Environment

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Priority commitment goals

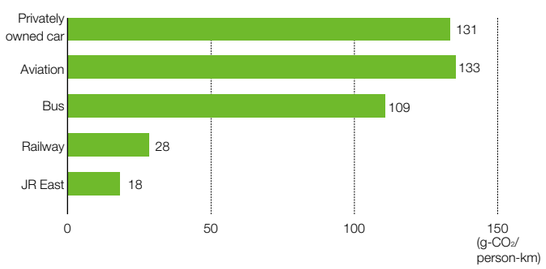
Priority commitment goals

Efforts to Realize a Sustainable Society

The JR East Group is engaged in businesses, mainly railways, that are widely interrelated with the daily lives of customers and indispensable to local communities and society. In “Move Up” 2027, we took the Sustainable Development Goals (SDGs) into account and set forth our commitment to solving social issues through our business and achieving the sustainable development of local communities. We have recognized environmental initiatives as an important issue since the company’s establishment, and are promoting efforts to realize a decarbonized and resource recycling-based society and conserve biodiversity.

In October 2020 Japan declared its aim to realize carbon neutrality by 2050. Within the transportation sector, railways are an environment-friendly mode of transportation with relatively low CO_2 emissions per transportation volume, but they also consume a large amount of energy. We will continue to take on the challenge of solving social issues through our business activities in order to improve the environmental superiority of railways in the future, keep them as the transportation system of choice, and realize a sustainable society.

CO_2 Emissions per Transport Volume (Passenger Transportation) (FY2021)



Source: Adapted from the website of the Ministry of Land, Infrastructure, Transport and Tourism

Efforts to Realize a Decarbonized Society

Towards Achieving the Zero Carbon Challenge 2050

Our Group management vision “Move Up” 2027 positions ESG as core management, while Zero Carbon Challenge 2050 targets net zero CO_2 emissions for the JR East Group by fiscal 2051 and to halve emissions (compared with fiscal 2013) by fiscal 2031.

In May 2022, ENEOS Corporation and JR East signed a partnership agreement to jointly study the expansion of CO_2-free hydrogen utilization for the decarbonization of railways. The two companies are collaborating to develop an integrated hydrogen station that will supply CO_2-free hydrogen to hydrogen hybrid trains, various fuel cell (FC) mobility vehicles (cars, buses, trucks, etc.), and facilities around stations.

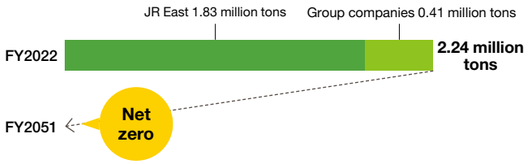
By promoting collaboration outside the company, we will contribute to realizing a decarbonized society by leveraging the knowledge we have accumulated through our railway and energy businesses to drive the construction of a CO_2-free hydrogen supply chain that spans the entire process of production, transportation, and utilization.

Integrated hydrogen station

Medium- and long-term environmental targets for Zero Carbon Challenge 2050

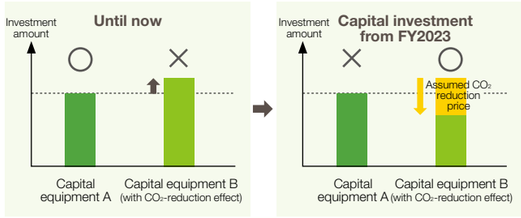
(1) Achieve net zero CO_2 emissions for the JR East Group by FY2051
(2) Reduce CO_2 emissions of JR East Group by 50% from the FY2013 level by FY2031
(3) Achieve net zero CO_2 emissions for train operations in the Tohoku area by FY2031

FY2051 CO_2 Emission Reduction Targets



Introduction of internal carbon pricing

Starting with capital investment in fiscal 2023, we will adopt internal carbon pricing (ICP) to accelerate the introduction of energy-saving equipment that contributes to CO_2 emissions reduction. The internal carbon price is currently set at 5,000 yen/t-CO_2.



Targets for reducing CO_2 emissions and energy consumption by FY2031

Performance Indicators		Base Value (Baseline Fiscal Year)	FY2031 Target	FY2022 Result
Total reduction	Railway business CO_2 emissions (10 thousand t-CO_2)	215 (FY2014)	108 (50% reduction)	**183☆ (14.9% reduction)**
Reduction in energy consumption intensity	Electricity consumption for train operation (Shinkansen) (kWh/car-km)	2.31 (FY2021)	2.09 (9.6% reduction)	**2.34☆ (1.3% increase)**
	Electricity consumption for train operation (conventional lines) (kWh/car-km)	1.47 (FY2021)	1.33 (9.6% reduction)	**1.48☆ (0.2% increase)**
	Energy consumption at branch offices, etc. (kL/m²)	0.0354 (FY2021)	0.032 (9.6% reduction)	**0.0346☆ (2.3% reduction)**

Performance Indicators		Numerical Targets	FY2022 Result
Reduction in energy consumption intensity	Reduction rate of energy consumption intensity of each JR East subsidiary	1% annual reduction (5-year average)	**No overall changes**

Other targets for reducing energy consumption by FY2031

Performance Indicators		Numerical Targets	FY2022 Result
Details of initiative	Switching platform and concourse lighting to LEDs	Total of 415,000 units	**Total of 105,000 units**
	Improving efficiency of large-scale air-conditioning systems	Total of 38 locations	**Total of 19 locations**
	Improving efficiency of small-scale air-conditioning systems	3,300 units	**618 units**
	Developing renewable energy-based power sources	700 MW	**131MW**

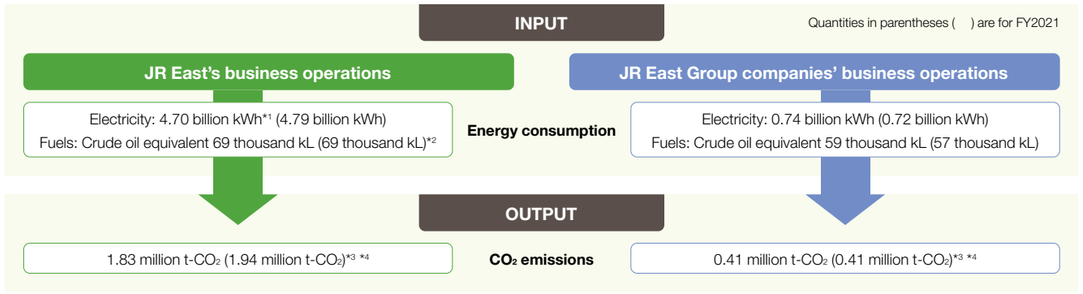
■ Indicates targets for JR East Group companies.

