

Development of user-friendly and energy-saving technologies

■ Concept

Products that are not easy to use will not be chosen by customers, even if their energy-saving performance is solid. Such products can neither contribute to energy conservation nor help prevent global warming. Ricoh is further developing its unique energy-saving QSU (Quick Start-Up) technology*, which enables users to make copies as soon as they need to. We are also expanding the product lineup of QSU-equipped machines with a view to reducing recovery time from energy-saving mode to less than 10 seconds for all our models in the future. Meanwhile, reducing unnecessary paper consumption (indirect energy saving) is important since paper production consumes a lot of energy. Ricoh helps decrease the environmental impact caused by customers' paper consumption by offering highly productive duplex copying functions, digitization, and by promoting sales of recycled paper.

* Ricoh's original energy-saving technology that enables quick recovery from energy-saving standby mode.

■ Target for Fiscal 2010

- ◎ Achieve Ricoh's energy-saving goals.

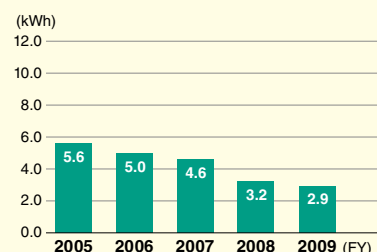
■ Review of Fiscal 2009

In the field of high-speed multifunctional color copiers, we launched the imagio MP C7501/ C6001 series equipped with our original energy-saving Color QSU technology to offer both user-friendliness and upgraded energy conservation features. The new models achieved Typical Electricity Consumption (TEC)¹ of 8.42 kWh² by reducing both recovery time from energy-saving (sleep) mode and electricity consumption, as well as through quicker switch to energy-saving mode after operation. In addition, sales of copiers using QSU technology with a recovery time of less than 10 seconds from energy-saving mode are steadily increasing,

<Japan>

Changes in energy consumption

① Monochrome copiers and multifunctional copiers



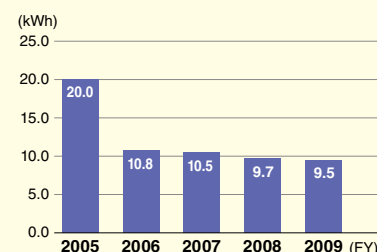
◎ Energy conservation values are calculated as follows:

$\Sigma(\text{Energy consumption when recovery time is 10 seconds (kWh)} \times \text{Annual number of units marketed}) / \Sigma \text{Annual number of units marketed}$

1. Energy consumption when recovery time is 10 seconds: Based on TEC measured for models with a 10-second recovery time from energy-saving mode in accordance with the method defined by the International ENERGY STAR Program. (Electricity consumption in standby mode was measured for models with a recovery time of more than 10 seconds.)

* Graphs ① and ② were compiled based on the number of units marketed in Japan.

② Color copiers and multifunctional copiers



<Global>

Changes in recovery time from energy-saving mode

③ Color copiers and multifunctional copiers

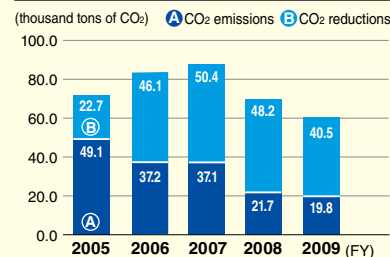


◎ Energy conservation values are calculated as follows:

$\Sigma(\text{Recovery time from sleep mode (sec.)} \times \text{Annual number of units marketed}) / \Sigma \text{Annual number of units marketed}$

Effect of QSU technology

④ Reduction in CO₂ emissions through the use of QSU technology



* A + B : CO₂ emissions generated if there had been no QSU-equipped models

A : Actual CO₂ emissions

B : CO₂ emissions reductions realized by the QSU-equipped models

thus reducing CO₂ emissions by approximately 40,500 tons a year (see graph ④).

