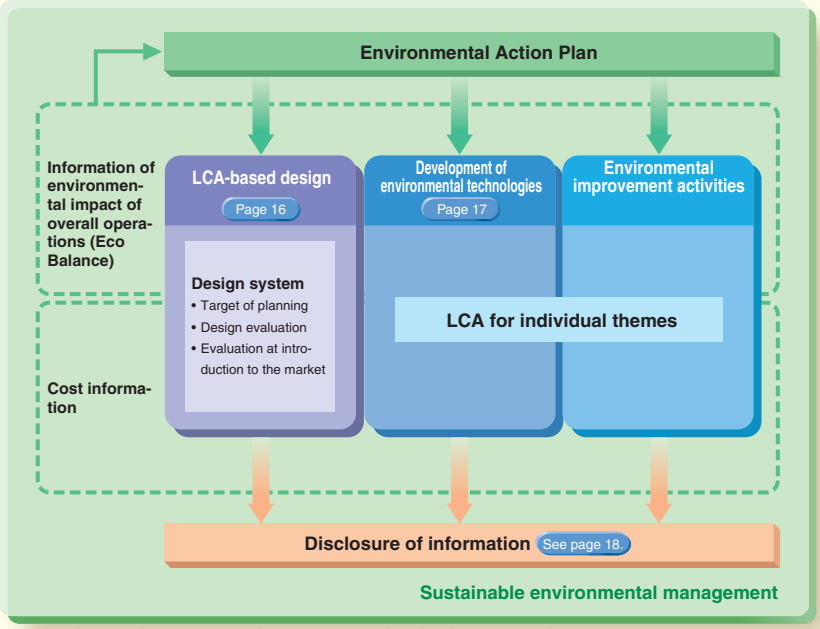
Promoting the development of environmentally conscious products by setting target values based on environmental impacts caused by overall business activities

● Concept of Product Development

The Ricoh Group uses the Plan-Do-Check-Action (PDCA) cycle in its product development to keep the integrated environmental impact[1] of all products during their life cycles below the limit at which the global environment is sustainable. First, the Eco Balance[2] data on environmental impacts caused by overall business activities are identified and utilized for establishing targets for products covered by the action plans (Plan). The design division then sets priority themes for respective models and draws up LCA-based designs[3] to achieve the targets (Do). Next, the Eco Balance data are utilized again to evaluate the achievements (Check), and the results are reflected in the next development targets (Action). The Group is also committed to developing environmental technologies that reduce environmental impact caused by its products and disclosing relevant information.

1. See page 9. 2. See page 51. 3. See page 16.

Position of LCA in Sustainable Environmental Management



● History of Improving the Environmental Performance of Products

In the 1980s, the Ricoh Group began to develop products to meet individual standards, such as noise, the chemicals contained in the products, and energy conservation. In 1990, various committees were established to reduce environmental impact through an integrated approach. These committees began studies to improve the environmental performance of all products throughout their life cycles. In 1994, the LCA study group was established. In 1998, the Ricoh Group began activities to identify the environmental impact of its overall operations using Eco Balance, and to reduce the environmental impact of processes with larger environmental impacts on a priority basis. In 2002, the Ricoh Group established an environmental action plan based on the evaluation of integrated environmental impacts. In 2003, the Group began to further improve various tools to promote LCA-based design. In 2004, Ricoh marketed products in which environmentally-sensitive substances were completely elimiated[4] in line with the company's own standards.

4. See page 28.

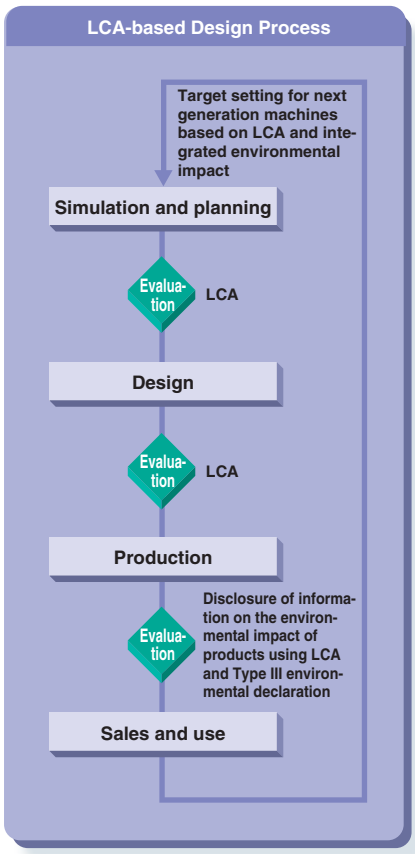
	Activities
1980s–	• The Ricoh Group begins to establish individual criteria, such as those for noise, chemicals contained in its products, and energy conservation.
1990	• Product Design Committee, Environmental Technology Committee and Eco Mark Committee established.
1994	• The concept of the "Comet Circle" completed. • LCA Study Group established. • LCA activities under individual themes to reduce the environmental impact of each product and overall operations promoted.
1998	• The concept of Eco Balance introduced. • Environmental Action Plan based on the Eco Balance prepared. • The Ricoh Group starts to build the Environmental Impact Information System.* *See page 49.
2000	• The Environmental Impact Information System completed. • The Ricoh Group begins to disclose information on environmental impact of products that was compiled based on the LCA (Type III Environmental Declaration). • The Ricoh Group begins to integrate data on environmental impacts caused by each product and by overall operations.
2002	• Environmental Action Plan prepared based on integrated environmental impacts.
2003	• The Ricoh Group clarifies the concept of LCA-based design, and begins to improve the system and tools to promote the concept.
2004	• Digital camera with an LCA-based design launched

