Measures Taken by JR East to Prevent Global Warming

In our efforts to reduce CO_2 emissions, the JR East Group pursues the efficient use of energy and the effective use of renewable energy. We also promote intermodal transportation with the aim of reducing CO_2 emissions from all forms of transportation.

Measures to prevent global warming

Current state of energy supply and demand

The electricity consumed by JR East for train operations as well as lighting and air conditioning at stations and in offices is supplied by JR East's own power plants and electric power companies.

Besides electricity, we also use diesel fuel and kerosene for diesel train operation and air conditioning at stations and in offices.

Although our transportation volume is on the rise year after year, our energy consumption has remained at about the same level.

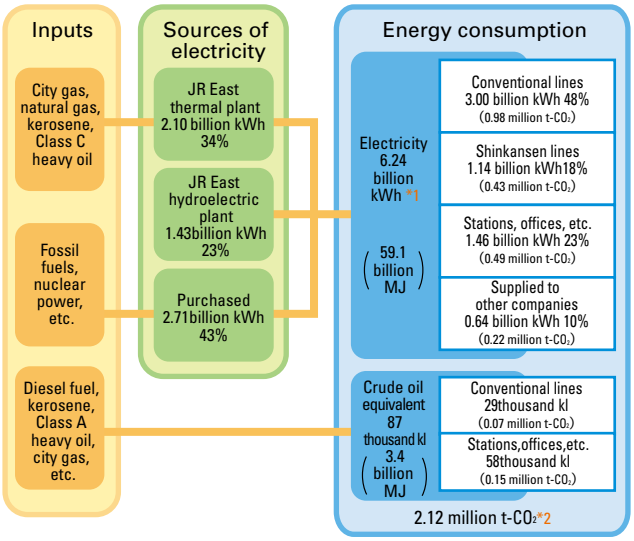
CO_2 emissions and reduction measures

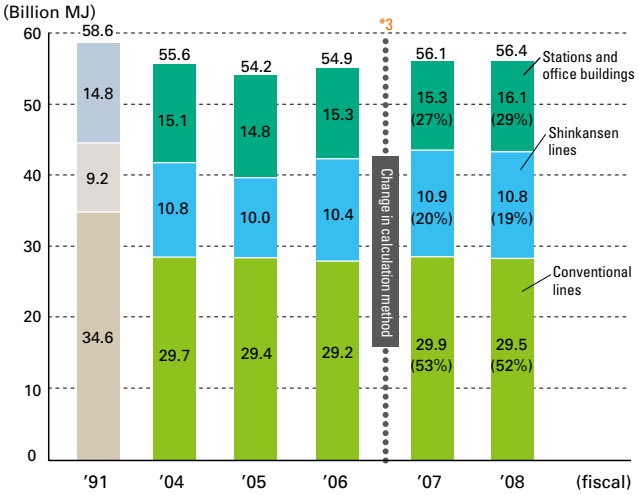
Our CO_2 emissions in fiscal ended March 2008 amounted to 2.12 million tons, about the same level as that of in fiscal ended March 2007.

During fiscal ended March 2008 water volume in rivers was less than in fiscal ended March 2007 and our hydroelectric plants generated less electricity. To compensate for it we increased the operating rate of our thermal plants, which led to increased emissions of CO_2. However, as commercial power plants improved their coefficient of CO_2 emissions, our total emissions turned out to be about the same as last year.

We are determined to continue to reduce energy used for train operation, which accounts for 70% of the total energy we consume. We will also undertake a range of measures to reduce CO_2 emissions, including energy saving actions for which new targets are set for stations and offices.

