

Environment

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[Priority commitment goals]



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Basic Concept for Ecology Promotional Activities

■Basic philosophy and basic policies for promoting ecological activities (established May 1992, partially revised in September 2012)

The JR East Group formalized its basic philosophy and policies in 1992 and established activity guidelines in 1996.

Our specific environmental protection measures are based on these.

Basic philosophy

The entire JR East Group, as a member of society, will diligently strive to balance global environmental protection with our business activities.

Basic policies

To contribute to creating a global environment for the future through our business activities for our customers and local communities.

To develop and provide the technology needed to protect the global environment.

To maintain our concern for the global environment and raise global environmental awareness of our employees.

■Activity guidelines for the promotion of ecological activities (established March 1996 and partially revised in February 1998 and September 2012)

- 1 While working to reduce total energy consumption by enhancing energy efficiency and introducing cleaner forms of energy, we endeavor to reduce CO₂ emissions, a contributor to global warming.
- 2 We ensure the proper management and processing of environmental pollutants and ozone-depleting substances, in compliance with laws and regulations. Moreover, we do our best to reduce generation of such substances and adopt environmentally responsible substitutes as much as possible.
- 3 We ensure the appropriate processing of various types of waste generated at our offices, establishments, stations, trains, and other locations. We strive to recycle waste and to reduce its generation, and to use more recycled and resource-saving products to minimize the burden we place on the environment.
- 4 We respect the natural environment, which nurtures diversified life, and endeavor to reduce noise and vibrations caused by train operations, thus achieving harmony with the environment along railway lines.
- 5 We are looking carefully at the impact of railways on the environment once again, in order to enhance the environmental superiority of railways and to spread that awareness throughout the world.

■Committee on Ecology

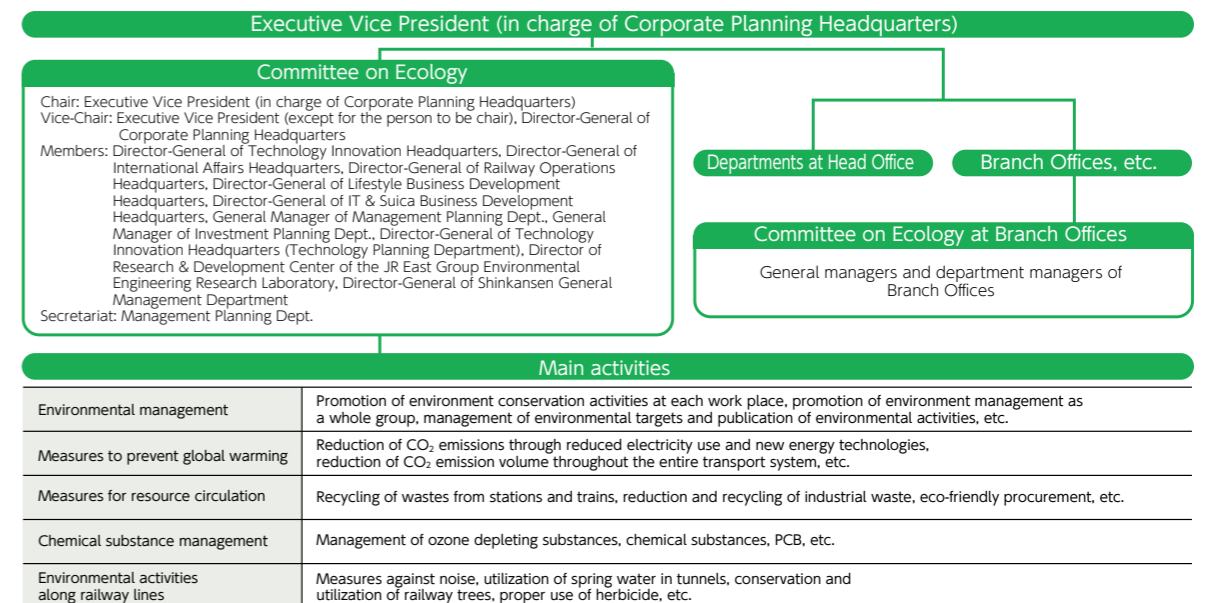
JR East established our Committee on Ecology Promotion, which is chaired by the executive vice president, as a management organization to promote environmental activities. It sets environment-related targets, implements environmental conservation activities, surveys the environmental impact of business activities, monitors progress toward target achievements, and so forth.

