

## Efforts of Environmental Management in the Hitachi Group

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*OVERVIEW: Reducing CO<sub>2</sub> emissions that cause global warming and becoming better environmental stewards are shared global responsibilities that must be addressed to preserve the planet for future generations. To achieve its environmental management objectives, the Hitachi Group is pursuing a wide range of initiatives and activities based on the key concepts of “emission neutral” and “creating a sustainable society” addressed in the Group’s long-term “Environmental Vision 2015” plan. Emission neutral is essentially the concept of balancing “direct environmental loads” — energy used to produce procured materials and to manufacture and distribute products — with reduction in “social environmental loads” generated after finished products are put into the hands of customers. Hitachi is building “super eco-factories” reflecting industry-leading green practices and innovations to reduce direct environmental loads, and creating “super eco-products” based on environmental efficiency factors and award-winning green technologies to reduce social environmental loads.*

### INTRODUCTION

THE Hitachi Group is pursuing an environmental management program that places high priority on “prevention of global warming,” “recycling resources,”

and “conserving ecosystems.” To reduce the environmental impact of manufacturing activities and the products and services offered to consumers, Hitachi has (1) implemented DFE (design for environment) at

Environmental Vision 2015

As a global citizen, we will promote innovation throughout the world while developing the potentials of the future generation to pioneer next-generation products and services.



Sustainability  
Compass

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**Eco-Mind & Global Environmental Management**  
Eco-mind & global environmental management

Throughout our entire group, we will create an advanced eco-mind and the power to transform it into action and build/operate a global management and evaluation system.

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**Next-Generation Products & Services**  
Provision of next-generation products and services

We will continue to make innovations for highly competitive products and services that will contribute to structuring a sustainable society and deploy new business models.

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**Super Eco-Factories & Offices**  
Factories and offices with a high-level of consideration for the environment

We will thoroughly carry out activities for the prevention of global warming and continue our efforts to promote recycling, and at the same time, to build up our bases with consideration for the environment.

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**Worldwide Environmental Partnerships**  
Collaboration with stakeholders

We will strengthen environmental communications and actively endeavor to realize concrete partnerships with our stakeholders while clarifying our objectives and achievements.

Fig. 1—Environmental Vision 2015.

The Hitachi Group has implemented effective environmental management by formulating long-term “Environmental Vision” plans based on “Action Guidelines for Environmental Protection,” drafting annual plans based on the “Sustainability Compass,” and assessing and improving results through “GREEN 21” activities.

the product development and design phase to enhance the environmental efficiency of products, and (2) thoroughly adopted progress management procedures with yearly targets at the manufacturing stage to achieve steady improvements.

For example, to reduce greenhouse gas emissions in group company manufacturing processes, Hitachi has implemented a CO<sub>2</sub> emissions reduction scheme, a super eco-factory certification system, and other schemes, while vigorously pursued the development and provisioning of energy-saving products and solutions. Here we will provide a summary overview of Hitachi's environmental management initiatives.

## HITACHI GROUP ENVIRONMENTAL MANAGEMENT

### Environmental Vision 2015

Hitachi's environmental management initiatives are guided by the Environmental Vision 2015 that commits Hitachi as "a global citizen, to promote innovation throughout the world while developing the potentials of the future generation to pioneer next-generation products and services," and the "sustainability compass" illustrated in Fig. 1 that points the way to achieve this vision. The four cardinal directions of the compass represent different spheres of environmental activity: North stands for next-generation products and services, South represents super eco-factories and offices, East stands for eco-mind and global environmental management, and West represents worldwide environmental partnerships. To achieve these goals by the year 2010, we have developed detailed Environmental Action Plans and set annual targets to be met. The content of these plans is wide-ranging and addresses reduction of global warming, more effective utilization of resources, expansion of our Eco-Product business, proactive efforts to implement environmental communication, and other initiatives.

An assessment tool called "GREEN 21" is used to evaluate progress in implementing the action plans, and to ensure steady progress in improving and raising the level of environmental activities. The GREEN 21 tool grades the progress of 56 items in eight sustainability compass categories to assess how well we are achieving our annual environmental management and environmental impact reduction targets, then plots the results as a radar chart for easy visual cognition. These results also serve as a powerful incentive for stepping up environmental activities, because they clearly reflect the rating of each group company.

