Special feature article

Activities of JR East Railway Company with respect to the Environment

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1 Introduction

Since in recent years it has become incumbent upon businesses to give consideration not only to value in the economic sense but also to value from the perspective of society and the environment, the social responsibilities of corporations, or that is to say CSR (Corporate Social Responsibility) is being strongly emphasized as a concept in the management of corporations.

In the past, actions were reactive and negative in character as exemplified by responses to such problems as pollution that had already been actualized. However, what CSR requires today are proactive and positive initiatives in which the corporation undergoes innovation in the face of issues of the environment and the concept of CSR and the emphasis is on changing the value concepts of the corporation.

2 Importance of Environment Management

Looking to the medium to long term future, activities having to do with the environment will lead to more competitive capability and strengthened brand power of a corporation without fail and are thus indispensable elements for the survival of a corporation.

A concrete example is the fact that the concept of Socially Responsible Investment (SRI) that prioritizes investment in corporations that stress social responsibility and in particular activities having to do with the environment is becoming extremely potent among investors of late. In the United States, it is said that investment funds allocated to companies that emphasize CSR activities amount to 250 trillion yen and that about 12% of total investment in the United States is being allocated to corporations that are assuming corporate social responsibilities. As JR East Railway Company has been fully privatized and the company is in a position of being subjected to evaluation by the market, it considers environmental management to

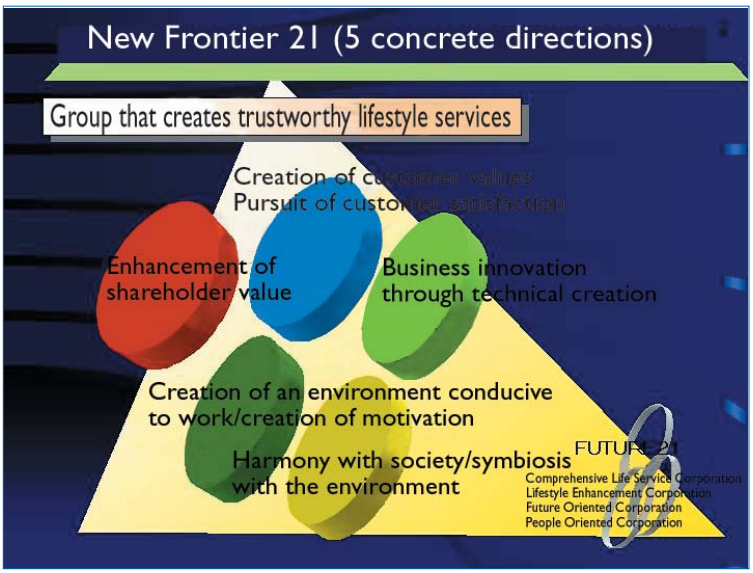

Fig.1: Medium Term Management Plan and Activities having to do with the Environment

play an extremely significant role in its future.

Another element, that is to say the possibility that the right to discharge CO_2 gas can be expected to become an item for transaction in the future, will need to be kept in mind. Railways are generally considered as a mode of transportation that is environment friendly but in fact, they are the source of an enormous environmental burden and discharge 2.3 million tons of CO_2 gas annually. This amounts to 0.2% of the total volume of carbon dioxide gas that is generated in Japan. Accordingly, the future issue of the right to emit carbon dioxide gas is an issue that must be kept in mind from the long-term range in corporate governance regardless of whether or not this may have an impact on the short-term activities of a corporation.

The third element is that activities having to do with the environment have become extremely important in acquiring the confidence of consumers.

The fourth element is that issues of the environment internalize a potential to act as a trigger for realizing a breakthrough in technical innovation and technology not only for JR East Railway Company but also for the industries of Japan as a whole.

In other words, as seen above, activities having to do with the environment are perceived as social obligations of corporations and a litmus test of corporations administered from outside the company. How corporate activities are perceived externally or what burden a corporation exerts externally on the environment must always be self-evaluated strictly and responding to this self-evaluation is considered the basis of activities having to do with the environment. Moreover, implementing such activities leads to enhancing competitive strength and brand strength of a corporation.

