

Creating "Social Value" —Environment—

Targets toward carbon neutrality and addressing the TCFD Recommendations

In May 2021, we endorsed the TCFD* recommendations, based on which we have been proceeding with analysis of climate change-related risks and opportunities. We will use the analysis results to ensure stable business operations over the long term, while contributing to the realization of a sustainable society.

* TCFD stands for Task Force on Climate-related Financial Disclosures, established by the Financial Stability Board (FSB) in order to consider issues concerning climate-related disclosures, etc. Its final report establishes the recommendation that companies, etc. understand and disclose information about the risks and opportunities that climate change presents to their business.

1. Governance

At JR Central, the Corporate Planning Division and the General Technology Division, which oversee the management and the technology sectors, respectively, play a central role in formulating and promoting environmental measures. The President and Representative Director and related directors

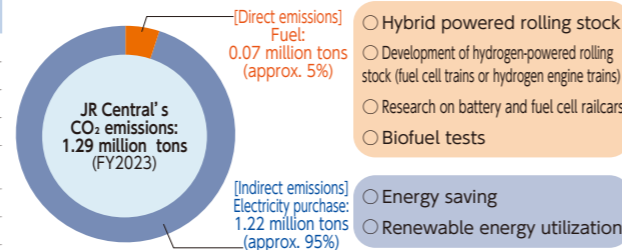
reflect the results of the study on climate change in management, and oversee the efforts to address climate-related issues. In addition, important matters are discussed and reported at the Board of Directors meetings, etc.

2. Strategies

The main climate change-related risks and opportunities that we recognize are as follows:

	Risk name	Risk materialization period
Transition risks	-Increased costs from the introduction of carbon pricing (decarbonization tax, etc.)	Medium term
	-Increased costs to respond to stricter regulations on CO ₂ and other emissions	Medium term
	-Increased costs to procure energy and materials	Medium term
Physical risks	-Increased damage to railway facilities from more frequent wind and flood damage	Short term
	-Increased suspension of service from more frequent wind and flood damage (decreased transportation revenue)	Short term
	-Adverse impact on material procurement, etc. due to supply chain disruption	Long term
	-Decreased revenue due to customers refraining from traveling under extreme weather conditions	Long term
Opportunities	-Customers who value environmental superiority shifting from other modes of transportation to rail	Long term

* Definition of risk materialization period: About one year for short term, through 2030 for medium term, and through around 2050 for long term



- Hybrid powered rolling stock
- Development of hydrogen-powered rolling stock (fuel cell trains or hydrogen engine trains)
- Research on battery and fuel cell railcars
- Biofuel tests
- Energy saving
- Renewable energy utilization

1 Transition risks

As we are aware of the risk of increasing costs for regulatory responses and CO₂ emissions due to the introduction of carbon pricing, among other factors, we recognize the importance of measures to reduce CO₂ emissions.

Of the 1.29 million tons of CO₂ currently emitted by JR Central (FY2023), approximately 95% is indirectly emitted through our use of electricity, while the remaining 5% is directly emitted through our use of fuels, etc.

To address the 5% direct emissions from the use of fuels, we introduced the Series HC85 with reduced environmental impact as well as promote tests on biofuels. We will also begin simulated driving tests combining vehicle driving test equipment and hydrogen supply facilities to develop hydrogen-powered vehicles. Research and development will be continued for battery railcars. To address the indirect emissions from the use of electricity, which account for

the remaining 95% of the total, we will make further energy-saving efforts, such as introducing additional energy-efficient rolling stock including the N700S and Series 315, and replacing frequency converters for the Tokaido Shinkansen one by one with types with lower power loss, in addition to other decarbonization efforts that are consistent with the decarbonization trend across the entire power generation sector in Japan. We have also achieved substantially zero CO₂ emissions by using, since July 2022, a FIT non-fossil fuel certificate equivalent to the electrical energy used for the train operations of the Taketoyo Line to enable the trains on the line to run substantially 100% on electric power derived from renewable energy. We are also implementing other measures to promote the use of renewable energy, including solar power generation on Shinkansen banking, which is currently under preparation.

* Refer to pages 69-70 for information on specific measures.

2 Physical risks

In the railway business, the largest climate change-related physical risk arises from wind and flood damage. For this reason, we have taken various measures in the past and strive to manage such risks more effectively going forward by analyzing the impact of climate change using the framework of the TCFD.

As part of this effort, we have conducted a quantitative risk analysis

3 Opportunities

We see the recent rise in environmental awareness toward decarbonization as an opportunity to further promote the use of train services, a means of transportation that possess high environmental superiority. Since April 2024, we have launched the GreenEX service, which reduces CO₂ emissions on the Tokaido and Sanyo Shinkansen lines to net zero, so that customers who are interested in preserving the global environment can use our services with even greater peace of mind. In addition, the target area has been extended to the Kyushu Shinkansen area since October 2024.

