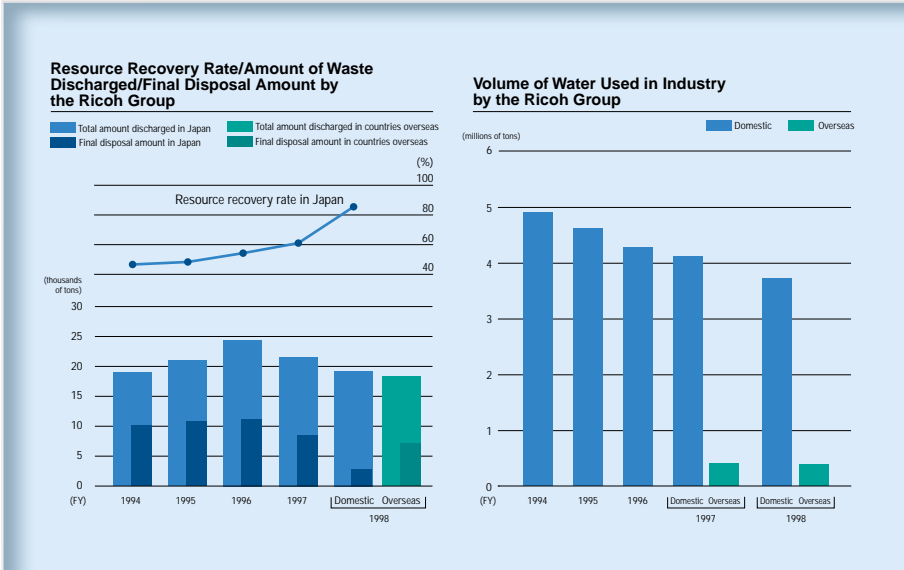


Resource Conservation and Recycling (Business Sites)

Goals and Progress

- Plans call for reducing final waste 90%, compared with that in fiscal 1992, by the end of fiscal 2001.
- ▶ We reduced waste 87% at all Ricoh offices.
- A 100% resource recovery rate (zero waste) has been targeted for all domestic production sites by the end of fiscal 2000.
- ▶ Ricoh Fukui and Ricoh Numazu achieved zero waste.
- A 70% resource recovery rate has been targeted for all domestic non-production sites by the end of fiscal 2000.
- ▶ We achieved 51% resource recovery rate in fiscal 1998.
- Plans call for a 100% resource recovery rate (zero waste) at all overseas production sites by the end of fiscal 2001.
- ▶ Resource recovery activities are already under way.



◎ Concept of Zero Waste

The Ricoh Group classifies zero waste (100% resource recovery rate) into level 1 (industrial waste), level 2 (industrial waste + general waste), and level 3 (industrial waste + general waste + household solid waste). Generally, in the context of zero waste, *waste* implies level 1. The group's definition, however, includes that for level 2 as well as waste to be incinerated. Our aim is to eliminate the stricter level 3 in the future.

Zero Waste Plants

Ricoh Fukui and Ricoh Numazu achieved zero waste in October 1998 and February 1999, respectively. These efforts were made to realize zero production losses, i.e., zero waste. In addition, costs incurred by production losses and the proper disposing of wastes were eliminated as well. Ricoh Numazu, for example, was able to reduce costs by ¥50.33 million.*

* See page 27.

Database on Recycling Businesses

To achieve recycling smoothly and the proper disposal of waste in the Ricoh Group, the Group has constructed a database on recycling businesses which allows each Ricoh site to search for recycling businesses, their contact number, and the type of waste handled using a PC-based network.



Resource sorting station and "recycling road" in Ricoh Fukui

◎ Concept of the "Minimum Resource Plant"

As the age of mass production, mass disposal, and mass recycling draws to an end, a new age that values the maximum use of minimum resources is dawning. To achieve the "minimum resource plant," which produces maximum effects with minimum resources, the Ricoh Group is conscientiously working to conserve resources in principle by using purchased resources effectively and without waste. We also value electrical energy and water as resources and are trying to minimize their use and recycle such resources.

◎ Five Rs for Realizing the Minimum Resource Plant

Reject→Return→Reuse→Reduce→Recycle. Based on these five Rs, the Ricoh Group is building "Minimum Resource and Zero Waste" plants with the support of other companies.

1. Reject

(Avoid buying anything that may become waste)

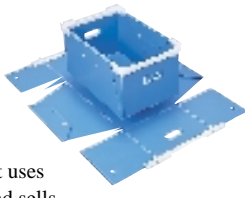
Minimum resource usage is encouraged both on the Ricoh side and the delivery business side. Such efforts are undertaken based on the awareness that "what is being sold is the content and function and not the container and packaging" by both sides. Such efforts also help reduce costs.

At the Ricoh Numazu Plant, all 3,600 types of packaging for purchased items are checked, and numerous improvements are being made, such as changing the method of delivering solvents from using drums to tankers. Many branches are carrying out similar activities, such as buying 100% recycled toilet paper that comes with neither packaging nor core.

