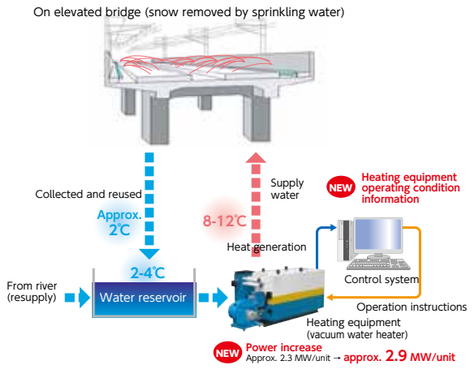
○**Energy-Saving Measures to Improve the Efficiency of Snow Removal Sprinkler Equipment**

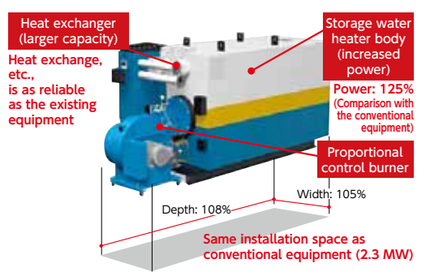
In addition to replacing aging snow removal sprinkler equipment, which helps to ensure stable Shinkansen transportation in regions with heavy snowfall, we are working on energy-saving by improving the equipment's efficiency. Snow removal sprinkler equipment is a system that prevents accumulation of snow on elevated bridges by sprinkling warm water that is heated using a heating device. At the same time, these systems also consume a huge amount of energy, and equipment on the Tohoku, Joetsu, and Hokuriku Shinkansen Lines uses 10,000 to 15,000 kL of kerosene per year in winter alone; converted into CO_2 emissions, this corresponds to 25,000 to 37,000 t.

We therefore developed a new, high-efficiency control system that uses heating equipment operating condition information and heating equipment that has a higher output while still occupying the same installation space as conventional equipment, and implemented it first at the Joetsu Shinkansen Nakajima Snow Removal Base (Nagaoka City, Niigata Prefecture), in FY2018. With this, we are working to reduce fuel consumption by 10%.

[Overview of Snow Removal Sprinkler Equipment and Key Developments]



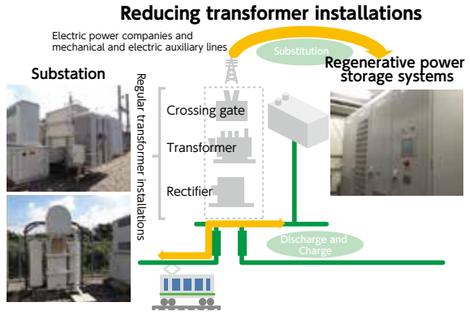
[Development machine (heating equipment)]

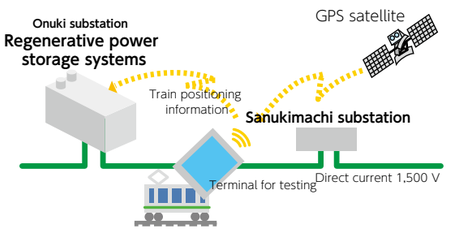


○**Slimming Down Transformer Substations Utilizing Regenerative Power Storage Systems**

By replacing the multiple machines located at substations with regenerative power storage systems, we are aiming to economize maintenance manpower by reductions transformer installations. At the demonstration experiment that has been conducted since October 2017 at the Onuki substation on the Uchibo Line, we are testing whether regenerative power storage systems can supply the electric power that trains need without the functions of a substation.

With this development, we control appropriate amounts of discharge and charge when trains are located at the appropriate sections, utilizing train positioning information gathered from GPS, and discovered that we can potentially reduce battery capacity by approximately 30%. In the future we hope to coordinate train energy conservation operation patterns with above ground facilities control, aiming for energy conservation by railways.





Measures for resource circulation

■Waste reduction and recycling

JR East generates many kinds of waste through its railway operations, including daily general trash removed from trains and stations and industrial waste from our General Rolling Stock Centers. Restaurants and retail stores in our lifestyle businesses also produce garbage and general waste. In order to reduce all these various forms of waste, JR East actively supports the approach known as "reduce, reuse, and recycle." For recycling in particular, goals are set for each type of waste.

■Recycling waste collected from stations and trains☆

Since trash from stations and trains contains recyclable materials, we placed separation bins in stations to have customers cooperate in separating trash. In October 2010, to further improve recycling rates by implementing thorough separation of trash, we built the JR East Tokyo Materials Recycling Center (operated by East Japan Eco Access Co., Ltd.) and started its operation.