■JR East Energy flow map



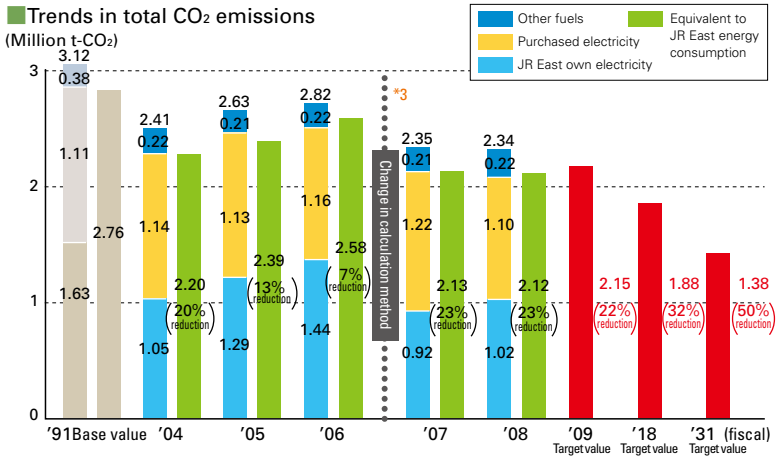


***1 6.24 billion kWh**
After subtracting electricity that we supplied to other companies, JR East consumed 5.6 billion kWh, which is equivalent to power consumed by 1.49 million ordinary homes over a period of 1 year.

***2 2.12 million t-CO_2**
Excluding supply to other companies

***3 Change in calculation methods**
Up until fiscal ended March 2006 CO_2 emissions from use of power and fuels and energy consumption were calculated with reference to the "Voluntary Action Plan on the Environment" by the Japan Federation of Economic Organizations. Beginning in fiscal ended March 2007, we have adopted a new method based on the law concerning the rationalization of the energy use (Energy Conservation Law) and the law concerning the promotion of the measures to cope with global warming (Global Warming Measures Law). Using the former coefficients, emissions for fiscal ended March 2008 were 2.09 million t-CO_2 (reduction of 24% compared to fiscal ended March 1991). Also, CO_2 emissions as a specified transportation operator designated by the Energy Conservation Law(the emissions generated only by railway operation, excluding offices and hospitals) will be shown to be 2.00 million t-CO_2 in the fiscal ended March 2008 report

■Trends in total CO_2 emissions



Reducing energy consumed for train operations

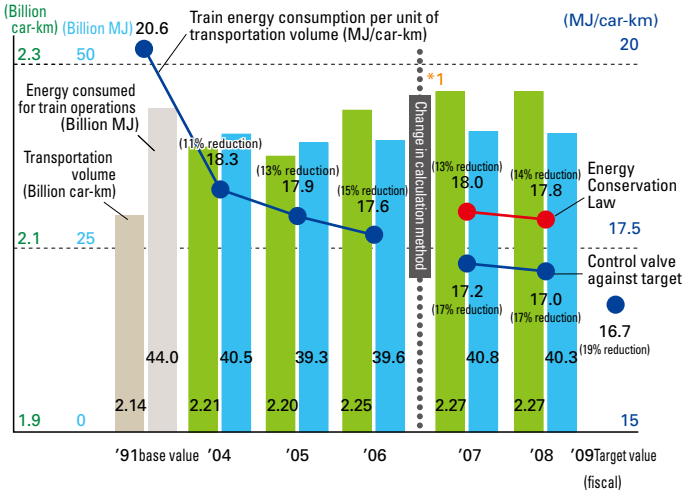
As of the end of fiscal March 2008, JR East had 10,428 energy-efficient railcars in operation. This accounts for 85% of our railcar fleet.

We are putting into service more new-generation energy-efficient railcars, with features such as regenerative brakes, which can convert kinetic energy during deceleration into electric energy, and variable voltage variable frequency (VVVF) inverters, which control motors without wasting electricity.

Energy consumption per unit of transportation volume during fiscal ended March 2008 was reduced by 14%*1 compared with fiscal ended March 1991.

This was calculated using revised coefficients in accordance with the amended Energy Conservation Law.

Trends in energy consumed for train operations and train energy consumption per unit of transportation volume



E233 series: State-of-the-art cars introduced on the Chuo Line in December 2006.

