10. Canon Inc.

1. Conpany Profile

Founded in 1937, Canon produces and markets products and solutions for homes, offices and industries, employing over 100,000 people worldwide. In fiscal 2003, the consolidated net sales was 3,198,072 million yen (≒29,889 million dollars) of which about 75% was generated outside Japan, and the consolidated net income was 275,730 million yen (≒U.S. 2,577 million dollars) . With increased focus on profit, Canon has achieved three consecutive years of profit growth, all of which have been all-time records.

Canon Group comprises 6 products operations which handle specific product-development and production related activities. The major product groupings within the 6 operations are Image Communications (Camera products, lenses), Office Imaging Products (Copying machines, image scanners, multifunction machines, facsimile machines), Peripheral Products (Laser beam printers), Inkjet Printer Products (Bubble Jet printers), Chemical Products (Toner cartridges) and Optical Products (Semiconductor production equipment).

2. Environmental Activities

Canon's corporate philosophy is *kyosei*, which means "All people, regardless of race, religion or culture, harmoniously living and working together into the future." Based on this philosophy, the *Canon Environmental Charter* was established in 1993 with the Environmental Assurance Philosophy to pursue maximization of resource efficiency and to contribute to the creation of a society that practices sustainable development in the interest of world prosperity and the happiness of humankind.

The Canon Environmental Charter embodies the basic philosophy and fundamental policies of our environmental assurance activities. All of these activities are based not only on the *kyosei* philosophy but also on the EQCD concept. The charter was revised in 2001 to reflect the introduction of a new plan to maximize resource efficiency, ensuring it is possible for the Group to pursue both environmental and economic goals through technological development and the establishment of social mechanisms.

In 2003, Canon set forth the overriding indicator Factor 2 as the Vision for 2010. Factor 2 sets the numerical goal of more than doubling resource efficiency across the entire life cycle of business activities by 2010 as compared with 2000. Mid-Term Environmental Goals and an Environmental Evaluation System have been created to incorporate the vision into our business activities in planned stages and to support the operation of the environmentally conscious management system.

The Mid-Term Environmental Goals is divided into product-related goals, goals related to operational sites, and common Group goals. For product and operational site goals, the three

major focuses are on: global warming prevention and energy conservation, resource conservation, and elimination of hazardous substances.

Canon's Sustainable Management

▼ Canon Environmental Charter (revised April 2001)

- Corporate Philosophy : *Kyosei* (established in 1988)
  - Achieve corporate growth and development while contributing to the prosperity of the world and the Happiness of Humankind
- Environment Assurance Philosophy
  - Pursue maximization of resource efficiency*, and contribute to the creation of a society that practices sustainable development in the interest of world prosperity and the happiness of humankind
- Fundamental Policies for Environmental Assurance
  - Seek to harmonize environmental and economic interests in all business activities (the EQCD concept: Environment, Quality, Cost, Delivery)
  - Offer green products through innovative improvements in resource efficiency
  - Eliminate anti-social activities that threaten the environment or human health and safety

* Maximization of resource efficiency is to augment the quality of products and services by minimizing the consumption of every resource while recycling it and reusing it.

▼ Environment Management System and Environmental Strategies

- Canon propels Environmentally Conscious Management by positioning its Mid-Term Environmental Goal as the "Plan", its Environmental Assurance Activities as the"Do", its Consolidated Environmental Evaluation System as the "Check", and its Improvement and Enhancement of Environmental Assurance Activities as the "Action" in the PDCA cycle (Figure 10.1).
- In the phase of Environmental Assurance Activities (the "Do"), Canon wrestles with the pursuit of the maximization of resource efficiency by means of three pillars of Product Environmental Strategies such as Energy Saving, Resource Conservation and Harmful Substances Elimination (Figure 10.2), and also by means of three pillars of the Environmental Strategies of each Site such as Global Warming Prevention, Resource Conservation, and Harmful Substances Elimination (Figure 10.3).

