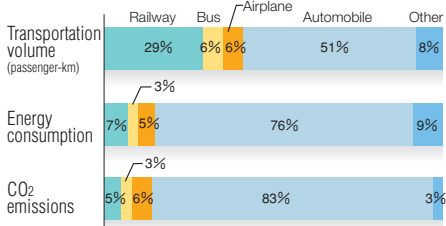


# Engagement in Global Environment Preservation, etc.

## Promoting railway's usage based on its characteristics of little burden on the global environment

JR Central believes that manifesting the superior qualities of railway, particularly with the Tokaido Shinkansen, results in a contribution to global environmental conservation. We have adopted an active approach that revolves around the following two points. The first is that further increasing the energy efficiency of railway operations, such as through the development of energy saving trains, provides for a direct reduction in the burden being placed on the environment. The second is to strive to provide even more comfortable transportation services so that as many passengers as possible will select and use railways, which have minimal impact on the global environment. We believe that through such efforts the impact of the entire transportation sector on the environment will be curbed and lead to preservation of the global environment.

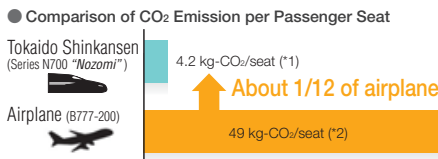
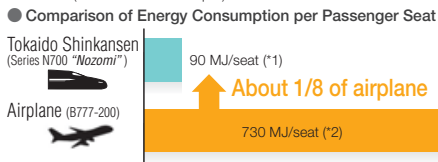
### Distribution of Transportation Volume, Energy Consumption and CO<sub>2</sub> Emissions (FY2008)



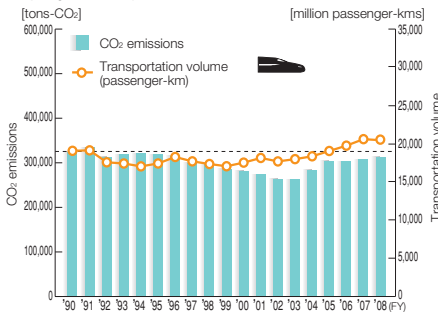
Source: Created based on data from Transportation Related Statistics (Ministry of Land, Infrastructure, Transport and Tourism)(Transportation volume/energy consumption), and the National Institute for Environmental Studies Greenhouse Gas Inventory Office of Japan(CO<sub>2</sub> emissions).

### Comparison of Tokaido Shinkansen and Airplane (Tokyo-Osaka)

\*1. Calculation based on running performance (JR Central figures) Series N700 "Nozomi" (Tokyo-Shin-Osaka)  
 \*2. Calculated by JR Central while referencing ANA's Annual Report 2010 B777-200 (Haneda-Itami-Kansai Airport)

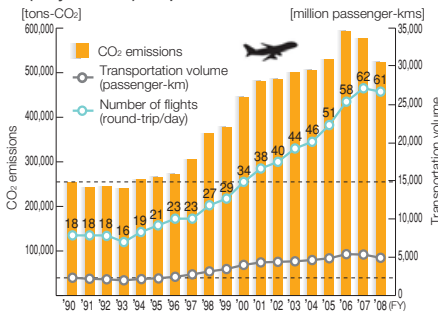


### Changes in CO<sub>2</sub> Emissions and Transportation Volume (Tokyo-Osaka) (Shinkansen)



Source: Created based on the FY2008 Inter-Regional Passenger Mobility Survey (Ministry of Land, Infrastructure, Transport and Tourism)

### Changes in CO<sub>2</sub> Emissions and Transportation Volume (Tokyo-Osaka) (Airplanes)



Source: Created based on the "Annual Aggregate Air Transportation Report (FY2008)" and the "Transportation Related Statistics" (Ministry of Land, Infrastructure, Transport and Tourism)

## Fundamental Policies for Engaging in Global Environmental Preservation

Railways have the outstanding characteristic of being highly energy efficient compared to other transport modes and having minimal adverse impact on the global environment. Even though railway accounts for 29% of the passenger transport volume for the entire country, it is responsible for only 5% of CO<sub>2</sub> emissions. We therefore believe that it is JR Central's top priority to further improve the environmental superiority of railway in an effort to conserve the global environment.

