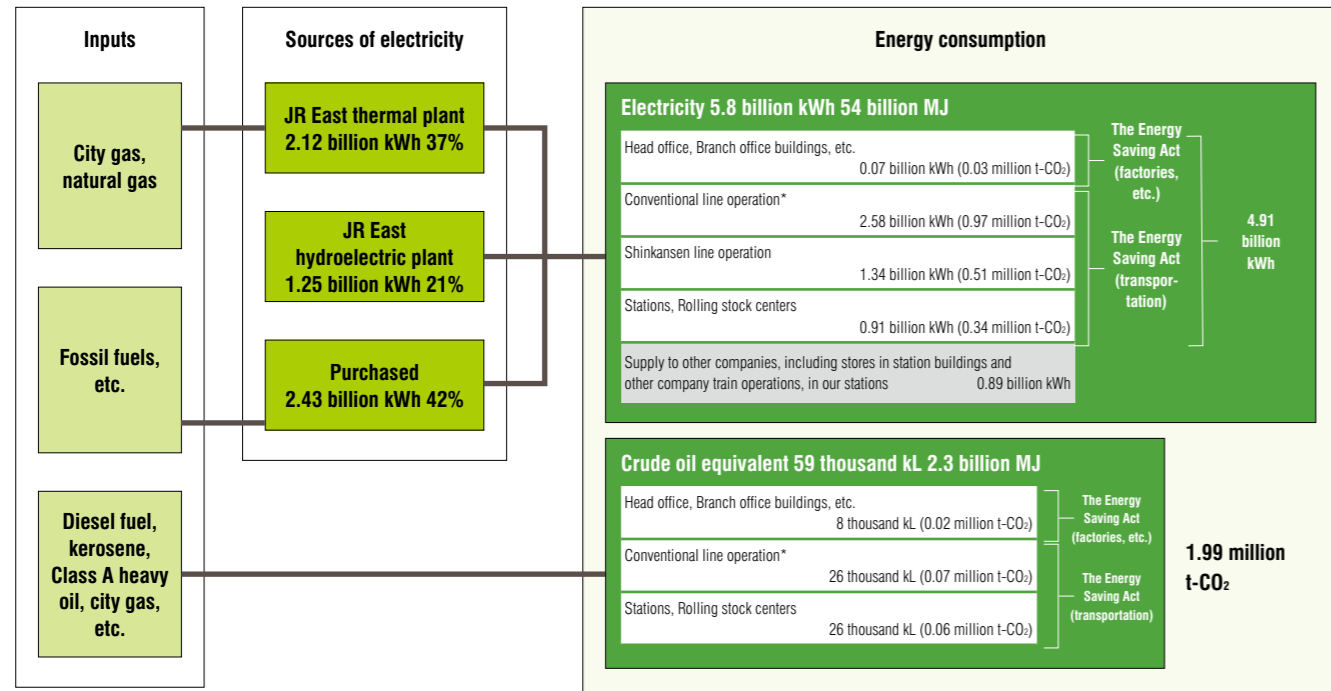
Measures to Prevent Global Warming

Energy flow map*

This shows the flow of energy from input through consumption. Power supplied by our own power plants and power companies is used for train operation and for station and office lighting and air conditioning. Diesel fuel and kerosene, etc. are also used to operate diesel trains and stations and office air conditioning.

Our energy consumption

We will strive to save energy for train operation, which accounts for about 80% of our total energy consumption, and, furthermore, it will be necessary to conduct energy-saving activities even in offices and other facilities.



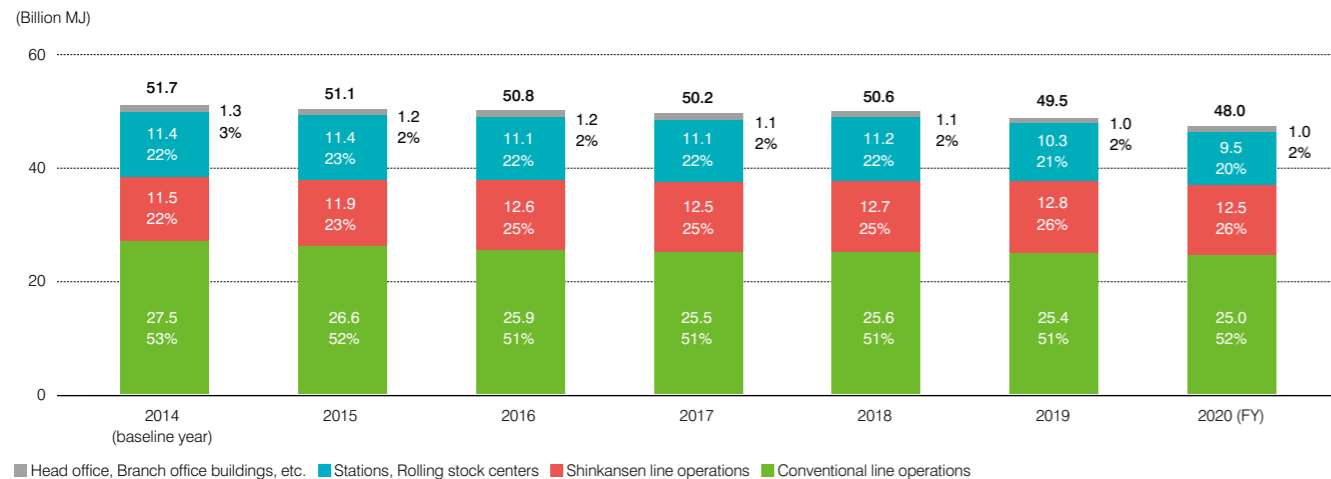
*Including BRT (Bus Rapid Transit) (CO₂ emissions are the amount calculated with 'adjusted' emission coefficients)