Note: External assurance on environmental performance

KPMG AZSA Sustainability Co., Ltd. has been engaged in providing external assurance on a set of selected environmental performance indicators (see pages 49-57) so that the reliability of the data in this report is ensured. The particular indicators that have been assured are marked with a ☆ for clarity.

Environment

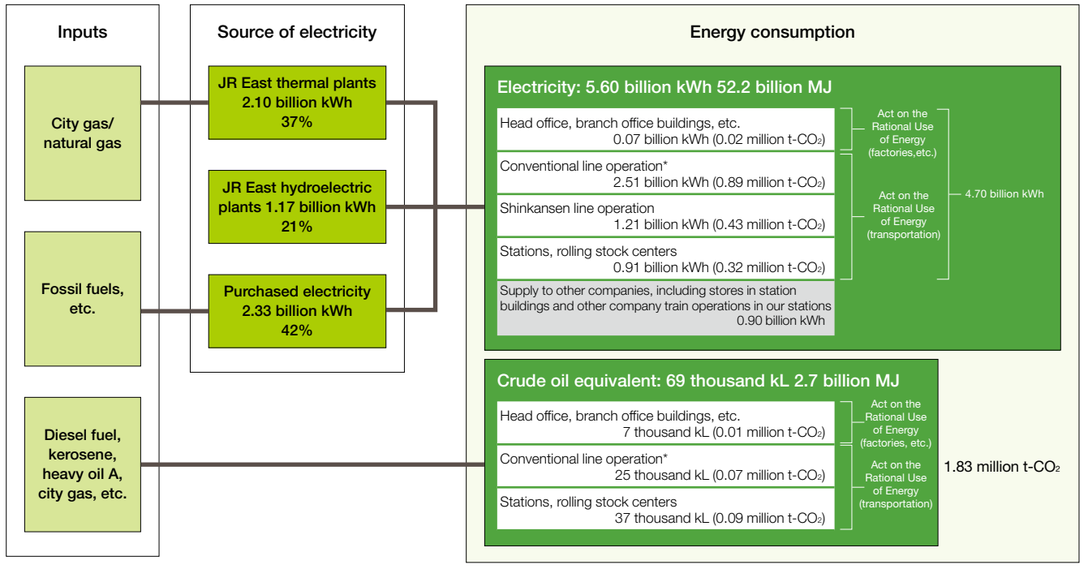
Energy consumption and CO_2 emissions of the entire JR East Group☆: FY2022 Results



*1 Electricity: Both electricity generated in JR East's power plants for internal use and electricity purchased from electric companies are included. For details regarding electricity generation and use please refer to the JR East Energy Flow Map below.
*2 Fuels: Natural gas and other fuels used for generating electricity in JR East's thermal power plants are not included.
*3 CO_2 emissions by Scope: Scope 1 emissions of the entire Group are 1.51 million t-CO_2☆ and Scope 2 emissions are 1.25 million t-CO_2☆.
*4 CO_2 emissions attributable to electricity purchased from external suppliers are calculated based on adjusted emission factors.

JR East Energy Flow Map☆

This shows the flow of energy at the company from input to consumption. Power supplied by our own power plants and electric companies is used for train operation, station, office lighting, and air-conditioning. Diesel fuel and kerosene, etc. are also used to operate diesel trains, stations, and office air-conditioning.

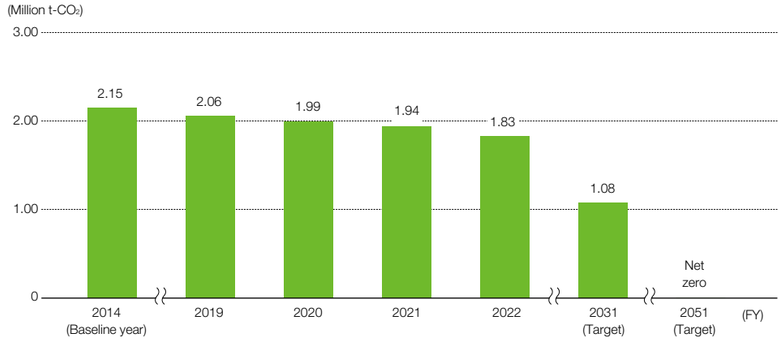


* Including BRT (Bus Rapid Transit)

Boundary
Although in principle the boundary for energy consumption is only JR East, it includes energy consumption for the applicable operations of the companies to which we entrust station operations. On the other hand, the energy consumption of shops on station premises which are operated by JR East Group companies is not included in the boundary. 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. Also, CO_2 emissions attributable to electricity purchased from external suppliers are calculated based on adjusted emission factors.

CO_2 Emissions from Railway Business☆



Boundary of data
The boundary of CO_2 emissions is the same as the boundary of energy consumption described on page 50.

Calculation methods
Our calculation of CO_2 emissions is based on the methods set forth in the Act on Promotion of Global Warming Countermeasures. However, for CO_2 emissions for energy provided from external sources and used as electric power in railway transportation, our calculations use adjusted emission factors for each electric power company. Using basic emission factors, CO_2 emissions for fiscal 2022 were 1.86 million t-CO_2 (decrease of 0.10 million t-CO_2 year on year).

