

# Environment



## Environment

The following section outlines a variety of environmental initiatives of ULVAC Group companies, including a battery-powered boat project, one application of our cutting-edge technologies that contributes to the global environment.

# Environment

\*Namegaya area of Chigasaki City: Location of our Tanbo (rice field) Project (started last year)

## The ULVAC Group Promotes Reduction of Environmental Impact with Proprietary Cutting-Edge Technologies

Amid growing demand to reduce CO<sub>2</sub> emissions to halt global warming, the Great East Japan Earthquake badly damaged several nuclear power plants, which until that point had been considered one of the most effective measures against global warming. The serious environmental destruction caused by the disaster has reminded us of the difficulty of tackling environmental issues and the necessity for drastic measures.

The ULVAC Group, which is committed to providing products that help protect the global environment, has been promoting environmentally friendly plant operations throughout the production processes for such products.

ULVAC's environmental initiatives can be classified into three main policies (as shown on the right).

In this section, we will introduce these initiatives.


### Contributing to reducing environmental impacts through ULVAC's proprietary technologies

ULVAC provides cutting-edge technologies for realizing natural energy, saving energy, saving resources, and reducing environmental impact. Among our cutting-edge products with high market shares, one finds production equipment for solar batteries, LEDs, LCD televisions, thin-film lithium batteries, condensers for hybrid cars, and rare-earth magnets. Though there may be few opportunities for


### Environmental Philosophy

Recognizing that environmental conservation is one of the highest-priority challenges facing humanity, the ULVAC Group has committed itself to the conservation of the Earth's natural environment and is making contributions toward society's environmentally sustainable growth and development in all business activities.


### Environmental Policies



To provide products that help save energy and resources, and protect the environment



To promote energy-saving, resource-saving and environmental products (environment and components)



To promote energy-saving, resource-saving and environmental protection in the manufacturing process

consumers to see our equipment firsthand, our products play important roles in producing our daily life environments. In addition, our compact and portable power generation systems that make use of temperature differences have recently been attracting the attention of hot spring resorts (see pages 13–14 for details). We have also developed a new production method for coating materials used for building insulated glass and can now offer such products at low prices. Further, our quick charging systems for electric vehicles, which are unique solutions combining solar and storage batteries with wind power generation, are being installed all over Japan.

### To provide environmentally friendly products

If the products developed with our proprietary technologies negatively impact the environment, our efforts mean nothing. Therefore, in addition to managing the chemicals contained in the materials used for our products, we are making voluntary efforts to refrain from using the chemicals listed in the RoHS Directive. Thanks to the cooperation of our suppliers, as of June 30, 2011, ULVAC sells 2,731 products that use no RoHS-listed substances. We will continue these efforts.

We are also working to reduce the operational energy necessary for our equipment. Our newest models of our semiconductor production equipment use 40% less electricity than the previous models. We have shipped more than 1,200 units of ECO-SHOCK; ECO-SHOCK energy-saving attachments are capable of reducing the electricity usage of vacuum pumps as much as 50% to 80% while the pumps are no-load running.

By setting voluntary targets, we have been working to reduce energy usage. To promote the use of natural energy, we have installed a solar power generation system at our Chigasaki Plant.

In this way, the ULVAC Group continues to contribute to environmental conservation with its proprietary cutting-edge technologies.



**Yoshio Sunaga**  
Executive Vice President  
and Environmental  
Management Representative

### Enhanced Environmental Management of the ULVAC Group

By establishing the Global Environmental Management Committee in 2010, the ULVAC Group enhanced its environmental management system. This stronger system now covers not only domestic but also overseas group companies in order to match the group's global production system.

