Annual Environmental Report 2000

EAST JAPAN RAILWAY COMPANY
Committee on Ecology

2. Efforts regarding global environmental conservation

Disruption of the global environment has become an important concern for us all. Global warming—believed to be caused by greenhouse gases such as CO_2—could have a seriously detrimental impact on our future, in terms of both time and space. The effects of further global warming include a change in overall climate, which will in turn effect the worldwide ecosystem and bring about a rise in sea levels.

The emission of large volumes of CO_2 into the air—a result of the use of fossil fuels—places the blame for global warming on us, the citizens of our environment. Therefore, while the products of industry and technology have produced real and lasting benefits, it is undeniable that they have created problems that, unless they are resolved, will forever impact life on the planet earth. Therefore, the difficulty of global environmental issues lies in the fact that we are assailants and victims at the same time.

As the unit of CO_2 emission from railways in proportion to transportation volume is low in comparison to other means of transportation, notably the automobile (see page 34), railways are in relative terms an environment-friendly means of getting from one point to the next. Moreover, electric trains do not emit any CO_2 in operation, since their power source is electricity.

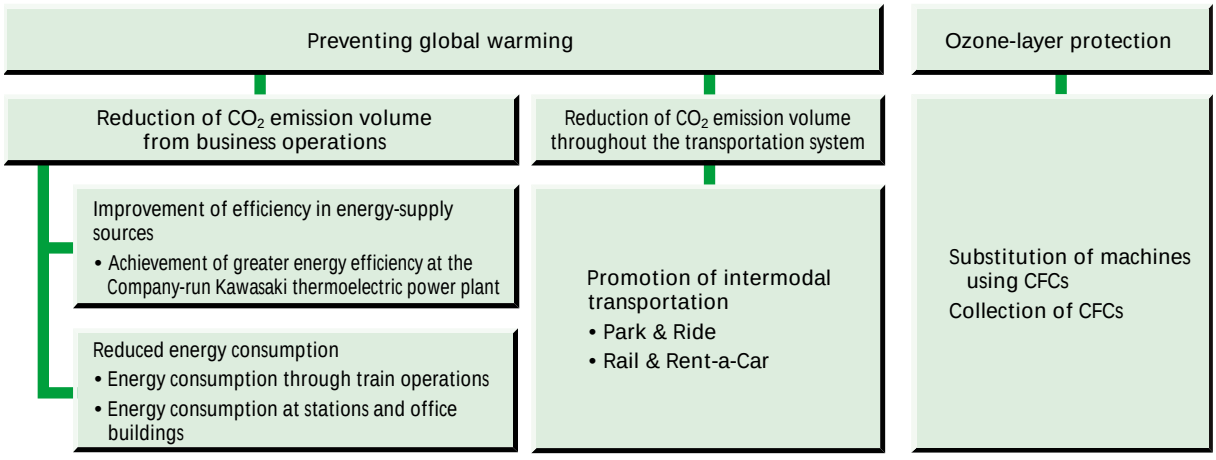
The volume of energy consumption by JR East, however, has reached 58.7 billion MJ (worth 1.52 million kl of crude oil) in fiscal 1999. This means that, however indirectly, we still emit a large volume of CO_2. JR East is striving to prevent further global warming through reductions in energy consumption and CO_2 emission.

■Goals and progress

Item	Goal (for achievement by 2001)	Figure from fiscal 1999		Reference value (figure from fiscal 1994)
		Actual achievement	Value achieved	
Total CO_2 emission volume from business operations	▲10%	▲ 8%	2.53 million t-CO_2	2.76 million t-CO_2
CO_2 emission volume in proportion to unit electric power generation by the Company-run thermoelectric power plant	▲10%	▲ 2%	567 g-CO_2/kWh	581 g-CO_2/kWh
Energy consumption for train operations, in proportion to unit transportation volume	▲10%	▲ 1%	0.345 MJ/ passenger-km	0.347 MJ/ passenger-km
Large-size refrigeration machines using CFCs	▲60%	▲53%	34 units	73 units

*The basis of comparison for the total CO_2 emission volume is the figure from fiscal 1990, in accordance with the COP3.