3 The Activities of JR East Railway Company

Based on the above state of affairs, JR East Railway Company is undertaking environmental activities with the following four elements as the base.

The first element is the initiative towards reducing the burden on the environment itself. In addition to the introduction of energy-saving vehicles and the achievement of greater efficiency in our self-operated thermoelectric power plant, efforts are also being made to reduce the consumption of energy in office buildings. Since business operations generate a large volume of refuse and waste, efforts are also being made towards recycling such waste and towards achieving zero emission.

The second element is the creation of railway services that are convenient for the customers. While the huge environmental burden exerted overall cannot be denied, it is also a fact that compared to other methods of transportation, the energy efficiency per unit volume transported in the case of railway is relatively superior. From this perspective, it is necessary to contribute to reducing the burden on the environment on a global scale by transforming the railway into as convenient a method of transport as possible. As a concrete initiative, an inter-modal form of transportation involving the railway and automobile is being promoted. For example, Kurikoma Kogen station on the Tohoku Shinkansen has a parking facility for 800 vehicles and offers the service of arriving at the station using an automobile and traveling onwards to one's destination using the railway. Numerous stations such as the Ryuo Station on the Chuo Line have similar facilities.

The third element that constitutes a basic concept is the creation of an environment target and the management progress towards achieving such a target. The results of environmental activities are not readily discernable nor do they bring an immediate increase to the

corporation's income. On the contrary, initially, such activities act as cost centers. However, as stated earlier, in the medium to long-term future, activities having to do with the environment are strategically important for strengthening competitive capability and brand power. For this reason, a quantitative target will be set and the status of progress determined without fail in order to carry out environmental activities that in reality cannot be readily seen as apparent as possible towards sharing the results within the group as a whole. Concretely, a plan for improvement with fiscal 1990 as the baseline year has been set for such factors as energy consumption per unit volume of transport and ratio of recycling of waste generated at stations and on trains and a plan for improving these ratios has been put in place and progress is being monitored on an yearly basis. Moreover, as other visible target management tools, two initiatives are being taken. One initiative is environmental accounting. This involves, for example, accounting the cost of investment in energy-saving trains and improvement of facilities along a certain route in order to reduce noise toward the reduction of the generation of carbon dioxide gas and electrical energy consumption to ascertain the actual reduction of cost that is entailed quantitatively and publicizing this in the annual Sustainability Report. The other initiative was the introduction of the environment management index last year in order to create an index that correlates the environment and corporate governance. The volume of discharge of CO_2 gas per unit operating income is in other words, the concept of the volume of CO_2 gas discharged in order to realize one yen of operating income. From this, it was found that the group generates 770 tons of carbon dioxide gas. The company intends to exert greater effort towards increased profit while at the same time reducing the environment management index and thus reducing the burden on the environment.

The fourth element for promoting environmental activities is the screening by a third party of the Sustainability Report that is published each year. From the year 2000, Asahi Audit Corporation (currently KPMG AZSA & Co.) was commissioned to check the reliability of the group's report from an external perspective and to note the results of the audit at the end of the report. The company intends to continue to be aware of perspectives of external third parties in undertaking its environmental activities.

4 Concrete Activities

This section will first explain activities having to do with energy saving and reduction of the discharge of carbon dioxide in gas in order to reduce the burden on the environment from among the approaches that have been outlined above.

The first consideration is that the company consumes 56.5 billion MJ of energy and 72% of this is energy is required to operate the vehicles. Accordingly, an important consideration is the introduction of energy saving vehicles.

The second consideration is achieving efficiency in the supply of energy, or in other words, achieving efficiency in our self-operated thermoelectric power plants and hydroelectric power plants.

The third consideration is how the carbon dioxide gas that is discharged from stations and offices that account for 28% of the energy consumed may be reduced.

