Mitsubishi Electric Group

Environmental Sustainability Report 2004

Changes for the Better

MITSUBISHI ELECTRIC CORPORATION

www.Global.MitsubishiElectric.com

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MITSUBISHI ELECTRIC

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Mitsubishi Electric Group Environmental Action Logo

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Mitsubishi Electric Group Environmental Sustainability Report 2004

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c o n t e n t s

Corporate Philosophy

The Mitsubishi Electric Group strives to improve its technology, services and creativity, to contribute to the attaining a more vigorous, affluent society.

Seven Guiding Principles

1. **Trust**
   Forge relations of strong trust with society, customers, shareholders, employees, vendors and other stake-holders.
2. **Quality**
   Strive to supply the best possible products, services and quality.
3. **Technology**
   Promote research and development and technical innovation, working to pioneer new markets.
4. **Citizenship**
   Contribute to the development of the community and society as a global company.
5. **Compliance**
   Observe the accepted norms and standards in all aspects of corporate activity and conduct.
6. **Environment**
   Respect nature, and strive to preserve and enhance the global environment.
7. **Growth**
   Secure appropriate profits, and establish a solid foundation for corporate development.

Report Coverage

Target period: April 1 2003 ~ March 31, 2004
Target companies: Mitsubishi Electric Corp. and 84 affiliates (63 domestic, 21 overseas)

Editorial Policy

The Mitsubishi Electric Group published its first Environmental Sustainability Report in 1998, and last year expanded the scope of the information to include commentary on corporate social responsibility. Further included in this 2004 edition, meanwhile, is a section addressing "compliance" – another step to enhance the value of the disclosed information as a social report. To create a communication tool appealing to a broad range of readers, the information has been carefully selected, accompanied by the generous use of tables and photographs, presentation of various collected data and other features supplied in a format easy to read and understand.

Finally, to gain reader understanding of the company's basic stance on craftsmanship – namely, "Contributing to the environment through product and business activities" – a special feature section has been newly added to present the "ideas" of the engineers involved in development design work.

Reference Guidelines

"Environmental Report Guideline" (2003 Edition) – Ministry of the Environment
"Business Owner Environmental Performance Indicator Guideline" (2002 Edition) – Ministry of the Environment
"Environmental Reporting Guideline Emphasizing Stakeholder Importance 2001" – Ministry of Economy, Trade and Industry
"Sustainability Reporting Guideline 2002" – Global Reporting Initiative

Changes for the Better
Mitsubishi Electric Group Environmental Management – Our Legacy of Growth and Progress –

Our Common Fate Aboard "Spaceship Earth"

When the term "Spaceship Earth" was first coined over three decades ago, I was stirred by the penetrating wisdom of the concept.

At that time in my career, I was directly involved in research to develop more efficient energy use, with this new expression underscoring the weight of my own personal work. With Japan at the end of the high growth period that characterized its postwar era, the nation had clearly obtained economic affluence. Yet, gazing at the dark, stagnant and putrid smelling rivers and other grim byproducts of this progress, this was also a time of somber and repeated introspection into the viability of our approaches to the economy, technology and other sectors.

Today, fish once again populate the rivers of many Japanese cities, with growing evidence that we are moving toward the resolution of local environmental issues. On the other hand, global warming and other macro-level environmental problems continue to grow in scale and complexity, prompting the inevitable conclusion that the time is now right to once again reexamine our shared journey, and common fate, as passengers aboard "Spaceship Earth."

Meaningful Action and Contributions

The Mitsubishi Electric Group, naturally, is one of the passengers on "Spaceship Earth," with our own business activities part of the journey and the destination of the craft. Taking this understanding to heart, we have not only succeeded in supplying energy conserving products, but also grown more energy efficient in all areas of our plant operations. We have developed water treatment processes through the use of ozone and other innovative technologies, in moving to reduce the impact of our activities on the ecosystem.

On this front, the greatest contribution of our Group is the supply of environmental-conscious products and services for which energy efficiency has been heightened on the strength of sophisticated engineering developments, together with the vigorous creation of technologies that contribute to sound environmental solutions.

Simply put, ours is the quest to mobilize technology and wisdom to transform "Spaceship Earth" into a more comfortable and reassuring place to live. The awareness of the weight of this responsibility, and the willingness to take action toward that end, comprise the essential environmental management commitment of the Mitsubishi Electric Group.

Continually Innovate for the Better

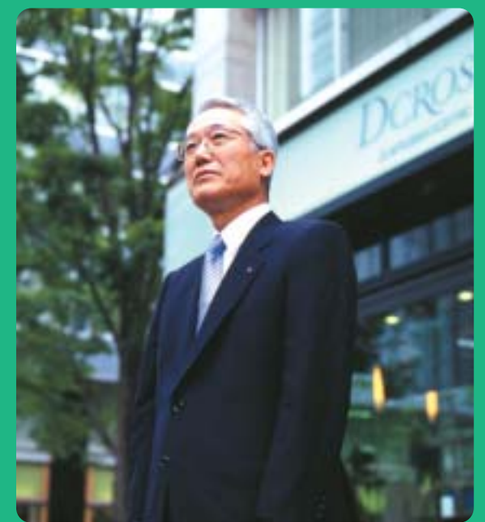
Harmony between economic prosperity and the environment – this is a critical shared theme of all people alive today. The road to this end, however, will be anything but smooth. In fact, from the many years that I personally spent as a researcher, I am keenly aware of the tremendous struggle that is certain to accompany the pursuit of this mission.

True to our corporate statement, "Changes for the Better," it is the resolve of the Mitsubishi Electric Group to "continually innovate for the better." From that solid foundation, we pledge to carry on the task of accumulating a portfolio of steadfast and progressive eco-friendly activities from here on as well.

Fostering Greater Mutual Understanding

In this, our Sustainability Report 2004, we are pleased to introduce the numerous programs and plans that the Mitsubishi Electric Group is advancing as a responsible and contributing corporate citizen, and as a passenger on board "Spaceship Earth." It is our sincere hope that these pages will foster greater mutual understanding and support between those of us in the Group, and all our precious stakeholders.

Finally, in the interest and spirit of raising our environmental-conscious stance to even greater and more effective heights, we welcome your candid comments and opinions on the contents of this report, and any and all aspects of the philosophy and endeavors of the extended Mitsubishi Electric Group.



June 2004

Tamotsu Nomakuchi
President and CEO

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Business Overview and Corporate Profile

Energy and Electric Systems

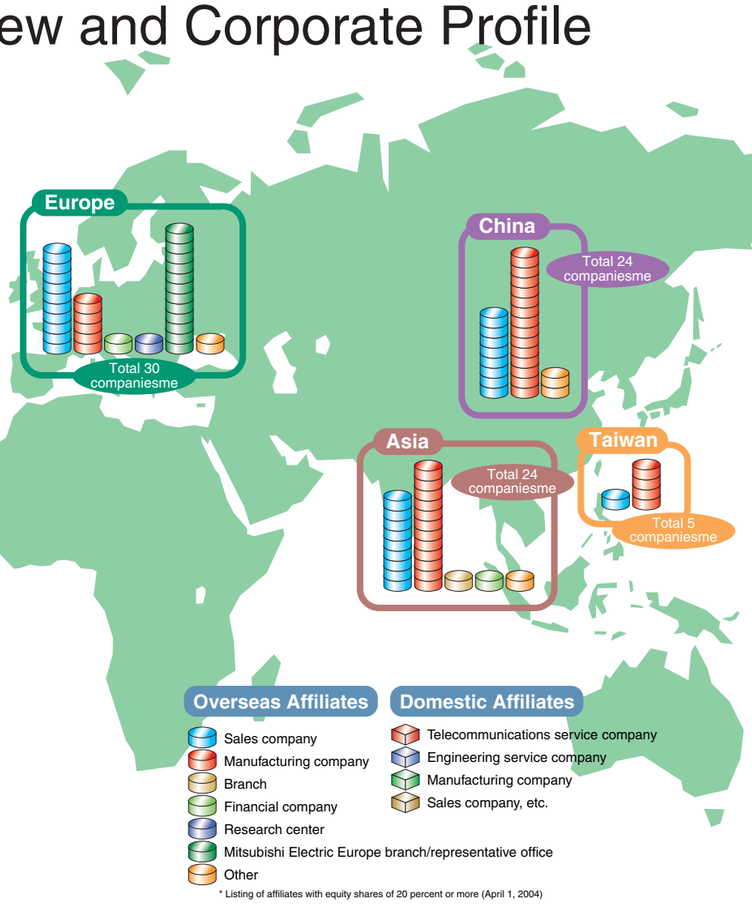
Turbine generators, water-wheel generators, nuclear-power equipment, electric motors, transformers, power electronics equipment, circuit breakers, gas insulated switchgears, supervisory control and protection systems, transportation equipment, elevators and escalators, others.

Outdoor-type panorama view elevator for Nanba Parks Building, Osaka
Securing an open and unenclosed elevator tower achieves unity with the sound, light and images emerging from the building itself. This development has attracted attention as a "charismatic elevator."

Industrial Automation Systems

Programmable logic controllers, inverters, servo motors, Factory Automation systems, electric motors, hoists, electro-magnetic circuit breakers, no-fuse breakers, earth leakage breakers, distribution transformers, electric meters, industrial sewing machines, numerical controllers, electrical-discharge and laser-processing machines, industrial robots, clutches, car audio, car navigation, electrical automotive equipment, engine management systems, others.

AC Servo MR-J3 Series
New-generation, general-purpose AC servo showcasing industry top-level high function and performance, contributing to improved productivity in semiconductors, liquid crystal and electronic devices.



Overseas Affiliates

- Sales company
- Manufacturing company
- Branch
- Financial company
- Research center
- Mitsubishi Electric Europe branch/representative office
- Other

Domestic Affiliates

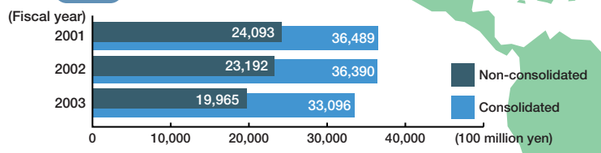
- Telecommunications service company
- Engineering service company
- Manufacturing company
- Sales company, etc.

* Listing of affiliates with equity shares of 20 percent or more (April 1, 2004)

Company Profile (March 31, 2004)

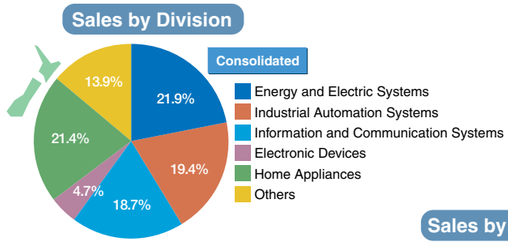
Name	: Mitsubishi Electric Corporation
Head Office	: Mitsubishi Denki Building, 2-2-3 Marunouchi, Chiyoda-ku, Tokyo 100-8310, Japan
Established	: January 15, 1921
Paid-in Capital	: 175.8 billion yen
Employees	: 98,988 (consolidated) 28,881 (non-consolidated)
Sales	: 3.3096 trillion yen (consolidated) 1.9965 trillion yen (non-consolidated)

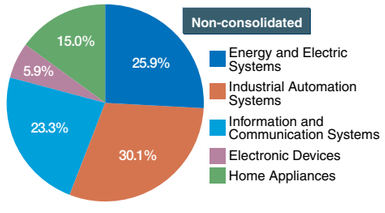
Sales



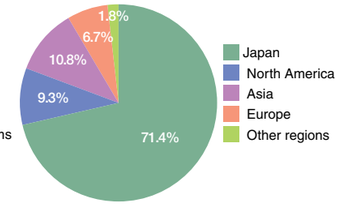
Fiscal 2003 figures include the effect of spinning off the LSI-focused semiconductor business, electric power and system transforming business, and manufacturing industry plant electrical equipment business into branch companies, transformation of domestic finance companies into equity method affiliates, etc. (consolidated sales decline of approx. 423 billion yen).

Sales by Division





Sales by Division



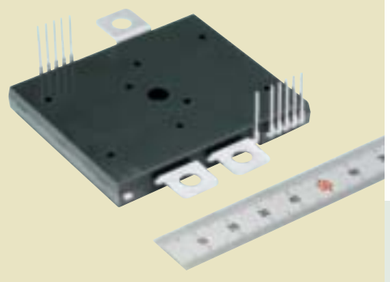
Information and Communication Systems

Wireless communications equipment, mobile handsets, wire communication equipment, satellite communication equipment, satellites, radar equipment, antennas, defence equipment, medical electronic equipment, broadcasting equipment, data transmission equipment, data transmission equipment, mainframe computers, servers, office computers, personal and mobile computers, peripheral devices, others

Mobile Phones
Mitsubishi Electric proposes innovative new-use styles geared to the full-scale arrival and expansion of third-generation services, terrestrial digital broadcasting and other advances, contributing to higher added value of the mobile phone.

Electronic Devices

Power modules, high-frequency devices, optical devices, CRTs, LCD devices, printed-circuit boards, others.



Transfer Mold Type*
High-Capacity Power Module CT300DJB060
Semiconductor adopting a new, high heat radiation insulation structure, realizing eco-friendly lead free content, while contributing to downsizing and cost reduction in motor drive systems.
* Molding method distinguished by the injection of heated and pressurized resin into heated molds.

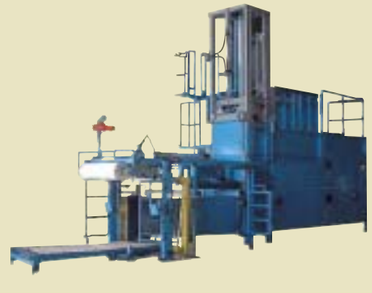
Home Appliances

Color televisions, projection televisions, video projectors, VCRs, DVD-related products, room air-conditioners, package air conditioners, refrigerators, fan heaters, electric fans, washing machines, ventilators, photovoltaic power generating systems, electric water heaters, fluorescent lamps, lighting fixtures, clean heaters, compressors, freezers, humidifiers, dehumidifiers, air purifiers, air-conditioning systems, commercial refrigeration units, vacuum cleaners, microwave ovens, others.

"Kirigamine" ZR Series Room Air-Conditioner
Features circulation of antioxidation components extracted from rosemary to every corner of the room, harnessing natural herbal power to suppress active oxygen generation and maintain healthy interior air quality.

Others

Finance, distribution, real estate, advertising/publicity, materials procurement and other services, materials, others.



"Lacruz" Fully Automated "Other Plastic" Volume Reducing Packing Machine
Engineered to reduce the volume of the waste category of "other plastic" unsuitable for recycling, to remove residue and other substances, and then to seal and package the plastic to create blast furnace recyclable materials.
Nakayama Machinery Co., Ltd.
Website: http://nakayamakikai.co.jp/
E-mail inquiries: info@nakayamakikai.co.jp.

Nurturing and Growing Together, Toward a Brighter Tomorrow

Bringing the “Flowers of “MET” to bloom on the tree of environmental management, to harvest the rich fruits of eco-products.

In rising to the universal challenge to forge a “sustainable society,” the Mitsubishi Electric Group believes we can make the greatest contribution by channeling the “technology,” “service” and “creativity” cultivated over the decades into “eco-products.” Simply stated, our goal is the vigorous supply of expertise and products that protect and improve the natural environment.

Working from this cone environmental philosophy, we have designated “Bringing the flowers of MET to bloom” as the watchword for our eco-friendly corporate stance. By “MET,” we mean “Materials” (effective use of resources); “Energy” (efficient use of energy); and “Toxicity” (reduced use of substances potentially harmful to the environment). Through these three pivotal perspectives, we aim to steadily reduce the environmental impact of the wide-ranging business activities and products of the Mitsubishi Electric Group.

To bring the “Flowers of “MET” to bloom, and harvest the rich fruits of eco-friendly technology and products, we are determined to grow the tree of environmental management straight and tall, constantly moving forward together toward a brighter, more rewarding tomorrow.

Core Environmental Policy

Under the international principle of “sustainable development,” the Mitsubishi Electric Group is committed to protecting and improving the global environment through all business activities and employee actions utilizing knowledge accumulated in the past as well as technologies yet to be developed.

