

# Environmental Conservation along Railway Lines

Some environmental impacts may occur in the vicinity of railway lines in the course of JR East business operations. These include noise and radio disturbances due to the passing of trains, discharge of air pollutants from thermal power plants, the use of chemical substances in maintaining facilities and rolling stock, etc. For this reason, JR East is working to lessen these impacts to the greatest extent possible.

Item	Target value (to be met by fiscal 2005)	Results in fiscal 2001		Reference value (figure from fiscal 1990)
		Actual	Achievement	
NOx emissions at company-run thermoelectric power plant	▲60%*	▲62%	376t	994t
Reduction of noise to less than 75dB in designated residential areas along the Tohoku and Joetsu Shinkansen Lines	100% (to be completed fiscal 2002)	75%	—	—

\* NOx emissions have been reduced by 60%. We are making ongoing efforts to monitor the target so that we can clear it continuously in the future.

## Noise reduction along Shinkansen lines

Ministry of the Environment of Japan (former Environment Agency) formulated the “Environmental Quality Standards for Shinkansen Superexpress Railway Noise” in 1975. The peak noise level generated by the Shinkansen is kept within certain limits (L max) during operation according to these criteria, which represent some of the world’s strictest environmental standards. For the purpose of noise abatement, JR East defines areas along railway lines as “heavily built-up areas,” “densely populated areas,” “areas comparable to densely populated areas” and “residential areas” depending on their particular characteristics. Measures were implemented up to 1996 for areas classified as “heavily built-up areas” and “areas comparable to densely populated areas,” to restrict noise levels below 75dB. At present, we are working toward establishing targets for “residential areas” during fiscal 2002, and we had progressed 75% toward this goal by the end of 2001.

The measures comprise the following; in above ground facilities, height extension of soundproof walls supporting transparent plates in consideration of the view from railcar windows, installation of triangle-peaked soundproofing device walls, installation of sound-absorbent materials, performing rail-smoothing\*, etc. For rolling stock, we are in the process of mounting a



A new single-arm pantograph and insulator

new type of low-noise pantograph. In particular, we verified the effects of a new type of single-armed pantograph and insulator in a test run and have begun installing it into commercial railcars.



Rail-smoothing railcars



## Noise reduction along conventional lines

Although the environmental standards specified by the Japanese government are not applicable to existing conventional lines, JR East is considering how to prevent significant noise levels so as not to disturb residents living along railway lines. Further, since Ministry of the Environment (former Environment Agency) promulgated its “Policy on noise measures for construction of new conventional railways or large-scale remodeling” in 1995, we are implementing the plans and execution of work in compliance with this policy in the case of large-scale remodeling.

We attempt to reduce noise through continuous welded rails\*<sup>2</sup> and PC sleepers\*<sup>3</sup> in the above ground facilities, and through flattening smoothing in railcars\*<sup>4</sup>.

\*1 Rail-smoothing: To smooth uneven rails caused by train operations.

\*2 Continuous welded rails: To make rails over 200 meters in length in one piece by welding the joints of rails.

\*3 PC sleepers: To replace wooden sleepers with sleepers made of PC concrete (Stronger than reinforced concrete).

\*4 Flattening smoothing in railcars: To return a flat part generated by non-rotation of wheels into the original forms by trimming.

