

Global environment

The value we provide

- We reduce the CO₂ emission volume of transportation infrastructure by placing high priority on improving the environmental performance of our railways
- We contribute to a recycling-based society by reducing (saving resources and extending use) reusing, and recycling (the 3Rs) our recyclable waste and products
- We work to minimize the impact of our operations on nature and the ecosystem and coexist in harmony with local communities and nature

Message from the officer responsible

Because we want to see the Earth smile



People around the world are working to find solutions to global problems like climate change, plastic waste, and diminishing biodiversity with the intent to create a sustainable human society. The JR-West Group acknowledges that our business activities affect the global environment, and preserving the earth's environment is accordingly a priority corporate responsibility. The Group is working in concert to create a sustainably developing society.

JR-West's activities to preserve the environment are rooted in our Basic Approach and our Code of Conduct. Another fundamental element in our environmental activities is the "think-and-act" mindset that we seek to instill in our employees to promote creative approaches to environmental preservation.

Our Medium-term Management Plan 2022 outlines specific measures to advance our environmental policies and sets environmental



objectives. Railways are generally much more energy efficient than other ways of transportation, and the JR-West Group is seeking to further reduce the amount of energy our railway facilities consume to make train services an attractive choice for a wider number of people. We will continue to reduce our overall CO₂ emissions and contribute to creating a recycling society while also decreasing our impact on nature and biodiversity to reduce our environmental footprint. We aim to enhance our business sustainability and be a positive contributor to society and a conservator of the environment.



Yasushi Neki
Technical Director
Manager of Technology Development,
Railway Headquarters

Basic Concept

JR-West, working in unison with its Group companies, will endeavor to protect the global environment and contribute to the realization of a society in which sustainable development is possible.

Code of Conduct

1. Aiming to be a corporate group that is friendly to the global environment, we will engage in appropriate and effective resource usage.
2. We will develop technologies and engage in creative innovation to protect the global environment.
3. We will act with a constant awareness of the need to protect the global environment.

Measures to Protect Biodiversity

1. Reduce the impact of our business activities on ecosystems
2. Develop new uses for available vegetation resources



Structure and role of our global environmental protection activities

The Global Environment Committee and three subcommittees

The Global Environment Committee of the JR-West Group sets environmental targets and implements measures to address environmental issues. Chaired by the president and includes directors of various business operations, the committee has three subcommittees promoting environmental action at our branch offices and Group companies.

The Railway Subcommittee covers the railway business division, the Business Development Subcommittee covers the non-railway business division, including hotel, retail, and restaurant operations, and the Think-and-act Environmental Subcommittee promotes employee environmental activities to raise individual awareness.



Environmental targets and performance

Environmental targets

We have set environmental performance targets in line with the five-year Medium-Term Management Plan 2022. We are working to attract more people to using the environmentally friendly railway infrastructure. Although this would increase energy consumption by our railway operations, it would reduce the

Item	FY2023 target	FY2019 actual
Energy consumption intensity (vs. FY2014)	-3%	-4.3%
Percentage of energy-efficient railcars	88%	87.6%
Station and onboard garbage (recyclable) recycling rate	96%	97.9%
Railway material recycling rate (facility construction)	97%	97.7%
Railway material recycling rate (rolling stock)	92%	95.3%

Promote environmentally friendly stations and office facilities

overall CO₂ emissions of the social transportation infrastructure. To best measure our energy usage under this dynamic, we measure the environmental performance of our business activities using units of "energy consumption intensity." One unit is the amount of energy used to move a train car one kilometer. Tracking these units enables us to gauge our energy efficiency.

Environmental performance

The introduction of energy efficient train cars and other energy-saving measures enabled us to continue lowering the intensity of our energy consumption in FY2019. We also broadened our efforts to recycle the trash collected at our stations and on our train cars as well as our used railway materials.

Environmental footprint of our business operations

The quantitative environmental cost of JR-West's business operations in FY2019 is presented below. More detailed information is available on our corporate website.

INPUT		OUTPUT	
Electricity	3.05 billion (0.39 billion) kWh	CO ₂ emissions ²	1,723 (236) thousand t-CO ₂
Fuels (crude oil conversion)	32,334 (23,114) kl	Industrial waste discharges ³ (items reported to the government as industrial waste)	9,600 (273,000) tons
A4-size copier paper	160 (200) million sheets	Drainage water ⁴	5.17 million cubic meters
Water (water supply, groundwater, industrial water, recycled treated water) ¹	5.36 (4.01) million cubic meters		

Numbers in parentheses represent the volume produced by consolidated subsidiaries and other Group companies (reported separately).