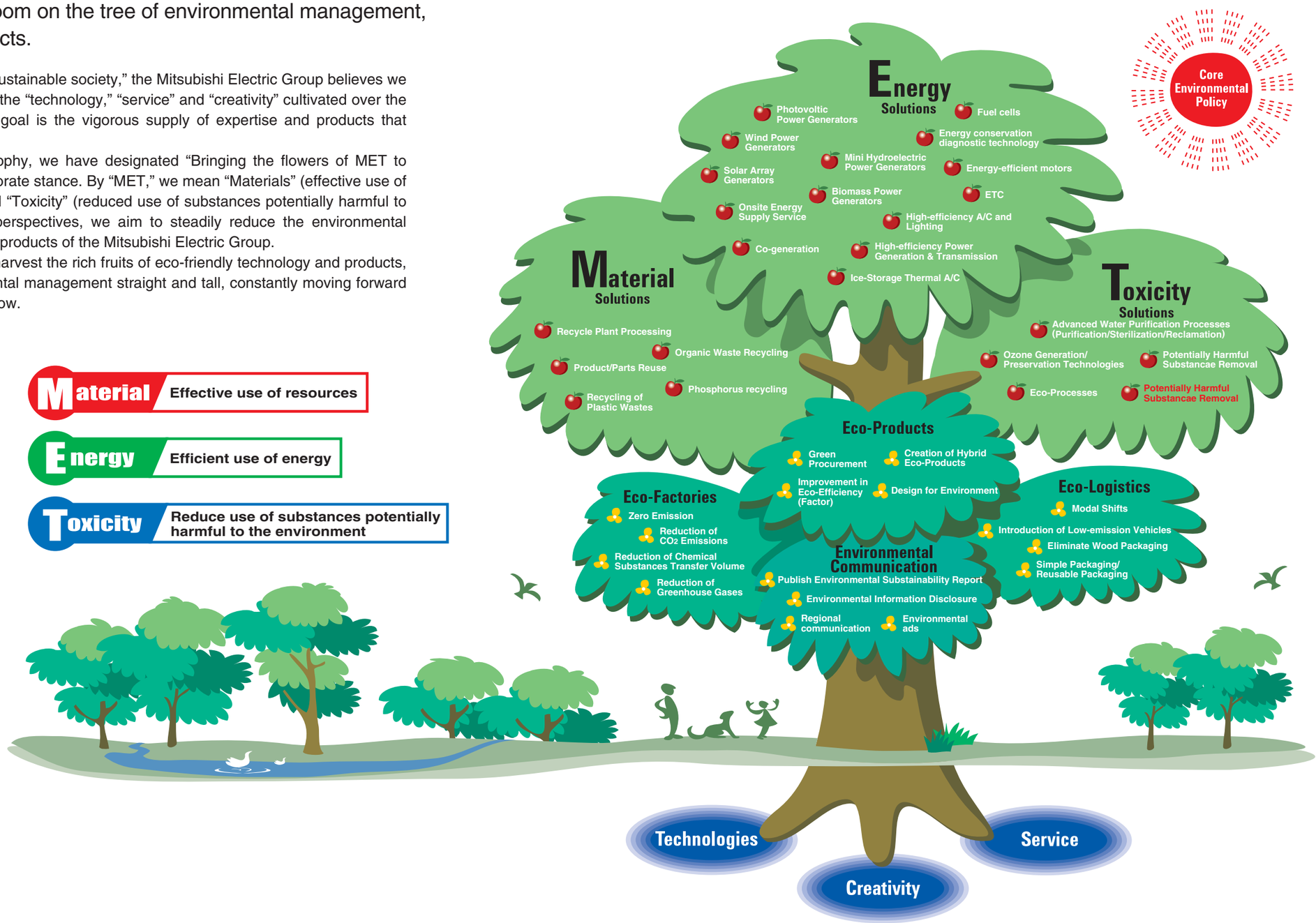
Environmental Code of Practices

1. We will strive to reduce any negative environmental impact resulting from our products and activities. We will develop technologies and processes that are compatible with the environment. Products will be fully assessed over their entire lifecycle, and our facilities will promote resource efficiency, conservation and recycling.
2. We are committed to understanding environmental problems and contributing to a universal awareness of the need for businesses to integrate their activities with the natural cycles of nature.
3. We will establish environmental management systems at all of our business sites and operate them according to accepted standards. At the same time, we will continually improve environmental controls through environmental audits and similar methods.
4. We will educate, train and motivate employees to be good environmental stewards in their own right, as well as support employees when they engage in activities that promote environmental protection.
5. We will foster active communication and cooperation regarding environmental protection worldwide.

Material Effective use of resources

Energy Efficient use of energy

Toxicity Reduce use of substances potentially harmful to the environment



From the following page, we are pleased to introduce an example of the “Flowers of MET,” blooming in unforeseen places, with examples of “eco-products” and “eco-technology” that are beginning to bear veriable fruit.

Creating Eco-Products!

* "Factor" is the benchmark for product environmental improvement. See page 23 for details.

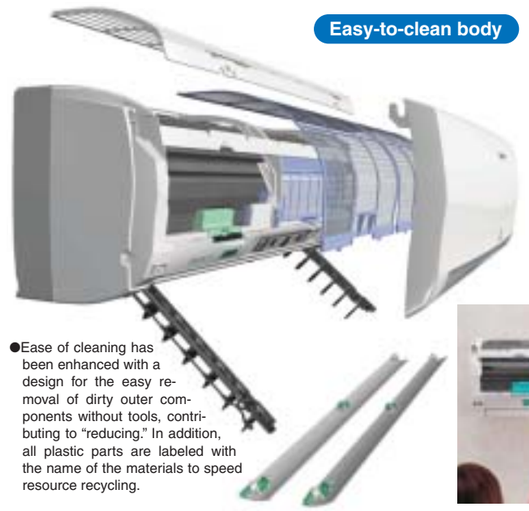
▼ "Kirigamine" ZR Series Room Air-Conditioner

***Factor 1.74**
Performance F1.085 × Environmental F1.606

We constantly strive to reduce the environmental impact of our air-conditioners throughout their entire service lives.

Environmental engineering from the customer's perspective

▲ Performance Testing Laboratory



●Ease of cleaning has been enhanced with a design for the easy removal of dirty outer components without tools, contributing to "reducing." In addition, all plastic parts are labeled with the name of the materials to speed resource recycling.

Yoshihiro Tanabe
Shizuoka Works
Engineering Section
Room Air-Conditioner Manufacturing Department

The "Kirigamine" room air-conditioner series features product design rooted in the reasonable demand to reduce negative environmental impact at manufacturing, and save more energy during use. Furthermore, maintaining clean operation for the maximum years of use, as well as realizing efficient recycling and reuse after end of life, are key considerations. In this section, Yoshihiro Tanabe, a Mitsubishi Electric designer known for his tenacious pursuit of people-friendly air-conditioning quality and performance, introduces the Kirigamine Series.

Maintaining Cleanliness to "Reduce" (Curb Disposal)

We have conducted a steady series of "scrapped product studies" since about 1998. At actual recycling plants, there were spent consumer electronic products that had been disposed of, and we arrived at the conclusion that, "It is necessary to adopt designs that facilitate easier product dismantling." For example, more than two-thirds of the discarded air-conditioners remained serviceable as products, but were dirty inside, smelled bad, performed poorly due to dirt and grime and so forth.

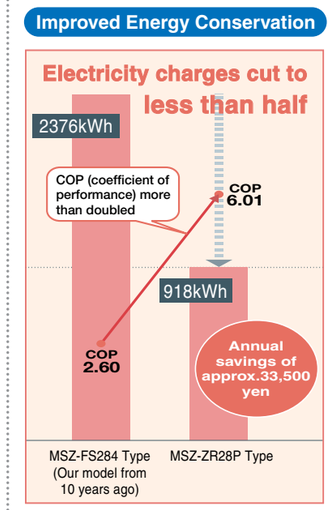
According to the results of a certain purchase motivation survey, meanwhile, on replacement purchase demand (which accounted for 53% of the total), some 16% cited "breakdowns" as the reason for purchasing a new product. The leading reason given in this category was "Dissatisfaction because the product is old," at 24%. Specific causes of this dissatisfaction included "decline in capacity" and other reasons, often including worsened capacity resulting from dirt inside the air-conditioner unit. While, ideally, the filter should be cleaned once every two weeks, many customers only clean it once a season. From the customer's standpoint, therefore, "eco-friendly products" refer not just to energy efficiency, but also to keep the inside of the air-conditioner itself clean."

Emerging from this perspective, therefore, was the "easy-to-clean body" based on ease of cleaning and recycling, the "3D clean filter" to prevent dirt from getting inside the air-conditioner in the first place, the "plasma ventilation interior clean" function to automatically clean the interior after use, and other developments. These concepts are the results of focusing our attention and expertise on the need to curb the disposal of these products.

Energy Conservation Begins from Proposals for "Performance + Ease of Use"

What is energy conservation, after all? An example is the "Double Floor Temperature Sensor." This is a function in which two separate controlling floor temperature sensors are mounted on an indoor unit to provide comfortable airflow in rooms being used, while realizing energy efficiency at the same time. The conventional approach has been to treat the temperature at the intake port as the room temperature. Now, however, with the Double Floor Temperature Sensor able to distinguish floor temperature distribution, controls are used to warm the room from the legs down during heating, while avoiding excessive chilliness during cooling. The result is energy savings of about 20%. Add area air-conditioning that only operates when necessary, and the savings climb by a further 10%. All manufacturers naturally channel efforts into raising product energy consumption efficiency in terms of the COP (coefficient of performance). With the design of the Kirigamine, however, we are proud of taking our efforts a step beyond, based on concern for the condition after the product is in the customer's hands. In this respect, we hope that the expanded use of the current Kirigamine will pave the way to greater overall energy conservation.

The volume of electricity used in today's products is roughly half what it was just 10 years ago, thanks in great part to the advances in inverter technology. The "Poki Poki Motor" (see page 13), a Mitsubishi Electric original used as a compressor, also contributes to this improved performance.



●Energy consumption efficiency (COP) more than doubled. Electricity charges fell to less than half the level of a decade ago.

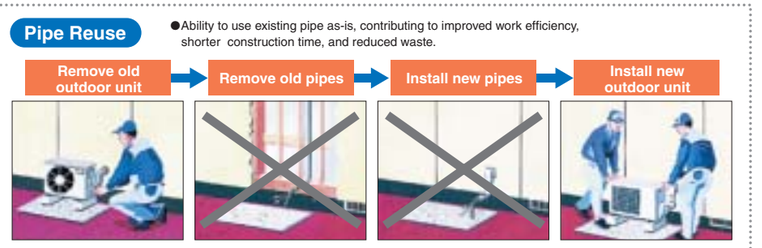
Reuse of Pipes and Recycling

Turning to our air-conditioner refrigerants, because the use of the chlorofluorocarbon R22 is destructive to the ozone layer, we have switched to the new refrigerant R410A. However, because changing the refrigerant also means changing the refrigeration oil, the standard approach when making such a move is to replace the pipes as well. Leaving the oil used in the old refrigerant model inside the pipes, however, causes deterioration, clogging and other problems for the oil used in the new refrigerant model. With our new refrigerant-use model, the existing pipes may be reused in both domestic and commercial applications. This breakthrough was made possible through the new development of refrigeration oil and other Mitsubishi Electric original "replace" technology. Reusing the existing pipes plays a key role in both reducing the volume of scrap materials and curbing the consumption of new materials.

With recycling, meanwhile, there are numerous issues to be addressed. For air-conditioners, the plastic in indoor units poses a problem. For example, many different types of material are used, and coating these items makes it impossible to reuse them. We are targeting this problem by reducing the types of plastic used as much as possible, using the interlocking method and other means of reducing the number of attachment points. Proper labeling of materials is also important, and we meticulously illustrate the dismantling markings on the product (see page 20) to raise the product-recycling rate. At present, we adopt recyclable plastic materials made from our refrigerator vegetable cases on the panels of the Kirigamine outdoor unit, and are working hard to promote recycling designs that are even more effective.

Getting Eco-Friendly from the Upstream Side, While Considering Environmental-Risk Substances

In aiming for an eco-friendly society, it is important to consider the handling of environmental-risk substances. At present, through the strong partnerships forged with our suppliers, we are studying the harmful substances contained in the materials and parts purchased. We base this program on our Green Procurement Standards, in promoting activities to reduce the environmental impact from the purchasing stage. Beginning with the current fiscal year, we have moved to lead-free soldering for the electronic substrates used in all major models.



Creating Eco-Products!

▼ Coil winding process (displacement)

Rough handling at assembly will prevent optimum performance. At the plant, though, you can not afford to plod along at a leisurely pace!

In reality, the top runner energy-stingy transformer was a hidden flower!

Hideo Matsubara Nagoya Works
Transformer Design Section
Power Distribution Control Manufacturing Department

Transformers make it possible to safely use high-voltage currents of several 10 thousand volts sent from transformer substations at the workplace or in the home. These units play a key role in the power receiving equipment of buildings and plants, utility poles and various other locations. For the secrets of the development of the “Super High-Efficiency Oil-Filled Transformer EX/TX Series,” the “top runner” transformer boasting stellar energy efficiency, we turned to Hideo Matsubara, a designer who has devoted the past eight years to perfecting transformers.

Factor 1.14
Performance F1.000 × Environmental F1.141

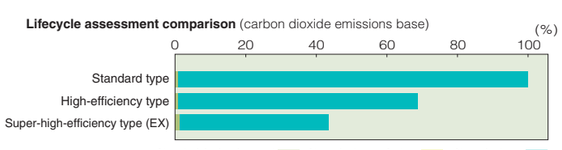
▲ Super High-Efficiency Oil-Filled Transformer EX/TX Series

Materials and Design Cut Total Loss by 60%

Because transformers are essentially simple machines, there has been little if any innovation in terms of principles, functions or other fundamental points. The true proving ground for success with transformers, therefore, lies in raising their energy efficiency – in other words, harnessing technologies to reduce loss.

In developing the EX Series, our most energy-efficient transformer, we engaged in repeated technical exchange with materials makers, with long debates over the best design. The stator core consists of a stack of electromagnetic steel plates. However, when we divide it up into several parts and measure the magnetic flux, we find that the flux varies widely from spot to spot. To control loss, therefore, it is important to advance design considering the differences in magnetic flux at the stator core outer and the inner circumference. It is also important to change the vertical and horizontal ratio (width and depth) without changing the stator core cross section. However, when the shape of the stator core is changed, there are also changes in the configuration of the coil that is wrapped around that core, with the loss generated at the coil also varying. Because of this, it is critical to create a design that reduces the total loss. Yet, since we have not traditionally designed from that perspective, this renewed our appreciation of the importance of design analysis. Furthermore, because electromagnetic steel plate is recyclable in the same way as ordinary steel, we use that steel plate as the stator core material. This material, then offers ample potential for further technological innovation.

Lifecycle assessment comparison (carbon dioxide emissions base)



Reforming the Workplace and Customer Awareness is Vital

In this way, we chose a “magnetic domain control electromagnetic board” as the new stator core. However, when we moved into the pilot production stage, we were just unable to realize the characteristics congruent with the design. Looking for what was wrong, we found that the workplace was handling the new model in the same way as the conventional model. Hastily putting the units together resulted in bent parts being used, deformation during transport and other problems. With the new product, however, the steel plate that serves as the stator core material was around 30% thinner than the conventional version, with most of the materials being extremely delicate.

A key point in this work is the degree to which stress can be removed from the assembly process. We explained this to the plant workplace to encourage workers to change their goal from quickly turning out the finished product. Instead, we taught them to “consider the importance of characteristics in handling.” I must say, though, that. Getting the workers to appreciate rough handling of this transformer detracts from its performance, and that it is simply different from the conventional model, turned out to be a series of squabbles and standoffs to say the least! (laughs).

In the same light, it is also essential to gain the understanding of the customer. A transformer has a long service life, and focus needs to be placed on its overall lifecycle rather than just the initial stages. The EX Series involves much time and work, as well as special materials, so, it is not cheap. However, the energy saving effects will pay back the initial outlay of large-lot users over a period of five to 12 years, with this performance also curbing environmental impact. At Mitsubishi Electric, therefore, we prepare and tender energy-efficiency proposals tailored to the transformer use of individual customers, striving to make the anticipated fruits of energy conservation visible.

With conductor soldering and electrode protection, building a “lead-free” cell took us an entire year.

Rising to the challenge of lead-free design for photovoltaic battery modules

Takeshi Takada Nakatsugawa Works
Module Technology Section
Photovoltaic Light Generation System Business Center

Factor 1.49
Performance F1.060 × Environmental F1.407

“Photovoltaic power generation,” now in the limelight as an attractive source of clean energy, is being increasingly used in homes and businesses alike. For the “photovoltaic battery module,” the true cornerstone of these systems, Mitsubishi Electric realized a lead-free mode to reduce the environmental impact at the production and disposal stages alike.

Eliminating Electrode-Protecting Lead

In photovoltaic power generation systems, most lead has traditionally been used to protect the photovoltaic battery module cell electrodes. A typical module measures 1.2 by 0.8m, with a frame thickness of 37mm, and rows of 40 photovoltaic battery cells each 15cm^2. The cells are made of silicon, and have electrodes using silver on the both the top and bottom. Because silver corrodes easily, the conventional approach was to use a lead solder coating to protect the electrodes. In our mission, we developed a new cell structure to enable all lead to be eliminated from the battery cells. The first step was the electrode paste, for which we used a newly perfected version where forming has been improved through ongoing joint research with materials makers. The electrodes are placed atop the silicone cells, and because the 300μm thickness of the cells makes them prone to breakage, they are protected with a layer of EVA (ethylene vinyl acetate). EVA is an excellent shock absorption material that is also lightweight and very resilient. In addition, while the cell surface (the side opposite the glass) was conventionally back coated with the fluororesin PVF (polyvinyl fluoride) film, we adopted the dual structure of PVF + PET (polyethylene terephthalate) to complement the move to lead-free with enhanced moisture resistance.