■JR East's efforts on behalf of global environmental conservation

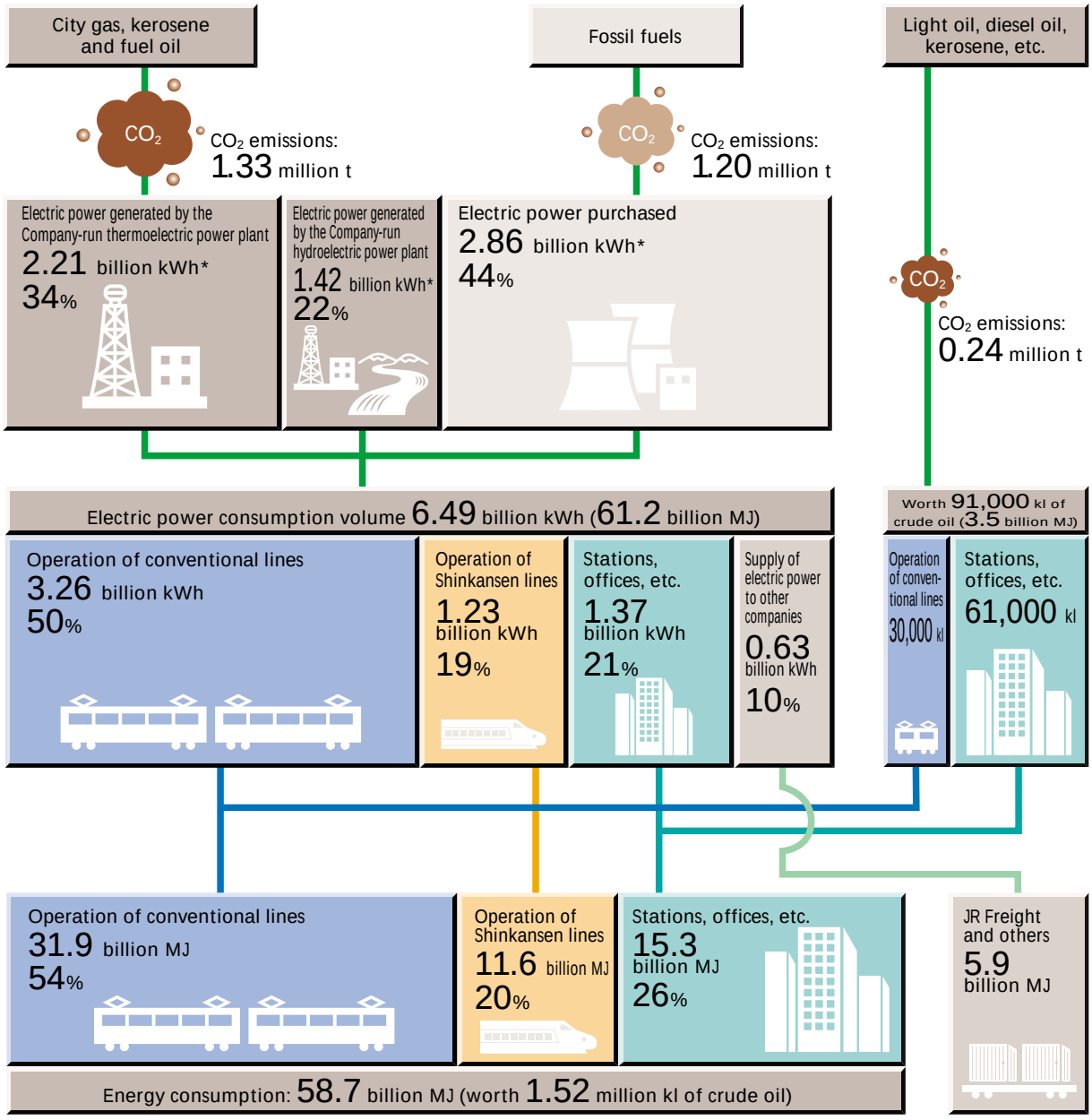


Energy supply and consumption by JR East

The supply of energy for JR East consists of electric power, which is generated by the Company-run Kawasaki Thermoelectric Power Plant and Shinanogawa Hydroelectric Plant, along with electric power purchased from power companies and other types of fuel.