¹ Water and drainage water represent the volumes capable of being technically measured.

² Carbon dioxide emissions are calculated using methods stipulated in the Japanese "Act on Rationalizing Energy Use" and "Act on Promotion of Global Warming Countermeasures"

³ Group company industrial waste discharges include waste produced by JR-related contracted construction

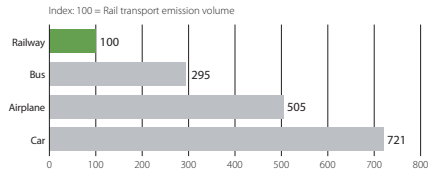
⁴ Drainage water reporting is limited to water flow that is capable of being technically measures, such as water release to rivers and water released to sewage systems.

Initiatives to prevent global warming (energy-saving)

Environmentally friendly railways

Train transportation is an extremely environmentally friendly form of transport that is exceptionally energy efficient and generates less CO₂ emissions than automobiles or airplanes. JR-West continually seeks to improve the environmental performance of its operations through introducing more energy-efficient rolling stock, train operation methods, and facilities.

CO₂ emissions per unit of "Passenger" transport volume (FY2018)



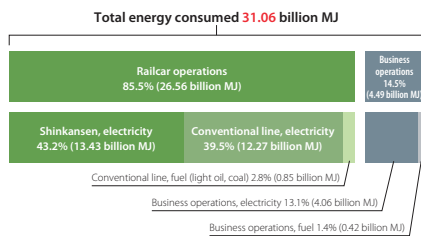
Source: JR-West based on Ministry of Land, Infrastructure and Transport data

Reducing energy consumed in railcar operations

Railcar operations represent 85.5% of the energy consumed by our railway business. Our ongoing efforts to introduce new energy-efficient train cars have raised the percentage of these cars to 87.6% of our overall fleet of trains at the end of fiscal 2019. We are also developing technologies and installing equipment enabling us to use energy more efficiently, such as the power storage facility¹ at Yasu Station on the Biwako Line.

We also promoted energy-conscious railcar operation and balanced our train schedules to better match customer traffic flow. These and other measures enabled us to reduce energy consumed by our train operations in fiscal 2019 to 2.0% lower than in fiscal 2014.

JR-West overall energy consumption (FY2019)



1 Power storage facility: Energy recovered during regenerative braking by train cars is collected in storage batteries. The energy is then discharged to assist nearby train cars during acceleration.
 2 JR-West's Zero Energy Stations use completely natural energy sources through combination of solar power and storage batteries to operate customer facilities on sunny days.

Eco stations

Efforts in recent years to make our stations more accessible with barrier-free facilities and safer with automated platform gates have tended to increase the amount of electricity needed to operate the stations. The Eco Station Design Guidelines we have adopted are reversing that trend. The JR Kobe Line's Maya Station, which opened for operation in March 2016, was designed based on these guidelines and operates on roughly half the amount of electricity of other stations of its size.

Higashi-hama Station on the San-in Main Line, which will be a stop for the Twilight Express Mizukaze luxury train beginning in November 2019, will be the Company's first Zero Energy Station (ZES)². The ZES will use energy harvested from microbes and environmental vibrations.

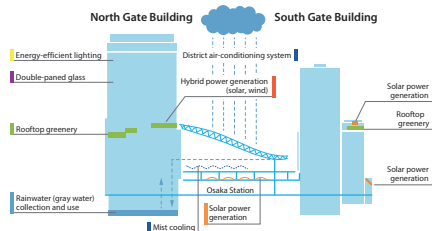


Higashi-hama Station is a ZES pilot station

JR-West Group environmental activities

The Company's Osaka Station City, operated by the Group's Osaka Terminal Building Company, was designed to combine environmental aspects with overall ease of use. The station uses solar, wind, and other renewable energies while also reducing energy consumption by incorporating natural sunlight through a domed roof over the train platforms.

JR West Real Estate & Development Company is combining its environmental principles with its vision for smart communities. The company is developing apartments and other properties using the latest technologies for energy efficiency, production, and storage. The environmental performance of these properties is contributing to realizing a sustainable society.



Partnership leads to substantial energy savings —The Kyoto Station Building HVAC System Retrofit—

(Front row, left to right) Yoshiyuki Takaura of the Kyoto Station Building Development Co., Ltd., Masayuki Mizutani of JR West Japan General Building Service Co., Ltd., Makoto Nakaya of the West Japan Railway Technia Co., Ltd., and Yu Okumura of Nishinoh Electric System Co., Ltd. (Back row, left to right) Naoki Kariatsumari of Nishinoh Electric System Co., Ltd., Masaru Inoue and Tatsuhiko Nishimura of West Japan Railway Technia Co., Ltd.