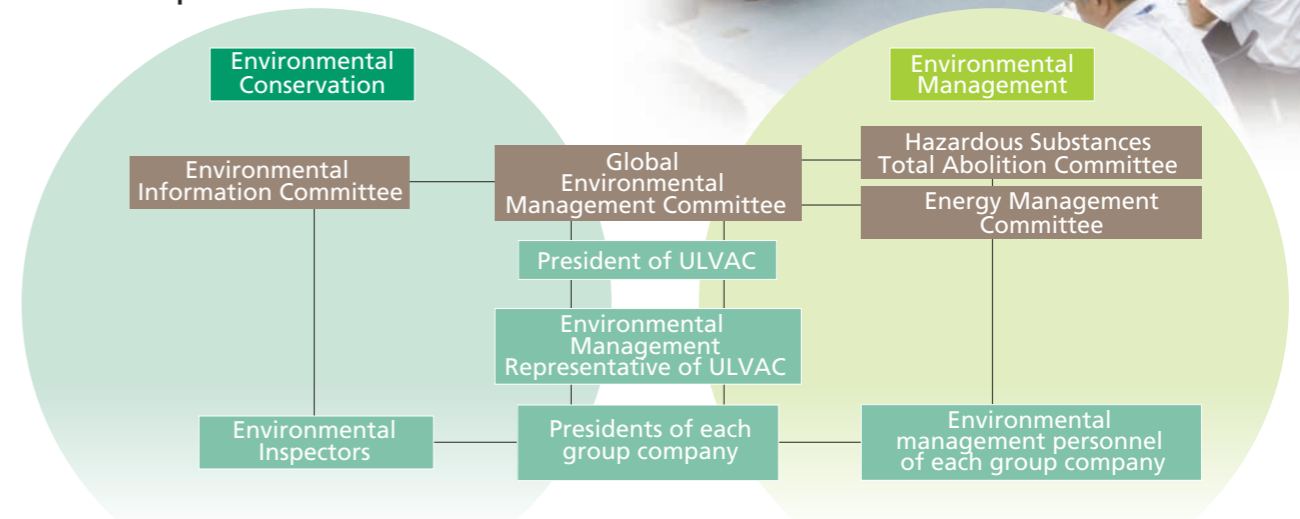
### To protect the environment in the manufacturing process

Production and recycling processes for equipment and materials necessarily involve certain risks of environmental pollution. To reduce such risks, any involved risks are double-checked by the Environmental Management Section and the Corporate Safety & Health Department upon newly installing, maintaining, changing, or terminating environmental facilities. In addition, we share information on environmental risks through cross-sectional activities led by the Global Environmental Management Committee. We have also been monitoring fixed points within our plants in order to prevent serious environmental accidents.



Global Environmental Management Committee

### Environmental Management System of the ULVAC Group



For more details on the ULVAC Group's environmental initiatives, visit the URL below

<http://www.ulvac.co.jp/csr/>

# Tackling Global Warming at Sea

## Participation in a battery-powered boat project

ULVAC participated in a battery-powered boat project promoted by Tokyo University of Marine Science and Technology, developing photovoltaic power generation and quick-charging systems for battery-powered boats, which are indispensable for the widespread use of such boats. Battery-powered boats reduce the environmental impact of traffic at sea. We asked the university professor leading this project, Professor Takamasa, to share with us the background and goals of the project as well as his expectations for ULVAC.



## Battery-Powered Boat Project

**Q: First, would you tell us about the developmental background of battery-powered boats?**

Most boats used today run on diesel. This is why boats generate noise, vibrations, and odors, and this causes adverse environmental impact on the quality of air and water because of the exhaust gas. In fact, many boats are less friendly to the environment than public transportation or cars.

Given such circumstances, our collaborative industry-university project team started to develop a battery-powered boat, the "Raicho-I" ("raicho" means "thunderbird" in Japanese), with a view to its commercialization. This new boat is equipped with a secondary battery and motor instead of the conventional combination of a fuel tank and engine.

## Social Issues Solved by Battery-Powered Boats

**Q: How do you think widespread use of battery-powered boats will change society?**

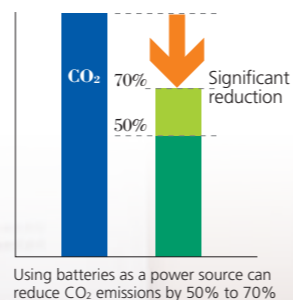
The Raicho-I is the world's first boat to be powered by a lithium-ion battery that has a rapid charging system. Conventional battery-powered boats use lead batteries that

weigh 10 times as much as lithium-ion batteries. Lithium-ion batteries, in addition to helping reduce the weight of boats, can be charged to approximately 80% of their full charge capacities within 30 minutes. Compared to boats of the same class equipped with diesel engines, operating a battery-powered boat costs roughly half (one-sixth if nighttime power is used) and emits 50% to 70% less CO<sub>2</sub>.

