We are promoting the Chuo Shinkansen Project using the Superconducting Maglev System based on the Nationwide Shinkansen Railway Development Act (hereinafter, “the Act”) to continually carry out our mission of operating a high-speed railway in the Tokyo Metropolitan area and the Chuo and Kansai regions from Tokyo through Nagoya to Osaka, which is the lifeline of our business, and drastically prepare for risks, such as aging in the future and large-scale disasters affecting the Tokaido Shinkansen.

The Tokaido Shinkansen has been in operation for more than half a century, and while we have been carrying out large-scale renovation, there is the risk of suspension of services due to major facility replacement caused by future aging. Furthermore, Japan is prone to earthquakes, and although we have taken earthquake resistance measures for the Tokaido Shinkansen, there is the risk of potential major disasters, including the undeniable possibility of long-term disruption to Japan’s main transportation artery due to a possible major earthquake. Therefore, as a drastic measure to prepare for these future management risks, we decided to complete the Chuo Shinkansen as quickly as possible, under the assumption that we bear the cost of its construction, utilizing the Superconducting Maglev System that we have developed. The Chuo Shinkansen will turn Japan’s main transportation artery into a dual system, and JR Central will operate it in an integrated manner along with the Tokaido Shinkansen.

Distribution map of the estimated greatest seismic intensity of a Nankai Trough Large Earthquake

Outline and Significance of the Chuo Shinkansen

The realization of the Chuo Shinkansen using the Superconducting Maglev System will contribute to the revitalization of Japan’s economic and social activities, turning Japan’s main transportation artery between Tokyo, Nagoya and Osaka into a dual system and merging the three major metropolitan areas into a “Super Mega Region.”

The Chuo Shinkansen Project as a national project

The Chuo Shinkansen is being constructed in accordance with the Act, which is a legal system for developing infrastructure essential to the nation in order to contribute to the development of the national economy, the expansion of the area of Japanese people’s lives, and the development of local communities. Based on the Act, we received designation as the operator and an order for construction from the Minister of Land, Infrastructure, Transport and Tourism in May 2011, and then the construction implementation plan was approved by the Minister of Land, Infrastructure, Transport and Tourism in October 2014. In the meantime, we have conducted environmental assessment procedures and completed the final environmental impact assessment report between Tokyo and Nagoya, which is promoted as the first stage.

On the other hand, in order to confirm that the principles of a privately owned company, such as freedom of management and autonomy of capital investment, would not be hindered by application of the Act, we referred fundamental clauses regarding application of the Act to the Ministry of Land, Infrastructure, Transport and Tourism (hereinafter, “MLIT”) and received a reply in January 2008 indicating that those principles would not be hindered.

In order to take steady steps towards the successful completion of this project, we will maintain sound management and stable dividends, sufficiently examine costs and demonstrate our flexibility, and make necessary investments to ensure safe and reliable transportation and to enhance the competitiveness of the Tokaido Shinkansen and conventional lines. We will first realize the project between Tokyo and Nagoya, where we have received approval for the construction plan, and strive to further extend the project to Osaka.

New Value Provided by the Chuo Shinkansen

The realization of the Chuo Shinkansen using the three major Superconducting Maglev System will contribute to the revitalization of Japan’s economic and social activities, turning Japan’s main transportation artery between Tokyo, Nagoya and Osaka into a dual system and merging the three major metropolitan areas into a “Super Mega Region.”

Outline of the Construction Implementation Plan (Part 2) of the Chuo Shinkansen between Shinagawa and Nagoya

<table>
<thead>
<tr>
<th>Station Location</th>
<th>Approximate location</th>
<th>Items related to construction costs</th>
<th>Approximate amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shinkansen Station</td>
<td>Kofu City area, south-central Akaishi Mountains</td>
<td>Construction line</td>
<td>9,030 billion yen</td>
</tr>
<tr>
<td>Osaka Station</td>
<td>Osaka Prefecture</td>
<td>Construction line</td>
<td>4,853.6 billion yen</td>
</tr>
<tr>
<td>Nagoya Station</td>
<td>Gifu Prefecture</td>
<td>Construction line</td>
<td>4,853.6 billion yen</td>
</tr>
</tbody>
</table>

* In the “Notice Concerning Total Construction Costs for the Chuo Shinkansen Section between Shinkansen and Nagoya, and Osaka” in the “Outline of the Construction Implementation Plan (Part 2) of the Chuo Shinkansen between Shinkansen and Nagoya and Osaka” (March 2019) * In the “Outline of the Construction Implementation Plan (Part 2) of the Chuo Shinkansen between Shinkansen and Nagoya and Osaka” (March 2019) * The survey report of the Chuo Shinkansen section between Tokyo and Osaka (December 2020)
Creation of new demand

In the competition between the Shinkansen and air travel, the shorter the travel time of the Shinkansen, the greater its share. Demand is therefore expected to shift from air travel to the Chuo Shinkansen due to the time reduction effect of the Superconducting Maglev System. In addition, the dramatic time reduction will greatly stimulate the flow between metropolitan areas, which is highly expected to generate new demand.