Life Cycle Assessment (LCA)

LCA means quantitatively identifying which and how much environmental impact exists in the life cycle of a product, from the gathering of resources for the production of raw materials to manufacturing, transportation, marketing, use, maintenance, collection, recycling, and disposal. LCA may also be applied to part of the above cycle.

Promotion of LCA-based Design

LCA-based design is not a simple process of designing from the viewpoint of LCA; it is a process where targets are set to reduce the environmental impact of products throughout their life cycles. Thus, LCA-based design is a process where environmental impacts are reduced based on PDCA. To effectively reduce the environmental impacts of all its products over generations, the Ricoh Group places an importance on the "integrated environmental impact" of all products throughout their life cycles, and has established numerical targets for reduction. Thus, the Ricoh Group is making an effort to establish an LCA-based design process based on PDCA. In addition, the Group is developing a CAD system and assessment system that facilitate the design process.



TOPIX

LCA-based design for digital cameras (Caplio R1)


Caplio R1

Through LCA-based design reduced 12% of the cameras' environmental impact throughout their life cycles

Environmental impact reduction and performance improvement

The Caplio R1 is a 25mm-thick compact digital camera equipped with a 4.8× wide-zoom lens and was launched in September 2004. In addition to its improved functions, the camera's environmental impact is significantly lower than that of its predecessors.

Promotion of LCA-based design for effective environmental impact reduction

The Caplio R1 was developed with the aim of reducing 10% of its environmental impact throughout its life cycle, from material production, assembly, logistics, and usage to disposal. We focused on reducing the amount of raw materials used and power consumed. As a result, raw-material consumption was reduced 17% and power about 31.5% of those of its predecessors. Throughout their life cycles, we achieved a 12% reduction, exceeding our original target.

● A System for Efficient Promotion of LCA-based Design

CAD System for LCA-based Design

The Ricoh Group developed and operates a CAD system to avoid the erroneous designations of materials, the environmental safety of which has not been verified, or those materials that do not conform to the recycling plan, in a drawing prepared by a person in charge of design. The system is interlocked with a database that contains not only information on costs and quality of materials but also information on environmental conservation, such as the use of environmentally-sensitive substances that are prohibited by the Ricoh Group* and targeted for total elimination as well as the results of evaluations on recyclability. The Group also maintains an extensive database to share information on the total elimination of environmentally-sensitive substances and exchange opinions with those in charge of design, procurement, or any relevant divisions.

*See page 28.

Assessment System for LCA-based Design

Ricoh is developing an operational system, based on data collected by the sustainable environmental management information system, to manufacture products that are environmentally conscious throughout their life cycles. This system is utilized in environmental impact assessments by unit and by part as well as for preparing EcoLeaf Type III environmental labels to disclose LCA information. In fiscal 2004, more information on the environmental impact by material and by part, environmental impact caused by chemical substances, and environmental impact due to transportation became available. Consequently, a simulation of how a change in the material used for a part affects the environmental impact throughout the product's life cycle, for example, became possible at the design stage.