With respect to the first consideration, that is the achievement of energy saving and reduction of carbon dioxide gas discharge, an explanation will be given here on the introduction of energy saving vehicles. For example, the 209 Series trains in use on the Keihin Tohoku Line and the E231 Series trains Yamanote Line and Sobu Line use only about half the energy required by the 103 Series trains. If the energy consumption of the 103 Series trains is assumed to be 100, the consumption of the 205 Series trains is 66 and the consumption of

the most modern E231 Series trains has been reduced to 47. These trains have achieved energy savings through reduction of weight, use of recuperative braking and VVVF Inverter Control that achieves ideal acceleration and deceleration without the use of a resistor (Figure 2). Looking at the extent to which energy saving vehicles have increased within the total number vehicles in use, of the 12,000 vehicles operated by the JR East Railway Company, about 8,000 vehicles have been replaced with energy-saving vehicles. New series such as the E2 Series (Komachi, Hayate) are successively being introduced into the Shinkansen vehicle system and 68% of all vehicles operated by the company are energy-saving vehicles. The target is to raise this level to 80% in two years (Figure 3).

The next consideration is achieving greater efficiency in our self-operated electric power generation plants. JR East Railway Company consumes 6.3 billion kW/h of electricity annually and this is equivalent to the electric power consumed by 1.74 million general households in one year. Of this, the company generates 56% of the power it consumes. Greater efficiency in power generation is being targeted by replacing the thermoelectric plant with a combined cycle generation plant (Figure 4).

The third consideration is energy saving at stations and office buildings and there is nothing new about this kind of initiative. The company is involved in cogeneration and the use of solar energy in the supply of heat and electricity. These solar generation facilities have been installed at Tokyo Station, Takasaki Station, and the Comprehensive Training Center.

The volume of carbon dioxide gas emitted by JR East Railway Company, with 1990 as the baseline, has been reduced by about 16% to date. The target is reduction by 20% as compared to the baseline by fiscal 2005. The target of Japan as a whole with 1990 as the baseline is 6% in 2010, so that our 20% target far exceeds the national