CO_2 Emissions by Scope (Non-Consolidated)

Item	Scope 1☆	Scope 2☆	Scope 3☆
CO_2 emissions in FY2022 (non-consolidated)	1.41 million t-CO_2	1.04 million t-CO_2	3.52 million t-CO_2

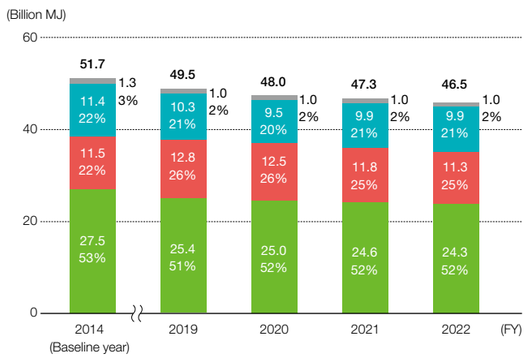
Scope 1: All CO_2 emissions directly attributable to fuel consumed in the operation of diesel railcars, operation of JR East thermal electric power plant, etc.
Scope 2: CO_2 emissions indirectly emitted from the use of electricity purchased from electric companies
Scope 3: CO_2 emitted by other companies which are related to our business activities
* The sum of Scope 1 and Scope 2 emissions and the total CO_2 emissions do not match, since the former includes emissions associated with the production of electricity supplied to other companies.
* Scope 3 emissions include 0.82 million t-CO_2☆ (0.98 million t-CO_2) for Category 1, 1.94 million t-CO_2☆ (2.38 million t-CO_2) for Category 2, 0.48 million t-CO_2☆ (0.46 million t-CO_2) for Category 3, and 0.29 million t-CO_2☆ (0.27 million t-CO_2) for Category 13. Figures in parentheses are values for fiscal 2021.

Calculation standards
Calculation standards for each category are as follows.
Category 1: Calculated by multiplying the amount spent on the purchase of products and services (JR East only) in relation to repairs or for system use by the emission factor*1 for each product and service
Category 2: Calculated by multiplying the amount of capital expenditure (JR East only) by the emission factor*2 per unit price of capital goods in the railway transport department
Category 3: Calculated by multiplying purchased fuel, electricity, and heat used (JR East only) by the emission factor*3 for each type of energy by amount used
Category 13: Calculated by multiplying the total floor area of buildings owned by JR East by the emission factor*2 per unit area for each type of building
*1 Uses emission factor data from the Embodied Energy and Emission Intensity Data for Japan Using Input-Output Tables (3EID) (2005 edition)
*2 (FY 2022): Uses emission factor data from the Emission Intensity Database for the Calculation of an Organization's Greenhouse Gas Emissions Generated by the Supply Chain, Ministry of the Environment. Uses the basic unit data of Database (Ver.3.2) (March 2022) (Emission Intensity Database V3.2). For calculations of category 13 for multipurpose facilities, the emission factor of the application with the largest percentage is used as a representative value.
(FY2021): Uses emission factor data from the Emission Intensity Database for the Calculation of an Organization's Greenhouse Gas Emissions Generated by the Supply Chain, Ministry of the Environment. Uses Database (Ver.3.1) (March 2021). For calculations of category 13 for multipurpose facilities, the emission factor of the application with the largest percentage is used as a representative value.
*3 (FY 2022): For fuel, uses IDEA (Inventory Database for Environmental Analysis). Emission Intensity Database for the Calculation of an Organization's Greenhouse Gas Emissions Generated by the Supply Chain (Ver. 2.3) (December 27, 2019); for electricity and heat, uses emission factor data from Emission Intensity Database (V3.2).
(FY2021): For fuel, uses IDEA (Inventory Database for Environmental Analysis). Emission Intensity Database for the Calculation of an Organization's Greenhouse Gas Emissions Generated by the Supply Chain (Ver. 2.3) (December 27, 2019); for electricity and heat, uses emission factor data from Emission Intensity Database (V3.1).

Energy consumption

This chart shows the energy consumption of the railway business and its breakdown. Train operation accounts for approximately 80% of the total energy consumption, and the remaining 20% is used at stations, rolling stock centers, and head office and branch office buildings.
The amount of energy consumed in fiscal 2022 was 46.5 billion MJ, a reduction of 5.2 billion MJ compared to fiscal 2014.

Energy Consumption in Railway Business Activities☆



Hydraulic power generated by JR East
The energy consumption outlined above is calculated based on the Energy Saving Act, but hydraulic power generated by JR East is calculated by multiplying JR East hydraulic power generation by 9.76MJ/kWh. In the reports required by the Energy Saving Act, we report hydraulic power as 0MJ.

Environment

Formulation of the medium-term Energy Vision 2027—Connect

In July 2022, we formulated Energy Vision 2027—Connect, which presents our energy strategy to realize a sustainable society and contribute to local communities and society. The JR East Group places paramount importance on the incorporation of ESG-oriented management practices under its group management vision "Move Up" 2027, and we are working to solve social issues through energy initiatives such as Zero Carbon Challenge 2050. The environment in which we operate has been changing drastically, including change in lifestyles due to the COVID-19 pandemic, the acceleration of global efforts toward decarbonization, and the energy situation.

To respond to these changes and increase the level of commitment to and speed up the implementation of "Move Up" 2027, we aim to improve the "3E's" (environment, economic efficiency, and energy security) of the JR East Group's strong energy network, which integrates generation, transmission and storage, and consumption in order to support the sustainable development of local communities.

Create

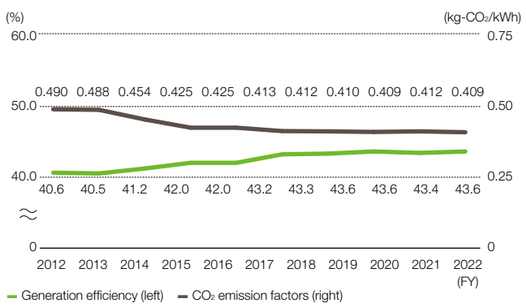
Electricity generated by JR East's power plants

JR East operates a thermal power plant in Kawasaki City, Kanagawa Prefecture with a total output of 809,000 kW, fueled by city gas and natural gas. We have been promoting the introduction of highly efficient combined cycle power generation units*, and Unit 1 came into operation in June 2021. We will continue to promote higher efficiency in our power generation facilities and consider the use of hydrogen power generation and carbon capture, usage, and storage (CCUS) technology in order to reduce CO_2 emissions.

Our hydroelectric power plants (in Tokamachi City and Ojiya City, Niigata Prefecture) have a total output of 449,000 kW and support our rail transportation as a clean energy source that does not emit CO_2. We also aim to coexist with the local community and harmonize with the river environment through the development of fishways and the release of salmon fry.

* A combined-cycle power generation unit is a power generation unit that combines gas turbines propelled by the combustion of gas with steam turbines driven by steam generated from exhaust heat.

CO_2 Emission Factors and Power Generation Efficiency at JR East's Thermal Power Plant☆



Calculation method
CO_2 emission factors for JR East's thermal power plant are based on the Act on Promotion of Global Warming Countermeasures, and power generation efficiency is based on the method stipulated in the Energy Saving Act.

