

A foundation supporting value creation

Global environment

The JR-West Group’s approach to protection of the global environment

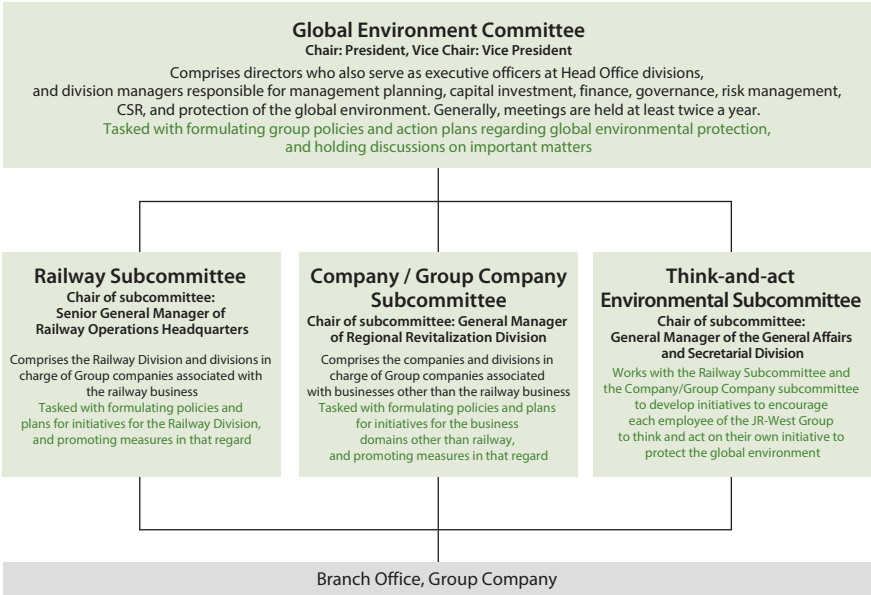
The JR-West Group will continue to fulfill its mission as a corporate group that supports social infrastructure, improving its ability to respond to environmental changes such as recurring disasters and alterations in the behavior of both customers and society, while giving priority to ensuring the safety of railways, which constitute its core business. The Group will contribute to the creation of a safe and comfortable society filled with meetings among people and smiles, which we have made our vision for the future. Through initiatives aimed at achieving this vision, we will push forward with efforts in the three priority domains of safety and security, coexistence with local communities, and global

environment, motivated by our desire to help achieve the SDGs aimed at creating a sustainable society, and to make western Japan an area in which everyone, including future generations, can continue to enjoy energetic, active lifestyles.

There is a rapidly growing social interest in protecting the global environment, including measures aimed at decarbonization and at countering climate change. The JR-West Group will pursue measures to protect the environment and improve the sustainability of our society, and we will continue to support the lives of our customers and fulfill our mission as a social infrastructure business group, helping to achieve our vision for the future.

Systems to promote initiatives to protect the environment

Recognizing that protecting the environment is an important managerial theme, the JR-West Group has established a Global Environment Committee chaired by the company president and comprising the general managers of principal divisions as well as full-time directors responsible for divisions at Head Office. This committee deliberates on important matters such as the Group’s basic policy for protection of the global environment, the setting of targets and medium- and long-term plans for the environment, and the formulation of action plans. Moreover, important items on the Global Environment Committee agenda are discussed and reported to the Management Committee and the Board of Directors, with the goal of sharing this information among senior management.



Progress on medium-term environmental goals

In tandem with the JR-West Group Medium-Term Management Plan 2022, the JR-West Group has set medium-term goals for fiscal 2023 and is working to achieve them.

As of fiscal 2021 we are on track to meet all of our goals in each field.

Energy consumption intensity (vs. FY2014)		Percentage of energy-efficient railcars		Station and onboard garbage (recyclable) recycling rate	
FY2023 target	FY2021 actual	FY2023 target	FY2021 actual	FY2023 target	FY2021 actual
-3%	-3.8%	88%	89.5%	96%	99.5%
Railway material recycling rate (facility construction)		Railway material recycling rate (rolling stock)		Promote environmentally friendly stations and office facilities	
FY2023 target	FY2021 actual	FY2023 target	FY2021 actual		
97%	98.0%	92%	95.1%		

Associated SDGs

7. Affordable and clean energy
9. Industry, innovation and infrastructure
11. Sustainable cities and communities
12. Responsible consumption and production
13. Climate action
14. Life below water