1. The challenges for the Kyoto Station Building

The Kyoto Station Building is a 24-hour operation housing the train station, a hotel, department store, theater, and other commercial operations. The building consumes the most electricity and produces the most CO₂ emissions of any single structure in Kyoto, which prides itself on being a model environmental city. Global warming made the building's "major environmental impact" a critical issue that needed to be addressed. In addition, the maintenance of the building needed to change for it to be a part of a sustainable society and to fulfill the vision for the building continuing to flourish in 100 years.



3. Project participants from inside and outside the Group

We created a project team from the building owners, a commissioning administration team, an architectural firm, and a construction company from both inside and outside the Group to generate innovative ideas for refurbishment. We had a very ambitious goal of incorporating highly efficient energy-saving facilities and, although there was some apprehension by Group members that participated in the project, the team was able to look beyond conventional approaches to try new ideas to achieve the goal.

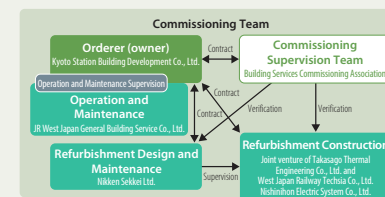


2. New approaches and building commissioning³

The Kyoto Station Building's heating system consumed such a huge amount of energy that just replacing the older equipment would not reduce its environmental impact. The system needed a radical upgrade plan.

We took this as an opportunity for a complete system overhaul. We began by defining what we needed to improve the building's quality so it will last a long time and delved deeper and deeper to examine the core issues to find out what exactly we needed to do. When we finally had clear and specific targets, we shared them with our stakeholders and decided to implement building commissioning to monitor the processes with continuous verification and analysis.

Structuring of the building commissioning

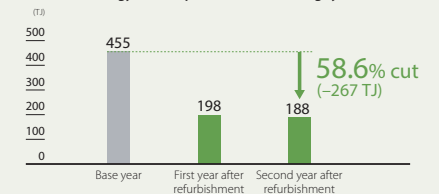


4. Massive energy savings

Without disrupting operations in the building complex, the team radically overhauled the outdated facilities and cut the building's overall annual energy consumption by roughly 30%. Energy consumption of the heating system, which was the main target, was reduced by roughly 60%.

Our achievement has been recognized as also being applicable to other buildings and has received widespread acclaim, even receiving the 2018 Minister's Prize of Economic, Trade and Industry for Energy Conservation Grand Prize. We believe the achievement reducing the energy consumption of the JR West Kyoto Station Building will enable wider contributions to efforts to mitigate global warming.

Annual energy consumption volume (heating system)



³ Commissioning is a process of analyzing the operating performance of an existing building, having specialists propose necessary refurbishment and adjustments for better operating performance and to optimize the system, and then installing the new equipment while verifying the performance improvement.

Contributing to a recycling oriented society (resource preservation)

Applying the 3Rs

JR-West Group applies the 3Rs of reduce, reuse, and recycle. Examples include reducing the items we use in the maintenance of our rolling stock, facilities, and electrical equipment; reusing runoff water when washing train cars; and recycling plastic and glass bottles, cans, and newspapers recovered at our stations and left in our train cars.



A station trash bin separated for four types of recycling materials

A concerted recycling effort with our customers and tenants

The Osaka Station City (OSC) encompasses Osaka Station, which is used by some 870,000 travelers in a single day, as well as a hotel, department stores, restaurants, shops, and other commercial operations. On an average day, these produce some 20 tons of garbage. Osaka Station provides customers with four types of waste receptacles for plastic bottles, cans and glass bottles, newspapers and magazines, and other waste. OSC tenants divide their waste into 20 different categories. The company tracks the waste generated by tenant and category to promote efforts to reduce the production of waste and to increase recycling rates.



(Left to right) Kento Uehara, Environmental & Logistics Group, Operation Unit at Osaka Terminal Building Company; Takashi Hayashi of Akioka Environmental Improvement Inc.; and Junji Uekubo, Umeda Branch OSC Operations Leader, and Takeshi Koyama, Umeda Branch Deputy Branch Manager of JR West Japan MARUNIX Co., Ltd.

hold regular waste management meetings where we provide feedback to each tenant about the volume of waste produced, how well the trash is being separated, and examples to follow. The Osaka Terminal Building Company, which operates OSC, and the site's waste management firms JR West Japan Marunix and Akioka Environmental Improvement encourage the waste separation efforts by the employees of the OSC tenants.

