Norio Sato
Vice President
Chairman,
Energy Subcommittee

Energy Subcommittee

To prevent global warming—one of the most significant and problematic environmental issues affecting the earth—overall CO_2 emissions must be reduced.

Global warming is a major issue affecting the very existence of humanity. In April 2004, the Japanese government revised the Energy Conservation Law, placing further restrictions on CO_2 emissions. As a global manufacturer, Toyota Industries continues to focus our efforts on incorporating energy conservation strategies into our manufacturing activities. We are careful to ensure that energy conservation techniques are fundamentally incorporated into new manufacturing lines, and we employ a system of checks and follow-up activities to monitor the progress. In addition to switching to cleaner sources of energy, Toyota Industries employs strategies that range from adopting large-scale energy conservation equipment to ensuring that each of our employees contributes in his or her own small way to conserving energy.

Energy Conservation Activities

Working to prevent global warming based on a four-pronged strategy to conserve energy

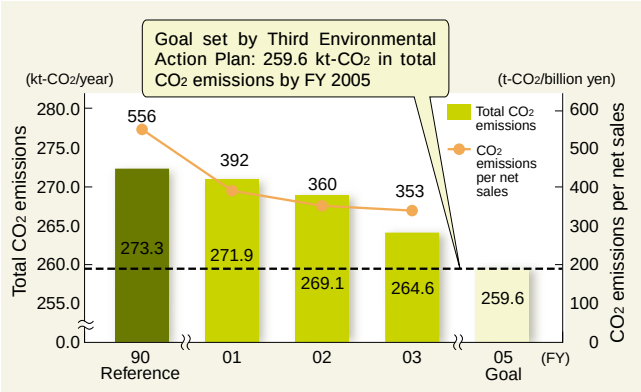
Energy Conservation Policies and Medium-Range Targets

The CO_2 emissions that Toyota Industries generates as a result of energy consumed in its business activities impact the environment in a variety of ways. The company's principal consumers of energy are the casting and other manufacturing plants, but product development and management activities demand their fair share. To address the need to prevent global warming, the company has set a medium-range goal of achieving a 5% reduction in total CO_2 emissions by the end of FY 2005 (based on FY 1990 levels). This goal has been incorporated into the company's Third Environmental Action Plan and forms the basis for the company's efforts to conserve energy. Toyota Industries employs a four-pronged strategy to conserve energy that is based on the principles of (1) reducing energy loss from product processing, (2) improving power supply methods, (3) improving production equipment, and (4) employing equipment compatible with alternative energy sources. These principles help to strengthen the company's management efforts, raise awareness among employees, and ensure that steady progress is made to conserve energy throughout the company.

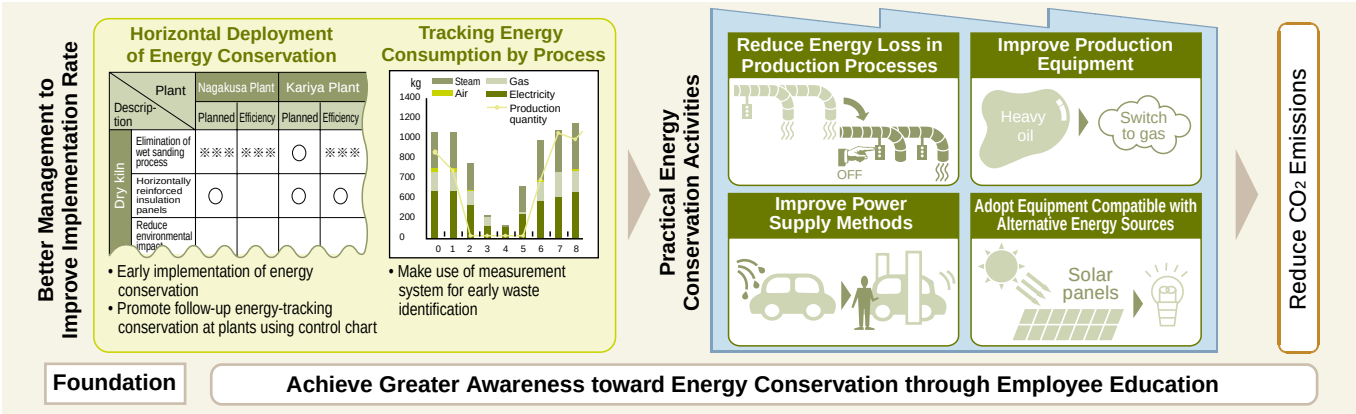
FY 2003 Achievements

For FY 2003, Toyota Industries established a year-end goal of restricting its total CO_2 emissions to 261.7 kt-CO_2, and 374 t-CO_2 per billion yen measured on a net sales basis. The company's efforts were focused on conserving energy in its casting processes, which are a major source of energy consumption. Due to factors such as production increases at various plants and a shift to full-scale production at the Higashiura Plant, the company was unable to achieve its overall CO_2 emissions target, ending the year with total CO_2 emissions of 264.6 kt-CO_2. However, the company's CO_2 emissions on a net sales basis fell to 353 t-CO_2 per billion yen, which was a decrease of 7 t-CO_2 per billion yen compared with FY 2002 levels, and was 37% lower than FY 1990 levels.

■ Total CO_2 Emissions and CO_2 Emission Per Net Sales

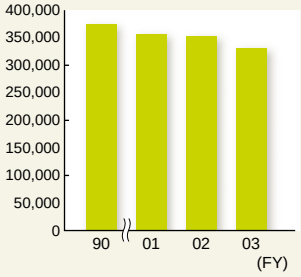


■ Energy Conservation Activities from the Perspective of CO_2 Emissions

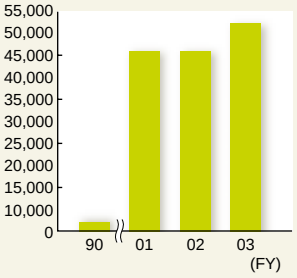


■ Energy Consumption

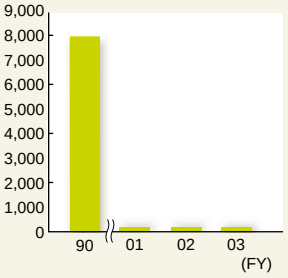
■ Purchased Electric Power (MWh)



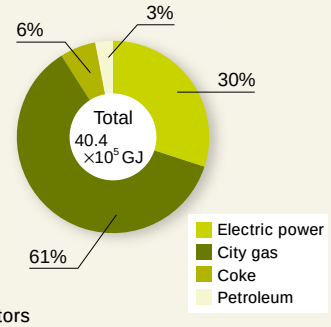
■ City gas (km³)



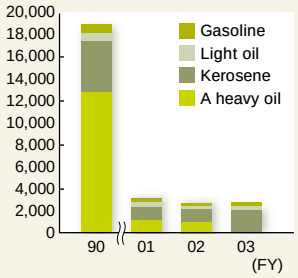
■ Liquid Petroleum Gas (1,000 kg)



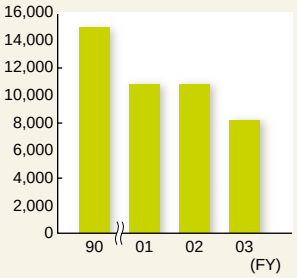
■ FY 2003 Energy Sources (In Terms of CO_2 Emission)



■ Petroleum (kl)



■ Coke (tons)



■ CO_2 Emission Conversion Factors

Electric power	0.3817 kg-CO_2/kWh	Kerosene	2.5308 kg-CO_2/l
City gas	2.3576 kg-CO_2/m³	Light oil	2.6468 kg-CO_2/l
LPG	3.0094 kg-CO_2/kg	Gasoline	2.3609 kg-CO_2/l
A heavy oil	2.7000 kg-CO_2/l	Coke	3.2502 kg-CO_2/kg

