



Environment

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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)

- 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.
- 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.
- 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.
- 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.
- 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

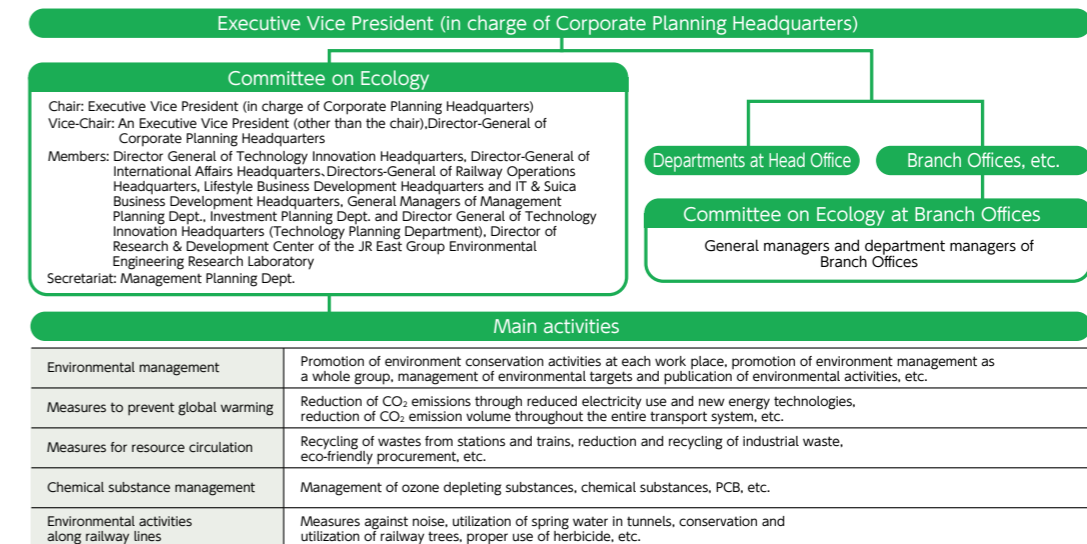
Established in 1992 as a top management organization to promote environmental activities and chaired by the executive vice president of JR East, the Committee on Ecology Promotion surveys the environmental impact of business activities, sets environment-related targets, implements environmental conservation activities and monitors progress toward target achievements, etc. which is also examined by top management. Furthermore, the

"Environmental Management Office" was established in our Management Planning Dept., and oversees 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 FY2018.

[Organizational structure to promote environmental management (as of July 2018)]



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 countermeasures after 2020, JR East has set environmental goals to be achieved in FY2031.

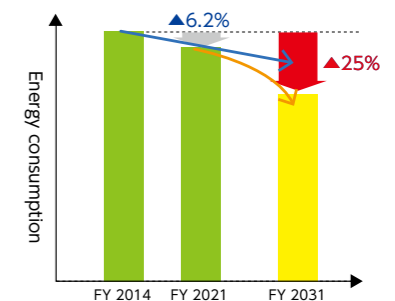
Category of environmental conservation activities	Performance indicators	Targets to be met by FY2031
Measures to prevent global warming	Energy consumption from railway business activities	25% reduction (compared to FY2014)
	CO ₂ emission volume from railway operations	40% reduction (compared to FY2014)

25% reduction of energy consumption for railway operations (compared to FY2014)

Towards realizing the FY2031 goals, we pursue achieving a reduction of 25% energy consumption

for railway operations (compared to FY2014) by accelerating the reduction pace to FY2021 through activities such as installation of power storage facilities, using renewable energy, and increasing the introduction of E235 series trains.

In addition, we aim to achieve further system innovation such as enabling energy-saving automated operation.



40% reduction of CO₂ emission volume from railway operations (compared to FY2014)

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, and a 25% reduction in energy consumption.