Performance that Stands up to Extended Use

Even with these design changes, it remains relatively simple to obtain initial use functions equivalent to those of conventional products. However, assessing whether the same level of performance will be achieved 25 or 30 years down the road is not nearly as easy. This led us to the question of how to fulfill the extended accountability now demanded of photovoltaic battery modules. Beginning from the establishment of the actual evaluation method, we carried out a rigorous testing schedule that required two- to three-fold the time devoted to JIS-standard testing. Because the module itself is too large, the testing was conducted on individual parts. Examples of this process include a heat shock test, in which surrounding environments of –40°C and +100°C were used at 30-minute intervals, at repetitions of 200 cycles. Another example is a water immersion test, in which the components were submerged in water of 80°C for two hours. The new-structure cells using the new electrode paste passed these and other tests with flying colors, with cost problems resolved and the products finally emerging in completed form. Development of this alternative method required a full year in all.

Because the photovoltaic battery cell is capable of making a stellar environmental contribution, our top priority lies in vigorously pursuring basic functions in the design process. Although the conversion efficiency fails to increase in direct proportion to the time and effort involved in this work, my goal is to continue improving the functions of photovoltaic battery modules.

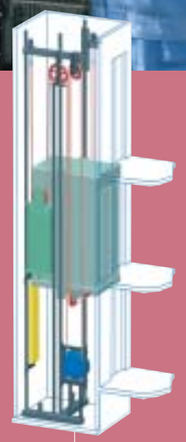
The quest for a perfect fit in the space between the elevator car and the wall was a fierce struggle, waged in millimeter units, between shaving size and maintaining strength. The result is the world's slimmest traction machine.

Designing an elevator without a machine room. But how does it move?

Inazawa Works **Akinobu Mori**
New Product Development Section
Development Department

With elevators and escalators, in what way is environmental impact being reduced? In this section, we talk to three young Mitsubishi Electric engineers engaged in elevator development design, to discuss the "ELEPAQ-i," an elevator designed to operate with no machine room. To repeat – this elevator has no machine room – at either the top or the bottom of the shaft. The secret is that both the traction motor and the control panel are installed in the space between the shaft wall and the car itself!

Hiroyuki Takagi Inazawa Works
Control Development Section
Development Department



◀ **Machine room-free elevator image**
The traction motor (blue portion) and the control panel (yellow portion) feature slim design that allow them installation between the shaft wall and the elevator car. As a result, there is no need for a machine room in the shaft. Eliminating the machine room on this Mitsubishi Electric elevator makes a handsome contribution to conserving saving space and resources.

Slim-type PM traction motor ▶

Inazawa Works **Naoyuki Maruyama**
Traction Machine Development Section
Development Department

Mori

Curbing Use and Emissions of Environmental-Risk Substances

For our eco-friendly elevator design, we started out by reducing the amount of vinyl chloride resin. Now, there are no parts on the standard model where the use of vinyl chloride is visible. Vinyl chloride used to be used on the walls, floors and ceilings, but this has been largely switched to polyester resin and acrylic resin. We are also moving to reduce the environmental impact of the painting process. At the Inazawa Works, there is a large painting line that ranks as one of a kind throughout the entire Mitsubishi Electric Group. With elevators demanding bright, eye-catching finishings, the trend has been to make heavy use of solvent-based paints with excellent color development. However, the toluene and other substances contained in solvents consist of volatile organic compounds (VOC) that contaminate the air, cause sick house syndrome and other problems. As such, they demand effective countermeasures. From the outset, we constructed a panel painting line using electrostatic paint (noted for its high transfer efficiency), and have adopted other ideas to cope with this problem.

We will continue to advance other measures as well, among them: (1) Eliminating the use of door panels with surfaces that require painting; (2) changing door reinforcing materials from welding to adhesion, eliminating the thick coats of paint required to repair welding warps; (3) conversion to VOC-free, water-based paint, and other steps aimed to slash the volume of solvent paint used. While the current conversion rate to water-based paint is about 10%, with the focus on undercoats, our current schedule is to shift to water-based paints for the finishing coats as well over the next two years.

For the chemical substance potentially harmful to the environment, we have completed our response for the design components, and are now advancing an effective approach for mechanical components as well. For example, we are steadily moving towards the use of materials that do not generate harmful gases when incinerated or cause lead elution following disposal, in addressing this challenge on all fronts as soon as possible.

Takagi

Downsizing the Control Panel into an Integrated Power Unit

For the elevator control panel, "lead-free and chrome-free," is the target and we are currently striving to achieve lead-free soldering. Besides the control panel itself, we have also changed the fixing method at both sides of the car suspension ropes (shifting from the Babbitt method of using lead to embed the wire to a caulking approach), and introduced other improvements.

Removing the machine room from an elevator enables downsizing of the various machine components, while the reduced installation space likewise contributes to resource conservation. It goes without saying, therefore, that lighter weight machinery also reduces the amount of drive energy used. On models before the ELEPAQ (marketed in 1998), the control panel was installed in the machine room at the top of the shaft. This allowed a panel width of 700mm, a depth of 400mm and a height of 1,400mm. No machine room means that the control panel must be sandwiched into the space between the shaft wall and the elevator car. The thickness (depth), therefore, can be no more than 100mm. We commenced development with this goal, but soon after read in a rival manufacturer's product catalog about a control panel of "only 100mm thick." That motivated us, and we quickly moved to change the design of the elevator car itself, working to build a control panel box even slimmer than that of our competitor. Our specific goal was a box of only 87mm in width.

To begin, we probed the existing problems. It soon became clear that the power supply containing a large transformer and an inverter – that is, the system used to adjust the voltage and frequency to ensure smooth operation – was taking up considerable space. We replaced the transformer with a switching power-supply technology based on a semiconductor device, while adopting a slim inverter at the same time. We packaged both systems into an integrated power unit. This facilitated a unified cooling response to the heat generated by the switching, and we also improved the cooling efficiency with an air duct design that introduced air from in front of the control panel and flushed out waste heat at the front. In this way, we realized our goal of 87mm thickness.

Further improvements have followed, with the cubic volume of the control panel on the current ELEPAQ-i (marketed in 2001) only 23%, or less than one-fourth, compared to when a machine room was used. This made a big contribution on the resource savings front. However, we could not afford to simply downsize. With maintenance ease ranking as another key concern, we also needed to overcome the stiff challenge of realizing high-density packaging that puts the needs of maintenance engineers foremost .

Maruyama

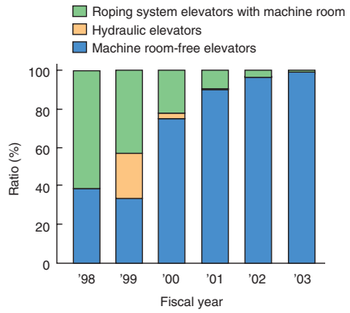
Compact, Lightweight Designs Reduce Environmental Impact

In terms of drive systems, elevators may be broadly divided into roping and hydraulic systems. With the roping system, traction mtors are used to move the elevator car up and down. At Mitsubishi Electric, we aimed for energy conservation from early on. From the standard spec "ELEPAQ" marketed in 1998, we have used the permanent magnet (PM) synchronized motor gearless traction machine.

The ELEPAQ traction motors is a pit-installed version. With the ELEPAQ-i marketed three years later, the depth of the pit was reduced by installing a slim traction motor with equipment thickness of only 187mm (or one-fifth the previous model) in the space between the elevator shaft wall and the car. Then, in 2003, we completed the world's slimmest PM gearless traction motor, only 159mm thick. In fact, the development goal at that time was to lower the thickness to below 160mm. At the prototype development stage, we actually succeeded in pushing the width down to 155mm. At the evaluation stage, however, we found ourselves locked in a tough struggle to shave thickness, one millimeter at a time. For example, we would add an inspection port, and then subject the unit to strength analysis. The weakened portion would be reinforced, which naturally increased the thickness. The next step was to carefully take off that portion, one millimeter at a time, being careful to remain within the range needed to satisfy the strength specs.

This slim traction motor was made possible by the "Poki Pok Motor" stator production technology, an exclusive breakthrough from Mitsubishi Electric. In terms of lowering environmental impact, the shift using control inverters from the 1980s made a solid contribution. In recent years, however, important sources of progress have included improved energy efficiency through the use of the aforementioned PM motor-type gearless traction machine, as well as slimming based on weight reduction. For instance, a 3.7kW-type traction motor was lightened from 450 to 300kg and then further to 230kg. This was yet another step in saving resources.

■ **Ratio of machine room-free elevators among Mitsubishi Electric standard type elevators**



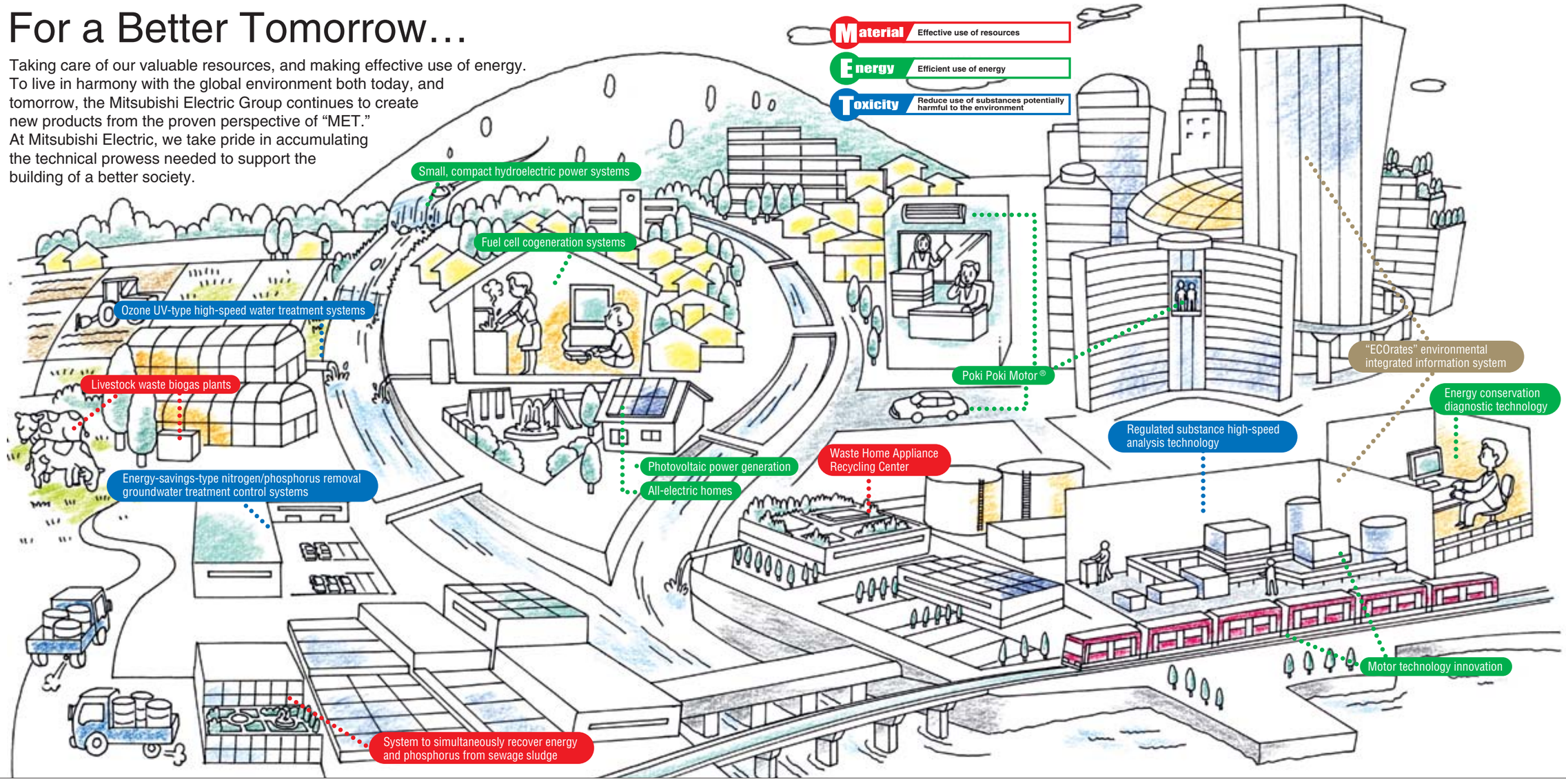
■ **Mitsubishi Electric elevator energy conservation**
(Treating elevators in the early 1970s as 100)

Model \ Year	'70	'75	'80	'85	'90	'95	'00
High-speed elevators	100%	95%	72%	62%	57%		54%
Low-speed elevators	100%		93%	74%	37%	32%	29%
Hydraulic elevators	100%				70%		60%

The shift to inverter use in the 1980s was a turning point that paved the way to greater strides in energy efficiency. From now, it is essential to expand the introduction of lightweight machines to reduce drive energy, greater efficiency in individual components, power management systems to achieve lower power consumption when elevators are not in use, and other progressive concepts and programs.

For a Better Tomorrow…

Taking care of our valuable resources, and making effective use of energy. To live in harmony with the global environment both today, and tomorrow, the Mitsubishi Electric Group continues to create new products from the proven perspective of "MET." At Mitsubishi Electric, we take pride in accumulating the technical prowess needed to support the building of a better society.

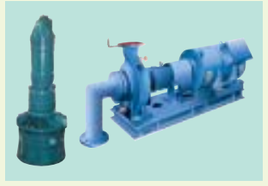


Mitsubishi Electric Group Eco-Friendly Technology

Channeling latent flow into power generation!

Small, compact hydroelectric power systems E

Schemes or effectively harnessing small water flow are not normally used (drops several meters to 80 meters) for power generation. Through the selection and combination of reversible pump turbines, underwater turbines and other equipment, flexible responses can be mounted to specific water supplies and location conditions. Economy is considered through machine stand-ardization and simplifying maintenance.



Winding away, with the power of reverse thinking!

Poki Poki Motor® E

To reduce the size and raise the efficiency of motors, Mitsubishi Electric set its sights on developing a pioneering stator core structure and winding method. Based on the reverse thinking of "wind the coil around the stator core, and then assemble it," we have innovated the structure and manufacturing process. We finally overcame the barriers of coil density and winding speed encountered in the conventional method. This motor is a thin chain type, reverse-bow type, lapped joint type, lantern type and other wide-ranging variations, supporting expanded use in air-conditioners, elevators and automobiles, as well as in information and FA machinery.

Swift detection of chemical substances potentially risk to the environment

Regulated substance high-speed analysis technology– the "single-drop extraction method" T

A high-speed analytical technology, achieved through the fusion of chemical and physical analysis technologies, used for the quick, precise detection of the six substances regulated in European RoHS Directive (lead, mercury, cadmium, chromium hexachloride, polybiphenyl bromide and polydiphenyl bromide ether). The complex pretreatment process adopted in the conventional method is replaced with "single-drop extraction" processing. This reduces analysis time to between 1/15 and 1/50 of the traditional level, while also facilitating high-sensitivity analysis of 100-ppm density content. Specifically, this method calculates mass through the following steps: ① Extract a small amount of the component substance using a solvent; ② dry this sample into a condensed state; and ③ subject the sample to TOF-SIMS (strike the sample with a high-speed ion beam in a high-vacuum state, then measure the airborne time of the secondary ions generated by this contact).

Extracting resources and energy together!

System to simultaneously recover energy and phosphorus from sewage sludge M

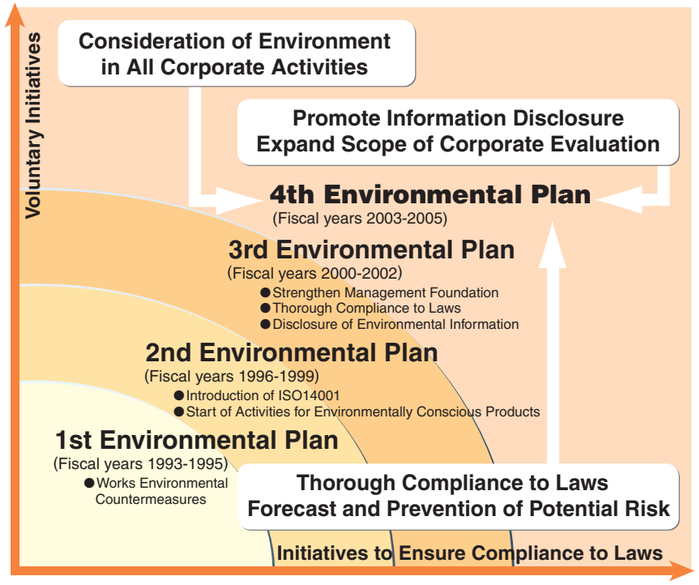
With this system, a new ozone+alkaline processing method is used for the high-speed removal of phosphorous from sewage sludge (approx. 90% in 30 minutes), followed by anaerobic digestion treatment of the sludge to effectively liquefy it and obtain methane gas. The system mounts an effective response to the depletion of resources (phosphorus), while the recovered methane gas can also be utilized for power generation. There are high expectations for its role in extracting substances of value from waste, in tandem with its efficient energy recovery.

We are convinced that schemes to continually reduce environmental impact are essential.