## Environmentally Superior Mode of the Tokaido Shinkansen

If the Tokaido Shinkansen (Series N700 "Nozomi" ) and an airplane (B777-200) are compared, the Tokaido Shinkansen consumes approximately one-eighth of the amount of energy per passenger seat when traveling between Tokyo and Osaka and has about one-twelfth of the CO<sub>2</sub> emissions. The Tokaido Shinkansen has overwhelming environmental superiority. If we look at transportation volume and CO<sub>2</sub> emissions for the Tokaido Shinkansen in the Tokyo-Osaka corridor in FY2008, we will see that compared with FY1990, CO<sub>2</sub> emissions have decreased as a result of our efforts to improve energy efficiency. Meanwhile, airplanes have shown an increase in transportation volume due to an increase in flights and consequent CO<sub>2</sub> emissions have virtually doubled.

If for argument's sake a calculation was made based on FY2008 transportation statistics that assumed that all transportation by airplane was handled by the Tokaido Shinkansen, it would show an actual overall emission reduction of approximately 450,000 tons. This corresponds to the yearly CO<sub>2</sub> emissions for 89,000 households.

## Environmental Action Guidelines, Environmental Management System

1. Provide comfortable transportation services to promote further use of railways which offer superior global environmental preservation
2. Promote technological development that contributes to global environmental preservation
3. Efficiently utilize fuel and energy
4. Promote waste control and recycling
5. Appropriately manage chemical substances
6. Procure environmentally-friendly goods and materials
7. Contribute to society and raise awareness for preservation of the global environment

### Environmental Management System



## Environmental Accounting

The investments, costs, and their principal effect involved in environmental conservation activities during FY2010 are estimated as below.

Classification	Main Efforts	Environmental preservation cost (100 million yen) <sup>1</sup>	
		Investment	Expenditures
Global environmental conservation	<ul style="list-style-type: none"> <li>Introduction of energy-conserving rolling stock</li> <li>Improved energy-savings at stations and office buildings</li> <li>Installation of non-CFC type equipment etc.</li> </ul>	854.2	0.8
Research and development	<ul style="list-style-type: none"> <li>Development of energy-conserving rolling stock</li> <li>Development related to environmental conservation along railway etc.</li> </ul>	1.1	65
Resource recycling	<ul style="list-style-type: none"> <li>Proper disposal and recycling of station and train refuse</li> <li>Proper disposal and recycling of items generated by workshops and engineering work etc.</li> </ul>	1.4	42.6
Environmental conservation along railway lines	<ul style="list-style-type: none"> <li>Countermeasures for noise and vibration</li> <li>Proper management of environmental load substances etc.</li> </ul>	48.6	38.9
Management activities	<ul style="list-style-type: none"> <li>Environmental advertising</li> <li>Environmental management education etc.</li> </ul>	—	0.1
Social activities	<ul style="list-style-type: none"> <li>Support and cooperation for organizations and other groups undertaking environmental conservation</li> </ul>	—	0.1
<b>Total<sup>2</sup></b>		905.4	147.6

<sup>1</sup> Fractions of ¥10,000,000 are omitted  
<sup>2</sup> Totals do not add up due to rounding

### [Principal Effects of Environmental Conservation]

- Energy-conserving model rolling stock ratios: 100% (Shinkansen), 89% (conventional line electric cars), 100% (conventional line diesel cars)
  - Reduction rate for operational energy per rolling stock-km: -21.6% (compared to FY1995 level)
  - Recycling rate for refuse and waste: Approximately 66%
  - Non-CFC rectifiers: 38 in operation
- [Approach to Environmental Accounting Tabulation]
- Compilation is applicable only to JR Central.
  - The applicable period is April 1, 2010 to March 31, 2011.
  - "Environmental Accounting Guidelines 2005," a publication of the Ministry of the Environment, was consulted with regard to aspects of style.
  - Depreciation is not included in the calculations for expenditures.
  - In the event of multiple-purpose expenditures, the full amount of the higher environmental conservation effect is included in the calculation.