FY 2003 Measures

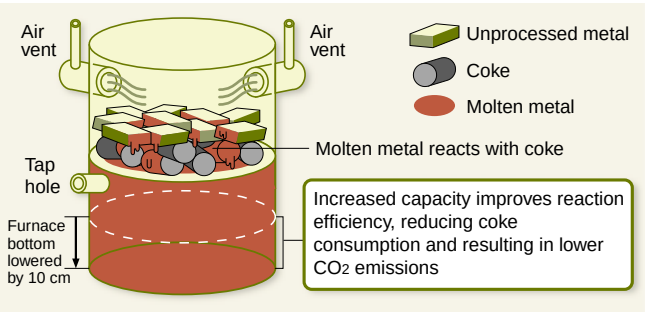
Description	Efforts	Plant
Reduce energy loss from product processing	Reduced air leakage using gauging device	Kyowa Plant Case Study D
	Improved operation of plant ventilation fans	Higashiura Plant
Improve power supply methods	Achieved pressure reduction in air compressors using terminal pressure control	Kariya Plant, Nagakusa Plant
	Improved efficiency of air compressor operation	Kariya Plant
	Improved boiler operating efficiency	Kariya Plant
	Installed variable air compressor device	Hekinan Plant Case Study C
Improve production equipment	Switched to sourcing molten metals	Obu Plant Case Study B
	Improved cupola reaction efficiency to reduce coke consumption	Higashichita Plant Case Study A
	Eliminated a coating step from the manufacturing process for reach truck frames	Takahama Plant
Employ equipment compatible with alternative energy sources	Began full operation of cogeneration system	Kyowa Plant
	Installed solar power generation equipment	Obu Plant

■ Production Equipment Improvements

Case Study A Improved Cupola Reaction Efficiency Reduces Coke Consumption

Cupola melting furnaces use coke as the fuel to melt unprocessed metal, which results in CO_2 emissions that are in proportion with the amount of molten metal. At the Higashichita Plant, the furnace bottom of each cupola was lowered by 10 cm to increase its holding capacity of molten metal. This raised the melting efficiency of the cupolas, reducing CO_2 emissions by an estimated 1,700 tons annually.

■ Improved Cupola Mechanism



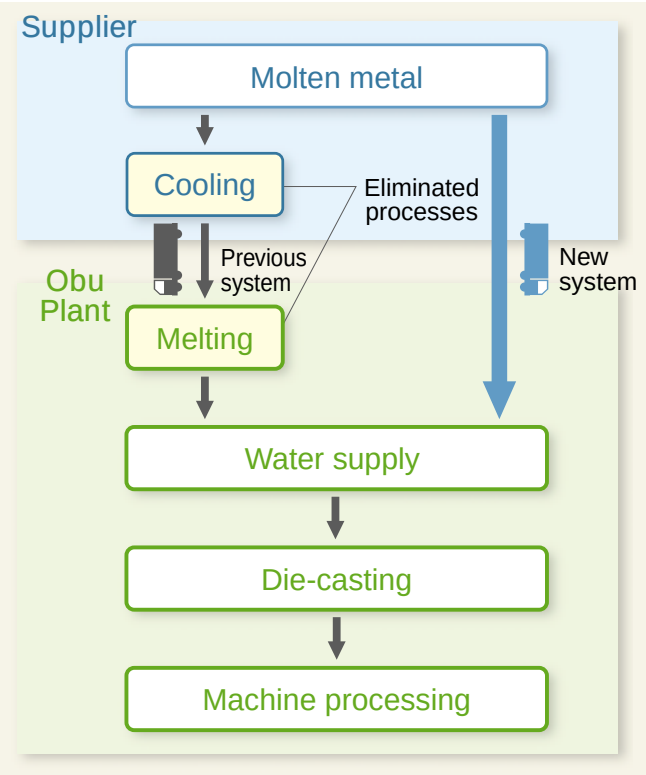
Production Equipment Improvements

Case Study B Sourcing Molten Metal

The die casting process usually utilizes previously melted ingots sourced from a supplier that smelts unprocessed aluminum alloy. Toyota Industries then remelts the ingots for die-casting. In order to reduce energy consumption and CO_2 emissions resulting from the remelting process, the Obu Plant now sources and directly transports molten metal from its suppliers to eliminate the need to remelt ingots.

The Obu Plant carefully ensures that the molten metal is sufficiently insulated and is transported in a manner that is compliant with transport regulations in order to reduce the risk involved in transporting hot molten metals. By making increased use of molten metals sourced from its suppliers, Toyota Industries expects to reduce 5,000 tons of CO_2 emissions annually.

■ Sourcing Molten Metal

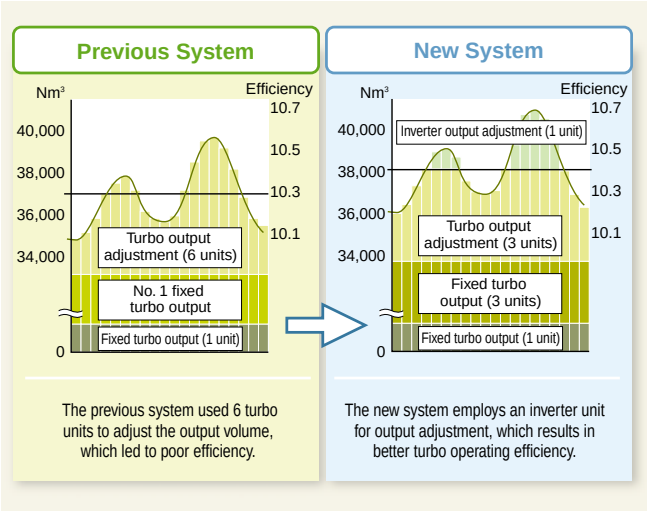


Power Supply Method Improvements

Case Study C Installing Variable Air Compressors

As part of an effort to improve the operating efficiency of its air compressors, the Hekinan Plant upgraded a compressor unit that suffered from poor energy efficiency after 20 years of operation. Previously, the system used six turbo units in order to provide an even compressor-output volume in response to changes in output demand. The plant replaced one of the turbo units with an inverter unit, which led to an improvement in output adjustment efficiency. The change is expected to reduce CO_2 emissions by 220 tons annually.

■ Changes to Air Compressor Output



Reduced Energy Loss from Manufacturing Processes

Case Study D Gauging Device Used to Reduce Air Leakage

Previously, compressor air leakage was detected by human ear alone during checks conducted on rest days or other occasions when the plant was quiet. Employees at the Kyowa Plant now use a gauging device to efficiently detect the location and amount of even minor air leaks during line operations. This change is expected to reduce CO_2 emissions at the Kyowa Plant by 50 tons annually.

Device for Checking Air Leaks

Future Activities

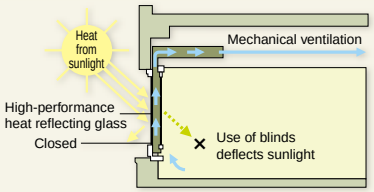
One of the targets of Toyota Industries for FY 2004 is to reduce energy consumption in all production lines newly introduced in FY 2004 by 30% as a foundation for its future energy conservation efforts. The company will also utilize more effectively an energy measurement system that will enable it to better identify energy issues and improve its energy performance. In addition, the company will install new cogeneration systems and equipment compatible with alternative energy sources.