**We strive to achieve "continueous improvements," in environmental management that mobilizes the specific traits and strengths of each business division.
This mission also includes further enhancing the management level of the Mitsubishi Electric Group as a whole, rooted in a genuine global perspective.**

The Aim: Actualization of a Sustainable Society

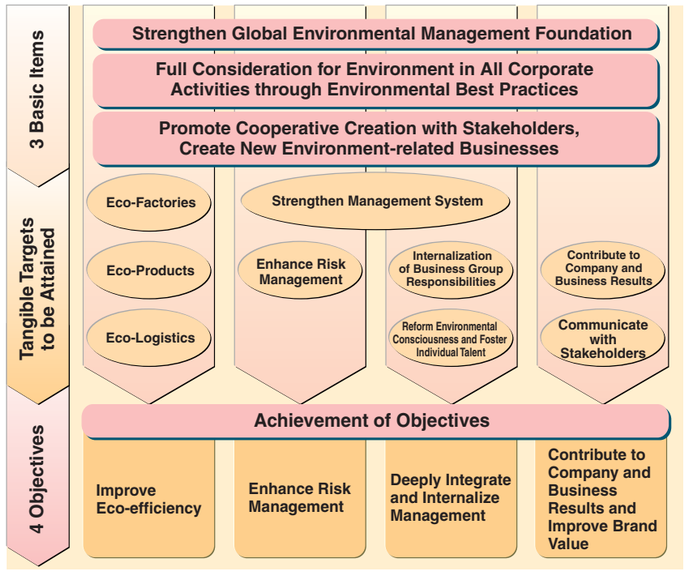
The Mitsubishi Electric Group created its first Environmental Plan in fiscal 1993 for the purpose of addressing issues related to preserving the global environment utilizing a systematic means from mid- and long-term points of view. Since the introduction of the first plan, we have worked to construct a solid foundation for our environmental management systems and maintained our commitment to developing technologies and products that contribute to the reduction of negative environmental impact. The 3rd Environmental Plan ended with the closing of fiscal 2002, and we initiated the activities of the 4th Environmental Plan from April 2003. With this new plan, we will focus on more actively promoting existing activities, creating new businesses related to energy solutions and recycling, giving careful consideration to the negative environmental impact of our products throughout the entire lifecycle, and providing more information regarding our activities to society, all for the purpose of contributing to the actualization of a sustainable society.



3 Basic Items to Achieve 4 Objectives

The 4th Environmental Plan sets out four objectives to be attained. Previously existing are the objectives of "improving eco-efficiency" and "enhancing risk management", and newly added are "deeply integrating and internalizing management" and "contributing to the company and business results and improving brand value."

We have identified three basic items required to achieve the objectives. Setting a goal of fiscal 2005 to achieve the objectives, the Mitsubishi Electric Group will set targets that can be measured tangibly. Interweaving these environmental measures at the core of corporate operations, employees will contribute to achieving the objectives as they perform their normal work duties.



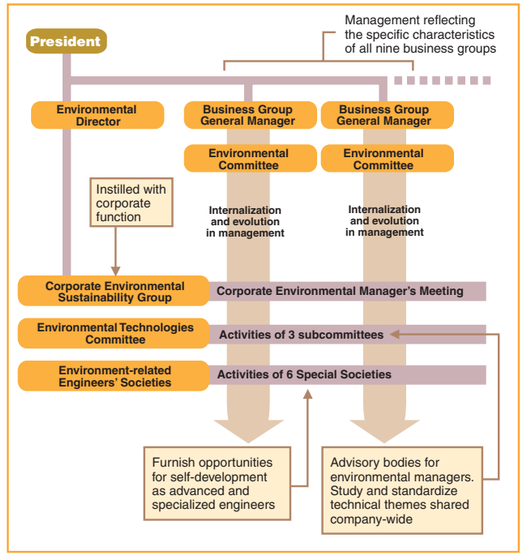
Mobilizing Business Traits to Advance Via Dual Management

Basic environmental policies and measures at the Mitsubishi Electric Group are implemented by the respective environmental committees in the nine business groups, in a scheme that seeks to internalize these efforts within the management. Using this approach, effective policy measures are aligned with specific business traits.

Our Corporate Environmental Sustainability Group is in charge of the overall coordination of these activities on a cross-divisional basis, and it represents the entire Mitsubishi Electric Group on the environmental front. While collaborating with the environmental managers at each business group, site and affiliated company to promote measures realizing the basic policies and goals of the Group, the Corporate Environmental Sustainability Group also promotes environmental communication, steers the Environmental Technologies Committee and Environmental Engineers' Societies, organizes the sharing of related technical information and performs other tasks.

To achieve environmental plans, meanwhile, the Mitsubishi Electric Group environmental management has advanced through a dual system of group-wide management and business site management. While operating through management cycles at the group and business group/site level teamwork is organized to continually carry out the PDCA (Plan, Do, Check, Action) cycle – the guiding principle under ISO14001. This is essential to promote environmental activities that span the entire corporate group.

■Organization Chart



■ISO14001 Acquisition Status (March 31, 2004)

North America 3	Head Office, branches, domestic business sites 26
Europe 1	Affiliated companies 82
China 7	
Other Asia regions 12	
Overseas tota 23	Japan domestic total 108

ISO14001 Certification Acquired by all Mitsubishi Electric Sites

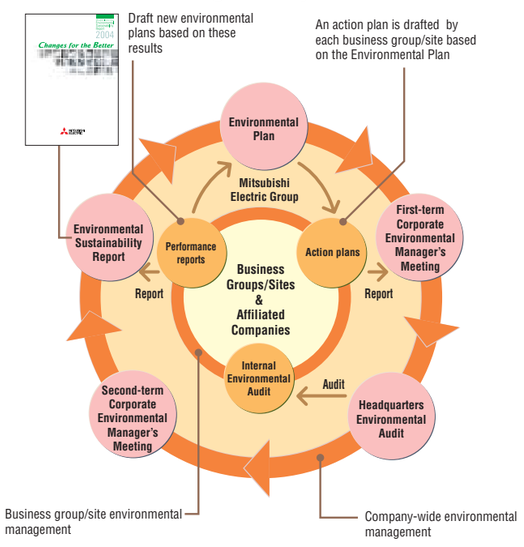
Mitsubishi Electric acquired certification under ISO14001, the international standard for environmental management, for all of its production bases, plant construction divisions and research centers in fiscal year 1998. In fiscal 2002, the Head Office district (the Mitsubishi Electric Building and four other affiliated buildings in Chiyoda Ward of Tokyo) also qualified under ISO14001, as did all branch companies in fiscal 2003. With this, all group business sites were fully certified under ISO14001. For our affiliates, as of the end of fiscal 2003, a total of 64 domestic and 23 overseas companies had acquired ISO14001 certification.

Promoting Improvement from a Global Perspective

As expected, the move to bolster Mitsubishi Electric Group's environmental management does not stop at Japan's borders. Plans call for the regular convening of "regional environmental conferences" and the conducting of "environmental audits" in the Big 5 regions served by the Group's business activities (Europe, North and South America, Asia, China and Taiwan), in moving to further raise the quality and level of environmental management.

At the regional environmental conference held in Europe in September 2003, tours were provided of the production operations and environmental-related facilities at the host factory of the conference, while mutual diagnosis sessions and other meetings were utilized to exchange the latest information on environmental management. The participating companies shared their common experiences and challenges in this area, and discussed the most effective responses and countermeasures.

■Environmental Management System



▲From a local environmental conference in five global regions.

Environmental Accounting

Introducing estimated effects to promote eco-friendly products and services.

For more effective environmental preservation activities, the Mitsubishi Electric Group has introduced environmental accounting. This is approach designed to stay abreast of the costs involved in preserving the environment.

Eco-Friendly Product and Service Effects of 45.5 Billion Yen

In fiscal 2003, total environmental protection spending by Mitsubishi Electric and 45 of its subsidiaries in Japan and abroad came to 13.6 billion yen. The fruits of these outlays, meanwhile, include reduced emissions of carbon dioxide and other chemical substances, along with improvements in other fronts areas (see the chart on page 18).

The real effects, meanwhile, of electricity fee savings from improvement in plant equipment control, reduced water rates thanks to water recovery and reuse, and profits from sales of scrap metal accompanying the recycling of waste and other materials came to 5.7 billion yen. Of the economic effects (estimated impact) of eco-friendly products and services introduced from fiscal 2003, customer-level economic effects were 43.3 billion yen, while environmental improvement effects were tracked at 2.2 billion yen.

Setting Estimated Effect Calculation Standards, Other Benchmarks

Recent years have seen a sharp increase in environmental protection activities, including those whose real effects (advancing the prevention of future pollution, product and service environmental considerations, education to promote those efforts, etc.), are difficult to grasp.

To express the total value of these and other activities, and thereby shed light on the specific effects of environmental programs, in August 2003 the Mitsubishi Electric Group established its “Environmental Accounting Study Panel.” This panel met and set definitions for the estimated effects of environmental protection activities, as well as the methods, standards and other yardsticks used to calculate these effects.

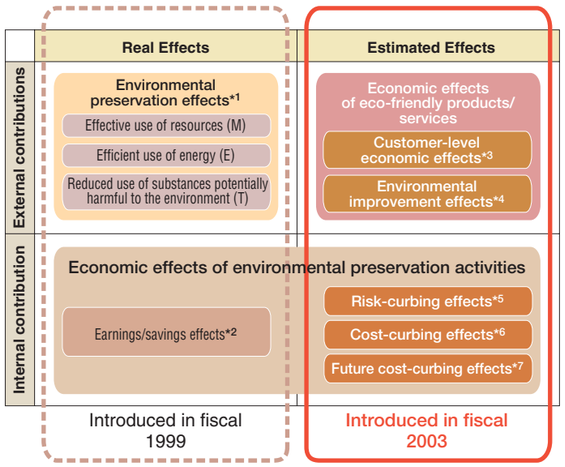
The effects of environmental considerations in products were calculated by comparison with the same models of the previous fiscal year. Likewise, the impact of such considerations adopted in services was monitored by comparing the conditions prior to the introduction of the specific services to customers.

Introduction of Internal Contribution Effects

The effects of eco-friendly products and services will be calculated for a wide range of products and services, to vigorously promote environmental friendliness in group business activities. With regard to the internal contribution effects of “risk evasion” and other areas, studies will be used to introduce calculation standards more objectively, to prevent individual differences when quantifying those effects. This stance also encompasses efforts to ascertain the monetary value of environmental protection effects (currently expressed in material quantities), the contributions to Mitsubishi Electric Group sales and profits (an impact area not yet monitored in terms of effect) and other clarification of the situation.

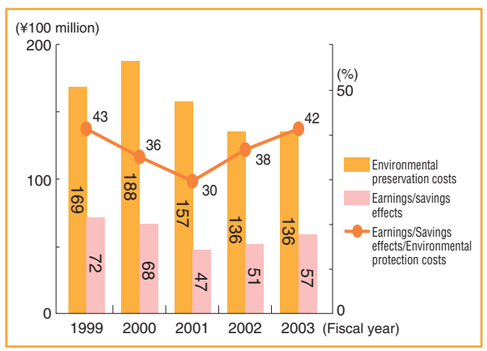
The designation of these and other effects in financial terms will shed light on the priority ranking of specific environmental policy measures, the impact of environmental protection activities on the group’s business and other information. This, we are confident, will raise motivation to engage in environmental protection.

■Mitsubishi Electric Group Environmental Accounting Effect Diagram



∗1: Degree of environmental impact (material volume) actually reduced by the Mitsubishi Electric Group, measured by volume of waste generation, CO2 emissions, chemical substance emissions, etc.
∗2: Economic effects actually achieved by the Mitsubishi Electric Group through valuable substance sales profits, energy and resource conservation, etc.
∗3: Estimated effects of electricity fee savings for customers linked to eco-friendly product energy conservation, energy solutions, etc.
∗4: Monetary conversion of environmental improvement effects (reduction in CO_2 and chemical substance emissions, etc.) stemming from eco-friendly products and services.
∗5: Effects of avoiding future loss through soil contamination, pollution-related accidents, etc.
∗6: Estimated effects of secondary cost reduction through education, information disclosure and other activities.
∗7: Estimated effects of curbing environmental tax costs and other burdens with potential to be assessed in the future.

■Economic Effects of Environmental Preservation Costs and Activities



■Estimated Effects of Eco-Friendly Products and Services (Fiscal year 2003)

	Total (¥100 million)	Major Contents
Customer economic effects	433	Electricity fee savings from customer energy conservation 12 product groups (including air-conditioners, refrigerators, VTR, etc.) and 4 business domains (photovoltaic power generation, electric power monitoring control system introduction, etc.)
Environmental improvement effects	22	Monetary conversion of CO_2/CFC emissions curbs through environmental taxes, etc. The aforementioned 12 product groups and 4 business domains + 3 business domains (wind power generation system introduction, CFC recovery, etc.).

Major Results in Fiscal 2003

With the 4th Environmental Plan, Mitsubishi Electric is advancing concrete approaches, treating fiscal 2005 as the target fiscal year.

* Unless otherwise specified, the deadline for achieving targets is the end of fiscal 2005.

	4th Environmental Plan/Action Targets	Major Results in Fiscal 2003	Evaluation
Eco-Factories	**Effective use of resources**		
	●Promote “zero emission” • The final disposal volume was held to within 1% of the total waste emission.	The final disposal volume was 550t (final disposal rate 0.75%). The total disposal volume was hold to within 1% for the second consecutive year, achieving “zero emission” level. ∗1	😊
	●Reduction in waste generation volume • Reduce total waste generation volume per net sales by 6% from fiscal 2002 (fundamental sales unit)	On its own, Mitsubishi Electric reduced the total waste generation volume by 3,600t compared to fiscal 2002, with this volume rising to 7,700t for the entire group (including affiliates). The fundamental sales unit climbed 17% from fiscal 2002, with the impact of the decline in sales also a contributing factor.	☹
	Energy conservation		
	●Reduction in CO_2 emissions (carbon-equivallent energy consumption per net sales) • Reduce emissions by 25% by fiscal 2010 vs. fiscal 1990 • Reduce emissions by 20% by fiscal 2005 vs. fiscal 1990 (Mitsubishi Electric: Improvement of over 1.5%/year Domestic affiliated companies: Improvement of over 1.0%/year)	Carbon-equivallent energy consumption per net sales decreased by 39% vs. fiscal 1990, and by 40% vs. the previous fiscal year. ∗1	😊
	Reduction in chemical substance emissions		
	●Reduction in chemical substance emissions • Reduce total emissions by more than 18% vs. fiscal 2002 • Disclose information at production site • Reduce emissions of ozone-depleting substances and greenhouse gases Control business site alternative CFC (HCFC, HFC) atmospheric emissions to within 0.2% of the total volume utilized on-site. Control business site SF_6 atmospheric emissions to within 3.0% of total volume utilized on-site.	• Total emissions decreased by 18% vs. the previous fiscal year. ∗2 • Volume of HFC and HCFC utilized vs. total emissions 0.3% (same as the previous year) ∗1 • Major reductions in PFC gas emissions of 82% vs. fiscal 1998 and liquid PFC emissions of 85% vs. fiscal 1995, achieving the targets. ∗1 • SF_6 emissions volume decreased by 87% vs. the previous year, although percentage compared to purchase volume increased over the previous year to 19%. ∗1	😊
Eco-Products	**Promotion of Green Procurement**		
	●Promote expanded Green Procurement through partnerships with suppliers	• Revisions made in “Green Procurement Standards Guide”. Based on revised guide, chemical substance content studies have been completed on approx. 7,000 purchased general-purpose electric/electronic components.	😄
	Reduce the negative environmental impact of products		
	●Raise the ratio of Eco-products to 70% or more of the production value.	• Of 161 product groups, the production value of 81 product groups targeted for application, 875.9 billion yen was focused on mass-produced home electric appliances, industrial mechatronics, etc., Eco-products comprised 49% of this total. ∗1	😊
	●Create advanced products with strong conformity with environmental standards (Hyper Eco-Products).	• Plans for the steady announcement of products complying with the management indicators set for each product.	☹
	●Continue promotion of product 3Rs (reduce, recycle, reuse) in all areas through packaging.	• A hundred percent recycle vegetable cases on recovered waste refrigerators, for use as air-conditioner outdoor unit panel parts. Currently, we are promoting eco-friendly designs, utilizing “closed-circulation”-type recycling and other expertise gleaned from recycling plants.	😄
	●Improve product energy efficiency	• In home appliance, we achieved energy conservation design effects of approx. 935GWh (compared to products shipped in fiscal 2002).	😊
	●Eliminate the use of HCFC as a foaming agent by the end of fiscal 2004, eliminate the use of HCFC as a refrigerant by the end of fiscal 2010.	• We are continuing conversion of refrigerant-use HCFC to HFC (heating/cooling air-conditioners) that commenced in fiscal 2001 (focusing on mainstay models). In addition, we are advancing the commercialization of refrigerators adopting isobutene (for which global warming potential is lower than HFC) as the refrigerant, with conversion scheduled for completion by the end of fiscal 2004.	😊
	Reponses to Extended Producer Accountability		
	●Realize recycling systems in compliance with the European WEEE Directive	• We are currently preparing a system to address the said directive, utilizing consumer electronics recycling expertise.	😊
	●Eliminate the use of the six substances regulated for use in Mitsubishi Electric products (lead, mercury, cadmium, chromium hexachloride, PBB and PBDE) by December 31, 2005. ∗3	• We have developed high-speed analysis technology, making steady progress toward banning the use of the six regulated substances.	😊
Eco-Logistics	**Reduction in the negative environmental impact of transportation**		
	●Reduction in CO_2 exhaust • Reduce the volume by 20% vs. fiscal 2002 ∗4	• Distribution sector CO_2 emissions were 97,000t-CO_2, a 2% decline from fiscal 2002. ∗2	☹
	Reduction in the negative environmental impact of packaging		
	●Eliminate the use of wood in major product packaging.	• The use volume was 12,000t, a 28% decline from fiscal 2001. ∗2	😊
	●Reduce the volume of the packaging materials used • Reduce the volume by 10% vs. fiscal 2001. ∗2	• Packaging material volume was 46,000t, a 7% decline from fiscal 2001. ∗2	😄
Management, etc.	●Strengthen the foundations for globally integrated environmental management	• ISO14001 certification acquired by Head Office and all branches, completed acquisition for all Mitsubishi Electric business bases. Overseas, Global Environment Committee are sponcered to improve the level of environmental management.	😊
	●Communications with stakeholders	• In addition to publishing editions of the “Environmental Sustainability Report 2003,” a document designed to address the environmental needs of society, in Japanese, English and Chinese, the group’s environmental website was enhanced. The First Environmental Management Advisor Conference was also held, with mutual understanding deepened. As social philanthropy activities, the Head Office joined regional business sites in planting and nurturing forests at the base of Mt. Fuji.	😊
	●New environment-related businesses	• See the proper page for further details.	
	●Reform environmental consciousness and foster individual talent	• Review company-wide and site-specific education systems.	😊

∗1: Mitsubishi Electric only ∗2: Mitsubishi Electric Group
∗3: The target has been expanded from RoHS target products to encompass Mitsubishi Electric products.
The deadline for banning use has been brought forward from the end of March 2006 to the end of December 2005.
∗4: The target expanded to sales companies. The benchmark fiscal year also changed from fiscal 2001 to fiscal 2002.