Electric power and fuel are used for train operations, as well as for lighting apparatus and air-conditioning equipment at our stations and offices. We also supply electric power to other companies, such as JR Freight, which run on our tracks.

■Energy map for JR East



*Volume refers to the amount of electric power consumed.

Energy savings/Reduction of CO_2 emissions

Trend in the volume of energy consumption and CO_2 emission volume

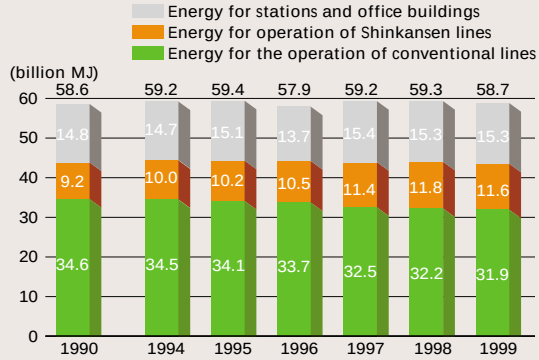
Electric power accounts for 94% of the total energy consumed by JR East, 56% of which is supplied by our power plants. It is therefore essential that we enhance the efficiency of these plants and reduce energy consumption in our trains and offices. By doing so, we can reduce energy consumption for our business operations and achieve a corresponding reduction in CO_2 emissions. Through measures such as these, the energy consumed through JR East's business operations in fiscal 1999 was 58.7 billion MJ (equal to 1.52 million kl of crude oil), while the volume of CO_2 emissions was 2.53 million t. Compared to the figures from fiscal 1990, the total CO_2 emission volume decreased 8% (*1), and the volume of energy consumption stayed at the same level.

(*1) The CO_2 emission factor from purchased electric power was calculated by using the emission factor applied by the Federation of Electric Power Companies Japan in fiscal 1990. Given the fiscal 1998 emission factor, the figure becomes 14%.

Achieving greater energy efficiency at our thermoelectric power plant

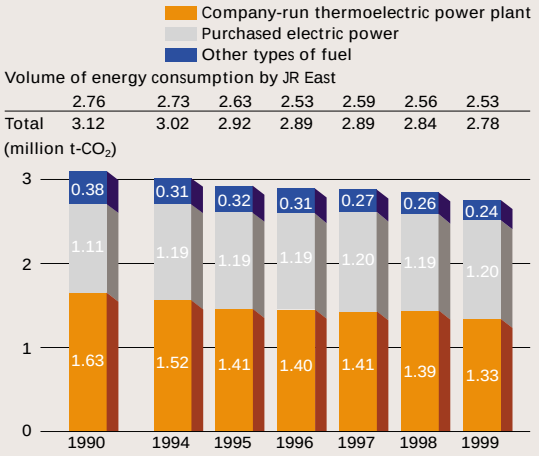
The Kawasaki Thermoelectric Power Plant run by JR East is in the process of replacing its old power-generating units with combined-cycle units employing steam power and gas turbines. In April 1999, we completed the replacement of unit No. 3, one of four units at the plant. On the basis of this replacement the thermal efficiency of unit No. 3 jumped from 34% to 46%. Accordingly, the annual CO_2 emission volume from our thermoelectric power plant was 1.33 million t, while the emission volume in proportion to unit electric power generation was 567 g-CO_2/kWh, meaning a 2% decrease compared to the figure for fiscal 1994. In fiscal 2000, when unit No. 3 shifts into operation, we expect to see a further reduction in the volume of CO_2 emission.

