What Measures is the Group Taking to Prevent Global Warming?

JR East Group takes a two-pronged approach to lower its CO_2 emission levels. First, we use energy efficiently and utilize natural energy. Second, we promote intermodal transportation, that is, an effective integration of various means of transportation.

Measures to Prevent Global Warming

Energy supply and consumption of JR East

The JR East power supply consists of electricity and other power sources. Our electricity comes from company-run power plants along with electricity purchased from power companies. We use this energy to power our trains as well as to light and air condition stations and offices. Other forms of energy such as diesel oil and kerosene are used to operate diesel vehicles and air-conditioning systems at stations and offices.

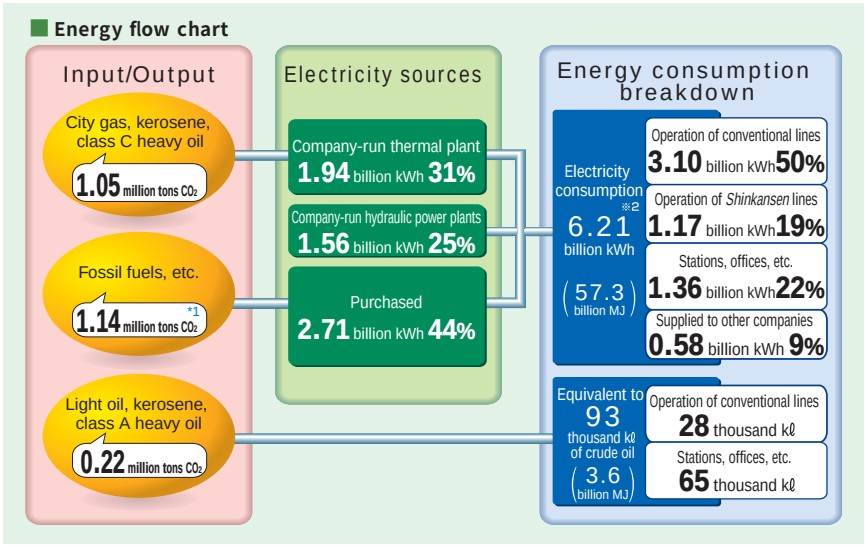
More efficient use of energy has reduced the amount of CO_2 emissions in FY 2003 by 20% from FY 1990 figures.