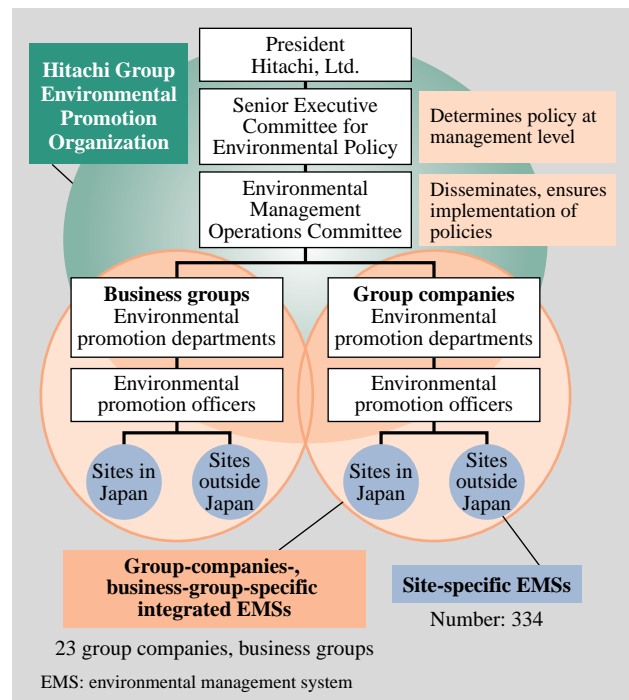


Fig. 2—Hitachi's Environmental Management System. Hitachi implemented an Environmental Management System for all group-affiliated companies.

## Environmental Management System

Fig. 2 shows a schematic of Hitachi's Environmental Management System that has been implemented for all group-affiliated companies. The Senior Executive Committee for Environmental Policy, chaired by the president of Hitachi, Ltd., assesses and sets the entire Group's environmental policies and strategies, which are then disseminated to all the group companies through the Environmental Management Operations Committee. Environmental promotion departments have been set up and staffed by environmental promotion officers in each business group and group company to ensure the policies and activities are fully implemented. In September 2006, the Hitachi Group Environmental Promotion Organization obtained ISO 14001 certification for its PDCA (plan-do-check-action) approach and for its group-wide environmental activities harnessing the combined strength of the entire Hitachi Group. Represented in the organization are Hitachi's Corporate Environmental Policy Division, the six business groups, the Research & Development Group, and environmental promotion officers and departments of 18 Hitachi Group companies. This organization has extensive oversight and authority over the

TABLE 1. Hitachi Group CO<sub>2</sub> Emission Reduction Target of 2010

Table shows CO<sub>2</sub> emission reduction targets Hitachi plans to achieve by the year 2010.

Japan	<ul style="list-style-type: none"> <li>• 7% reduction in CO<sub>2</sub> emissions (base year 1990)</li> <li>• Achieving industry group separate targets (targeting hospitals, offices, etc. that do not have industry group separate targets)</li> <li>• 25% reduction in CO<sub>2</sub> production (base year 1990)</li> </ul>
Outside Japan	<ul style="list-style-type: none"> <li>• 5% reduction in CO<sub>2</sub> production (base year 2003)</li> </ul>

environmental activities of 250 group companies and about 400,000 employees, accounting for 90% of Hitachi’s environmental impact.

### COUNTERING GLOBAL WARMING IN MANUFACTURING PROCESSES

#### Reducing CO<sub>2</sub> Emissions

Table 1 shows CO<sub>2</sub> emission reduction targets Hitachi plans to achieve by the year 2010. In 2007 the entire Hitachi Group companies in Japan invested approximately ¥6.4 billion in energy conservation, which is equivalent to 35,000 kL of crude oil a year, for a reduction in CO<sub>2</sub> emissions of about 100,000 t a year. Converted to emissions from ordinary households, this is equivalent to the CO<sub>2</sub> emissions from 18,200 households. Although achieving our 2010 CO<sub>2</sub> reduction target successfully as shown in Fig. 3, our hard-won reductions have been largely offset by CO<sub>2</sub> emission increases due to mergers and acquisitions, construction of new plants, and so on. In the rest of this section we will consider three policies for achieving our 2010 CO<sub>2</sub> emission reduction target: (1) Deployment of CO<sub>2</sub> emission reduction scheme, (2) Implementation of the super eco-factory and office certification system, and (3) Development energy-conservation diagnosis and policies.