•Boundary Though, in principle, the boundary for energy consumption is only JR East, it nonetheless includes energy consumption for the applicable operations of the companies with whom we entrust station operations. On the other hand, the energy consumption of shops on station premises which are operated by Group companies is not included in the boundary. We match the boundary for the energy consumption for the entire JR East business with that of transportation, plants, and others defined by the Act on the Rational Use of Energy (The Energy Saving Act).

•Calculation method Energy consumption was calculated by the method defined by the Energy Saving Act.

•Hydraulic power generated by JR East The foregoing energy consumption is calculated by the idea of the Energy Saving Act, but hydraulic power generated by JR East is calculated by multiplying by 9.76MJ/kWh. As for hydraulic power generated by JR East, reports required by the Energy Saving Act are reported by the OMJ.

Composition of energy consumption by JR East*



Overview of JR East Group's energy initiatives

The Group aims to optimize energy at various stages: create, send, store, and utilize. Moreover, approximately 25% of energy consumed during train operations, etc., is renewable energy such as hydroelectric, solar, and wind power, which produce zero CO₂ emissions.

Creating (energy creation)

- Improve efficiency of thermal power plant
- Steady maintenance and operation of hydroelectric power plants
- Promoting the introduction of renewable energy

Delivering

- Improving the power transmission efficiency of JR East's own power grid

Storing (Energy storage [power storage/heat storage])

- Power storage system
- Demonstration experiment of superconductivity flywheel

Utilizing (Energy-saving)

- Accumulator railcar train
 - E235 series
 - E7 series
 - EV-E301 series
 - EV-E801 series
- Ecote model stations
 - Hirazumi Station (solar power generation)
 - Musashi-Mizonokuchi Station (greening)
- High-efficiency equipment
 - Shinjuku Station (LED lighting)
 - JR SHINJUKU MIRAINA TOWER
 - JR Minami-Shinjuku Building
- Eco-friendly office buildings

Diversification of energy

- Implementing and enhancing hydrogen stations
 - Hydrogen stations
- Introducing fuel cell buses and vehicles
 - FC bus
 - Business-use automobiles
- Developing trial fuel cell railcars
 - FV-E991 series