## Environmental Impact of Operations

The main resources and energy utilized as well as waste generated during JR Central's business activities for FY2010 are indicated in the figure on the right side.

### Voluntary Plan

We have established a "Voluntary Plan" and are striving to accomplish its goals.

Ever since FY2002, we have set higher objectives in an effort to contribute to global environmental preservation. As a result, all of the objective goals were achieved as of the end of FY2010.

#### ● Introducing Energy-Conserving Rolling Stock

We are introducing energy-conserving rolling stock that features even greater energy efficiency than the conventional types. With the FY2007 revamp, we raised our conventional line energy-conserving electric cars ratio goal from 60% to 85%.

- Shinkansen trains : 100% by FY2003
- Conventional line electric cars : 85% by FY2010
- Conventional line diesel cars : 100% by FY2010

#### ● Improving Unit Energy Consumption

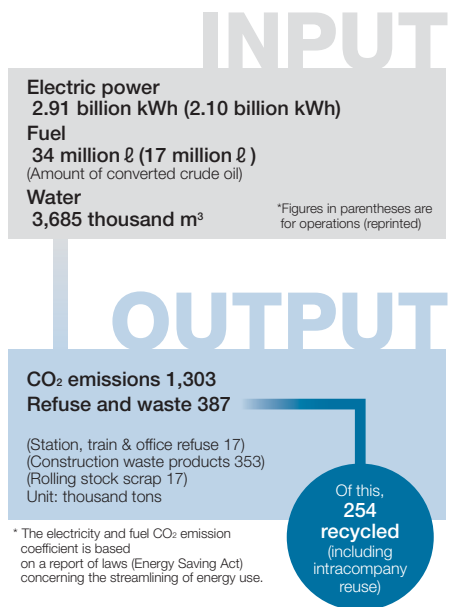
We are improving our unit energy consumption (amount of energy consumed when running 1 carriage for 1 kilometer).

With the FY2007 revamp, we raised our conventional goal of a 7% improvement to a 15% improvement.

15% reduction by FY2010 (compared to FY1995)

#### ● Status of Voluntary Plan Achievement

As of the end of FY2010 we had achieved all of our goals and we will continue to actively introduce energy-conserving rolling stock, such as the Series N700 for Shinkansen and Series 313 for conventional lines, and make further improvements.

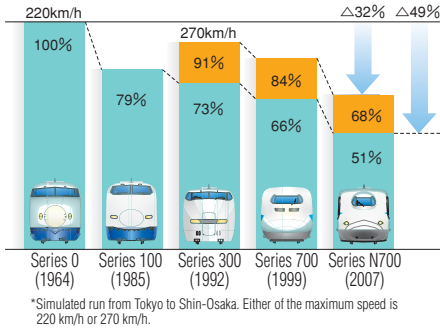


### Status of Voluntary Plan Achievement

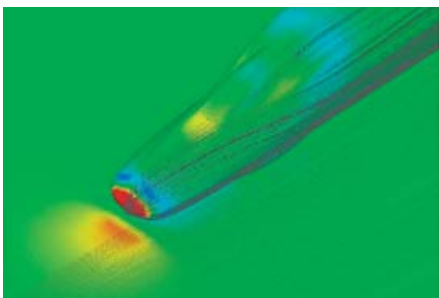
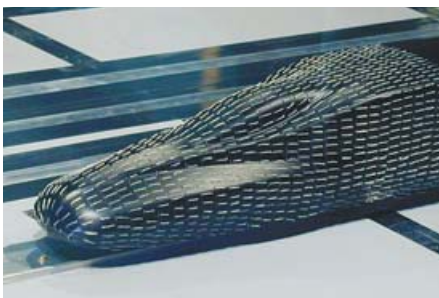
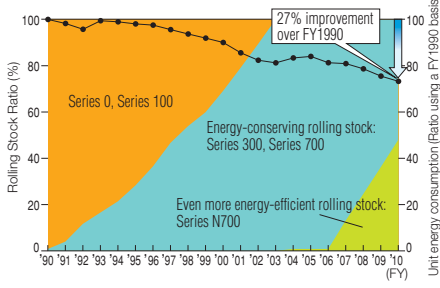
Classification	Target year	Target value	Results as of the end of FY2010
Percentage of energy-conserving rolling stock for Shinkansen trains	2003	100%	100%
Percentage of energy-conserving rolling stock for conventional line electric cars	2010	85%	89%
Percentage of energy-conserving rolling stock for conventional line diesel cars	2010	100%	100%
Unit energy consumption (J/rolling stock-km: Compared to FY1995)	2010	-15%	-21.6%