1. The measuring procedure is defined by the international ENERGY STAR Program.
2. Indicates the value for imagio MP C7501SP. Values for other models: imagio MP C7501: 15.79 kWh; imagio MP C6001SP: 6.78 kWh; imagio MP C6001: 14.94 kWh.

■ Future Activities

We will further improve QSU technology, so that more customers will use energy-saving mode, and pursue user-friendliness (shorter recovery time from energy-saving mode) and energy-saving for color copiers.

Evolution of energy-saving technology QSU

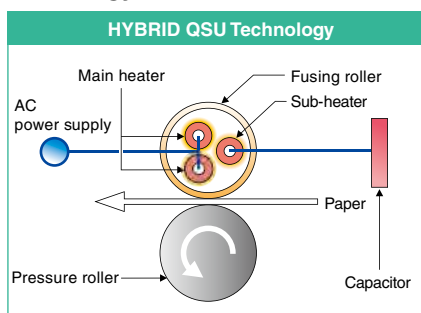
QSU (Quick Start-up), Ricoh's original energy saving technology, was developed to achieve effective energy conservation for copiers. It enables quick recovery from the energy-saving mode, allowing users to make copies whenever they need to. According to a customer survey, the longer it takes to recover from energy-saving mode, the less the energy-saving mode is used. Ricoh focused its efforts on developing QSU technology in a way that satisfies both user-friendliness and energy conservation so that our customers will use the energy-saving mode more often. In 2001, we launched the imagio Neo 350 series, the first multifunctional monochrome copiers equipped with QSU, and received the Minister of Economy, Trade and Industry Prize, the highest prize of the Energy Conservation Grand Prize presented by the Ministry. Following that, we introduced HYBRID QSU, an integration of traditional QSU technology and capacitors (electric storage devices), in high-speed multifunctional monochrome digital copiers, and have since reinforced the lineup of QSU-equipped products¹. In fiscal 2006, Ricoh developed Color QSU technology, which adopts the IH² fusing system and successfully reduces recovery time from the energy-saving mode for multifunctional color copiers, which had been a difficult challenge. The imagio MP C4000 released in June 2008 features Color QSU

technology and new color PxP toner that facilitate a recovery time from the sleep mode³ of less than 15 seconds. This new color PxP toner has been introduced in a growing number of our copiers, including the imagio MP C7500SP/C6000SP, which was launched in December 2007. These multifunctional digital full-color copiers, whose energy consumption is almost 50% lower than conventional counterparts, received the Chairman Prize of (ECCJ) under the Energy Conservation Grand Prize in fiscal 2008. Such substantial improvement of energy efficiency is made possible by a combination of the new color PxP toner and higher thermal conductivity of the fusion system. In addition, we also developed energy-saving printers that use our GELJET technology, including the IPSiO GX e2600 series launched in December 2009, which boasts a very low power requirement: average power consumption in operation of less than 36 watts, equivalent to the energy consumption of a fluorescent light; and power consumption in energy-saving mode of less than 1.4 watts.

1. Capacitors are incorporated only in the 100V machines marketed in Japan.
2. IH stands for "Induction Heating," a technology that heats metal instantly with the magnetic force generated by an electric current passing through a coil. This technology is also widely incorporated in electric rice-cookers and stoves.
3. A type of energy-saving mode [See Page 26.](#)

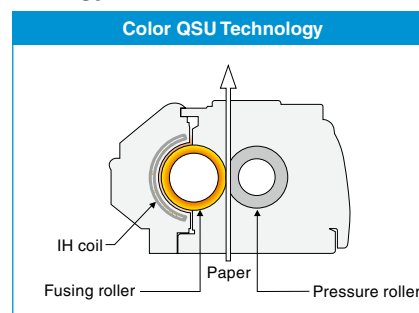
● HYBRID QSU Technology

Traditional QSU technology is combined with a capacitor (electric storage device) to store electricity while in standby mode so that it can be used for start-up and printing operations. This technology is adopted in high-speed type multifunctional copiers.