2. Return

(Return what can be returned to suppliers)

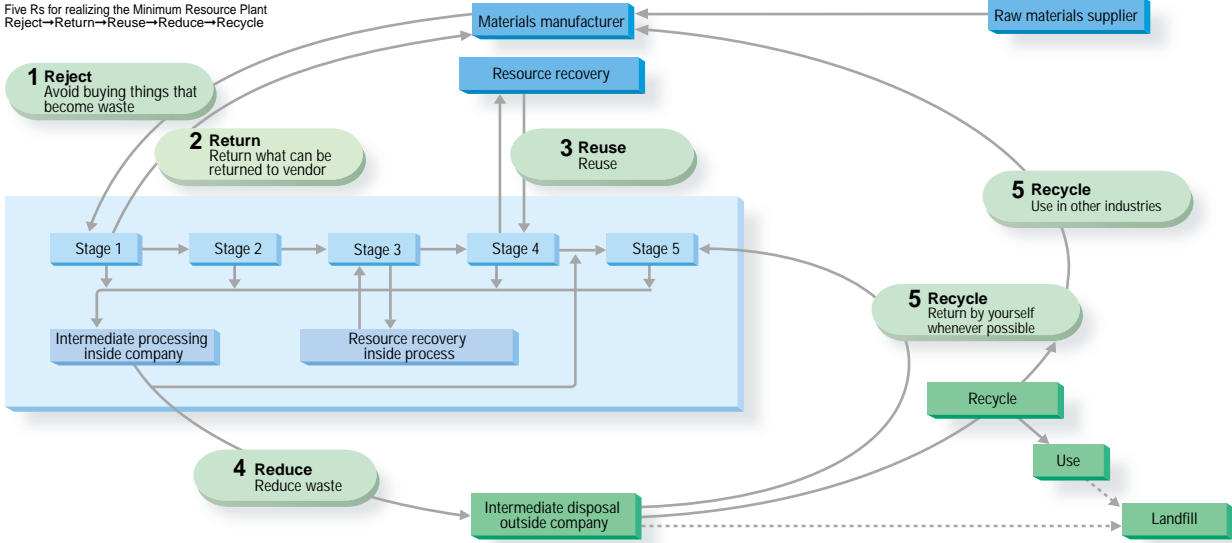
Improving delivery containers by changing them into reusable types and returning them to suppliers not only uses less resources but also reduces costs. Many plants have changed to using Kayoibako (reusable box) reusable delivery containers. Ricoh Unitechno Co., Ltd., has also developed a foldable type of reusable box called Fladan, which it uses within the company and sells commercially.



Foldable type reusable box Fladan

Circulatory Manufacturing Systems

Five Rs for realizing the Minimum Resource Plant
Reject→Return→Reuse→Reduce→Recycle



Recycling Examples (Some activities at the Ricoh Numazu, Ricoh Ikeda, and Ricoh Fukui plants)

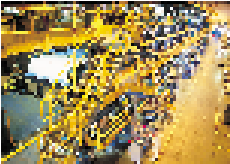
Classification	Type of Industrial Waste	Product	After Recycling
Level 3 (Industrial waste + general waste + household solid waste)	Level 1 (Industrial waste)	Paper	Unusable copier paper Unusable thermal paper
			Recycled copier paper, toilet paper Solid fuel
		Cardboard	Cardboard
		Wooden box	Chip
		Used pallet	Particleboard
		Metal	Drum, cutting powder, cutting scrap Aluminum tube of photosensitive drum
			Recycled metal Car part
	Level 2 (Industrial waste + general waste)	Liquid waste	Fluoroboric acid waste liquid Ammonium sulfate
			Fluorite Raw material of paints (deep blue color)
		Acid solvent	Recycled oil
		Gas solvent	(No change)
	Sludge	Sludge	Cement
		Toner waste	Dye for shoe sole
	Plastic waste	Bags for raw materials and chemicals	Drying furnace firing agent
		Ribbon, film	Solid fuel
		Beads	Road-paving agent
	Flammables	Paper cups, cigarette butts, etc.	Fuel
	Nonflammables	Bottles	Recycled glass
		Cans	Recycled metal
		Dry cell batteries	Recovered mercury, reused metal
		Leftover food	Manure
	Household solid waste	Raw sewage	Soil-improving agent

Biological Processing of Sludge

Ricoh Atsugi's biological wastewater processing system for industrial and domestic sewage has reduced the 28 tons of sludge that used to be discharged and processed monthly to zero and achieved an annual savings of ¥1.2 million.

Minimum Use of Water Resources

To wash its thermal paper production line, Ricoh Industrie France S.A. required 30m³ of water daily in 1996. By 1998, it had cut this volume 50%, to below 15m³. Ricoh Atsugi, Ricoh Unitechno Co., Ltd., and Taiwan Ricoh Co., Ltd., have installed wastewater recycling systems to filter and reuse plant wastewater in their toilets. And the Ricoh Yashiro Plant has constructed a closed recycling system to achieve resource recovery of wastewater.



The thermal paper production lines in Ricoh Industrie France

3. Reuse

Reusing discarded products that had been used only once reduces resource usage and cost. At the Ricoh Ikeda Plant, customers are asked to cooperate in recovering trays and reels used for delivering ICs. The recovered trays and reels are inspected, reshaped, and reused. Currently, the reuse rate has reached 70%, which means that more than 100 tons of plastic materials are saved every year. Ricoh Fukui also reuses the paper core of thermal paper.



Reusing the paper core of thermal paper

4. Reduce (Reduce waste)

"Waste when mixed but resource when sorted." In order to increase the resource recovery rate, Ricoh is promoting the careful sorting of waste and the reduction of waste itself. At most production sites, the careful sorting of waste is now practiced. Ricoh Fukui, which has already achieved zero waste, is also implementing various detailed improvements, such as using nonwash rice in the company restaurant, thus producing no wastewater from the washing of rice, and using different rice bowl sizes to further reduce garbage. Several offices have also stopped supplying personal wastebaskets to reduce the amount of waste thrown away and promote the recovery of resources.

5. Recycle

In order to reuse waste discarded from Ricoh business sites as resources in every possible way, Ricoh is studying resource recovery methods and forming networks with other companies. Resource recovery consists of such methods as material recycling, which reuses materials as the same material again; chemical recycling, which reuses materials after changing it chemically; and energy recovery (thermal recycling), which recovers heat energy by burning materials.



Organic fertilizer made from leftover food from the company restaurant