# Engagement in Global Environment Preservation, etc.

## Comparison of Electric Power Consumption by Tokaido Shinkansen Rolling Stock Type



## Changes in the Ratio of Tokaido Shinkansen Energy-Conserving Model Rolling Stock and Unit Energy Consumption



## Efforts on the Tokaido Shinkansen

### (1) Progress in Committing to Energy-Conserving Rolling Stock

If electricity consumption rates for simulated travel between Tokyo and Shin-Osaka are compared, at the maximum speed of the Series 0, 220km/h, the latest Series N700 consumes approximately half as much energy. Even at a maximum speed of 270km/h, the Series N700 consumes 32% less energy and demonstrates remarkable improvements in energy efficiency.

We had been steadily introducing newly developed energy-conserving rolling stock and replaced all rolling stock with the high-speed, energy-conserving Series 300 and Series 700 by the time the Shinkansen Shinagawa Station was opened in October 2003.

Furthermore, we have been introducing the Series N700, which has even better energy-conserving performance, in a concentrated manner since FY2007. As a result, by the end of FY2010, we had improved unit energy consumption\* by approximately 27% compared with FY1990.

\*Amount of energy consumed when running 1 carriage for 1 kilometer

### (2) Energy-Saving Technology on Series N700

The Series N700 is "the newest, fastest and best rolling stock on the Tokaido and Sanyo Shinkansen". Not only speed and comfort but energy efficiency has been highly improved.

#### ① Reduction in Running Resistance

On the Series N700, an aerodynamically superior nose shape was developed to reduce specific running resistance. Also, exterior uniformity was enhanced by introducing the smoothed passenger cabin window, which alleviates unevenness between the outside sheathing and the window pane, as well as by installing cover-all hoods between all cars.

#### ② Reducing Rolling Stock Weight

Reducing the weight of rolling stock contributes greatly to improving its energy efficiency. For the Series 300 and later developed Series 700 and Series N700, a simpler bolsterless bogie was adopted and also a lighter aluminum alloy was adopted for the body frame as opposed to the steel frames that were used for the Series 0 and Series 100. Furthermore, whereas a direct-current traction motor was used in the Series 0 and Series 100, all rolling stock after the Series 300 employed a high performance and small alternating-current traction motor made possible by improvements in semiconductor technology.

These efforts have made it possible to reduce the weight of post-Series 300 rolling stock in 16 car trainsets by over 250 tons when compared with the first Shinkansen train, the Series 0.



### ③ Introduction of Body Inclining System

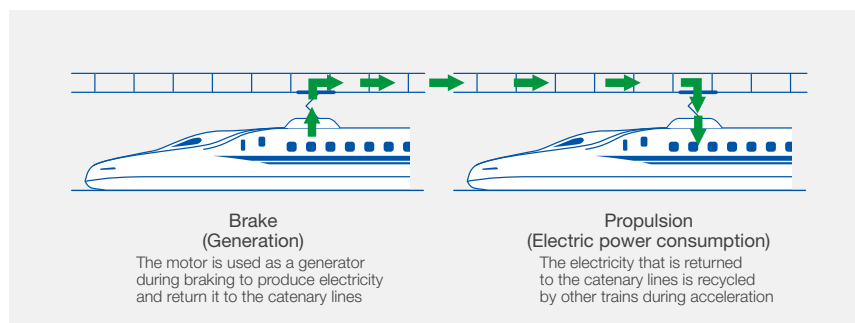
On the Series N700, in an attempt to improve speeds at curves, where they are presently restricted, a body-inclining system was installed. This system enables improvements in speed while maintaining ride quality. It shortens travel time and at the same time realizes an improvement in energy savings through a decrease in the frequency of speed adjustment.