Encouraging kids to separate trash too

OSC holds a special Kids Week twice each year, during which children are invited to see some of the behind-the-scenes operations in the OSC "backyard", including how much trash is collected in a single day. We also talk to the kids about environmental issues and show ways that waste is being reused, such as using waste oil to make soap and recycling paper to make toilet paper.

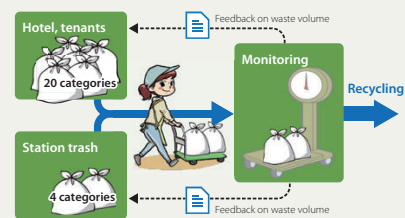


Children visiting the OSC backyard

Waste separation helping to increase recycling

Waste separation is key to recycling, and the roughly 10,000 people working at OSC are all doing their part. The high numbers of store employees and visitors in the commercial operations make it particularly important to actively encourage trash separation. To promote trash separation by all tenants, we

The recycling flow at Osaka Station City



Diligently recycling for a better society

With the help of the people using Osaka Station and all the workers at OSC, we at the JR-West Group will continue to diligently carry out recycling efforts. We are proud that the Osaka Station is leading our contribution to creating a sustainable society and will continue seeking to further raise the percentage of recycled waste at our largest train terminal.

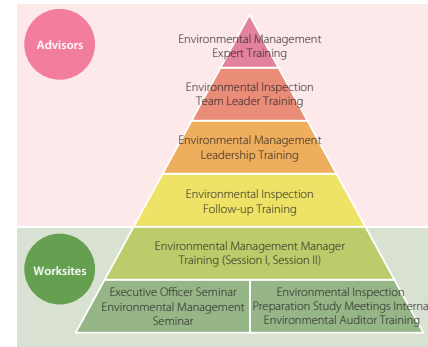
Our environment management system¹

Complying with laws² and Avoiding environmental contamination risk

Train operations are very eco-friendly compared to other forms of transportation, but our business operations can impact the environment if we do not properly handle the waste that it produces, such as the waste oil and chemical substances. We created our own environmental management system (EMS)³ based on the ISO 14001 standards⁴ which is in effect at all of the business sites of the railway division to ensure we comply with laws and avoid risk of environmental contamination.

We support these efforts with training programs for employees to become environmental managers at the worksites and an environmental management leadership training program to become a qualified internal environmental inspector. We also conduct annual environmental inspections to ensure the EMS system is functioning effectively.

Environmental management training programs



Concerted Group effort to avoid environmental pollution risk

The Mihara Shinkansen railway maintenance unit publishes a detailed disclosure of its environmental pollution from the Shinkansen train operation. The district and Group companies use these reports to help avoid risk of environmental pollution and as motivation for employees to each do their part on a daily basis. The Environmental Management Committee meets monthly examine and implement risk avoidance measures at the worksites based on the reports. Daily efforts to remind employees of the measures before they start work each day are having a demonstrable positive impact.

The Company recognizes worksites like the Mihara Shinkansen district with an award for exceptional environmental management, and we are aiming to continue improving our EMS activities throughout the Group.



The Environmental Management Committee of the Mihara Shinkansen Railway Maintenance Unit

1 An environmental management system (EMS) is a system and measures to fulfill environmental policies and meet targets intended to conserve the environment.
2 Complying with laws represents compliance with the standards and policies set by Japan Accreditation Board, a Japanese public interest incorporated foundation providing ISO and other accreditation related to environmental conservation.
3 The JR-West EMS was created based on ISO 14001:2004. The Company began implementing its EMS system to its railway operation sites in fiscal 2001, and the system is currently in effect at 223 sites (as of March 31, 2019).
4 ISO 14001 is an international standard for EMS.

Coexisting in harmony with communities and nature

The JR-West Group's business activities benefit in many ways from nature; at the same time, and we recognize that our operations do impact the natural environment. We therefore work with local communities to help preserve biodiversity with the aim of limiting the impact we have on various ecosystems.

The nature in our railway belts is home to protected species and rare fauna and flora, and we conduct our daily operations to protect these species. We have created a field guide to these species for use in project preliminary surveys and have detailed biodiversity preservation procedures to follow when any of the species are discovered.

The Kisuki Railway Department participated in one of the more unique environment protection measures when it joined an

organization of people living along the train line and various local groups dedicated to revitalizing the land and railway assets along the railway. We have joined the organization's efforts to beautify Sakuraoorochi Lake, the Akagawa Firefly Park, and to preserve local terraced rice fields.



Joining local citizens to beautify the Sakuraoorochi Lake area



Inspecting for rare fauna and flora prior to a project