Measures to Prevent Global Warming

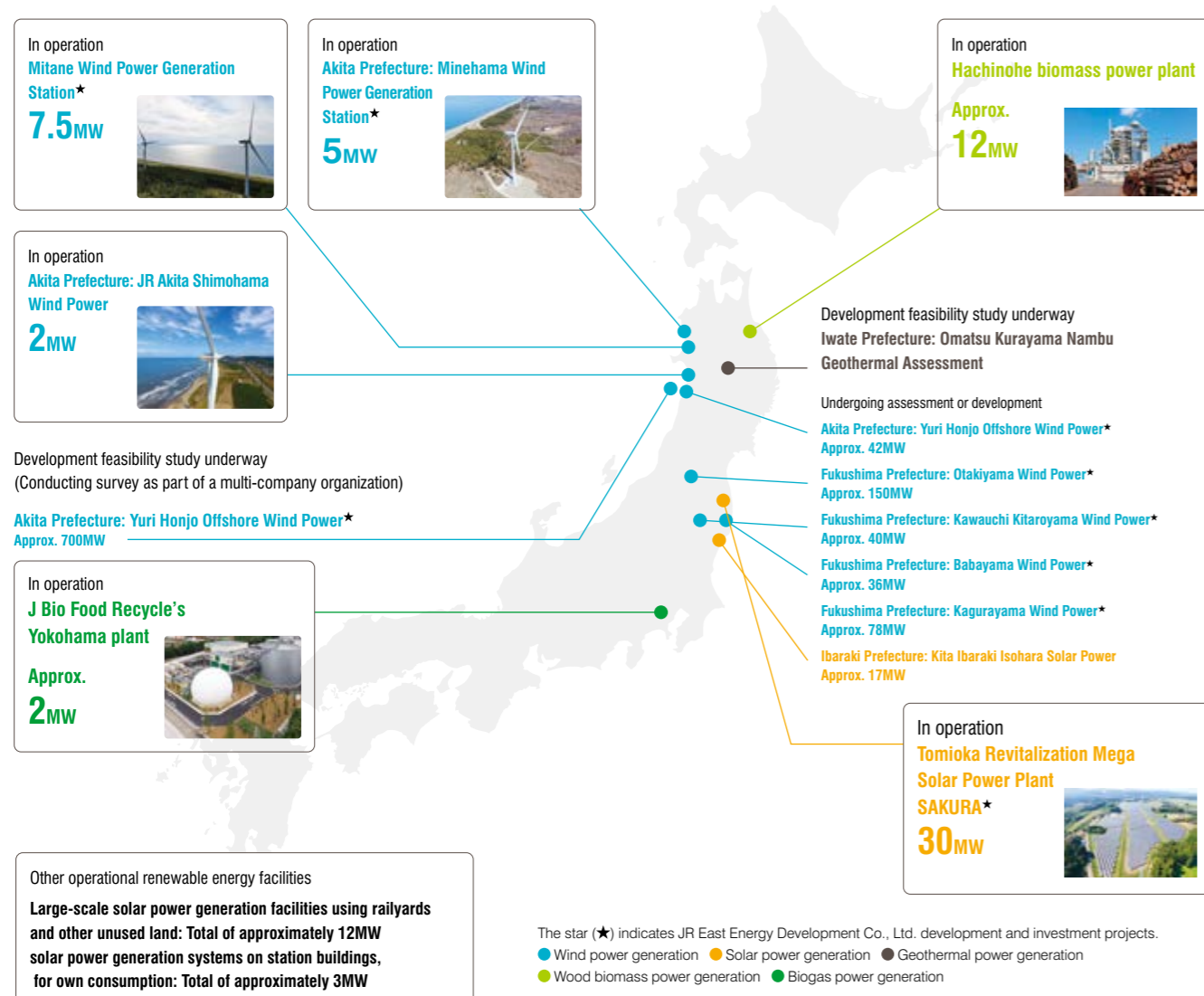
Progress of introducing renewable energy

We place solar panels on the roofs of platforms and station buildings and in rolling stock centers, using the energy they generate for our own use or on other trains passing through our tracks. In July 2018, we installed a compact wind power turbine at Oga Station. In addition to covering that station's electricity requirements, some power from the turbine is used for the ACCUM, which is driven by an AC storage battery. Through such efforts, in FY2020 we generated approximately 2.70 million kWh for our own consumption.

In addition to working with JR East Energy Development Co., Ltd. to develop renewable energy, we are actively introducing renewable

