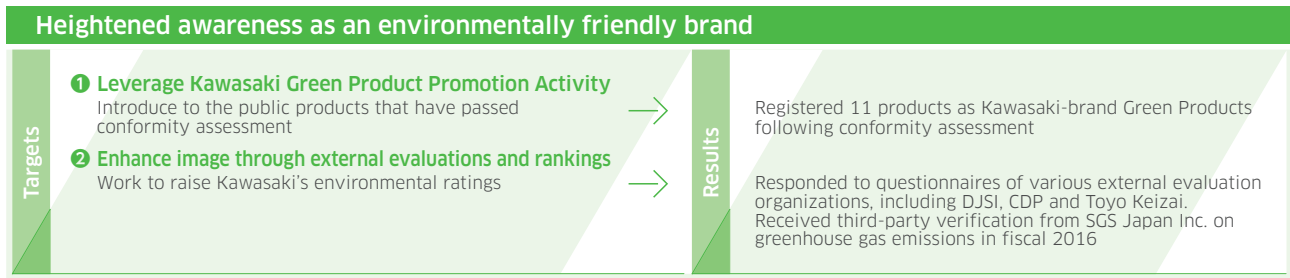


Heightened Awareness as an Environmentally Friendly Brand

Key Strategies and Targets under Eighth Environmental Management Activities Plan (FY2014–FY2016) and Fiscal 2016 Results



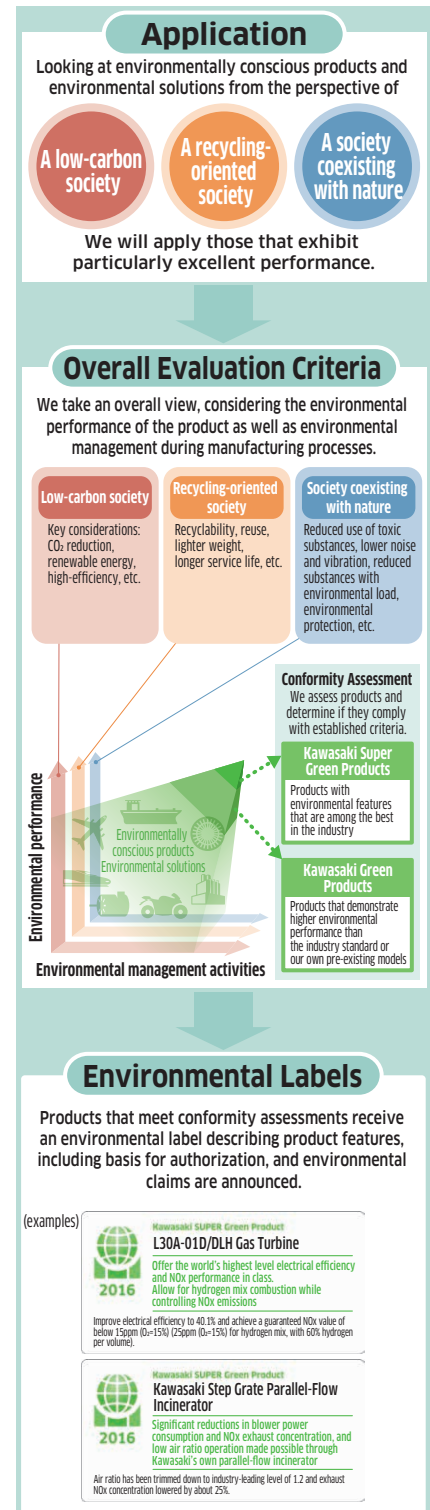
Toward Heightened Awareness as an Environmentally Friendly Brand

We actively distribute information externally about Kawasaki-brand Green Products, which have passed conformity assessment under the Group's own criteria, in a way that makes environmentally conscious products easy to understand. As in the previous fiscal year, we selected 11 products in fiscal 2016, bringing the lineup of green products to 32 since the program was initiated in fiscal 2014.

1. Kawasaki Green Product Promotion Activity

To realize our Group Mission: "Kawasaki, working as one for the good of the planet," we will draw on high-level, comprehensive technological capabilities over the Kawasaki Group's extensive range of business pursuits to create new value for coexisting with nature and building a brighter, more comfortable future for generations to come. We have launched Kawasaki-brand Green Products, a program in support of the Group Mission objective and through which we will boost the environmental performance of products and accelerate the reduction of environmental impact caused by associated manufacturing processes. The products selected for this program must meet self-established criteria and are categorized as either Kawasaki Green Products or Kawasaki Super Green Products. The products are then labeled compliant with ISO 14021, and the list is made public.