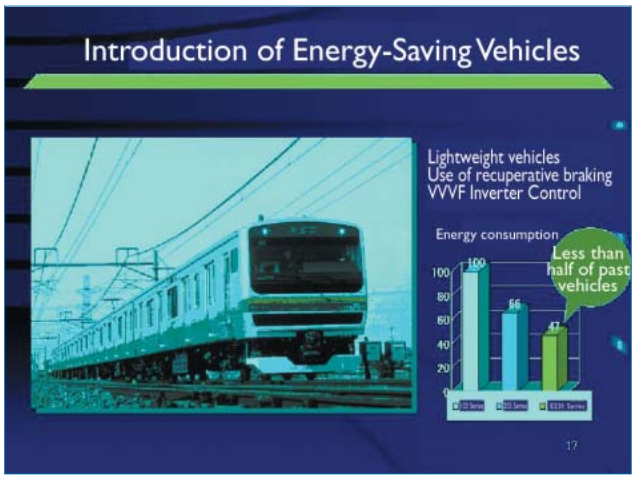

Fig.2: Introduction of Energy-Saving Vehicles

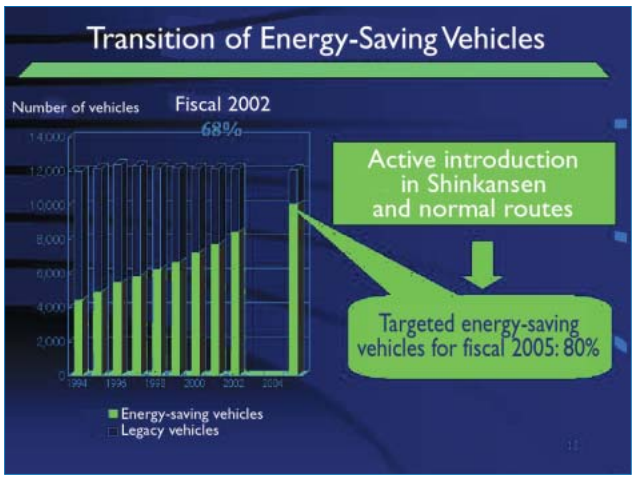

Fig.3: Transition of Energy-Saving Vehicles

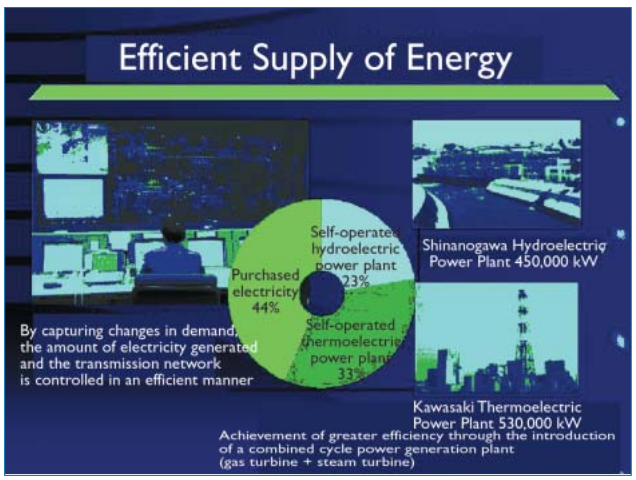

Fig. 4: Efficient Supply of Energy

goal not only in volume, but also in the targeted timing, and the company considers this target to be adequately achievable. In the future, further introduction of energy-saving vehicles and achievement of greater efficiency in our self-operated thermoelectric power plant will be utilized in order to achieve this target without fail (Figure 5).

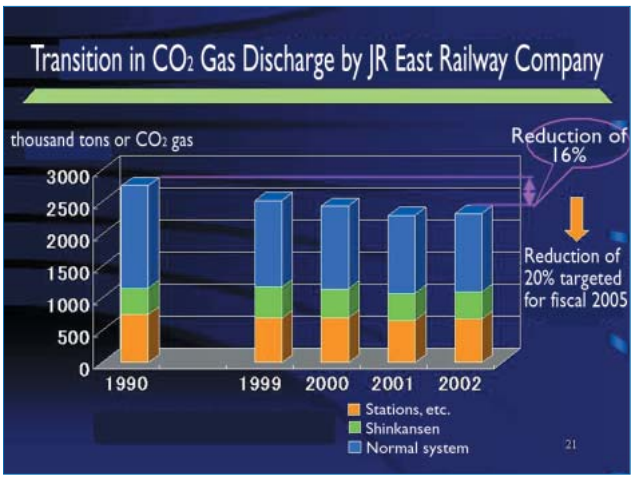

Fig.5: Transition in CO_2 Gas Discharge by JR East Railway Company

As the second concrete initiative, there is the recycling of waste and achievement of zero emission.

JR East Railway Company generates copious amounts of refuse and waste through its business activities. One such source is the waste that is discarded by customers in stations and the volume of this waste amounts to approximately 50 thousand tons per year. In order to deal with this waste, recycling is currently being undertaken at recycling centers installed in Ueno, Omiya, and Shinkiba in the metropolitan area. Moreover, the industrial waste generated at construction sites and factories amounts to about 500 thousand tons per year. With respect to this, initiatives for reducing waste and for selecting materials that do not generate waste are in place. And the third element is the procurement of materials and in this respect, the company is implementing green procurement that involves the procurement of materials that exert little burden on the environment.

The volume of waste from stations and trains has been reduced from the initial approximately 74 thousand tons to about 50 thousand tons. This 50 thousand ton figure is equivalent to 1% of the residential waste generated in Tokyo or to the waste generated by approximately 130 thousand people, and indicates that an enormous amount of waste is still being generated in stations and on trains. Recycling of this was approximately 14% in 1994 when a survey concerning this matter first began but has increased to approximately 37% (Figure 6). Looking at the history of the recycling of waste from stations and trains, in August 1992, Sugamo Station set up waste receptacles that separate waste into three types on a trial basis. This was later extended along the Yamanote Line and a recycling center was installed in Ueno Station. Today, such centers are located in Ueno, Shinkiba, and Omiya. The Shinkiba center separates newspapers and magazines, the Ueno and Omiya centers provide separate receptacles for cans, bottles, and PET bottles, and send these to the recycling route.

