Energy Conservation (Products)

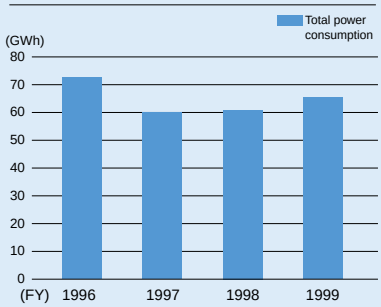
◎Concept of Energy Conservation

Unlike household appliances or automobiles, most office equipment, such as copiers, facsimiles, and printers, are on 24 hours a day, either in standby mode or in operation. Therefore, the most important considerations in office equipment are the capability of conserving power while in standby, starting up quickly from standby, and using less power while in operation. We also focus on improving duplex copying because efficient paper use is also considered as energy conservation.

Goals and Progress

- Reduce the energy consumption per product 30%, compared with that of fiscal 1996, by the end of fiscal 2001.
- ▶ In fiscal 1999, energy consumption for black-and-white copiers was 92.5%* that of fiscal 1996.
  * See notes to the Annual Power Consumption graph below for calculations.
- ▶ In fiscal 1999, energy consumption for facsimiles was 59.6%* that of fiscal 1996.
  * See notes to the Changes in Energy Consumption of facsimiles graph below for calculations.
- Increase the speed of duplex copying and the number of types of recyclable paper that can be used in copiers to promote the efficient use of paper and thus reduce CO_2 emissions during paper manufacturing.
- ▶ The duplex* copying/printing function of copiers and laser printers was improved through advanced paper feed technology. Some series of copiers marketed in fiscal 1999 were able to sustain 100% duplex copying productivity while continuously printing.
  * Duplex copying productivity (%) = (Time spent on simplex → duplex copying)/(Time spent for simplex → simplex copying) 100
- ▶ Paper weighing 64g/m^2 can be used in all copiers, facsimiles, and printers marketed in fiscal 1999. Recycled paper containing 70% or more recovered paper can be used in all copiers, facsimiles, and printers marketed in fiscal 1999.

Annual Power Consumption of Hybrid Machines, Copiers, Facsimiles, Printers, and Color Hybrid Machines Sold



◎Power consumption in fiscal 1999 increased from that of fiscal 1998 due to a significant increase in the number of color hybrid machines sold.

◎The figures above were calculated according to data on the number of units sold and the amount of power consumed by category in an attempt to improve data accuracy. The figures in the 1999 issue of the Ricoh Group Environmental Report were calculated according to power consumption, the total number of units marketed in each given year, and categorized by copying speed and are therefore different from their corresponding figures given above.

◎The calculation of power consumption is as follows:

Copiers, hybrid machines, and color hybrid machines:

Annual energy consumption = Energy consumption efficiency [Wh/h]* × the number of units sold, assuming the units are in operation eight hours a day, 240 days a year

Facsimiles:

Annual energy consumption = Energy consumption in standby mode [Wh/h] × the number of units sold, assuming the units are in operation 24 hours a day, 365 days a year.

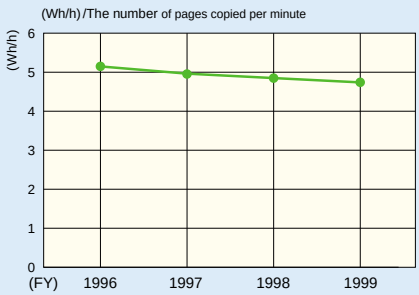
Printers:

Annual energy consumption = Energy consumption in standby mode [Wh/h] × the number of units sold, assuming the units are in operation eight hours a day, 240 days a year.

The sum of these three figures is designated as total power consumption.

*Energy consumption efficiency was measured in accordance with the Ministry of International Trade and Industry's Law Concerning the Rational Use of Energy.

Changes in Energy Consumption of Copiers



◎Negligible reductions in power consumption were the result of a transition in the market from analog machines to (digital) hybrid machines that have higher energy consumption efficiecy. We are planning to achieve our goal with the introduction of energy conservation technologies in the future.