■ Trend in energy-consumption volume



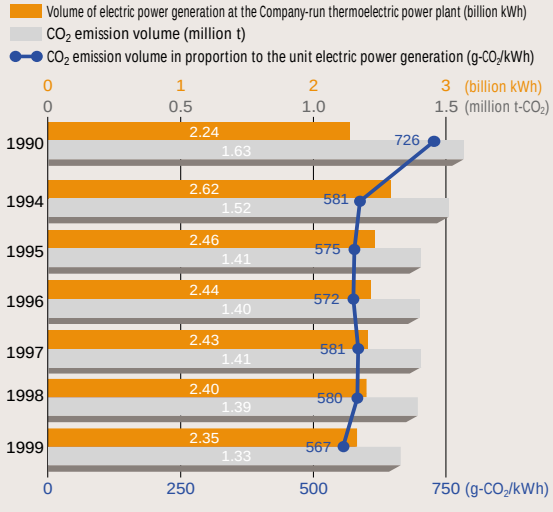
*Purchased electric power and electric power generated by the Company-run hydroelectric plant were calculated based on 9.42 MJ/kWh. The electric power generated by the Company-run thermoelectric power plant and other fuel types were calculated based on the figures for actual consumption of fuel.

■ Trend in total CO_2 emission volume



*Calculation of CO_2 emission factor from fuel and purchased electric power was based on the emission factor set forth in the Voluntary Action Plan established by Keidanren (Japan Federation of Economic Organizations) and by the Federation of Electric Power Companies Japan. (The CO_2 emission factor used for purchased electric power is the one applied in fiscal 1990.)
*Includes the supply of electric power to JR Freight and others.

■ Electric power generation and CO_2 emission volume at the Company-run thermoelectric power plant



Reducing energy consumption in train operations

JR East is in the process of introducing energy-saving cars, including the E231 series used for local trains on the Sobu Line, as a means of reducing energy consumption in train operations. This accounts for 74% of JR East's total energy consumption.

The volume of energy required to transport one passenger a distance of 1 km was 0.345 MJ in fiscal 1999. However, while certain factors might serve to decrease energy consumption—such as the introduction of energy-saving cars and improved efficiency in energy-supply sources—the actual volume of energy consumption basically unchanged due to the increase of operation energy for the Shinkansen lines including the opening of the Nagano Shinkansen Line and the decrease in transported volume. Therefore, energy consumption in proportion to unit transportation volume decreased by 1% compared to 1994, failing to achieve the decrease of 10% we had targeted.

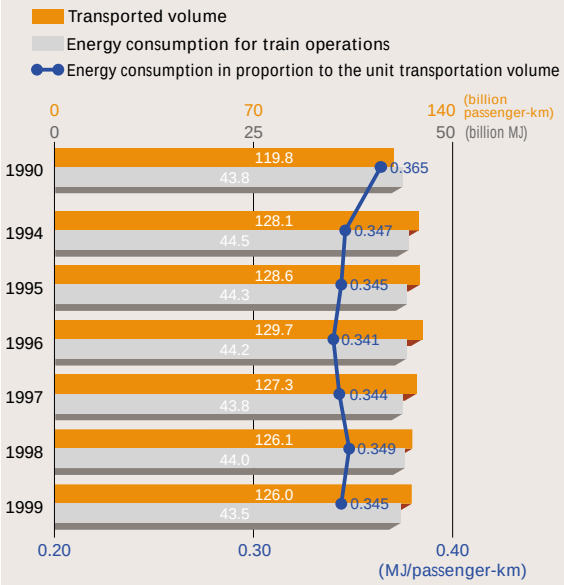
We were able to achieve a significant reduction in energy consumption among our energy-saving cars as compared to our old models, due to their reduced weight and the application of regenerative brakes (*1), VVVF inverters (*2) and other technologies.

The 209 Series used on the Keihin-Tohoku Line and E231 Series used the Sobu Line consume just 47% of the energy volume traditionally required (i.e., that of the 103 Series), while the 205 Series running on the Yamanote Line and others consumes 66% of the energy volume traditionally required.

