

Achieving a Resource Efficient Society

Hitachi's Approach

Creating higher economic value with fewer resources, embracing production and consumption activities that reduce the environmental burden, and achieving a resource efficient society and economy—these aims, as the United Nations' Sustainable Development Goals (SDGs) cite in "Goal 12: Ensure sustainable consumption and production patterns," are directed at achieving a resource efficient society, an increasingly important and shared concern of humankind. As a corporate group with manufacturing and sales operations in locations around the world, Hitachi positions the achievement of a resource efficient society as an integral part of its Environmental Vision and is advancing efforts to make efficient use of the Earth's finite resources.

In keeping with our long-term Environmental Innovation 2050, we recognize water resources to be a key environmental risk and seek to build a society that uses water and other resources efficiently. We are implementing a variety of initiatives, such as reducing the volume of water used, making effective use of raw materials, and making sure to promote the "three Rs" of reduce, reuse, and recycle. We are making active use of the technologies and expertise held by various Group companies in advancing thoroughgoing waste management, water and resource conservation during production, and utilization of used and recycled components in IT equipment. The Hitachi Group as a whole will continue to promote manufacturing approaches that contribute to the achievement of a resource efficient society.

Enhancing Efficiency of Water Usage

Water Conservation

Hitachi uses water in such production processes as cleaning, cooling, and painting. To reduce water usage through greater efficiency, we are enhancing our level of water management by installing flow meters at more locations, introducing wastewater treatment devices to increase the use of recycled water, and upgrading water supply facilities at our business sites.

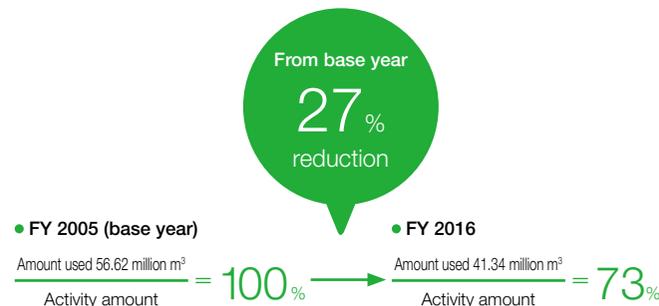
Different countries and regions are affected by water-related issues in different ways, so we devise appropriate countermeasures for each region. Our business sites in China, India, and the Philippines, for example, are striving to reduce the volume of water used by strengthening measures against water leakage.

Actions and Achievements

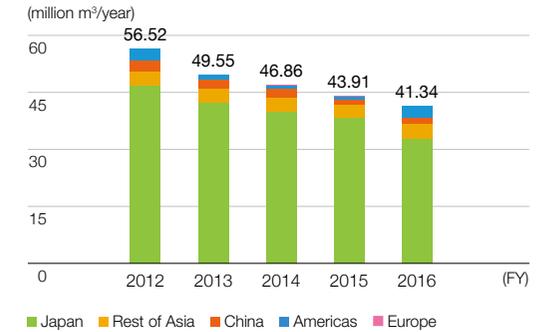
In fiscal 2016, we set a target of a 23% reduction (over the base year of fiscal 2005) for water usage per unit at our 204 global sites and achieved a 27% reduction.

Key Indicators

- Reduction in Water Usage per Unit



Water Usage



Breakdown by Region (million m³/year)

	2012	2013	2014	2015	2016
Europe	0.03	0.02	0.02	0.01	0.02
Americas	3.15	1.20	0.98	0.89	3.09 ^{*1}
China	2.85	2.50	2.32	1.22	1.51
Rest of Asia	3.85	3.65	3.85	3.56	4.00
Japan	46.64	42.18	39.69	38.23	32.72
Total	56.52	49.55	46.86	43.91	41.34

^{*1} Includes 2.12 million m³/year used by a materials company that became a consolidated member of the Hitachi Group in fiscal 2016.