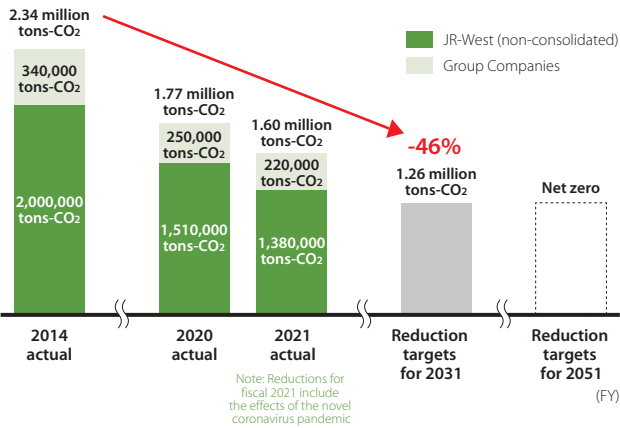
“JR-West Group Zero Carbon 2050” long-term environmental goals

Setting goals to achieve zero carbon

As social movements aimed at achieving a decarbonized society rapidly gain ground, understanding that Group businesses such as railways emit a large amount of CO₂ and responding to climate change caused by global warming, such as storms and floods and other intensifying natural disasters, are important management issues that must be addressed for the JR-West Group to continue doing business. In recognition of the need for the JR-West Group to be more active in addressing climate change, we have formulated the “JR-West Group Zero Carbon 2050” long-term environmental goals, in addition to the environmental goals included in the Group’s Medium-Term Management Plan.

Target values include reducing CO₂ emissions for the entire Group by 46% (in comparison to fiscal 2014) by fiscal 2031 and to virtually zero by fiscal 2051.

CO₂ emission trends and targets (Scope 1+2, Group Companies)



CO₂ reductions in Scope 3 (non-consolidated basis)

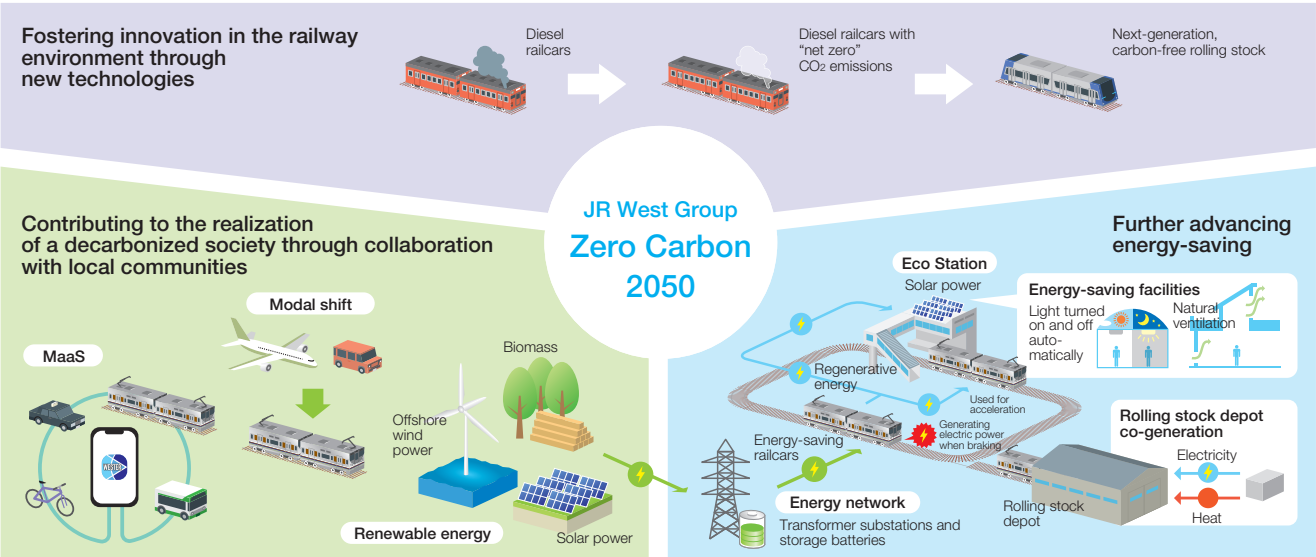
FY2020	FY2021
1,980,000 tons-CO ₂	1,870,000 tons-CO ₂

- Scope 1: Total CO₂ produced by combustion of diesel oil for operation of diesel train operation and combustion of kerosene and heavy oil, etc., for operational purposes
- Scope 2: Total CO₂ emitted indirectly by JR-West in association with electric power (for train and business operations) purchased from power companies
- Scope 3: Total CO₂ emitted from other companies in relation to the business activities of JR-West (indirect emissions other than Scope 1 and Scope 2)

Main initiatives

To achieve our long-term environmental goals, we are proceeding with initiatives in the following three main areas.