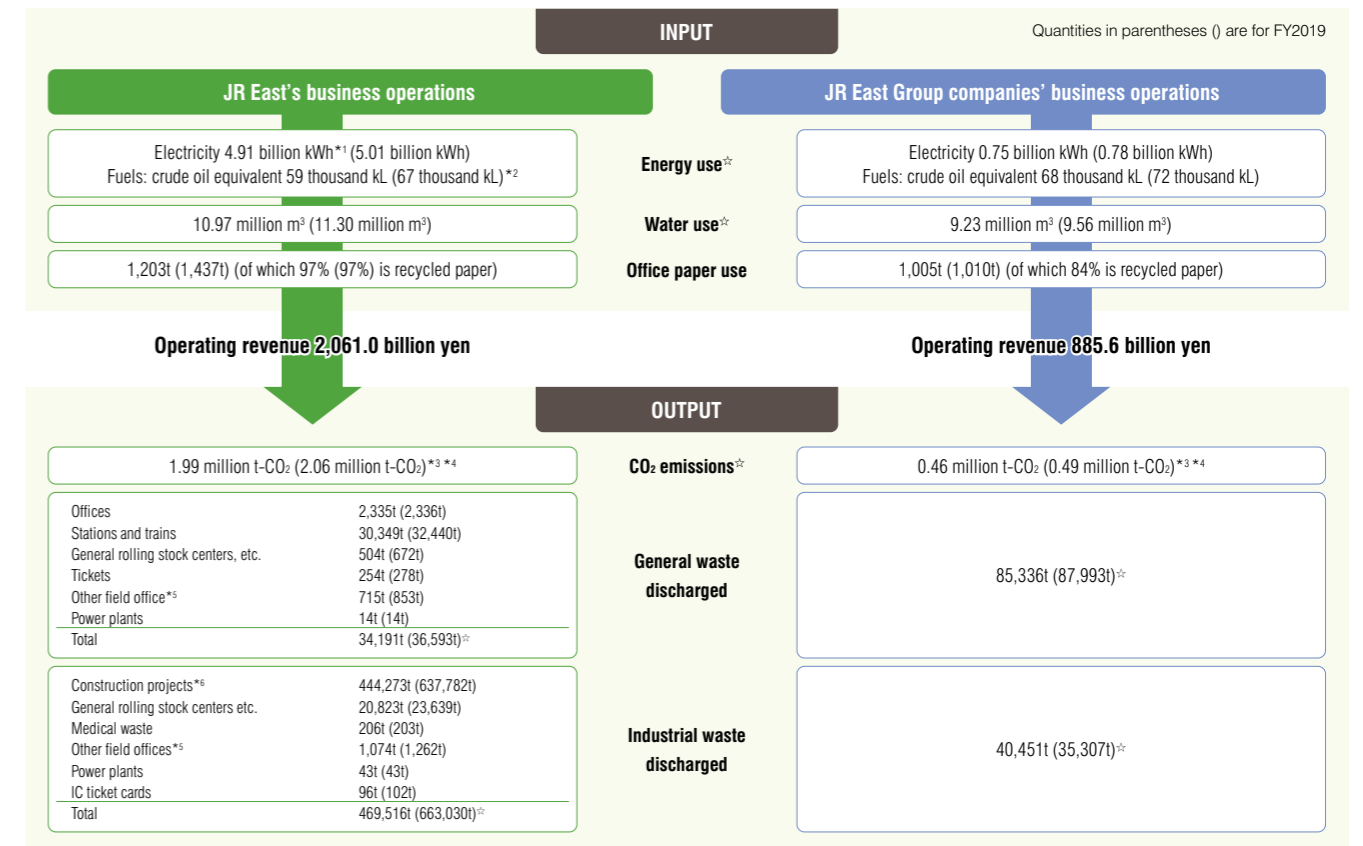
energy (wind, solar, and geothermal) initiatives, centered on the Tohoku region. Taking advantage of the feed-in tariff (FIT) system, we have steadily launched operations at megasolar power plants and large wind power generation plants. In FY2020, we generated approximately 19.40 million kWh of electricity. Using "non-fossil certificates" obtained through the development of renewable energy, we are providing "CO₂-free electricity" for our trains. As a result, we aim to achieve zero CO₂ emissions in the Tohoku region by FY2031

The JR East Group's current renewable energy development plan



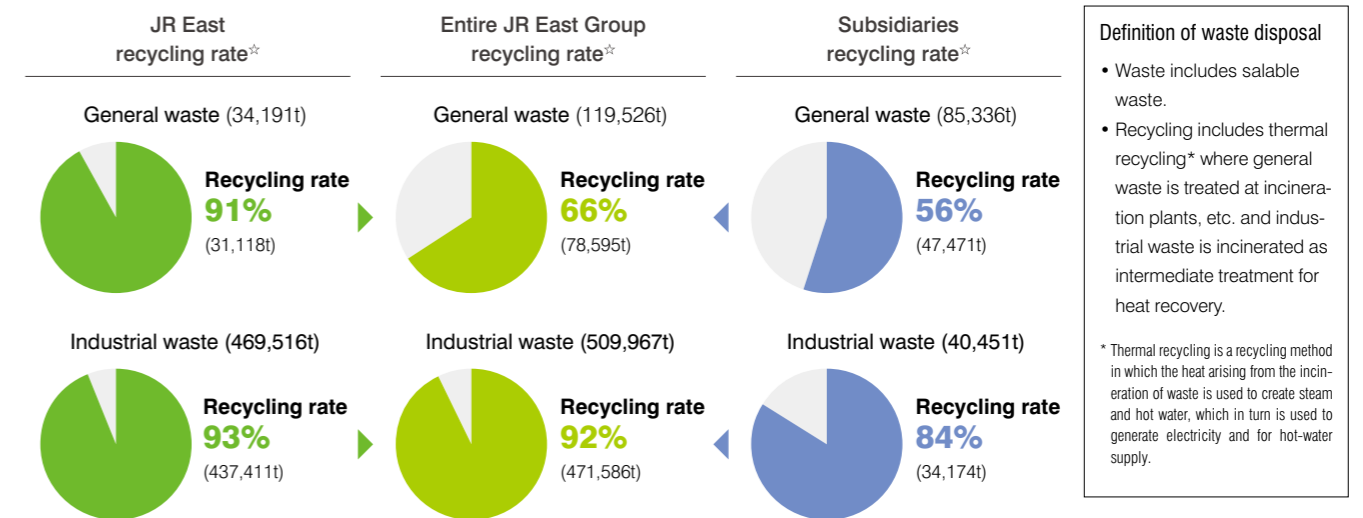
In addition to the plan outlined above, we plan to work with JR East Energy Development Co., Ltd., collaborating with local communities on further study and development to promote solar and wind power generation plants. By FY2051, we aim to develop enough renewable energy to cover around 30–40% of the energy we use in the railway business. This figure rises to 50–60% for renewable energy if the hydroelectric power plants we operate are added in.