FOCUS Energy Conservation Initiatives by the Obu Plant and Nagakusa Plant

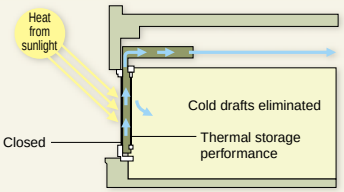
Creating an Office Environment that Makes Efficient Use of Solar Heat and Wind

The recently rebuilt Obu Plant incorporates architectural concepts designed to make efficient use of natural resources. Air flow windows that utilize solar heat and wind resources help to reduce the environmental impact of heating, ventilation, and air-conditioning (HVAC) systems.

■ Summer Air Flow

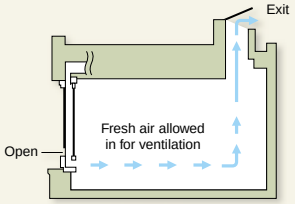


■ Winter Air Flow



The use of heat reflecting glass and blinds helps to counteract cold air conditioning during the winter and high temperatures during the summer, both of which assist in reducing the environmental impact of office HVAC systems.

■ Evening Ventilation



Letting in fresh air at night helps to cool the building and lowers the environmental impact from running HVAC systems.

Nagakusa Plant Recognized for Outstanding Energy Conservation Performance

The Nagakusa Plant, which manufactures automobiles, was recently recognized for its creative improvements and outstanding energy conservation performance with the 2003 Economy, Trade and Industry Minister's Award. The plant was selected for its successful efforts in eliminating one step in the car wash processes from the plant's vehicle painting process. By eliminating this step, the plant significantly reduced the water consumption and energy needs ordinarily used in the washing and drying of vehicles. This achievement was covered in detail on p.28 of Environmental Report 2003.

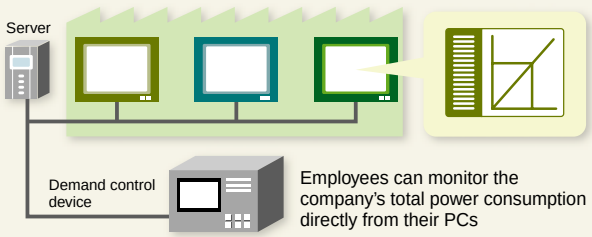
Economy, Trade and Industry Minister's Award and Award Ceremony

Subsidiary Spotlight

Hara Corporation Adopts Demand Control Device to Conserve Energy

Hara Corporation, a subsidiary of Toyota Industries that manufactures textile machinery, has increased the environmental awareness of its employees, and has been conducting routine control checks for energy efficiency. As part of this effort, the company has adopted the use of demand control devices that enable its employees to monitor the company's power consumption status from their PCs. The company's use of demand control devices has led to increased awareness of the need for environmental conservation among the company's employees, while helping to eliminate unnecessary operation of HVAC systems. The resulting energy savings are expected to reduce the company's CO_2 emissions by 60 t-CO_2 annually.

■ Operation of Demand Control Device



The demand control device is set to 18°C in the winter and 28°C in the summer. HVAC systems automatically shut off at 10 AM and when winter temperatures exceed 18°C.

Shiro Endo
Senior Managing Director
Chairman,
Pollution Prevention
Subcommittee

Pollution Prevention Subcommittee

Aiming for sustainable growth and coexistence with the global environment

During FY 2003, numerous changes were made to Japan's environmental regulations, including the addition of the Chemical Substance Law* and the Water Pollution Control Law. The Japanese government also entered into the final phase of studies aimed at introducing restrictions on VOCs as part of future changes to the Air Pollution Control Law. In Europe, the EU's ELV directive took effect during FY 2003 with further regulations on chemical substances expected to be introduced in the future. The increasingly strict regulatory environment means that Toyota Industries must further reduce our environmental risks and practice regulatory compliance to achieve sustainable growth, while reducing our environmental impact on both a company-wide and group-wide level.

Managing Chemical Substances and Reducing Substances of Concern

Taking positive steps to achieve the targets established by the Third Environmental Action Plan

Medium-Range Goals and Major Objectives

Toyota Industries' Third Environmental Action Plan has set a medium-range goal of achieving a 50% reduction, compared with FY 1998 levels, in total emissions of PRTR-designated substances and VOCs by FY 2005. Toyota Industries is steadily working to meet this target and is voluntarily reducing its emissions of greenhouse gases such as fluorinated gases and other substances of concern.

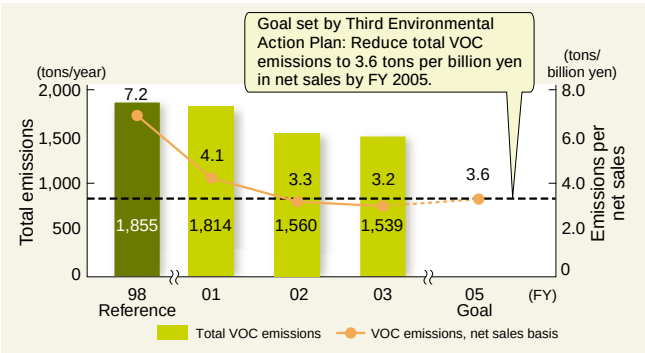
FY 2003 Achievements

Toyota Industries increasingly switched to powder coating processes during FY 2003 in an effort to reduce emissions of VOCs and other substances of concern. The company's VOC emissions on a net sales basis stood at 3.3 tons per billion yen, which was a reduction of 54.6% from FY 1998 levels. This figure surpassed its medium-range goal of 3.6 tons per billion yen in net sales. Emission levels of the PRTR-designated substances toluene and xylene both fell due to the company's efforts to reduce VOCs. Total emissions of PRTR-designated substances stood at 6,853 tons, which was down 46.0% from FY 1998 levels.

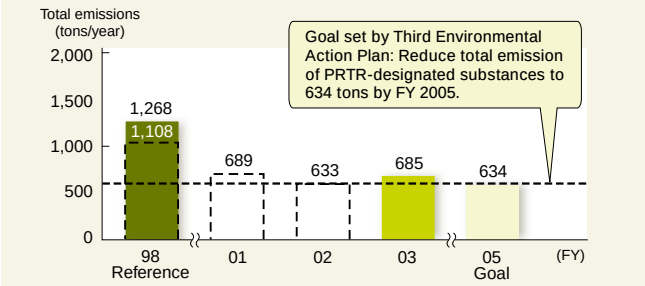
Toyota Industries also improved its management of chemical substances and established the Ecology Material Investigation System (EMIS) in collaboration with Hitachi, Ltd.

* Chemical Substance Law: officially know as the Law Concerning the Examination and Regulation of Manufacturers, Etc. of Chemical Substances.

■ **Total VOC Emissions and VOC Emissions per Net Sales**



■ **Total Emissions of PRTR-Designated Substances**



• Outlined bar data is based on the calculation method used through FY 2002 (see below).

Revised Method for Calculating Emissions of PRTR-Designated Substances

Starting from FY 2003, Toyota Industries has changed its method for calculating emissions of PRTR-designated substances in order to improve its risk management. In the above graph, the solid bars for FY 1998 and FY 2003 are based on the revised calculation method. The data for FY 2001 and FY 2002 is based on the previous calculation method.

