

Global environment

Climate change-related risks and opportunities, and scenario analysis (information disclosure based on TCFD recommendations)

Basic approach

Realizing that environmental protection is an important management task, we have formulated the JR-West Group Basic Environmental Policy under which we pursue increasingly deeper initiatives from a long-run perspective.

Climate change is a particularly crucial issue, and our group understands that our business as a whole emits a large amount of CO₂ and recognizes 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.

Governance

The JR-West Group will contribute to the creation of a sustainable society, and we will pursue initiatives to protect the environment and allow us to grow sustainably in the long term. And to serve as the driving force behind these initiatives, we have established the Global Environment Committee, which is chaired by the president and comprises executive directors in charge of Head Office departments and general managers of the principal divisions. This committee generally meets twice annually to deliberate on the Group's basic policy for global environmental protection and on the setting of medium- and long-term environmental targets and plans. It also monitors the progress of concrete initiatives aimed at achieving the plans and targets.

Items on the Global Environment Committee agenda are reported to and discussed by the Sustainability Committee, Group Management Committee, and Board of Directors as necessary.

Strategy

Based on the impacts of climate change and socioeconomic scenarios in light of the situations presented by the IPCC (Intergovernmental Panel on Climate Change), the JR-West Group has analyzed the risks and opportunities that climate change represents to the railway business.

We are aware of such risks as the heightened costs accompanying the introduction of carbon pricing, and increased damage brought on by more frequent typhoons and floods. 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 details of the analysis is shown on pages 60 to 62. The analysis was conducted using a 1.5°C increase scenario (RCP*1 1.9) and a 2°C increase scenario (RCP 2.6) in which society aggressively addresses climate change to prevent temperature rise; and a 4°C increase scenario (RCP 8.5) in which measures are insufficient to prevent a temperature rise. Note that the qualitative analysis is based on a 1.5°C increase scenario and a 2°C increase scenario.

The JR-West Group has formulated the JR-West Group Zero Carbon 2050

Risk management

The JR-West Group will update the content of its analysis 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 the analysis and the state of initiatives aimed at achieving long-term environmental

Indices and goals

The JR-West Group has formulated the JR-West Group Zero Carbon 2050 long-term environmental goals and has set the objective of achieving net-zero CO₂ emissions for the entire Group by 2050. We have set interim goals of reducing emissions by 35% by fiscal 2026 and 50% by fiscal 2031 (both against fiscal 2014 levels).

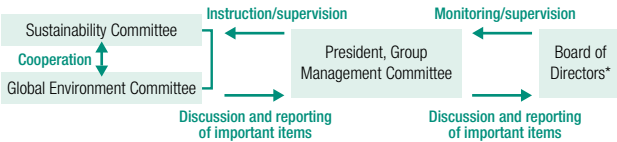
Additionally, the JR-West Group supports the recommendations of the TCFD (Task Force on Climate-related Financial Disclosures). We will proceed with appropriate disclosure and analysis of information on risks and opportunities related to climate change.

These risks and opportunities, and the analysis thereof, focus on those areas comprising our core businesses: railways, sales of goods and food services, hotels, shopping centers, and real estate.

Global Environment Committee members and organization chart

Chair: President Vice chair: Vice president

Members: Directors who also serve as executive officers at Head Office departments, and division managers and in-house company heads responsible for management planning, capital investment, finance, governance, sustainability, global environmental protection, BCP, and information disclosure



* Examples of matters referred to the Board of Directors for discussion:
Setting of long-term environmental goals, climate change-related risk and opportunity analysis, content of information disclosures based on TCFD recommendations

long-term environmental goals and has set the objective of achieving net-zero CO₂ emissions*² for the entire Group by 2050. We have set interim goals of reducing emissions by 35% by fiscal 2026 and 50% by fiscal 2031 (both against fiscal 2014 levels).