JR East Group's environmental impact
FY2020 Results



*1 Electricity: Both electricity generated in JR East's power plants and used internally and electricity purchased from electric companies are included. Please refer to the "JR East Energy flow map" on page 80 for details about electricity generation and use.
*2 Fuels: Natural gas and other fuels used for generating electricity in JR East's thermal power plants are not included.
*3 CO₂ emissions by Scope: Scope 1 emissions of the entire Group are 1.40 million tons CO₂ and Scope 2 emissions 1.48 million tons CO₂. (please see page 77)

*4 CO₂ emissions attributable to electricity purchased from external suppliers are calculated based on the adjusted emissions coefficient.
*5 Other field offices: Technical centers, equipment maintenance centers, and other locations such as train crew offices.
*6 Construction projects: Waste generated by our construction projects, but for which contractors legally become the waste-discharging entities, is included in industrial waste.



Measures for Resource Circulation

Measures for resource circulation

All Group companies promote 3R practices (Reduce, Reuse, Recycle) to reduce the various waste products produced through our business activities and achieve an environmentally friendly society. We have already met our FY2021 recycling rate targets for each type of waste product.

Moreover, JR East Group will work as one to tackle the plastics issue, which is an important topic both socially and internationally. Our efforts include setting new targets for reduced emissions and recycling ratios.

Collection and reuse of recyclable waste

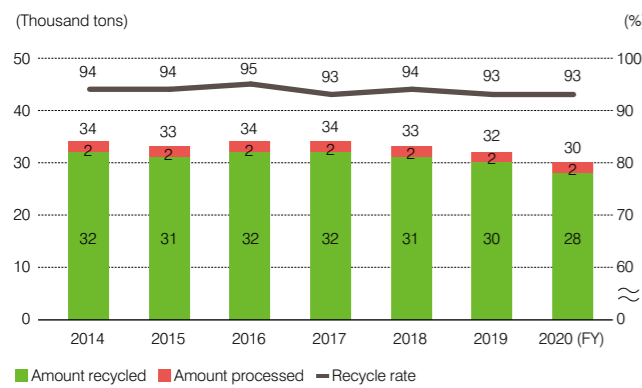
We are working to enhance recycling rates. For example, JR East Tokyo Materials Recycling Center (operated by JR East Environment Access Co., Ltd.) makes a thorough effort to sort waste from stations and trains, which contains recyclable materials. Such waste as magazines and newspapers is recycled into coated paper or office paper used internally. Used tickets are all recycled into such items as toilet paper and cardboard (recycling rate of 100%).



JR East Tokyo Materials Recycling Center

Office paper for internal use, made from recycled paper

Waste from construction projects



Food recycling / Biogas power generation project

We recycle food products and operate a biogas electricity generation business through J BIO FOOD RECYCLE (jointly established with the JFE Group). We source a daily volume of as much as 80 tons of food waste from our subsidiaries and food manufacturers and utilize biogas created by methane fermentation processing to generate electricity.

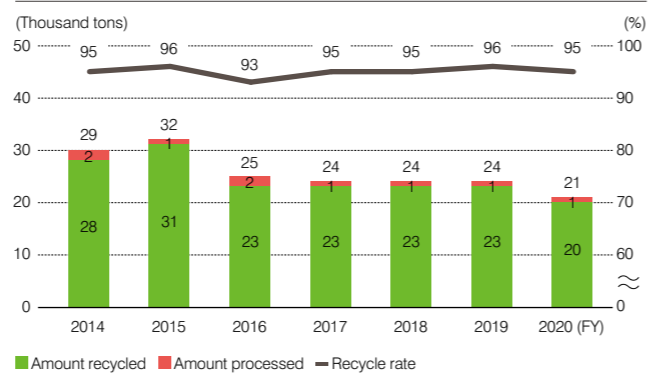
We can process the same amount of food waste as is generated by approximately 3,000 families. We also capture some of the byproduct heat and utilize it inside the plant.



Recycling at general rolling stock centers

At our regional General Rolling Stock Centers, waste is sorted into 20 to 30 categories to reduce waste generation and promote recycling.