Furthermore, the Management Planning Dept. serves as the secretariat overseeing environmental management for the entire JR East Group.

■Compliance with environmental laws and regulations

There were no major violations of environment-related laws and regulations resulting in penalties in FY2019.

[Organizational structure to promote environmental management (as of July 2019)]



Environmental Management

Management of Environmental Goals

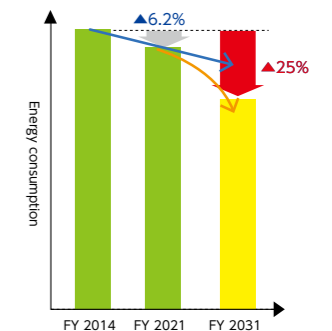
■FY2031 goals

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 which will be a new international framework for global warming countermeasure after 2020, JR East has set environmental goals which plan to be achieved in FY2031.

Category of environmental conservation activities	Performance indicators	Targets to be met by FY2031
Measures to prevent global warming	Energy consumption from railway business activities	25% reduction (compared to FY2014)
	CO ₂ emission volume from railway operations	40% reduction (compared to FY2014)

Reduce energy consumption and CO₂ emissions in railway operations

Towards realizing the FY2031 goals, we pursue achieving reduction of energy consumptions by 25% and reduction of CO₂ emission volume by 40% in railway operations (compared with FY2014) by accelerating the pace of reduction through FY2021 through activities



such as installation of power storage facilities, self-consumption of renewable energy, and expanded introduction of E235 series trains. In addition, we aim to achieve further system innovation such as enabling energy-saving automated operation.

As for the reduction of CO₂ emission volume, based on the assumption that power company emission factors will be 0.37 kg-CO₂/kWh in FY2031, we have set goals on CO₂ emission volume, or reducing energy consumption by 25%.

State of progress toward FY2021 goals

FY2021 Goals

Since 1996, JR East has been conducting environmental conservation activities with a focus on specific goals.

Note: External Assurance on environmental performance and environmental accounting data

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

Figures in parentheses are in comparison to FY2014

Category of environmental conservation activities	Performance indicators	Unit	Reference value (FY2014)	FY2021 goal	FY2019 result
Measures to prevent global warming	Energy consumption from railway business activities	Billions of MJ	51.7	48.5 (6.2% reduction)	49.5* (4.3% reduction)
	Electricity consumption for train operation (Shinkansen lines)	kWh/car-km	2.49	2.36 (5.1% reduction)	2.41* (3.2% reduction)
	Electricity consumption for train operation (conventional lines)	kWh/car-km	1.59	1.46 (8.3% reduction)	1.50* (5.6% reduction)
	Energy consumption at branch offices, etc.	kL/m ²	0.0407	0.0366 (10.0% reduction)	0.0359* (11.8% reduction)

Progress of Environmental Measures

Category of environmental conservation activities	Performance indicators	FY2021 goal	FY2019 result
Measures to prevent global warming	Implementation of more ecoste Model Stations	Total of 12 Stations	Total of 10 Stations
	Switching Platform and Concourse Lighting to LEDs	Total of 62 thousand units (reduction of 129 million MJ)	Total of 52 thousand units (reduction of 110 million MJ)
	Improving Efficiency of Large-scale Air-conditioning Systems	Total of 10 Locations (reduction of 82 million MJ)	Total of 8 Locations (reduction of 76 million MJ)