Since these new boats run on electricity, they can contribute to society's shift from being reliant on gasoline and other fossil fuels to becoming a low-carbon society.

Also, if people see boats as an environmentally friendly means of transportation, this may promote marine leisure activities and even cause changes to the future of marine traffic and fisheries.

For example, kombu (kelp) cultivation is vulnerable to water pollution caused by the gas and oil discharged from boats. Thus battery-powered boats will contribute to the conservation of the marine ecosystem.



Japan is surrounded by the ocean and has many rivers. This technology is just what Japan needs.



**Tomoji Takamasa**  
PhD in Engineering, Professor, and Dean,  
Graduate School of Marine Science and  
Technology,  
Tokyo University of Marine Science and  
Technology

## The Future of Battery-Powered Boats

**Q: What do you want to achieve with battery-powered boats? And what are your expectations for ULVAC?**

Japan is surrounded by the ocean and has many rivers and isolated islands. For this reason, I strongly believe that Japan truly needs battery-powered boats. Such boats will not only reduce the load on the environment, they will also serve as an important means of transportation in the manner of cars and airplanes, thereby greatly contributing to reductions in traffic jams and accidents as well as the growth of new industries.

I also want to realize the "eco-friendly fishing ports" (ports that aim to prevent global warming by reducing CO<sub>2</sub> emissions from fishery activities as well as to reduce fishery costs by saving energy) being promoted by the Ministry of Agriculture, Forestry and Fisheries. By increasing the number of battery-powered fishing boats and deploying more battery charging infrastructure, such fishing ports will soon move closer to realization. To this end, we are testing

battery-powered boats in fisheries. These efforts will help protect the fishing industry, which is among Japan's most important industries.

Of course, still many challenges remain to be overcome. We won't be able to do this alone. It is only by cooperating with companies that have excellent technology, such as ULVAC, that we will be able to create new value.

I hope that as our partner for making a difference in the world, ULVAC will enhance its technological strengths through this joint research and development as well as our experiment- and verification-related activities.



## Battery-Powered Boats and ULVAC's Technology

In 2010, ULVAC completed a photovoltaic electric vehicle quick-charging system (a PV/EV charging system). This technology enabled our participation in the battery-powered boat project. During the project, we challenged ourselves to develop the motor and drive unit of the "Raicho-S." As EV motors are connected to transmissions, they must be high-speed, low-torque motors in order to generate power. For boats not designed for frequent stop-start operations, ULVAC developed drive units featuring low-speed, high-torque motors capable of being directly connected to propellers (rather than through reduction gears,

which causes power loss). Our technology helped realize this simple propulsion system. In addition to quick chargers and motor inverters, ULVAC has also developed power semiconductors and power generation/storage systems that use natural energy, such as solar and wind power, which are essential for controlling such quick chargers and motor inverters. ULVAC will continue to offer technologies that contribute to society.



Quick-charging system for battery-powered boats



## Progress in battery-powered boats contributes to conserving the global environment. To this end, I'm determined to meet any requests.

ULVAC successfully developed the motor inverters, thereby playing an important role in the battery-powered boat project. For this project, we needed to develop truly unprecedented low-speed, high-torque boat motors in just half a year. Despite the difficulty of such a task, we were able to meet the deadline in cooperation with our research divisions and overseas group companies.

Though the motor inverter installed on the "Raicho-S" is still a prototype, we are pushing forward to commercialize it: we have not only visited China many times to procure reliable parts and components, but we are also verifying such materials internally. We are confident that these steady efforts will lead to the cost reductions necessary to realize mass production of battery-powered boats.

In addition to commercializing the motor inverters for battery-powered boats, we are aiming to install photovoltaic quick-charging systems at fishing ports. To this end, we will offer various technologies by combining the technological strengths of our group companies.



**Koji Shibayama**, Senior Manager, Components Division



Water jet

"Raicho-S"

# Construction of a New, Environmentally Friendly Cleaning Plant

The ULVAC Group audits its environmental facilities upon their opening in order to reduce their environmental loads and prevent environmental incidents.