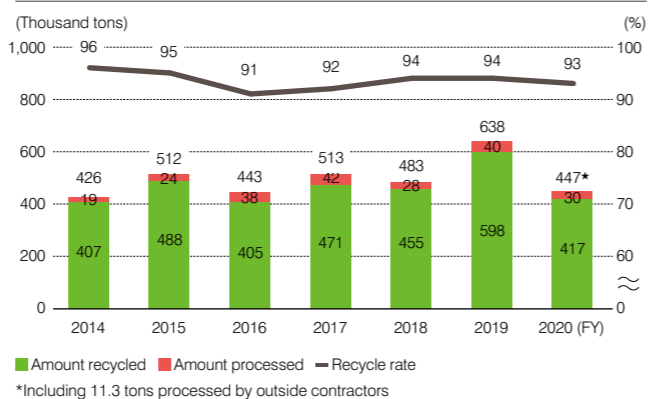
Waste from general rolling stock centers



Reducing construction waste

JR East endeavors to appropriately process the byproducts of construction and to reduce construction waste by internally standardizing design and construction methods.

Waste from construction projects



Others

Biodiversity

Hometown Forestation Program

Since 2004, we have promoted the achievement of a sustainable society with our involvement in the Hometown Forestation Program, an initiative to protect biodiversity by planting native tree species to regenerate forests. So far, we have undertaken this initiative in Fukushima, Niigata, and Miyagi prefectures. Since 2019, we have been moving forward with the Shima Furusato Forest Project in Nakanojo, Gunma Prefecture.



Shima Furusato Forest Project hosted in 2019

Forest development along railway lines

Since 2008, we have been promoting the "railway trees project" project aiming to protect environments along railways and mitigate natural disaster damage to tracks. We plan to fundamentally review our concept of ideal railway forest management and replant trees when they are due to be replanted over the course of roughly 20 years.

Currently, we hold around 1,080 plots of forestland along railways (approximately 3,900 hectares with 5.8 million trees). These trees have the effect of absorbing roughly 15,000 tons of CO₂ from the atmosphere, or 0.8% (as of FY2020) of the Company's CO₂ emissions.

Chemical substance management

Under the act for rational use and proper management of fluorocarbon

We endeavor to reduce the use of substances specified as controlled substances under the Ozone Layer Protection Law and adopt substitutes that have less impact on the environment. Under the Act for Rational Use and Proper Management of Fluorocarbon, we reported a leakage amount of around 4 thousand t-CO₂* for FY2020.

Chemical substance management and reduction

The Company is classified as a business operator handling over a certain amount of specified chemical substances under the PRTR framework*. Accordingly, 11 of our sites reported emissions and transfer amounts to the relevant local government bodies in FY2020.

Also, considering the impact on ecosystems, we are working to reduce and substitute chemical substances such as by introducing stainless steel railcars that do not require painting.

*PRTR system
A system where companies notify their releases and transfers of chemical substances as required by the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (Law concerning Pollutant Release and Transfer Register (PRTR)). It encourages the monitoring and control of toxic chemical substances emitted into the environment and measures to prevent negative impact on the environment.

Promoting green procurement and purchasing

Green sourcing

The "JR East Code of Conduct for Material Procurement" posted on our website indicates a procurement policy that emphasizes the fulfillment of corporate social responsibility. We ask all of our partners to comply with the "Green Procurement Guidelines," which were devised to promote observance of the relevant regulations and to reduce the environmental burden.

Reference: Code of Conduct for Material Procurement of JR East

http://www.jreast.co.jp/e/data/procurement/code_of_conduct.html

Promoting green purchasing

At JR East, we primarily promote the procurement of environmentally friendly office supplies, and have prepared a structure where relevant products can be purchased through our in-house goods procurement system.

Established Ekimachi Energy Create Co., Ltd.

We established Ekimachi Energy Create Co., Ltd. in April 2020 to handle the supply and management of energy for the Shinagawa development project, which is scheduled to open in FY2025. Going forward, we aim for development that incorporates advanced environmental and energy technologies.

TCFD Recommendation-Related Initiatives

Since the adoption of the Paris Agreement, the countries and governments of the world have made a major shift toward decarbonization. Companies now must ascertain the financial impact of climate change-related risk and to disclose relevant information. JR East will draw up scenarios based on objective data to ascertain the financial impact of future climate change in the transportation service business. The business is vulnerable to natural disasters, which are intensifying in scale as climate change progresses. We will proactively work to disclose information using the framework of the Task Force on Climate-related Financial Disclosures (TCFD).

Further, we expressed our support for the TCFD recommendations in January 2020.