Furthermore, in addition to the anticipated new use of intermediate stations in Kanagawa, Yamanashi, Nagano and Gifu Prefectures, the opening of the Chuo Shinkansen will shift some of the current “Nozomi” passengers on the Tokaido Shinkansen to the Chuo Shinkansen, creating room for additional “Hikari” and “Kodama” services when there is more room in the Tokaido Shinkansen schedule. This may improve travel times and frequencies between cities along the Tokaido Shinkansen line and each of the three major cities, thereby increasing the flow of people.

Broad ripple effects on the economy and society

Due to the overwhelming time reduction effect of the Superconducting Maglev System, Tokyo - Nagoya - Osaka will be connected in about one hour, and the three major metropolitan areas will become a “Super Mega Region” with a total population of about 66 million, or over half of Japan’s total population. This “Super Mega Region” is expected to become the core driving new growth for Japan, which is experiencing a declining population, by broadening the scope of activities and thereby significantly changing lifestyles, such as the way people do business and spend their leisure time, as well as expanding various possibilities.

The final report of the “Super Mega Region Concept Study Group” established by MLIT titled “Creating a Super Mega Region to Overcome a Declining Population: Creating New Value through Liberation from Time and Place” (May 2019) presents the following as “impacts of the Linear Chuo Shinkansen.”

From the Final Report of the “Super Mega Region Concept Study Group” (May 2019)

- Opportunities for face-to-face interaction between people will increase, and the time for interaction will expand, which will lead to opportunities to create new innovation.
- It is expected to bring about changes in business styles and lifestyles by liberating people from “time” and “place”, which have been factors that restrict working and living styles, and providing a variety of options.
- Due to the integration of the three major metropolitan areas, the entire Super Mega Region will create new value and growth industries, which will increase the attractiveness of the region in attracting people and investment from overseas.
- By organically connecting the Linear Chuo Shinkansen, Shinkansen and expressway networks, it is expected that the multiplicity and substitutability of the high-speed transportation network, which forms the framework of the national land policy, will be enhanced, and a sustainable flow of people and goods will be secured.
- It is expected that new regional revitalization will begin in the areas around the intermediate stations located between the three major metropolitan areas, and that the effects of the Super Mega Region will spread widely beyond the areas along the Linear Chuo Shinkansen.

Furthermore, according to the “National Land Policy Simulation Model” compiled by MLIT, the productivity improvement effects of the formation of the Super Mega Region as a result of the opening of the Chuo Shinkansen are estimated to be 3.5 trillion yen per year for the opening of the line up to Nagoya and 6.5 trillion yen per year for the opening of the line up to Osaka.

In this way, the dramatic reduction in travel time brought about by the opening of the Chuo Shinkansen will have a major impact on the entire country and will lead to the creation of new value and the sustainable growth of Japan as a whole.

Promotion of Construction

We are steadily carrying out the planned construction work in areas along the Shinkansen-Nagoya section for which we obtained approval of the Construction Implementation Plan, placing priority on safety at work, environmental conservation, and cooperation with local communities and examining costs sufficiently. Capital investments have totaled 1,526.8 billion yen in the period from FY2014, when we obtained approval of the Construction Implementation Plan, to FY2022. The total length of construction areas that have already been contracted out reached about 90% of the Shinkansen-Nagoya section, including the Yamanashi Maglev line, totaling about 296 km, at the end of September 2023.

In the Southern Alps Tunnel construction area, we have yet to convey Shizuka Prefecture and other parties, due to which we have not been able to begin tunnel drilling work. In such circumstances, with regard to impacts on water resources of the Oki River, such as in the "Interim Report on the acceptance of excavated soil," we have been able to begin tunnel drilling work. In such circumstances, with regard to impacts on water resources of the Oki River, such as in the "Interim Report on the acceptance of excavated soil," we have been able to begin tunnel drilling work. In such circumstances, with regard to impacts on water resources of the Oki River, such as in the "Interim Report on the acceptance of excavated soil," we have been able to begin tunnel drilling work.
The Superconducting Maglev System is an advanced technology unique to Japan. Instead of using the friction between wheels and rails like conventional railways, it runs in a non-contact manner due to the magnetic force between the Superconducting Magnet mounted on the vehicle and the coils mounted on the ground. In addition, to obtain the strong power of the magnets, the technology uses a superconducting magnet utilizing the phenomenon, whereby electrical resistance vanishes when a superconducting magnet is cooled below a certain temperature. Furthermore, superconducting magnets can be used in a stable manner, unlike conventional railways. These features make it possible to travel at an ultra-high speed of 500 km/h in a stable manner, unlike conventional railways.

The level of the Superconducting Maglev System Technology has been evaluated in multiple stages since running tests began on the Yamanashi Maglev Line in April 1997. In July 2009, the Superconducting Magnetic Levitation Technological Practicability Evaluation Committee of MLIT (hereafter referred to as “Committee”) confirmed that the Superconducting Maglev System Technology had already achieved levels sufficient for commercial operation, and the Minister of Land, Infrastructure, Transport and Tourism established technological standards for the Superconducting Maglev in December 2011. Subsequently, in February 2017, the Evaluation Committee confirmed its evaluation that the technology development required for commercial lines was completed, and in March 2023, the Evaluation Committee assessed that steady progress has been made in brushing up the technology. We will continue to make efforts to reduce the cost of construction, operation, and maintenance of the commercial lines and further brush up Superconducting Maglev System Technology while studying running tests using the Series L0 improved version and developing commercial vehicle specifications.