■ 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 to provide external assurance on a set of selected environmental performance and environmental accounting indicators so that the reliability of the data 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	FY2018 result
Measures to prevent global warming	Energy consumption from railway business activities	Billions of MJ	51.7	48.5 (6.2% reduction)	50.6 [☆] (2.1% reduction)
	Electricity consumption for train operation (Shinkansen lines)	kWh/car-km	2.49	2.36 (5.1% reduction)	2.44 [☆] (1.9% 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)	0.0379 [☆] (6.9% reduction)

Progress of Environmental Measures

Category of environmental conservation activities	Performance indicators	FY2021 goal	FY2018 result
Measures to prevent global warming	Implementation of more ecoste Model Stations	Total of 12 Stations	Total of 9 Stations
	Switching Platform and Concourse Lighting to LEDs	Total of 36 thousand units (reduction of 83 million MJ)	Total of 39 thousand units (reduction of 84 million MJ)
	Improving Efficiency of Large-scale Air-conditioning Systems	Total of 10 Locations (reduction of 82 million MJ)	Total of 7 Locations (reduction of 61 million MJ)

Annual Targets through FY2021

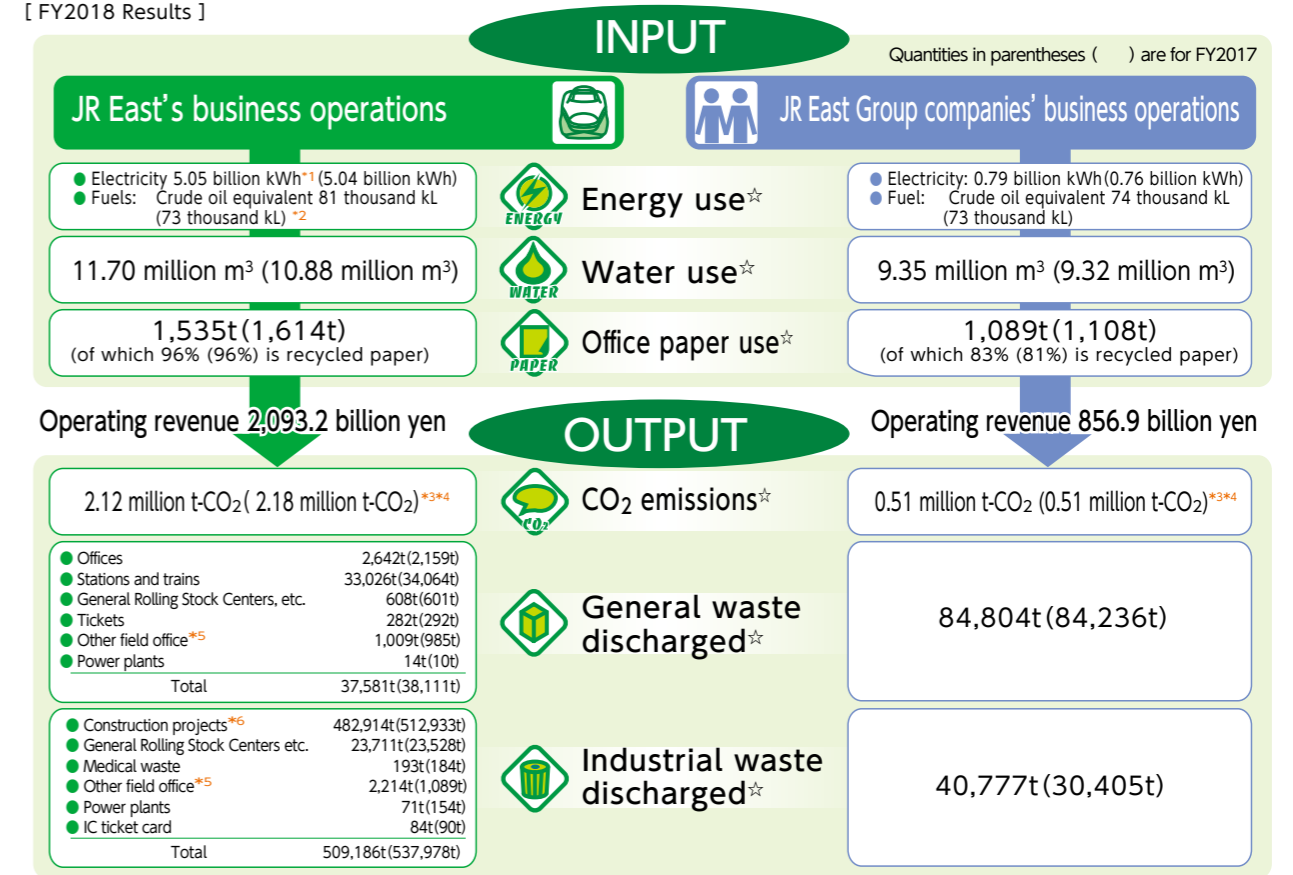
Category of environmental conservation activities	Performance indicators	Goal	FY2018 result
Measures to prevent global warming	Reduction Rate of Energy Consumption Intensity of Each JR East Group Company	Every year 1% reduction in each group company	2.3% reduction by all group companies
Measures for resource circulation	Recycling rate for waste generated at stations and on trains	94%	94% [☆]
	Recycling rate for waste generated at General Rolling Stock Centers, etc.	96%	95% [☆]
	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