Basic formulas:

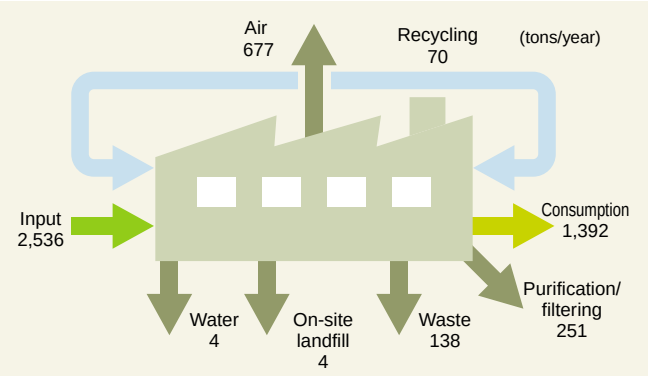
Total emissions of PRTR-designated substances = (volume of PRTR-designated substances used) x (emissions coefficient)

Volume of PRTR-designated substances used = (volume of products used that contain PRTR-designated substances) x [PRTR-designated substance content (%)]

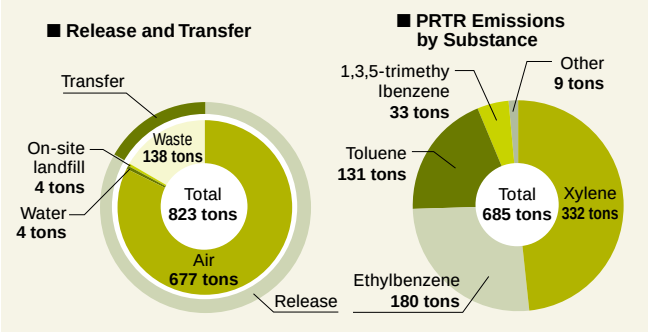
- The percentage of PRTR-designated substance content is now based on the maximum value from the supplier and not the mean average value.

Example: Supplier submits data indicating 10-20% toluene content
Previous method: Toluene content set at 15%
Revised method: Toluene content set at 20%

■ FY 2003 PRTR-Designated Substance Mass Balance



■ FY 2003 PRTR-Designated Substance Release and Transfer



FY 2003 Measures

Description	Efforts	Plant
Reduce VOCs	Switched to powder coating processes	Kariya Case Study A
	Reduced paint thinner consumption Improved thinner recovery rates	Nagakusa
Reduce fluorinated gases	Installed fluorine recovery units	Kariya Case Study B
	Performed routine monitoring of fluorine recovery levels	Kariya
Reduce other chemical substances besides VOCs and fluorinated gases	Switched to non-organochlorine cutting oils	All plants Case Study C
Promote chemical substances management	Managed polychlorinated biphenyl (PCB) storage sheds	Company-wide Case Study D
	EMIS	Company-wide Case Study E

Case Study A Switching to Powder Coating to Reduce VOCs

The Textile Machinery Division of the Kariya Plant has switched to powder coating of components used in water-jet looms*1 in order to replace the use of solvent-based paints. In the future, the plant will expand its use of powder coating to other textile machinery such as air-jet looms*2 and spinning machinery*3, with the eventual goal of achieving zero emissions of VOCs.

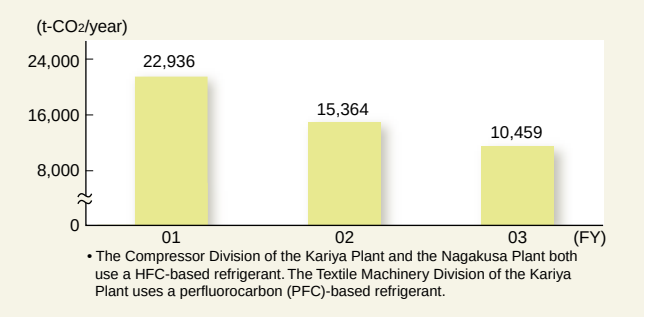
*1 Water-jet loom: a weaving machine that inserts weft yarn using water.
*2 Air-jet loom: a weaving machine that inserts weft yarn using air.
*3 Spinning machinery: a machine that spins cotton fibers into yarn.

Water-Jet Loom

Case Study B Installing Fluorine Recovery Units

Toyota Industries is striving to reduce its emissions of the alternative refrigerant HFC-134a, a hydrofluorocarbon (HFC)-based substance that is said to contribute to global warming. The company uses HFC-134a to develop car air-conditioning compressors and for its vehicle assembly processes. During FY 2003, the Kariya Plant installed fluorine recovery units and began routine monitoring of fluorine recovery levels. Recovered fluorine is now either destroyed by a third-party processing firm, as in the case of the Kariya Plant, or is reused in assembly processes, as done by the Nagakusa Plant.

■ Fluorine-Based CO_2 Emissions (t-CO_2/year)



• The Compressor Division of the Kariya Plant and the Nagakusa Plant both use a HFC-based refrigerant. The Textile Machinery Division of the Kariya Plant uses a perfluorocarbon (PFC)-based refrigerant.

Case Study C Switching to Non-Organochlorine Cutting Oils

Some cutting oils may contain organochlorine compounds, which improve cutting performance. However, the waste oil that results from using these products can release air pollutants such as dioxins and hydrogen chloride during incineration by waste processing firms.

Toyota Industries has largely eliminated its use of organochlorine-based cutting oils. By March 2004, the company replaced over 90% of its organochlorine-based cutting oils with environmentally safer alternatives.

Case Study D **PCB Storage Management**

PCBs were previously used to insulate transformers and condensers until they were banned in 1976 due to their toxicity. Toyota Industries oversees the management of 892 storage sheds containing PCBs. The company regularly files reports on the status of its PCB management with government authorities. Every precaution is taken to ensure that PCBs are not released or allowed to leach into the soil.

PCB Storage Shed

Case Study E **EMIS**

Toyota Industries recently established the EMIS, a comprehensive system that combines database and workflow functions for improved chemical substance management.

Previously, the company did not have a system to store and manage environmentally related data, which ranges from chemical substance content data for raw materials and indirect materials used in manufacturing processes to MSDS* data and assessments of applicable environmental regulations. Thus, each piece of data had to be managed and saved separately—this was carried out by the BS Safety, Health and Environment Department. The EMIS database system, however, has since enabled the centralization of data management, and has brought with it the added advantages of improved data management, better tracking of substances of concern, and improved ease of data calculation and retrieval.

The EMIS system also integrates workflow functions, which include the ability to conduct prior environmental assessments. These features have improved the company's workflow and management tasks while contributing to reduced paper consumption.