Annual Targets through FY2021

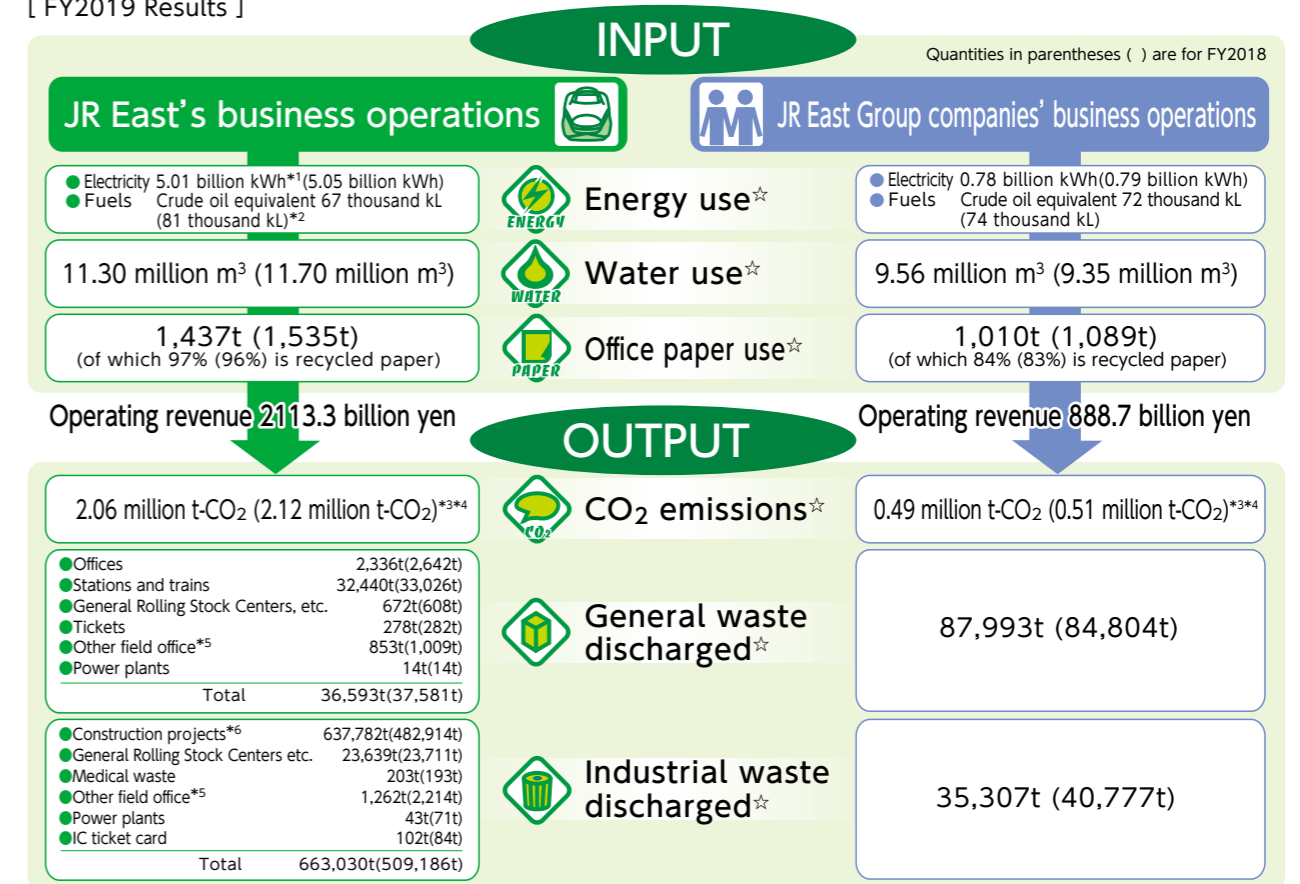
Category of environmental conservation activities	Performance indicators	Goal	FY2019 result
Measures to prevent global warming	Reduction Rate of Energy Consumption Intensity of Each JR East Group Company	Every year 1% reduction in each group company	1% reduction by all group companies
Measures for resource 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%	96%*
	Recycling rate for waste generated in facility construction projects.	96%	94%*
	Implementation Rate of Recycling by Group companies	100%	100%
Environmental management	Setting of numeric targets by Each JR East Group Company	Targets to be revised continually	Established