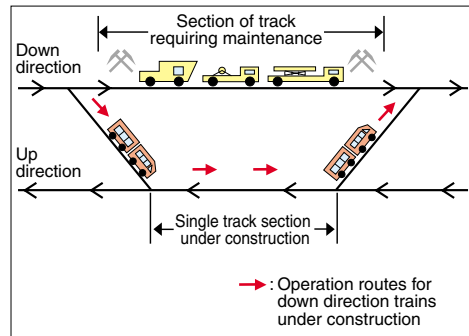


Soundproof walls of transparent plates

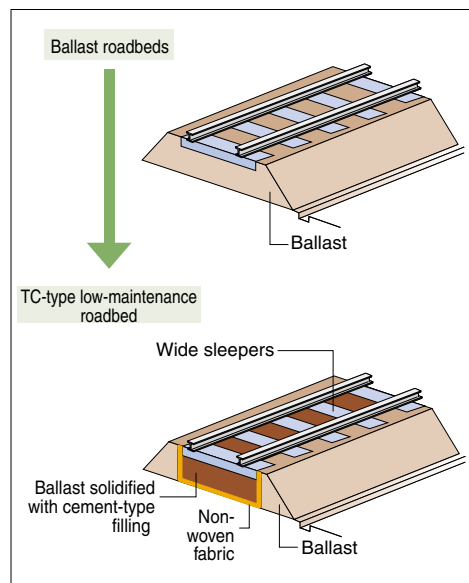


## Noise during maintenance work

Maintenance work on roadbeds is conducted during nighttime hours when trains basically do not operate; however, local residents are always informed in advance when such night work is scheduled. When performing the work we make every effort to reduce noise generated by machines. We will also conduct such maintenance work during the daytime employing modified operational methods. This includes the implementation of "Renovation works" where maintenance work is carried out intensively, thereby reducing maintenance work during nighttime hours. Further, in order to reduce such maintenance work itself, we are replacing conventional ballast roadbeds with highly stable TC-type low-maintenance roadbeds. These keep roadbed deformation to a minimum, especially in the Tokyo metropolitan area where tracks are exposed to a high volume of rail traffic.



Renovations works



TC-type low-maintenance roadbeds

## Radio disturbance

Along Shinkansen lines, television interference is sometimes caused when pantographs momentarily bounce over overhead wires. We are in the process of implementing measures to establish common television receiving facilities for such affected households.

## Harmony with existing scenery

In many cases, relatively large structures such as railway viaducts and bridges, or buildings such as stations and station buildings, are built along and around railway lines. Thus the impact on regional scenery produced by these structures is not insignificant. Within the construction departments which plan and design these structure and buildings, we have organized design committees. The committee checks how the planned structure may affect the existing scenery, and awards are bestowed for excellent designs. Such initiative may also receive awards from outside organizations. In fiscal 2001, we received the highest award for a viaduct (commissioned in 1995) built near Tokyo Station on the Chuo Line in the category "Landscape and Design Award" from the Japan Society of Civil Engineers (evaluation is based on maintaining harmony with the existing scenery over several years after completion of construction).



Viaducts in the vicinity of Tokyo Station on the Chuo Line

## Environmental pollutants

### Thermal power plants

The company-run Kawasaki power plant uses city gas, kerosene, and low sulfur heavy oil, which are fuels that impose a lower environmental burden than other conventional fuels. However, nitrogen oxides (NOx), sulfur oxides (SOx), soot and dust are emitted as a result of using these fuels. Thus, we are striving to reduce emissions by using NOx removal equipment, dust collectors, etc. In fiscal 2001, NOx emissions fell to 376 tons, thus achieving a 60% reduction from fiscal 1990. This was actually the target value for fiscal 2005, thus we were able to achieve our goal well ahead of schedule. We will continue monitoring these emissions so that all targets can be achieved in the future.

### Incinerators

Refuse incinerators may generate dioxin under certain conditions. JR East has been burning a portion of the refuse discarded at stations and on trains using the company's own incinerators; however, we are gradually eliminating our incinerators and consigning disposal to the municipality in consideration of the "Law concerning Special Measures against Dioxins." All compact incinerators with less than 50 kg/h burning capacity have been decommissioned, but as of the end of fiscal 2001 we were still using 18 incinerators with capacity exceeding 50 kg/h. We are in the process of reducing this number in fiscal 2002. It is planned to discontinue the use of company-owned incinerators except for two large incinerators (over 200 kg/h), which were upgraded to comply with the emission standards effective until December 2002.

### Diesel railcars

Since diesel railcars, which use light oil, generate soot and dust while running, JR East is moving ahead to replace existing engines with new engines that emit a lower volume of hazardous substances. Also, we are undertaking a study into a hybrid diesel railcar with an eye to future use.