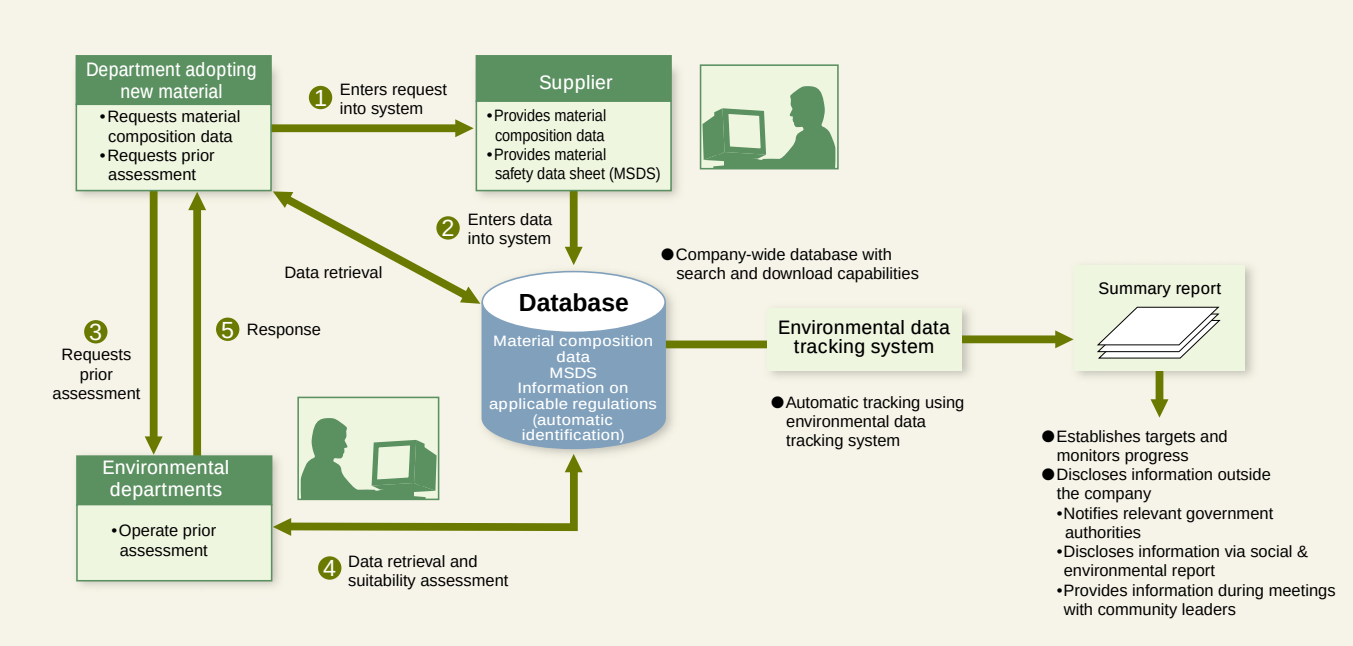
Features of EMIS System

- Database functions
  Centralized database containing environment, safety, and health-related data
- Workflow (electronic decision making) functions
  Improved workflow and reduced paper consumption

Future Activities

Future activities will focus on further reducing environmental risks and substances of concern as well as working to achieve the targets set forth by the Third Environmental Action Plan. Concrete measures will include the expanded use of powder coating by the Textile Machinery Division of the Kariya Plant and conversion to the use of water-based paints by the Vehicle Division of the Nagakusa Plant.

■ **Chemical Substance Management System**



*MSDS: a data sheet listing the chemical substances contained in raw materials and indirect materials used in a product.

Regional Environment Conservation

Gaining the trust of the community by conducting business in the manner of a good corporate citizen

Toyota Industries is shouldering the responsibility of contributing to environmental conservation and reducing its impact on the surrounding regional environment. The company has established voluntary targets and is ensuring that its product development and manufacturing activities take into consideration the environment.

Setting Voluntary Environmental Targets

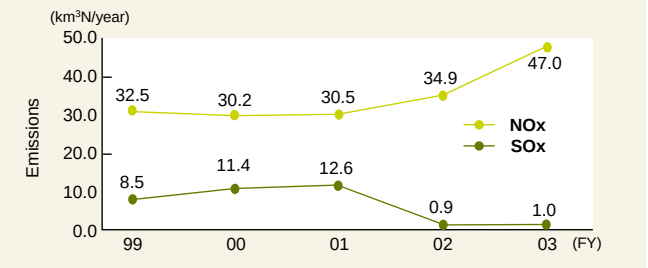
Toyota Industries uses voluntary environmental targets that exceed both regulatory standards and community guidelines in their strictness. In FY 2003, the company's voluntary targets were expanded to cover noise and vibration pollution, in addition to existing voluntary targets for air pollution.

Reducing Air and Water Pollution

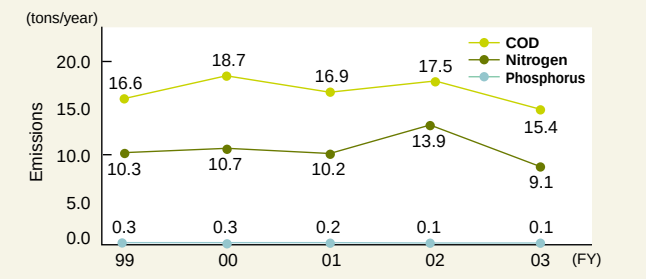
Toyota Industries is reducing its emissions of air pollutants such as SOx, NOx, and soot through equipment upgrades and other efforts to reduce pollution at the source.

Water pollution is being addressed in various ways, including the installation of continuous-measurement devices to better monitor nitrogen and phosphorus levels in water. Eutrophication* in the Ise Bay is specifically being addressed through stricter water quality management and upgrades of the wastewater treatment facilities of the nearby Kariya and Obu Plants.

■ SOx and NOx Emissions



■ COD, Nitrogen, and Phosphorus in Wastewater



Preventing Noise and Vibration Pollution

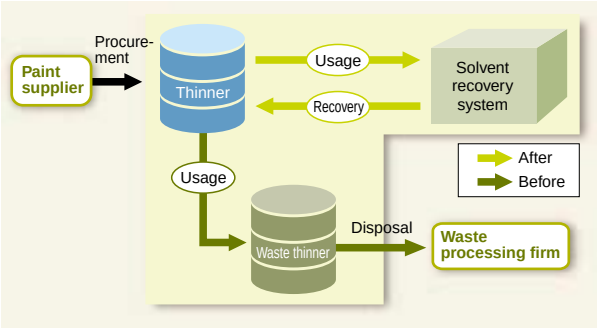
Noise pollution and vibration pollution are interrelated and can be emitted both inside and outside the plants. Toyota Industries works to identify noise and vibration sources with an emphasis on plants located close to residential areas. Specific measures include installing soundproof walls and enclosures and enforcing restrictions on the speed with which vehicles are operated within plant boundaries.

Subsidiary Spotlight

Reducing VOC Emissions at Aichi Corporation

Aichi Corporation, which manufacturers and sells truck-mounted work platforms, installed in March 2004 a solvent recycling system to automatically recover, distill, and cool thinner used in painting processes. The new system will enable the company to recycle 85% of its thinner consumption, which will save 8,000 liters of thinner annually. In addition to reducing VOC emissions, the system will enable the company to achieve zero emissions of flammable waste liquid, which otherwise requires special management under Japanese regulations.

■ Recovery and Recycling of Waste Thinner



Reducing VOC Emissions at Toyota Industrial Equipment Mfg., Inc.

Europe and the United States are leading the way for stricter regulations on air pollution. U.S.-based companies like Toyota Industrial Equipment Mfg., Inc., which manufactures forklift trucks, are taking steps to reduce their emission of VOCs and other air pollutants. During FY 2003, the company replaced four painting robots with more efficient models and installed two powder coating systems that enabled the company to switch to paints with a lower environmental impact. The company's consumption of air polluting substances dropped from 3.8 kg per forklift truck manufactured in 1995 to 0.1 kg per forklift truck manufactured in 2003.

*Eutrophication: release of substances containing nitrogen and phosphorous into lakes and rivers from household wastewater and industrial wastewater, leading to the multiplication of plankton and microbes that affect water quality.

Shinjiro Kamimura
Senior Managing Director
Chairman,
Resource Utilization
Subcommittee

Resource Utilization Subcommittee

In order to conserve natural resources, Toyota Industries will reduce wasteful consumption by implementing a more efficient manufacturing process

Toyota Industries is challenging the widespread assumption that mass production and mass consumption lead to mass disposal thorough the recycling and reuse of waste materials. We are also addressing the need to better utilize finite resources and properly dispose of spent resources in a way that does not contribute to global warming, air pollution, and other forms of environmental impact.

As we near our goal of zero landfill waste*1, Toyota Industries is now focusing on resource productivity enhancement by reviewing and changing our manufacturing practices. This marks a departure from our previous emphasis on recycling of spent resources.

Reducing Industrial Waste

Nearing the goal of zero landfill waste

Medium-Range Goals and Major Objectives

Toyota Industries has established the goal of achieving zero landfill waste, while its Third Environmental Action Plan has set the goals of zero direct landfill waste*2 at each of its plants by the end of FY 2003, and zero indirect landfill waste*3 by FY 2005. In addition to working toward these accomplishments, the company is considering measures that will further reduce waste generation by improving productivity and minimizing resource loss.