## Construction of a Cleaning Plant for Large FPDs in Suzhou, China

We are building a new cleaning plant in the Suzhou Industrial Park to provide cleaning services for large FPDs in China (scheduled for completion in December 2011 and to start cleaning operation in February 2012). Designed in accordance with the ULVAC Group's design, construction, and operation standards for chemical treatment plants\*, this new plant will adopt the following new environmentally friendly cleaning methods: recycling of heat, water, and other resources generated from the operation of the plant's equipment as well as the use of new materials and technologies instead of the conventional chemicals.

Wastewater is to be collected by special chemical tanks and discharged in amounts below the statutory effluent limit by the new wastewater treatment equipment. The final

wastewater treatment tank is equipped with double monitoring sensors and automatic control valves to prevent the discharge of wastewater exceeding the limit from the plant.

At this new plant, with a total area of 4,000 square meters (which can be expanded as necessary), we will work to improve product quality, enhance productivity, and operational efficiency as well as promote cleaning line automation. The plant will offer full service to customers, including large equipment production, parts processing, technological development, process provisioning, and cleaning services. We hope this environmentally friendly plant will receive many orders.

\* Design, construction, and operation standards for chemical treatment plants: The ULVAC Group's standards intend to ensure that plants handling surface treatment and cleaning operations that use acids and alkali have environmentally-conscious designs and are safely built and operated with minimal environmental impact.



### Outline of the New Plant

- Location:** On the premises of ULVAC (Suzhou) Co., Ltd., No. 277 Suhong East Road, Suzhou Industrial Park, Suzhou City, Jiangsu Province
- Construction Schedule:** April 2011 start, December 2011 completion
- Building:** One-story plant with a total floor area of 4,000 m<sup>2</sup>

### ULVAC (Shanghai) Trading Co., Ltd.

Sale and customer support for ULVAC products in China



### ULVAC (Suzhou) Co., Ltd.

Production and sale of vacuum equipment, devices, and components in China



Cleaning Department, Suzhou Branch, ULVAC (Shanghai) Trading Co., Ltd.  
Tang Jian-Ming, General Manager (center)  
Zhou Ming-Hua, Deputy General Manager (left)  
Wang Bin, Manager (right)

## Targets of ULVAC environmental initiatives and FY2010 results

Initiative item	Environmental policy	Action item	ULVAC environmental initiative target	FY2010 results	Evaluation	FY2011 environmental initiative target
Environmental contribution through our products	To provide products that help save energy and resources and protect the environment	Distribution of products contributing to the environment/re-use of resources	Expanding sales of eco-friendly products	We actively participated in exhibitions and trade fairs and promoted our products. We installed photovoltaic quick-charging systems on Yakushima Island and other locations. We also installed quick-chargers in various locations, contributing to an approximately 20,000 kg annual reduction in CO <sub>2</sub> emissions	○	Expanding sales of eco-friendly products
		Green procurement	Completing elimination of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE by July 2011	Some of the products of the Components Division and the Materials Division now comply with RoHS	△	Completing elimination of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE by July 2013
	To promote energy and resource savings and environmental protection in products (equipment and components)	Energy savings through production processes and products	Reducing energy consumption of products	We gathered data on our equipment's energy consumption while in use and examined how to reduce such consumption. We will apply our findings in our products	○	Reducing energy consumption of products
Environmental contribution at our plants and offices	To promote energy and resource savings and environmental protection in production processes	Practicing the 3Rs	Recycling raw materials	We examined recycling of various target raw materials. For some target materials, we established a procedure from the solution to the recycling stage	○	Recycling raw materials
			Recycling and reduction of waste	We successfully improved the efficiency of waste recycling by reviewing the waste treatment method in the Chiba area. We lowered the landfill rate in the Chigasaki and Susono areas to below 3%	◎	Recycling and reduction of waste
		Resource savings	Improving yield of materials	We improved the yield of long MoTi products. We will reflect the higher yield by reducing costs	◎	Improving yield of materials
		Improvement of the plant and office environments	Reducing usage of harmful chemicals	We improved the safety of the specialty gas by strengthening usage management. Through proper use, we reduced wasteful use of such gas	○	Reducing usage of harmful chemicals
		Energy savings	Reducing energy consumption	We upgraded the heat source equipment at the Institute of Semiconductor & Electronics Technologies, reducing energy consumption by approximately 20% in crude oil terms	◎	