Towards these goals, as environmental protection initiatives under our Long-Term Vision and Medium-Term Management Plan 2025, we are further improving energy savings by, for example, introducing energy-efficient railcars, adopting power made from renewable energy, and implementing next-generation biodiesel. We are also striving to achieve a passenger modal shift by, for example, making trains and other public transportation more convenient through MaaS apps and publicizing the environmental friendliness of trains as transport modes within and between cities. It is all part of collaborative efforts with regions and communities to achieve a decarbonized society.

Going forward, the JR-West Group will take appropriate measures to address the risks and opportunities it has identified.

*1 RCP: Representative concentration pathways
*2 Scope 1 and Scope 2 emissions (consolidated)

targets in meetings of the Global Environment Committee.

Content discussed by the Global Environment Committee is reported to and discussed by the Sustainability Committee, Group Management Committee, and Board of Directors as necessary, sharing and managing matters such as climate change-related risks as important issues for management.

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.

Qualitative analysis of risks and opportunities

Risks recognized

* Sales of goods and food services; SC: shopping centers

Type	Risk to the company	Impact	Major businesses that will be impacted					Measures			
			Railways	Sales/ Food*	Hotels	SC*	Real estate				
Risks associated with the transition to a decarbonized society (transition risks)	Policy and legal	Heightened costs accompanying the introduction of carbon pricing	Large	○	○	○	○	○	● Promote energy-efficient rolling stock, energy-saving equipment, and energy-saving driving ● Use alternative fuels, switch electricity to renewable sources ● Transition to low-carbon equipment and facilities through the use of internal carbon pricing ● Install energy-efficient equipment (high-efficiency air conditioners, LED lighting, water-saving equipment, etc.) ● Decrease the amount of electricity purchased from retail electricity providers by incorporating solar power from on-site PPAs and other means ● Reduce basic contract fees by managing demand values through cooperation with tenants ● Respond to growing green investment through the issuance of green bonds		
	Technology	Increased green investment brought on by emissions controls	Large	○	○	○	○	○	● Respond to growing green investment through the issuance of green bonds		
		Increased development costs to support next-generation technology		○		○	○	○	● Control development costs through open innovation and joint development with other companies ● Use subsidy systems from the government and other organizations		
		Failed investment due to errors in assessing environmental values		○		○	○	○	● Investment activities that take environmental values into account using internal carbon pricing		
	Market	Increased costs for procuring fossil fuels		○	○	○	○	○	● Use alternative fuels ● Study sustainable modes of transportation that are environmentally appropriate for the region		
		Increase in material prices due to suppliers passing on environmental costs through their pricing	Large	○	○	○	○	○	● Control the cost of purchasing materials by updating equipment and reviewing facilities		
		Increase in electricity shortages caused by disturbances in the supply-demand balance associated with the electrification of society and the expanded use of renewable energy		○	○	○	○	○	● Promote energy-efficient rolling stock, energy-saving equipment, and energy-saving driving ● Establish in-house systems and methods to respond to power shortage warnings		
		Increase in construction costs with the dissemination of ZEH and ZEB					○	○	● Use subsidy systems from the government and other organizations (ZEH support project of the Sustainable Open Innovation Initiative, etc.)		
		Growth of ethical consumption in society		○	○	○	○	○	● Achieve smart, green transport by using MaaS in urban areas and intercity transportation ● Consider sustainable transport systems that are environmentally appropriate for the region, in consultation with the region concerned		
									● Pursue business (new store set-up, etc.) from the perspective of the environment and ethical consumption ● Expand EV parking spaces so EVs can coexist with public transportation ● Adopt environmentally friendly product planning, construction planning, and equipment specifications (use solar power systems, make rooftop gardens, make wooden apartment buildings fire-proof) ● Use environmentally friendly sales promotion tools in model homes (use posters and banners made of green materials, buy environmentally friendly equipment, switch to digital pamphlets, etc.)		
Reputation		Decline in the environmental preeminence of railways due to the electrification of automobiles	Large	○	○		○		● Disclose information on the status of TCFD analysis and the JR-West Group Zero Carbon 2050 long-term environmental goals ● Conduct research on the development of social infrastructure through the Kyoto University Disaster Risk Management Engineering course (JR-West), and hold regular lectures for citizens, both funded by the company ● Acquire more environmental certifications, such as DBJ (Development Bank of Japan) Green Building Certification, and publicize these ● Create environmentally friendly standard specifications ● Incorporate new technologies in collaboration with installation contractors		