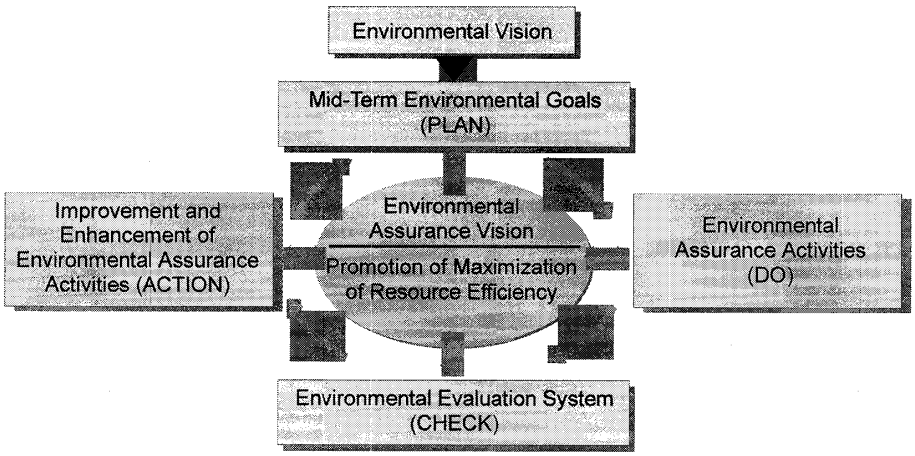

Figure 10.1: Environmental management system of Canon

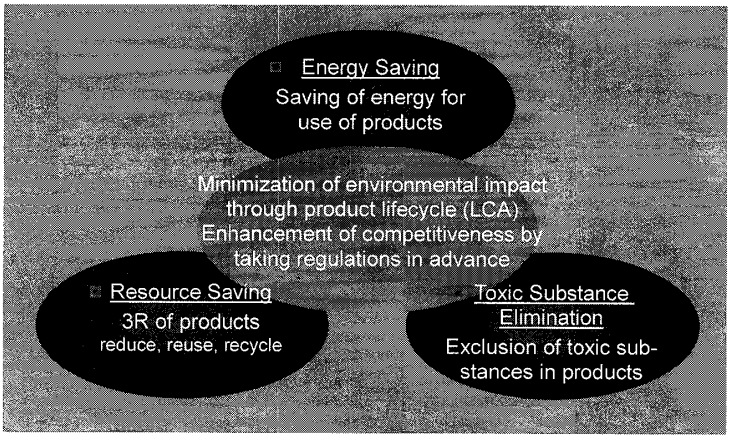

Figure 10.2: Environmental strategy for products

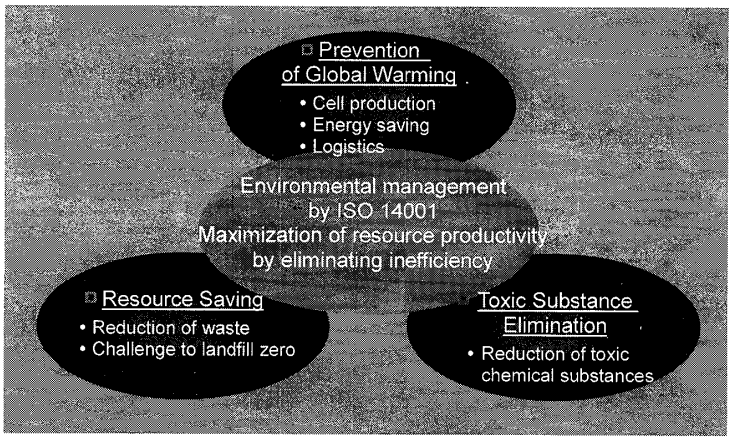

Figure 10.3: Environmental strategy for sites

3. Objective and Premises of Study

▼ Objective

- The objective of the study is to examine the possibility of the practical use of JEPIX by means of participating in JEPIX Forum as part of the study on the Eco-efficiency Indicators for the purpose of the improvement of the environmental efficiency of Canon.