Disclosure of information based on TCFD recommendations

Recommendations	Content
Governance	We have established a Sustainability Strategy Committee chaired by our president and representative director to manage sustainability-related initiatives, set goals regarding climate change mitigation, and confirm progress versus targets.
Strategy	Our strategy is to identify important risks associated with climate change, assess the probable impacts on our business activities, and verify the validity of our business strategies.
Risk Management	The Sustainability Strategy Committee is working to ascertain climate change-related risks for each department and to prevent or reduce them.
Indicators and Targets	We use reduction of energy consumption and CO ₂ emissions as climate-related indicators and targets. We have also set environmental management indicators to better understand the relationship between those reductions and environmental impact.

Climate change-related strategy

(1) Awareness of risks and opportunities

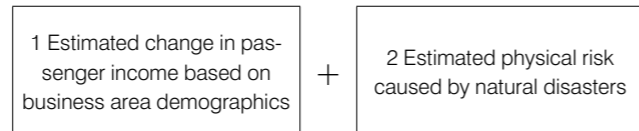
The risks and opportunities associated with climate change are those that result from the transition to a new framework, such as the strengthening of regulations and technological progress that occurs in the process of decarbonization, and those that result from physical changes, such as severe weather caused by global warming. We examined physical risks after estimating passenger income based on future demographics as a baseline for analysis. We recognize the following points as major climate change risks and opportunities.

	Main risks and opportunities	Timeframe
Physical risks	Damage to railway facilities and equipment and suspension of operations due to wind and water disasters	Short term
	Decrease in the number of passengers due to extreme weather events (heavy rain, extreme heat)	Long term
Transition risks	Cost increases due to the introduction/strengthening of a carbon pricing system	Medium term
	Decrease in passenger numbers due to competition with other means of transportation such as electric vehicles	Long term
	Decrease in passenger numbers due to damage/change to tourist attractions	Long term
Opportunities	Increase in passenger numbers due to preference for low-CO ₂ -emissions transportation	Long term

Short term: Less than three years
 Medium term: Three to nine years
 Long term: 10 years or more

(2) Scenario analysis

The scenario analysis targeted the transportation services business. The number of passengers in the business is expected to fall due to population decline (declining birthrate and aging population), and it is predicted that the impact will be particularly significant in rural areas. Over the medium-to-long term, in addition to macrosocioeconomic factors such as population decline, factors resulting from progressing climate change are expected to take a toll. In order to ascertain the financial impact of these factors and to verify the adequacy of our business and environmental strategies, we conducted the following scenario analysis with 2050 as the target year.



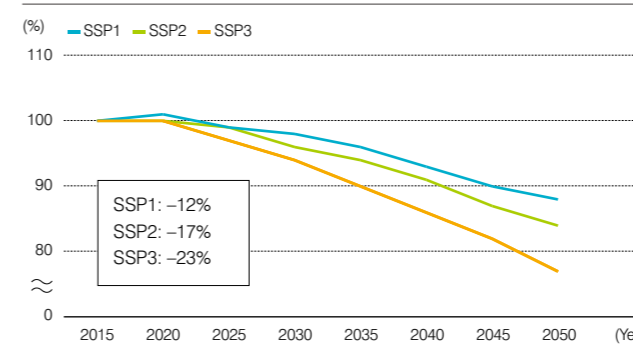
1 Estimated change in passenger income based on business area demographics

We estimated changes in passenger income up to 2050 based on data such as the Shared Economic Pathways (SSPs)*1 data on population and GDP*2, which are used across a range of fields in climate change research. The result was a difference of about 11% in the 2050 population estimate in ¥0.4 trillion in the passenger income estimate between the social scenario of "Sustainability" (SSP1) that we aim for and the opposing scenario of "Regional Rivalry" (SSP3).

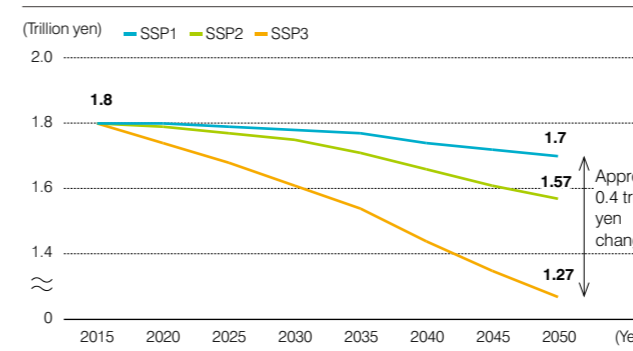
*1 Shared Economic Pathways (SSPs): Scenarios of projected socioeconomic global changes up to 2100.
 *2 Population data taken from the National Institute for Environmental Studies "Japan Shared Economic Pathways Population Estimates by Municipality." GDP data taken from the International Institute for Applied Systems Analysis (IIASA)'s "Global Dataset of Gridded Population and GDP Scenarios."

