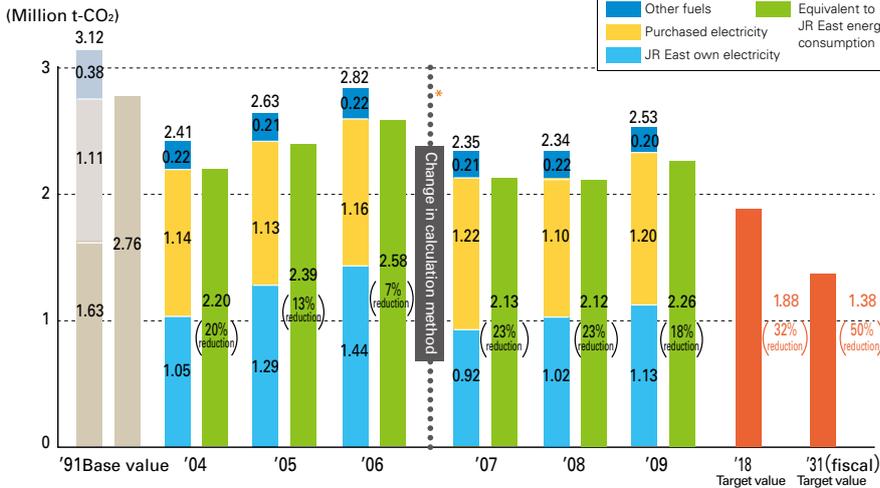


# Measures to Prevent Global Warming

## CO<sub>2</sub> emissions and reduction measures

Our CO<sub>2</sub> emissions in the fiscal year ending March 2009 amounted to 2.26 million tons, an increase of 0.14 million tons from the previous fiscal year. Reasons included higher coefficients for CO<sub>2</sub> emissions by electric power companies, and increased operating rates of our own thermal plants to compensate for less electricity generated by our hydroelectric plants. 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<sub>2</sub> emissions, including energy conservation actions for which new targets are being set for stations and offices.

### Trends in total CO<sub>2</sub> emissions



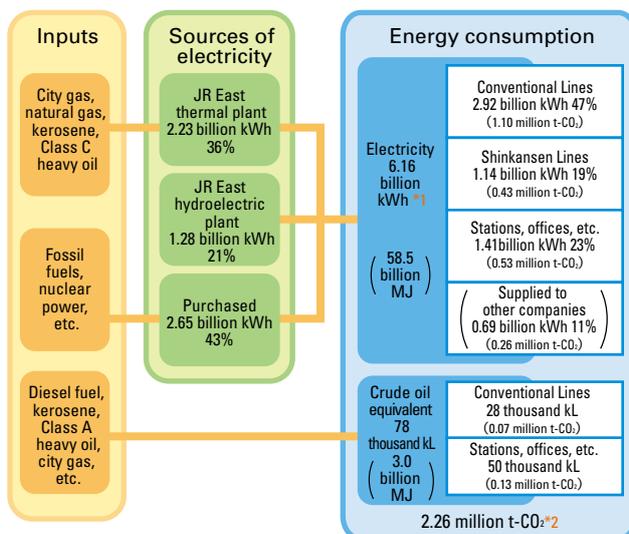
### \*Change in calculation method

Through the fiscal year ending March 2006 CO<sub>2</sub> 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 the fiscal year ending March 2007, we have adopted a new method based on Act on the Rational Use of Energy (Energy Conservation Law) and the Act on Promotion of Global Warming Countermeasures (Global Warming Measures Law). Using the former coefficients, emissions for the fiscal year ending March 2009 were 2.10 million t-CO<sub>2</sub> (a reduction of 24% compared to the fiscal year ending March 1991). Also, CO<sub>2</sub> 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 2.13 million t-CO<sub>2</sub> in the report for the fiscal year ending March 2009.

## Energy conservation and CO<sub>2</sub> reduction

The electricity consumed by JR East for train operations as well as for 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. We will strive to save energy in various ways and reduce CO<sub>2</sub> emissions.