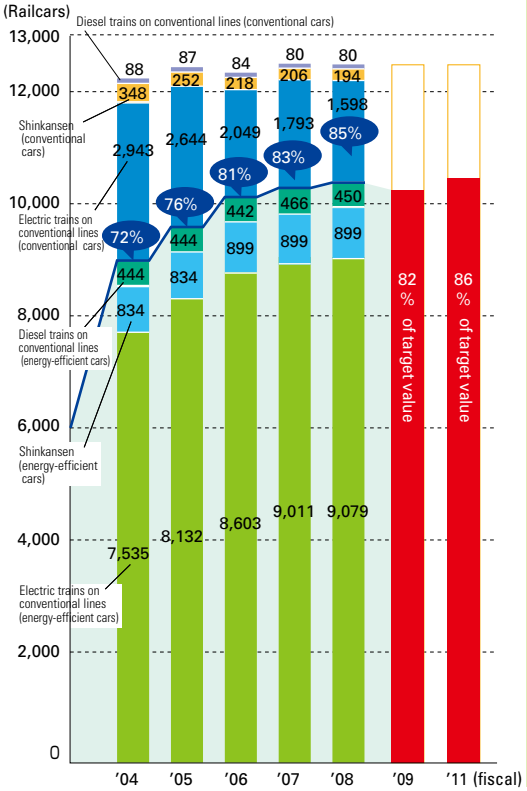
E2 series: VVVF inverter railcars used for Shinkansen "Asama" and "Hayate" trains.

E231 series: VVVF inverter cars for commuter and suburban transportation.

***1 Change in calculation method**

Through fiscal ended March 2006 energy consumption was calculated with reference to the "Voluntary Environmental Action Program" of the Japan Federation of Economic Organizations. Beginning in fiscal ended March 2007, we have adopted a new method based on the law concerning the rationalization of the energy use (Energy Conservation Law). Under the former method, energy consumption for train operation for fiscal ended March 2008 was 38.5 billion MJ and the energy consumption per unit of transportation volume was 17.0 MJ per car-kilometer or a reduction of 17% from the level of fiscal ended March 1991.

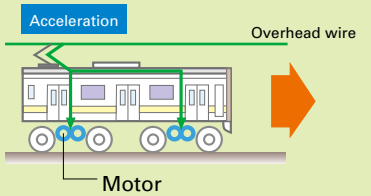
Trends in energy-efficient railcars

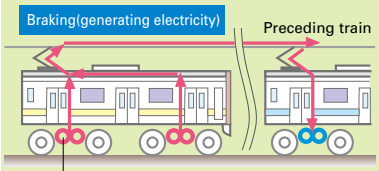


Regenerative brake mechanism

A regenerative brake generates electricity during braking

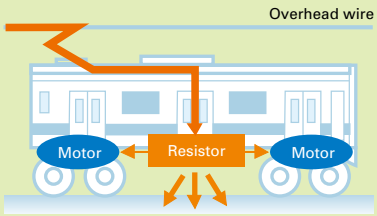
Motors of an energy-efficient railcar function as electric generators when brakes are applied, and electricity generated in this process is transmitted to the overhead wire, making more efficient use of this energy. (In case of a conventional railcar, energy generated by applying brakes is simply discharged as heat.)





Mechanism of VVVF inverter control

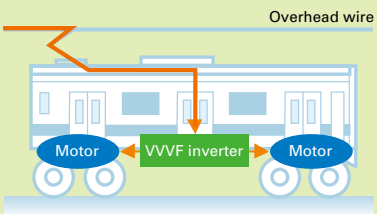
Conventional train



Wasted heat is generated

When running a train, resistors control voltage needed for motors, generating heat that is wasted.

VVVF inverter train



Efficient operation is possible

A VVVF (variable voltage/variable frequency) inverter can control electricity without wasting it, making train operation more efficient.

Optimization of Power Supply

Reducing CO_2 emissions through increased efficiency in power generation and supply

Electric power is indispensable for reliable train operation. At JR East we are making power generation more efficient and utilizing more renewable energy, by replacement of facilities in our own power plants, with a view to reducing CO_2 emissions.
We adjust the balance of electricity generated at our thermal and hydroelectric plants in accordance with fluctuating demand. Our load dispatch command monitors and controls our operations to ensure most efficient power generation.