JR East Tokyo Materials Recycling Center

○**Recycling trash generated at stations within the company**

Magazines, newspapers and similar paper items collected from our segregated trash boxes at stations and trains are being recycled into coated paper and stationery and used in our offices.

Newspapers and other papers collected in stations and elsewhere are recycled into office paper used by our company.

■Reducing and recycling tickets☆

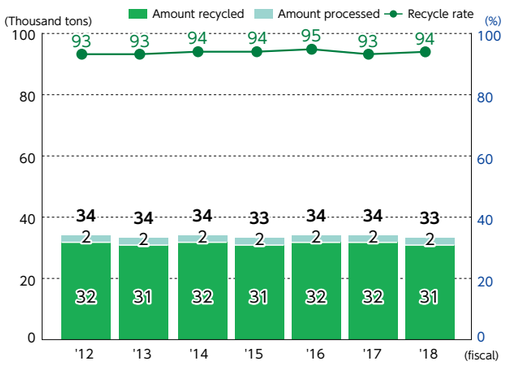
Collected used tickets are sent to a paper mill. After the iron powder has been separated from the backs of the tickets, the paper is recycled to make toilet paper and corrugated cardboard.

Used tickets collected at stations are recycled into toilet paper.

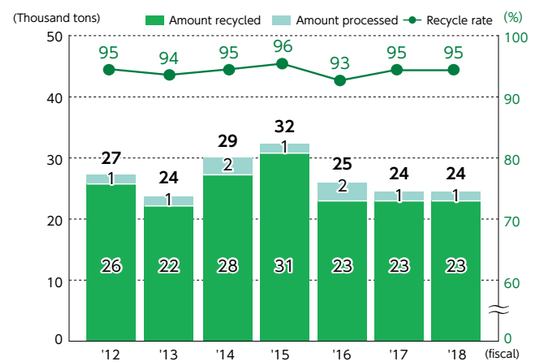
■Recycling at General Rolling Stock Centers☆

JR East Group is recycling waste generated during the manufacture and maintenance of rolling stock. At our regional General Rolling Stock Centers, waste is sorted into 20 to 30 categories to reduce waste generation and promote recycling. Starting in FY2006, we have been collecting data on the volume of retired railcars that are sold as scrap to be recycled so as to monitor our progress.

[Waste from stations and trains]



[Waste from General Rolling Stock Centers]

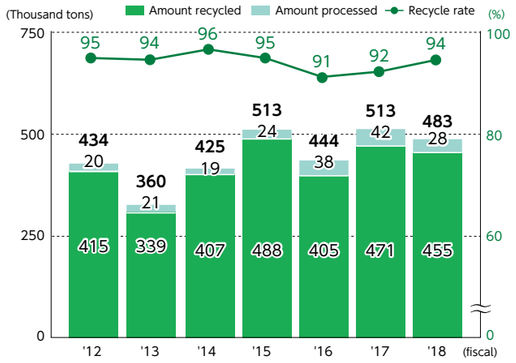


■Reducing construction waste☆

JR East endeavors to reduce waste from construction by standardizing design and construction methods that help to properly dispose of construction byproducts and to minimize waste.
JR East reduced waste from construction and maintenance works at stations and other structures, including approximately 59 thousand tons of waste from work entrusted to JR East*.

*Work entrusted to JR East Construction work contracted to JR East by local governments etc., to be done at non-JR East facilities, for such purposes as to ensure safe train operations.

[Waste from construction projects]



■Reducing waste at offices☆

In departments at the Head Office and Branch Offices, we strive to reduce waste by promoting elimination of paper and by recycling, including the use of creative, employee designed trash cans. In FY2018, we recycled 2,145 tons out of a total of 2,642 tons of waste (81%).

■Efficient use of water resources☆

As a consumer of 11.70 million m³ of water annually, JR East actively promotes the use of recycled waste water*, using, for example, rainwater and water already used for washing hands to flush toilets. At the Head Office building, 24 thousand m³ out of 33 thousand m³ of water was reused in FY2018.

*Recycled waste water Defined as water of a quality level between clean water and sewage water. It is used for limited purposes as a recycled resource.

■Promoting green procurement

JR East is procuring products with lower environmental impact. As part of those efforts we formulated the "JR East Green Procurement Guidelines." Outlined in these guidelines is our philosophy with regard to materials, conservation of resources, and packaging. We also are promoting the procurement of environmentally friendly office supplies.