The program logo embodies the Group's commitment to environmental sustainability through products and manufacturing. The three pillars in the logo represent our primary business areas—land, sea and air transport systems, energy and environmental engineering, and industrial equipment—and the innovative and advanced technological capabilities in these respective areas form a firm foundation for these pillars, which together support the global environment.



2. Product Assessment

For newly developed and designed products, as well as for particularly important products, Kawasaki assesses products according to such criteria as resource and energy savings and recycling potential, with the goal of reducing the environmental impact of our products during their life cycles. Because specific evaluation techniques vary depending on the type of product, each business segment draws up product assessment rules appropriate to the characteristics of the respective product. The main evaluation items of product assessment are shown below.

- ① Product weight reduction
- ② Product energy saving
- ③ Longer product life
- ④ Product safety and environmental conservation effectiveness
- ⑤ Measures for product disposal and recycling
- ⑥ Environmental impacts when problems or other extraordinary circumstances occur
- ⑦ Provision of information for use and maintenance
- ⑧ Compliance with regulations

3. External Information Disclosure

At Kawasaki, we vigorously pursue disclosure of environmental information through many external evaluation organizations, including the CDP Climate Change Information Request, published by the Carbon Disclosure Project (CDP); the Environmental Management Survey, conducted by Nikkei Research Inc.; the Toyo Keizai CSR Survey; and the Dow Jones Sustainability Index.


Key Strategies and Targets under Ninth Environmental Management Activities Plan (FY2017–FY2019)

Heightened awareness as an environmentally friendly brand

Targets

- ① **Leverage Kawasaki Green Product Promotion Activity**
→ Register Kawasaki-brand Green Products every year and release data to public
- ② **Enhance image through external evaluations and rankings**
→ Announce results of third-party verification, improve evaluations under such schemes as CDP (Carbon Disclosure Project: world's most authoritative CO₂ index), and sustain placement in Dow Jones Sustainability Index

The Third Set of Kawasaki-brand Green Products

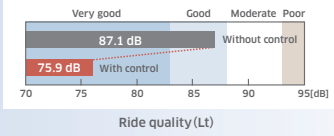


Kawasaki
Powering your potential


Active Suspension System

Compact, lightweight suspension system developed in-house to provide improved ride quality and lower energy consumption

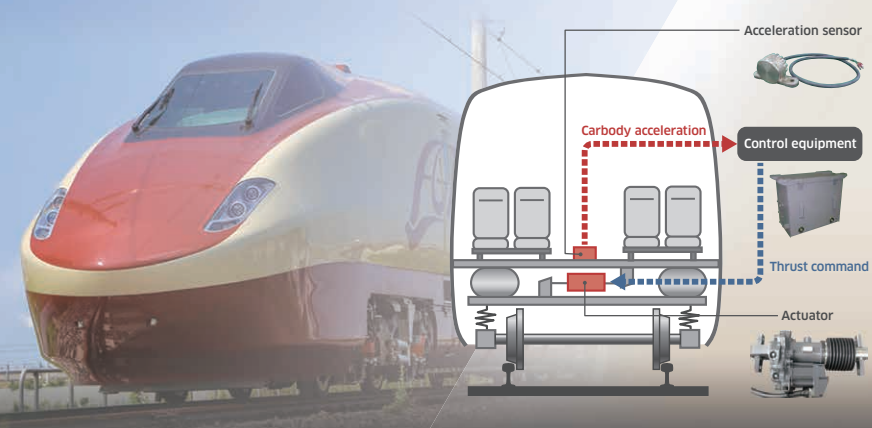
This active suspension system has been downsized from previous systems, with the installation length contracted from 750mm to 460mm and the weight reduced from 70kg to 32kg. The system also features a 30% improvement in power consumption, better responsiveness and reduced noise/vibrations.



Ride quality (Lt)



2016
Kawasaki
Green Product




Product Description

An active suspension system that comes installed with an in-house developed electric actuator, and delivers significant improvements in ride quality.

Special Features

- Offers reduced power consumption compared with previous systems through a 50% improvement in efficiency of the actuator, which limits vibrations
- More compact and lightweight (downsized from 750mm and 70kg, to 460mm and 32kg) compared with previous systems
- Reduces vibrations and negative impact on tracks through improved responsiveness

Kawasaki Heavy Industries, Ltd.