### ④ Expansion of Regenerative Braking System

Regenerative braking refers to a system that uses the motor as a generator to convert kinetic energy into electric power when braking and then returns it to the overhead contact wires for other trains to use. JR Central was first to use regenerative braking for practical application on the Shinkansen and has equipped the Series 300, and subsequent Series 700 and Series N700, with the system.

In the Series 700, 12 of the 16 cars in one trainset are regenerative, but in the Series N700, this was extended to 14 cars, so that the braking force required during usual operation of one trainset is entirely covered by the regenerative braking. This has enabled further improvements in energy efficiency of the Shinkansen.

#### Regenerative Braking System



#### Efforts to Promote Non-Smoking and Separation of Smokers from Non-Smokers

In March 2009 JR Central removed smoking areas from conventional line platforms at all stations and made stations of conventional lines completely non-smoking. At the end of FY2010 some of the smoking areas on the Shinkansen platform at Nagoya and Tokyo stations were turned into smoking rooms with a capacity of approximately 20 persons.

The Series N700 that was introduced in 2007 offers smoking rooms since all seats have been rendered non-smoking. And, in March 2011 all non-reserved seats on Nozomi and Hikari services were rendered non-smoking when smoking was prohibited in the #3 non-reserved cars on the Series 300 and Series 700.



▲Smoking Room of Series N700

# Engagement in Global Environment Preservation, etc.

## Efforts on Conventional Lines

### (1) Progress in Committing to Energy-Conserving Rolling Stock

JR Central has been successively introducing new energy-conserving conventional line rolling stock since its foundation as a company. As of the end of FY2010, 89% of conventional line electric cars had been replaced with energy efficient rolling stock. By actively replacing engines in existing conventional line diesel cars with new engines with better performance and superior energy conserving capability, we were able to equip 100% of our diesel cars with new engines by the end of FY2008.

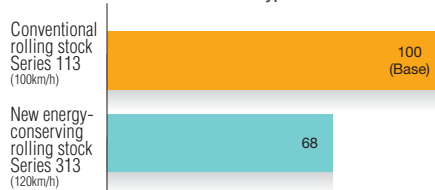
### (2) Energy-Saving Technology of Conventional Line (Improvement in Energy efficiency)

On conventional railways as with the Shinkansen, efforts are being made to improve the energy efficiency of rolling stock through such measures as reducing car weight as well as introducing more efficient electric power control conversion systems and regenerative brakes that generate electric power by using the motor as a generator during braking.

For diesel cars as well, we are striving to introduce rolling stock with greater energy efficiency through a reduction in car weight and introduction of new fuel-efficient model light-weight diesel engines.

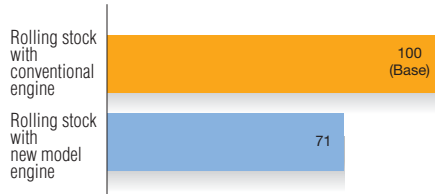
### Comparison of Electric Power Consumption and Diesel Fuel Consumption of Conventional Line Car (Electric Car and Diesel Car)

#### Comparison of Electric Power Consumption by Conventional Line Electric Car Type



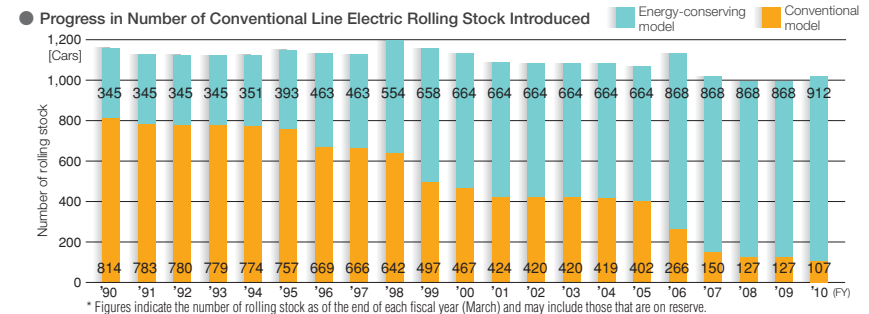
\* Simulation running the conventional Series 113 rolling stock and the new Series 313 rolling stock (calculated by energy regeneration ratio of 75% for Series 313) from Nagoya to Nakatsugawa (local trains)