Topics

Participating in Initiative to Recycle Food Waste into Biogas

In August 2016, JR East Japan Group entered the food recycling business with J Bio Food Recycle Co., Ltd., established as a joint venture with the JFE Group. The Yokohama Factory completed in August 2018 receives a maximum of 80 t of food waste a day across the city, starting with JR East Japan Group's station buildings, and generates power by Biogasification through methane fermentation treatment. It expects to generate power to be used as renewable energy by approximately 3,000 ordinary homes, and a part of the waste heat will be effectively utilized inside the factory. Since much of the food waste generated at station buildings, etc. has a high amount of fat, salt, and packaging, etc. mixed in with it, it was difficult to recycle this waste by making it into livestock feed. The Food Recycling Business aims to improve the food recycling rate of the JR East Group and generate environmentally friendly renewable energy, contributing to the prevention of global warming.

■CSR Procurement

With regard to selecting suppliers for material procurement, we have published a Code of Conduct Regarding Material Procurement of JR East on our website, which states that we focus on the fulfillment of our corporate social responsibilities when procuring materials by considering factors such as legal compliance and environmental preservation. We also request that all our suppliers comply with the relevant laws and regulations and seek to reduce their environmental footprint.
In addition, we seek to understand the current status of all material-related suppliers by conducting a survey of their CSR initiatives once a year, as a rule, which indicates whether or not they are implementing initiatives relating to green procurement and environmental footprint reduction, initiatives that consider employees' human rights, other compliance initiatives that have an impact on society, and so forth. The results of these surveys are used as one of our decision-making criteria when selecting suppliers.

Reference: Code of Conduct Regarding Material Procurement of JR East (on our corporate website)
https://www.jreast.co.jp/e/data/procurement/code_of_conduct.html

Chemical substance management

■Compliance with laws and regulations and reduction of chemical substances

When using chemical substances, the effects on human health and ecological systems must be fully considered. The JR East not only rigidly adheres to established standard values, but restrict the use of such substances and adopt substitutes that have less impact on the environment.

■Reducing and replacing ozone depleting substances☆

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 Rationalized Use and Proper Management of Fluorocarbon, we reported a leakage amount of around 5,000t-CO_2e for FY2018.
• Cooling units(large refrigerators)—We are steadily replacing air conditioning units using specified chlorofluorocarbons (CFCs) with systems that do not use them and completed the removal of such units from buildings.
• Rolling stock—Except for some diesel railcars, all of our cars use HCFC or CFC substitutes. As of the end of March 2018 we were using 0.6 tons of CFCs and 86 tons of HCFC or CFC substitutes. We routinely check for gas leaks, and collect the refrigerants when scrapping retired railcars in accordance with applicable laws and regulations.
• Fire-extinguishing agent—Although 64 tons of halon gas was still in use as a fire-extinguishing agent as of the end of March 2018, we have it under proper control and are replacing it with non-halon agents (such as powder agents and CO_2) when building new facilities or renovating existing ones.

■Chemical substance management

As JR East uses chemical substances primarily for painting and repairing our railcars, we take rigorous steps for their use and management in order to prevent spills. We are a company that handles a certain amount of specified chemical substances, and 12 JR East facilities submitted the data regarding the release and transfer of these substances to relevant authorities in FY2018, pursuant to the PRTR System*.
We have also been introducing stainless steel railcars that do not require painting. At the end of March 2018, as many as 88.3%☆ of the 10,589☆ cars operated on our conventional lines were stainless steel railcars. Beside their use for railcars, we used 421 tons of organic solvents for painting railway facilities and stabilizing track beds in FY2018.

*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.

[Amount handled, released and transferred from 12 reporting-required facilities (kg)]

Chemical substance	Handled	Released into air	Transferred into sewerage	Transferred to other facilities
1,2,4-Trimethylbenzene	93,044.9	10,347.0	0.0	2,038.1
Ethyl benzene	1,029.0	1,000.0	0.0	0.0
Xylene	74,483.2	6,147.7	0.0	134.0
Toluene	13,652.7	4,550.0	0.0	88.6
Nickel	4,673.4	0.0	0.0	0.0
n-Hexane	1,538.5	170.0	0.0	0.0
Methylnaphthalene	56,097.5	278.0	0.0	0.0
1,3,5-trimethylbenzene	2,809.8	2,800.0	0.0	0.0
Chrome and trivalent chrome compounds	1,261.3	0.0	0.0	25.0
Molybdenum and its compounds	1,453.2	7.0	0.0	0.0
Total	250,043.4	25,299.7	0.0	2,285.7

■Management of PCBs(polychlorinated biphenyls)

Equipment containing PCBs is securely stored in exclusive storage locations and reports on it are filed as required by the Act on Special Measures concerning Promotion of Proper Treatment of PCB Wastes. We render this equipment harmless to the extent that can be done by PCB waste treatment facilities. In FY2018, we had equipment such as stabilizers, transformers and capacitors treated at PCB waste treatment facilities.