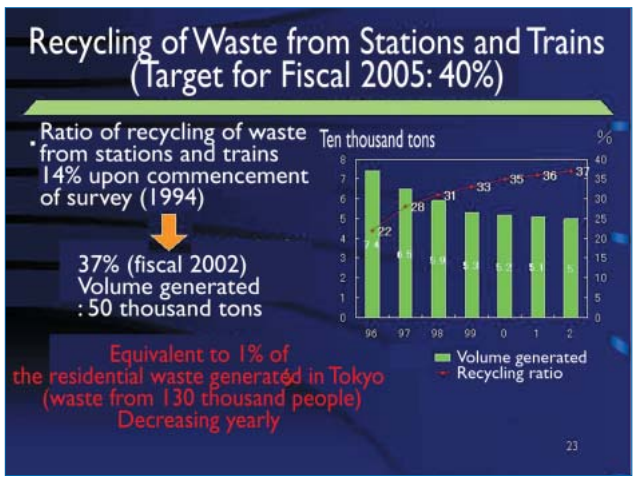

Fig.6: Recycling of Waste from Stations and Trains

JR East Railway Company has been making efforts to reduce the volume of waste generated as explained above and to increase the ratio of recycling.

Taking the example of paper in explaining concrete methods of recycling, rubbish that is collected in the receptacle is separated,

compressed at the Shinkiba recycling center, and delivered to a paper making company. Of the copy-paper used by this company, 98% is recycled paper made from such newspapers and magazines.

Taking the example of tickets as another case, about 760 tons are collected from all stations per year and reprocessed in a paper manufacturing plant to produce toilet rolls or cardboard paper or to produce the business cards of company staff and personnel.

This flow has been successful in raising the recycling ratio of waste from stations up to 37% as a whole and efforts are being made to raise this to 40% in the next three years. As a point of reference, the ratio of recycling of residential waste in Japan as a whole is reported to be only 14% (Figure 7).

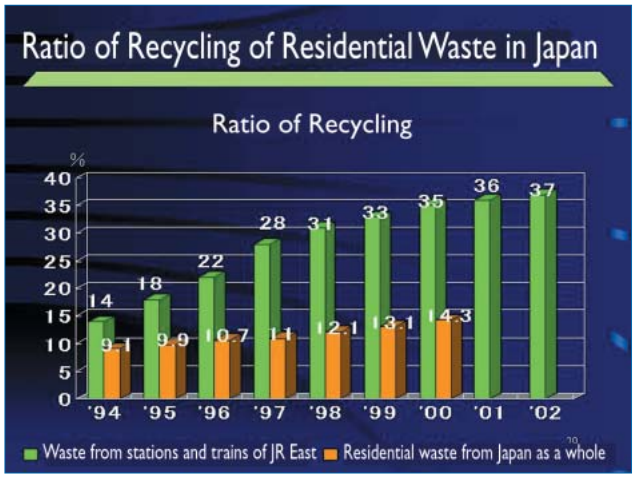

Fig.7: Ratio of Recycling of Residential Waste in Japan

Next, with respect to consideration for the procurement of materials, green procurement guidelines have been established and to the extent possible, materials that do not exert a burden on the environment are being procured. As a concrete example, upon renewal of the uniforms worn by staff that was undertaken from last year to this year, some of the uniforms purchased were made from recycled polyester produced from used PET bottles. In other words, PET bottles discarded by customers are being used for the uniforms of station staff, conductors, and drivers.

Of the copy-paper used, 98% is recycled paper and the supplementary tickets used by conductors when settling fares on a train also use recycled paper in order to reduce the burden on the environment in the purchase of materials. Variously, the materials that are procured are those that are conducive to recycling and reuse in the future.

In addition to the above, waste from construction sites and factories also present an issue. In terms of recycling of waste from factories, of the approximately 20 thousand tons generated each year, 74% is being recycled. This is an increase from 57% when the survey was first commenced to the current 74% and is extremely close to the target (Figure 8). In terms of the recycling of vehicles, about 60% of total waste is steel waste followed by aluminum, copper, stainless steel, and debris that account for about 8% of the waste. This waste is separated into approximately 30 types and each type is delivered to recycling businesses as well as used in the company's own factory to recycle the wheels of waste vehicles in order to manufacture disk seats for brakes (Figure 9).

