What is to be concluded cost/effectiveness analysis in environmental accounting?

JR East has been conducting environmental accounting since FY 1999 to identify the cost/effectiveness of our environmental conservation activities. Since FY 2000, we have also included data on economic effect. In FY 2001 we calculated an environmental management index that compares an operations' CO_2 emissions with operating income, to assist management decision-making.

Basic concept

Generally, environmental accounting has two roles: It serves as a management tool to increase the efficiency of corporate environmental conservation activities through quantitative evaluation; and as a communication tool to objectively report corporate environmental conservation activities to stakeholders.

JR East now conducts environmental accounting and announced its first results in FY 1999. For disclosing this information, we follow the *Environmental Accounting Guidelines* (FY 2002 edition) issued by Ministry of the Environment, which facilitates comparison with other companies.

Although the environmental accounting system is still in the process of development, we plan to make full use of this tool in our efforts to disclose valid data on environmental management as transparently as possible.

Result for FY 2002 Environmental accounting

The main points of FY 2002 environmental accounting are as follows:

As for the cost of environmental conservation activities, we have an investment of 79.2 billion yen, while expenditures were 14.3 billion yen. Investment in global environment conservation activities was up 19.0 billion yen to 74.1 billion yen of the total, due to the accelerated introduction of energy-saving *Shinkansen* railcars and so forth. Introducing such railcars and other equipment cuts CO_2 emissions by 520,000 tons over the lifespan of the vehicle.

Investment in environmental conservation activities along railway lines was increased 1.4 billion yen over the previous year to 5.1 billion yen, due to installing waste categorization receptacles (eliminating incinerators) and using more efficient track equipment.

Environmental conservation cost calculation

Environmental conservation costs

- ○Data refers to East Japan Railway Company as a whole, on a non-consolidated basis.
- ○Based on Ministry of the Environment, *"Environmental Accounting Guidelines (FY 2002 edition)."*
- ○"Environmental conservation costs" cover only those identified by our current management system
- ○For multipurpose activities with significant environmental effect, the amount stated refers to total cost. (The cost for pollution prevention includes all expenses incurred in installing continuous welded rails, etc., as this is considered to contribute to enhanced functionality. The cost for global environmental conservation includes the total amount invested in energy-efficient railcars.)
- ○Expenses do not include depreciation
- ○Expenses for processing refuse generated at stations and trains (under resource-recycling costs) are calculated as follows: A model is set up for cleaning stations and trains. Then the percentage occupied by waste recycling and processing is calculated (in proportion to the entire model). By multiplying the overall cleaning expenses for stations and trains by this percentage, the amount of expense in question is obtained.
- ○Of resource-recycling costs, the cost of processing waste from construction work and rolling stock facilities is calculated for each facility by multiplying the waste volume in FY 2002 by a standard per unit cost.

Environmental conservation effect

- ○The effect of environmental conservation is calculated based on figures that represent environmental targets.

Economic effect of environmental conservation activities

- ○As for global conservation, economic effect is calculated by determining the annual reduction of electricity and maintenance costs generated by the introduction of energy-efficient railcars, cogeneration, etc. (including partial estimates), then multiplying the reduction amount with the legally accepted depreciation lifespan.
- ○Cost of processing waste generated by construction work and rolling stock facilities incorporates revenue gained from resale of reusable resources.

Environmental conservation activity category	Environmental conservation costs (billions of yen)		Environmental conservation effect driven by environmental goals			Economic effects involved with environmental conservation activities (billions of yen)
	Investment	Expenses		FY 2001	FY 2002	
Environmental conservation along railway lines (antipollution activities)	5.06	5.93	Reduction of noise to 75dB or less in designated residential areas along the *Tohoku* and *Joetsu Shinkansen* Lines	75%-achievement	100%-achievement	–
			NOx emissions at dedicated thermal plants	376 tons	399 tons	
Global environmental conservation	74.11	–	Total CO_2 emissions from general business activities	2.29 million tons-CO_2	2.32 million tons-CO_2	29.20
			CO_2 emissions in proportion to unit electric power generation at dedicated thermal plants	539 g-CO_2/kWh	519 g-CO_2/kWh	
			Ratio of energy-efficient railcars	63%	68%	
			Energy consumption for train operations in proportion to unit transportation volume	18.8 MJ/car-km	18.6 MJ/car-km	
			Number of large freezer units using specific chlorofluorocarbons (CFCs)	23 units	19 units	
Resource-recycling	–	6.44	Station/train waste recycling rate	36%	37%	0.23
			Rolling stock maintenance facilities waste recycling rate	71%	74%	
			Construction project waste recycling rate	76%	84%	
			Usage of recycled paper for office stock	97%	98%	
Environmental management	0.06	0.53	Foresting railway lines	12 locations 20,000 trees planted 2,000 participants	13 locations 10,000 trees planted 3,500 participants	–
Research and development of environment-related technologies	–	1.39				–
Social activities	–	0.04				–
Total	79.23	14.33				29.43

Reference:
Amount of facilities investment for the period : 245.9 billion yen
Total amount of research and development costs for the period : 15.2 billion yen*

Verifying by environmental management index

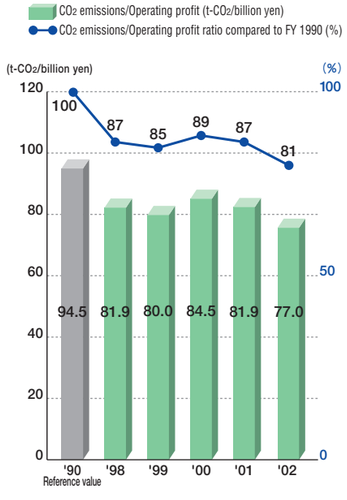
JR East established an environmental management index and uses it to determine the relationship between environmental activities and our economic activities. We use the data calculated to guide business planning and decision-making. For example, reducing CO_2 emissions is one of our top priorities. Using our environmental management index, we consider the volume of CO_2 emissions as an environmental impact factor in comparison to operating profits as an added economic value.

Environmental management index

$$= \frac{\text{Environmental impact}}{\text{Economic value added}} = \frac{\text{CO}_2\text{ emissions (t-CO}_2\text{)}}{\text{Operating profit (billion yen)}}$$

Accordingly, a smaller value indicates less stress on the environment, while still maintaining the same economic value. Thanks to our efforts over the last decade, the value of 945 (t-CO_2/billion yen) recorded in FY 1990 had improved to 770 by FY 2002.

Environmental management index



* **Total R&D costs**
Includes research and development in basic fields, including funding to the Railway General Research Institute (6 billion yen) in accord with the Agreement on Research Activities.