- Fostering environmental innovation through new technologies**
We have begun to consider the switch from trains fueled with diesel oil to using oil from next-generation biodiesel fuels, which will reduce CO₂ emissions effectively to zero, and are considering moving to advanced carbon-free rolling stock in future.
- Further advancing energy-saving**
Although we are already working to conserve energy through the introduction of energy-efficient rolling stock and equipment, we will endeavor to make more energy-saving efforts.
- Contributing to the realization of a decarbonized society through collaboration with local communities**
By leveraging the environmentally advantageous characteristics we offer in terms of CO₂ output per unit of transportation in urban areas and between cities, and using MaaS to improve convenience by creating an environment in which anyone can move with ease, we will endeavor to make public transportation as a whole—including railway—a smart, green mode of transport. We are also considering participating in additional renewable energy businesses.



A foundation supporting value creation

Global environment

Risk and opportunity/scenario analysis on climate change (information disclosure initiatives based on TCFD recommendations)

We will leverage the fact that railways—the core business of the JR-West Group—are more environmentally friendly than other types of transport, to help reduce the CO₂ emissions of society as a whole by having more people utilize our services. Moreover, the impact of the climate change associated with global warming, such as intensifying natural disasters, is increasing with every year, and the need for society as a whole to address it is growing rapidly.

The JR-West Group must understand the fact that our business as a whole emits a large amount of CO₂ and recognize that addressing climate change is an important issue for management if we are to continue doing business into the future. We are working to understand the risks and opportunities that climate change brings.

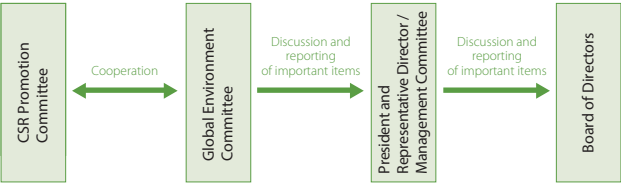
Additionally, the JR-West Group supports the recommendations of the Task Force on Climate-related Disclosure (TCFD), and we will proceed with appropriate disclosure and analysis of information on risks and opportunities related to climate change.

These risks and opportunities, and the analysis thereof, focus on the railway business, which is the core business of the JR-West Group, and which is expected to be strongly affected by climate change.

Governance

The JR-West Group will contribute to the creation of a sustainable society, and we will promote initiatives to protect the environment and allow us to grow sustainably in the long term. The Group has established a Global Environment Committee as an organization to push forward with these initiatives, which is chaired by the president and representative director and comprises the general managers of principal divisions as well as full-time directors responsible for divisions at the Head Office. This committee generally meets twice annually to deliberate on the Group's basic policy for protection of the global environment and on the setting of targets and medium- and long-term plans for the environment, as well as to monitor the status of plans and concrete initiatives aimed at achieving targets.

Note that items on the Global Environment Committee agenda are discussed and reported to the Management Committee and the Board of Directors as necessary.



Strategy

Based on the effect of climate change and socioeconomic scenarios reflected the situations offered by the Intergovernmental Panel on Climate Change (IPCC), the JR-West Group has analyzed the risks and opportunities that climate change represents to the

railway business.

We are aware of the risks of increased damage brought on by more frequent typhoons and floods, the heightened tax burden accompanying the introduction of a carbon tax, and the increasing amount of the renewable energy surcharge brought about by Japan's review of the makeup of its electricity sources. Conversely, the superior environmental characteristics of railway have been recognized, and it was found that the increased convenience offered by the spread of MaaS and other similar services also provides opportunities to increase railway use.

The specific content of analyses is as shown at right. (This analysis is based on a scenario of a 2°C increase in temperature, where society has actively addressed climate change.) The direction of the technological solutions addressing changes in the business environment, including climate change, is illustrated in the "JR-West Group Technology Vision" (see pages 13 and 14). Going forward, the JR-West Group will contribute to the creation of a sustainable society, taking appropriate measures to address the risks and opportunities it has identified and working to increase corporate value in the long term as a business group that is responsible for social infrastructure.