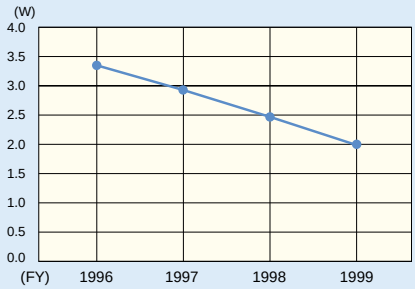
◎Energy conservation values for copiers are calculated as follows:

Σ (Energy consumption efficiency [Wh/h])[1]/ (copying speed[2]) × the number of units marketed)/Σ the number of units marketed

1. Energy consumption efficiency was measured in accordance with the Ministry of International Trade and Industry's Law Concerning the Rational Use of Energy.
2. Copying speed = the number of pages copied per minute

◎In the 1999 issue of the *Ricoh Group Environmental Report*, data on power consumption by product group was based on Σ (Energy consumption efficiency [Wh/h]) × the number of units marketed)/Σ the number of units marketed. However, this calculation does not account for copying speed and is therefore inexpedient since the energy conservation capabilities of copiers with different operating speeds cannot be evaluated. The 2000 issue adds copying speed into the equation, enabling the energy conservation capabilities of copiers with different operating speeds to be evaluated based on the amount of energy consumed per page.

Changes in Energy Consumption of Facsimiles



◎The energy conservation capabilities of facsimiles are stable due to the adoption of technology[1] developed for the RIFAX BL110.

◎Energy conservation values for facsimiles are calculated as follows:

Σ (Energy Star energy consumption in standby mode[2] [W])/(printing speed[3]) × the number of units marketed/Σ the number of units marketed

1. See page 48.
2. Energy Star energy consumption in standby mode=energy consumption in standby mode pursuant to the standards of the International Energy Star Program
3. Printing speed = the number of pages printed per minute

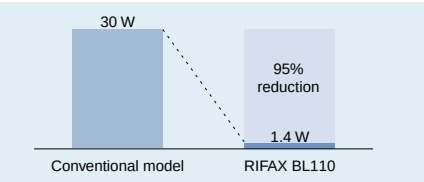
Standby Mode Energy Conservation Technologies for Facsimiles

In general, all ordinary facsimiles have to be in standby mode to receive transmissions. In 1996, Ricoh developed a CPU dedicated to energy conservation and incorporated it into a hybrid facsimile the company marketed as the RIFAX BL110. This machine achieved an approximate 1.4 W[1] power consumption, a 95% reduction from the 30 W consumption of Ricoh's conventional machines. As of 1999, there are more than 550,000 facsimiles operating with this technology all around the world. The total amount of energy thus saved[2] is equivalent to that consumed by 200,000 households in Tokyo. Ricoh will be applying this technology to its facsimiles extensively.

1. In standby mode for energy conservation
2. A five-year period of use is assumed in the calculation.

RIFAX BL110

Comparison of Power Consumption while in Standby Mode



Energy Conservation Technologies for Machines in Operation

The development of energy conservation technologies for copiers and printers can be rephrased as the history of improvements in the rate of thermal efficiency. A considerable amount of power is used when copiers and printers transfer toner from the thermal drum onto the paper and permanently affix it with heat. Ricoh is not only developing toner transfer technologies but also improving energy efficiency by installing appropriate wattage heaters in its machines.

Advanced Technologies for Energy Conservation

Ricoh has developed a small ISDN G4 unit that realizes energy conservation in high-speed G4 facsimiles. G4 facsimiles are superior to conventional G3 machines in terms of transmission speed and image definition. The application of the G4, however, was restricted to high-end business-use due to the need of installing an ISDN line. G4 facsimiles with the newly developed ISDN G4 unit consume 80% less power in standby mode than those without. Moreover, fewer key parts in the G4 translates into a downsizing of the machine and a cost reduction in its manufacture. Consequently, the RIFAX SL3300, a G4 facsimile, achieves a low 2.2 W power consumption in standby mode even with the G4 unit. The worldwide popularity of the Internet has increased the number of ISDN line subscriptions and installations. Ricoh succeeded in making this high-end technology available to more people while decreasing environmental impact.