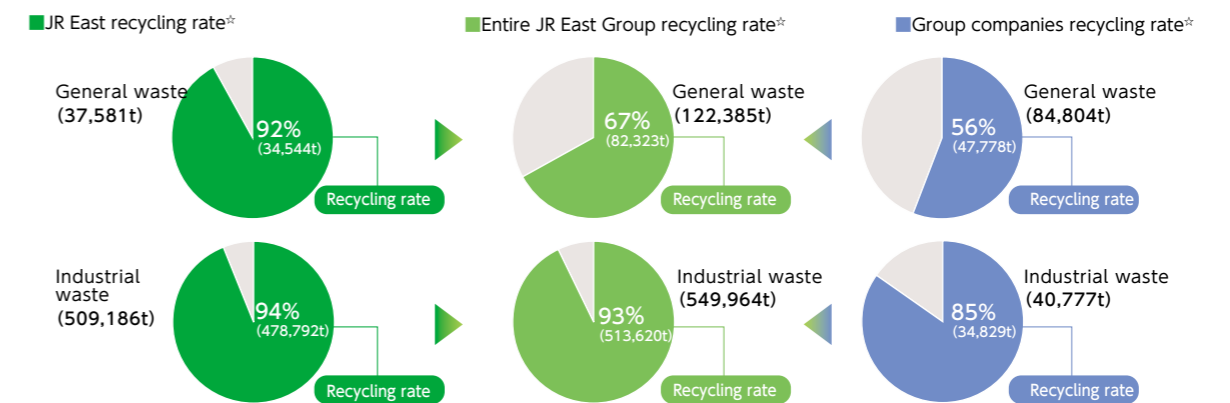
Progress of Environmental Management by Entire Group

■ JR East Group's environmental impact

[FY2018 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 87 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 1.52 million tons CO₂* and Scope 2 emissions 1.65 million tons CO₂*. (please see page 88) *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 FY2018, our environmental conservation costs amounted to approximately 13.5 billion yen in investments and 20.6 billion yen in expenses. By introducing new type of cars, we estimate we will reduce CO₂ emissions by about 120 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 FY2018 the value of the indicator was 5.37t-CO₂/million yen, compared to 9.45t-CO₂/million yen for FY1991.

[Environmental accounting for fiscal year ended March 2018☆]

() : FY2017

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	5.31 (4.80)	12.07 (12.72)	—	—
Global environmental conservation activities	8.16 (10.88)	—	Energy consumption from railway business activities	50.6 billion MJ
			Electricity used for railway operations per unit of transport volume	Shinkansen 2.44 kWh/car-km Conventional Lines 1.50 kWh/car-km
			Energy consumption per unit of floor area at branch offices, etc.	0.0379 kL/m ²
Resource circulation activities	—	6.46 (5.64)	Recycling rate for waste generated at stations and on trains	94%
			Recycling rate for waste generated at General Rolling Stock Centers, etc.	95%
			Recycling rate for waste generated in construction projects	94%
Environmental management	—	0.36 (0.35)	—	—
Environmental research & development	—	1.70 (1.62)	—	—
Social activities	—	0.03 (0.03)	—	—
Total	13.47 (15.68)	20.62 (20.36)		12.02 (13.87)