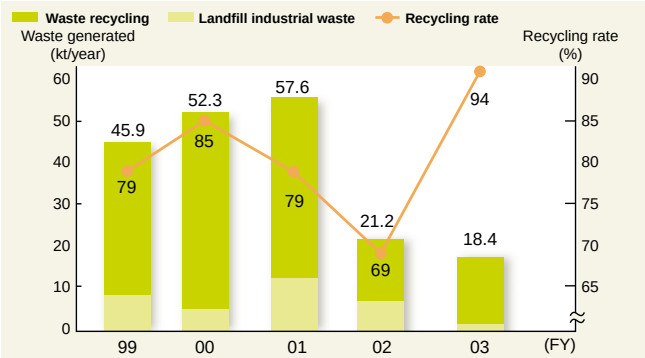
FY 2003 Achievements

The company's major focus for FY 2003 was on better utilizing industrial waste generated from its casting processes. During the year, the company generated 18,368 tons of industrial waste*4 and was able to recycle 17,196 tons of it for a 94% recycling rate*5, surpassing the previous year's performance.

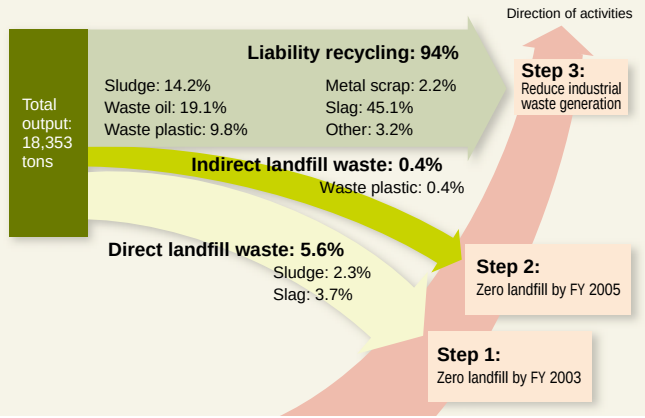
The company generated 1,097 tons of direct landfill waste, which fell short of the FY 2003 target of 340 tons. However, the company's progress through FY 2003 indicates that the target of zero direct landfill waste is within reach. Indirect landfill waste fell to 74 tons, partly as a result of efforts to recycle ash generated from the incineration of plastic waste. The company thus reached its zero indirect landfill waste target ahead of schedule.

*1 Zero landfill waste: defined by Toyota Industries as a 95% or greater reduction in direct landfill waste compared with FY 1998 levels, and a 95% or greater reduction in indirect landfill waste compared with FY 1999 levels.
*2 Direct landfill waste: industrial waste that is directly disposed in landfills without intermediate treatment such as crushing or incineration.
*3 Indirect landfill waste: industrial waste that is subjected to intermediate processing, such as crushing or incineration, before being disposed in landfills.
*4 Industrial waste: all industrial waste including direct landfill waste, indirect landfill waste, and recycled waste.
*5 Recycling rate: ratio of industrial waste that is recycled.
*6 Deoxidizer: a reducing agent used to remove oxygen during casting.

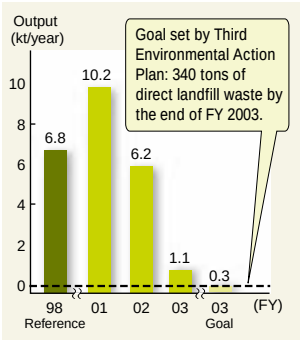
■ Industrial Waste



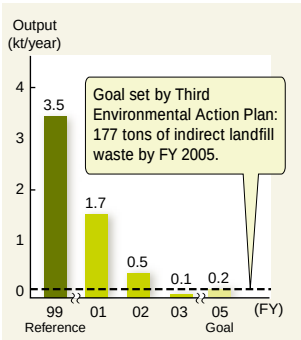
■ Breakdown of Industrial Waste in FY 2003



■ Direct Landfill Waste



■ Indirect Landfill Waste



FY 2003 Measures

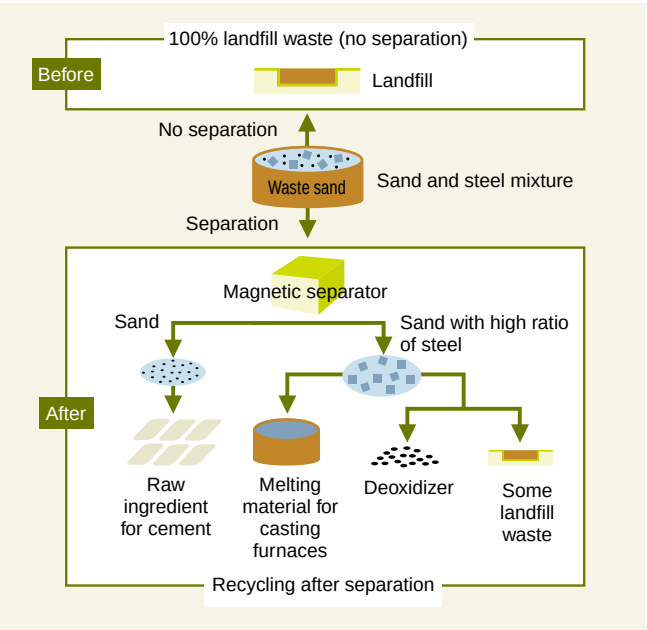
Description	Efforts	Plant
Reduction of direct landfill waste	Installed magnetic separators to recycle waste sand	Higashichita Case Study A
	Decommissioned older wastewater treatment facilities to reduce sludge dewatering pollution	Obu
Reduction of indirect landfill waste	Reused waste plastic as a combustion improver and reducing agent, reducing waste after incineration; recycled burned ash from incineration	All plants
Reduction of industrial waste	Reused cutting scraps	Hekinan Case Study B
	Installed sludge dryers for wastewater treatment facilities; decreased wastewater sludge output by reducing coagulant usage	Kariya, Takahama
	Installed compressors designed to prevent waste oil resulting from hydraulic oil consumption	Higashichita
	Installed concentrators and revised specifications to reduce waste oil	Kariya
	Reused plastic waste through better sorting of waste	Nagakusa

Case Study A Installing Magnetic Separators to Reduce Waste Sand

The slag produced from casting performed at the Higashichita Plant accounts for the majority of direct landfill waste generated by Toyota Industries. In order to address the need to recycle waste sand, which is largely composed of sand with a high ratio of steel, the plant installed magnetic separators. This enables the plant to recycle the separated sand as a raw ingredient for cement.

The collected sand with a high ratio of steel is then recycled by mixing them with scraps generated from the machining of casting parts. The resulting mixture is compressed and recycled for use as a melting material. Due to the plant's limited demand for melting materials, the remaining separated steel particles are recycled as a deoxidizer*6 by other companies. The amount of waste sand destined for landfill waste is now less than 10% of previous levels.

■ Recycling Waste Sand



Case Study B Reusing Cutting Scraps

The cutting scraps generated from the grinding processes at the Hekinan Plant were previously treated as industrial waste. However, observing the high percentage of steel content in its cutting scraps, the plant came up with the solution to recycle the scraps for use by external companies as raw material for steel. The plant has since installed compaction units to compress and solidify the cutting scraps for resale to other companies. This measure has enabled the plant to resell 240 tons of cutting scraps annually.

Future Activities

Toyota Industries has every intention of further improving its management and processing of landfill waste.
The company is also considering the adoption of resource-productivity concepts as a tool for managing and reducing industrial waste.