### JR East Energy flow map

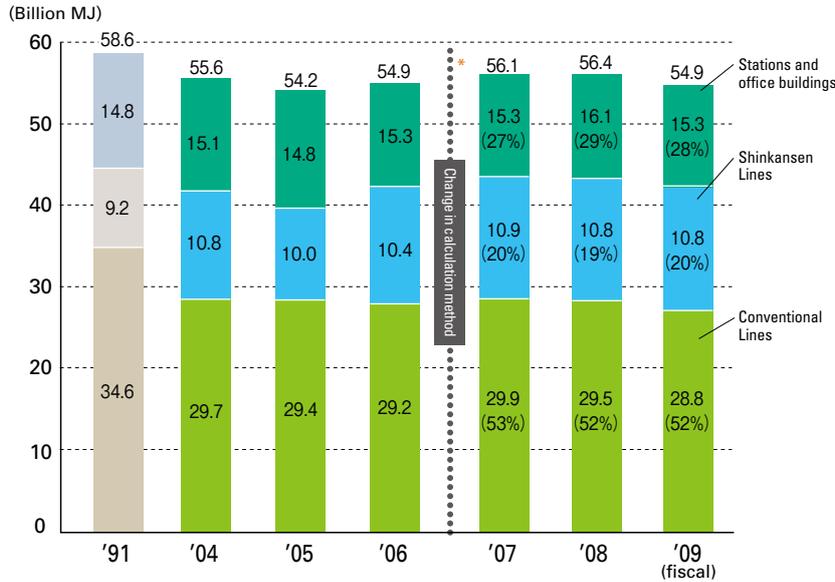


\*1 6.16 billion kWh  
After subtracting electricity that we supplied to other companies, JR East consumed 5.47 billion kWh, which is equivalent to power consumed by 1.41 million ordinary homes over a period of 1 year.

\*2 2.26 million t-CO<sub>2</sub>  
Excluding supply to other companies.

—Measures to Prevent Global Warming—

■ Composition of energy consumption

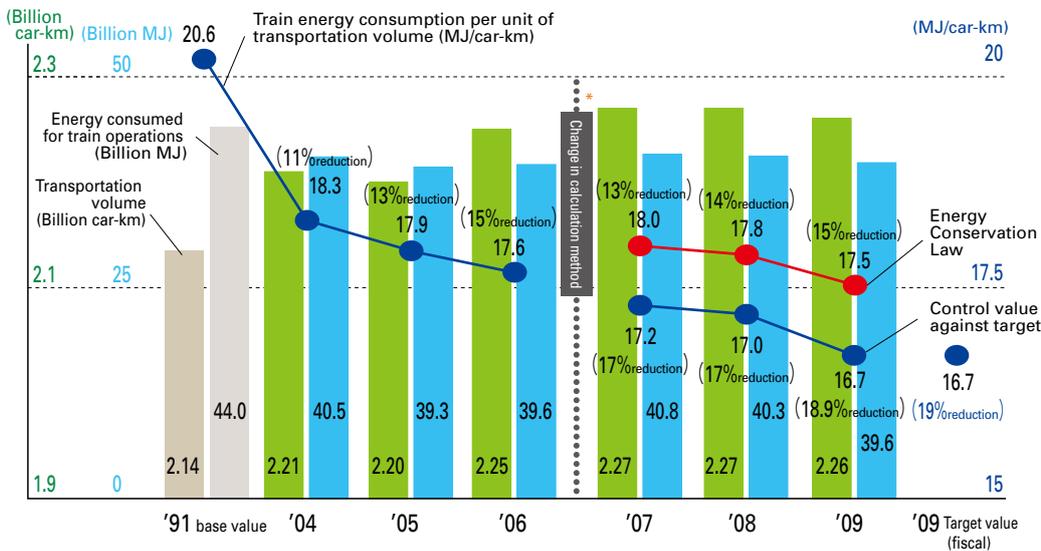


**\*Change in calculation method**  
 Until the fiscal year ending March 2006, fuels and energy consumption were calculated with reference to the "Voluntary Action Plan on the Environment" by the Japan Federation of Economic Organizations. Beginning in the fiscal year ending March 2007, we have adopted a new method based on Act on the Rational Use of Energy.(Energy Conservation Law) and the Act on Promotion of Global Warming Countermeasures.