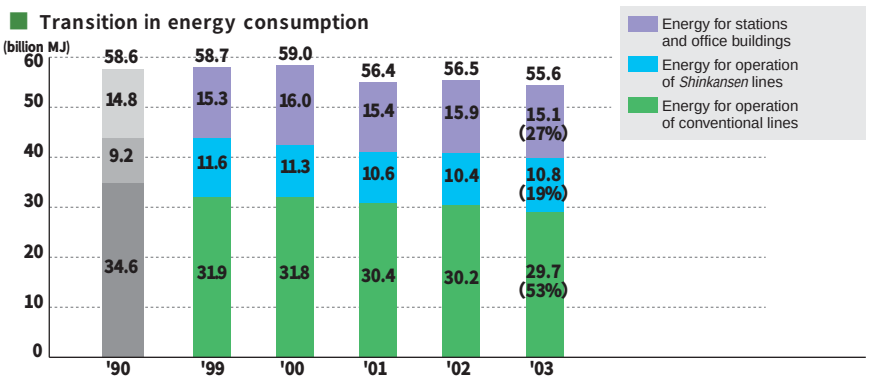
Using Energy Efficiently

Energy consumption and rate of change

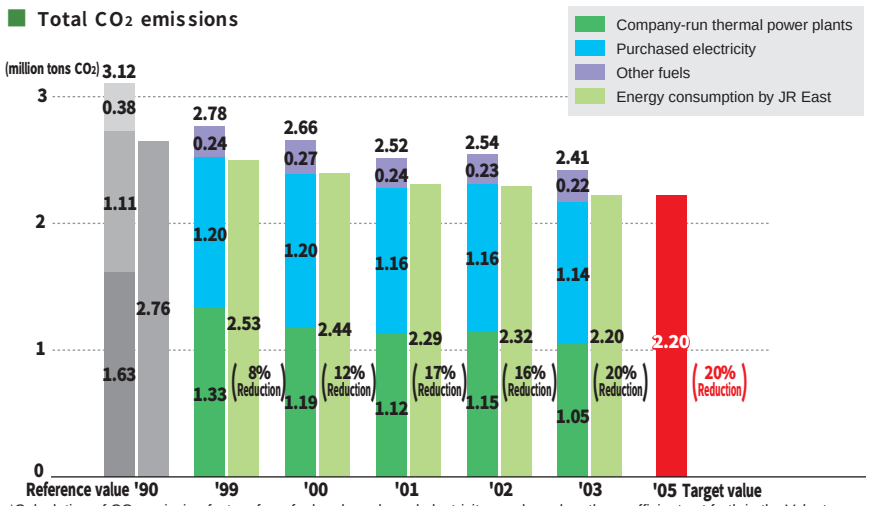
In FY 2003, energy consumption for JR East was 55.6 billion mega joule (MJ) while the resulting CO_2 emissions stood at 2.2 million tons-CO_2, a substantial reduction compared to the previous fiscal year.

This achievement was the result of a variety of efforts, but was also due to external factors such as an increase in the amount of river water available for power generation at our hydraulic power plants. Thus we must not be satisfied about our achievements and should keep striving to reduce energy used for train operations, which currently accounts for 73% of energy consumption, through continuous introduction of energy-saving railcars.





*Purchased electric power and electric power from company-run hydraulic power plants were calculated based on 9.42 MJ/kWh. Power generated by company-run thermal power plant and other fuels was calculated from actual fuel consumption.



*Calculation of CO_2 emission factors from fuel and purchased electricity was based on the coefficient set forth in the Voluntary Action Plan established by the Japan Business Federation and the Federation of Electric Power Companies Japan.

***1 1 1.14 million tons CO_2**

To maintain simple comparability with historical figures, FY 1990 CO_2 emission coefficient of the Federation of Electric Power Companies Japan was used to derive the figure; substitution with the FY 2002 coefficient would result in a figure of 1.11 million tons CO_2.

***2 6.21 billion kWh**

Equivalent to the annual electric power consumption of 1.68 million households

Reducing energy consumption in train operations

As of FY 2003, 8,813, or 72% of all JR East railcars, were of the energy-saving type. We are gradually replacing old conventional railcars with energy-saving railcars equipped with the "regenerative brakes" and "VVVF inverter*1 controls." For *Shinkansen* lines, we are introducing lighter, more energy-saving railcars with lower air resistance with smoothed design.

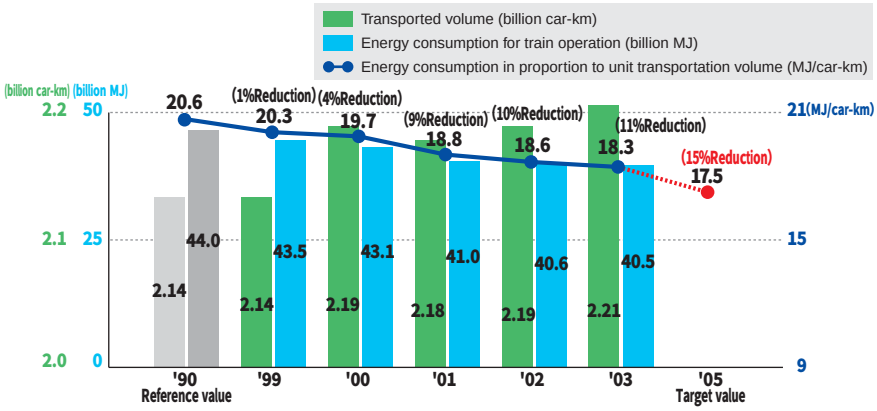
These energy saving measures reduced energy consumption in proportion to unit transportation by 11% in FY 2003 when compared to figures for FY 1990.