Next Steps to Improve Water Usage Efficiency

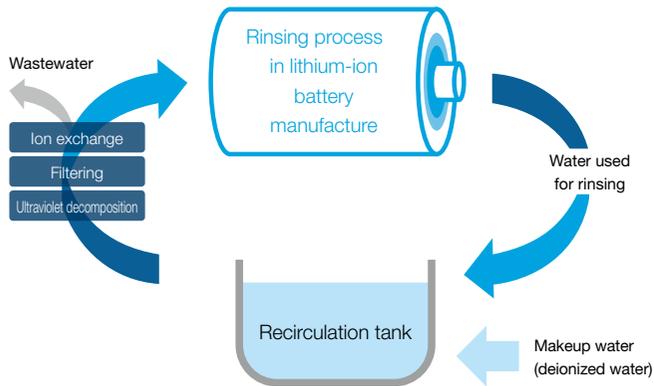
Hitachi has set a target of enhancing water usage efficiency in fiscal 2050 by 50% compared to fiscal 2010. We will aim to realize a resource efficient society by maintaining appropriate management of our business-related water usage and taking measures to solve each region's water-related issues, such as by reducing water intake quantity and promoting the circulative use of water through the purification and reuse of wastewater.

Reducing Water Use Through Improved Efficiency

▶ Reducing Water Use in the Manufacture of Hybrid Vehicle Batteries (Hitachi Vehicle Energy, Ltd.)

Hitachi Vehicle Energy has reduced the amount of water used in manufacturing lithium-ion batteries for hybrid vehicles by circulating and reusing the pure water*¹ utilized in rinsing. Deionized water that has been used in the rinsing process is mixed with makeup water (deionized water) in a recirculation tank, and then subjected to ultraviolet decomposition, filtering, and ion exchange. Through this cycle, it can be repeatedly used as rinse water. As a result, industrial wastewater and water usage have been slashed by more than 99%, compared with the amount used before the system was introduced.

*¹ Deionized water: Water from which the impurities have been removed using an ion exchange resin, reverse osmosis membrane, distiller or other means.



Recirculation System Flowchart for Pure Water Used in Rinsing

▶ Fixing Leaks to Reduce Water Usage at a Washing Machine Manufacturing Site (Shanghai Hitachi Household Appliances Co., Ltd.)

Shanghai Hitachi Household Appliances produces about 1 million automatic washing machines each year and uses large amounts of water in quality checks during acceptance tests. To reduce the amount of water used, the company spent six months conducting repeated surveys, checks, improvements, and verifications and located the places where water was leaking through the monitoring of underground pipes and the installation of more meters. It implemented water-saving activities, replacing leaking underground pipes and repairing and updating air conditioning equipment. As a result, the company now uses only half the water it did in the past. To prevent the recurrence of water leaks, the pipe routing was changed so that pipes are now above ground with fewer joints.



An automatic washing machine acceptance test.

Improving Efficiency in the Use of Resources

Promoting Product Collection and Recycling

In response to the 2001 Home Appliance Recycling Law, Hitachi is taking part in a cooperative effort among five companies*¹ in the same industry to recycle air conditioners, television sets, refrigerators, and washing machines at 19 recycling plants nationwide. In fiscal 2016, we recycled around 59,000 metric tons of the roughly 66,000 tons of end-of-life home appliances we collected.

Hitachi has built its own recycling network of 11 locations in Japan providing services near our customers to collect and recycle such end-of-life products as supercomputers, mainframes, and other computing machines; communication equipment like network devices and telephone switchboards; and information equipment like ATMs.