CO_2 emission factor of electricity generated by JR East (thermal power and hydroelectric power):
The adjusted emission factor in FY2022 was 0.284 (kg-CO_2/kWh).

Create

Progress in introducing renewable energy

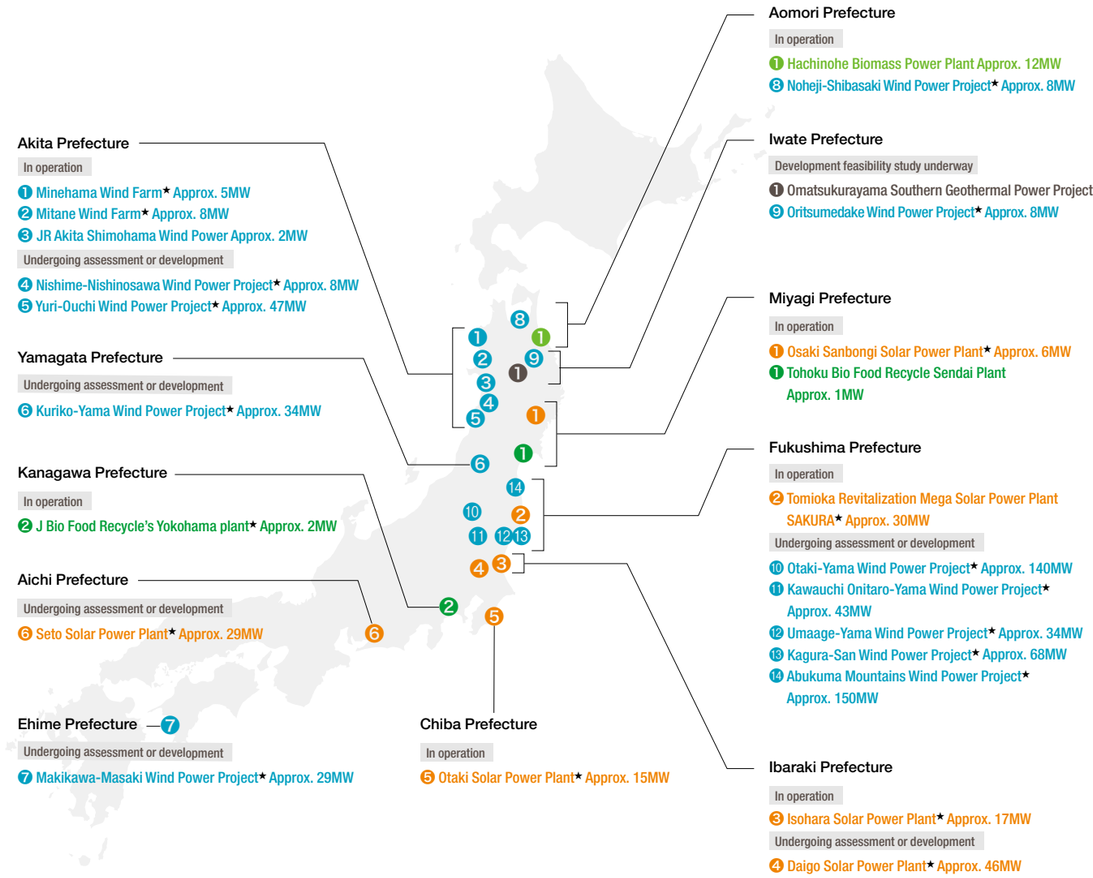
We have installed solar panels on platforms and roofs of station buildings and rolling stock centers to generate power for use on-site and for train operation via our power distribution lines. For example, we have installed a small wind turbine generator at Oga Station to supply electricity used at the station, and use some of this electricity to operate the AC battery-driven ACCUM trains.

Through these efforts, in fiscal 2022 we generated approximately 1.90 million kWh of energy for our own consumption. In addition, we are working with JR East Energy Development Co., Ltd. to develop renewable energy, and proactively introduce renewable energy (wind, solar, and geothermal) initiatives centered in the Tohoku area. Taking advantage of the feed-in tariff (FIT) system, we have steadily launched operations at mega solar power plants and large wind power generation plants. In fiscal 2022, we generated approximately 132.70 million kWh of electricity. Through the use of non-fossil fuel certificates obtained from renewable energy, we plan to supply CO_2-free electricity, and aim to achieve net-zero CO_2 emissions for our train operations in the Tohoku area by fiscal 2031.

Future development goals

We achieved an output of 131,000 kW by FY2022 in cooperation with JR East Energy Development Co. Ltd. We will continue to develop renewable energy sources, and aim to generate 700,000 kW by FY2031 and 1,000,000 kW by FY2051. This should mean that approximately 30-40% of the energy used by the railway business will come from renewable energy sources by FY2051. If JR East-operated hydroelectric power plants are also included as renewable energy sources, approximately 50-60% of our energy will come from renewable sources.

The JR East Group's Current Renewable Energy Development Plan



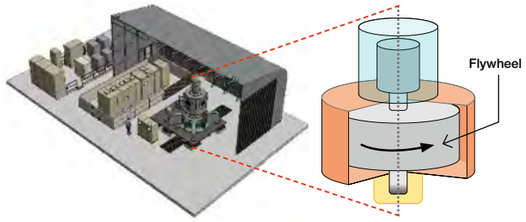
The star(★) indicates JR East Energy Development Co., Ltd. development and investment project.
● Wind power generation ● Solar power generation ● Geothermal power generation
● Wood biomass power generation ● Biogas power generation

Environment

Deliver • Store

Superconducting flywheel energy storage system

In order to effectively utilize the regenerative electric energy generated during train braking, we are working to store it as electric power in storage batteries installed on the ground. To diversify storage media, we are conducting demonstration tests of flywheels that convert electric energy into rotational energy. We are improving maintenance by making the bearings non-contact through the use of superconductivity technology.



Superconducting flywheel energy storage system

Use

Reducing energy consumption in train operations

Regarding trains, we are promoting the introduction of energy-saving vehicles equipped with regenerative braking that converts kinetic energy during deceleration into electrical energy, as well as variable voltage variable frequency (VVVF) inverters that convert direct currents to alternating currents for efficient motor control. In addition, we have replaced some diesel vehicles in non-electrified sections of the railway with diesel hybrid vehicles and battery-powered trains (nicknamed ACCUM). As of the end of March 2022, 99.1% of the vehicles (12,104 railcars) were energy-saving vehicles.

