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

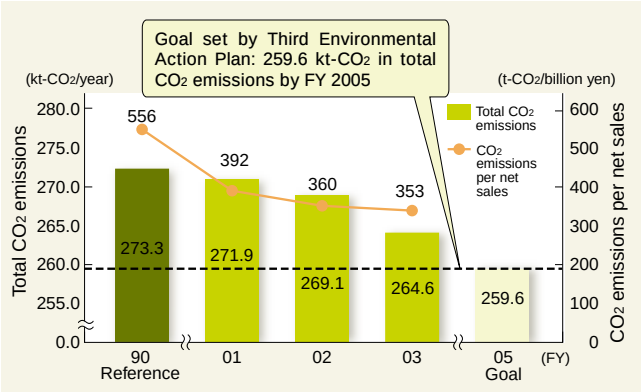
Energy Conservation Policies and Medium-Range Targets

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.

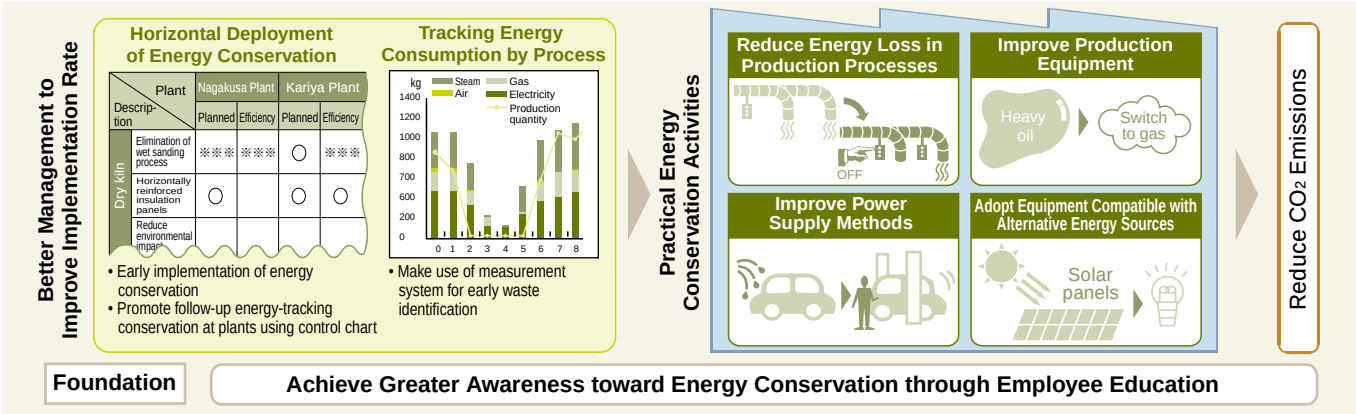
FY 2003 Achievements

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

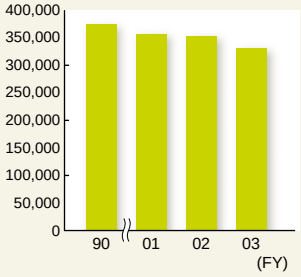


■ Energy Conservation Activities from the Perspective of CO_2 Emissions

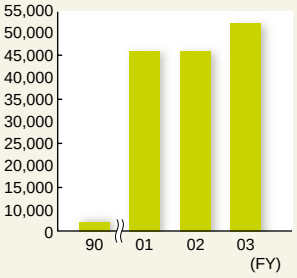


■ Energy Consumption

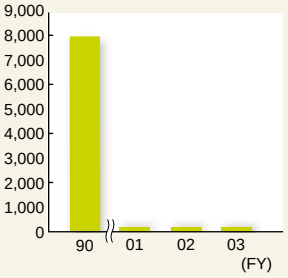
■ Purchased Electric Power (MWh)



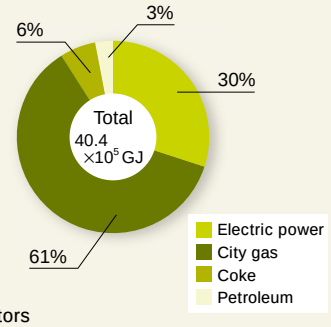
■ City gas (km³)



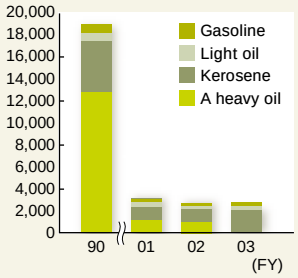
■ Liquid Petroleum Gas (1,000 kg)



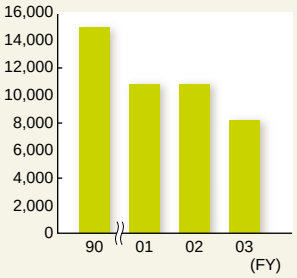
■ FY 2003 Energy Sources (In Terms of CO_2 Emission)