Risk management

The JR-West Group will update the content of its analyses based on information such as changes in the business environment and the publication and update of a range of forecasts issued by public institutions in relation to the risks and opportunities associated with climate change, along with measures to address them. We will also periodically deliberate on and monitor the content of analyses and the state of initiatives aimed at achieving long-term environmental targets in meetings of the Global Environment Committee.

Moreover, content discussed by the Global Environment Committee will be discussed and reported to the Management Committee and the Board of Directors as necessary, sharing and managing risks related to climate change as important issues for management.

Indices and goals

The JR-West Group has formulated the "JR-West Group Zero Carbon 2050" long-term environmental goals and, with these as targets, has set the objective of reducing CO₂ emissions for the entire Group effectively to zero by fiscal 2051, with an interim goal of reducing emissions by 46% of fiscal 2014 levels by fiscal 2031. We believe that this is a level that will result in Japan meeting the goals that it has set for CO₂ reduction and lead to the achievement of the targeted temperature increase of 1.5°C or less, or less than 2°C higher than that of the time of the industrial revolution—the goal of the Paris Agreement. The JR-West Group will promote initiatives to reduce CO₂, and, through initiatives intended to realize the goals of "JR-West Group Zero Carbon 2050," we will contribute to the creation of a sustainable society.

Risks recognized			
Type	Risk to the Company	Effect	Measures
Risks associated with the transition to a decarbonized society (transition risks)	Policies and laws		
	Large increases in the renewable energy surcharge	Large	● Promotion of energy-efficient rolling stock, energy-saving equipment, and energy-saving driving
	Increased tax burden due to reforms in the tax system, such as the introduction of a carbon tax	Large	● Substitution/conversion of fuels, switching electricity to renewable sources
	Increased green investment brought on by emissions controls	Large	● Transition to low-carbon equipment and facilities through the introduction of internal carbon pricing
	Technology		
	Increased development costs for support of next-generation technology		● Response to growing green investment through issue of green bonds
	Failed investment due to errors in assessing environmental values		● Control of development costs through open innovation and joint development with other companies
	Market		
	Increased costs for procuring fossil fuels	Large	● Use of subsidy systems from the government and other organizations
	Increased material prices due to suppliers passing on environmental costs through their pricing	Large	● Investment activities that take environmental values into account through the introduction of internal carbon pricing
Risks associated with the physical effects of climate change (physical risks)	Abnormal weather		
	Increased costs for procuring fossil fuels	Large	● Substitution/conversion of fuels
	Increase in material prices due to suppliers passing on environmental costs through their pricing	Large	● Evaluation of sustainable modes of transportation that are environmentally appropriate for the region
	Increase in electricity shortages caused by disturbances in the balance between supply and demand associated with the electrification of society and the expansion of energy conservation		● Controlling the cost of purchasing materials by reviewing equipment updates and reviewing facilities
	Promoting ethical consumption in society		● Promotion of energy-efficient rolling stock, energy-saving equipment, and energy-saving driving in order to reduce the amount of electricity consumed
	Decline in the environmental preeminence of railways due to the electrification of cars	Large	● Establishing in-house systems and methods to respond when warnings of power shortages are issued
	Negative effect on material procurement due to reduced ESG rating	Large	● Achieve smart, green transport by using MaaS in urban areas and intercity transportation, areas where the characteristics of railway offer advantages
	More criticism from stakeholders due to delays in initiatives and insufficient disclosure of information	Large	● In areas where the characteristics of railway do not offer advantages, consider sustainable transport systems appropriate for regions in terms of the environment, in consultation with the region concerned
	Loss of consumer confidence due to increased suspensions of train operations		● Disclosure of information on the status of TCFD analysis and the "JR-West Group Zero Carbon 2050" long-term environmental goals
	Increased damage to railway facilities due to the increasing frequency of typhoons and floods	Large	● Research on the development of social infrastructure through the Kyoto University Disaster Risk Management Engineering course (JR-West), along with regular lectures for citizens, both funded by the Company
Risks associated with the physical effects of climate change (physical risks)	Working environment		
	Increased damage to railway facilities due to the increasing frequency of typhoons and floods	Large	● Publishing of information on JR-West safety initiatives, including planned suspensions of operations
	More suspension of train operations due to damage to railway facilities	Large	● Timely and appropriate provision of information to customers when train operations are suspended
	Increased impact on trains due to power blackouts	Large	● We will promote the following initiatives from the standpoint of mitigating damage to customers and to railway facilities
	Increased damage insurance	Large	● [Measures to prevent flooding of railway facilities]
	Material shortages due to disruptions in supplier logistics		● We will implement both hard and soft measures to prevent flooding and relocate rolling stock at important facilities such as general depots, rolling stock holding facilities, signal equipment facilities and control centers
	Increased air conditioning costs due to rising temperatures		● [Implementation of a weather disaster response system]
	Increased damage from animals due to the expanding range of wild animals cause by decreased snowfall		● Introduce a weather disaster response system on major railway lines in the Kansai Urban Area to prepare for worsening weather disasters and minimize the risk of human error
	Increase in labor accidents such as heat stroke due to rising temperatures		● To improve safety with regard to localized heavy rainfall, radar rainfall monitoring systems will be deployed on all conventional railway lines
	Increased cost of measures to prevent heat stroke		● [Reinforcement measures of slopes on railway line]