▼ Premises

- The input data used of the study are electricity, gas, petroleum (heavy oil and kerosene) iron, resin, and PRTR substances based on the Canon's *environmental reports* and *sustainability reports* from 2000 to 2002 that are of domestic use.
- The coefficient of global warming is based on the ordinance of the Ministry of Environment.
- Raw Materials:
  - Glass was found as raw material other than resin, iron and aluminum in the environmental reports. However, it was eliminated as being below 5% of the total raw materials based on the cut-off rate of 5%.
- PRTR substances:
  - The analysis includes the impact on the air exhausted by PRTR substances.
  - PRTR substances exhausted below 5% of the total weight were eliminated
  - Xylene, although it is over the cut-off rate of the total weight, was eliminated because it is not evaluated by JEPIX.
  - The domestic data in 2001 and 2002 were estimated by dividing the total exhausted volume on the consolidated basis proportionately with the sales by region.
  - The data in 2000 was directly quoted from the data on page 30 in the *Environmental Report* in 2001

▼ Conceptual Figure of Eco-balance

- This analysis deals with three aspects of eco-balance, i.e. Site-balance including environmental burdens by fuel combustion and by atmospheric emission of PRTR substances, Core-balance including environmental burdens in the production process of fuel and electricity, and Sub-balance including environmental burdens in the production process of raw materials (Figure 10.4).

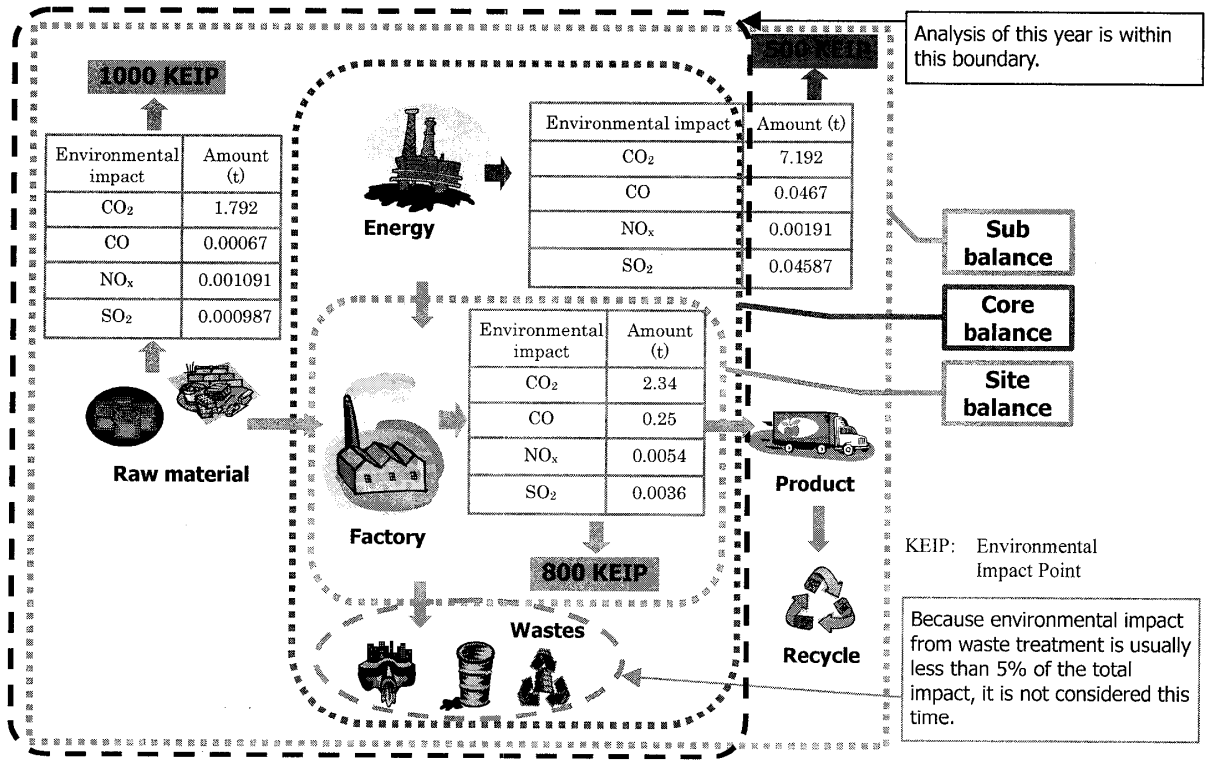

Figure 10.4: Total area of eco-balance

▼ **Background Data (Data Source)** (Figure 10.5)