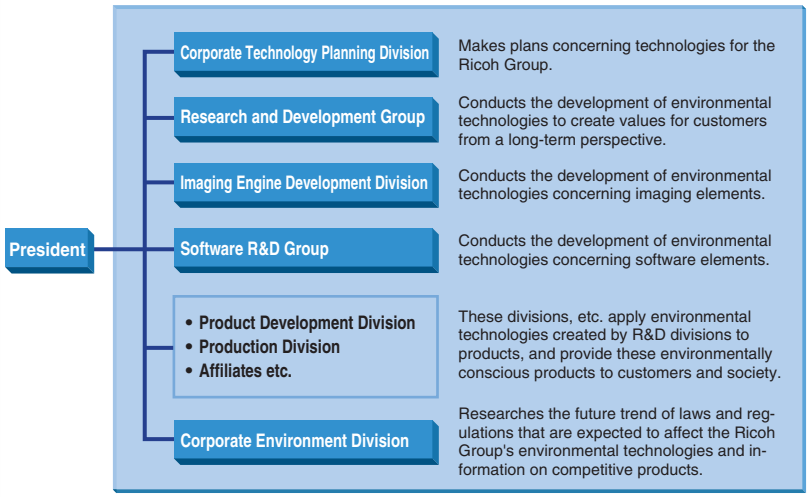
Assessment of Recyclable Design

More efficient reuse and recycling can be realized by simplifying the disassembly and sorting of products collected after use and choosing materials that contain less chemical substances and are easily recyclable. In 1993, Ricoh announced its "policy on recyclable design" aimed at significantly reducing the time and cost of recycling (e.g., fewer screws used in machines and standardizing plastic materials). Ricoh also applied "recyclable design" and a "product assessment system" to its entire line of copiers, facsimiles, laser printers, and multifunctional copiers. Following the improvements made at some stages, in fiscal 2003, Ricoh implemented level 6 of its recyclable design policy.

Promotion of Development of Environmental Technologies

The development of environmental technologies is one of the most important efforts to realize sustainable environmental management. It is the basis for providing customers with "products that unobtrusively contribute to a reduction in environmental impact while in use" and for simultaneously realizing both a reduction in environmental impact and the creation of economic value. The Ricoh Group has established medium- and long-term plans for the four fields, namely, "energy conservation," "resource conservation and recycling," "pollution prevention (environmental comfort)," and "reduction in paper use in printing/copying." Not only the R&D Division but also all business divisions and affiliates are engaged in developing environmental technologies and products. In fiscal 2004, in an attempt to further drive these efforts, the Ricoh Group established its Environmental Technology Committee to share technologies among Group companies and launch new technological applications.

Structure to Develop Environmental Technologies

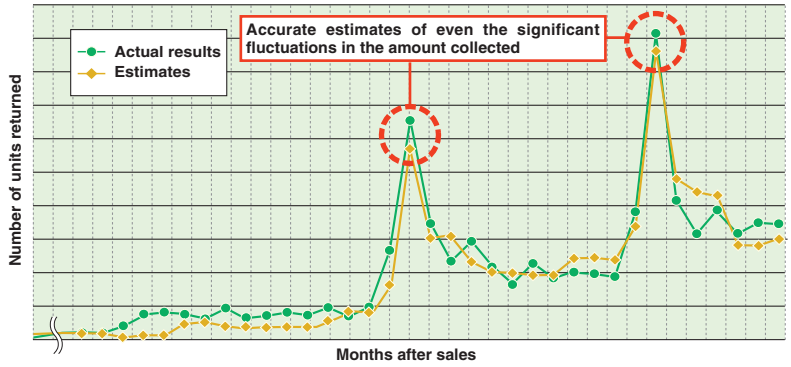


(The Ricoh Group's) Environmental Technology Committee

Estimating the Amount of Used Products Collected

In September 2004, Ricoh developed a new technology that estimates the amount of used products collected from the market. Estimates are made by sampling useful data, such as the number of employees and the number of copies produced, from a customer database. The analysis and storage of distribution data per item leads to significantly accurate estimates of the amount of used products collected. The accuracy of the estimates can be improved by correcting errors and reflecting collection results in subsequent estimates.
This technology can be used to prepare appropriate plans to manufacture and market recycled machines based on detailed estimates of the number of copies produced per model in a given region during a given length of time (monthly, semiannually, annually). In April 2005, an estimate system to be used in the manufacturing and marketing of recycled machines was established. This system is expected to bring about a range of benefits such as reducing logistics problems through streamlined collection and recovery processes.

Data on the estimated amount of used products collected (conceptual)



Studying Fuel Cells that Do not Use Fossil Fuel

In the area of new technologies, we promote the development of new forms of energy, such as fuel cells. We mounted a hybrid power generation system, which consists of direct methanol fuel cells and secondary cells, on a Ricoh GelSprinter (Gel Jet printer) and exhibited it at Eco Products 2004. Working with Tohoku University and Nagaoka University of Technology, Ricoh is also carrying out research and development on ethanol fuel cells that use biomass instead of fossil fuel.