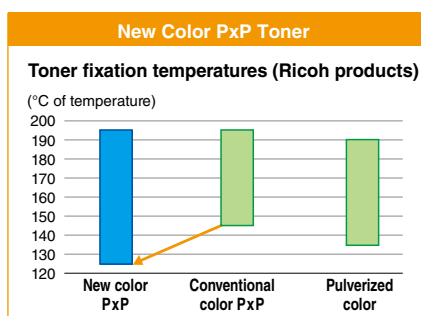
● Color QSU Technology

This technology is based on IH (Induction Heating), which uses magnetic force to produce heat, and has been further improved in such a way to cause the fusing roller itself to generate heat. With increased heat efficiency, this technology shortens warm-up time, thus enabling color copiers to both be user-friendly and energy-saving.



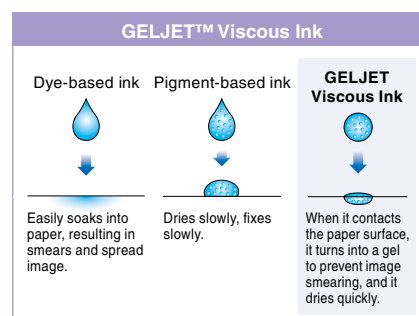
● New Color PxP Toner

Using newly developed polyester-resin particles of a smaller and uniform size, this toner is designed to fuse at a temperature 20 degrees lower than conventional polymerized toners. This new toner realizes a shortened warm-up time, faster continuous output, and less energy consumption when in use.



● GELJET Viscous Ink

GELJET Viscous Ink is a pigment-based ink with high viscosity and high penetration, which enables high-speed duplex printing on plain paper with a picture quality as high as that of laser printers. Its low energy consumption also allows users to save running costs.



Efforts to realize a more user-friendly energy-saving mode and a recovery time of 10 seconds

Our assessment of the impact of our products on global warming shows that, while there are emissions of greenhouse gases (GHG) directly from Ricoh Group operations such as production, transportation, marketing, and maintenance, a significant level of CO₂ emissions is also generated while the products are used at customer sites¹. The energy-saving mode is automatically activated to minimize power consumption when products are left in standby mode for a certain period of time, and thus it contributes to energy

conservation for customers who use Ricoh copiers. To maximize energy-saving effects, it is necessary to set the time of the shift to a higher energy-saving mode to be as short as possible (see table on next page). According to a customer survey, many customers feel that the waiting time is too long when the recovery time from the energy-saving mode exceeds 10 seconds. Therefore, to encourage customers to use the energy-saving mode without the stress of waiting, Ricoh is committed to technological development aimed at reducing the recovery time from the energy-saving mode to less than 10 seconds. For monochrome multifunctional copiers,

we achieved a recovery time from the sleep mode² of less than 10 seconds³ when we released the imagio Neo 350 in February 2001, and we have since introduced this feature to many other models. In terms of color multifunctional copiers, imagio MP C4000 has achieved the recovery time from the sleep mode to less than 15 seconds³. For models whose recovery time from the sleep mode still exceeds 10 seconds, the “preheating level 2” button is provided to realize a recovery time of 10 seconds while allowing customers to save energy—although not as much as when in sleep mode—to the maximum extent possible. In this way, Ricoh is offering its customers a way to promote energy conservation without sacrificing user-friendliness.

1. See page 51.

2. A type of energy-saving mode. See the table on right.

3. When used at a room temperature of 20°C. This figure may vary depending on the conditions and history of use.

Energy-saving mode levels and their effects

Setting mode	Displayed term	Description	Energy-saving effects
Preheating	Panel Off	A ready-to-use status, but only with the control panel display cleared.	Small
Low power consumption	Energy Saver	A status where the temperature of the fusing heater, which consumes most electricity, is lowered to save energy; takes longer to recover than from the preheating mode (only for some models).	Medium
Sleep	Auto Off	Power to the fusing heater is turned off to save most energy. If the machine cools down to room temperature, the recovery time may take as long as the warm-up time.	Large

* See the manual for each model for specific energy consumption information and other data related to each setting in the energy-saving mode.