😄 Well done 😊 Almost there ☹ Have a way to go (Self evaluation)

The Mitsubishi Electric Group sets its sights on building products that improve eco-efficiency.

We are mobilizing the "MET" benchmarks to reduce environmental impact throughout the product lifecycle, and raising the ratio of "Eco-Products" to over 70% by the end of fiscal 2005.

MET Indexes for Each Product in the 4th Environmental Plan

The Mitsubishi Electric concept of "Eco-Products" consists of steadily enhancing the ease of use and function that are the essential value of any product, while striving through the "MET" indexes to reduce environmental impact throughout the entire product lifecycle – from material procurement and use, through final disposal. "MET," meanwhile, refers to "Materials" (effective use of resources); "Energy" (efficient use of energy); and Toxicity (reduce the use of substances potentially harmful to the environment). This concept is the foundation in determining design and evaluation benchmarks, thus paving the way to Eco-Product creation.

Under the Group's 4th Environmental Plan, the LCA (Life Cycle Assessment) method is applied to all products, with the goals managed under each aspect of MET in the development of Eco-Products. This stance also encompasses complying with the recovery and recycling regulations for waste electric and electronic products and other requirements, as Mitsubishi Electric rises to role of being increasingly accountable as a producer.

In-House Standardization of Design for Environment: DFE Methods

The Mitsubishi Electric Group has actively advanced the concept of "DFE" since 1991. The corporate environmental technology committee consisted of DFE experts of each factory draw up internal rules to realize DFE principles, while establishing the DFE Guideline*1, LCA evaluation and other design standards, while sharing actual designs and methods.

Individual product designs are advanced in accordance with these Guideline. The effectiveness of this approach is quantitatively evaluated and verified using the 3R product assessment*2 (comprising 14 large and 51 intermediate evaluation indicators), along with LCA, Factor X (see page 23) and other schemes.

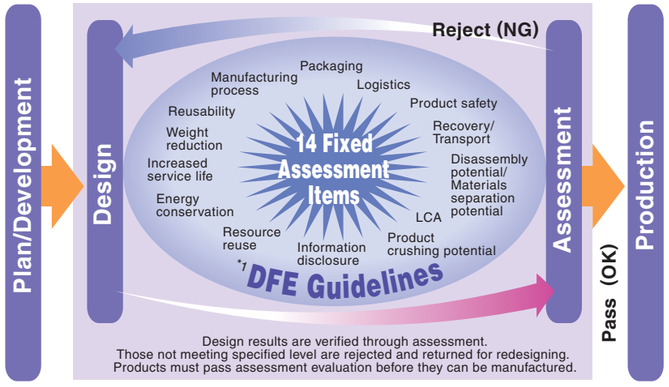
Recycling Plant to Create New Technology

Simply stated, to be eco-friendly, designs must be customized to the traits of specific products. For example, with IT equipment, which are characterized by short product lives, reducing both the impact of chemical substances contained in procured materials, and environmental impact at the time of manufacture and assembly, is key. For home appliances, which have extended lifecycles, the key demands are energy conservation during use and easy recycling of the waste products.

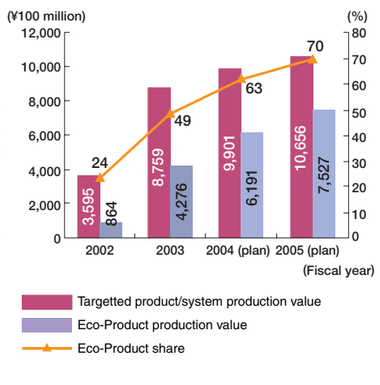
The recycling plant owned by Mitsubishi Electric (see page 21) plays an important role in addressing these challenges. The know-how, themes and other information acquired from the plant's operations provide valuable feedback through close exchange with the design division, and is put to work in design for environ-ment. The most prominent feature of this approach is dismantling and recycling tests for a prototype model under development brought into the recycling plant. The estimated recycle ratios, total cost and other expertise gained from the recycle plant are reflected in the sub-sequent designs.

Breakpoint design, barrier-free design and other original technologies are the fruits of feedback from these recycling frontlines.

■3R Product Assessment*2



■Mitsubishi Electric Eco-Product Share



Our Goal is 70% Eco-Products

Under the 4th Environmental Plan, one of our goals is to raise the "Eco-Product" share of the group's total production value to over 70% by the end of fiscal 2005. In this regard, the share of Eco-Products for fiscal 2003 was 49% of the 875.9 billion yen production value of the 81 product groups targeted for application.

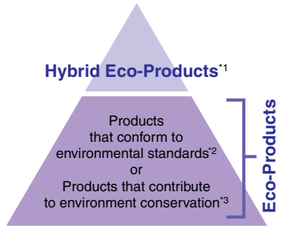
One approach is the increasing development of highly advanced eco-friendly products – referred to as "Hyper Eco-Products" at Mitsubishi Electric.

Green Procurement Standards Guide

The Mitsubishi Electric Group drafted its Green Procurement Standards Guide in September 2000. This guide was used to conduct surveys of the environmental approaches used at suppliers, the chemical substances contained in procured product materials and other areas, striving to stay well abreast of the situation.

In response to the subsequent RoHS (Restrictions on the use of Hazardous Substances) Directive, expanded corporate accountability and other changes in conditions in Japan and abroad, these standards were revised in August 2003. In this revised version, chemical substances were divided into four categories by "content and attachment bans" and "management target" levels. Standards were set for the handling and action plans applied to each substance, moving toward "Green Procurement" in production materials purchases that are further advanced. Based on these revised standards, a survey was completed in fiscal 2003 of the chemical substance contained in some 7,000 general-purpose electric/electronic components.

■Eco-Products and Hybrid Eco-Products



*1 Categorized as an Eco-Product if it satisfies one of the following conditions and is approved by in-house procedures:
1. Introduces a new concept or innovative technology that contributes to sustainability.
2. Achieves a factor rating higher than 2.
3. Is awarded special recognition for contribution to environment-related matters, such as excellence award for environmentally conscious design.

*2 Product that satisfies one of the following conditions:
1. Satisfies quantitative standard determined by taking both degree of Factor X improvement and degree of social contribution into consideration.
2. Receives commendation as an industry-leading product or for contributing to environment-related matters.

*3 Product that provides directimprovement to the environment via use.

Setting Use Deadlines for RoHS-Regulated Substances

By the deadline date of December 31, 2005, Mitsubishi Electric will halt the use the six substances regulated under RoHS Directive – lead, mercury, cadmium, chromium hexachloride, PBB and PBDE to the product. Likewise, the deadline for banning the use of purchased materials and components from suppliers containing these substances has been set for July 1, 2005 – an approach that has been steadily adopted from European-bound products.

■**Mitsubishi Electric Group**
"Green Procurement Standards Guide"
"Chemical Substance Control List"

Technology Development to Support Eco-Products

■Risk-Substance High-Speed Analysis Technology (Single-Drop Extraction)

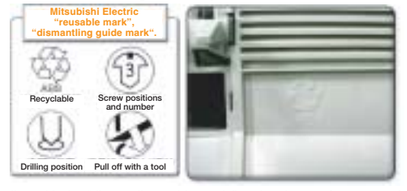
High-speed analysis technology effective in tracing the quantities of the six regulated sub-stances during Green Procurement activities. The process involves dissolving a tiny 0.1g sample in solvent, followed by dripping, drying and analysis. The total time required for analysis, traditionally no less than 15 hours for chromium hexachloride and 50 hours for PBB and PBDE, has been slashed to a mere one hour or so. This technology enables a prompt, precise evaluation of the compatibility of procured items.
(see page 14)


▲Analysis equipment

■Breakpoint Design Example

Metal parts, previously difficult to remove due to their integrated molding, have been redesigned for easy removal just by bending the latch tabs.

■Barrier-Free Design Example



Labeling with the "dismantling guide mark," makes it easy for anyone (regardless of age or nationality) at recycling plant to indicate for treating, dismantling and re-covering/recycling of waste equipment.

Product Recycling

Advancing effective recycling is also our responsibility.

Mitsubishi Electric energetically advances resource recycling, rooted in the understanding that we are responsible for the products that we build, from start to finish. This quest continues, spearheaded by technology and intelligence cultivated through recycling consumer electronics, personal computers and other fine products.

Channeling Our Recycle Plant Feedback into Product Design

Japan's Electrical Home Appliances Recycling Law was enacted in April 2001. This legislation levels stiff demands for the creation of a recycling society, in which steel, copper and other materials are removed from waste home appliances and other products arriving at the end of their service lives, and revived through effective use as recycled resources. To support this social mission, Mitsubishi Electric emerged as an industry pioneer with the establishment of the Higashihama Recycle Center (Hyper Cycle Systems Co., Ltd.) in Ichikawa City, Chiba Prefecture. We also joined five other consumer electronic product makers* to launch a network of 15 recycle processing facilities around Japan, for which individual partners serve as business operators to promote, the recycling of electric home appliances through a system of mutual collaboration. Our Recycle Center acquired ISO14001 certification in April 2001, earning the valued designation as an eco-friendly processing facility.

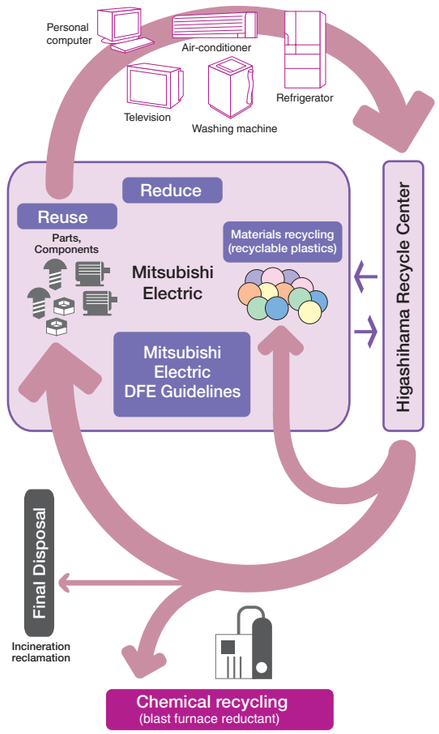
The scrapping and sorting information generated at our recycle plant provides valuable feedback to manufacturer design divisions, and provides strong support in creating new products engineered to minimize waste. To promote rich, sustainable harmony between the environment and economic activity, highly advanced resource recycling technology is mobilized in teaming up with the design division. With recycle plant operations front as well, relentless improvements are carried out to eliminate waste and attain the goal of "zero emission."

For personal computers, the Law Regarding the Promotion of the Utilization of Recycled Resources (more commonly known as the "3R Law") was enacted in April 2001. With this, waste PCs are now subject to recycling in the same way as consumer electronics. Mitsubishi Electric has been accepting home-use PCs since October 2003 and business-use models from April 2001, and conducts energetic resource cycling under a control system from collection through the final recycling stage.

(*): The other five companies are Sanyo Electric, Sharp, Sony, Hitachi H&L and Fujitsu General.

■Recycle System

Information is exchanged with the Higashihama Recycle Center in an effort to develop and design products that are easy to reduce (disassemble), reuse and recycle.



■Home Appliance Products Recycled (Fiscal 2003)

	Air-conditioners	Televisions	Refrigerators	Washing machines
No. collected (Unit: 1,000s)	205	271	306	171
No. recycled (Unit: 1,000s)	204	270	305	171
Total weight of refrigerants recovered (CFC, etc.) (t)	108,371	–	32,165	–
Total weight of recycled products processed (t)	8,824	7,101	17,152	5,100
Total weight of recyclable resources (t)	7,425	5,962	11,202	3,381
Percent of products recyclable (%)	84	84	65	66
Legal standard (%)	60	55	50	50

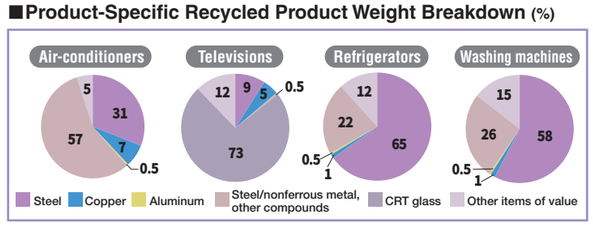
■Personal Computer Products Recycled (Fiscal 2003 business use)

		Desktop	Notebook	CRT display	LCD
Collected (kg)		48,719	3,182	101,407	264
No. of units collected		4,730	677	4,852	60
Reusable resources (kg)		35,518	1,202	77,113	195
Reusable resource ratio	Actual (%)	73	38	76	74
	Required by law (%)	50	20	55	55

■Personal Computer Products Recycled (Fiscal 2003 home use)

		Desktop	Notebook	CRT display	LCD
Collected (kg)		3,028	244	41,466	189
No. of units collected		294	52	1,984	43
Reusable resources (kg)		2,208	92	31,532	140
Reusable resource ratio	Actual (%)	73	38	76	74
	Required by law (%)	50	20	55	55

■Product-Specific Recycled Product Weight Breakdown (%)



Progress in Recycle Design (Higashihama Recycle Center)

For those who process waste electrical home appliances, there is a sense of crisis. The true challenge is imagination – envisioning what lies 10 years down the road.

The Mitsubishi Electric Higashihama Recycle Center is the first recycling plant ever opened in the consumer electronics industry. The information here is naturally channeled to our product design division, and shared with other companies in the industry to raise the level and quality of environmental response. On this page we hear from Yasuhito Iseki of Hyper Cycle Systems, the company operating this state-of-the-art facility, about the work performed here.

Sorting and Scrapping Each Separate Material is Not Easy

During the summer work peak, we will process up to 1,000 washing machines and 1,700 air-conditioners daily. Because most of the waste electrical home appliances brought to the Center were manufactured about 10 years ago, the most challenging and costly work is to manually dismantling them and sort out each separate material. Dismantling, by its nature, is close to demolition. Though there is an urgent need for design for recycling, we can not afford to sit around and wait for such breakthroughs. Instead, we are responding by promoting mechanical processing and other advances. This is particularly true of plastic materials, which rely heavily on mannual sorting by hand.

Our goal is to mobilize the scale and technical skills of the center to promote greater mechanization of this process, and evolve it into a "closed-circulation" recycling mode in which the plastic materials we sort out are re-used in new products. For this, we will need to perfect innovative new sorting methods as well as make progress in other areas. The plastics resource recovery technology developed in recent years is an example of success on that front. We break up the crushed plastic fragments containing metal shards and vinyl chloride-coated copper wire into even smaller pieces, remove the metal and vinyl chloride through gravity and electrostatic separation, and recover high-purity plastic. Through these and other such efforts, we have succeeded in reducing the volume of plastic landfill dust to less than one-fifth the level when the Center first commenced operations.

Yasuhito Iseki
Development Technology Section
Manufacturing Technology Department
Hyper Cycle Systems Co., Ltd.

Technology to Make Eco-Friendliness Profitable, Not Costly

I am always making pleas to the design teams of the different plants. In recycling products manufactured over the past 10 years, the trend has been to leave the work up to the recyclers, and hope that they can somehow resolve the problems. For products designed from now here on, however, I tell them to devote greater attention to recycling needs when they first draw up their designs! Moreover, this should not be a halfhearted approach, finally yielding to pressure to preserve environment. On the contrary, I want the designers to work from a genuine sense of crisis. In our daily work at the Center, we have come to understand that there will soon be nowhere to discard waste products, and nowhere to safely incinerate waste. Without firm, dependable controls, such action will immediately contaminate the environment.