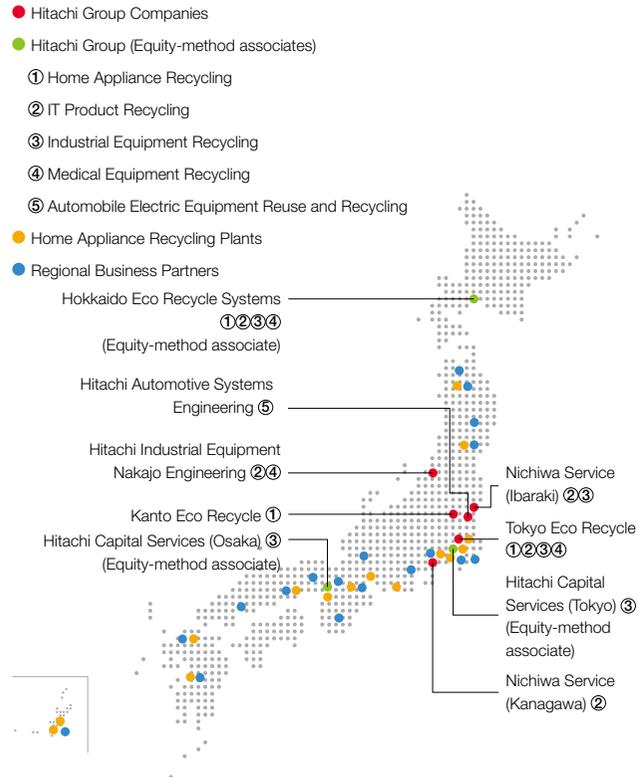
In the United States, when a customer replaces a large-capacity storage unit with a new model, part of the end-of-use device is cleaned and inspected and resold as a certified Hitachi product.

We collect automobile electric components from dealers and repair shops, disassembling, checking, cleaning and restoring, reassembling, and inspecting them so they can be reused as equipment featuring the same performance as new products.

We are also promoting collection and recycling through recycling networks for medical equipment and such industrial equipment as pumps, motors, distribution boards, transformers, refrigeration equipment, and air conditioners.

*¹ Hitachi Appliances, Inc.; Sharp Corp.; Sony Corp.; Fujitsu General Ltd.; and Mitsubishi Electric Corp.

Product Recycling Network



Using IT to Manage Waste

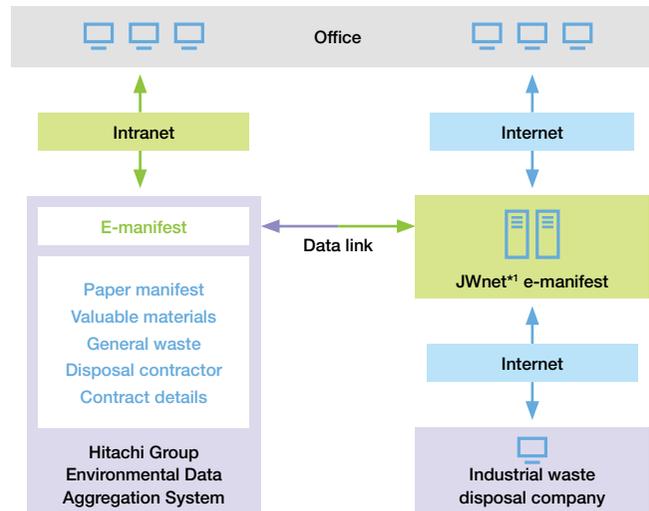
Hitachi has developed a waste management system aimed at more efficient processes and reduced compliance risk. In Japan, we visualize the generation and disposal of waste produced at our factories, offices, and contract operations and manage data on waste contractors so that we can keep accurate track of our progress in waste recycling. In fiscal 2016, entries were made to the system regarding waste generated at approximately 2,800 locations in Japan. This information is being put to use in measures to reduce waste volume, improve recycling rates, and enhance the management of waste contractors to counteract

the cross-border movement of hazardous waste materials.

We have established a target of raising the e-manifest*1 system registration rate to at least 90% by fiscal 2015. This was achieved in fiscal 2014, and we continued with our efforts in fiscal 2016.

*1 The e-manifest is a document that waste generators must issue when commissioning a disposal company to handle waste disposal.

Waste Management System

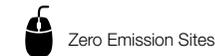


*1 JWnet: The Japan Waste Network is an electronic manifest system operated by the Japan Industrial Waste Information Center under the auspices of Japan's Ministry of the Environment.