Preventing Global Warming through Reduced Paper Consumption

RECO-View RF Tag Sheet—capable of displaying data on rewritable RF Tags

<Ricoh (Japan)>

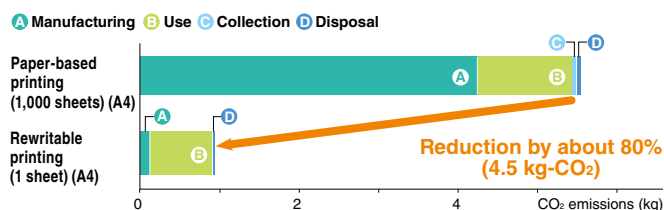
In fiscal 2003, Ricoh developed the RECO-View RF Tag Sheet by combining RF tags with Ricoh's own rewritable technology, making the RECO-View RF Tag Sheet capable of rewriting and displaying data written on cards or sheets. This sheet displays digital data recorded on a tag, and the display changes as the tag is rewritten. A sheet is capable of being rewritten approximately 1,000 times*, making it possible to cut CO₂ emissions by 80% across its lifecycle compared to paper-based printing. This tool also helps prevent human error, as operators are able to visually check information on the management of operation processes written on RF tags, and it is currently utilized in a wide variety of areas, including logistics, medical care, and office work.

* This number may vary, depending on the condition of use.

* Visit <http://www.reco-view.com> for further details of the RECO-View RF Tag Sheet.

See page 39 for introduction of the tag sheet to a Ricoh plant.

CO₂ emissions during 1,000 printing operations



[Data coverage] ■ Manufacturing: materials and manufacturing processes ■ Use: RW printer (calculation based on electricity consumption)/laser printer (calculation based on electricity consumption and toners) ■ Collection: 100-km of transport by a 4-ton truck from the usage site ■ Disposal: waste disposal (with thermal recovery)/waste disposal (w/o thermal recovery)/landfill/collection of used paper (for paper-based only)

[Source] ■ Paper: JLCA Database by Japan Environmental Management Association for Industry (JEMAI) ■ Rewritable sheet: on materials, JLCA Database by Japan Environmental Management Association for Industry (JEMAI), Materials Database (4000ss) by the National Institute for Material Science (NIMS); on manufacturing process, Electricity & gas, data from the Japanese Ministry of the Environment ■ Laser printer: Data on IPSiO NX810 (publicly available from the JEMAI Ecoleaf program) ■ Collection and disposal: Japan Tappi Journal 55(6) 838-852(2001)

imagio Easy PO Box Printing

<Ricoh (Japan)>

In October 2009, Ricoh released the “imagio Easy PO Box Printing Type A,” which prevents the user picking up someone else's printouts by mistake or forgetting printouts while generally reducing

wasteful printing in the office. This application automatically stores each print job in the “PO box” of the individual user, enabling the user to confirm print jobs on the multifunctional printer's control panel to print out on demand. Print jobs can be canceled before printing if the wrong instructions have been given—such as more copies than intended, color copies instead of black-and-white, single-sided printing instead of double-sided printing, or other incorrect settings. It also offers security in that documents will not be mistakenly picked up by another user if the printouts are left uncollected for some time after the instructions were given. This gives users a sense of security, allowing them to feel safe about printing confidential documents without the risk of top-secret contents being revealed to others. Moreover, because there is no need for user registration or setup on the PC, this application is user friendly, can be installed at low cost, and requires little time for management or training. These features enable immediate use.

A similar system was installed at Ricoh's Head Office (where 2,200 employees work). Calculations show that the system has helped prevent around 2.8 million pages being printed in error, which constitute roughly 24% of all printouts. This has greatly helped reduce both costs and environmental impact.