JR East has been removing the old engines used in our diesel railcars and replacing them with new engines that consume less energy. We are also introducing newer, lighter diesel railcars, including the Kiha 100 Series, the 110 Series, and others. Overall, the rate of introduction for energy-saving cars, as of the end of March 2000, is an impressive 55%. We are striving toward further achievements in energy savings as well, notably through the introduction of next-generation commuter trains—known as AC trains—which are currently in development.

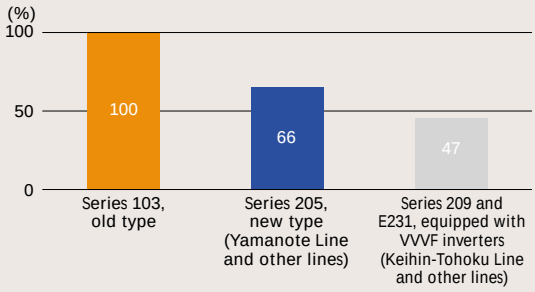
(*1) Regenerative brake: A brake that generates electric power via a motor during application for subsequent use as electricity.
(*2) VVVF inverter: VVVF stands for "variable voltage variable frequency," an inverter that can efficiently control train speed.

■ Trend in energy consumption in train operations and transported volume

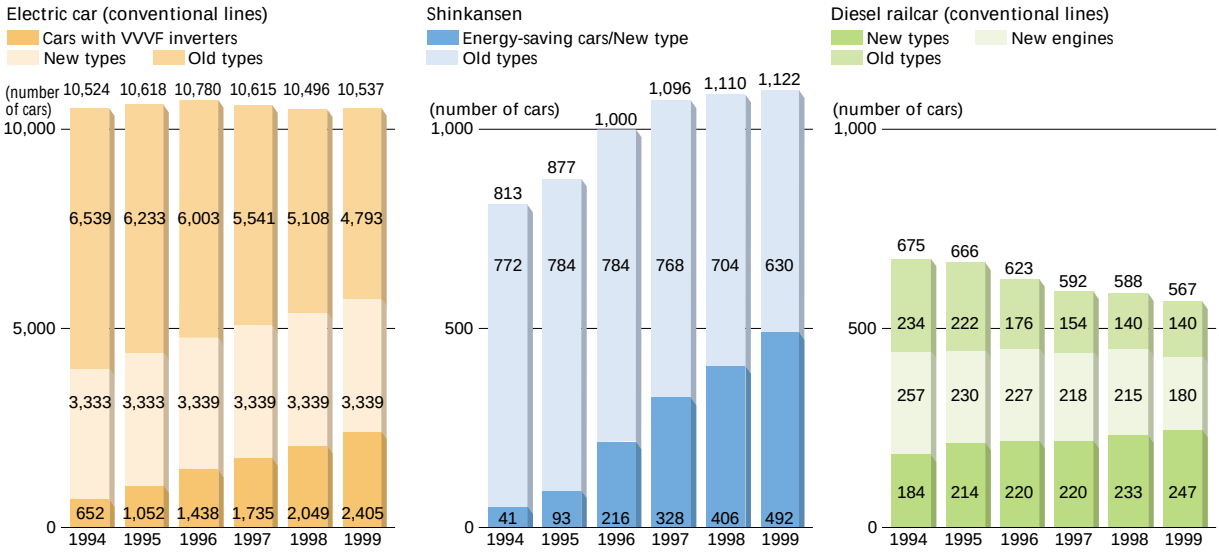


Energy-saving cars (E231 Series)

■ Comparison of energy consumption in train operations



■Trend in introduction of energy-saving cars



Energy savings at stations and office buildings

To ensure reduced energy consumption at our stations and office buildings, we are working to introduce more efficient facilities and enhance the productivity of our existing machinery.

Furthermore, as a means of bringing more efficiency to the energy-supply system at stations and other facilities, we have introduced co-generation systems at the Machida Station building, Sendai Station, the General Training Center (in Fukushima Prefecture) and so forth, and have introduced gas heat pumps at four stations, including Shinjo Station on the Yamagata Shinkansen Line.