◎ Target achieved ○ Target 70%+ achieved  
△ Target 50%+ achieved × Target less than 50% achieved

## Environmental performance of the ULVAC Group

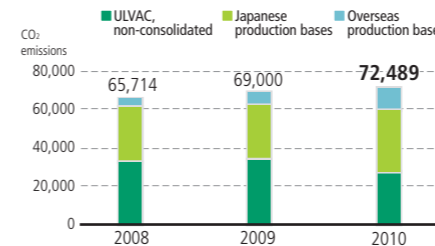
The ULVAC Group consists of about 60 domestic and overseas companies, each of which is committed to conserving energy and resources. We will continue to strive to use resources effectively and conduct our businesses in an environmentally friendly manner.

### Towards more efficient use of energy

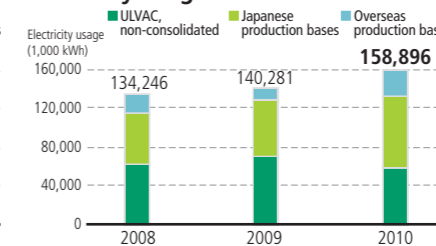
The ULVAC Group promotes energy conservation at its R&D and production sites. In FY2010, the group's overseas

energy use increased by 194% due to both steady production and the expanded scope of companies targeted for calculation. On the other hand, the group's domestic energy use dropped to 96.4% of the previous year's level thanks to stricter energy management. As overseas production is expected to continue to increase throughout FY2011, improving overseas energy use efficiency remains a challenge. We will continue our efforts to reduce energy use.

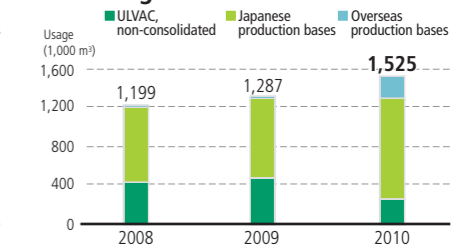
### CO<sub>2</sub> emissions trends



### Electricity usage trends



### Water usage trends



### Material balance (ULVAC Group)

INPUT		OUTPUT	
<b>Electricity usage</b> 158,896,000 kWh	<b>Fuel usage</b> ● Heavy oil: 1,178 KL ● Kerosene: 69 KL ● Light oil: 89 KL	<b>Chemical substances (PRTR-listed)</b> 275 t	<b>CO<sub>2</sub> emissions</b> 72,489t-CO <sub>2</sub> Caused by use of electricity, gas, and fuel
<b>Gas usage</b> ● PG: 130 t ● LNG: 746 t ● City gas: 1,939 t	<b>Water usage</b> 1,525,000 m <sup>3</sup>	<b>Packaging</b> 1,168 t	<b>Total waste emissions</b> 7,586 t
			<b>Landfill rate</b> 7.2%

\* This data is based on individual data from major Japanese production bases (19 sites), overseas production bases (26), and R&D bases (4).  
\* Data for overseas production bases comes from 11 of the 26 such bases.  
\* Data for packaging is the total from 16 of the 44 sites.

Topics

### Accolades for our contributions in reducing greenhouse gas emissions

#### Recipient of the first "Kanagawa Award for the Prevention of Global Warming"

ULVAC won the first "Kanagawa Award for the Prevention of Global Warming" in the Greenhouse Gas Reduction Technology Development Category for our development of a photovoltaic quick-charging system for electric vehicles. This award is given to enterprises, organizations, or individuals that have made excellent achievements toward greenhouse gas reduction. In this case, ULVAC developed the first photovoltaic quick-charging system in the prefecture and installed the system in Chigasaki's municipal parking area. The award is in recognition of our efforts to develop charging infrastructure for electric vehicles and promote the use of natural energy.

At the first awards ceremony, 10 companies received an award in the Greenhouse Gas Reduction Performance Category while 5 companies received an award in the Greenhouse Gas Reduction Technology Development Category. ULVAC entered the contest upon the recommendation of Chigasaki City and was the only winner among the 15 winners to be recommended by a public institution.



Director Yamamoto (left) receiving the award from the then governor of Kanagawa Prefecture

### Saving electricity with renewable energy: solar and wind power

#### Developing a battery charging station for power-assisted bicycles

ULVAC developed and launched the Hybrid Cycle Pit, a battery charging system for power-assisted bicycles that integrates a small wind power generator, a solar power generator, and a battery charger.