Principles of the Superconducting Maglev System

**Propulsion System**

By passing current through the Propulsion Coils on both sides of the guideway, a magnetic field is produced, and thus the vehicle is propelled forward by the attractive force and repulsive force of the opposite poles acting between the ground coils and the Superconducting Magnets built into the vehicle.

**Levitation System**

The levitation and Guidance Coils are installed on both sides of the guideway (track). When the vehicle is moving, the board Superconducting Magnets pass through at high speed; an electric current is induced in the levitation and Guidance Coils, causing them to become electromagnets. This generates a force that both pulls the car and lifts it off the ground.

**Guidance System**

The evaluation and Guidance Coils on both sides of the guideway are installed in the center of the guideway at all times by attracting the force on the far side of the vehicle and a repulsive force on the near side where the vehicle moves to center to either side.

Total Construction Costs for Shinagawa-Nagoya Section

In the "Notice Concerning Total Construction Costs for the Chuo Shinkansen Section between Shinagawa and Nagoya" (April 2021), we announced that the total construction costs for the Shinagawa-Nagoya section are expected to increase from 5.52 trillion yen estimated at the time of the "Construction Implementation Plan (Part2) of the Chuo Shinkansen Section between Shinagawa and Nagoya" (March 2018) to 7.04 trillion yen. The reasons for the increase in construction costs include responding to strengthening construction work, enhancing earthquake countermeasures, and securing utilization sites of excavated soil. We will prioritize sound management and stable dividends with regard to future management just as always and will fund the construction costs mainly through operating cash flows and the remaining amount through repayable borrowings. If we anticipate that it can no longer ensure sound management and stable dividends, we will aim to complete the construction by adjusting the pace of construction and fully utilizing its management strength.

As a reference, in order to confirm that the funds necessary for completion of the construction are secured, we calculated the operating cash flows based on certain reasonable assumptions in the event that the revenue recovers at a realistically expectable pace from the impact of the COVID-19 pandemic, and it confirmed that, approximately 1 trillion yen of new financing is added to such operating cash flows, the cumulative amount of the funds available for construction of the section between Shinagawa and Nagoya would exceed the total construction costs of 7.04 trillion yen in FY2028. It should be noted, however, that it does not mean that a new target time for opening is set; however, a trial calculation of the status of securing funds under certain assumptions was made for reference purposes only.

Thus, we have confirmed that we will be able to secure the level of funds necessary to complete the construction even after incorporating new construction costs. We will continue to proceed with the Chuo Shinkansen Project with the aim of early realization of the Chuo Shinkansen while ensuring sound management and stable dividends.

Estimates to confirm construction costs are secured as of (April 2021) for the following reasons:

* Construction costs for the Shinagawa-Nagoya section are expected to increase from 5.52 trillion yen estimated at the time of the "Construction Implementation Plan (Part2) of the Chuo Shinkansen Section between Shinagawa and Nagoya" (March 2018) to 7.04 trillion yen.
* We will prioritize sound management and stable dividends with regard to future management just as always and will fund the construction costs mainly through operating cash flows.
* Construction work will be strengthened in response to a discussion at the Extraordinary General Meeting of Shareholders in 2018 held in April 2018; the Extraordinary General Meeting of Shareholders approved the strengthening of construction work at an extraordinary general meeting held in April 2018.
* If we anticipate that it can no longer ensure sound management and stable dividends, we will aim to complete the construction by adjusting the pace of construction and fully utilizing its management strength.
* The cumulative amount of the funds available for construction of the section between Shinagawa and Nagoya would exceed the total construction costs of 7.04 trillion yen in FY2028.

For reference: Results of confirmation

<table>
<thead>
<tr>
<th>Period</th>
<th>Expenditure</th>
<th>Operation revenue</th>
<th>Operating surplus or deficit</th>
<th>Capital investment</th>
<th>Other income and expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2028</td>
<td>1,530 billion yen</td>
<td>240 billion yen</td>
<td>1,290 billion yen</td>
<td>6.0 trillion yen</td>
<td>3% interest rate on financing</td>
</tr>
</tbody>
</table>

Note: In and after the period marked with an asterisk (*) above, in calculating the funds available for construction of the section between Shinagawa and Nagoya, it is assumed that major repairs and overhauls will be conducted and that the funds available for construction of the section between Shinagawa and Nagoya will exceed the total construction costs of 7.04 trillion yen in FY2028. It should be noted, however, that it does not mean that a new target time for opening is set; however, a trial calculation was made for reference purposes only.

**Series L0 improved version**

While steadily conducting running tests, we have optimized running tests using the Series L0 improved version, which further brushed up the Series L0 based on the results of the running tests so far.