Series E235 (Yokosuka Line)

Series EV-E801 (Oga Line)

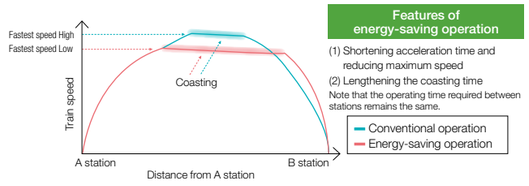
Employee Voices

Osaki Transportation Depot,
Tokyo Branch Office

Efforts to reduce energy consumption through energy-saving operations

We have been working with the Environmental Engineering Research Laboratory to reduce energy consumption since the introduction of the E235 Series. We promote energy-saving operation, a method that visualizes the amount of electricity used based on driving data obtained from trains, and reduces overall energy by optimizing train operation. We have cooperated with the Ikebukuro Transportation Depot to reduce the amount of electricity used on the Yamanote Line.

The result was achieved through the efforts of each and every driver in their daily operations. In order to achieve further reduction, we will continue to further reduce energy consumption and introduce the concept of energy-saving operation to automatic train operation (ATO), and eventually expand this initiative to other line sections.



Comparison of operation curves between conventional and energy-saving operation

Utilization of hydrogen energy

In March 2022, we started trials of hybrid fuel cell test trains (hydrogen-hybrid advanced rail vehicles for innovation, nicknamed *HYBARI*) on the Tsurumi and the Nambu lines, and will promote their adoption in the future based on the outcome of the trials.

Also, some of our sales offices offer a “new environmentally friendly traveling experience” by lending our hydrogen-fueled fuel cell electric vehicles (FCEVs) and promoting the environmental superiority of railways in an effort to make hydrogen more accesible to the public. We also operate a daily hydrogen shuttle bus (FC bus) that circulates from Tokyo Station to Takeshiba and the surrounding areas. We will continue to diversify our energy sources and promote a variety of initiatives based on the resources we have at our stations as well as our rail lines to realize a hydrogen society and increase demand.

Hydrogen-hybrid train FV-E991 (*HYBARI*)

Efforts to Realize a Resource-Recycling Society

In order to realize a resource-recycling society, the JR East Group has set targets of reducing the amount of various types of waste generated and disposed of in our business activities by fiscal 2031. We will continue mobilizing the power of the JR East Group to further promote waste separation, chemical recycling, reduction of food loss and waste, and other initiatives.

Resource recycling targets by FY2031

Performance Indicators			FY2031 Target (%)	FY2022 Result (%)
Raise recycling ratios (per fiscal year)	Recycling rate for waste generated at stations and on trains		94	93
	Recycling rate for PET bottles in waste generated at stations and on trains		100	99
	Recycling rate for waste generated at general rolling stock centers, etc.		96	95
	Recycling rate for waste generated in facility construction projects		96	93
Reduce emission Intensity (FY2021 standard)	Provided by B2C (Business to consumer)	Reduction in single use plastics	25	22
		Switching from single use plastic containers and packaging to renewable materials	60	11
		Reduction rate of final disposal amount of food waste	50	54
Reduce emission Intensity (FY2014 standard)	Waste (general/industrial) reduction rate and recycling rate*1	Reduction ratio*2	32	45
		Recycling rate*2	73	73

■ Indicates targets for JR East Group companies
*1 Excludes overseas JR East Group companies
*2 Excludes companies that do not generate waste

Groupwide waste generation, amount recycled, recycling rate: FY2022 results

( ) shows data for FY2021

JR East Waste Generation, Amount Recycled, Recycling Rate*1

General waste discharged

Offices	1,981t (2,134t)
Stations and trains	17,316t (18,332t)
General rolling stock centers, etc.	432t (428t)
Tickets	107t (118t)
Other field offices*2	876t (940t)
Power plants	12t (12t)
Total☆	20,724t (21,964t)

General waste discharged 20,724t☆ → Recycling rate☆ 89% (Recycling volume 18,386t☆)

Industrial waste discharged

Construction projects*3	300,236t (399,210t)
General rolling stock centers, etc.	23,128t (14,538t)
Medical waste	235t (215t)
Other field offices*2	1,033t (1,468t)
IC ticket cards	53t (131t)
Power plants	406t (245t)
Total☆	325,091t (415,807t)

Industrial waste discharged 325,091t☆ → Recycling rate☆ 93% (Recycling volume 302,976t☆)

Plastic waste volume

Stations, trains, general rolling stock centers	4,066t (2,796t)

Recycling rate 89%

*1 Waste includes salable waste
*2 Other field offices: Technical centers, equipment maintenance centers, and other locations such as train crew offices
*3 Construction projects: Waste generated by our construction projects, but for which contractors legally become the waste-discharging entities, is included in industrial waste

JR East Group Companies' Waste Generation, Amount Recycled, Recycling Rate*1

General waste discharged

Transportation	1,236t (1,377t)
Retail & Services	11,873t (13,351t)
Real Estate & Hotels	37,753t (35,632t)
Others	50t (82t)
Total☆	50,912t (50,442t)

General waste discharged 50,912t☆ → Recycling rate☆ 64% (Recycling volume 32,650t☆)

Industrial waste discharged

Transportation	7,271t (7,812t)
Retail & Services	7,528t (6,960t)
Real Estate & Hotels	13,628t (19,273t)
Others	513t (780t)
Total☆	28,941t (34,825t)

Industrial waste discharged 28,941t☆ → Recycling rate☆ 88% (Recycling volume 25,491t☆)

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: A recycling method that recovers waste heat from burning waste to produce steam and hot water to be used for power generation, hot water supply, etc.

Water and office paper usage by the entire Group

( ) shows data for FY2021

JR East Usage Volume

Water use*☆ **9.63 million m³** (9.46 million m³)

Office paper use **732t (1,016t)** of which 94% (95%) is recycled paper

JR East Group Companies' Usage Volumes

Water use*☆ **7.04 million m³** (6.77 million m³)

Office paper use **787t (914t)** of which 85% (85%) is recycled paper

* Water use comprises the total of tap water, industrial water, and groundwater consumption

Environment

JR East Group is working as one on the three Rs (Reduce, Reuse, Recycle) to reduce the amount of various types of waste generated and disposed of in its business activities.