While reducing CO<sub>2</sub> emissions at the manufacturing stage, Hitachi is also taking steps to reduce emissions at the transportation stage. We are collecting CO<sub>2</sub> emissions data relating to transportation (from delivery of products to hauling waste materials), and seeking to achieve a 4% reduction (base year 2006) in real specific energy consumption by the year 2010 by optimizing transportation modes and improving transportation efficiency.

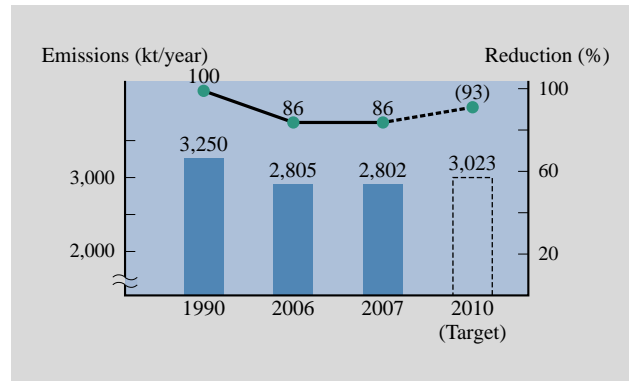


Fig. 3—CO<sub>2</sub> Emission Trends for Hitachi in Japan. In 2007 the entire Hitachi Group companies in Japan invested approximately ¥6.4 billion in energy conservation, which in crude oil equivalents is close to 35,000 kL of oil a year, for a reduction in CO<sub>2</sub> emissions of about 100,000 t a year.

#### CO<sub>2</sub> Emission Reduction Scheme

Hitachi implemented a CO<sub>2</sub> emission reduction scheme in 2003 to help reach the group’s CO<sub>2</sub> emissions reduction target. The scheme defines annual emission targets for Type 1 and Type 2 designated energy management facilities, then assigns grades ranging from A to D based on how well the facilities meet their CO<sub>2</sub> reduction targets. These objective assessments are taken seriously as management benchmarks, and a growing number of group companies are giving greater priority in their budgets to energy-conservation activities.

#### Super Eco-factory & Office Certification System

In 2007 Hitachi introduced a system for certifying plants and offices built according to top-most green practices as “super-eco factories and offices.” By recognizing and rewarding facilities based on industry-leading environmental practices, this initiative will promote energy conservation and reuse, reduce chemical material discharge, and improve recycling of resources. To be certified, facilities must attain six times lower energy consumption than the mandatory level set by the Law concerning the Rational Use of Energy (1% reduction in energy consumption averaged over five years). In 2007, the year the certification program was started, four plants and one office were certified in Japan, and four plants were certified outside Japan. In the interests of our stakeholders, Hitachi also discloses all the activities and achievements of super eco certified facilities in details on the Web<sup>(2)</sup> as illustrated in Fig. 4.

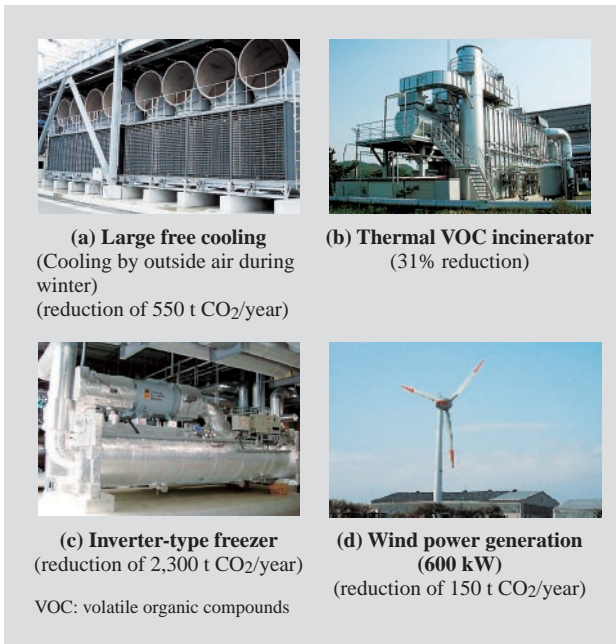


Fig. 4—Super Eco-factory Examples.  
Examples show Hitachi Plasma Display Ltd. [(a) and (c)], Hitachi Maxell, Ltd. (b), and Hitachi Engineering & Services Co., Ltd. (d).