The system's lithium-ion secondary battery makes it possible to offer 24-hour charging service using only clean energy (no commercial power supplies are necessary). The system can charge the batteries of up to 5 power-assisted bicycles at once, and as many as 10 bicycles per day. The electricity stored in the secondary

battery can also be used as emergency power.

The ULVAC Group will augment our product development efforts and business activities in order to realize a sustainable society using clean, renewable energy.



In July 2011, a ceremony to mark the opening of the Hybrid Cycle Pit was held in Chigasaki Park in Chigasaki City, Kanagawa

### A distinguished natural heritage with a quick-charging station

#### Installing an electric vehicle quick-charging station with a power storage function on Yakushima Island, a World Natural Heritage Site

ULVAC installed an electric vehicle quick-charging station with a power storage function in the parking area of Kurio Beach in Yakushima Town, Kagoshima Prefecture. This system generates power using a combination of solar panels (5 kW) and a commercial power supply, storing the generated power in a lithium-ion battery. Its quick charger is capable of charging the batteries of electric vehicles to up to 80% of their full charge capacities in about 30 minutes.

This station can also be used as an emergency power system in the same manner as the battery charging station for power-assisted bicycles (above).

To accommodate foreign tourists to Yakushima

Island, the charging service is made available in four languages (English, Chinese, Korean, and Japanese). ULVAC hopes that this charging station will help reduce CO<sub>2</sub> emissions and conserve the island's rich natural environment.



Electric vehicle quick-charging station with a power storage function



The monitor offers a choice of four languages

## Chemical Substance Management

The ULVAC Group is committed to properly managing the various chemical substances used in the research and development as well as production processes of products and parts.

### Elimination of RoHS-Listed Substances

The ULVAC Group worked hard to eliminate RoHS-listed substances from our procurement items and products with an initial deadline in 2006 and a second deadline in 2008, but we were unable to fully achieve elimination before these deadlines. The third deadline was set to June 2011.

By this time, we were able to raise the RoHS conformity rate of our 1.6 million procurement items to 99.8%.

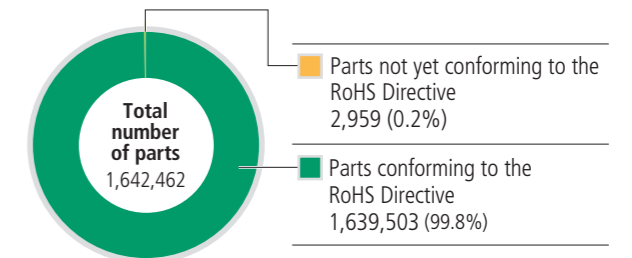
As for the number of products, however, 2,731 products (approximately 30%) conform to the RoHS Directive.

The remaining 70% of non-conforming products include many large devices composed of thousands or tens of thousands of parts. In some such non-conforming

devices, conforming parts account for 99.8% of all parts.

Unfortunately, we have yet to fully eliminate RoHS-listed substances, but we will review our targets and continue elimination efforts with our goal of passing a healthy environment to the next generation.

#### Promoting conformity to RoHS of registered parts



### Toward Proper Management of Chemical Substances

The Tsukuba Institute for Super Materials researches and develops new materials, functions, and better deposition processes. Consequently, it handles many kinds of chemical substances as well as nanomaterials, such as carbon nanotubes.

To reduce the risks involved in the use and storage of chemical substances, the institute collects MSDS\* and other hazard and toxicity information as well as safety information, assessing the risks of each research and development effort in advance. The March 11 Great East Japan Earthquake was sufficiently large to destroy the welds and wires of the tip-resistant fittings of the chemical storage cabinets, but the cabinets did not fall, thereby protecting the stored chemical substances. I believe this is evidence that the personnel responsible for

chemical substance management at each laboratory are storing chemical substances using the most suitable method for each kind.



The earthquake damaged the earthquake-resistant fittings of this chemical storage cabinet.



Takahiro Nakayama, Tsukuba Institute for Super Materials

\*MSDS: Abbreviation of material safety data sheet. Such sheets contain information necessary for safely handling chemical substances.