Development of User-Friendly and Energy-Saving Technologies

● Concept

Products that are not easy to use will not be chosen by consumers, even if their energy-saving performance is good. Such products can neither contribute to energy conservation nor help prevent global warming. Ricoh constantly strives to improve its user-friendly and energy-saving technology, QSU[1], and introduce it into various products. Also, the company is highly committed to reducing environmental impact caused by paper consumption, which is the largest cause of environmental impact[2] related to Ricoh's business activities. Ricoh helps decrease environmental impacts caused by consumers' paper consumption by offering a duplex copying function, promoting the use of electronic paper, and aggressively marketing recycled paper[3].

1. Energy-saving technology developed originally by Ricoh that enables machines to recover quickly from energy-saving mode (off/sleep mode).
2. See page 29.
3. See page 26.

● Targets for Fiscal 2004

◎ Achieve Ricoh's energy-saving goals.

◎ Develop practical application technologies for alternative paper and rewritable paper.

● Review of Fiscal 2003

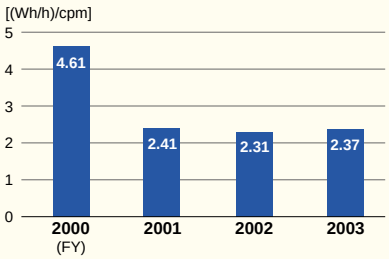
Ricoh enriched its black-and-white energy-saving product line by marketing the black-and-white high-speed digital multifunctional copier that achieved the highest energy consumption efficiency among products of the same class. Reduction in CO_2 emissions through the use of QSU technology amounted to approximately 15,000 tons in fiscal 2003 (see graph❺). Regarding the application of alternative paper, Ricoh marketed a product to which the integrated technology of an IC tag and rewritable medium has been introduced.

<Japan>

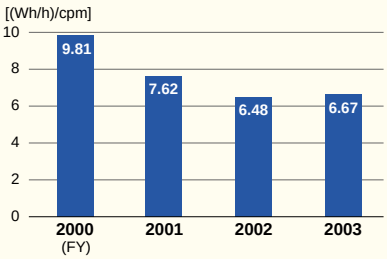
Changes in Energy Consumption

❶ Black-and-White Copiers and Multifunctional Copiers

Black-and-white plain-paper copiers, excluding those that accommodate wide-format paper



❷ Color Copiers and Multifunctional Copiers

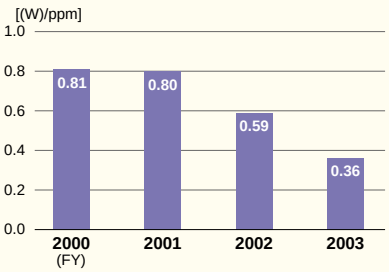


◎ Energy conservation values for copiers are calculated as follows:
Σ [<Energy consumption efficiency (Wh/h)>[1]/<copying speed[2]> × the number of units marketed]/
Σ the number of units marketed

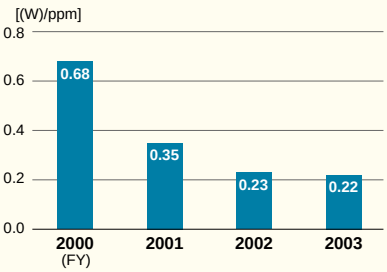
1. Energy consumption efficiency was measured in accordance with the Ministry of Economy, Trade and Industry's Law in Japan Concerning the Rational Use of Energy.
2. Copying speed = copies per minute (cpm)

Data for multifunction black-and-white copiers, color copiers and multifunction copiers are pursuant to the measurement standard for energy consumption efficiency of the Law Concerning the Rational Use of Energy.

❸ Black-and-white and Color Printers



❹ Facsimiles (Including Multifunctional Copiers)



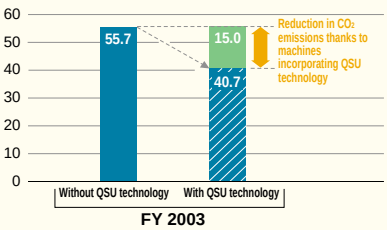
◎ Energy conservation values for facsimiles and printers are calculated as follows:
Σ [<Energy Star energy consumption in standby mode[3] (W)>/<printing speed[4]> × the number of units marketed]/Σ the number of units marketed

3. Energy Star energy consumption in standby mode = energy consumption in standby mode pursuant to the standards of the International Energy Star Program.
4. Printing speed = print per minute (ppm)

* Data for the four graphs above are calculated based on the number of units marketed in Japan.

<Global>

❺ Reduction in CO_2 Emissions through the Use of QSU Technology



● Future Activities

Ricoh will promote the introduction of user-friendly and energy-saving technologies to color copiers by improving the QSU technology and developing new energy-saving technologies.