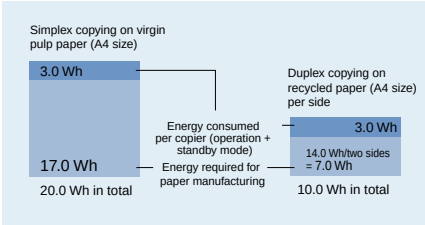
RIFAX SL3300 equipped with the newly developed environmental conservation-oriented ISDN G4 unit

Improved Duplex Copying, Less Global Warming

Photocopying generates CO_2, and in Japan approximately 776,000 tons[1] of copier paper are used every year. This is equivalent to roughly 2,328,000 tons of CO_2[2]. These figures cannot be ignored in view of global warming. If virgin pulp paper is used to make copies, about 20 Wh[3] will be consumed for each page. This includes the energy to manufacture the paper. On the other hand, 100%-recycled paper reduces the CO_2 generated during production, and duplex copying further reduces environmental impact by about half. Thanks to improved technologies, including Ricoh's paper feed method, the imagio MF5570 has achieved high-speed duplex copying of 55 pages per minute[4], which is the same speed for simplex copying. Machine operation is made easy as well in order to facilitate use by as many people as possible. Ricoh puts considerable efforts into marketing recycled paper as part of its contributions toward reducing energy used in paper manufacturing.

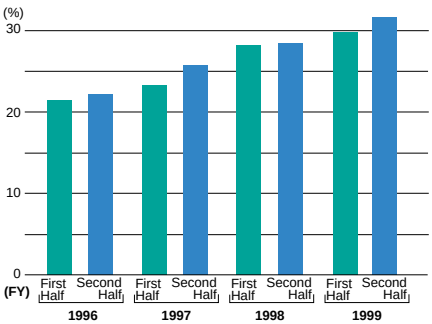
1. Source: *Paper and Pulp Statistical Table*, Ministry of International Trade and Industry.
2. Source: Ricoh's LCA examples announced at the 1997 meeting of the Electrophotography Society of Japan. (See page 20.)
3. Specified machines under certain conditions were used to calculate the figure; numerical values may differ according to machine type or conditions.
4. A4 size, continuous copying mode

Comparison between Simplex and Duplex Copying in Terms of Energy Consumption



imagio MF5570

Recycled Paper Sales



Energy Conservation (Business Sites)

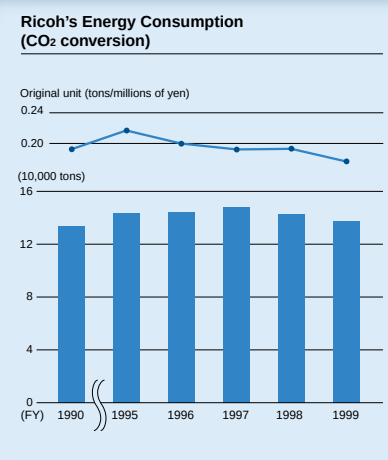
◎Concept of Energy Conservation at Business Sites

The Ricoh Group is developing energy conservation activities, based on its Eco Balance* concept, that will take efficiency and economic benefits into consideration. Activities include the introduction of cogeneration systems at business sites that tend to have larger environmental impact.

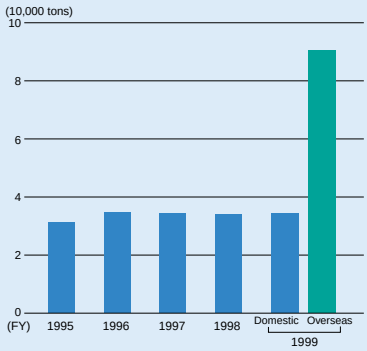
*See pages 11 and 12.

Goals and Progress

- Ricoh is to reduce CO_2 emissions at least 15% by the end of fiscal 2001 on a per sales basis, compared with those of fiscal 1990.
  (Domestic and overseas production sites other than Ricoh's have set numeric goals of 15% or more each.)
- ▶ Ricoh reduced CO_2 emissions 10.3% in fiscal 1999, compared with those of fiscal 1990. Six domestic production subsidiaries out of seven reduced CO_2 emissions 24.5–66.7%.