Before lecturing about the "global environment" and other lofty concepts, therefore, we need to devote serious thought to what we can do about the work operations in our own front yard. Obviously, recycling requires cost. But rather than always worrying about how costly protecting the environment is, we need to figure out how to make recycling profitable. At the very least, advances in closed-circulation recycling will help cut costs in this area. Just three years ago, for example, the idea of reusing plastic recovered from waste electrical home appliances in new products was dismissed as great folly. But today, we are doing just that. In this way, we need to take advantage of the potential that has always existed, joining forces to cultivate technology capable of extracting value from spent products and other waste.

▲Hard or high-value parts are scrapped by hand.

▲The washing machine automatic crushing line.

Factor X

Numerically measuring of improvements in eco-efficiency, to promote greater development and use of Eco-Products.

In using "Factor X," an index for evaluating both improvement in product value and reduction in environmental impact, the initial goal is to reach "Factor 4," while steadily contributing to the creation of a sustainable society.

Measuring Advances in Eco-Efficiency with Unique Computations

"Factor X" is an index used to evaluate reductions in environmental impact and technical advances made in products and services. The approach was first proposed in the early 1990s by a German researcher, who envisioned it as a target to be realized over the following 30 to 50 years. The "X" value, which serves as the goal, uses different levels to express specific areas of progress, which are: conventional improvements (Factors 1 to 3), major design changes (Factors 3 to 10), and de-materialization levels (Factor 20 and up). In a nutshell, the higher the factor, the greater the sustainability of the product measured.

Mitsubishi Electric first adopted Factor X in December 2001, and has continued to publicize the results.

Computing Factors for Both Performance Improvement and Environmental Impact

At the Mitsubishi Electric Group, we calculate Factor X using our own method, with the "MET" formula, for trial computations of the social contribution offered by individual products. Generally "eco-efficiency" is calculated through the formula of "product performance ÷ environmental impact." With the conventional factor calculation approach, the stress on the degree of contribution by environmental impact factors treated product performance improvement as a constant (denominator-1). From this fiscal year, however, improvements in product performance have also been reflected in the calculation formula, evaluating both product improvement and environmental impact reduction.

Used in calculating environmental impact, meanwhile, are the three indexes of "non-recycled resource consumption," "energy consumption" and "Content of chemical Substances potentially risk to the environment." Benchmark products (as a general rule, products manufactured in house by Mitsubishi Electric in 1990) are treated as "1" for each index. The three indexes are then applied to the products under evaluation, the results being integrated to calculate the current environmental impact compared to 1990 (1.0).

Raising Value in the Marketplace

Factor X is an evaluation index used to compare in-house products. Because factor definitions, benchmark products, calculation formulas and other details differ from company to company, Factor X cannot be used as a product selection guide. It is, however, an effective key in creating Eco-Products. This led the "Eco-Efficiency Investigation Panel" (which maintains its secre-tariat in the Japan Environmental Management Association for Industry) to prepare the "Guide to Product Eco-Efficiency Indexes," a handbook focussing on Mitsubishi Electric and three other electrical/electronic machinery companies. This guide deter-mines basic matters pertaining to the use of such indexes, and contributes to expanding their proliferation and recognition, while raising the value of the resulting factors on the market.

To help achieve a sustainable society, Mitsubishi Electric is cur-rently striving from a global perspective to attain the initial goal of "Factor 4."

■Basic thinking on factor calculation

- Comparison is made with standard products (fundamentally manufactured by company in 1990).
- Both the performance factor (improvement in product performance) and the environmental impact factor (reduction in environmental impact) are evaluated, then the results are expressed in multiplied form.
- Performance evaluation index:
  Evaluated by "basic performance (product function, performance, quality, etc.) × product life" *1
- Environmental impact index based on MET, using the following three indexes:
  ① Non-recyclable resource consumption *2
  ② Energy consumption
  ③ Content of chemical substances

Based on these indexes, calculations are made of the environmental impact of the evaluation product, treating the benchmark product as "1," with the results integrated as vector length.

*1: Set for each separate product.
*2: Non-recyclable resource consumption index = Virgin resource consumption + non-recyclable resources (volume disposed of without being recycled) = [product mass - recycled materials/parts mass] + [product mass - recyclable resource mass]

■Factor calculation formula

Factor

$$= \left\{\frac{\text{Current product performance}}{\text{Current product environmental impact}}\right\} = \frac{\text{Current product performance}}{\text{Standard product performance}}$$

$$\left\{\frac{\text{Standard product performance}}{\text{Standard product environmental impact}}\right\}$$

$$\times \frac{1}{\frac{\text{Current product environmental impact}}{\text{Standard product environmental impact}}} = \text{Performance improvement}$$

$$\times \frac{1}{\text{Environmental impact reduction}}$$

= Performance factor × Environmental impact factor

■Case Study: EcoMonitorPro (Energy Measuring Unit)

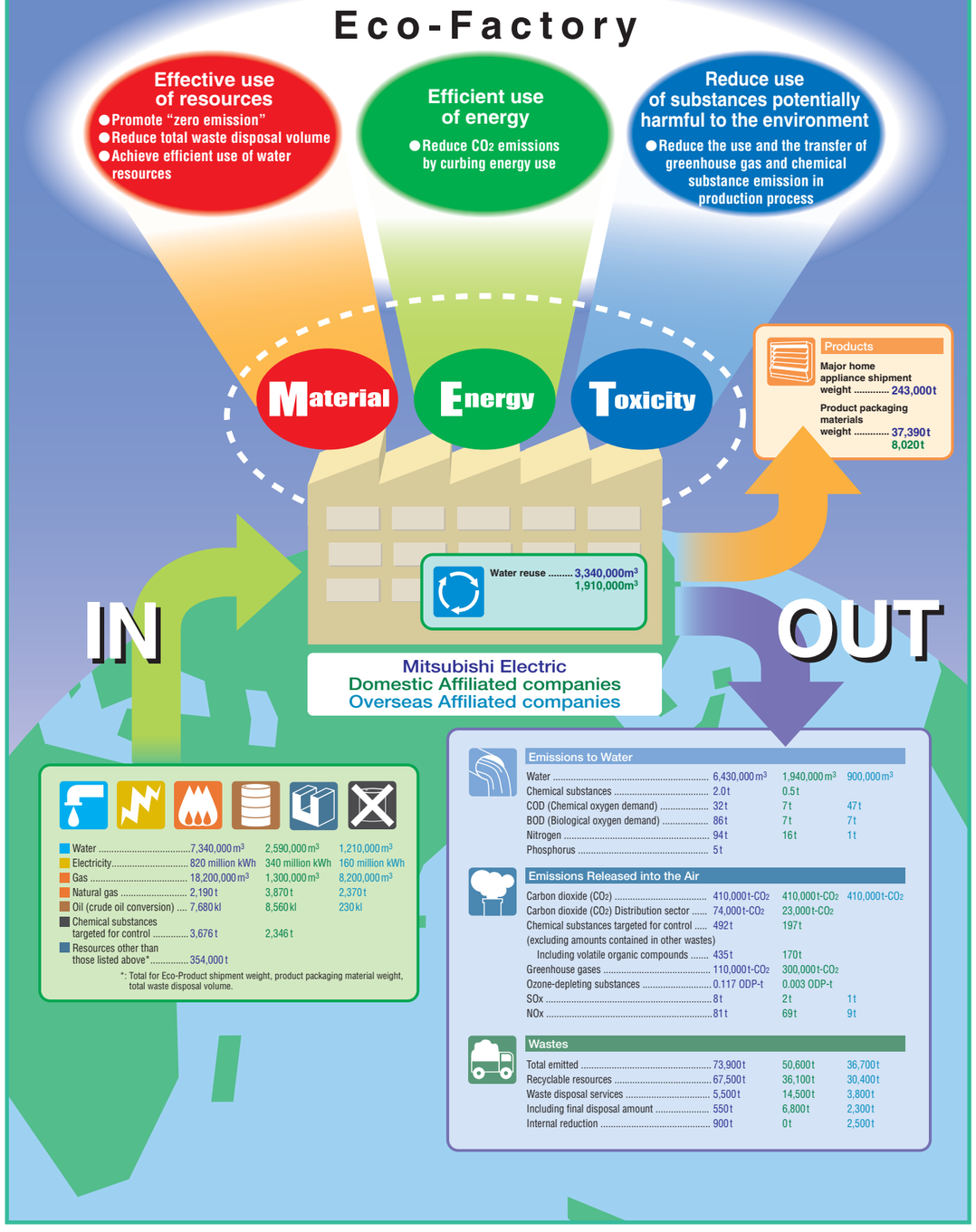
Factor 3.96 = Performance factor 2.500 × Environmental Impact Factor 1.582

		Environmental impact				Product value
		M: Effective use of resources	E: Efficient use of energy	T: Chemical substance content		
Standard product	1998 model EMU-B3P5	1	1	1	1.732	1
Present product	2003 model EMU2-HM1-B	0.55	0.37	0.88	1.095	2.5
	Improvements	Reduction in a product's virgin resources 45% Reduction in a product's non-recyclable resources 45%	Electricity consumption Reduction at time of regular use 51% Reduction at standby time 82%	Reduction in the lead of solder 12.5%		Number of energy measurement factors 4 →10:2.5 times
(A) Environmental impact factor (1/Current product environmental impact) / (1/Standard product environmental impact)						1.582
(B) Performance factor (Current product added value) / (Standard product added value)						2.500
(A) × (B) Factor						3.96

Degree of social contribution	Reduction in Virgin Resources Used (t) 0.76 (t)	Reduction in Electricity Consumption (GWh) 1.34 (GWh)	Reduction in Potentially Harmful substances (kg) lead 0.6 (kg)

▲EcoMonitorPro 2003 model EMU2-HM1-B

We advance eco-friendly production activities from all perspectives and in all of our processes, from materials procurement through final disposal.



The 3Rs (Reduce, Reuse, Recycle)

Moving toward the goal of “zero emission,” to excel as a responsible member of the recycling society.

By setting our goals high, and bolstering activities gaining for the “3Rs” (reduce, reuse, recycle), we strive for effective use and curbed consumption of resources, while minimizing the volume of waste.

Setting Goals for Each Manufacturing Process as Emission Countermeasures

From fiscal 1994, the Mitsubishi Electric Group began a scheme to manage the “3R activities” and clarify the conditions surrounding environmental impact. Set in fiscal 1996 were goals for, 1) consigned disposal*1; 2) total waste emission*2; and 3) recyclable resource rate*3. Through these quantitative emission controls, the performance figures in fiscal 1999 achieved all of these goals. From fiscal 2000, the environmental approaches at affiliated companies were beefed up, goals for emission reduction and resource recycling were set for each manufacturing process, and other efforts channeled not only into post-emissions countermeasures, but also to control and prevent waste from occurring in the first place.

In fiscal 2002, a new target was set to contain final disposal volume*4 within 1% of the total waste emissions. The attainment of this 1% target is defined as the achievement of “zero emission.” Adopted for controls on total waste emissions was efficient resource use evaluation based on the indicator linked with net sales, with the goal for the total emission per net sales (fundamental sales unit) set at a 6% reduction from the fiscal 2002 level (to be achieved at the end of fiscal 2005).

“Zero Emission” Achieved in Fiscal 2003

For Mitsubishi Electric itself, the final disposal rate*6 was successfully held to under 1% again in fiscal 2003, duplicating the same feat realized in fiscal 2002 and thereby achieving the target “zero emission” level. Group affiliates continue to lag far behind the target (with a 13% rate), prompting concerted efforts to slash this to within 3% in fiscal 2004.

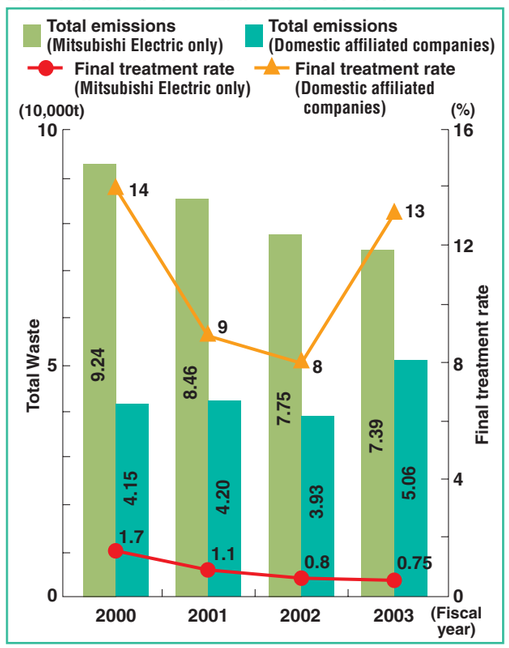
Mitsubishi Electric’s total waste emission volume was cut by 3,600t in fiscal 2003. Due to the decline in sales for the year, the fundamental sales unit rose by 17% compared to fiscal 2002, worsening to 3.7. To achieve the goal for our fiscal 2005 fundamental sales unit, we will strive to reduce nonessential procurement and waste, improve the design and production process and otherwise track the sources of problems and wasteful practices in tightening up our management stance.

Contributing to Water Resource Protection Through Conservation and Reuse

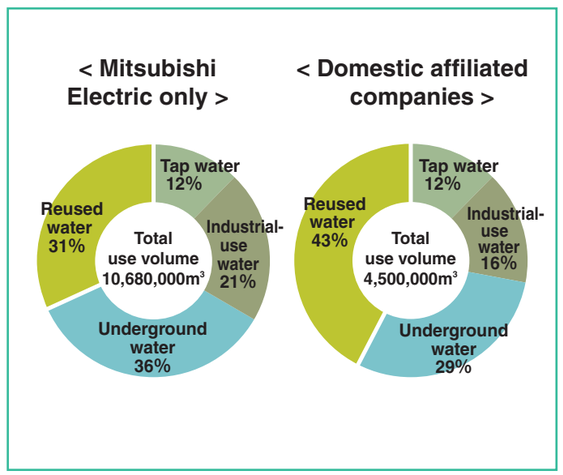
Mitsubishi used a total of 10.68 million m^3 of water during fiscal 2003, of which 3.34 million m^3 (31%) consisted of recycled water.

The use of tap, industrial and well water for the year was 7.34 million m^3. A key factor behind the reduction in this use to around half of the fiscal 2002 level includes achieving a fuller grasp of the volumes of water used in the processes, adjustments in the necessary supply volume and other water conservation activities. Spinning impact of Renesas Technology Corp. into an independent operation and other pertinent developments also contributed.

■Trend in Total Waste Emission Over Time



■Water use



*1: Volume for consigned waste
Final disposal volume + intermediate treatment volume (treatment volume incinerated, neutralized, crushed etc.)
*2: Waste (non-valuable) volume + materials (valuable) volume
*3: Volume of recyclable resources in total waste emissions
*4: Volume of waste placed in landfills
*5: Of valuable materials + waste, volume treated as “recyclable resources”
*6: Final disposal ratio within total waste emissions volume

Energy Conservation

“Energy loss visualization” activities effectively pool our energy saving technology, in moving to reduce energy-consumption linked CO_2 emissions.

Energy conservation experts are pooled from around Japan at a single site, for concentrated energy savings diagnosis. Detecting energy waste that is often overlooked, in cutting back on losses.

The Goal: Reduce Fiscal 2010 CO_2 Emissions by 25% (carbon-equivallent energy consumption per net sales: fundamental sales unit)

The Mitsubishi Electric Group advances efforts to lower energy consumption at all stages of its business operations, from design through production and shipment. In the 4th Environmental Plan for example, we have determined to reduce fiscal year 2010 CO_2 emissions (calculated by the fundamental sales unit) by 25% or more compared to the fiscal 1990 benchmark. In this way, we focus on programs structured to enable energy loss reductions that lead to improvement in productivity.

Big Drop in Fundamental Sales Unit with Corporate Spin-off, Cool Summer and Warm Winter

Using the fundamental sales unit as a yardstick to reflect on group energy conservation activities to date, this indicator steadily declined through fiscal year 2000. During fiscal 2001 and 2002, however, the impact of changes in the Mitsubishi Electric corporate structure, along with deflation-fueled declines in production volume and sales unit prices caused sales to fall, translating into a worse in the fundamental sales unit.

In fiscal 2003, the CO_2 emissions of Mitsubishi Electric alone were 410,000t-CO_2 (down 48% from fiscal 2002). Viewed by the fundamental sales unit, this was a 39% decline compared to fiscal 1990. The factors behind this progress include energy conservation efforts by individual factories, reduction in air-conditioning energy due to the cool summer and warm winter of the past year, and the spinning off of the Mitsubishi Electric electronic device division (which accounted for 61% of CO_2 emissions) as an independent company (i.e., the April 1, 2003 establishment of Renesas Technology Corp. as a joint venture with Hitachi Ltd.).