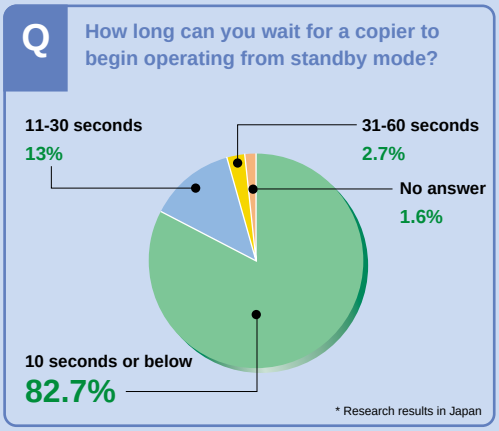
Segment Environmental Accounting of Product Energy Conservation (Benefit on cost in QSU product development)

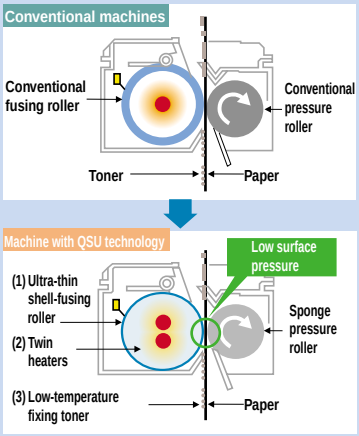
Costs			Effects		
			Economic benefits		Effect on environmental conservation
Item	Main costs	Costs	Internal benefits	Customer benefits	
R&D cost	Cost of developing energy-saving units	400 millon yen	Amount of profit contribution 2,305 million yen	Reduction in payment for consumed power supply 918 million yen	Reduction in CO_2 emissions 15,046 (t)
	Cost of molds, jigs, parts, etc.	512 millon yen			

* The reduction in payment for consumed power supply and CO_2 emissions is the annual benefit brought from eight hours of operation per day, 20 days of operation a month. Internal benefits refer to benefits on gross profits in sales results in fiscal 2003.

QSU, Energy-Saving Technology that Realizes Energy-Saving in Standby Mode and Quick Recovery from Energy-Saving Mode

According to Ricoh's market research, most consumers prefer copiers that recover from energy-saving mode in a shorter time (see pie chart). It also shows that many users of machines that need a longer time to recover from energy-saving mode do not utilize an energy-saving function and many users of products to which QSU technology is introduced make use of the function. If it takes too long to recover from the energy-saving mode, consumers will not use the function because they cannot make copies whenever they need to. That is, a copier/printer that takes longer time to recover from standby mode consumes extra energy in the mode. Users of products to which QSU technology is introduced seem to be free from stress and practice energy conservation unconsciously.





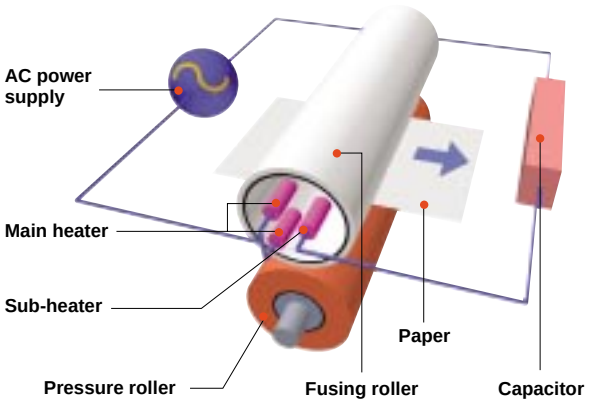
● QSU technology incorporated in Aficio (imagio Neo) series

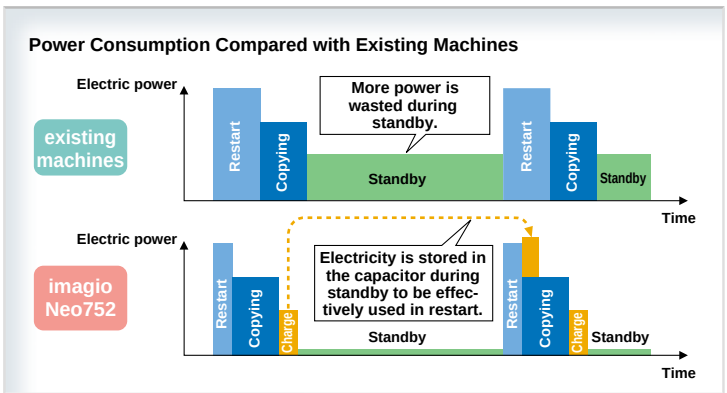
(1) Ultra-thin shell-fusing roller
In order to realize quick start-up, the fusing roller was thinned as much as possible to shorten the temperature rise time.
(2) Twin heaters
Because a thin roller is apt to get cold, the temperature is carefully and effectively adjusted by using two separately controlled heaters.
(3) Low-temperature fixing toner
This toner ensures a fixity that is equal to or higher than that of conventional toner even at low temperatures and supports both energy saving and the quick startup function.