#### Diesel Fuel Consumption Comparison by Conventional Line Diesel Car Model

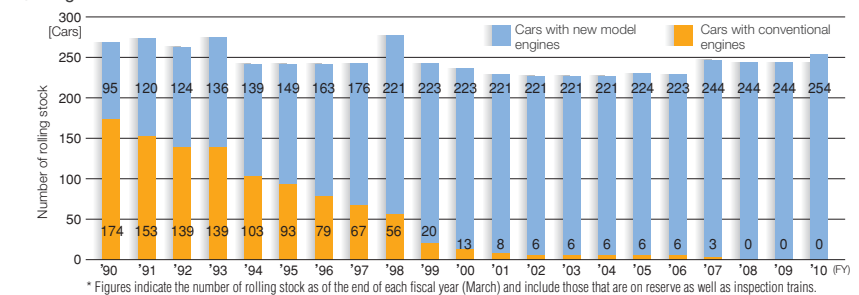


\* Based on performance when running the Kiha 40 with the new and old engines (Conventional engine: DMF15HS; New engine: C-DMF14HZ)

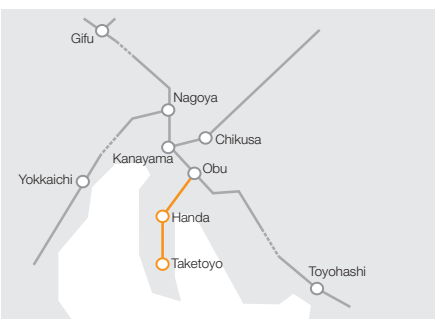
### Progress in Committing to Energy-Conserving Rolling Stock (Electric Car and Diesel Car)



#### Progress in the Number of Conventional Line Diesel Cars Introduced



### The Taketoyo Line



### (3) Plans for Introduction of Rolling Stock

Since its inception, JR Central has continued to actively introduce energy-conserving rolling stock and will continue to do so through the end of FY2012 and subsequently discontinue use of trains that were manufactured during the JNR era that have aged. This will mean that almost all conventional line rolling stock and diesel cars owned by JR Central will be energy-conserving rolling stock.

JR Central has decided to electrify the Taketoyo Line (19.3km between Obu and Taketoyo), which carries commuters in the Nagoya metropolitan area, by the spring of 2015. This electrification will enable a decrease in the burden put on the environment with a reduction in CO2 emissions from operation of the Taketoyo Line by 2,900 tons annually (57% reduction from present).

### Effective Use of Resources

As we conduct our business activities to promote ridership of railway, a mode of transportation with minimal impact on the global environment, we are proactively working to effectively utilize resources, such as be engaging in "Reduce, Reuse, and Recycle". For example, we use non-painted stainless steel for conventional line rolling stock, reduce emissions of waste materials during construction, recycle tickets, commuter passes, rolling stock and uniform, reuse rainwater for irrigation, and separate rubbish.

### Environmentally-Conscious Material Procurement

In February 2004, the JR Central Green Procurement Guidelines were established. In the procurement of materials for construction and engineering work, not only is economic efficiency being pursued based on price, quality and time limits, but efforts are being advanced that give further consideration to global environmental conservation.

With regard to articles used in offices, we are making an effort to purchase environmentally-conscious products.

### Compliance of Related Laws

We distribute check lists and explanatory materials to each department in the company concerning those items that must be confirmed, and create a system that enables each employee to strictly adhere to these laws after correctly understanding the particulars of the regulations.