■ 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

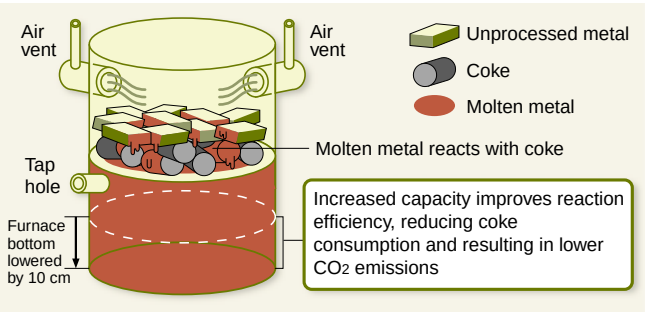
Description	Efforts	Plant
Reduce energy loss from product processing	Reduced air leakage using gauging device	Kyowa Plant Case Study D
	Improved operation of plant ventilation fans	Higashiura Plant
Improve power supply methods	Achieved pressure reduction in air compressors using terminal pressure control	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



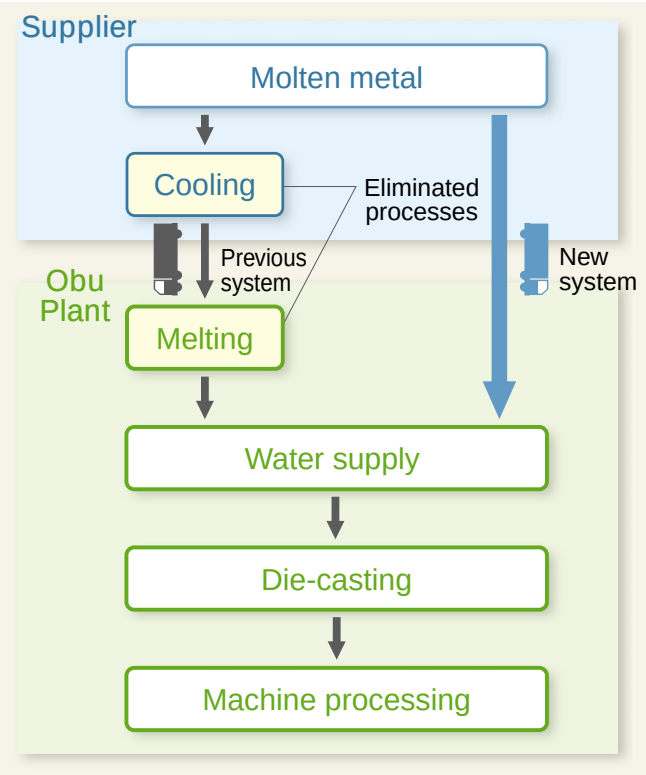
Production Equipment Improvements

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

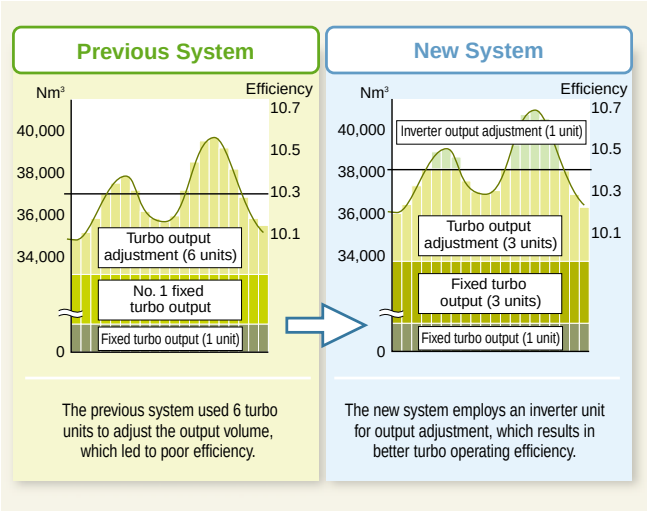


Power Supply Method Improvements

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

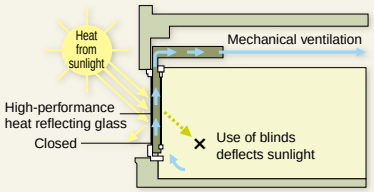
One of the targets of Toyota Industries for FY 2004 is to reduce energy consumption in all production lines newly introduced in FY 2004 by 30% as a foundation for its future energy conservation efforts. The company will also utilize more effectively an energy measurement system that will enable it to 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

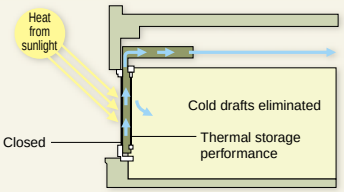
Creating an Office Environment that Makes Efficient Use of Solar Heat and Wind

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

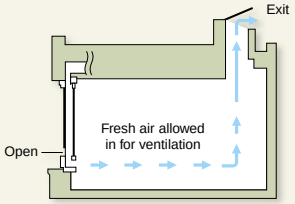


■ Winter Air Flow



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.

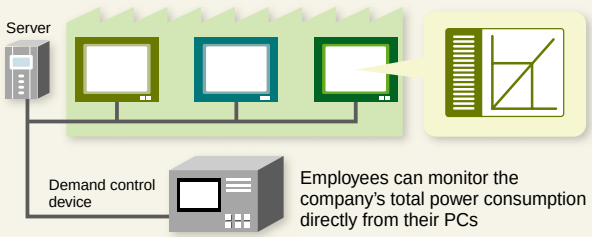
Economy, Trade and Industry Minister's Award and Award Ceremony

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.