Reducing energy consumed for train operations

As of the end of March 2009, JR East had 10,529 energy-efficient railcars in operation. This accounts for 86% of our railcar fleet.

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



**\*Change in calculation method**  
 Through the fiscal year ending March 2006 energy consumption was calculated with reference to the "Voluntary Action Plan on the Environment" by the Japan Federation of Economic Organizations. Beginning in the fiscal year ending March 2007, we have adopted a new method based on Act on the Rational Use of Energy (Energy Conservation Law). Under the former method, energy consumption for train operation for the fiscal year ending March 2009 was 37.8 billion MJ and the energy consumption per unit of transportation volume was 16.7 MJ per car-kilometer or a reduction of 18.9% from the level of the fiscal year ending March 1991.

—Measures to Prevent Global Warming—

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 the fiscal year ending March 2009 was reduced by 15% compared with fiscal year ended March 1991.



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

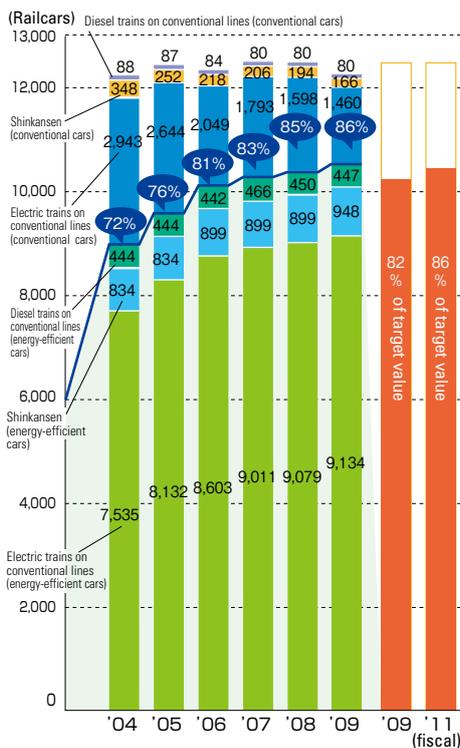


E2 series: VVVF inverter railcars used for Shinkansen "Asama" and "Hayate" trains.

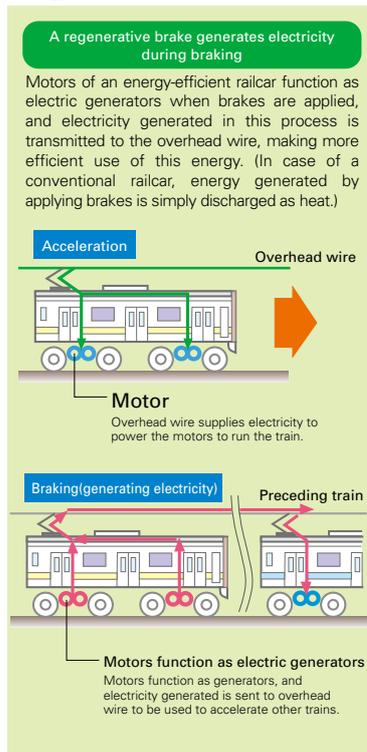


E231 series: VVVF inverter cars for commuter and suburban transportation.