- Analysis of financial impact (risk of damage to facilities) -

Since its founding, JR Central has actively worked to strengthen its facilities against all natural disasters, whether they arise from climate change or not, based on the recognition that the starting point and the main mission of the railway business is securing safe and reliable transportation.

* Refer to pages 27-34 for information on specific measures.

of potential damage to Tokaido Shinkansen equipment as a result of the increasingly frequent occurrence of river floods, and the analysis results were disclosed on our website in April 2022. In addition, we have recently completed the analysis of revenue decreases of the Tokaido Shinkansen due to suspension of service. (Refer to "Analysis of Financial Impact" for specific disclosure content.)

By securing safe and stable transportation and improving transportation services, we intend not only to increase transportation revenues, but also to contribute to the preservation of the global environment. Of our risks and opportunities, we expect the impact of wind and flood damage to be most significant for the railway business. Therefore, we have analyzed the financial impact on the Tokaido Shinkansen, JR Central's main management resource, as follows.

Meanwhile, various studies on climate change predict that rising average temperatures will lead to more frequent floods and rising sea levels in the areas where JR Central operates, posing an increased risk of damage to facilities that support train operations.

In light of this, we analyzed the risk of facility damage from river flooding and high tides, using hazard maps*1 published by local governments and other organizations, focusing on the Tokaido Shinkansen, which accounts for the majority of our transportation revenues. As a result, it was found that some facilities would suffer damage.

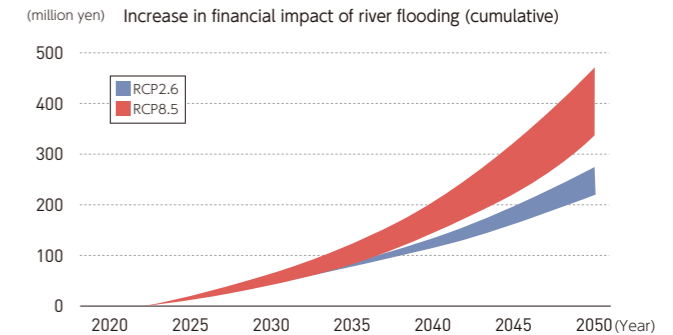
When we analyzed the potential financial impact, taking into account the increased risk of river flooding due to climate change, it was found that in 2050 alone, the financial impact (facility damage) is expected to increase by approximately 10 million to 20 million yen under RCP2.6*2 (2°C scenario), and by approximately 20 million to 30 million yen under RCP8.5 (4°C scenario).

On a cumulative basis through 2050, a financial impact of approximately 220 to 270 million yen and approximately 340 to 490 million yen is expected under the RCP 2.6 (2°C scenario) and the RCP 8.5 (4°C scenario), respectively.

For the Tokaido Shinkansen, we are implementing measures to ensure that our train operations will not be significantly affected by flooding caused by planned scale rainfall,*3 including relocating, elevating, and/or installing anti-flooding doors at main facilities by May 2024. The analysis above has taken into account these measures. Although there is a possibility that some facilities may suffer flood damage, it is expected that train operations will not be significantly affected and that there will be no significant financial losses due to reduced transportation revenues.*4

For storm surges, when we analyzed the potential financial impact, taking into account the impact of sea level rise due to climate change, it was found that the financial impact (facility damage) is expected to increase by approximately 150 million yen under both RCP2.6 (2°C scenario) and RCP8.5 (4°C scenario) in the case of assumed maximum scale rainfall.*5

Scenario	Increase in financial impact (100 million yen)	
	2050 (single year)	Cumulative through 2050
RCP2.6 (2°C)	0.1~0.2	2.2~2.7
RCP8.5 (4°C)	0.2~0.3	3.4~4.9



1 For floods, refer to the Flood-Prone Area Map (planned scale rainfall), and for storm surges, refer to the Storm Surge Inundation Area Map (assumed maximum scale rainfall)
 *2 RCP: Representative Concentration Pathways, which are climate change scenarios to project future greenhouse gas concentrations published in the Fifth Assessment Report of the IPCC
 *3 Planned scale rainfall: Rainfall that occurs once in several decades to 200 years
 *4 Refer to "Flooding countermeasures" on page 31 for details.
 *5 Assumed maximum predicted rainfall: Rainfall that occurs once every 1,000 years

- Analysis of financial impact (risk of revenue decrease due to suspension of service) -

For the Tokaido Shinkansen, we have installed rain gauges at 59 locations along railway lines and elsewhere. When rainfall reaches a certain threshold, operation regulation, such as slowing down or suspending service, are implemented to ensure safety. We have worked to further ensure safety, including introducing operation regulation using the soil rainfall index, an index that is excellent for grasping the extent of sediment disaster risk, in 2022. We are also taking steps to ensure that train operations will not be significantly affected by rainfall by implementing the abovementioned flooding countermeasures for the Tokaido Shinkansen.