		Negative effect on material procurement due to reduced ESG rating	Large	○	○	○	○	○	● Publish information on JR-West safety initiatives, including planned suspensions of operations ● Provide information to customers in a timely and appropriate manner when train operations are suspended		
		More criticism from stakeholders due to delays in initiatives and insufficient information disclosure	Large	○	○	○	○	○			
		Loss of consumer confidence due to increased suspensions of train operations		○	○		○				
Risks associated with the physical impact of climate change (physical risks)	Abnormal weather	Acute risks							Initiatives mainly in the railway business Measures to prevent flooding of railway facilities ● Implement both facilities-based and operations-based 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 Weather disaster response system ● Introduce a weather disaster response system on major railway lines in the Kansai area to prepare for worsening weather disasters and minimize the risk of human error ● Deploy radar rainfall monitoring systems on all conventional railway lines to improve safety in the event of localized heavy rainfall Reinforcement measures of slopes on railway lines ● Reinforce sloping areas and establish drainage systems to improve safety and shorten times when operation is restricted, primarily in the Kyoto/Osaka/Kobe area ● Create slope disaster charts and utilize sensing technologies to understand slope deformation and enhance detection precision Strengthening of railway track equipment ● Improve train operations' safety and durability by replacing old wooden sleeper sections with concrete ones Planned suspensions of operations ● Implement planned suspensions of operations, including relocation of rolling stock, as necessary when large typhoons approach or make landfall ● Appropriately provide information regarding planned suspension and resumption of operations Emergency response training		
				Increased damage to facilities due to the increasing frequency of typhoons and floods	Large	○	○	○	○	○	Initiatives in each business ● Create a crisis management manual ● Ensure safe operation of business through proper shutdowns, and early or delayed openings or closings of stores ● Have BCP measures (supplies, BCP back-up power source, etc.) in place in new office buildings ● Install emergency equipment (water and flood gates, etc.), have back-up power, install cubicles on higher building floors ● Collaborate with local government to offer usage of buildings with floors and cubicles that don't flood, and elevated water tanks, for use as regional evacuation shelters (e.g., Machiya Building, Yokohama Portside Building) ● Use hazard maps to minimize risks and boost market competitiveness (e.g., do not put apartments on the first floor of buildings in areas in danger of flooding)
				More suspension of train operations and stoppage of business due to damage to facilities	Large	○	○	○	○	○	● Taking BCP into account, install emergency power generators at control centers in order to maintain function during power blackouts ● Establish in-house systems and methods to respond to power shortage warnings ● Deploy the N700S to the Tokaido and Sanyo Shinkansen lines (Its onboard battery-based self-propulsion system will allow us to help customers in the event of extended blackouts)
				Increased impact on trains and stoppage of business due to power blackouts	Large	○	○	○	○	○	
				Material shortages due to disruptions in supplier logistics		○	○	○	○	○	● Ensure that there are multiple channels in the supply chain for important items that have a significant effect on business operations and that a certain amount of inventory is maintained
	Chronic risks		Increased damage insurance		○				● Pursue initiatives to mitigate damage to railway facilities (stated above)		
			Increased air conditioning costs due to rising temperatures		○	○	○	○	○	● Green rooftops and building walls, adopt heat-insulating materials ● Improve air conditioning efficiency by introducing regional heating and cooling systems ● Reduce energy consumption by installing high-efficiency air conditioners	
			Increased damage from animals due to the expanding range of wildlife caused by decreased snowfall		○					● Expand measures to prevent damage from animals (install fences to keep deer from entering, develop sound equipment for repelling animals, improve vehicle obstruction guards, etc.)	
			Increase in the risk of food poisoning due to rising temperatures			○	○	○		● Step up food hygiene	
			Increase in labor accidents such as heat stroke due to rising temperatures		○	○			○	Measures to prevent heat stroke ● Prepare equipment to counter heatstroke, such as air-conditioned clothing, use the WBGT index, work in the morning and evening hours ● Equip crew compartments on railcars with air conditioners Reconstruction of railway systems ● Reduce workload along railway lines through onboard and sensor-networked ground inspections, surveying with MMS technology, and the mechanization and automation of construction work ● Reduce workload along railway lines through the integration of functions into vehicles and the simplification of ground facilities	
Working environment		Increased cost of measures to prevent heat stroke		○			○				