Soon, we will be installing a photovoltaic generator set on the roof of the Shinkansen platform at Tokyo Station (32 kW) and on the roof of the training building at the General Training Center (30 kW). The installation of another photovoltaic generator is being planned for integration into the roofing material itself. This system will be capable of generating 100 kW of electric power, concurrent with the implementation of the extension of the roof over the Shinkansen platform at Takasaki Station.

We are also conducting basic examinations of a storage system for electric power; a system that can utilize the electric power generated when the trains are stopped. This is all part of our search for technologies that will further the cause of energy-efficient operation.

Co-generation system

Photovoltaic generator set

The General Training Center, which opened in April 2000

Reduction of CO_2 emissions throughout the transportation system

Intermodal transportation

Considering the subject of public transportation, we at JR East believe that it is very important that all of society endeavor to reduce CO_2 emissions. Although the automobile is much more mobile than the railway, the latter is obviously more advantageous in terms of the environment (see page 34).

JR East therefore offers intermodal transportation, combining the merits of transportation in its various mode. For example, one would use a car to reach the nearest train station, and then take a train to the station nearest one's chosen destination. After that, a rental car could supply an added measure of freedom and convenience, taking you directly to the final address.

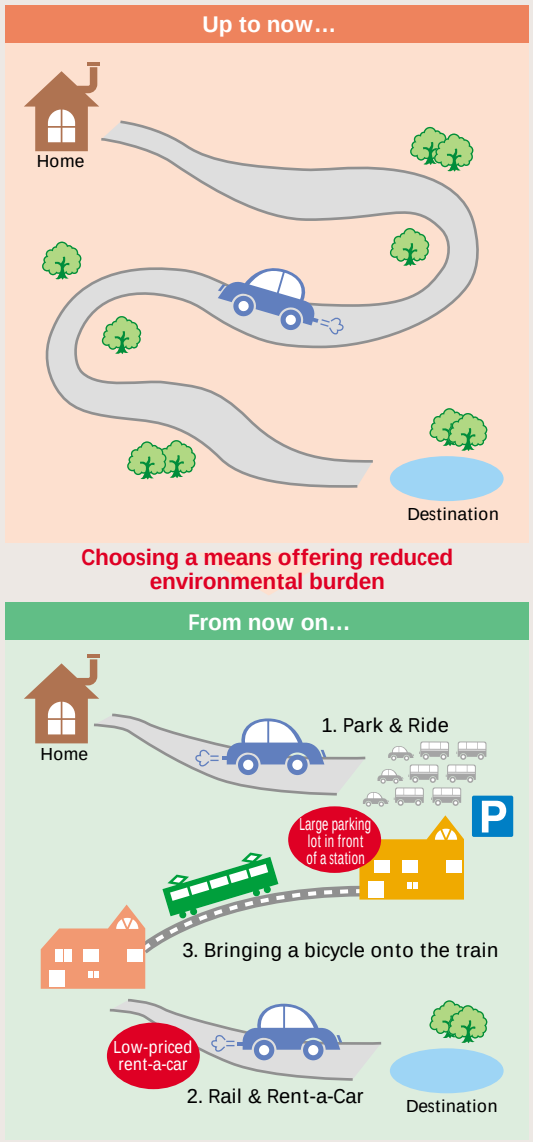


Image of intermodal transportation

Parking lot at Shinjo Station

1. Park & Ride

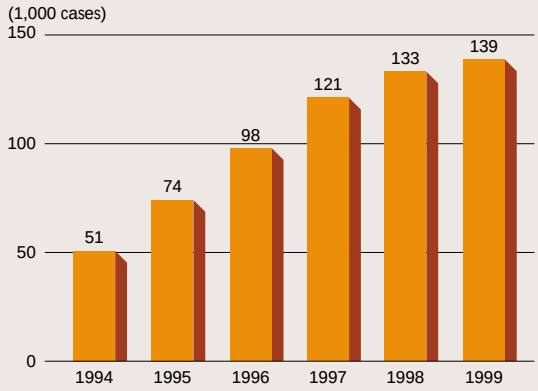
JR East has provided 143 stations with parking lots, which collectively have a capacity for 23,500 cars. These lots are available for free or at a discount—as can be arranged either independently by us or in cooperation with local municipalities. In the vicinities of five stations located between the Yamagata and Shinjo stations of the Yamagata Shinkansen Line (which reopened in December 1999 with an extended section), we provided parking lots for 2,770 cars in cooperation with the municipalities located along the line. From this point forward we will be dedicated to providing our commuters with quality parking accommodations.

2. Rail & Rent-a-Car

JR East offers the Rail & Rent-a-Car program, with which one can easily combine train and rental car service. To make it even more accessible, we are busy improving the productivity of our reservation system. Fees are being reduced, too.