Reducing Water Consumption

Using rainwater and reducing cleaning time of industrial water filtration equipment to reduce consumption levels

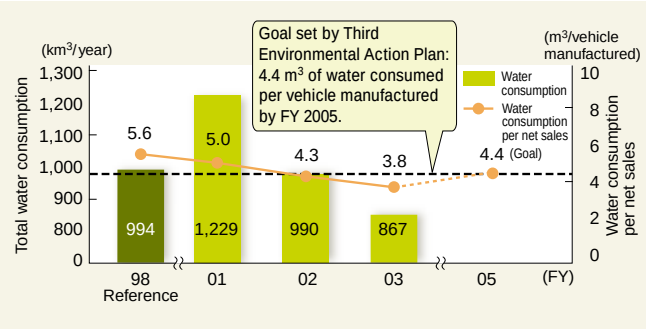
Medium-Range Goals and Major Objectives

Toyota Industries recognizes the importance of water as a natural resource and has made it an objective to reduce the company's water consumption. The Third Environmental Action Plan has set a FY 2005 goal of achieving a 20% reduction in water consumed per vehicle manufactured, compared with FY 1995 levels. In addition, plants, other than the one in automotive manufacturing, are currently applying themselves to the management and reduction of overall water consumption levels.

FY 2003 Achievements

Major achievements in FY 2003 include the further elimination of washing processes from vehicle manufacturing lines. The company's water consumption during FY 2003 stood at 3.8 m³ per vehicle manufactured, which surpassed the medium-range goal of 4.4 m³.

■ Total Water Consumption and Water Consumption per Vehicle Manufactured



FY 2003 Measures

Efforts	Plant
Changed coolant replacement cycle to save water	Kariya
Reduced cleaning times of industrial water filtration equipment	Kariya, Obu Case Study A
Eliminated vehicle washing processes	Nagakusa
Redirected and reused overflow water from cooling towers	Hekinan
Used rainwater for toilet sanitation	Higashiura

Case Study A Reduced Cleaning Times of Industrial Water Filtration Equipment

The Kariya Plant uses filtration equipment to remove steel deposits from industrial water. Although this equipment requires regular cleaning to remove the deposits, the plant determined that its cleaning times could be shortened by one third without impacting the filtration performance. This prompted the plant to change its equipment operating standards, resulting in 34.8 km³ of water being saved annually.

Future Activities

Toyota Industries is looking at ways to reduce the consumption of dilution water by extending the useable life of cutting fluids and reuse purified groundwater. The company will seek to better distribute information on conservation measures taken by the company's plants in order to enable other plants to implement the same measures.

Reducing CO_2 Emissions from Logistics Operations

Maximizing cargo loads, improving transport routes, and switching to alternative transport methods

Medium-Range Goals and Major Objectives

Logistics operations have an undeniable impact on the environment and can contribute to global warming and air pollution through emissions of substances of concern. The Third Environmental Action Plan has set a FY 2005 goal of reducing the company's total CO_2 emissions from transport operations to within FY 1990 levels.

FY 2003 Achievements

Toyota Industries improved the efficiency of its land-based transport operations by combining its shipments with those of other companies, optimizing its shipping routes to reduce trips, and maximizing its cargo loads. Alternative transport methods such as rail and ship transport are also being increasingly used. These changes enabled the company to reduce its total CO_2 emissions to 6,278 tons, which surpassed the medium-range goal.

Subsidiary Spotlight

ST Liquid Crystal Display Corp.*1

Reducing Waste Liquid

ST Liquid Crystal Display Corp. generates acid waste and alkali waste from its manufacturing activities. Previously, the company used a third-party processing firm to process its acetone and isopropyl alcohol*2 waste. However, this waste is now completely reused as a source of nutrition for the bio-treatment of water conducted by the company's wastewater treatment facilities. This change has reduced the company's output of waste fluid by 2.4 tons annually, while reducing the consumption of methanol that was previously needed for use as a biological nutrient.

Measures to Reduce Waste Liquid

Phase	Processing	Efforts
1. Reuse as pure liquids	In-house	• Changed to different chemicals • Improved separation and recovery of impurities • Identified solution of reusing waste liquid based on its characteristics (Seeking improvements for each phase)
2. Use for separate manufacturing processes		
3. Treat wastewater		
4. Process industrial waste	Third party	

Water Conservation

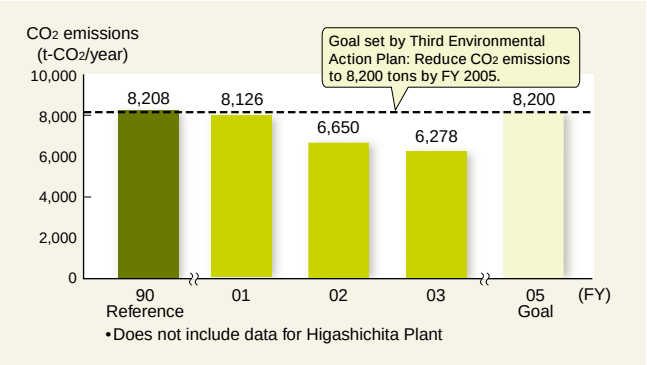
The manufacturing of precision LCDs requires the use of vacuum pumps to supply pure water, whereupon it must undergo a further purification process before it can be used in manufacturing. Starting from FY 2003, the company began reusing the vacuum pump cooling water for other cooling tanks and boilers. This measure enabled the company to save 50 km³ of water annually.

Michigan Automotive Compressor, Inc.

Michigan Automotive Compressor, Inc., uses coagulants to purify contaminated water at its wastewater treatment facilities. The sludge that results from this process is dewatered and treated as industrial waste. The company has discovered that the residual active coagulants from the sludge before dewatering can be reused in the coagulation process. This additional step has significantly reduced the company's overall consumption of coagulants. In addition, the company now uses multiple dewatering processes for better efficiency and reduced sludge output.

*1. ST Liquid Crystal Display Corp. is not a consolidated subsidiary but is accounted as an affiliate by the equity method.
*2. Isopropyl alcohol: a clear, colorless liquid that is mixed with water or ethanol for use as a paint solvent or industrial solvent.

■ CO_2 Emissions from Logistics Operations



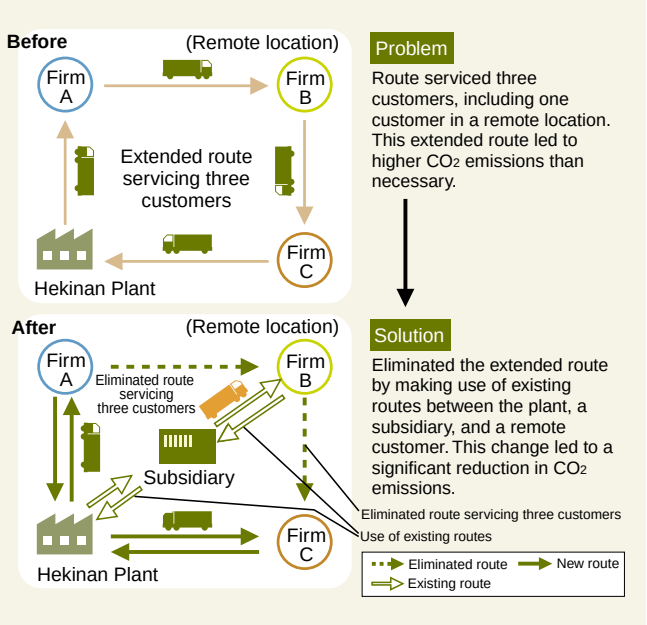
FY 2003 Measures

Efforts	Plant
Optimized transport routes	All plants Case Study A
Combined shipments with other companies	All plants
Maximized cargo loads	All plants Case Study B
Switched from truck to ship transport	Takahama
Expanded use of ship and rail transport	Takahama Case Study C

Case Study A Optimizing Transport Routes

The Hekinan Plant uses trucks to deliver engines to its customers. Previously, the company used a daily trucking route that incorporated deliveries to three customers, including one customer in a remote location. The plant has since replaced this trucking route with two shorter ones by utilizing existing shipping routes between the plant, a Toyota Industries subsidiary, and its remote customer. This change reduced the plant's CO_2 emissions by 32.4 tons annually.