Global environment

Opportunities recognized

Type	Opportunities for the company	Impact	Major businesses that will be impacted					Seizing opportunities
			Railways	Sales/ Food*	Hotels	SC*	Real estate	
Resource efficiency	Reductions in CO ₂ emissions and energy consumption by updating rolling stock and equipment to energy-efficient ones		○	○	○	○	○	● Accelerate the installation of high-efficiency equipment such as devices that utilize regenerative power, by using new subsidy programs and energy-saving facilities ● Install energy-efficient equipment when upgrading (high-efficiency air conditioners, LED lighting, water-saving equipment)
	Equipment updates making effective use of government support systems such as tax incentives		○	○	○	○	○	● Use ZEH subsidy systems and other support from the Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Economy, Trade and Industry, and Ministry of the Environment
Energy sources	Wider use of fuels with net-zero CO ₂ emissions, fuel cells, and storage batteries through technological progress and reductions in pricing	Large	○	○	○	○	○	● Study new energy sources (next-generation biodiesel, carbon-free next-generation rolling stock, fuel-cell co-generation systems, etc.) ● Reduce the cost of installing storage batteries by utilizing national and local government grants
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 environmental awareness of customers (modal shift)	Large	○	○	○	○		● Increase usage of trains and the JR-West Group's many other services by publicizing trains' environmental advantages and the Group's green initiatives ● Enhance secondary transport services linked with railway (park and ride, electric bicycle sharing services, etc.)
	Increased use due to the greater convenience of public transport associated with the proliferation of MaaS, and due to a growth in non-resident population	Large	○	○	○	○	○	● Enhance services using digital technology ● Enhance MaaS (Kansai MaaS, WESTER MaaS app, etc.) ● Create synergy by offering public transport users the courtesy services of other JR-West Group businesses
	Increasing the use of public transport and spreading the sharing economy		○				○	● Upgrade equipment and systems for bike sharing and other parts of the sharing economy
	Spread of sustainable modes of transportation that are environmentally appropriate for the region	Large	○					● Cooperate with regional communities using demand-based transportation to make regional public transport more convenient ● Promote BRT development projects using self-driving and convoy driving technologies
	Spread of sustainable modes of housing that are environmentally appropriate for the region						○	● Develop environmentally friendly housing (architectural planning, equipment specs, sales methods*) * e.g., save on building materials by reusing a model home for multiple properties; use VR to give prospective buyers virtual tour of housing units
Market	Reduction of electricity procurement costs through expansion of renewable energy		○	○	○	○	○	● Study participation in renewable energy business ● Expand renewable energy use by installing solar power equipment through on-site PPAs that utilize building rooftops and idle land
	Wider use of electricity with net-zero CO ₂ emissions through technological progress and reductions in pricing Acquisition of real estate that has low environmental impact and meets rental needs						○	● Use 100% renewable energy for new lease properties ● Encourage customers and others to carry out ESG investing by acquiring environmental certifications such as the DBJ Green Building Certification
	Securing of revenue in the electricity supply and demand market using JR-West equipment		○				○	● Study participation in VPP (virtual power plant) business
Resilience	Ensuring of reliability through successful BCP measures in the event of weather disasters so as to reduce suspensions of train operations and stoppage of business		○	○	○	○	○	● Pursue measures to mitigate damage to railway facilities (see previous page) and disclose related information ● Gain customers by developing real estate resistant to natural disasters ● Have BCP measures (supplies, BCP back-up power source, etc.) in place in new office buildings ● Install emergency equipment (water and flood gates, etc.)
	Maintaining railway forests helps reduce CO ₂ emissions and prevent disasters		○					● Ongoing forest conservation activities through Club J-WEST Forest ● Study the effective use of railway forests