Meanwhile, rising average temperatures due to climate change could lead to more frequent heavy rainfall in the future, which could result in more cancellations and delays of Tokaido Shinkansen services. If a train is canceled, no revenue will be earned, and if a train is delayed by more than two hours from its scheduled arrival time, limited express fares will be refunded. Therefore, if there is an increase in rain that affects Shinkansen operations, our revenues are expected to decrease.

In view of these circumstances, we have calculated the potential financial impact by applying projected scenarios for the frequency of rainfall under climate change to the amount of revenue loss due to cancellations and delays caused by heavy rain, which has been obtained from the train operation data up to the time of analysis. The results indicate that in 2050 alone, the financial impact is expected to be approximately 60 to 80 million yen under RCP 2.6 (2°C scenario) and approximately 120 to 160 million yen under RCP 8.5 (4°C scenario).

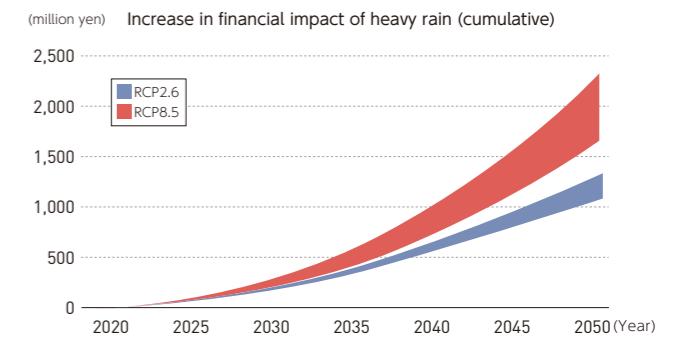
On a cumulative basis through 2050, a financial impact of approximately 1,070 to 1,320 million yen and approximately 1,660 to 2,340 million yen is expected under RCP 2.6 (2°C scenario) and RCP 8.5 (4°C scenario), respectively.

Even if the impact amount were to be 2,340 million yen, which is the cumulative maximum value under RCP8.5 (4°C scenario), it would still amount to less than 0.3%

of our Shinkansen transportation revenues for the latest fiscal year that ended March 31, 2023. Considering that the Tokaido Shinkansen accounts for approximately 90% of JR Central's transportation revenues, if the financial impact as calculated in this analysis occurs, the impact on the overall transportation revenues would be minor.

* This analysis does not include the impact of typhoons.

Scenario	Increase in financial impact (100 million yen)	
	2050 (single year)	Cumulative through 2050
RCP2.6 (2°C)	0.6~0.8	10.7~13.2
RCP8.5 (4°C)	1.2~1.6	16.6~23.4



3. Risk management

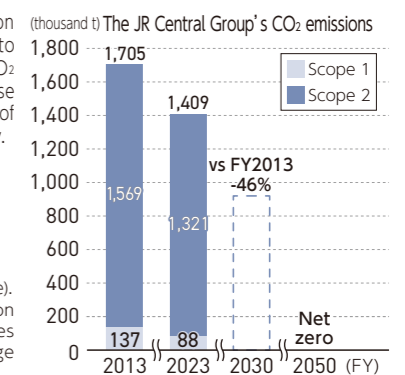
At JR Central, the Corporate Planning Division and the General Technology Division assess and analyze the impact of climate change risks and opportunities on its business in close cooperation with related departments, and formulate and promote countermeasures.

As part of measures to reduce physical risks, we have been strengthening our facilities to cope with natural disasters in general, not just those caused by climate change, since the Company was established. In addition, as a fundamental measure to prepare for large-scale disasters, we are working on the construction of the Chuo Shinkansen that uses the Superconducting Maglev System.

We will continue to deepen our risk analysis on climate change to ensure the long-term and stable operation of the railway business and also to contribute to the realization of a sustainable society.

4. Goals and indicators

On the basis of the Japanese government's 2050 carbon neutrality policy, JR Central and the JR Central Group aim to achieve net zero CO₂ emissions by 2050 and to reduce CO₂ emissions by 46% from the FY2013 level by 2030. With these efforts, we will further elevate the environmental superiority of railways and contribute to the realization of a sustainable society.



Scope 3 emissions are approximately 2 million tons* (JR Central alone).
 * Since estimating Scope 3 emissions requires information provided by many third parties, the figures are estimates based on a wide range of assumptions and may change significantly in the future.