Developing the NE Train

We have developed a prototype NE Train, the first hybrid railcar system*2 to make train operation even more energy efficient. Test runs have been conducted since May 2003. This new train is expected to reduce energy consumption by about 20%. Fuel cell powered NE Trains are part of our future development plans.

NE Train, a hybrid system that saves energy and reduces gas emissions

Energy consumption during train operation and unit transportation volume

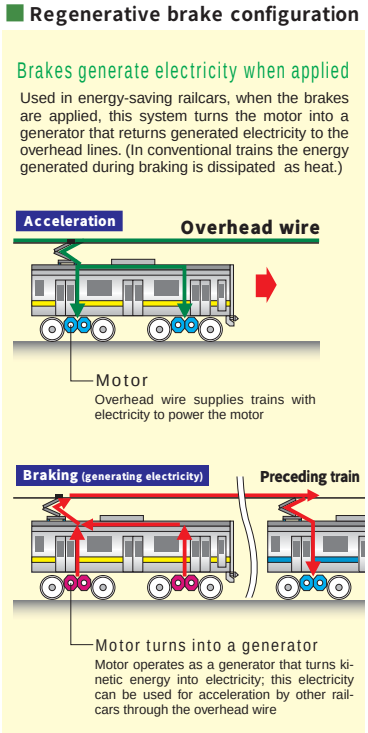


E231 series: VVVF railcars run on the *Yamanote*, *Chuo*, *Sobu*, *Utsunomiya* and other lines

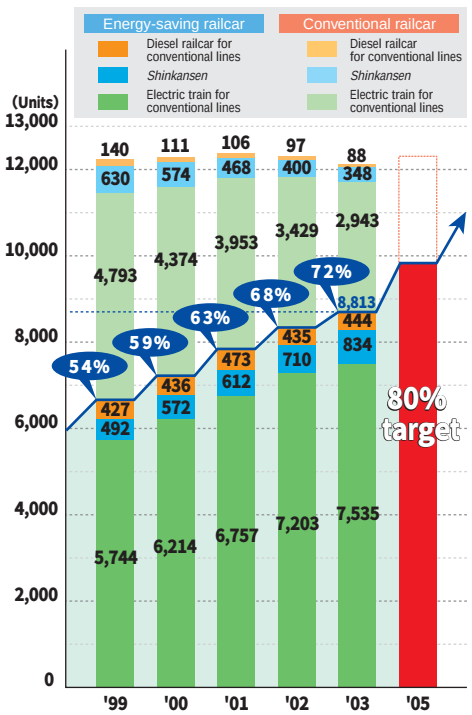
E2 series: VVVF railcars for "Asama" and "Hayate" *Shinkansen*

Kiha 110 series: diesel railcars for conventional lines feature fuel-efficient and low-polluting engines

Regenerative brake configuration



Transition in proportion of energy-saving railcars



*1 **VVVF inverter**
VVVF stands for variable voltage variable frequency. It enables efficient control of motor revolution without the use of electrical resistance.

*2 **Hybrid railcar system**
The motor is powered by electricity generated by an engine. The power generated during regenerative braking is stored in the battery and used during acceleration.

Saving energy in motor vehicle operation

In addition to trains, JR East uses many types of vehicles, including those to maintain facilities, to transport equipment and materials, and to provide transportation services. We are now introducing low-emission vehicles such as hybrid cars, natural gas vehicles, and fuel-efficient vehicles with idling-stop functions. At the end of FY 2003, 18% of our fleet of 3,191 vehicles was replaced with low-emission vehicles.

Improving energy efficiency in stations and office buildings

We are working to reduce energy consumption at the JR East stations and station buildings. One major undertaking has been to install cogeneration systems, which utilize the electricity produced as well as heat generated as a by-product. In FY 2003, we installed the system at the Niigata *Shinkansen* Rolling Stock Center and added 17 gas heat pump air conditioners to provide more efficient air conditioning.