A foundation supporting value creation

Global environment

Opportunities for recognition

Type	Opportunities for the Company	Effect	Efforts to grasp opportunities
Resource efficiency	Reductions in CO ₂ and energy consumption through updating of rolling stock and equipment to energy-efficient equipment	Large	● Accelerating the installation of high-efficiency equipment such as devices that utilize regenerative power, by using newly created subsidy programs and energy-saving facilities
	Equipment updates making effective use of government support systems such as tax incentives		
Energy sources	Promotion of fuels with virtually zero CO ₂ emissions, as well as fuel cells and storage batteries through technological progress and reductions in pricing	Large	● Evaluating new energy sources (next-generation bio-diesel fuels, carbon-free next-generation rolling stock, fuel-cell co-generation systems, etc.)
Products and services	In areas where the characteristics of railway can be put to good use, railways are acknowledged as being environmentally superior, with use increasing due to policy-based promotion of public transport and greater awareness of railway use (Modal shift)	Large	● Promoting the use of railway by strengthening the appeal of its environmental superiority ● Enhancing secondary transport services linked with railway (Park and ride, electric bicycle sharing services, etc.) ● Enhancing services using digital technology ("ICOCA de Jisapo," a time-staggered commuting point service) ● Enhancing MaaS (Kansai MaaS, "Wester" MaaS app, etc.)
	Increased use due to the greater convenience of public transportation associated with the proliferation of MaaS	Large	
	Promotion of sustainable modes of transportation that are environmentally appropriate for the region	Large	
Market	Reduction of electricity procurement costs through expansion of renewable energy	Large	● Cooperating with regional communities using demand-based transportation to make regional public transport more convenient ● Promoting BRT development projects using automated driving and convoy driving technologies
	Securing of revenue in the electricity supply and demand market using JR-West equipment		
Resilience	Reduction of suspensions of train operations and ensuring of reliability through successful implementation of BCP measures with regard to weather disasters	Large	● Evaluating participation in renewable energy businesses ● Evaluating participation in VPP (Virtual Power Plant) businesses
	Establishment of railway forests reduces CO ₂ and helps to prevent disasters		

Contributing to a recycling-oriented society

The JR-West Railway Group is promoting the 3Rs—Reduce, Reuse, and Recycle—to reduce the environmental impact of wastewater and waste arising from our business activities, and

we will work as a group to contribute to the creation of a recycling-oriented society.

Examples of initiatives

Removing sludge in wastewater treatment using an electrolytic wastewater treatment system (West Japan Railway Techsia Co., Ltd.)

West Japan Railway Techsia Co., Ltd., developed the "J-TREAT" electrolytic wastewater treatment system, which electrolytically processes wastewater resulting from washing vehicles and rolling stock parts at locations such as vehicle depots, eliminating more than 90% of dirt from sludge emissions (clods of dirt removed from wastewater), in addition to reducing the power consumed by the treatment process. Compared to wastewater treatment equipment that utilizes conventional flotation methods, this system contributes significantly to purifying wastewater, conserving energy, and reducing waste, and to date it has been installed at 11 vehicle depots belonging to the Company. Additionally, delivery of this system is being expanded outside the JR-West Railway Group, helping to reduce the environmental impact of society as a whole.



In addition to reducing this environmental impact, we also sought to conserve cost and save space.

Shinichiro Okamoto, Kohei Nitta

Environmental Technology Division, West Japan Railway Techsia Co., Ltd.

In developing this electrolytic wastewater treatment system, we were particularly aware of the need to avoid the use of chemicals and to conserve electricity by controlling the current used to suit the level of contamination.