Making our own thermal power generation more efficient

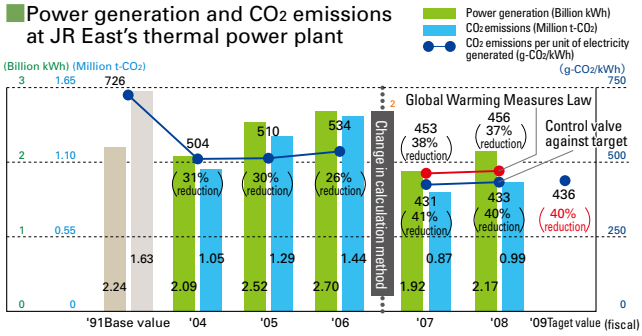
JR East operates a thermal power plant in Kawasaki City, Kanagawa Prefecture, with a total output of 655 thousand kW. We replaced three of its four generation units with more efficient combined-cycle power generation units*1, and In June 2006 we replaced kerosene with natural gas as fuel for the No.3 generation unit. As a result of these efforts, we have reduced CO_2 emissions per unit of electricity generated at the plant by 37%*2 compared to fiscal ended March 1991. We will continue to work on reduction of CO_2 emissions and the one remaining older generation unit is scheduled to be replaced with combined-cycle power generation units in 2013.

At Kawasaki thermal station kerosene was replaced with natural gas to run No. 3 generation unit in June 2006.

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

***2 Change in calculation method**
Up until fiscal ended March 2006 CO_2 emissions were calculated with reference to the "Voluntary Environmental Action Program" by the Japan Federation of Economic Organizations. Beginning in fiscal ended March 2007, we adopted a new method based on the law concerning the promotion of the measures to cope with global warming.(Global Warming Measures Law) Under the former method, CO_2 emissions per unit amount of generation are 433 g-CO_2/kWh, reduction of 40% from the level of fiscal ended March 1991.

Power generation and CO_2 emissions at JR East's thermal power plant



JR East's own hydropower plants that do not emit CO_2

JR East has 3 hydroelectric power plants in Ojiya City and Tokamachi City, Niigata Prefecture, and since these do not emit greenhouse gases, such as CO_2 or exhaust gases such as nitrogen oxides, they provide us with clean sources of energy. They started operation in 1939, 1951, and 1990. With a combined output of 449 thousand kW, the plants generate 1.4 to 1.8 billion kWh yearly and contribute to reduction of 0.43 million to 0.55 million tons of CO_2 emissions.

Shinanogawa Hydropower station producing clean energy without emitting CO_2.

Utilization of Natural Energy

JR East also utilizes natural energy. Solar panels are installed at Tokyo station, Takasaki station, General Education Center, and R&D Center. Takasaki station doubled its solar panels in March 2004.
In addition, solar panels were installed at Tokyo station above Tokaido line platforms (Platforms No. 9 and 10) and are scheduled to be operational in fiscal ending March 2011.

Solar panel installed atop platform roofs at Takasaki station.

Environmental Management at Large Underground Stations

In conjunction with renovation of air conditioning equipment, which consumes most energy at large stations, we are undertaking measures to reduce energy usage. When we undertook renovation work at Ueno station and the underground Keiyo Line area in Tokyo stations to renew equipment and eliminate the use of CFCs, we reviewed the capacity of cooling equipment for air conditioning and installed inverter controls. We aim at reducing energy by monitoring operations through IP networks and by optimum operating controls through energy diagnosis by our Building Energy Management System (BEMS).
These efforts resulted in reduction of energy consumption by air conditioning units by as much as 40%. The work at Tokyo station was completed during the early part of fiscal ending March 2009, completely eliminating the use of CFCs by air conditioners.

Reducing impact of the heat island phenomenon by greening of rooftops

We have been promoting green plantings on rooftops of station buildings and office buildings owned by JR East since fiscal ended March 2005. As of March 2008 we have covered an area of about 6,900 m² (equivalent to about 90% of the lawn area of the National Athletic Stadium) in 20 projects. They reduce the effect of the heat island phenomenon. The plants also absorb CO_2, and they help reduce energy usage for air conditioning in the buildings because they block some of the sun's heat.