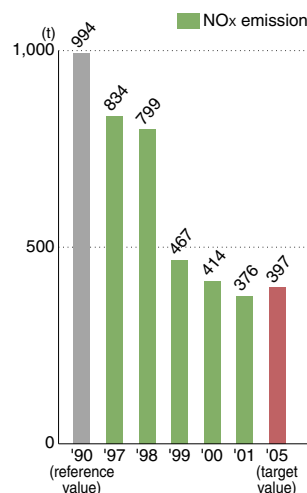
## Chemical substances

JR East uses chemical substances in the painting and repair of railcars at our main rolling stock workshops. These chemicals are strictly managed to prevent spills and leakage. Further, in accordance with the "Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Laws)," enterprises handling specific chemical substances over a certain volume must notify the volume released and/or transferred to the prefectural governments. We therefore employ an accepted method to calculate the amount of such substances released and/or transferred and participate in a PRTR regulation examination meeting, which all JR companies take part in. Thirteen facilities notified the government on these matters in June 2002. We are in the process of introducing stainless steel rolling stock, which require no coating, in order to reduce the amount of these chemical substances used. Stainless steel railcars now account for 49% of the company's 10,710 conventional electric railcars. The Company also uses organic paint solvents in the maintenance of railway facilities such as bridges. These uses do not require notification under PRTR regulations, with 320 tons being used in fiscal 2001. We use detergents in our cleaning operations at stations and station buildings, but East Japan Eco Access Co., Ltd., is reducing the amount of detergents used by employing the "Ozohiter" (movable ozone water generator) developed in collaboration with another company.

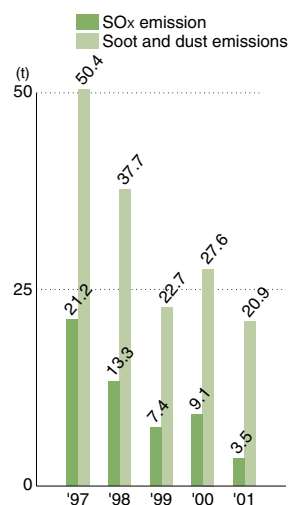
Name of chemicals	Unit	Level of emissions into the air	Level of discharge into public water bodies	Amount transferred to sewers	Amount transferred to outside facilities
Bisphenol A type epoxy resin	kg	24,000	0	0	2,000
Ethylene glycol	kg	0	8,400	320	4,800
Xylene	kg	24,000	0	2,800	1,100
Chromium and Chromium (III) Compounds	kg	0	0	0	150
Dioxins	mg-TEQ	869	0	2	3,193
Toluene	kg	28,170	0	6,807	19,356

Note) There is no discharge to soil and landfill disposal.  
Notified volume released and transferred in 13 places

● Volume of NOx emission from company-run thermoelectric power plant



● Volume of SOx, soot and dust emissions from company-run thermoelectric power plant







\* This is calculated based on the "Assessment of public benefit of forest lands" (Press release of Forestry Agency dated September 6, 2000).

## Herbicides

The overgrowth of weeds on or around railway tracks leads to low visibility that compromises the safe operation of trains as well as being annoying to adjacent residents. For this reason, in addition to mowing weeds, we also spray with herbicides. We only use herbicides in minimal amounts and with the lowest possible ratings for both mammalian and aquatic toxicity to reduce the environmental impact of weed control. The areas where herbicides are applied are also limited. Because of these controls, we restricted use to 336 tons in fiscal 2001.

## Polychlorinated biphenyl (PCB)

JR East has been using transformers, condensers, fluorescent light ballasts, etc. containing PCB as insulation. We are taking aggressive steps to replace this equipment with PCB-free equipment. The obsolete PCB-contaminated equipment (approximately 2,000 tons in total) is being strictly stored in special warehouses. In accordance with the "Law Concerning Special Measure against PCB waste," we notify the prefectural governors (mayors in some cities). We are currently examining disposal methods with safety being the paramount consideration so these hazardous materials can be rendered harmless as soon as possible.