The number of customers using our Rail & Rent-a-Car program in fiscal 1999 increased by a factor of 2.7 times compared to fiscal 1994, prior to the existence of our Torenta-Kun discount car rental program.

■Trend in use of Rail & Rent-a-Car



Rail & Rent-a-Car

3. Bringing a bicycle onto the train

JR East recommends that customers make their train trips more fun and environment-friendly with the use of bicycles. In November 1998, we developed and marketed the “Traincle” lightweight bicycle, which is collapsible for easy storage in a coin-operated locker. Furthermore, we revised our business regulations concerning the charge for carrying collapsible bicycles onto trains. This means our customers can now bring bicycles onto the trains for free. All that is required is that the bicycle be placed in a bag.

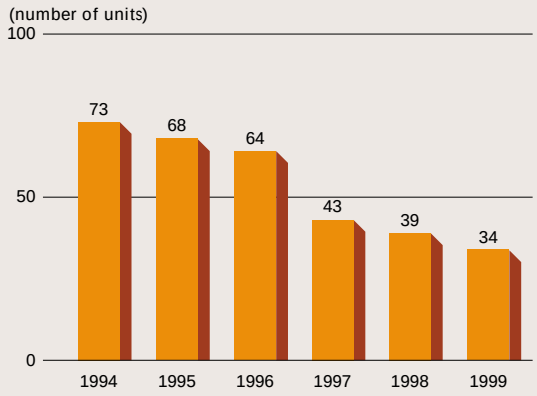
Traincle

Ozone-depleting substances and other greenhouse gases

Replacement of facilities reliant on CFCs

JR East is replacing its old facilities for ones that are free of CFCs and halon gas. For example, we are systematically replacing our large, CFC-based refrigeration machines with high-efficiency, CFC-free models. Accordingly, the number of large, CFC-based refrigeration machines went from 73 in fiscal 1994 to 34 in fiscal 1999, a drop of 53%.

■Trend in the number of large, CFC-based refrigeration machines



Air-conditioning facilities

Given that most of the air-conditioning facilities used on our trains use a CFC substitute (R22), we recover it at the time they are scrapped.

Our old diesel railcars were equipped with CFC-based air-conditioning facilities, but beginning in fiscal 1993 our new cars have used CFC substitutes (R134a) that do not negatively impact the ozone layer. Air-conditioning facilities equipped in the E231 Series, in operation since fiscal 1999, also use a cooling medium (R407c) that does not cause ozone-layer depletion.

Equipment collecting CFCs and CFC substitutes used in trains

Other greenhouse gases

Apart from CO_2, we also use HFCs (hydrofluorocarbons) for air conditioning in trains and PFCs (perfluorocarbons) and SF_6 (sulfur hexafluoride) in trains, as well as for power generation and conversion. However, the use of such substances is restricted within the tightly packaged products, so there is usually no emission into the air. Nonetheless, we are extremely careful not to cause emissions. We prevent leakage during maintenance operations and scrapping, at which time they are processed in the appropriate manner.

eco-train

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