Development began with learning about water treatment and studying examples from other companies. Trials were conducted in a range of different locations while we worked with manufacturers to explore the major issues of conserving space and reducing the cost of electrodes.

As a result, we successfully developed electrodes using a cheaper metal (molybdenum) as a substitute and reduced output of sludge to

ten percent of that of normal methods, representing a major reduction in both cost and environmental impact.

We are now attempting to create a monitoring system that will allow us to further reduce the energy consumed in water treatment, and we hope to reduce environmental impact and contribute to a recycling-oriented society by promoting the adoption of the equipment we have developed at more locations.



(From right) Shinichiro Okamoto, Kohei Nitta

Examples of initiatives

Environmental impact reduction /environmental management of the rolling stock division, use of water-based paint for rolling stock (Hakusan Depot, Kanazawa Branch)

The Hakusan Depot handles large amounts of waste, oil, grease, and chemical substances related to rolling stock maintenance, and to ameliorate our effect on the global environment, we are using detailed check sheets for each location in line with actual conditions at the time of operational inspections, to enable us to effectively operate environmental management systems unique to JR-West in accordance with ISO14001. Moreover, we have set targets for the reduction of chemical substances and reduced the amount of environmentally harmful chemical substances we use by substituting environmentally friendly substances for the organic solvents used in the rust-inhibiting paint we use for axles on rolling stock.



We will promote management in cooperation with a wide range of divisions

Yohei Nakayama

Rolling Stock Management Staff
General Affairs Department (current Quality Management Center)

To implement the PDCA cycle effectively, we created individual check sheets to suit actual conditions at each of our locations. These check sheets were intended to allow all employees, including those of Group Companies, to share common objectives, and they were linked to internal audits to check the actions of each division. We used PowerPoint presentations rather than distributing documents when introducing these check sheets, as part of a paperless initiative we have had in place for some time. Additionally, we revise our internal rules annually, and we are working to ensure that the PDCA cycle is carried out properly.

Going forward, I hope to leverage the experience I have gained to date to provide the employees around me with a broader perspective on the environment and to work with everyone to implement better environmental management.



Yohei Nakayama reviews the check sheet (at right)

We will work to maintain quality and our employees' health

Masahiro Niwa

Rolling Stock Management Staff
Rolling Stock Inspection Center

The rust-inhibiting paints we have used to date are organic substances and may affect the body, thus we substituted them with water-based paints out of concern for work environments and the health of our employees, while maintaining quality in order to prevent axle parts from rusting. We spent approximately one and a half years evaluating whether water-based paints with a track record in other locations would be appropriate for use on the W7-Series Shinkansen. Although we encountered some difficulties, such as changes to work processes stemming from new mixing tasks, we pooled our thoughts to create an optimal procedure. Currently we are working to change to water-based paints on other parts. We will continue to maintain quality while remaining aware of the relevant environmental and health aspects.



Examples of initiatives

Reducing food loss and utilizing it in biomass power generation (HOTEL GRANVIA OKAYAMA Co., Ltd., and Biodiesel Okayama Co., Ltd.)

HOTEL GRANVIA OKAYAMA is continuing initiatives to reduce food waste, such as ordering ingredients in the correct amount, cooking the right amount of food, and the 30–10 campaign to reduce leftovers with the cooperation of our customers. Furthermore, from April 2021 we embarked on a new initiative in which we bring cooking waste such as vegetable and fish skins to a food product recycling factory (Biodiesel Okayama Co., Ltd.).

This factory uses microorganisms to decompose and ferment waste, using the biogas arising from this process as fuel to generate electricity. By making effective use of the waste that had previously been incinerated as material for renewable energy, we will work with local communities to help build a sustainable society.



Utilizing food waste effectively

Shota Takahashi

Chief of Planning Section, Planning Department HOTEL GRANVIA OKAYAMA Co., Ltd.

We had been working to separate waste and reduce food loss for some time, and have now begun participating in a biomass power generation business using food waste. This business has no effect on operations, nor does it take a great deal of time and effort, and the results are evident in the power generated, which has increased our staff's awareness of environmental awareness. At the Hotel Granvia we are pursuing a range of environmental initiatives in addition to biomass power generation, including switching to LED lighting and installing water-saving devices. We are also actively engaged in initiatives to improve the local environment, such as participating in cleanup activities

on the Hyakken river.

Going forward, we intend to participate in a range of activities in an effort to be the best hotel in the region, and we will continue to cooperate with biomass power generation while contributing to a recycling-oriented society.