Notes
Capital investment for the period: 452.8 billion yen
Total R&D costs for the period: 18.1 billion yen (Consolidated)

The above table's relations up to with the table for Targets and Results is 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)

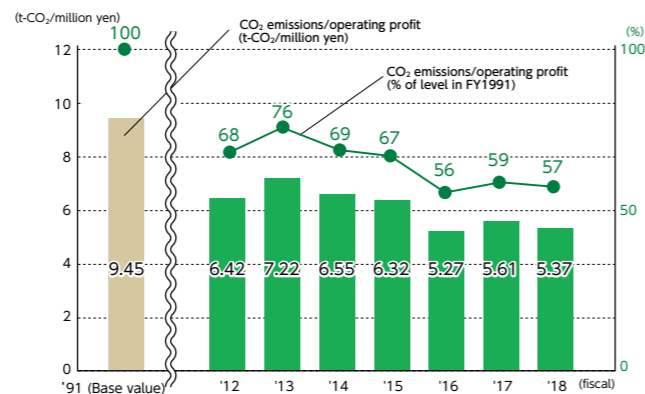
Environmental conservation costs
○Data are for East Japan Railway Company only (i.e., non-consolidated data).
○Environmental conservation costs are mainly based on data available in the current management system.
○To date, we have declared the total amount of investments in energy-saving rolling stock, 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 FY2018 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.

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

[JR East's Environmental Management Indicator ☆]



Progress of Environmental Conservation Activities at Each Workplace

Creating an environment-conscious culture

JR East believes it is important to promote environmental activities with clear goals established for the entire JR East Group, and to have every employee actively involved. We are expanding the scale of our environmental activities

by promoting "JR East Eco Activities" at each work place, developing leaders through environmental education, and sharing recognition of outstanding environmental efforts through the presentation of awards.

TICKET TO TOMORROW

Eco-Friendly Exhibit on the Frontlines

Chief Conductor, Yokohama Transportation Depot, Yokohama Branch Office,



At the Eco-Friendly Promotion Committee where I work as a leader, we operate under the mantra, "Let's actively engage in eco-friendly activities that everyone can do! Tackling eco together." In FY 2018, we held an eco-friendly exhibit inside our workplace to raise our employee's eco-consciousness, exhibiting slippers made of newspapers, which are useful in disasters, eco-friendly scrubbing brushes made of acrylic yarn, etc. An employee who participated gave a favorable review saying, "I physically felt closer to eco," and it was a good opportunity to entrench eco-consciousness.

In the future, we hope to utilize other eco-friendly exhibits and events such as eco-cap art, which uses the bottle caps of plastic bottles, to not only engage our employees but also allow our clients and people in the community to enjoy eco-friendly activities.

Environmental education & training system

For effective environmental management, it is essential that all employees have appropriate knowledge on environmental issues. We provide environmental education lectures to our employees in training in order to develop environmental activists in the local organization of JR East and group companies.

Internal environmental audits

At our General Rolling Stock Centers and others which obtained ISO 14001 certification, in-house auditors are trained through external training programs, and conduct routine audits at the centers in order to evaluate environmental activities.

Education of environmental-activity promoters at each organization of JR East and group companies
[Training of those responsible for the environment]
<ul style="list-style-type: none"> ● Persons trained: those responsible for the environment at local organizations, etc. ● Objective: improvement of ability in environment-related matters as trainers to field offices, etc. ● Number of participants: 13
[Environment countermeasures of Shinkansen practical training]
<ul style="list-style-type: none"> ● Persons trained: those responsible for the environment at each Branch Office ● Objectives: learning of basic knowledge about relevant rules and regulations for noise and vibration ● Number of participants: 10
[JR East Group Environmental Management Promotion Conference]
<ul style="list-style-type: none"> ● Persons participating: those responsible for the environment at all group companies (twice a year) ● Objective: promotion of environmental management for the entire JR East Group
Implementation of training and lectures on the environment in Branch Offices