#### ① Management of Chemical Substances

After notification is made regarding emissions and amounts for transfer to the prefecture concerning the targeted chemical substance in accordance with "the Law Concerning Reporting et cetera of Release of Specific Chemical Substances to the Environment and Promotion of the Improvement of Their Management (PRTR Law)," JR Central manages the substance appropriately.

We are also trying to reduce usage amounts by promoting the use of substitutes when possible.

#### ② Countermeasures against Soil Contamination

As a result of a soil survey, a level of specific harmful materials that exceed ordinance standards has been detected in a lease land (City of Kawasaki) and the Hamamatsu Workshop (City of Hamamatsu) in FY2010. We have reported these results to relevant organizations and are implementing cleanup measures in accordance with laws and regulations.

### Efforts to Preserve the Environment along Railway Lines

We have implemented needed noise and vibration countermeasures for the Shinkansen on both rolling stock and the ground. In particular, our rolling stock countermeasures include continuing to introduce new rolling stock with superior environmental performance that has optimal nose shapes and improved pantographs and pantograph covers. Our ground facility countermeasures include building noise barriers and extending the height of current noise barriers, raising banks, improving rail beds, and re-facing rail surface. In addition, we completed noise countermeasures for dealing with "densely-populated residential housing areas", "concentrated residential housing areas" and "areas conforming to concentrated residential housing areas" in FY2002 as instructed by the government. We are presently continuing to expand these noise countermeasures to other regions.

We will continue striving to preserve the environment along railway in the future as well by proceeding with low-noise / low-vibration countermeasure technology research such as developing new noise barriers with greater noise-reducing effect.



▲Noise Barriers



▲Pantograph on Series N700

# Engagement in Global Environment Preservation, etc.



▲"Eco Business Trips" Poster

## ■ The Proposal of "Eco Business Trips"

We propose the idea of "Eco Business Trips" as part of our endeavor to prevent global warming. "Eco Business Trips" refer to "business trips that contribute to environmental conservation." In other words, the mindset of "selecting transportation and business trips methods that emit small amounts of greenhouse gases when traveling mid to long distances (business trips)." "Eco Business Trips" have a great impact on reducing CO<sub>2</sub> emissions and are a relatively easy way to reduce greenhouse gas emissions that do not entail any initial investment or obvious costs to maintain. We believe that the idea of "Eco Business Trips" and actual efforts based on this idea would contribute to further preventing global warming. We are actively disseminating information, and engaging in advertising campaigns, in hopes of spreading the idea of "Eco Business Trips."

## ■ Introduction of Natural Energies and Highly-Efficient Systems

When renovating facilities and building new ones, we are striving to improve environmental performance by leveraging natural energies, such as solar power generation systems, and introducing energy-saving equipment. We have installed an approx. 500kW solar power generation system, on the expansive roof of the SCMAGLEV and Railway Park (opened in March 2011). We also plan to make the Hamamatsu Workshop more energy efficient by introducing an approx. 300kw solar power generation system, highly efficient transformer equipment, and boilers. In the General Training Center, which will be opened in September 2011, and Nagoya Station New Building (tentative name), which will be completed in FY2016, various kinds of energy-saving equipment and natural energies will be utilized.

## ■ Introduction of Cogeneration System

We have installed cogeneration systems that effectively utilize exhaust heat generated during power generation for cooling / heating at the Nagoya Station, JR Central Towers, the Komaki Research Center, and Nagoya Central Hospital in an effort to improve energy efficiency and reduce CO<sub>2</sub> emissions.