Hybrid QSU: Energy Saving for High-Speed Machines

Hybrid QSU, which is incorporated into the imagio Neo 752 series, is the industry's first hybrid heat source. Hybrid QSU is an integration of a next-generation electrical storage device; capacitor and Ricoh's quick start-up (QSU) technology. QSU technology makes use of an ultrathin-shell fusing roller, which is essential for a quick restart, to enable high-speed printing of 75 pages/min. Unfortunately, the heat of the fusing roller is easily transferred to the paper, which deteriorates printing quality and speed. To solve this problem, sufficient heat needs to be supplied to the fusing roller. Ricoh therefore decided to use its quick charging and discharging capacitor technology. During standby, the capacitor stored power then restores heat to the fusing roller after the heat is transferred to the paper during printing. The machines is therefore able to maintain productivity at 75 pages/min. while requiring only 30 seconds to warm up (1/10 the time of existing machines) and has an energy consumption efficiency of 117 Wh/h (about 1/2 that of existing machines), which is the best performance in the high-speed machine category.

* Capacitors are incorporated only in the 100v machines marketed in Japan.





Enrichment of Energy-Saving Product Lines

In fiscal 2000, Ricoh marketed user-friendly and energy-saving products, the Aficio 1035/1045 (imagio Neo350/450) series, in which its original energy-saving technology, QSU was used. Since then, Ricoh has positively promoted the introduction of such technology to its copiers and printers. In fiscal 2003, Ricoh marketed the imagio Neo752/602 series, high-speed multifunctional digital copiers in which QSU technology was used, and completed a wide-ranging energy-saving product lineup comprising various machines with productivities of between 22 and 75 copies/min. Hybrid QSU, the advanced QSU technology, is used in the imagio Neo 752 series with a copying productivity of 75 copies/min. The imagio Neo752/602 series received the Energy Conservation Chairman's Prize at the 14th Energy Conservation Grand Prize competition.

imagio Neo752 model with optional SR33V finisher, Z-fold unit type N12 and RT39 PPC tray

Lineup of Products with QSU Technology

	Products	Printing speed (/min.)	Time required to recover from energy-saving mode	Electric power consumption in standby mode	Energy consumption efficiency
Copier	imagio Neo221	22 pages	10 seconds	6W	29Wh/h
	imagio Neo271	27 pages	10 seconds	6W	29Wh/h
	imagio Neo352	35 pages	10 seconds	4.5W	33Wh/h
	imagio Neo452	45 pages	15 seconds	4.5W	48Wh/h
	imagio Neo602	60 pages	30 seconds	5.5W	57Wh/h
	imagio Neo752	75 pages	30 seconds	10.7W	117Wh/h
Printer	IPSiO NX650S	22 pages	10 seconds	5W	—
	IPSiO NX750	28 pages	12 seconds	5W	—
	IPSiO NX850	32 pages	12 seconds	5W	—
	IPSiO NX920	45 pages	15 seconds	7W	—

User-Friendly Duplex Copying Function

To provide more consumers with user-friendly duplex and n-up copying functions (copying multiple pages on one sheet of paper), and to reduce the environmental impact caused by the use of paper, Ricoh has developed higher-speed duplex and n-up copying technologies that are more user friendly. The imagio Neo752/602 series, in which a single-path system is used, simultaneously reads both sides of a two-sided document with a single scan by two scanning sections and realizes higher-speed duplex copying of two-sided documents (equal to the speed of single-sided document copying). The series also achieves 100% duplex copying productivity* while in continuous operation. Many of our multifunctional digital copiers also achieve 100% duplex copying productivity while in continuous operation.

* Duplex copying productivity (%) = (Time spent on simplex → duplex copying)/(Time spent on simplex → simplex copying) × 100. The time is measured from the moment the desired number of copies is entered and the "Copy" button is pressed to the moment the copier is ready for the next batch of copying.

Duplex Copying Function of the Gel Jet Printer

The electrostatic absorption belt technology used in laser printers was applied to the Gel Jet BT paper carriage system of the IPSiO G Gel Jet printer series marketed in fiscal 2003. A wide head for high-speed writing and quick-drying pigment ink to shorten the waiting time for drying-up are used in the series to realize faster duplex printing than any other machine of the same class and to heighten the efficiency of duplex printing. Also, a zero-waste dual tank system to completely use up the contents of a cartridge is incorporated in the series to reduce environmental impacts.