Reducing Waste Volume

For fiscal 2016, we set a target of a 12% reduction (from a base year of fiscal 2005) for waste and valuables generated per unit, bettering this by achieving a 13% reduction. Every business site is reducing waste through on-site recycling of byproducts and scrap from the production process and efforts to curb use of packing materials during transport. Under the Zero Emission initiative, which seeks to minimize landfill disposal, 98 business sites achieved their zero emission goal*1 as of fiscal 2016.

*1 Defined as a final disposal rate (landfill disposal/waste and valuables) of less than 0.5% in any given fiscal year.

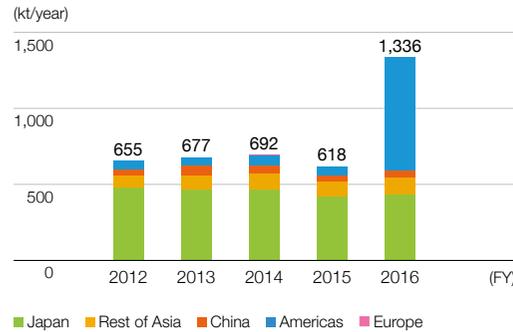


Key Indicators

- Reduction in Waste and Valuables Generated per Unit



• Waste and Valuables Generated



Breakdown by Region (kt/year)

	(FY)				2016
	2012	2013	2014	2015	
Europe	1	1	2	1	2
Americas	58	56	67	63	744*1
China	38	62	54	36	48
Rest of Asia	80	93	106	98	107
Japan	478	465	463	420	435
Total	655	677	692	618	1,336

*1 Includes 675 kt/year of a materials company that became a consolidated member of the Hitachi Group in fiscal 2016.

Next Steps in Improving Resource Efficiency

Hitachi upholds the goal of improving resource efficiency by 50% between fiscal 2010 and 2050. We aim to realize a resource efficient society through the implementation of such conservation measures as using recycled materials in the manufacturing process, reducing or recycling waste, and collecting end-of-use products for recycling.

Efficient Use of Resources

▶ Reusing and Recycling IT Products (Hitachi Computer Products [America], Inc. and Hitachi Data Systems International Distribution Center)

Hitachi Computer Products (America) and Hitachi Data Systems International Distribution Center manufacture and market mass storage systems for use in enterprise computer systems. When customers exchange these systems for newer models, some of the IT equipment is cleaned, retested, and then reused as products with a company warranty. Other, waste-bound products are recycled for their resources. In fiscal 2016 the product recycling volume was 412 metric tons.

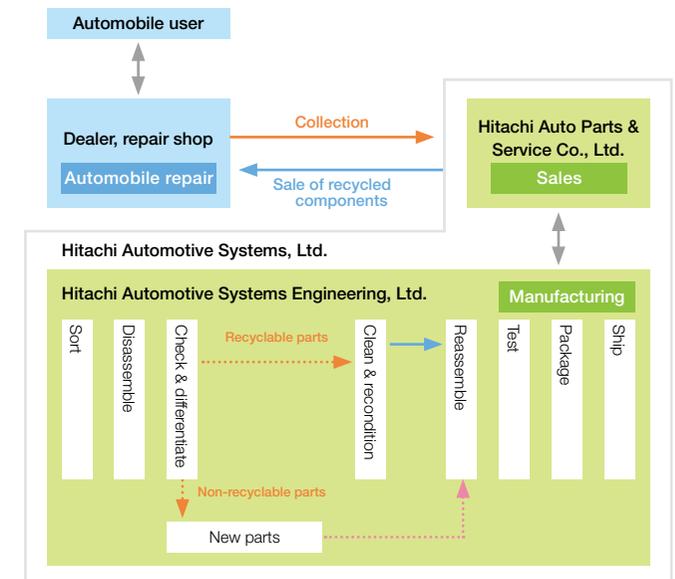
These reuse and recycling efforts, together with the company's environmental efforts overall, have been recognized with a Greenovation Award every year since 2011 from the Norman Chamber of Commerce in the company's home city of Norman, Oklahoma.