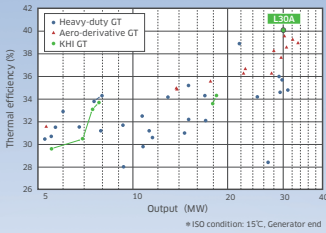


Kawasaki
Powering your potential


L30A-01D/DLH Gas Turbine

Offer the world's highest level electrical efficiency and NOx performance in class. Allow for hydrogen mix combustion while controlling NOx emissions

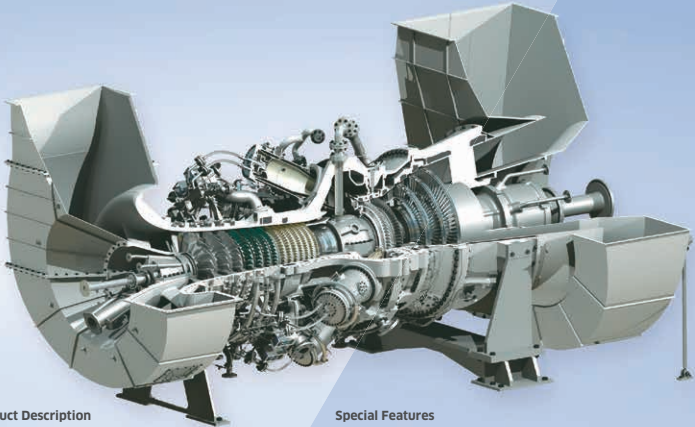
Improve electrical efficiency to 40.1% and achieve a guaranteed NOx value of below 15ppm (O₂=15%) (25ppm (O₂=15%) for hydrogen mix, with 60% hydrogen per volume).



* ISO condition: 15°C; Generator end



2016
Kawasaki
SUPER Green Product



Product Description

Highly efficient gas turbines that deliver eco-friendly low NOx emissions. The world's highest efficiency was achieved by adapting high pressure ratio compressor, improvements of components, state-of-the-art cooling technology. Well-proven Kawasaki Dry Low Emission (DLE) combustor has been improved to enable hydrogen mixed combustion while maintaining world's lowest NOx.

Special Features

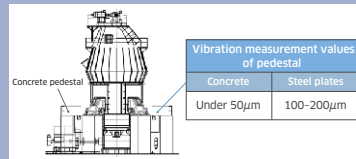
- Achieve electrical efficiency of 40.1%—world's highest in 20MW–35MW class
- Offer the world's lowest NOx emissions of below 15ppm (O₂=15%) (25ppm (O₂=15%) for hydrogen mix) due to their in-house developed DLE combustor that allows for hydrogen mixed combustion
- Extend overhaul intervals to six years that is 1.5 times longer than previous models

Kawasaki Heavy Industries, Ltd.

CK Mill

Long-lifetime CK Mill that achieved remarkable power savings and reduced vibrations

Energy consumption has been lowered by 30%-50%, thanks to improved grinding energy efficiency. The weight and vibration level were reduced by around 10% and 50%, respectively, by switching the support structure (pedestal) for the main pressing mechanism from steel plates to concrete.



2016
Kawasaki
Green Product

Kawasaki Heavy Industries, Ltd.



Product Description

A high-efficiency roller mill for cement plants with highly efficient grinding and classification mechanisms and a concrete pedestal to meet the demands for reduced energy and resources.

Special Features

- Achieves significant energy savings through improvements to configurations of grinding roller and fine powder separator
- Offers significant reductions in product weight and vibrations during grinding process, through switching pedestal for main pressing mechanism from steel plates to concrete
- Nearly doubled its service life, thanks to superhard metal welded onto surface of grinding rollers and mill table liners