Intermodal system

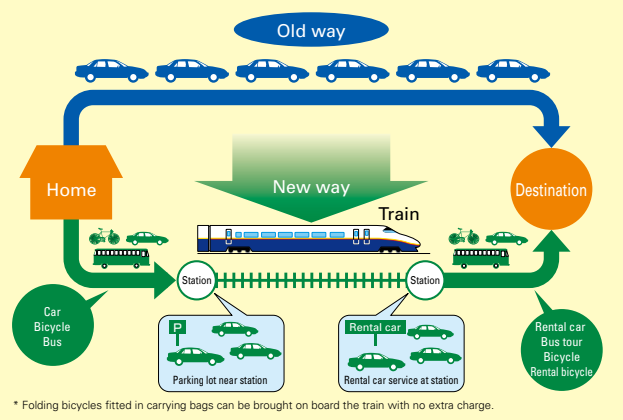
Reducing CO_2 emissions throughout the transportation system

A railway is a highly energy-efficient mode of transportation with low environmental impact, but railways alone cannot completely satisfy transportation needs of customers. JR East is working to reduce CO_2 emissions of the entire transportation system by promoting intermodal transportation*1 combining the use of railways with use of other modes of transportation.

Also, to promote intermodal transportation, we are improving the convenience and riding comfort of railways. For example, we are opening new railway lines to allow passengers to go to their destinations smoothly; we are adding services that operate through on JR East and other companies; we are expanding the area in which one Suica is valid for travel on JR East and on other lines as well; we are making our stations and cars barrier-free.

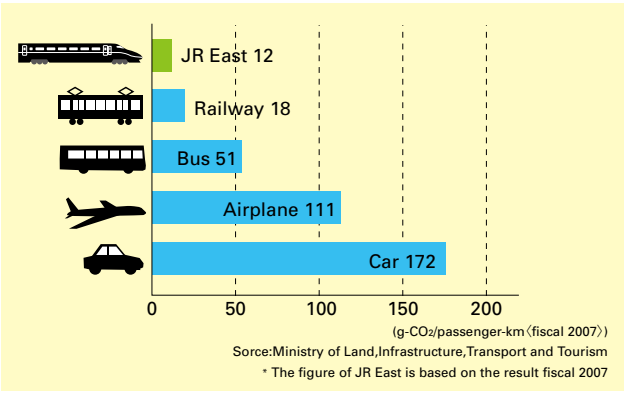
***1 Intermodal transportation**
Intermodal transportation means a transportation system that allows a person to get from a given point to a final destination by connecting different modes of transportation.

■Intermodal transportation



* Folding bicycles fitted in carrying bags can be brought on board the train with no extra charge.

■CO_2 emissions by mode of transportation



Sorce:Ministry of Land,Infrastructure,Transport and Tourism
* The figure of JR East is based on the result fiscal 2007

Park-and-ride schemes

In order to promote park-and-ride schemes, so that our customers can drive their cars from home to nearby stations and use our trains from there, we are adding parking spaces in front of the stations. By the end of March 2008, 123 JR East stations had prepared parking spaces for eleven thousand cars.*2

***2 Parking spaces for eleven thousand cars at 123 stations**
Parking spaces for eleven thousand cars at 123 stations represent the total number of parking spaces near our stations, including those owned by JR East, operated by our Group companies, and run in collaboration with local municipalities.

At 10 stations between Tomobe and Iwaki on Joban Line, parking charges are free for express train customers going farther than a specified distance.

Rail and car rental

To suggest to our customers travel plans that use a combination of railways and automobiles, JR East has been offering a car rental service called "Train-ta-kun" since 1995, with discounted rental charges. Furthermore, we are facilitating intermodal transportation by introducing new classes of automobiles, such as light cars, by offering attractive rates, and by installing car navigation systems as standard equipment in rental cars.

Development of Travel packages

JR East is energetically promoting travel packages that use trains as a means of transportation with lower environmental impact, while capitalizing on rich natural and tourist resources in various regions. Examples include plans for sightseeing by taxi in cooperation with local businesses, and car rental plans that allow travelers to enjoy a train journey while benefiting from the mobility of rental cars.