Resource Flow in a Recycling-Oriented Society (Circular Economy)

Reselling seats and window frames from a Komachi service train

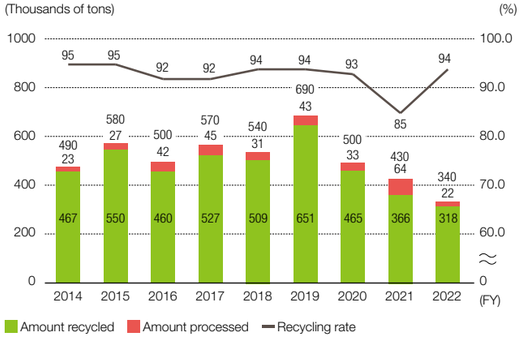
JR East Tokyo Materials Recycling Center

Office paper made from recycled newspaper

Collecting and reusing waste from stations and trains

The recycling rate of waste generated from stations and trains is being improved through thorough sorting of waste by people and machines at the JR East Tokyo Resource Recycling Center (operated by JR East Environmental Access Co., Ltd.) and other facilities. Magazines and newspapers are recycled into office paper, etc., and all used tickets are recycled into toilet paper, etc.

Waste from Stations, Trains, General Rolling Stock Centers, and Construction Projects



Reducing and recycling waste from construction projects and general rolling stock centers

With construction projects, which account for about 70% of the waste we generate, we are working to reduce waste by appropriately treating construction by-products and standardizing in-house design and construction methods. At general rolling stock centers, we rigorously separate waste into approximately 30 types and promote waste reduction and recycling.

Sorting waste at rolling stock centers

Initiatives for recycling waste plastic

Since 2021, we have continued to recycle a portion of waste plastic into RPF*, which is used in one of our recycling methods.

As part of this effort, we conducted a demonstration experiment at Musashi-Mizonokuchi Station in January 2021 to promote proper separation of waste plastic. In the experiment, visually-intuitive trash cans were installed exclusively for waste plastic along with conventional trash cans, and posters were displayed to encourage customers to separate their waste plastic. With the support from Kawasaki City, we were able to receive wide understanding from our customers regarding the experiment.

* Refuse derived paper and plastics densified fuel in a high-grade solid fuel made from used paper and waste plastics sourced mainly from industrial waste

Initiatives to tackle food waste

Publication of the Save Food Get Started Book

Together with The Orangepage Inc. we have published a web-based booklet that provides an opportunity to think about and act on food-related issues. This booklet not only contains information about food issues that businesspeople should know about but also actions that consumers can put into practice.

Take-out mottECO for leftovers

Nippon Hotel Co. Ltd. introduced mottECO at Tokyo Station Hotel and nine other hotels in April 2022 as an initiative to reduce food loss. The program aims to reduce food loss and waste by encouraging guests to take home leftover food at their own risk, as well as to promote and raise awareness of a “take home your own food” culture.

The Ministry of the Environment adopted Nippon Hotel’s efforts as a mottECO introduction model project for fiscal 2022.

mottECO

Biodiversity Initiatives

We have been continuously implementing the Hometown Forest Planting program, an activity to plant native trees and regenerate forests to protect the richness of the land since fiscal 2005. To date, we have planted a total of approximately 170,000 trees in four prefectures in our service area.

Adatara Hometown Forestation (Otama Village and Nihonmatsu City, Fukushima Prefecture)

In addition, in an effort to protect ocean diversity, we are working at Takeshiba tideland, which is adjacent to the *WATERS takeshiba* development, to revitalize the environment of Tokyo Bay Edomae and create a place for learning. In fiscal 2022, *WATERS takeshiba* held events to survey tideland organisms and water quality, experience goby fishing, and clean up the area. In addition, artworks using marine debris were exhibited, and lectures on the relationship between the sea and tidal flats were held. We hosted a total of 24 events with approximately 1,300 participants.

Others

Chemical Substance Management

Under the Act for Rational Use and Proper Management of Fluorocarbons

We endeavor to reduce the use of substances specified as controlled in compliance with the Act on the Protection of the Ozone Layer Through the Control of Specified Substances and Other Measures and to adopt substitutes that have less impact on the environment. Under the Act on Rational Use and Appropriate Management of Fluorocarbons, we reported a leakage amount of 3 thousand t-CO_2e☆ for fiscal 2022.

Chemical substance management and reduction

The Company is classified as a business operator handling over a certain amount of specified chemical substances under Japan’s pollutant release and transfer register (PRTR) system.* Accordingly, 11 of our sites reported emissions and transfer amounts to the relevant local government bodies in fiscal 2022. Also, considering the impact on ecosystems, we are working to reduce and substitute chemical substances, for example, by introducing stainless steel railcars that do not require painting.

* This is a system whereby 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. It encourages the monitoring and control of toxic chemical substances emitted into the environment and measures to prevent negative impact on the environment.

Environment

TCFD Recommendation-Related Initiatives

Since the adoption of the Paris Agreement, countries and governments around the world have made major shifts toward decarbonization. Companies must now ascertain the financial impact of climate change-related risks and disclose relevant information to their stakeholders. In January 2020, JR East announced its support for the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). Using objective data, JR East undertakes a quantitative evaluation of the financial impact of future climate change on its Transportation services business. This business is vulnerable to weather and other natural disasters, which have been worsening as climate change progresses.