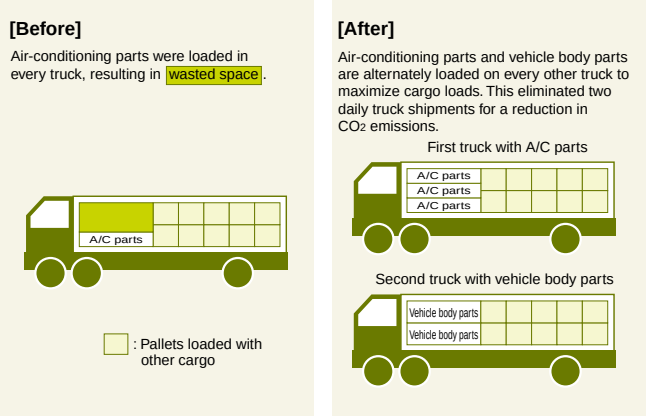
■ Optimized Transport Route



Case Study B Maximizing Cargo Loads

The Nagakusa Plant, which assembles vehicles, previously shipped air-conditioning parts in 30 daily truck shipments. In order to eliminate wasted cargo space, the plant decided to alternately ship air-conditioning parts and body parts in every other truck for better cargo loading efficiency.
This measure enabled the plant to eliminate two of its daily truck shipments, which is expected to reduce the plant's CO_2 emissions by 14.4 tons annually.

■ Better Cargo Management



Case Study C Expanding use of ship and rail transport

Truck transport is generally considered to produce CO_2 emissions that exceed ship transport and rail transport in that order. Toyota Industries is switching to ship and rail transport in order to deliver forklift trucks to remote customers in areas such as Hokkaido and Kyushu.
These measures have reduced the company's CO_2 emissions by 7.2 tons annually.

Future Activities

Future efforts will concentrate on further combining the company's shipments with those of other companies and making increased use of alternative transport methods.

Reducing Packaging

Switching to packaging methods that reduce waste

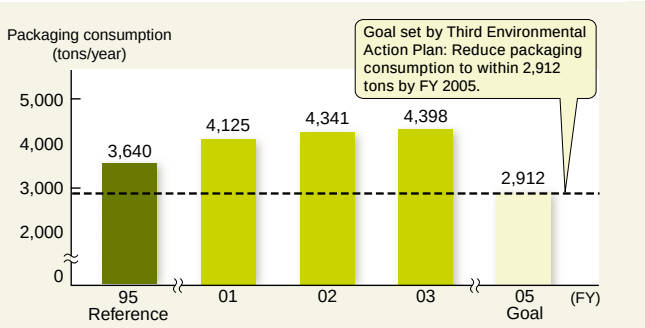
Medium-Range Goals and Major Objectives

Toyota Industries is reducing its use of packaging materials as part of an effort to conserve resources. The company's Third Environmental Action Plan has set a target of achieving a 20% reduction in packaging consumption by FY 2005, compared with FY 1995 levels.

FY 2003 Achievements

Toyota Industries consumed 4,398 tons of packaging materials in FY 2003, which continued a trend toward increased packaging consumption by the company. Improvements in packaging methods and the expanded use of returnable containers were offset by production increases. These increases were significantly higher, including a notable increase in textile machinery production. Based on future production forecasts, the company will fall short of its medium-range goal of reducing packaging consumption to within 2,912 tons annually. Looking forward, Toyota Industries will continue to implement measures aimed at reducing its overall packaging consumption. The company will also establish new targets on a net sales basis in order to better grasp its progress.

■ Packaging Consumption



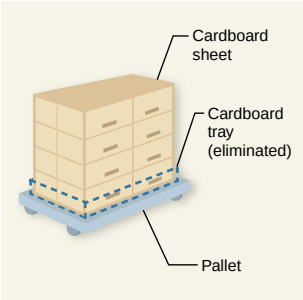
FY 2003 Measures

Efforts	Plant
Improved part packaging method to save material	Kariya (Textile Machinery Division)
Changed packaging method to save cardboard	Kariya Case Study A (Compressor Division)
Expanded service area for returnable containers to other parts of Japan	Takahama Case Study B (TOYOTA Material Handling Company)

Case Study A Changing Packaging Methods to Save Cardboard

The Compressor Division of the Kariya Plant exports compressors and parts using reinforced cardboard packaging. Previously, the company used a cardboard tray between pallets and boxes. By forgoing the use of this tray, the plant is expected to save six tons of cardboard annually.

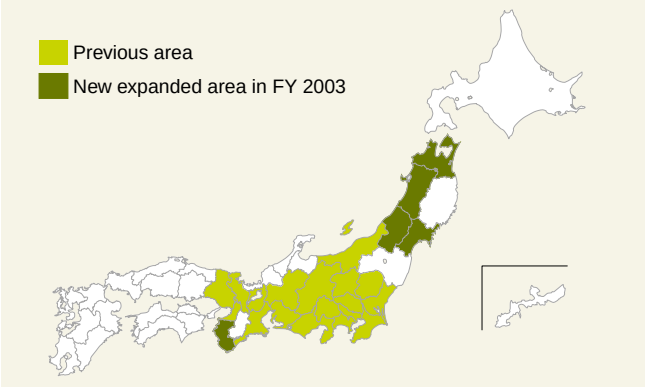
■ Streamlined Packaging



Case Study B Returnable Container Use

Since FY 2002, the Takahama Plant has gradually replaced its use of cardboard packaging, for service parts, with returnable containers that are collapsible. In FY 2003, the plant expanded the availability of this service to include five additional prefectures. This has saved 2.1 tons of packaging materials annually.

■ Areas Covered by Returnable Container Service



Future Activities

Toyota Industries will continue to streamline its packaging methods to reduce waste and will consider establishing a collection program to recycle waste packaging materials.

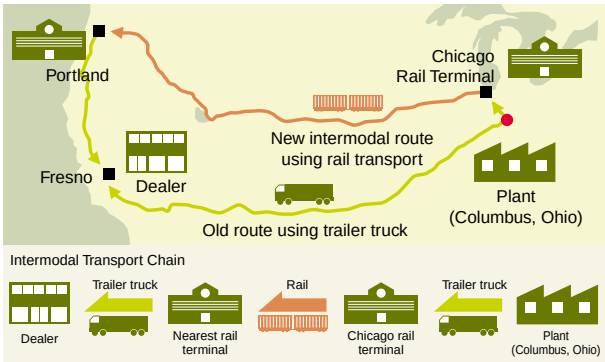
Subsidiary Spotlight

Toyota Material Handling USA, Inc.

Switching to Intermodal Transport*

Toyota Material Handling USA, Inc., which markets forklift trucks in the United States, has switched to intermodal transport for its westbound shipments of forklift trucks. Previously, westbound shipments were transported solely by truck. The company now delivers its products to a rail terminal for transport on westbound rail routes. Upon reaching the rail destination, the forklift trucks are unloaded and delivered to dealers and customers by trailer truck. The use of intermodal transport effectively reduced the company's CO_2 emissions from truck transport.

■ Intermodal Shipping to West Coast



*Intermodal transport: movement of goods using more than one means of transport, such as truck and rail transport, for optimal efficiency.