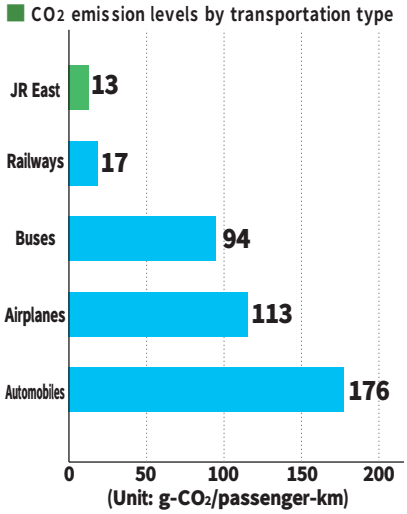
Improving Energy Efficiency with Integrated Transport Systems

Intermodal transportation

Although railways use energy in a highly efficient manner and the impact on the environment is low, this alone is insufficient to satisfy all customer transportation needs. To lower the environmental impact of the overall transportation infrastructure, JR East is encouraging intermodal transportation, the integration of trains with other modes of transportation.

As of March 2004, car parking lots at 527 stations have been expanded to accommodate 60,000 vehicles, promoting our Park & Ride program that links cars and trains. We also provide "Rail & Rent-a-car," a service that integrates trains with rental cars, as well as "Air Rail," a discount service that combines train and air travel. Tours that combine trains and buses are also available to customers.

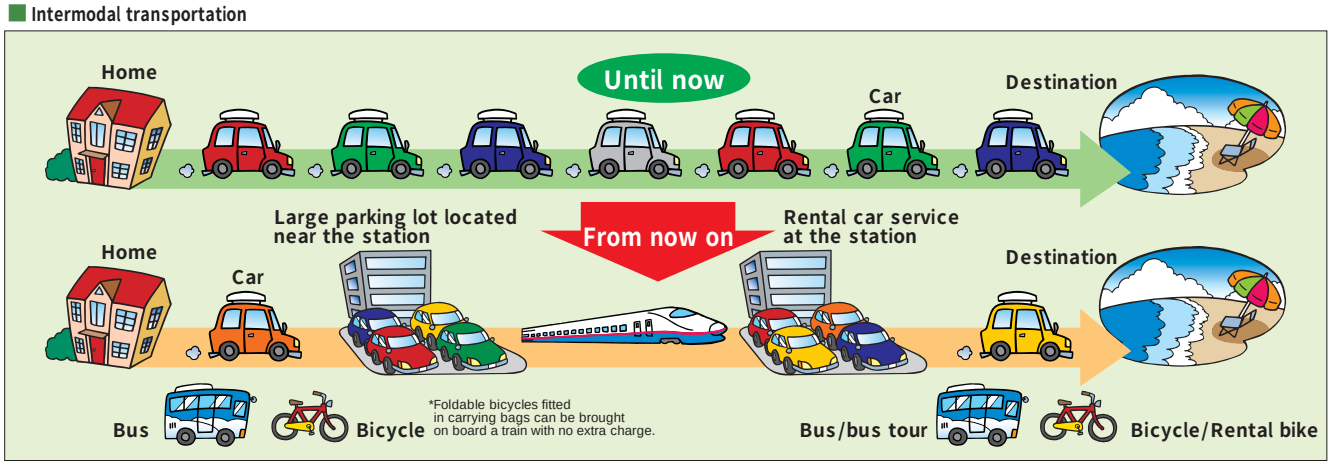
■ CO_2 emission levels by transportation type



Source: *"Transportation and Environment"* issued by the Foundation for Promoting Personal Mobility and Ecological Transportation

A Park & Ride at Kurikoma Kogen Station on the *Tohoku Shinkansen*

■ Intermodal transportation



Supplying Electricity Efficiently

Load-dispatch center improves supply efficiency

JR East's demand for electric power fluctuates throughout the day, reaching a peak during rush hours. To supply electricity efficiently in the face of such varying conditions, we combine and balance the amount of electricity generated at our power sources*1, which are company-run thermal and hydraulic power plants and purchased electricity. Our "load-dispatch center" plays a vital role through monitoring and controlling energy supply in real time to optimize our use of energy.