Hitachi Virtual Storage Platform G Series.

▶ Reusing Automotive Electrical Components (Hitachi Automotive Systems Engineering, Ltd.)

Since 1994, Hitachi Automotive Systems Engineering has applied the knowledge and understanding gained as a manufacturer of automotive equipment to recycle automotive electrical component collected from dealers and repair shops. A technical system to sort, disassemble, check and differentiate, clean and recondition, reassemble, and test is used to recycle about 60% of the electrical components collected. These components are then sold as products that perform as well as new products. In fiscal 2016 the company received the Award of the Director-General of the Japanese Ministry of Economy, Trade, and Industry's Industrial Science and Technology Policy and Environment Bureau (for Resources Recirculation Technologies and Systems) in recognition of these efforts over many years.



► **Recycling Rare Earths in Sludge Generated During Magnet Manufacturing (Hitachi Metals, Ltd.)**

Hitachi Metals' Magnetic Materials Company manufactures the rare earth magnets used in motors for automobiles, industrial products, electrical machinery, electronic devices, and other products that demand high efficiency and light weight. When recycling the rare-earth-containing sludge*¹ generated during magnet production, the conventional process is to bury and treat it as industrial waste without using the iron contained in residue. There was also the problem of large amounts of acid and alkali required to treat the sludge for recycling.

Hitachi Metals developed a carbothermal reduction method*² in which sludge is taken as iron ore and enables reuse not only of magnetic rare earth elements but also of iron as pig iron.*³ It also established a resource recycling process that minimizes the use of acid and alkali. In recognition of these efforts, Hitachi Metals received the Rare Metal Recycling Award as part of the fiscal 2016 Awards for Resources Recirculation Technologies and Systems.

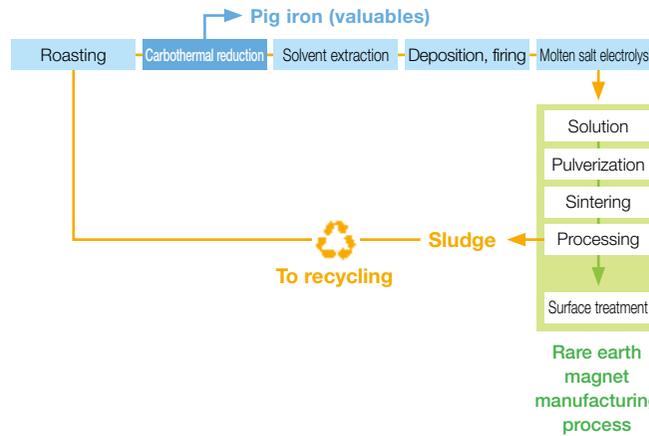
*¹ Sludge: A mud-like material that is a mix of water (grinding fluid) and processing waste when magnets are processed.

*² Carbothermal reduction method: A method of recovering rare earth elements as slag (a material that rises to the surface of sludge) by heating sludge as if it were iron ore together with carbon.

*³ Pig iron: Iron removed from a blast furnace or electric furnace by reducing iron ore.



Slag with concentrated rare earths (left) and pig iron.



Flow of Recycling with the Carbothermal Reduction Method

► **Turning Plastic and Paper Waste into High Calorie Fuel (Nichiwa Service, Ltd.)**

Nichiwa Service has developed shared services that consolidate and standardize waste management for the Hitachi Group, using certain plastic, paper, and wood materials that are unsuitable for recycling as the raw material in manufacturing refuse paper and plastic fuel (RPF), a high calorie solid fuel. As an alternative to fossil fuels, RPF contributes to the prevention of global warming with the reduction of CO₂ while also promising such effects as extending the life of final disposal sites. In fiscal 2016, about 1,700 metric tons of waste material generated at Hitachi Group business sites were made into RPF.



An RPF manufacturing facility.