Targets for Group companies

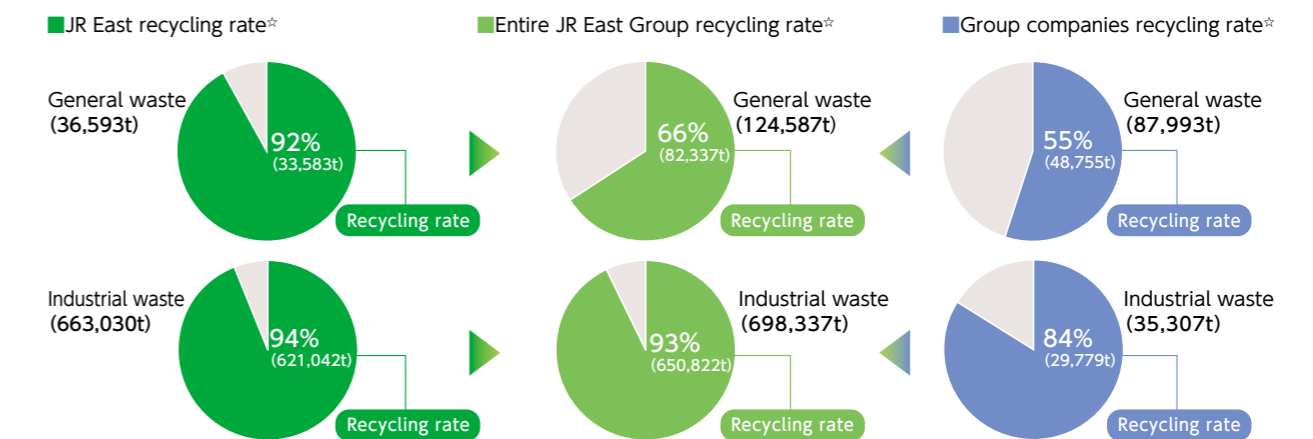
Progress of Environmental Management by Entire Group

JR East Group's environmental impact

[FY2019 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 100 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 is 1.33 million tons CO₂ and Scope 2 emissions 1.56 million tons CO₂. (please see page 101)
 *4 CO₂ emissions attributable to electricity purchased from external suppliers are calculated based on the adjusted emissions coefficient.
 *5 Other field office: Technical centers, equipment maintenance centers, and other locations such as train crew depots.
 *6 Construction projects: Waste generated by our construction projects, but for which contractors legally become the waste-discharging entities, is included in industrial waste.



Definition of waste disposal
 · Waste includes salable waste.
 · Recycling includes thermal recycling* where general waste is treated at incineration plants etc. and industrial waste is incinerated as intermediate treatment for heat recovery.
 *Thermal recycling is a recycling method in which the heat arising from the incineration of waste is used to create steam and hot water, which in turn are used to generate electricity and for hot-water supply.

Environmental Accounting and Environmental Management Indicators

In FY2019, our environmental conservation costs amounted to approximately 22.5 billion yen in investments and 19.6 billion yen in expenses. By introducing new type of cars, we estimate we will reduce CO₂ emissions by about 12 thousand tons per year. JR East has its own Environmental Management

Indicator to assess the relation between our business activities and environmental impacts. These are calculated by dividing CO₂ emissions, which are a major factor in our environmental impacts, by operating profits, which represent our economic value added. A smaller value of the indicator means that we are making a smaller impact on the environment to create the same economic value added. For FY2019 the value of the indicator was 5.27t- CO₂ /million yen, compared to 9.45t- CO₂ /million yen for FY1991.

[Environmental accounting for fiscal year ended March 2019*] ():FY2018

Category	Environmental conservation costs (billion yen)		Environmental conservation benefits in relation to environmental targets		Economic benefit of environmental conservation activities (billion yen)
	Investments	Expenses			
Environmental conservation (pollution prevention) activities along railway lines	5.19(5.31)	10.35(12.07)	-	-	-
Global environmental conservation activities	17.33(8.16)	-	Energy consumption from railway business activities	49.5 billion MJ	9.60(10.24)
			Electricity used for railway operations per unit of transport volume	Shinkansen 2.41 kWh/car-km Conventional Lines 1.50 kWh/car-km	
			Energy consumption per unit of floor area at branch offices, etc.	0.0359 kL/m ²	
Resource circulation activities	-	7.10(6.46)	Recycling rate for waste generated at stations and on trains	93%	5.60(1.78)
			Recycling rate for waste generated at General Rolling Stock Centers, etc.	96%	
			Recycling rate for waste generated in construction projects	94%	
Environmental management	-	0.36(0.36)	-	-	-
Environmental research & development	-	1.78(1.70)	-	-	-
Social activities	-	0.03(0.03)	-	-	-
Total	22.51(13.47)	19.61(20.62)			15.20(12.02)