## Utilization of water issuing from tunnels

In some of JR East's underground tunnels the amount of water issuing is increasing due to rising water tables. This does not interfere with train operations as the water is discharged from the tunnels by pumps; however, we are working on a new project whereby this water can be made use of. With the cooperation of municipalities, from fiscal 2001, we have been discharging spring water taken from within the Kokubunji tunnel on Musashino Line (between Shin-Kodaira and Nishi-Kokubunji) into the Nogawa River via Sugataminoike (all located in Kokubunji City, Tokyo). In this way we are able to improve the environment by increasing the river's water volume. In a similar fashion sump water sourced from the Sobu tunnel on the Sobu Line (between Tokyo and Ryogoku) is being supplied to the Tachiaigawa River (Shinagawa-ku, Tokyo). This began in July 2002.



Sugataminoike where water volume was restored

## Protection of railway trees

Forests have been protecting lines from various natural threats since the inception of Japanese railways. In 1893, trees to prevent snow drifting on to the rails were planted along the section between Mizusawa and Aomori on the Tohoku Honsen Line at 41 locations. Later, protective trees were planted in a number of regions to stabilize hillsides and prevent mudslides. At present, JR East has approximately 6 million trees on an area of land covering 4,400 ha in total. Because these trees not only absorb 17,000 tons\* of CO<sub>2</sub> equivalent to 0.7% of CO<sub>2</sub> discharged by JR East annually, but also create a rich natural environment that is appreciated by local communities, we conserve them with care.



Railway trees

## Environmental consciousness in residential plot development

We are implementing land use and development plans taking the conservation of the natural environment in residential areas into consideration. In "Fiore Kitsuregawa" (located at Kitsuregawa-cho, Tochigi Prefecture, total area of 82 ha, 1,115 houses), we have a land utilization plan making use of existing natural topographic features and trees, and we preserve natural trees when selling land lots. Another way of preserving an unspoiled environment for future generations is through new building agreements. In a current development called "View Verger Annaka Haruna" (Annaka City, Gunma Prefecture, 49ha in total area, approximately 700 houses planned), we are planting indigenous trees in accordance with the "Potential nature vegetation guiding method."



Arbor Day in "View Verger Annaka Haruna"

## Afforestation

We have been planting trees on an annual basis at all branches as part of the "Afforestation along railway lines" program, beginning in 1992 with tree-planting conducted at 11 locations including Yotsuya Station on the Chuo Line. This is a volunteer activity by JR East group employees, and we also encourage the participation of local residents in this activity. Twenty-three thousand people took part in these activities over a ten-year period up until fiscal 2001, planting 210 thousand trees. Each year, JR East group employees conduct fund-raising activities to coincide with the planting period and some of the money raised goes toward covering the expenses of the afforestation program. We have been involved in the "Onuma home town afforestation" program in Onuma (in southern Hokkaido) from fiscal 2000. Through the "Onuma home town afforestation committee," established by JR East and JR Hokkaido, volunteers from inside and outside the Company are asked to participate. The trees are grown in pots at nurseries from acorns, and they are planted at many places within Hokkaido under the guidance of Dr. Akira Miyawaki (Emeritus Professor of Yokohama National University), an international forestry expert. In October 2001, approximately 750 participants potted 55,000 seedlings. Similar events are also scheduled to be held in October 2002.



"Afforestation along railway lines"



"Afforestation of Onuma home town"

## Eco-tourism

Under the theme "Communing with wonderful nature," JR East provides services that allow people to visit and experience nature in many places. In fiscal 2001, approximately ten thousand tourists took part in 15 tours, including "Shirakami mountain range trekking," "Visit to a clear stream," and "Studying Fukushima away from home." By establishing long-stay type hotels (Folkloro and Familio) and using them as a base, we were able to provide the "LO-CO club" plan, which is a sociable trip designed to bring people into contact with nature and the culture of the land. Approximately 15,000 have enjoyed the plan.

Using many different stations as starting points, "Hiking from the station" is an activity whereby tourists can enjoy themselves by taking a nature walk within an easy distance from the station and see numerous scenic spots that change with the seasons. There are both "Event courses," which must be reserved in advance and "Recommended courses," which tourists can enjoy whenever they like without a reservation. The event courses were held approximately 200 times in fiscal 2001, and were attended by about 100,000 people.



Familio



"Hiking from stations"