[ISO14001-certified facilities]

Certified facilities	Year and month of certification
(JR East)	
Kawasaki Thermal Power Plant	Mar-01
Tokyo General Rolling Stock Center	Mar-01
Omiya General Rolling Stock Center	Feb-02
Shinkansen General Rolling Stock Center	Nov-02
Koriyama General Rolling Stock Center	Dec-03
Nagano General Rolling Stock Center	Feb-05
Akita General Rolling Stock Center	Jul-05
(Group companies)	
East Japan Eco Access Co., Ltd.	Nov-99
Nippon Restaurant Enterprise Co., Ltd. (CK headquarters)	Sep-02
JR East Mechatronics Co., Ltd.	Mar-08
East Japan Marketing & Communications, Inc.	Aug-08
JR East Railcar Technology & Maintenance Co., LTD.	Dec-10
Japan Transport Engineering Company	Oct-14



Safety



Society



Environment

Development of Environmental Education by Delivering Lectures on Request

In FY2010, to contribute to the development of a sustainable society, JR East initiated environmental education programs for children to understand environmental issues and their relationship to society. JR East employees working in each area are visiting neighboring schools for the programs. In FY2018, the program was implemented at 80 schools, primarily elementary schools, in the JR East area. As these initiatives were well-received, we received an Excellence Award at the Career Education Awards sponsored by the Ministry of Economy, Trade and Industry in FY2018.



Delivering Lectures

Initiatives for: environmental activities of the Shinanogawa Power plant

In July 2016, we opened the "Citizen house; Ojiya Shinanogawa Hydroelectric Plant House" as a part of popularization activities for the Shinanogawa Hydraulic Power Plant to give the opportunity to learn about the mechanism of hydraulic power generation which is a source of clean energy. We have been popular among the people of the local community, and in December 2017, the number of visitors reached 100,000.

Also that, we release juvenile salmon as a part of initiatives to harmonize water usage and the river environment of the Shinanogawa River with the people of the local community.



Ojiya Shinanogawa Hydroelectric Plant House

Measures to Prevent Global Warming

Energy conservation and CO₂ reduction

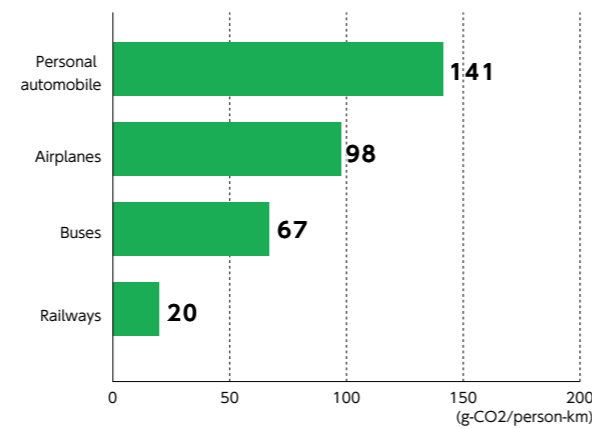
Railways are an environmentally friendly mode of transportation that accounts for a low share of the total CO₂ emissions produced by the transportation sector relative to their share of transportation volume.

However, JR East consumes around 5 billion kWh of power each year, which is a massive amount corresponding to approximately 1.4 million households.