With respect to waste that is generated from construction sites, the volume generated last year was about 480 thousand tons and of this, 84% was recycled. The company undertakes methods of design to ensure the generation of as little waste as possible from the design

Fig.8: Recycling of Waste from Factories

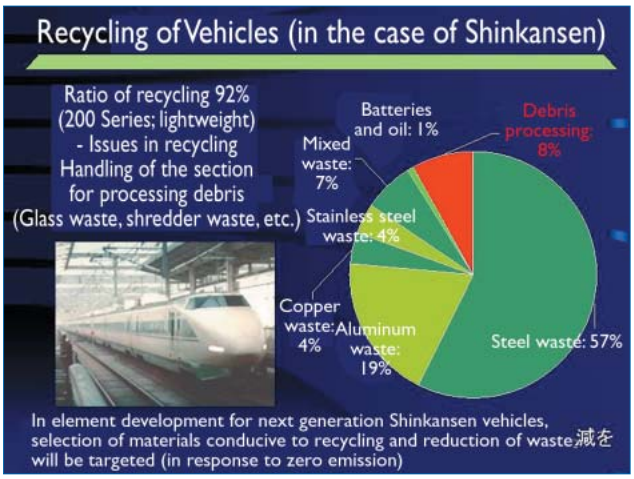

Fig.9: Recycling of Vehicles

Fig.10: Recycling of Waste from Construction Sites

phase in order to raise the ratio of recycling. (Figure 10)
The company is working towards zero emission through the initiatives that have been outlined above.

At this point, an explanation will be provided on research and development as a concrete activity that is involved in preserving the environment. JR East Railway Company established the Research and Development Center in December 2001 and concrete research and development including concrete aspects of the environment are being conducted at this center. Here, rolling tests are already being conducted on the environment-friendly AC Train and energy-efficient NE Train. Since the company considers the issue of the environment to act as a trigger in the development of new technology, it believes strongly that the accumulation of small technical development efforts will eventually lead to a major breakthrough and that it is important for corporations to continue steady, though perhaps low-key, efforts in research and development. As an example, in the automotive industry that had been considered in the past to exert a significant burden on the environment, the development of fuel cells and hybrid cars has been significant. It has been reported that Prius, a hybrid car developed by Toyota Motors, is capable of being driven over 35 kilometers on a liter of gasoline. In the past, the railway was considered environment-friendly while automobiles that exerted a heavy burden on the environment ran at the most 10 kilometers on a liter of gasoline. In other words, the development of Prius has tripled this energy efficiency in one blow.

Needless to say, technical development is important not only from the perspective of the environment but also extremely significant in view corporate governance.

As a concrete activity, an explanation will be given here on the protection of the natural environment. The area of railroad forest possessed by JR East Railway Company is approximately 4,400 hectares, or 1,000 times the area of the National Stadium in Tokyo and 6 million trees are growing in this forest. The function of the forest is to protect the vehicles and tracks from natural disaster and at the same time, these 6 million trees act to absorb carbon dioxide gas. The volume of carbon dioxide gas absorbed is only about 17 thousand tons and considering that the company generates 2.3 million tons of carbon dioxide, this accounts for only 0.7% of the total, but the fact is that at least some carbon dioxide is being absorbed.

In an initiative for further creating forestry, each railway region began an afforestation program in 1992 and to date, 27 thousand volunteers have participated to plant 22 thousand trees. The company intends to

continue this type of activity steadily into the future (Figure 11).

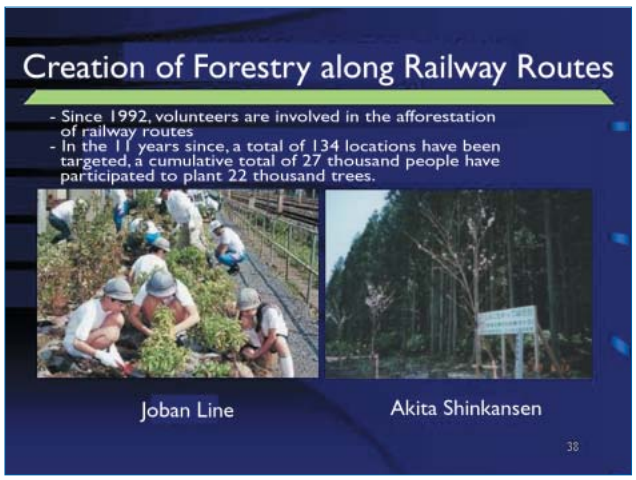

Fig.11: Creation of Forestry along Railway Routes

Another initiative that the company has emphasized is the issue of noise. In fiscal 2002, an extremely difficult target level of 75 dB was achieved in residential areas. Since the Tohoku Shinkansen and Joetsu Shinkansen were completed somewhat after the Tokaido Shinkansen and Sanyo Shinkansen, the hurdle was somewhat higher, but again, this was cleared last fiscal year.