Scenario	State of domestic society	Birthrate	Mortality rate
SSP1 (2°C)	Sustainability: Development of renewable energy and environmental technology, urban concentration, compact development with robust networks	High	Moderate
SSP2 (Middle)	Middle of the Road: Maintain the status quo, current trends progress relatively unchanged	Moderate	Moderate
SSP3 (4°C)	Regional Rivalry: Uniform population decline, depopulation of regional areas	Low	Moderate

Business area population estimates by scenario (versus 2015)



Business area population estimates by scenario (versus 2015)



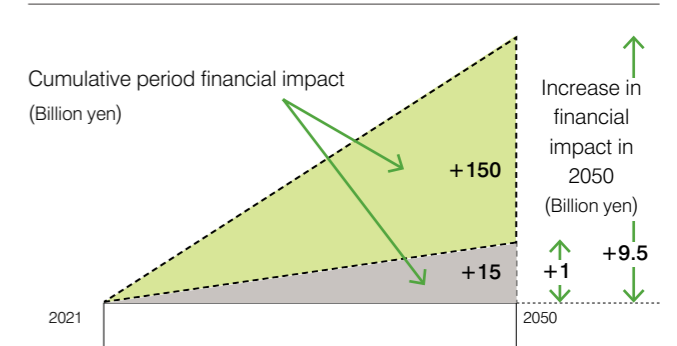
2 Estimated physical risk caused by natural disasters

For RCP2.6 (2°C) and RCP8.5 (4°C) scenarios*3, we analyzed physical risks from natural disasters (floods, storm surges, landslides) caused by climate change, and estimated the financial impact until 2050 based on certain assumptions. The calculation factored in future disasters, calculated using the rate of increase in the occurrence of natural disasters due to 2°C and 4°C rises at about 100 locations in the business area, and the financial impact of natural disasters during the 10 years from FY2011 to FY2020. We concluded the single-year financial impact (decrease in fares and increase in disaster recovery expenses) until 2050 would be between ¥0.5 and ¥4.8 billion in the RCP2.6 (2°C) scenario and between ¥1.5 and ¥5.3 billion in the RCP8.5 (4°C) scenario. These are still first-stage scenario analyses; moving forward, we plan to carry out a quantitative evaluation of the financial impact on our major routes based on disaster scenarios, and work to refine estimates.

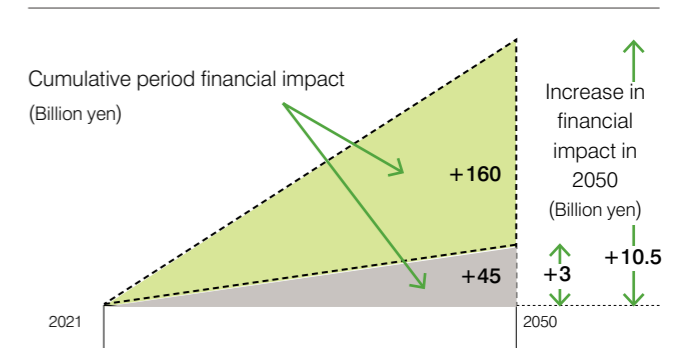
*3 Representative Concentration Pathways (RCPs): Representative Concentration Pathway Scenarios used in the IPCC Fifth Assessment Report

Climate change scenario	Period (FYs)	Increase in financial impact in 2050 (Billion yen)	Financial impact (Billion yen) (decrease in fares and increase in disaster recovery expenses)	
			Cumulative period	Annual
RCP2.6 (2°C)	2022 ~ 2051	1~9.5	15~145	0.5~4.8
RCP8.5 (4°C)		3~10.5	45~160	1.5~5.3

Potential increase in financial impact under RCP2.6



Potential increase in financial impact under RCP8.5



(3) Future policy and initiatives based on analysis results

We have long been working to mitigate climate change by introducing energy-saving railcars and improving the efficiency of our power plants. In May 2020, we set a new long-term environmental goal of achieving "effectively zero" CO₂ emissions in the railway business in FY2051 with our Zero Carbon Challenge 2050 initiative. Moving forward, we aim to further increase the environmental advantage of railways over other forms of transportation and contribute to the realization of a carbon-free, sustainable society.

In addition, we have signed partnership agreements regarding "compact town" development with local government bodies in regional areas based on the idea of enriching local communities. These initiatives will lead to the creation of bustling city centers and inflow of tourists. We position such efforts as contributing to the realization in Japan of a sustainably developing society, and will continue to promote attractive development centered on stations.