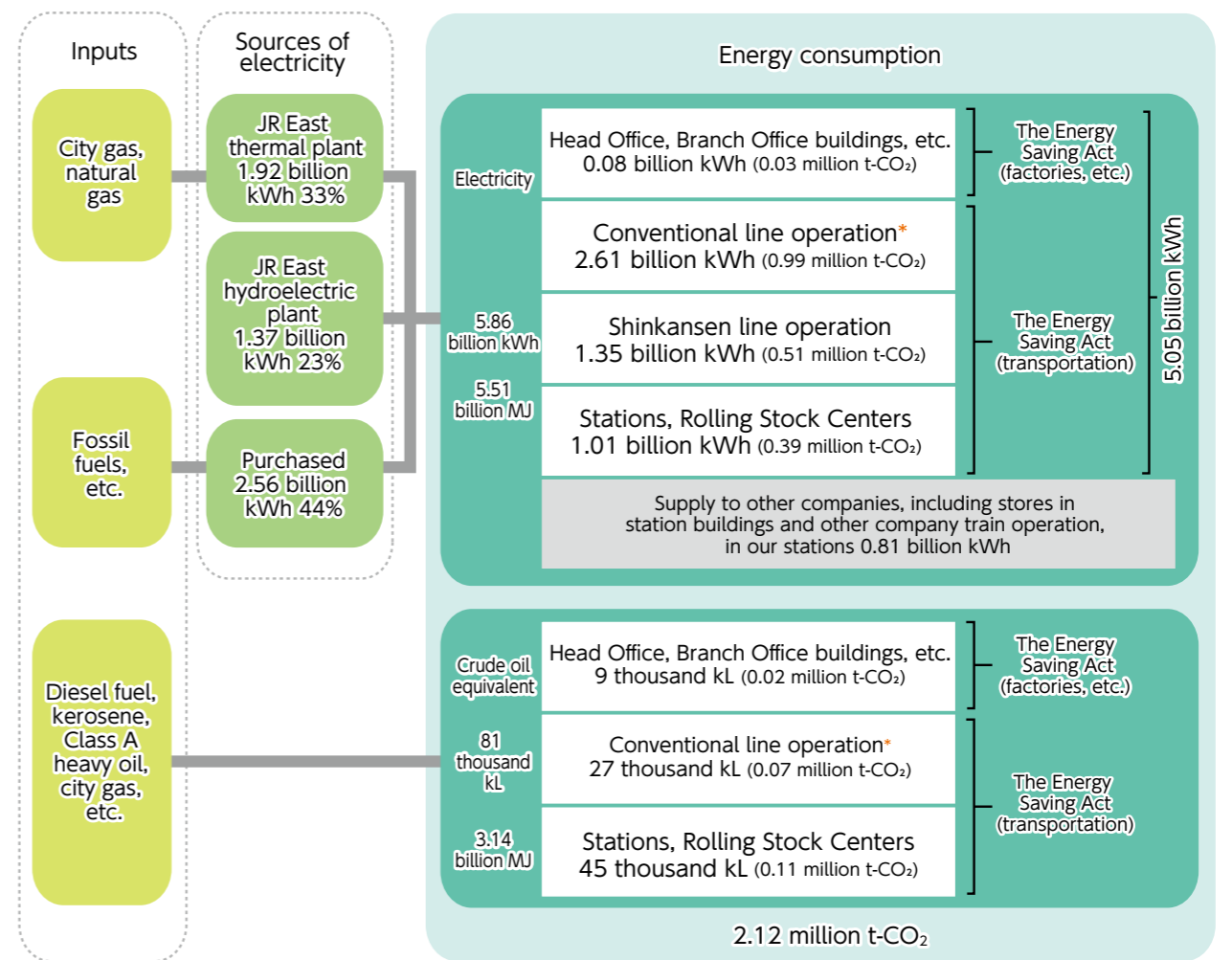
We will therefore strive to save energy for train operation, which accounts for about 80% of our total energy consumption, and furthermore, it will be necessary to conduct energy saving activities even in offices and others.

The energy flow map 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 are also used to operate diesel trains and stations and office air-conditioning.

[CO₂ emissions per transportation amount (FY2017 passengers)]



[JR East Energy flow map]*



(CO₂ emissions are the amount calculated with 'adjusted' emission coefficients)

* Including BRT (Bus Rapid Transit)

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 premise which are operated by group companies is not included in the boundary. Thus, 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 hydroelectric power generated by JR East is calculated by multiplying by 9.76MJ/kWh. For hydroelectric power generated by JR East, reports required by the Energy Saving Act are reported by the 0 MJ.

[Composition of energy consumption by JR East]**