Disclosure of Information Based on TCFD Recommendations*1

<table>
<tr><th>Recommendations</th><th>JR East's Initiatives</th></tr>
<tr><td>Governance</td><td>The JR East Sustainability Strategy Committee, chaired by the president and representative director, oversees and makes decisions mainly regarding the establishment and progress of climate change targets, and the management of risks and opportunities. The committee includes the vice presidents, and executive directors as well as full-time corporate auditors, and outside directors also attend its meetings. The committee is held twice a year, and the Zero Carbon Working Group and Hydrogen Working Group report and discuss the progress of CO_2 emissions reductions and hydrogen utilization.
Promotion structure
JR East Sustainability Strategy Committee chairperson: President and representative director
Aiming to realize a sustainable society, we will establish and promote the Group's basic policies and other measures to solve social issues such as global environmental problems.
Committee members
Vice presidents, executive directors
outside directors, full-time corporate auditors
Reports
Supervision and decision-making
Secretariat
Coordination of each working group and consideration of overall policy development
Reports to JR East Sustainability Strategy Committee and coordinates promotion of measures
Cooperation
Adjustment
Zero Carbon Working Group
Considers energy conservation measures, introduction of renewable energy, etc.
Hydrogen Working Group
Considers utilization of hydrogen</td></tr>
<tr><td>Strategy</td><td>In the JR East Group Management Vision, "Move Up" 2027, we have committed to practicing ESG management, with the prevention of global warming and energy diversification as our guiding principles. To achieve these goals, we identify and assess the key risks and opportunities that climate change poses to our business activities and verify the appropriateness of our business strategies. In this disclosure, we identify physical risks related to natural disasters as important risks, and conduct scenario analysis using elaborate methods based on hazard information and other information published by the government.</td></tr>
<tr><td>Risk management</td><td>Within the framework of risk management, each department identifies risks influenced by climate change and specific measures are taken to avoid or reduce them. With regard to climate change mitigation, at least once every six months we compile and conduct a detailed analysis of energy consumption, CO_2 emissions, chlorofluorocarbon (CFC) leakage, and financial status for each business. We also identify, specify, and assess risks based on revisions to laws and regulations and other important changes in the external environment. With regard to adaptation to climate change, we are strengthening and promoting efforts to reduce physical risks in the Transportation services business due to acute and chronic weather-related disasters.</td></tr>
<tr><td>Metrics and targets</td><td>We have set Zero Carbon Challenge 2050 as a goal for the entire JR East Group, aiming to reduce CO_2 emissions by 50% by fiscal 2031 (compared to fiscal 2014) and to achieve net zero CO_2 emissions in fiscal 2051. In addition to regularly monitoring progress towards these targets, we are promoting Groupwide initiatives to further ensure our contribution to the realization of a decarbonized society. Please refer to pages 49-51 for the scope of our targets and progress toward achieving them.</td></tr>
</table>

*1 Please visit the following URL for details of the JR East Group's information disclosure based on the TCFD recommendations (Japanese only): https://www.jreast.co.jp/eco/pdf/taskforce.pdf

Details of strategies

(1) Awareness of risks and opportunities

We recognize that there are two kinds of risks and opportunities associated with climate change. One is physical, for example, the intensification of weather-related disasters caused by global warming. The other is a transition in the social environment, for example, the strengthening of regulations and technological progress aimed at mitigating climate change The main risks and opportunities that we have identified are as follows.

Main Risks and Opportunities		Business Impact*2	Timing of Manifestation*3
Physical risks	Damage to railway facilities and equipment, and suspension of operations due to windstorms, floods, etc.	Large	Short term
	Decrease in passenger volume due to extreme weather (heavy rain, heat)	Small	Long term
Transition risks	Increased costs due to the introduction and strengthening of the carbon pricing system	Not rated	Medium term
	Decrease in passenger volume due to competition from other modes of transportation, such as electric vehicles	Large	Long term
	Decrease in passenger volume due to damage or change in tourism resources	Not rated	Long term

*2 Scale of business impact: Large: events with a financial impact of ¥500 million or more in revenues and expenses
*3 Timing of manifestation—scale of time: Short term: within one year; Medium term: more than one year but within five years; Long term: more than five years

(2) Details of scenario analysis (physical risks)

As a baseline for the analysis, passenger revenue is estimated based on future demographics, and a scenario analysis is conducted for the Transportation services business. In the Transportation services business, future passenger volume is expected to decrease due to Japan's declining birthrate and aging population, and the impact is expected to be particularly significant in rural areas. In order to ascertain the financial impact of these factors and to verify the appropriateness of our business and environmental strategies, we conducted the following scenario analysis for fiscal 2051.

Scenario Analysis Methodology (Overview)

(1) Estimated change in future passenger revenue trends based on business area demographic projection + (2) Estimated financial impact of severe weather disasters = (3) Financial impact

(1) Estimated passenger revenue trends based on business area demographic projections

We estimated changes in passenger revenue up to fiscal 2051 based on data such as the Shared Socioeconomic Pathways (SSPs) data on population*4 and gross domestic product (GDP)*5, which are used across a range of fields in climate change research (Graph 1, see page 60). There was approximately 11% difference in the population estimate for fiscal 2051 between the scenario of Sustainability (SSP1), which is our goal, and the opposing scenario of Regional Rivalry (SSP3), and a ¥350 billion difference in estimated passenger revenue (Graph 2, page 60). Our estimate of passenger revenue is based on projections for the post-COVID-19 era.

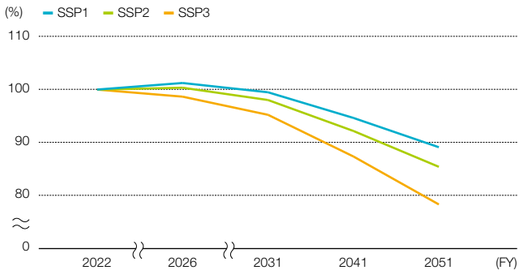
Shared Socioeconomic Pathways (SSPs)

Scenario	State of Domestic Society	Birth Rate	Mortality Rate
SSP1 (2°C)	Sustainability: Development of renewable energy and environmental technology, urban concentration, compact development with robust networks	High	Moderate
SSP2 (Middle)	Middle of the Road: Maintain the status quo, current trends progress relatively unchanged	Moderate	Moderate
SSP3 (4°C)	Regional Rivalry: Uniform population decline, depopulation of regional areas	Low	Moderate

Environment

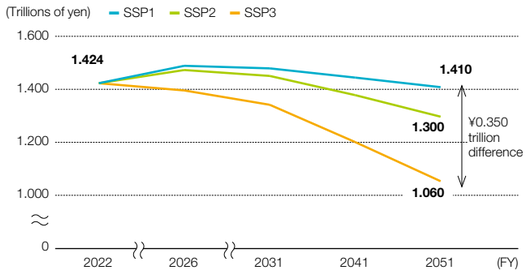
(1) Estimated Passenger Revenue Trends Based on Business Demographic Projections (continued)

Graph 1: Estimated Population of Our Business Area by Scenario



Estimates of future population in our business areas based on Japanese SSP population estimates by municipality, GDP and other data

Graph 2: Trends in Passenger Revenue by Scenario



Estimated future passenger revenues by SSP based on future population estimates within our business areas

*4 Socioeconomic Scenarios
*5 Population data source: Japanese SSP Population Estimates by City, Town, and Village, National Institute for Environmental Studies (NIES)
GDP data source: International Institute for Applied Systems Analysis (IIASA)

(2) Estimation of financial impact of severe weather disasters

Since most of our major railway assets and lines with large passenger revenues are concentrated in and around the Tokyo metropolitan area, a widespread disaster in this area would have a significant financial impact. We therefore selected flooding caused by the overflow of Class A rivers flowing through the Kanto region (due to projected rainfall) as a specific disaster event for scenario analysis. We conducted a quantitative assessment of the financial impact of this scenario using the inundation assumptions published by the government, the asset value of major lines, and passenger revenue trends.