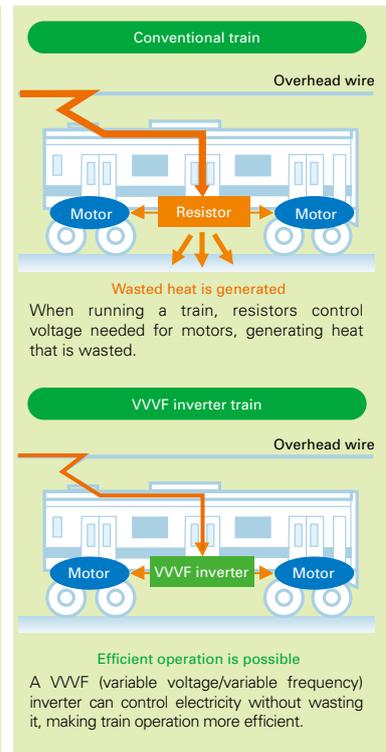
Trends in energy-efficient railcars



Regenerative brake mechanism



Mechanism of VVVF inverter control

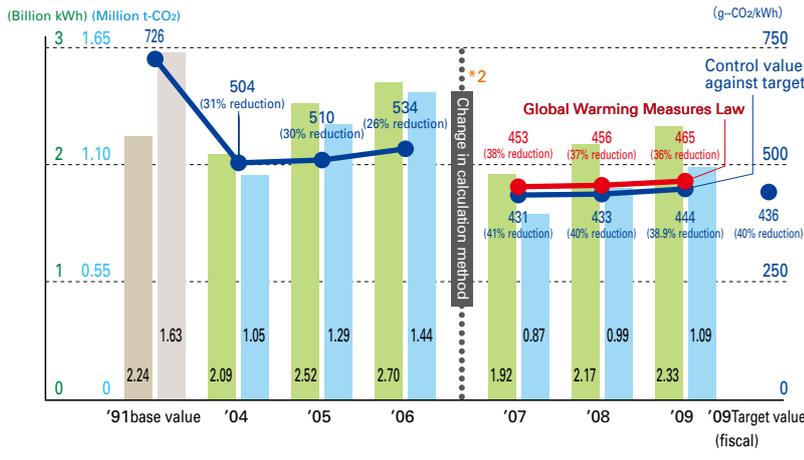


—Measures to Prevent Global Warming—

JR's own power plants

JR East operates a thermal power plant in Kawasaki City, Kanagawa Prefecture, with a total output of 655 thousand kW. At the plant, we replaced three of its four generating units with combined-cycle power generation units\*1 with improved generating efficiency. 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 CO2 emissions per unit of electricity generated at the plant by 36%\*2 compared to the fiscal year ending March 1991. In an effort to further reduce CO2 emissions, we will replace the last steam-powered generation unit using heavy oil with a combined-cycle generation system using natural gas in 2013.

■ Power generation and CO2 emissions at JR East's thermal power plant



**\*1 A combined-cycle power generation units**  
 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**  
 Through the fiscal year ending March 2006 CO2 emissions were calculated with reference to the "Voluntary Action Plan on the Environment" by the Japan Federation of Economic Organizations. Beginning in the fiscal year ending March 2007, we adopted a new method based on the Act on Promotion of Global Warming Countermeasures (Global Warming Measures Law). Under the former method, CO2 emissions per unit amount of generation are 444 g-CO2/kWh, a reduction of 38.9% from the level of the fiscal year ending March 1991.

- Power generation (Billion kWh)
- CO2 emissions (Million t-CO2)
- CO2 emissions per unit of electricity generated (g-CO2/kWh)

Utilization of natural energy

We also promote use of natural energies, including solar and wind power. 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 will be installed at Tokyo Station above the platform serving Tokaido Line tracks No. 9 and 10, and are scheduled to be operational during the fiscal year beginning April 2010. Also, in preparation for employing wind-power generation, we will carry out research to determine whether there are effects when electricity generated by wind power (which fluctuates according to wind velocity) is routed to a transformer substation.



Solar panel installed atop platform roofs at Takasaki Station.



Installation of solar panels is planned also at Tokyo Station.