### Development of Energy-conservation Diagnosis and Policies

Hitachi has organized teams of energy conservation experts that provide energy-conservation diagnosis with surveys and suggestions on how to improve energy usage and conserve energy. The goal is to maximize the effectiveness and efficiency of energy-conservation measures by accumulating knowledge of energy-saving measures at various plants and facilities and then appropriately deploying these practices at other facilities where they are needed.

To promote and extend environmental management practices to its affiliates around the world, Hitachi

periodically hosts environmental conferences suited specifically to personnel working in Hitachi’s companies outside Japan. This not only offers a way to disseminate a deeper understanding of Hitachi’s Environmental Action Plans, but also provides a forum for sharing region-specific energy-conservation issues and discussing effective policies and measures by spurring communication among Hitachi employees across the world.

### COUNTERING GLOBAL WARMING WITH PRODUCTS AND SERVICES

#### Expand Eco-Products

In 1999 Hitachi introduced design-for-environment assessment to minimize environmental impacts at each stage of a product’s life cycle, as shown schematically in Fig. 5. Products are evaluated according to eight criteria — mass and volume reduction, long-term usability, reusability, recyclability, easiness of dismantling treatment, etc. — and those scoring at least two (on a five-point scale) on all of the criteria, but having an average score of three or higher, are designated Eco-Products.

#### Improving Environmental Efficiency

In addition to design-for-environment assessment, to use resources effectively Hitachi also introduced “an environmental efficiency index” that measures the environmental impact and resource consumption of products. As one can see in Fig. 6, this product evaluation index uses a product’s value as numerator and environmental impact or resource consumption as denominator. As numerator, we take a product’s value which is calculated by function and lifespan. As denominator, we use two parameters. The first parameter is the amount of the product’s value to the raw materials used in its production and the waste

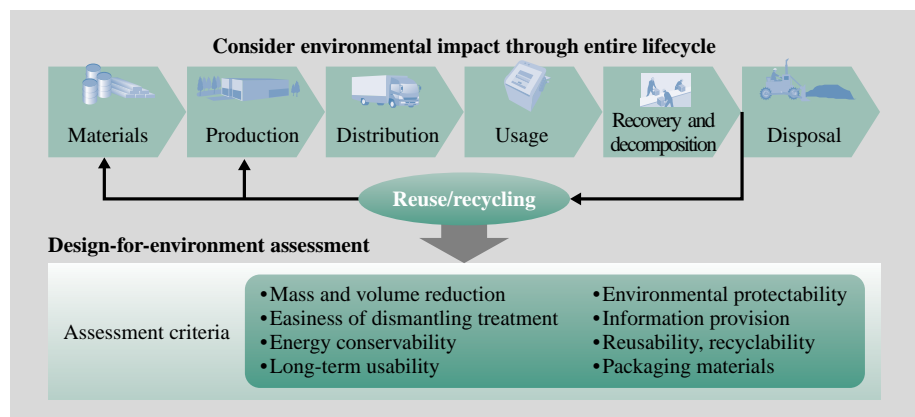


Fig. 5—Design-for-environment Assessment.  
It is an assessment method for evaluating environmental impact of a product throughout all stage of its life from material procurement to disposal.

**Environmental efficiency definition**

- **Efficiency of global warming prevention** = 
$$\frac{\text{Product life span}^{*1} \times \text{product function}}{\text{Amount of greenhouse gas emissions through life cycle of product}}$$
- **Resource efficiency** = 
$$\frac{\text{Product life span} \times \text{product function}}{\Sigma \text{ Each resource value coefficient} \times (\text{Amount of new resources to be used throughout the product's life cycle}^{*2} + \text{Amount of resources disposed of}^{*3})}$$

**Factor definition**

- **Factor of global warming prevention** = 
$$\frac{\text{Efficiency of global warming prevention for product being evaluated}}{\text{Efficiency of global warming prevention for reference product}}$$
- **Resource factor** = 
$$\frac{\text{Resource efficiency for product being evaluated}}{\text{Resource efficiency for reference product}}$$

\*1 Set use time  
 \*2 Amount of resources used – amount of resources reused and recycled  
 \*3 Amount of resources used – amount of resources that are reusable and recyclable

Fig. 6—Definitions of Environmental Efficiency and Factor. Index measures the environmental impact and resource consumption of products.