Ricoh's Energy Consumption (CO_2 conversion)



Energy Consumption at Production Sites Other than Ricoh's (CO_2 conversion)

Cogeneration Systems

Ricoh Numazu began using a cogeneration system in November 1999. Accordingly, half the plant's power supply, which was once provided solely by power companies, is now complemented by an in-house generation system using city gas. Furthermore, waste heat produced by the generator is effectively used to cut total annual cost and CO_2 emissions 3,000 tons. The Central Research Center has also adopted a cogeneration system.

Innovative Manufacturing Line Significantly Reduces Power Consumption

The unusual design of Ricoh Unitechno's manufacturing line helps the plant conserve energy. Conventional manufacturing lines consist of multiple conveyor belts driven by a large motor, and regardless of the length, there would be only one line. Ricoh Unitechno's new manufacturing line consists of carts chained to one another in a single line. The length of the "cart line" can be adjusted by adding or subtracting any number of carts. This new system only needs a single 400 W motor to run while conventional lines need one that is in the 5–6 kW range. As a result of this new design, 45.8 kg of CO_2 emissions can be cut per day, to 2.2 kg per day, or approximately 95% less than those of conventional lines.

Examples of Energy Conservation Activities at Business Sites

Because the Ricoh Group regards energy as an important resource, the Group's business sites plan beneficial energy conservation activities, aiming at producing the maximum effect using the minimum amount of energy. We also believe that sharing the know-how the business sites have gained will improve the energy conservation efforts of the Group as a whole.

Elimination of Climatic Factors

To promote efficient energy conservation at business sites, it is necessary to eliminate the influential factors of an area's climate. Ricoh Optical Industries, which is located in Iwate Prefecture—an area where the temperature can drop to -7°C in winter—attempts to eliminate the influence of the area's climate by using double windows, resin window frames, or adiabatic film on windows. Most plants in the Ricoh Group apply adiabatic paint to their roofs so that the building can be cooled more efficiently and, in the process, save the energy that would have been used for air-conditioning in the summer.

Double windows with a resin window frame

Windows covered with adiabatic film

Roof painted with adiabatic paint

Partial Air-Conditioning by Gas Heat Pump

Ricoh Optical Industries uses a gas heat pump air-conditioning system to lower CO_2 emissions. The system provides partial air-conditioning during overtime hours, cutting CO_2 emissions and energy costs roughly by half, compared with air-conditioning that uses electricity.

Reflective Sheets Used with Fluorescent Lighting

Reflective sheets with aluminum evaporating film were attached to fluorescent lamps, making them approximately twice as bright as before. As a result, only half the number of fluorescent lamps is now needed.

Solar- and Wind-Powered Generators for Parking Lot Lighting

Ricoh Atsugi replaced its old parking lot lighting facility with solar- and wind-powered generators. There were no significant cost involved in the installation since no wiring was required. The new system saves ¥480,000 in electricity bills per year. Also, 11.4 tons in CO_2 emissions were cut.

Improve Air-Conditioning Efficiency by Lowering the Ceiling

As part of its plant renovations, Ricoh Optical Industries lowered the ceiling of the building to improve the efficiency of its air-conditioning. This also resulted in the need for fewer fluorescent lamps.

Energy Conservation of Air Compressors

Most plants belonging to the Ricoh Group use air compressors to operate production line equipment. Ricoh Fukui connects ducts to its air compressors to channel in fresh air, which is cooler than the air inside the plant, to reduce power consumption.

Switching from Kerosene to City Gas to Heat Boiler

Ricoh Ikeda switched from using kerosene to city gas as its boiler fuel in September 1999, taking the surrounding residential area into consideration. The switch is expected to reduce CO_2 emissions 1,000 tons annually.

Energy Conservation in Clean Rooms

Ricoh Atsugi and Ricoh Optical Industries have several clean rooms that they inspect in a variety of ways and that focus on energy conservation. The inspections cover the relationship between room temperature and condensation as well as how clean the rooms at start-up. The two plants promote energy conservation by setting the level of the clean rooms in accordance with the requested quality of products.