Next, a word of explanation on communication with respect to the environment.

The company participates in the Eco-products Fair and holds Ecology Campaigns in Tokyo Station and Sendai Station in order to communicate the activities of the company with respect to the environment to customers and other external stakeholders (Figure 12). Moreover, since 1996, an Annual Environmental Report has been published and since 2000, this report is being subjected to a third party audit. Since 2002, the report is published as the Social Environmental Report and includes not only issues of the environment but also incorporates social issues including safety and services. For children, an easy-to-understand booklet on ecology is also being produced (Figure 13).

Fig.12: Communication with respect to the Environment (1)

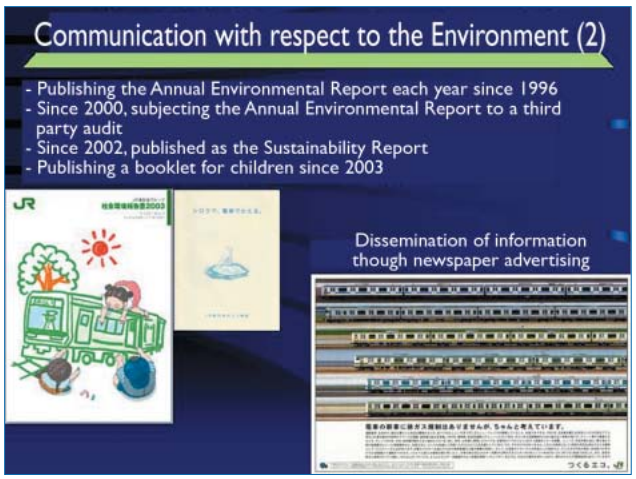

Fig.13: Communication with respect to the Environment (2)

Next is an explanation about measures toward realizing a railway system that is convenient to use. With respect to this, the company is promoting the inter-modality of railways and automobiles. The concept is for the railway to cover the area of its strength and for the automobile to cover the area of its strength. For example, there is a huge parking lot that holds 800 automobiles at Kurikoma Kogen Station on the Tohoku Shinkansen so that customers can arrive at the station by automobile and use the railway for subsequent travel. A similar service is being provided at Ryuo Station on the Chuo Line. There is the Limited Express Kaiji that leaves Ryuo Station in the morning and returns in the evening, and through creating this parking lot, customers are now able to arrive at the station by automobile and

to use the express for travel beyond.

In other initiatives, thematic products such as "Adult's Holiday" and "My Family" or perhaps "Hiking from the Station" that take into consideration the concept of "eco-tourism" are being created.

5 Conclusions

Finally, four elements that are meaningful in responding to the issues of the environment will be enumerated as an ending note to this lecture.

The first element is that as a result of having tackled the environmental issue for the last 10 years, the maintenance of corporate governance with equity and integrity towards assuming social responsibilities has led to the strong belief that these activities will contribute to the sustainable development of the company, raise its competitive capability, and strengthen its brand power.

The second element is a strategic issue that is indispensable in the sustainable development of a corporation. The issues involved do not merely involve the creation of images, but rather must be viewed as important strategic issues that bring change to the corporation and lay the foundation of such change by the corporation.

The third element is that railways are not environment friendly in any way. It is our concept that issues of the environment will need to be addressed with this fact as the basis. It is true that railways may be superior when compared to other means of transportation in terms of the environment, but looking at the total picture, awareness of the fact that railways exert a burden on the environment must be recognized.

The fourth element is that while reducing the burden on the environment that is attributable to railway services, railways must be made more convenient, reliable, and safe and be reborn to provide appropriate services to promote their use. This is a significant role and social obligation, that is to say CSR of the company.