1. Baseline assessment

For each of the rivers selected for evaluation, the financial impact is quantitatively evaluated in terms of the loss of passenger revenue due to planned service suspensions and the time required for restoration, as well as the cost of restoring railway assets such as stations and tracks, in the event of flooding due to planned rainfall.

2. Assessment of climate change impact

Based on the results of the baseline assessment, the financial impact of climate change up to fiscal 2051 is estimated by taking into account future changes in the probability of flooding under multiple climate change scenarios.*6

3. Verification of effectiveness of flood control measures

Based on planned rainfall, JR East is taking disaster countermeasures, both in terms of physical facilities and human responses, such as raising the height of electrical equipment considered of critical importance to operations and installing water stop plates at building openings, in accordance with the degree of importance of the facilities. In addition, we developed a decision support system on railcar evacuation and prepared a vehicle evacuation manual (see “Initiatives to address flooding” on page 42). We intend to verify the effectiveness of these measures by estimating the financial impact of climate change in each case with and without the measures, thereby assessing the loss reduction effect of the implementation of the measures.

4. Summary of analysis results

The financial impact of climate change was found to be slightly smaller in the RCP*7 2.6 (2°C increase) scenario than in the RCP8.5 (4°C increase) scenario, which was common to all rivers in the time of fiscal 2051. Also, we found that inundation measures are effective for loss reductions regardless of the climate change scenario, and that loss reductions due to vehicle evacuation are significant.

*6 Yukiko Hirabayashi et al. (2013). Global flood risk under climate change. *Nature*
*7 RCP (Representative Concentration Pathways scenario)

Estimated Financial Impact for Flooding of the Arakawa River (Upstream)*8

Rivers Expected to Overflow	Lines Expected to Be Significantly Affected			
Arakawa River (upstream)	Joetsu Shinkansen	Keihin-Tohoku Line	Utsunomiya Line	Joban Line
	Tohoku Shinkansen	Saikyo Line	Kawagoe Line	Sobu Line

Climate Change Scenarios	Flood Control Measures (Physical Facilities and Human Responses)	Increase in Financial Impact (Loss) (Billions of yen)	
		FY2051	FY2022-2051, Cumulative Total
RCP2.6 (2°C increase)	No countermeasures	+3.0	+45.0
	With countermeasures	+1.2	+17.7
	Loss reduction effects of countermeasures	(1.8)	(27.3)
RCP8.5 (4°C increase)	No countermeasures	+3.0	+45.5
	With countermeasures	+1.2	+18.9
	Loss reduction effects of countermeasures	(1.8)	(26.6)


*9

Estimated Financial Impact for Flooding of the Tonegawa River

Rivers Expected to Overflow	Lines Expected to Be Significantly Affected	
Tonegawa River	Tohoku Shinkansen	Joban Line

Climate Change Scenarios	Flood Control Measures (Physical Facilities and Human Responses)	Increase in Financial Impact (Loss) (Billions of yen)	
		FY2051	FY2022-2051, Cumulative Total
RCP2.6 (2°C increase)	No countermeasures	+0.3	+4.1
	With countermeasures	+0.3	+3.9
	Loss reduction effects of countermeasures	0.0	(0.2)
RCP8.5 (4°C increase)	No countermeasures	+0.3	+4.5
	With countermeasures	+0.3	+4.2
	Loss reduction effects of countermeasures	0.0	(0.3)


*9

Estimated Financial Impact for Flooding of the Edogawa River

Rivers Expected to Overflow	Lines Expected to Be Significantly Affected	
Edogawa River	Joban Line	Sobu Line

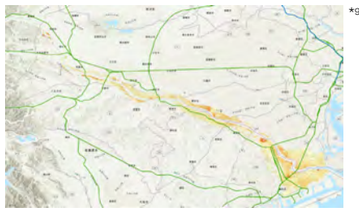
Climate Change Scenarios	Flood Control Measures (Physical Facilities and Human Responses)	Increase in Financial Impact (Loss) (Billions of yen)	
		FY2051	FY2022-2051, Cumulative Total
RCP2.6 (2°C increase)	No countermeasures	+0.6	+8.5
	With countermeasures	+0.2	+2.2
	Loss reduction effects of countermeasures	(0.4)	(6.3)
RCP8.5 (4°C increase)	No countermeasures	+0.7	+9.7
	With countermeasures	+0.2	+2.4
	Loss reduction effects of countermeasures	(0.5)	(7.3)


*9

Estimated Financial Impact for Flooding of the Tamagawa River

Rivers Expected to Overflow	Lines Expected to Be Significantly Affected		
Tamagawa River	Keihin-Tohoku Line	Nambu Line	Tokaido Line

Climate Change Scenarios	Flood Control Measures (Physical Facilities and Human Responses)	Increase in Financial Impact (Loss) (Billions of yen)	
		FY2051	FY2022-2051, Cumulative Total
RCP2.6 (2°C increase)	No countermeasures	+0.4	+5.4
	With countermeasures	+0.3	+4.1
	Loss reduction effects of countermeasures	(0.1)	(1.3)
RCP8.5 (4°C increase)	No countermeasures	+0.4	+6.3
	With countermeasures	+0.3	+4.6
	Loss reduction effects of countermeasures	(0.1)	(1.7)


*9

*8 The amount of increase in financial impact (loss) for the Arakawa River (upstream) has changed from the figure presented in the JR East Group Report 2021 due to a change in the external information referenced from the IPCC Fifth Assessment Report to the Sixth Assessment Report and a review of the calculation method for utilizing the latest information.
*9 Map of flooded areas (yellow to red) caused by projected rainfall on rivers expected to flood and our operating lines (blue: Shinkansen, green: conventional lines)