▲General Training Center (completion image)

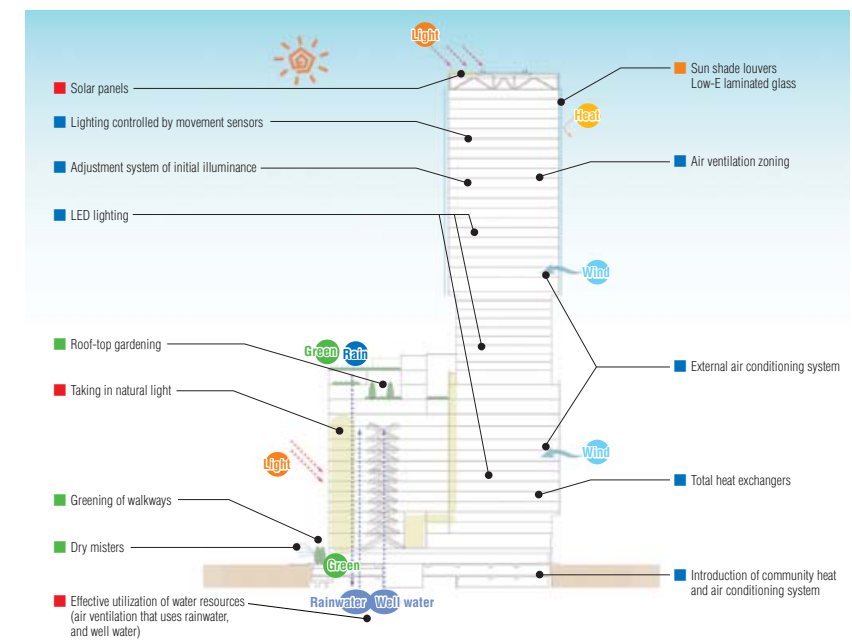


▲SCMAGLEV and Railway Park



▲Renovation of the Hamamatsu Workshop (completion image)

## Considering the Environment at the Nagoya Station New Building (Tentative Name)



### ■ Contribution to Community Development

Railway stations serve as a gateway to communities. In order to let them fulfill the role better, we are cooperating with the requests of local governments to establish new stations, improve station buildings, develop plazas in front of stations, and facilitate railway elevation projects, thereby contributing to community development.

We are also renovating facilities working with the government and municipalities based on the related laws, such as the Barrier-Free Law, so that passengers, including physically challenged passengers and elderly passengers, can use our railway safely and comfortably. In particular, in accordance with fundamental government policy, we promoted barrier-free facilities through the continued installation of elevators and escalators at stations used by more than 5,000 passengers a day. Also, efforts are underway in cooperation with the government and municipalities to renovate stations that are used daily by anywhere from 3,000 to 5,000 passengers, which are now required to be renovated in conjunction with the new fundamental policy released in March 2011. Efforts are also being made to improve equipment to prevent people from falling off platforms.

Furthermore, we established the “Nagoya Central Hospital” in Nakamura Ward, Nagoya City which offers advanced and cutting-edge medical treatment with its experienced staff and the latest medical equipment. This hospital provides high-quality medical treatment and nursing care qualified by the hospital function evaluation (Ver. 5.0) by the Japan Council for Quality Health Care in September 2008 and contributes to the local community as a core hospital of the Nagoya area by emergency medical treatments and cooperation with regional medical treatment centers.

### ■ SCMAGLEV and Railway Park

We opened “SCMAGLEV and Railway Park” in March 2011 in Nagoya in response to a request from City of Nagoya to participate in the “Monozukuri (manufacturing) Culture Exchange Area Project”.

We believe that the Park will deepen the general public’s understanding of railway, widely contribute to society, and ultimately lead to the promotion of industrial tourism by introducing “the progress of the high-speed railway technology” through displaying the rolling stock of the Tokaido Shinkansen as well as the conventional line and the Superconducting Maglev.

We are promoting efforts to attract visitors, such as engaging in advertising activities and offering products linked with Nagoya region tourism, as we aim to get the SCMAGLEV and Railway Park on track.

### ■ International Exchange

We undertake a wide range of international operations, such as gathering up-to-date railway information from around the world via the company’s network of overseas offices (Washington D.C., London, and Sydney), participating in international conferences to exchange technological and management information with railway operators in the world, and issuing press releases to overseas interests as part of our PR activities.

We also participate in cooperation over railway technologies in response to government requests, and contribute to human resource development by accepting interns from overseas universities and international organizations.



▲Elevator installation (Kyoto station)



▲Nagoya Central Hospital



▲SCMAGLEV and Railway Park