Development of Color Rewritable Media

Ricoh, using a photochromic compound, has developed a new medium to control color development with light. When light is applied to the photochromic compound, its state changes and the wavelength of the absorbed light changes. That is, color development can be controlled by changing the light being applied. This technology may lead to the development of media such as papers and films on which color images can be rewritten several times. Rewritable media may reduce paper consumption by a significant margin.

Disclosure of Environmental Information of Products

The main purpose of disclosing environmental information of products is to inform customers of the excellent environmental performance of Ricoh's products. In addition, it is also important to inform society of Ricoh's environmental conservation activities and their results, and disclose environmental information in a positive manner. For this purpose, Ricoh is firmly committed to publicizing the results of LCA studies, technology development, and evaluation methods at academic societies and conferences. Furthermore, Ricoh is contributing to the formation of various environmental labeling in the world, and is making an effort to acquire various certifications.

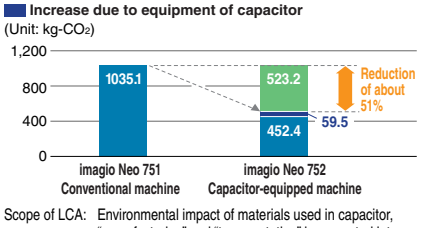
● Publication of Information at Academic Societies and Conferences

LCA of Capacitor-equipped Digital Multifunctional Copiers

Launched in fiscal 2003, the imagio Neo 752 series, high-speed multifunctional digital copiers, are equipped with Hybrid QSU, which is an integration of Ricoh's quick start-up (QSU) technology* and a capacitor, an electrical storage device. As a result, the time it takes for the machine to recover from energy-saving mode was reduced from 300 seconds to only 30 seconds. This may further encourage customers to use the energy-saving mode, and a significant energy conservation effect can be expected from the customers' side. On the other hand, the installation of a capacitor as a new device can mean additional consumption of energy and resources. In an LCA comparison between the energy/resource consumption of the imagio Neo 752 and that of an earlier model (the imagio Neo 751), however, it was discovered that the newer machine produces 523.2kg less CO_2 emissions over five years because the reduced environmental impact of its improved energy-saving features more than compensate for the environmental impact of its capacitor.

*See Page 20.

LCA Comparison of Capacitor-equipped Machine and Conventional Machine (CO_2 emissions)



Scope of LCA: Environmental impact of materials used in capacitor, "manufacturing" and "transportation" is converted into CO_2 emissions. The life of a copier is defined as five years.

● Disclosure of Information using Environmental Labels

Type I Environmental Labels

Type I environmental labels have been established in countries and regions pursuant to ISO 14024 standards. These labels, which are placed on products and shown in brochures, help customers decide which products to buy. Ricoh's criteria for product design used to promote global green marketing are actually more severe than those set by the international Type I environmental label. Moreover, Ricoh actively contributes to establishing Type I environmental labeling criteria in many countries. In fiscal 2004, Ricoh acquired Type I labels from New Zealand and Taiwan.

Type II Environmental Labels

Type II environmental labels are given to products that satisfy standards independently set by each company. The Ricoh Group has defined the Recycle Label, and has set its own standards for recyclable designs, reuse rate of parts, and environmental safety.

Recycle

* For details, refer to the following Web site.
http://www.ricoh.com/environment/label/type2/index.html

Type III Environmental Declaration

As green purchasing is increasingly popular at present, the timely and global disclosure of information is increasingly important, not only for the selection of products by customers but also for sustainable environmental management by the Ricoh Group. The Ricoh Group, following the Type III Environmental Declaration, continuously endeavors to quantify the environmental impact of products using LCA and disclose this information. In addition, the Ricoh Group is making efforts to promote the Type III Environmental Declaration. In fiscal 2004, the Ricoh Group acquired certification for its digital cameras and had its certification for its copiers and laser printers renewed by the EcoLeaf Type III environmental labeling program.

* For details, refer to the following Web site.
http://www.ricoh.com/environment/label/type3/index.html

International Environmental Labels for which the Ricoh Group Qualifies

* Type I Environmental Labels

http://www.ricoh.com/environment/label/type1/index.html

● Eco Mark*/Japan

An example of the Eco Mark on an imagio Neo 753 series model (certification no. 03117032)

● Green Label*/Thailand

● International Energy Star Mark/Japan, the United States, Europe, etc.

● Environmentally Friendly Label*/Hungary

● Energy Efficiency Labeling Scheme (EELS)/Hong Kong

● Blue Angel Mark* (BAM)/Germany

● Environmental Choice Program (ECP) Mark*/Canada

● Green Mark*/Taiwan

● Environmental Choice*/New Zealand