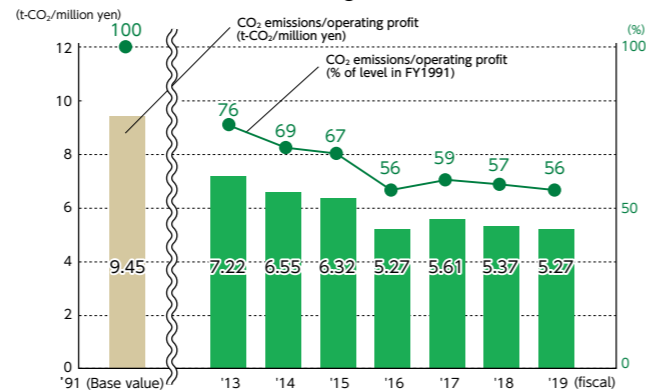
Notes
Capital investment for the period: 509.4 billion yen
Total R&D costs for the period: 20.7 billion yen (Consolidated)

The above table's relations with the table for Targets and Results are as follows:
"Environmental conservation activities along railway lines" = "Environmental activities along railway lines" and "Chemical substance management"
"Global environmental conservation activities" = "Measures to prevent global warming" and "Chemical substance management"
"Resource circulation activities" = "Measures for resource circulation"
"Environmental management" = "Environmental management" and "Environmental communication"
"Environmental research & development" = "Research & development"
"Social activities" = "Environmental communication"

(Notes on calculation of environmental conservation costs and benefits)
Environmental conservation costs
○Data are for East Japan Railway Company only (i.e., non-consolidated data).
○Environmental conservation costs are mainly based on data available in the current management system.
○To date, we have declared the total amount of investments in energy-saving rolling stock, but starting from FY2016, we will not declare amounts corresponding to upgrades of aging rolling stock.
○Expenses do not include depreciation charges.
○In the costs for resource recycling activities, expenses for treating waste generated at stations and by trains are calculated by multiplying the allocations by the expenses for cleaning stations and train cars, based on a model for cleaning stations and trains.

○In the costs for resource recycling activities, the expenses for treating waste generated through construction projects are calculated by multiplying waste volume for FY2019 by standard unit costs for the type of waste in that region.
Environmental conservation benefit
○Environmental conservation benefits are calculated based on figures set as our environmental targets.
Economic benefit of environmental conservation activities
○Economic benefit of global environmental conservation activities is calculated by multiplying annual savings (estimates are used in some cases) in electricity and repair costs resulting from the introduction of energy-efficient trains by the expected useful life, to determine useful-life economic benefit.
○Income from the sales of waste generated at General Rolling Stock Centers and through construction projects is included in economic benefit of resource circulation activities.

[JR East's Environmental Management Indicator*]



Environmental Management Indicator

$$\text{Environmental Management Indicator} = \frac{\text{Environmental Impacts}}{\text{Economic Value Added (EVA)}} = \frac{\text{CO}_2 \text{ emissions (t-CO}_2\text{)}}{\text{Operating profit (million yen)}}$$

Overview of JR East Group's energy initiatives

At JR East Group, we aim to optimize energy at various stages in "Creation, Send, 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

JR East Group's renewable energy

Delivering

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

To trains, stations, office buildings, etc.

Storing

(Energy storage [power storage/heat storage])

Diversification of energy

- Implementing and enhancing hydrogen stations

Utilizing (Energy-saving)

- Energy-saving rolling stock
 - E235 series
 - E7 series
 - Accumulator railcar train (ACCUM)
 - EV-E301 series
 - EV-E801 series
- Eco-station model stations
 - Hiraizumi Station (solar power generation)
 - Musashi-Mizonokuchi Station (greening)
- High-efficiency equipment
 - Shinjuku Station (LED lighting)
- Eco-friendly office buildings
 - JR Shinjuku Miraina Tower
 - JR Minami-Shinjuku Building

- Introducing fuel cell buses and vehicles
 - Fixed-route buses
 - Business-use automobiles
- Developing trial fuel cell railcars
 - FV-E991 series