Detecting Often Overlooked Energy Loss

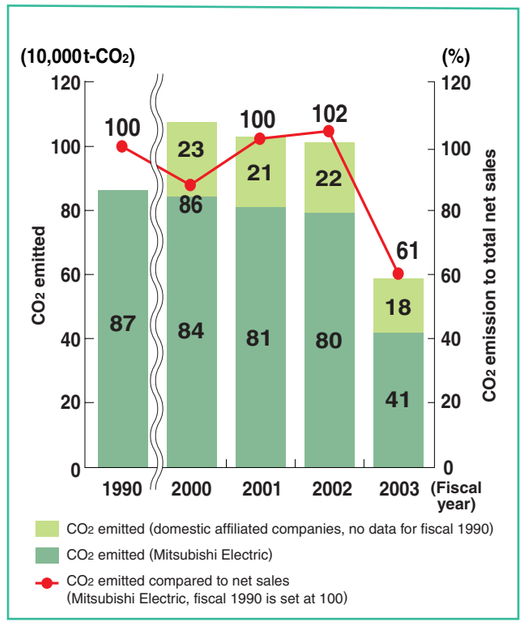
Our energy conservation subcommittees formed by energy managers at each factory engage in “energy loss visualization” activities, utilizing energy conservation diagnosis and electric power measuring units to achieve their aims. These activities install “EcoMonitor”, the instrement for continuously monitoring the consumption electricity and other energy, thereby clarifying the state of energy use at plants and offices, providing a prompt, precise understanding of where the energy loss is occurring.

For example, at the end of each workday, people turn off the power switches. Using this new visualization approach, it became clear that the exact time that this power is turned off varies from person to person, often leading the wasteful consumption of energy for purposes other than production.

Our “energy loss visualization” activities use the recorded data to detect such energy waste, a problem that tends to be overlooked, with improvements in the situation used to realize energy conservation.

To fully satisfy the goals of the 4th Environmental Plan, we will continue vigorously developed these activities, focussing on mass-production plants and other business sites where we expect excel-lent results.

■Trend in CO_2 Emission Compared to Net Sales



Redoubled use of IT, to help slash chemical substance emission transfer volume.

Harnessing our integrated environmental information system to achieve the goal of a 6% reduction in emission transfer volume* from the previous year, shrinking the use of VOC, sulfur hexafluoride and other chemical substances.

(*): Total for atmospheric emissions, public water system discharge, sewage transfer and waste transfer volumes.

Mobilizing Our In-House Developed Information System

To stay abreast of chemical substance emission transfer volume, Mitsubishi Electric uses its in-house developed "MET" environmental management integrated system. By MET, we mean M (Materials), effective use of resources; E (Energy), efficient use of energy; and T (Toxicity), reduced use of substances potentially harmful to the environment. Working from the results of this analysis, we are a particularly focused on volatile organic compounds (VOC) such as toluene, xylene and styrene, which account for some 70% of the emission transfer volume, together with sulfur hexafluoride (SF6), characterized by extremely high global warming potential, in advancing programs aimed at reduction.

From fiscal 2003, the application of this integrated environmental information system has been expanded to our affiliated companies.

Corporate Spin-Off and Coating Improvements Reduce Emission Transfer Volume by 18%

The Mitsubishi Electric Group used 110 types of chemical substances during fiscal year 2003 (96 types by the Mitsubishi Electric), totaling 6,021t. The emission transfer volume of these substances was tracked at 1,043t (17% of the total handled), a reduction of 18% from the previous year (and down 26% vs. fiscal 2000).

Factors behind this progress include the spinning off Renesas Technology (one arm of the semiconductor division) as an independent company, and a decline in the use of toluene and xylene by reducing the steel plate coating area, shifting to water-soluble paint and adopting alternative washing liquids.

Fiscal 2004 Themes Include VOC Volume Reduction and Regulation

Key environmental themes for fiscal 2004 include reducing the total use volume of toluene, xylene, styrene and other volatile organic compounds (VOC), and preparing for the VOC regulations projected to be enacted as law this fiscal year. As action plans on this front, we will expand the use of water-soluble coatings and introduceVOC removal measures.

Risk-Prevention Activities

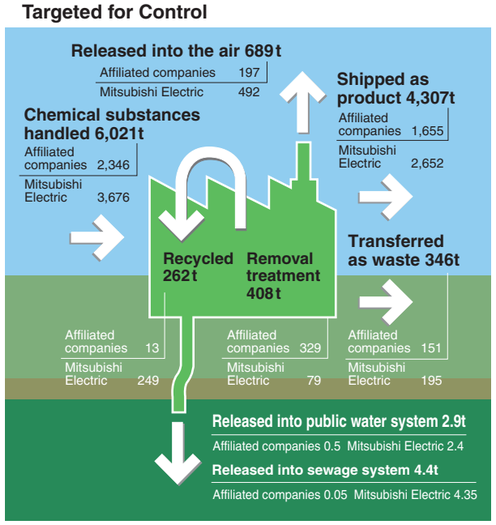
The Mitsubishi Electric Group takes advantage of its scrupulous environmental management system to probe the environmental risk factors present in business contents and site locations, as well as the properties, types and other aspects of wastewater, exhaust and solid waste. The goal, in all cases, is to minimize the scale of the eco-environmental involved.

One phase of this stance consists of the internal environment audits and compliance checks commenced in 1992. With this approach, teams of environmental management experts are formed in-house, and perform audits and inspections of the environmental management status at each business site and corporate affiliate. During fiscal 2003, inspections were conducted at 12 business sites and 82 affiliates, with improvements made in waste management, emergency contact routes, chemical substance storage methods and other areas.

Soil and Groundwater Pollution Responses

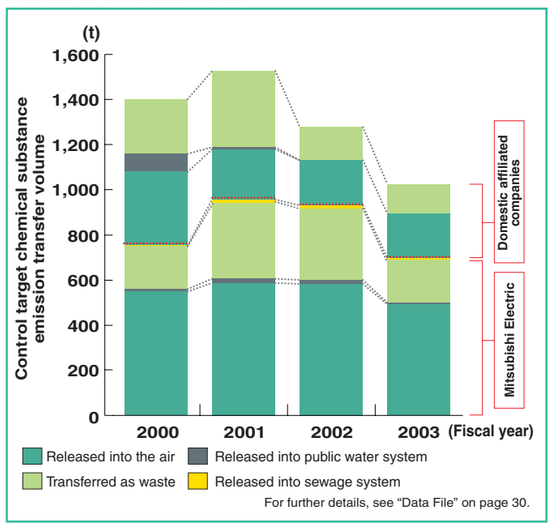
Trichloroethane and other VOCs are among the causes of soil and groundwater pollution. Mitsubishi Electric halted all in-house use of these substances in fiscal 1999, followed by similar action by its domestic affiliates in the spring of 2001 and bans at overseas production bases in December 2002.

■Materials Balance of Chemical Substances Targeted for Control



●No waste release into the soil.

■Trend in Total Emissions



For further details, see "Data File" on page 30.

Striving to realize environmental friendly distribution systems through strategic eco-logistics (Economy and Ecology Logistics) activities.

We establish "cost-minimum environmental concious logistics systems," aiming for the reliable delivery of products using packaging and transportation modes with limited environmental impact, with the least possible expense.

Promoting the "3Rs" in Packaging Materials, guided by the Packaging Technology Committee

The Mitsubishi Electric Group advances ecological improvements in packaging from the product design stage on, promoting the trend toward the "3Rs" (reduce, reuse and recycle) in packaging materials. The major planks of these activities are:

① Promoting improvements in product packaging, all the way back to product design.
② Promoting the use of alternative materials to Styrofoam.
③ Improving materials through review of business transactions and the distribution environment.

In the 4th Environmental Plan, we are aiming for a 10% reduction by fiscal 2005 against the level recorded in fiscal 2001. The packaging materials used in fiscal 2003 came to 46,000t, a 7% decline from fiscal 2001.

Reducing the Use of Wood Materials with Shift to Steel and Cardboard

Under the 4th Environmental Plan, Mitsubishi Electric aims to eliminate the use of wood in the packaging of our major products.

Examining the reduced use of wood, on the export front, we have seen strengthened "cargo use wood quarantine regulations," which results in delivery delays and has other impacts. In Japan, the Law for Promotion of Effective Utilization of Resources, the Construction Materials Recycling Act and other regulations have been effective in promoting the practice of carrying home wood waste from local sites. However, with a shortage of chip-processing companies and other qualified recyclers, the cost of waste treatment is rising.

As an action plan, we are promoting the shift to steel, cardboard and other alternative materials for which reuse systems have already been established, together with the use of returnable packaging.

The volume of wood used in fiscal 2003 was 12,000t, a reduction of 28% from the 17,000t used in fiscal 2001.

Promoting a Modal Shift to Reduce CO2 Emissions

Mitsubishi Electric collaborates with its distribution subsidiary Mitsubishi Electric Logistics Corporation to curb emissions of carbon dioxide (CO_2), nitrogen oxides (NOx) and particulate matter (PM) from automobiles, trains, vessels and aircraft during product transportation.

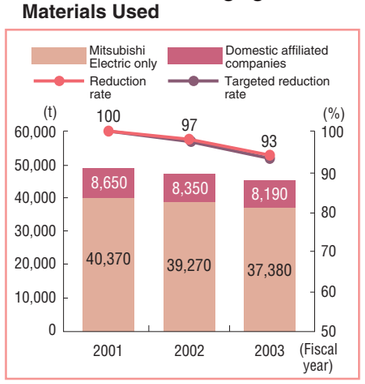
In the 4th Environmental Plan, the goal is to reduce CO_2 emissions resulting from product transport (sales distribution) by 20% by the end of fiscal 2005 compared to the fiscal 2002 level.*

Toward this end, we are promoting a modal shift to railway and marine transport, shipping modes that generate fewer emissions than trucking, with shipment by large (31-foot) containers having commenced in the railway transportation sector. As a result of these efforts, fiscal 2003 CO_2 emissions in the distribution sector fell by 2% compared to the fiscal 2002 level.

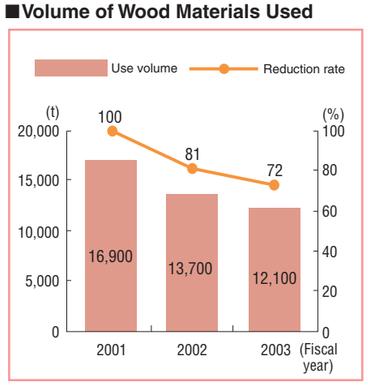
In terms of aggregate transportation volume (ton/kilometer base), there is a 3% reduction. The share of CO_2 emissions from the modal shift (targeting railway and marine transport) rose 0.2 points from 1.7% in fiscal 2002 to 1.9% in fiscal 2003.

(*): With the target expanded to include sales companies, the benchmark fiscal year was moved up from fiscal 2001 to fiscal 2002.

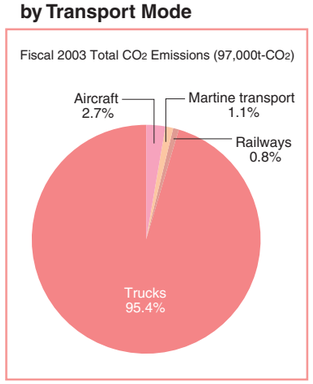
■Total Volume of Packaging Materials Used



■Volume of Wood Materials Used



■Share of CO_2 Emissions by Transport Mode



Deploying a diverse range of information-sharing forums, to deepen understanding of environmental activities.

We evolve communication activities from many different perspectives, explaining our approaches to the environment in layperson's terms.

"Environmental Sustainability Report 2003," Featuring Enhanced CSR Commentary

This marks the sixth edition of the Mitsubishi Electric Group's Environmental Sustainability Report – a corporate message on the environment first published in 1998. This year's report adopts the guiding perspective that, "In gaining for sustainable development, companies must verify their activities from the three dimensions of the economy, the environment and society." We have expanded pages devoted to commentary on social philanthropy, ties with employees and other areas of CSR (corporate social responsibility).

In preparing this report, briefings were held for members of the press, securities analysts, and representatives of environmental nongovernmental organizations (NGO) and educational institutions. In the question-and-answer sessions that followed these presentations, we received many valuable opinions. One widely expressed view was the desire that the revised report serve as more than a mere internal management index, and be expanded into an guide facilitating comparison with other companies.

Website Contents Also Enriched

The Mitsubishi Electric Group Environmental Website*1 introduces our stance and action on the environment from various different angles. The site is used to post environmental plans, activity examples, detailed data and other features. Animation and other new features have been added on both the Japanese and English language editions, to make our environmental management vision easier to appreciate and emulate. The same contents may also be viewed on the global website*2.

※1 http://www.MitsubishiElectric.co.jp/corporate/eco/index.html
※2 http://global.MitsubishiElectric.com/company/environ/index.html

Website

▲"MET animation" English-language version.

Participation in Eco-Exhibition and Symposium

At "Eco-Products 2003," a trade fair held in Tokyo in December 2003, Mitsubishi Electric showcased solutions from the perspectives of daily life, society and R&D, and addressing the theme, "Making Energy Visible and Understandable." In addition, at a business leader seminar sponsored as one phase of "Eco-Products 2003," Mitsubishi Electric President Tamotsu Nomakuchi participated in a panel discussion on the topic, "Environmental Management and Contributing to Society," in an exchange that helped to strengthen interaction with other industries.

Profiling the Mitsubishi Electric Approaches at the "Environmental Week" Exhibition

The "Environmental Week" exhibition was held in March 2004 at "DCROSS," a communication space venue located diagonally to the prestigious Marunouchi Building in the Chiyoda Ward district of Tokyo. Mitsubishi Electric took part in the event, presenting displays under the titles of "Eco to Prevent Global Warming," "Eco for Resource Recycling" and "Eco Powered by Original Technology." We showcased our photovoltaic power generation systems, plastic materials-recycling technology, and an actual service model and application examples of the Poki Poki Motor. Visitors benefited from experiencing first-hand the environmental commitment of the extended Mitsubishi Electric Group, in the midst of a relaxed, familiar, everyday setting.

Eco-Products 2003

▲President Nomakuchi at the "Eco-Products 2003" business leader seminar.

▲Elementary school students visiting "Eco-Products 2003" were treated to explanations of the global environmental challenge.

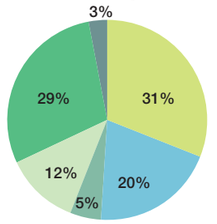
DCROSS

▲The Mitsubishi Electric Group communication space opened in June 2003. This roomy venue features a plush sofa, a big-screen TV display with high-definition images and other impressive features. The space is open to the general public, and excels not only as a business scene but also as an enjoyable place to sit and relax on holiday outings.

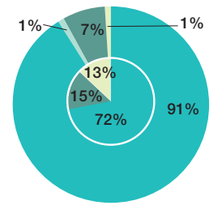
Business Site Environmental Data

M (Materials) Effective Use of Resources

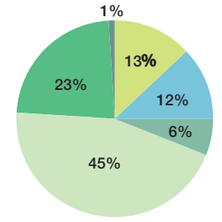
■Consigned disposal volume breakdown by division
Mitsubishi Electric only 5,500t



■Waste breadown
Outer circle: Mitsubishi Electric only 73,900t
Inner circle: Domestic affiliated companies 50,600t

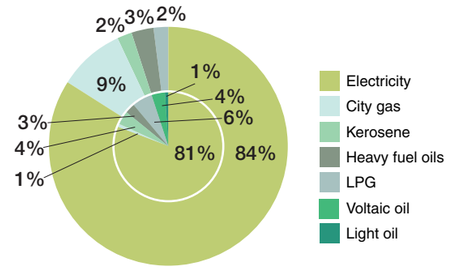


■Water use breakdown by division
Mitsubishi Electric only 7,340,000m³

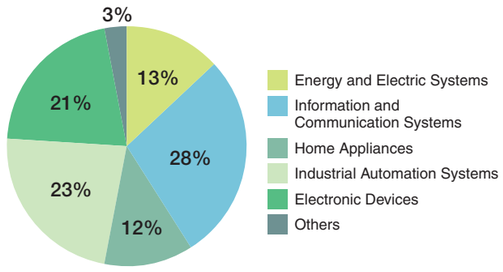


E (Energy) Efficient Use of Energy

■Energy use volume breakdown
Outer circle: Mitsubishi Electric only 410,000t-CO_2
Inner circle: Domestic affiliated companies 180,000t-CO_2



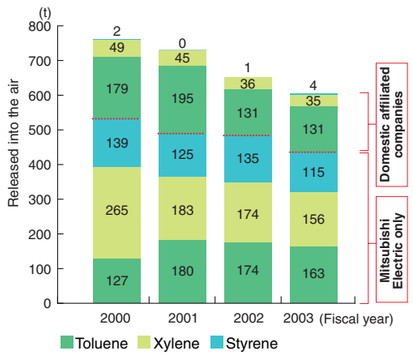
■Energy use volume breakdown by division
Mitsubishi Electric only 410,000t-CO_2



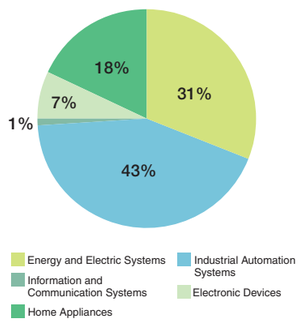
T (Toxicity) Reduce use of substances potentially harmful to the environment

<Reduction of chemical substance emissions>

■Trends in volatile organic compound (VOC) released into the air



■Emission transfer breakdown by division
Mitsubishi Electric only 694t



■Trends in controlled chemical substance emission transfer volume (t)

		FY2000	FY2001	FY2002	FY2003
Mitsubishi Electric only	Released into the air	552	586	577	492
	Released into public water systems	7	18	16	2
	Transferred as waste	190	340	325	195
	Released into sewage systems	6	8	7	4
Domestic affiliated companies	Released into the air	322	228	204	197
	Released into public water systems	80	1	0.5	0.5
	Transferred as waste	244	342	144	151
	Released into sewage systems	0	0	0	0.06

Corporate Ethics and Compliance

Conduct rooted in ethical vision – full observance of the law, never turning our backs on social standards.