* Sales of goods and food services; SC: shopping centers

Assumptions for quantitative impact of risks and other concerns

For risks and other concerns extracted through qualitative analysis, we have made quantitative impact assumptions for those items that we expect to have a significant impact and for which objective future forecast data corresponding to the scenarios used in the analysis are available. In addition, we have estimated the trend in transportation revenues based on estimated population and GDP data derived from socioeconomic scenarios. Our assumptions are based on society in 2030 or 2050. The transition risks are calculated based on a 1.5°C/2°C scenario in which society acts

proactively to address climate change. The physical risks and impacts on transportation revenues are calculated based on 1.5°C/2°C and 4°C scenarios. (The results of the estimated impacts are shown in the chart on page 62.) In particular, the physical risks and impacts on transportation revenues are greater in the 4°C scenario than in the 1.5°C/2°C scenario. Based on these factors, we will take measures to address the risks and promote initiatives to realize a decarbonized society, so as to help curb climate change.

Presuppositions for assumed transition risk and physical risk impact

Transition risks	Item	Source of forecast data used for trial calculation	Assumed impact in 2030	
			4°C scenario	1.5°C/2°C scenario
Transition risks	Heightened costs accompanying the introduction of carbon pricing	IEA "World Energy Outlook 2021"	—	US\$ 140/t-CO ₂ (2030, NZE scenario, developed countries) Exchange rate: US\$ 1 = ¥130
	High material prices due to suppliers passing on environmental costs	Kiyoshi Fujikawa (author) "Load of Carbon Tax by Region and Income Group," others	—	About 2% higher than the current level
Physical risks	Item	Source of forecast data used for trial calculation	Assumed impact in 2050	
			4°C scenario	1.5°C/2°C scenario
Physical risks	Greater damage to facilities due to increase in natural disasters	Technical Study Group on Flood Control Planning in Light of Climate Change "Recommendations for Flood Control Planning in Light of Climate Change" (revised April 2021); Ministry of Land, Infrastructure, Transport and Tourism	Approx. four times more frequent than current levels	Approx. two times more frequent than current levels
	Reduced revenue owing to increased operational suspensions due to natural disasters			

Quantitative impact assumptions (financial impact) for transition risks and physical risks

Transition risks	Item	Assumed impact in 2030	
		4°C scenario	1.5°C/2°C scenario
Transition risks	Heightened costs accompanying the introduction of carbon pricing	—	+20 billion yen/year
	High material prices due to suppliers passing on environmental costs	—	+2 billion yen/year
Physical risks	Item	Assumed impact in 2050	
		4°C scenario	1.5°C/2°C scenario
Physical risks	Greater damage to facilities due to increase in natural disasters	10 billion yen/year	3 billion yen/year
	Reduced revenue owing to increased operational suspensions due to natural disasters	4.5 billion yen/year	1.5 billion yen/year

Trial calculation of changes in rail transportation revenue

Based on population and GDP data derived from socioeconomic scenarios, which are used in cross-disciplinary climate change research, we have estimated the changes in rail transportation revenue up to 2050. The population data is derived from "Japanese SSP Population Estimates by City, Town, and Village," published by the National Institute for Environmental Studies. GDP data is derived from "Global Dataset of Gridded Population and GDP Scenarios," published by IIASA (International Institute for Applied Systems Analysis). Based on projected demographic and domestic

GDP changes in our business areas, we have estimated the changes that will occur from fiscal 2024 onward, which is the period following the revised JR-West Group Medium-Term Management Plan. (For the data referenced here, the 1.5°C/2°C scenario = SSP1 and the 4°C scenario = SSP3.) The future forecasts in our trial calculation are based on demographic and GDP estimates only and do not take into account individual factors that may affect revenues, such as future sales measures.