IPSiO G707

Reducing Paper Consumption through Printing Solutions

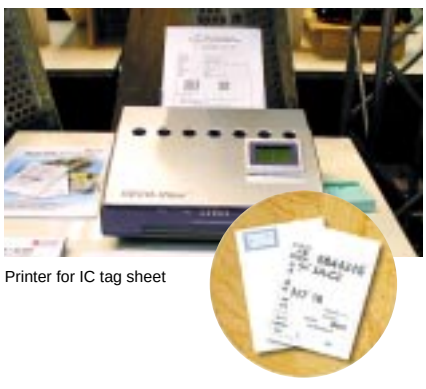
Ricoh provides its customers with printing solutions to realize an ideal printing environment suitable for each customer's business requirements. In addition, Ricoh provides customers with a document solution to scan and digitize paper documents and display them on networked PC screens so that they may be shared.

Development of Practical Application Technologies for Alternative Paper

To reduce paper consumption, Ricoh is committed to the development of paperless technologies. Ricoh is developing practical application technologies for a rewritable media/system by using thermal media and photochromic compounds.

Practical Application of Rewritable IC Tag Sheet

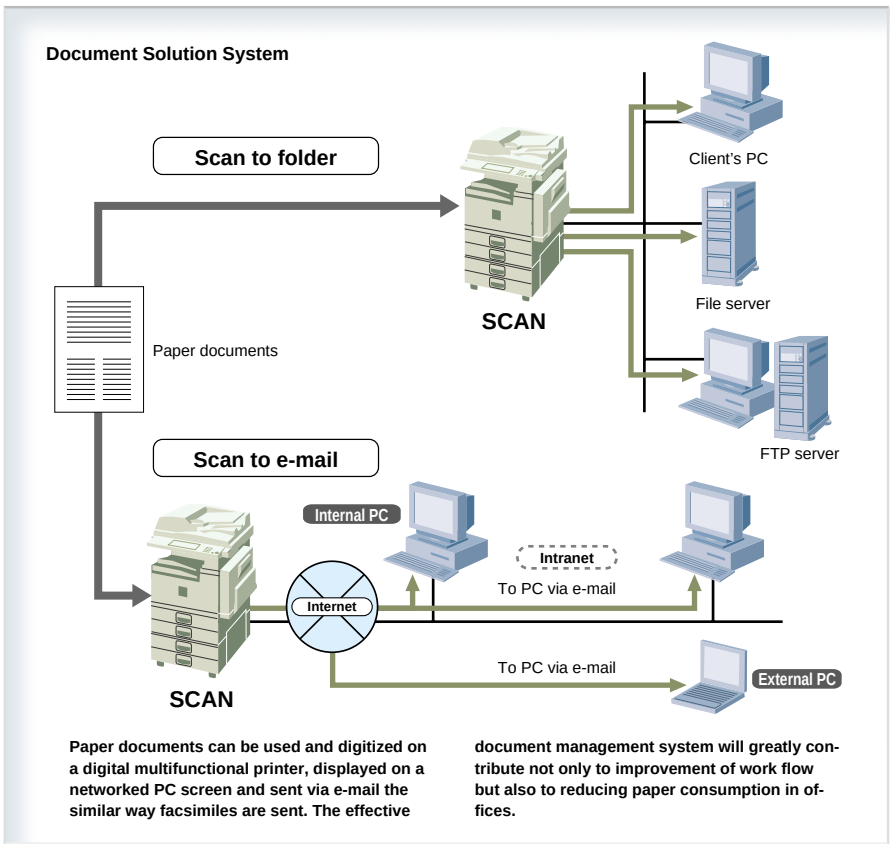
Rewritable IC tags that record the latest inventory, production capacity, etc. are now used for information management in various industrial fields, such as production and distribution. However, they have the drawback that the recorded data is invisible. In order to solve this problem, Ricoh developed the RECO-View™ IC tag sheet, which makes it possible to display and rewrite data recorded on IC tags by using thermal media technology. With this technology, data recorded on IC tags and the content to be printed can be rewritten at the same time. These IC tags were tested at the Ricoh Numazu Plant and marketed in December 2003.



Printer for IC tag sheet

RECO-View™ IC tag sheet

Rewritable printer and paper



Paper documents can be used and digitized on a digital multifunctional printer, displayed on a networked PC screen and sent via e-mail the similar way facsimiles are sent. The effective document management system will greatly contribute not only to improvement of work flow but also to reducing paper consumption in offices.

Development of Rewritable Paper Printer

Only 30% of the paper used in offices is stored for a long time after being printed on. That is, 70% will never be used again. Ricoh, by introducing thermal media to printers, is promoting the development of a rewritable paper printer to make it possible to reprint an ordinary document more than 200 times. Ricoh is making efforts to realize higher-speed, energy-saving, and small-sized systems for office use.

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 wave length 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.