- The background data used in the study were prioritized in the order of (1) Japan LCA Forum data, (2) NIRE database, and (3) the data of the ordinance of the Ministry of Environment (only for CO_2).
- NIRE database was used for LCI data of each fuel in relation to the inventory data of electricity production (the details are as shown below).
- City gas and propane gas were converted into the amount of heat when calculated in REGIS according to the following physical properties values:
  - City gas (density:0. 84 kg/m^3, calorific power: 11,000 kcal/kg)
  - Propane gas (density: 1.96 kg/m^3, calorific power: 25,100 kcal/kg)

*Data source: Website of LNG Chubu Co., Ltd (http://www.lngc.co.jp/page. 007.html)

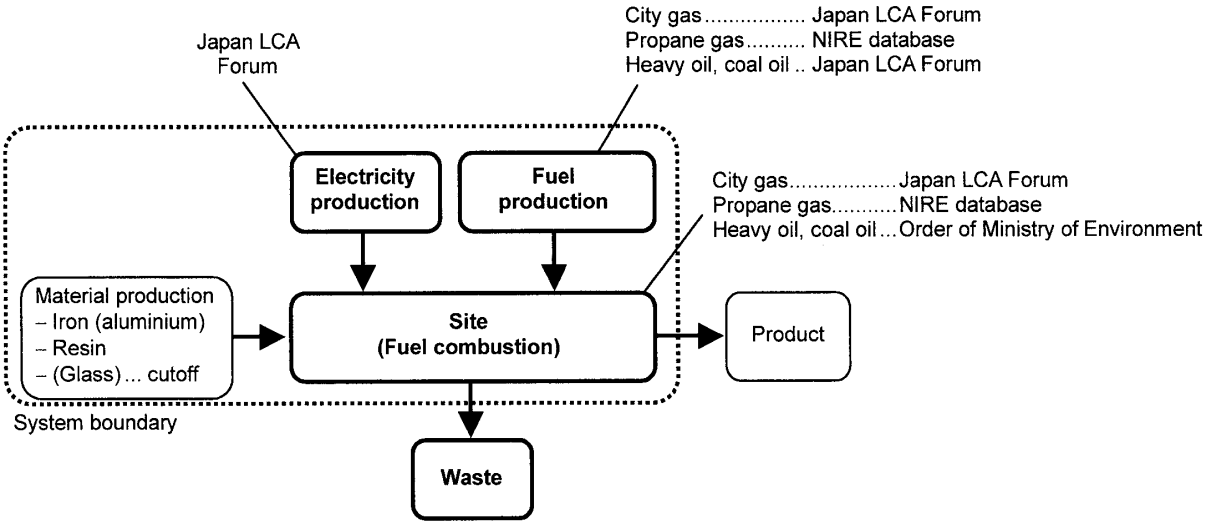

Figure 10.5: Background data and data source

- In order to make the inventory data of electricity production perfect, it is necessary to obtain LCI data for each fuel that are used for electricity production as downstream data. In this study, the data of NIRE database were used for that purpose.
- CO_2 emission amount from each emission source calculated in this study showed a relative error of within 10% as compared with the data on CO_2 emission according to the ordinance of the Ministry of Environment.

4. Result of Analysis

▼ Eco-efficiency (2000～2002 using JEPIX) (Figure 10.6)

- In spite of the rise of the sales revenue, the total point of the environmental burden decreased during the period from the year 2000 to 2002. As a result, Eco-efficiency calculated by the following formula increased year by year during the same period:
  Eco-efficiency = Sales Revenue / JEPIX Point of Environmental Burden
- Eco-efficiency of the year 2002 increased at 17% as compared with the year 2000.