Industry segment name	No. of products	Examples
Information & Telecommunication Systems	18	 Server
Electronic Devices	8	 Tabletop microscope
Power & Industrial Systems	19	 PWB drilling machine
Digital Media & Consumer Products	19	 Camcorder
High Functional Materials & Components	10	 Anisotropic conductive film

Fig. 7—Examples of Super Eco-Products. Super Eco-Products are shown for their respective industry segments.

remaining when it is disposed (resource efficiency). The second is the quantity of greenhouse gases generated during its lifecycle (efficiency of global warming prevention). We also use a factor to express a product’s environmental efficiency relative to a reference year product.

**Expansion of Super Eco-Products**

Representing the most advanced products in terms of environmental efficiency, Hitachi has designated Eco-Products with an environmental efficiency factor of 10 or more, that are industry leaders, and highly

regarded by outside of Hitachi as “Super Eco-Products.” As of March 2008, Hitachi currently manufactures 74 of these Super Eco-Products (see Fig. 7), and we intend to boost sales of these products to more than 30% of total Eco-Product sales by 2010.

**ACHIEVING EMISSION NEUTRAL STATUS**

Hitachi has set itself the target of achieving emission neutral status (see Fig. 8) by the year 2015, whereby “direct environmental loads” — energy

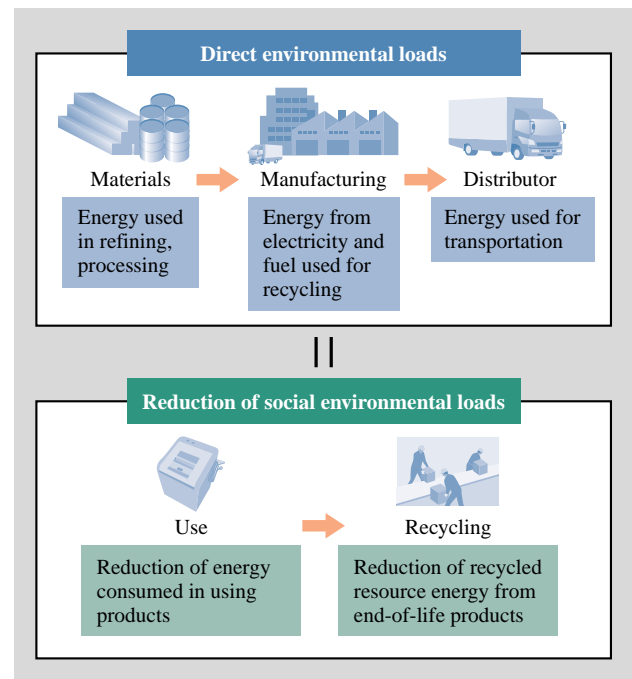


Fig. 8—Achieving Emission Neutral Status. Direct environmental loads are offset by reduced social environmental loads.

consumed in processing materials, manufacturing products, dealing with greenhouse gases from plants, recycling/disposing of wastes, and transportation — will be offset by a suppression in “social environmental loads,” the electricity consumed by products and energy used for recycling end-of-life products, among other items. Hitachi has now taken a comprehensive set of policies designed to reduce global warming by driving down social environmental loads by boosting thermal power generation efficiency, reducing the resources and power needed to produce products, developing systems and software that reduce environmental impact and other measures. At the same time, we are holding down the amount of wastes generated by optimizing the use of materials while steadily reducing greenhouse gases to reduce direct environmental loads.

## CONCLUSIONS

Here we have given a summary overview of Hitachi’s environmental management initiatives. Hitachi is making excellent headway toward its goals

of achieving emission neutral status by the year 2015 and sharply reducing the environmental loads of the group’s manufacturing activities and provisioning of products and services. We have also made remarkable progress in raising environmental awareness among the approximately 400,000 Hitachi Group employees with our environmental e-learning program (a Web-based training system), support for the government’s “Cool Biz” initiative to keep air conditioner temperatures at 28°C during the summer, and other measures. Hitachi will continue to step up its efforts ahead with more ambitious environmental management initiatives, while striving for full disclosure of information and open communication with the Hitachi Group’s stakeholders.

## REFERENCES

- (1) Hitachi Group Corporate Social Responsibility Report, <http://www.hitachi.com/csr/download/index.html>
- (2) Hitachi Group Environmental Activities site, <http://greenweb.hitachi.co.jp/en/index.html>

## ABOUT THE AUTHORS

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