With the ethics of corporate conduct now subject to unprecedented scrutiny, "compliance" has emerged as a crucial theme for all companies. We take a rigorous approach on the compliance front, pursuing the dual perspectives of organizational improvement and enhancement of employee awareness in support of this stance.

Enlightenment and System Building for Compliance

The Mitsubishi Electric Group has issued its "Corporate Ethics and Compliance Statement," a statement comprising six basic principles: (1) Compliance with the Law; (2) Respect for Human Rights; (3) Contribution to Society; (4) Collaboration and Harmonization with the Community; (5) Consideration of on the Environmental Issues; and (6) Awareness of Personal Integnity People.

The actual structuring of the group's compliance system, meanwhile, dates from 1991. This year marked the establishment of the "Corporate Conduct Standards Committee," a unit assigned the task of promoting compliance activities and drawing up specific standards of conduct. The current system incorporates the steady stream of revisions made in these standards over the years since. Retooling as a result of the sewer system contract bid-rigging scandal uncovered in 1995 provided particularly strong motivation in this direction.

For the Corporate Conduct Standards Committee, which acts as the nerve center of this system, the executive officer in charge of legal affairs serves as Chairperson, with the regular members composed of the various corporate staff division managers. Attending from the Board of Directors, meanwhile, is the auditor in charge of investigations. Staffed by these high-ranking personnel, the Committee meets twice yearly for deliberations of the planning and progress made. The practical operations are coordinated by second highest-ranking managers at each division, who function as "corporate affairs managers" in promoting the day-to-day activities. As assistants in this process, "compliance key personnel" are also assigned to line sales, technology divisions and other sectors.

For risk management and other more pressing demands, meetings of personnel from the pertinent divisions are called as required, to mount swift, precision responses.

Introduction of the Ethics Compliance Hot Line, Supporting Self-Improvement

The "Ethics Compliance Hot Line" was launched in 2002 as an internal notification system. This system was introduced to closely consider the comments from employees for more effective "deterrence and prevention" of illicit actions, and thereby nipping potential problems in the bud. The hotline is equipped with an exclusive e-mail address, set up to enable any Mitsubishi Electric employee to expose corruption or engage in other whistle-blowing fully anonymously. Even if reports are made using real names, confidentiality is rigorously upheld, with no unfair treatment of the whistleblower tolerated. Upon receiving a report, the Compliance Section conducts an investigation, with confirmation of wrongdoing resulting in punishment of the guilty parties and improvement measures in the divisions involved.

The Company will not allow these systems and organizations to deteriorate into mere shells of accountability. We subscribe to the belief that continually inspecting and verifying will always be an essential part of the quest to enhance corporate compliance.

Corporate Ethics and Compliance Statement

Compliance with the Law

We will never establish a target, nor make a commitment, that could be achieved with conduct that would violate applicable laws or generally accepted community standards.

Respect for Human Rights

We will conduct ourselves always with a respect for human rights. We will not tolerate discrimination based on nationality, race, religion, gender, disability or any other reasonj prohibited by applicable laws nor will we tolerate other conduct which violates international laws, covenants or principles regarding respect for individual and human rights.

Contribution to Society

Concurrently with the pursuit of a reasonable profit, we will conduct ourselves always with an awareness of our corporate social responsibility in order to further the progress of the entire society.

Collaboration and Harmonization with the Community

As a good corporate citizen and neighbor, we will support worthwhile civic and charitable organizations and activities in the communities where we reside or worrk that contribute to community development.

Consideration of Environmental Issues

As part of our goal to achieve a recycling-oriented society, we will do our best to pay attention to and respect the global environment in every aspect of our business.

Awareness of Personal Integrity

We will conduct ourselves with the highest integrity, making a proper distinction between public and private matters and, will use company resources, including monetary resources, time and information for legitimate business purposes. We will use company computers and various networks and on-line services, including e-mail and internet access, primarily for company business.

■Corporate Ethics and Compliance System

Corporate Conduct Standards Committee

- Established in 1991
- Role: Promote Mitsubishi Electric Group compliance activities and define conduct standards
- Membership
  Chairperson: Executive officer for legal affairs
  Members: Leaders of Corporate Affairs Department, Personnel Department, other corporate staff divisions
  Observers: Audit Board members in charge of investigations
  Secretariat: Legal Affairs Department
- Meeting schedule: Twice yearly, with Chairperson reporting on deliberation results to executive officers meeting

Secretariat (Legal Affairs Department)

Compliance Section

Ethics Compliance Hot Line

- Contact point for whistle-blowing notifications of legal violations, wrongdoing or unethical conduct by organizations or individual employees.

Legal Affairs Manager
(Each business site)

- Promote ethics compliance activities within own division (self-audits, compliance education, systematic application of matters decided by Corporate Conduct Standards Committee, etc.)

Compliance Key Personnel

- Work under supervision of Legal Affairs Manager, promoting ethics compliance activities within own division.

Improvements in Personnel System and Workplace Environment

Forging systems that draw out the abilities of each individual, while cultivating safe and healthy workplace environments.

We advance improvements in our personnel compensation system, in creating a corporate climate to vigorously support individual ability development. This stance considers employee health and safety, in realizing workplace environments where all tasks can be performed with energy and peace of mind.

Introducing the Merit System to Further Stimulate Ambition

In March 1998 Mitsubishi Electric completed revisions in the compensation for its management personnel based on the roles of individual mangers in the company. For our general employees as well, sweeping reforms have been made in the conventional qualification system, an area in which demotions were not conventionally made, with the introduction of the "role and duties value system." This is an approach in which compensation is determined in accordance with the individual's role (rank) and achievements in work performance (officially revised effective March 16, 2004).

The foundation of the new system has no connection whatsoever to age, years of continuous service or other traditional factors. Rather, this approach makes it possible for workers striving for improved results and performance to earn roles of higher value, and thereby receive compensation commensurate to their achievements. Those who excel in participation in and contribution to management activities will be selected for higher positions. At the same time, this is also a system in which demotion can take place if it is deemed that the assigned role has not been sufficiently fulfilled. In this way, we have raised the degree to which performance is reflected in positions and compensation to a higher level than ever before, striving to stimulate the ambition of our individual people and thereby further enhance our corporate fiber as a whole.

Along with introducing the new system, we are also taking action to enhance the various management systems that support our personnel compensation scheme, aiming for flexible linkage between the "trinity" of policies of "evaluation and compensation," "assignment and utilization," and "skill development."

Expanding Career Choices, Utilizing the Skills of Female Employees

As the Japanese population ages, there is a trend of growing diversity in how people are coming to view their "second careers." Mitsubishi Electric has responded to these changes with the introduction of a rehiring system under which employees receive opportunities to work for five years past the mandatory retirement age of 60. Also in force is a system that furnishes support for employees seeking to develop second careers, by granting them extended leave, lump-sum payments and other types of strategic assistance. Working through this "multiple-track personnel system," which offers employees numerous choices geared to their particular lifestyles and values, Mitsubishi Electric helps its people enjoy more productive and satisfying lives from the age of 50 and beyond.

▲Wheelchair slope

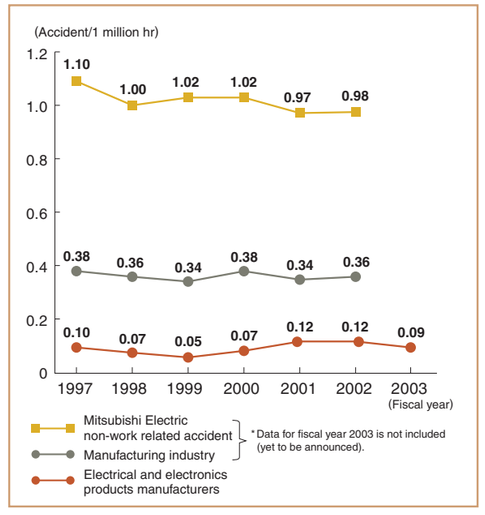
Related is the "Positive Action Committee," which has been established with the goals of actively utilizing the ambitions and skills of our female employees, systematically cultivating female executives, and supplying an environment that supports women in manifesting the full range of their skills and potential. In the quest to put the abilities of our female employees to work in the most rewarding and constructive way possible, the committee will continue to aim for strategic activities and goals.

Striving for "Zero Danger" and Disabled-Friendly Workplaces

As an organization entrusted with the health and livelihood of a large number of employees and their families, Mitsubishi Electric strives to supply a safe, secure work environment for every one of its valuable people. Aiming for the shift from "zero accidents" to "zero danger," in tandem with creating a new safety culture, we advance administrative management based on our own "Labor Safety and Health Management System." This system focuses on the four pivotal fields of "Safety Management," "Health Management," "Construction Work Safety Management" and "Traffic Safety Management," and seeks to eliminate the potential causes of danger and use other committed activities to generate reliable results within the manufacturing industry.

Removing the root causes of danger will also help cultivate workplaces where it is easier for disabled employees to realize their full potential. Mitsubishi Electric prides itself as an active, enlightened employer of disabled people, and as of March 2004, had achieved the ratio of such hiring required under Japanese law. We have also established our "Guideline for Improving Workplaces for Disabled Employees," and mobilized this as a benchmark for refitting restrooms for easier use by the disabled, building slopes for wheelchair access, creating systems to provide visual recognition of machine operation for use by hearing-impaired employees, and carrying out other improvements and additions to realize more friendly, productive workplaces for the physically-challenged members of our corporate team.

■Work Accident Frequency



The vigorous pursuit of corporate philanthropy in Japan and abroad, helping to build a world where everyone lives in harmony and with of mind.

The Mitsubishi Electric Group, determined to fulfill its duties as a responsible corporate citizen, pursues a broad range of social philanthropic activitie both at home in Japan and overseas. These activities are long-term commitments, rooted in the awareness that the key to success lies in perse verance and sustained devotion.

Global Philanthropy through Overseas Foundations

Mitsubishi Electric has established the "Social Philanthropy Committee," a group chaired by the executive director in charge of social philanthropy, to promote the philanthropic activities of the Mitsubishi Electric Group as a whole. The Committee works closely with foundations set up in the United States and Thailand, the SOCIO-ROOTS Fund and other bodies in advancing a broad range of social philanthropic activities. Here, we are pleased to briefly introduce our two key foundations and fund.

The Mitsubishi Electric America Foundation (MEAF), established in Washington D.C. in 1991, provides support for physically challenged individuals in the United States. In May 2000, Mitsubishi Electric became the first Japanese company ever honored with the esteemed Helen Keller Achievement Award, which that year helped to commemorate the 120th anniversary of the birth of Helen Keller herself. This commendation is presented to individuals or companies that contribute to improving the lives of visually impaired people, or to visually challenged persons who personally overcome their disabilities to forge new lifestyles. MEAF earned stellar praise for its activities in support of the internship program for the American Foundation for the Blind, ongoing contributions that led to the selection of Mitsubishi Electric for the award.

The Mitsubishi Electric Thai Foundation (METF) was also launched in 1991, in Bangkok, Thailand. It is primarily active in supplying scholarship aid to university students and supporting lunch programs at the elementary school level. Under the school lunch support program, funds are donated to about 30 schools every year, with the individual schools using this money to purchase fertilizer, feed and other necessary supplies. This provides vital support for their efforts to grow vegetables, raise livestock and other constructive activities aimed at providing meals for underprivileged children unable to enjoy proper lunches due to poverty.

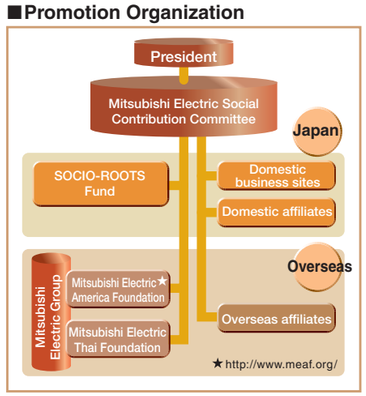
SOCIO-ROOTS Fund Matches Employee Donations

The SOCIO-ROOTS Fund was introduced in 1992 as a gift program under which the companies match employee donations, thereby doubling the total value of the money being given. Mitsubishi Electric Group business sites around the Japan regularly accept charitable donations from their employees. The funds collected (employee contributions and the matching gifts from the company) are then channeled through the Donation Secretariat and distributed to national and regional groups and schools, social welfare facilities for the disabled and other locations operated by NPOs, as well as various groups involved in activities to support these efforts. Moreover, because individuals donating more than 50,000 yen may designate how those funds are to be used, the Fund has also proved to be a highly effective means of cultivating the volunteer spirit.

Corporate Philanthropy Focusing on Five Pivotal Fields

The Mitsubishi Electric Group conducts a rich range of corporate philanthropic activities focusing on the following five pivotal fields: (1) "Social welfare" – support and donations for the disabled, health care assistance for the elderly and other vital programs; (2) "Regional Communities" – contributing to local communities through the spontaneity and ingenuity of individual Mitsubishi Electric Group employees; (3) "Global Environmental Preservation" – tree planting, cleanups, recycling and other eco-friendly activities; (4) "Promoting Science and Technology" – support for nurturing the scientific knowledge and skills of young people destined to be the leaders of the next generation; and (5) "Supporting Sports and Cultures" – a key means of instilling greater meaning and fulfillment in our daily lives. The precious experiences gained through these and other genres of social philanthropy are clearly paving the way to new growth and strength for the Mitsubishi Electric Group.

■**Promotion Organization**

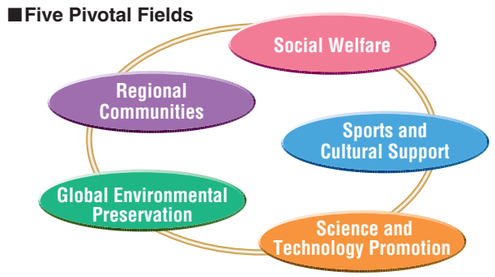


▲Presentation of Helen Keller Achievement Award

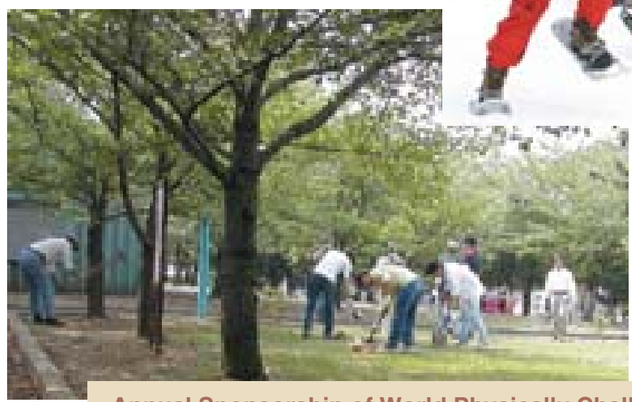
▲Mitsubishi Electric "SOCIO-ROOTS Fund" Symbol Mark

▲For "Santa's House," a facility for Thai orphans opened in February 2004 by the SOCIO-ROOTS Fund, a vehicle was purchased for shopping trips, shuttling and supporting other daily needs.

■**Five Pivotal Fields**



◀Outdoor classes organized by the National Wildlife Federation, a group supported by the Mitsubishi Electric America Foundation. Here, explanations are given to physically challenged individuals about trees and plants, wild animals and other aspects of the natural world.



▲The preliminary tournament for the "2005 Special Olympics Global Winter Games," a competition for the intellectually challenged, was held in February 2004 in Nagano Prefecture. Mitsubishi Electric was a sponsor of this event, and contributed through the production of the competitors' number tags, arranging for use of snow tractors and on other important fronts. Members of the company ski club also acted as volunteers in helping to run the event.

◀"The Association to Cultivate Cherry Trees at Mizugaike Park" is a project sponsored in Itami City in Hyogo Prefecture, with Mitsubishi Electric employees taking part as the key participants. With cooperation from the Itami City Greening Association, the members fertilize, prune and rid the park's cherry trees of caterpillars. Of particular interest is the fact that the cherry trees along the Potomac River in Washington D.C., a long-standing symbol of Japan-U.S. friendship, were grown from saplings originally cultivated in Itami City. In 2003, to commemorate the 90th anniversary of these goodwill ties, descendant saplings from the Potomac cherry trees made a triumphant return to Itami.

Annual Sponsorship of World Physically Challenged Art Exhibition

Mitsubishi Electric Building Techno Service has acted as a sponsor of the World Physically Challenged Art Exhibition every year since 1994. Organized with key assistance from the Association of Mouth and Foot Painting Artists Worldwide, this annual event seeks to deepen understanding of the challenges faced by disabled artists, and assist such individuals in gaining greater self-sufficiency. The 2004 exhibition was staged in January at the prestigious Marunouchi Building in the Marunouchi district of Tokyo, featuring works and skill demonstrations by 42 artists from 15 countries. The perseverance and expertise used by the artists in painting with their feet and mouths, not to mention the actual creations on display, were greatly inspiring to all who visited the event. Mitsubishi Electric Building Techno Service employees and family members acted as volunteers in organizing and operating the exhibition site, with the proceeds from sales of charity goods and other profits donated to facilities for the physically challenged in the sponsor sites and other worthy causes.

◀Physically challenged artists demonstrated their skills.