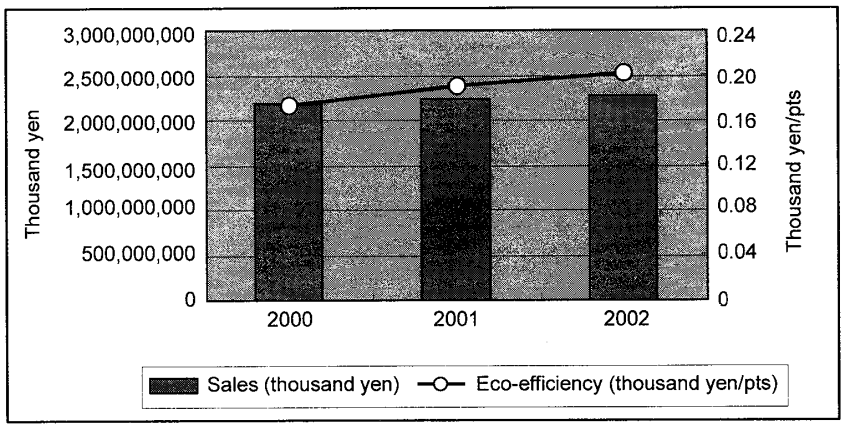

Figure 10.6: Secular change of eco-efficiency

▼ **Total Eco-balance (2000～2002 using JEPIX)** (Figure 10.7)

- The core-balance was the biggest and the site-balance was the smallest in terms of the environmental burden in each year.
- Owing to the effect of the reduction of raw materials volume, the environmental burden of the sub-balance became smaller. As a result, the total environmental burden has decreased year by year, resulting the 11% reduction in 2002 as compared in 2000.
- No significant yearly change can be found in the environmental burden of the core-balance.

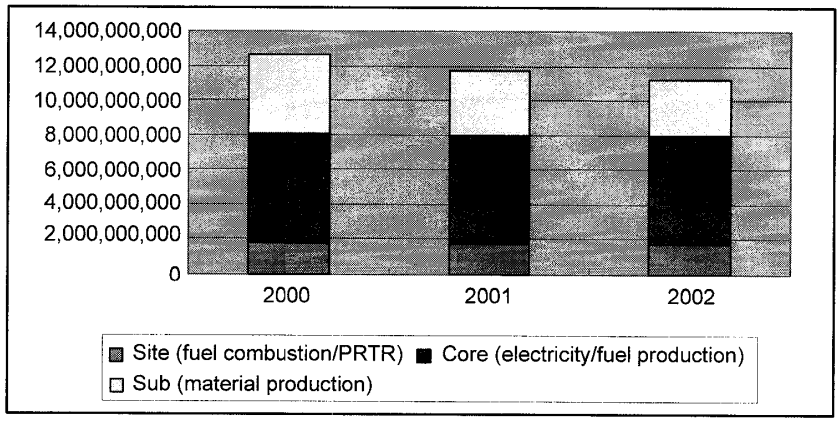

Figure 10.7: Secular change of eco-balance

▼ **Breakdown of Sub-balance (Raw materials)** (Figure 10.8)

- The most reduced items in the breakdown of sub-balance (raw materials) are the production of resin and iron in each year.
- Especially, the reduction of the amount of resin used affects greatly the decrease of the environmental burden of the sub-balance, resulting in 34% decrease in 2002 as compared in 2000 in terms of the sales unit calculated by the following formula;

  Sales unit = Environmental burden of Sub-balance / Sales

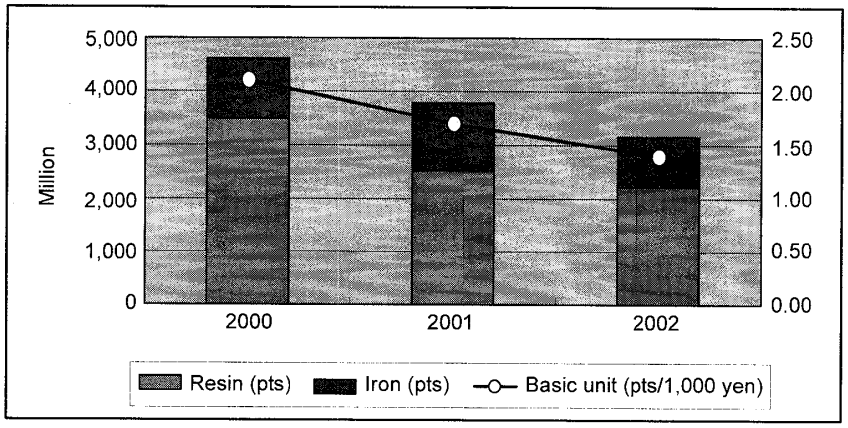

Figure 10.8: Breakdown of sub balances (material)

▼ **Results of Inventory in 2002** (Figure 10.9)

- The following Figure below shows the component ratio of JEPIX points of all the emission substances.
- CO_2 accounts for 76% of the total component.
- The ratio affected by PRTR substances in terms of JEPIX points is below 1%.