Greening rooftops

We have been promoting green plantings on the rooftops of stations and office buildings owned by JR East since the fiscal year ending March 2005, in order to reduce "heat island" effects and help reduce energy usage for air conditioning in the buildings. As of the end of May 2009, we had covered a combined rooftop area of about 8,900 m<sup>2</sup> in 30 projects.



—Measures to Prevent Global Warming—

**Environmental management at large underground stations**

When we began our equipment renewal work at Ueno Station and the underground Keiyo Line area in Tokyo Station to eliminate the use of CFCs, we reviewed the capacity of cooling equipment for air conditioning and employed inverter controls. We also endeavor to reduce energy by monitoring operations and exercising optimum operating control based on diagnosis using our Building Energy Management System (BEMS). As a result, in the fiscal year ending March 2009, energy consumption by air conditioning units was down by a very substantial 49% (from the level of the fiscal year ending March 2005) at Ueno and Tokyo Stations.

**Saving energy in office buildings**

In response to revisions to laws and regulations, saving energy in office buildings has become increasingly important. We work hard on reducing energy consumption both in hardware, including the introduction of highly efficient equipment and facilities, and in software, including temperature management of air conditioning and diligently turning off lights.

**Saving energy in information systems**

Energy consumption by information equipment has increased dramatically over the past several years and has become a real problem for society. We at JR East are promoting Green Information Technology (Green IT) - endeavoring to save energy in information systems and reducing energy consumption by making use of IT systems.

**Saving energy at stations**

At Mejiro Station on the Yamanote Line and Ichigaya Station on the Chuo Line, we worked to promote energy conservation (electric equipment) using a variety of technologies to reduce CO<sub>2</sub> emissions. Specifically, we introduced electric energy meters, evened the levels of illumination on platforms, and introduced automatic on-off systems and LED displays and illumination. As a result, at Mejiro Station, we reduced use of energy related to lighting by about 30%.

■ Evening illumination on platforms (only at Mejiro Station)



Before: Intensity was higher at the ends of the platform



After: Intensity is even throughout the platform after changing the layout of lighting apparatus

—Measures to Prevent Global Warming—

**Intermodal Transportation = Reduction of CO<sub>2</sub> emissions by the entire transportation system**

• Promoting Park-and-Ride

We are adding parking spaces in front of stations in order to promote park-and-ride schemes that our customers with tickets for the Shinkansen or limited express trains can drive their cars from home to nearby stations and use the train network from there. By the end of March 2009, 96 JR East stations had parking spaces for eleven thousand cars\*. Not only can people get to their destinations safely and surely, without getting bogged down in traffic congestion, but they can travel with less impact on the environment.

\*Parking spaces for eleven thousand cars at 96 stations

Parking spaces include those developed by JR East, and those managed by JR East Group companies or in cooperation 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.

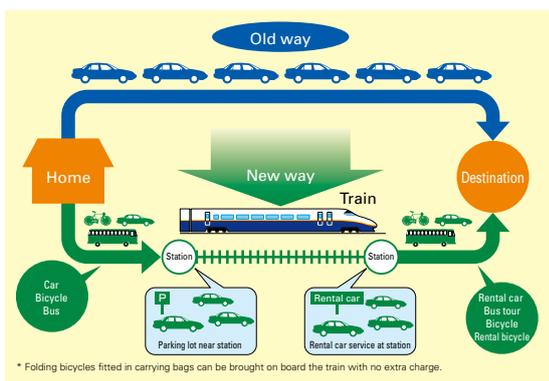
• Promoting rail and car rental

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. We are facilitating intermodal transportation\* by introducing new classes of automobiles, such as light cars, offering attractive rates, and installing car navigation systems and ETC as standard equipment on rental cars.

\*Intermodal transportation

Intermodal transportation is provided when a transportation system allows a person to get from an origin point to a final destination by connecting between different modes of transportation.

■ Intermodal transportation



■ CO<sub>2</sub> emissions by mode of transportation