Improving thermoelectric power generation

The company-run thermoelectric power plant with a total output of 655,000kW is located in Kawasaki, Kanagawa Prefecture. The plant has reduced its CO_2 emissions by 31% per unit electric power generation in FY 2003 from that in FY 1990 through replacement of its four power generating units sequentially to a "combined-cycle power-generating unit"*2 and optimization of their operations.

Improving hydroelectric power generation

Hydroelectric power is a cleaner energy source that does not emit greenhouse gases. JR East has a hydroelectric power plant on the Shinano River with total output of 450,000 kW, generating 1.4 to 1.8 billion kWh per year.

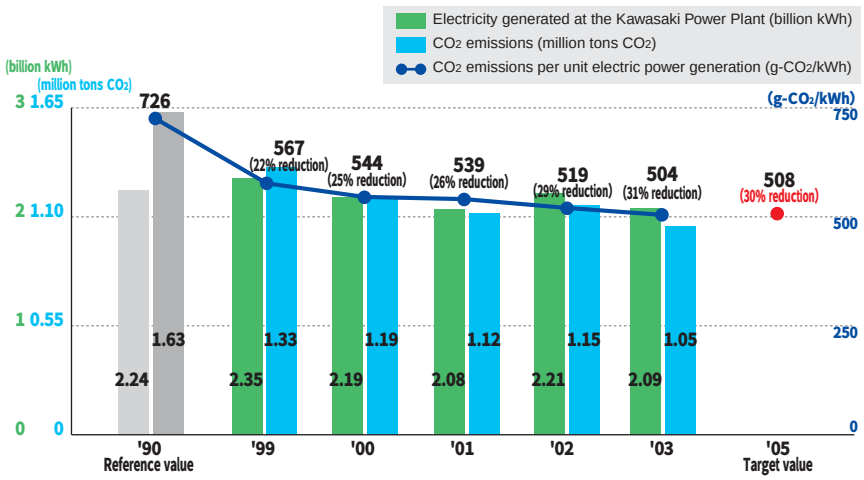
Since FY 2001 we have been working with the Shinano River Construction Office of the Ministry of Land, Infrastructure and Transport to improve the aquatic environment in the middle stretch of the river. We have begun increasing the dam discharge volume in summer when water temperature rises, and also during the fall, when salmon run. As a result, an increase in the number of fresh-run salmon has been confirmed.

Using renewable energy sources

We also promote the use of renewable energy sources such as solar and wind power. Photovoltaic (PV) generators have been installed at Tokyo Station, Takasaki Station, the General Education Center, and the Research & Developing Center. In FY 2003, we doubled the amount of PV panels at Takasaki Station.

The Group companies have followed; in FY 2003 "Kokubunji L" Terminal Building in Kokubunji, Tokyo installed wind power and PV generator systems to produce electricity for lighting.

CO_2 emission levels from the Kawasaki Power Plants



Kawasaki Thermoelectric Power Plant; aging power-generating unit 4 is scheduled for upgrade to highly efficient high-output combined-cycle power-generating units.

Three plants, Senju, Ojiya and Shinojiya, make up the Shinanogawa Power Station with a total output of 450,000 kW.

The number of solar panels on the *Shinkansen* platforms at Takasaki Station has been doubled

Wind power generator on the roof of Kokubunji L Terminal Building. The amount of power generated at any given time can be checked on a monitor screen inside the building.

***1 JR East electricity sources**
Company-run thermoelectric power plant : 31%
Company-run hydroelectric power plants: 25%
Purchased electricity: 44%

***2 Combined-cycle power-generating unit**
A power-generating unit combining "gas turbines" propelled by gas combustion with "steam turbines" propelled by steam from exhaust heat.