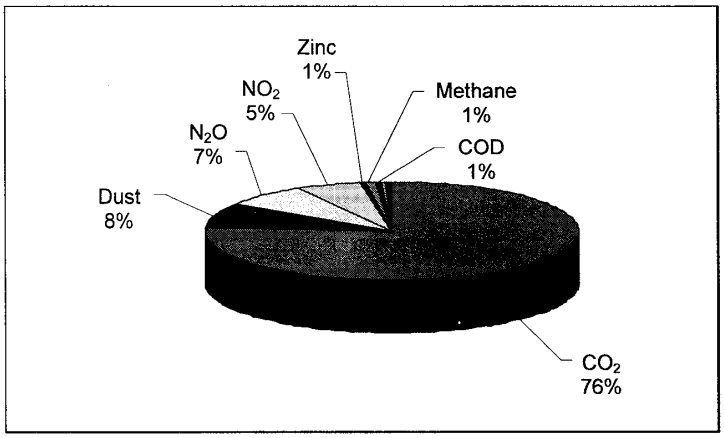

Figure 10.9: Result of impact assessment

▼ **Findings on Amount of CO_2 emission** (Figure 10.10)

- The amount of CO_2 is discharged most at the production process of electricity.
- The emission of CO_2 derived from energy consumption has been constant during the periods. However, the total amount of CO_2 emission was decreased at 12% in 2002 as compared in 2000 because of the reduction of CO_2 emission derived from raw materials.

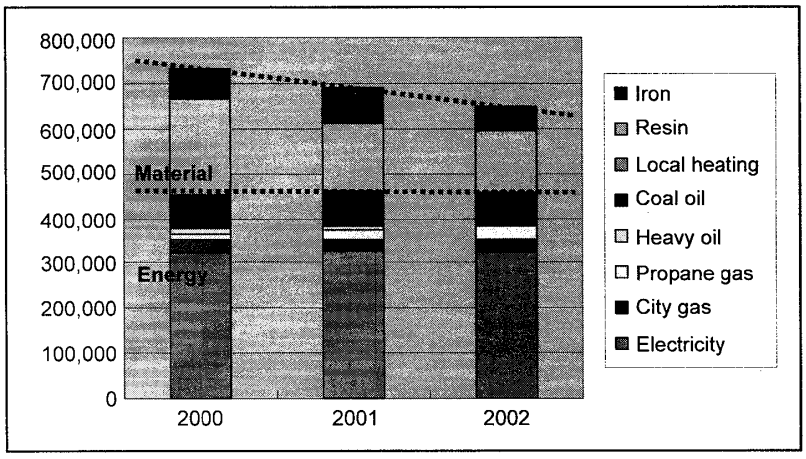

Figure 10.10: CO_2 emission (by emission source)

5. Results of Analysis

- Eco-efficiency of the year 2002 increased at 17% as compared with the year 2000.
  - In spite of the rise of the sales, the total point of the environmental burden decreased during the period from the year 2000 to 2002.

- The core-balance (the production of electricity and fuel) was the biggest and the site-balance (fuel consumption and PRTR substances) was the smallest in terms of the environmental burden in each year.
- The environmental burden of the sub-balance in 2002 deceased at 34% as compared in 2000 due to the reduction of the amount of resin used.
- The amount of CO_2 emission was decreased at 12% in 2002 as compared in 2000.
- CO_2 accounts for 76% of the total component. ratio of JEPIX points.

6. Problems and Possibility of JEPIX

- Problems of JEPIX
  - Development of Eco-factors applicable to global standards is needed.
  - The relationship between laws & regulations and the scientific rationality of JEPIX is obscure to users.
  - The process and justification of the calculation of Eco-factors on each substance is unclear to users.
  - Results at micro levels are not always consistent when aggregated to macro levels.
- Possibility of JEPIX
  - There will be a possibility to utilize JEPIX as objective indicators in quantifying environmental performances of firms.