Medium-Diameter Shield Tunnel Boring Machine

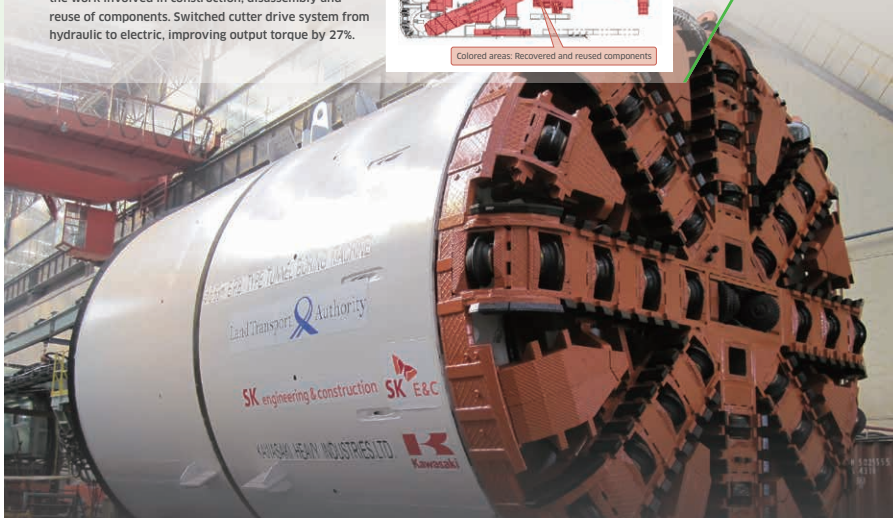
Reduces construction period on tunnel projects and environmental impact, thanks to reuse of main components of shield tunnel boring machine and enhanced driving power efficiency

Changed joining method for main structural parts from welded fixing to bolted connection, thereby simplifying the work involved in construction, disassembly and reuse of components. Switched cutter drive system from hydraulic to electric, improving output torque by 27%.



2016
Kawasaki
Green Product

Kawasaki Heavy Industries, Ltd.



Product Description

A shield tunnel boring machine that features a structure more conducive to component reuse through the application of a bolt-on method for the joining of main structural parts. In place of prevailing welded fixing. This machine offers improved output torque and less waste oil through a change in the cutter drive system from hydraulic to electric.

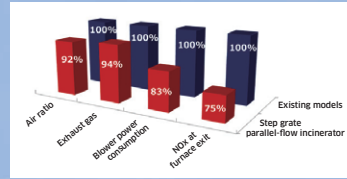
Special Features

- Switch from welded fixing to bolt-on connection for joining of main structural parts obviates need for welding and gas-cutting work at assembly, disassembly and component reuse stages
- Cutter drive output torque efficiency improved through switch from hydraulic to electric format
- Hydraulic fluid, which had been required to run cutter drives. Is no longer necessary, thereby reducing the amount of hydraulic fluid used overall as well as the amount of hydraulic fluid disposed of after machine use

Kawasaki Step Grate Parallel-Flow Incinerator

Significant reductions in blower power consumption and NOx exhaust concentration, and low air ratio operation made possible through Kawasaki's own parallel-flow incinerator

Air ratio has been trimmed down to industry-leading level of 1.2 and exhaust NOx concentration lowered by about 25%.



Comparing environmental performance with existing models



2016
Kawasaki
Green Product

Kawasaki Heavy Industries, Ltd.



Product Description

A parallel-flow incinerator that uses a step grate type stoker, which facilitates operation at low air ratio and significantly reduces blower power consumption and NOx exhaust concentration.

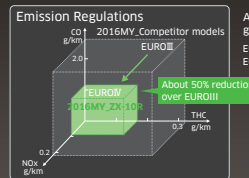
Special Features

- Lower air ratio of 1.2, reduced blower power consumption, and lighter exhaust gas processing equipment
- Minimizes NOx concentration through combustion at low air ratio with reduced air intake volume

Ninja ZX-10R (2016MY)

Achieves performance that outshines competitor models with world's highest environment-oriented features

Compliant with EUROIV European emission regulations and R41-04, Europe's new noise emission regulations, the Ninja ZX-10R is one of the best in the world for fuel economy at Worldwide Motorcycle Test Cycle (WMTC) mode.



Addition of evaporative gasoline emissions regulation
EUROIII : None
EUROIV : 2.0g/test

Met EUROIV requirements ahead of other companies



2016
Kawasaki
SUPER Green Product

Kawasaki Heavy Industries, Ltd.



Product Description

A super sports bike (base of competition model for the World Superbike Championship) incorporating Kawasaki's exclusive new technology and boasting top-level environmental performance while delivering capabilities that outshine the competition on the circuit as well as comfortable rides on public roads.

Special Features

- Delivers track capabilities that outshine the competition, thanks to application of new technology, as well as comfortable rides on public roads
- Complies with EUROIV European emission regulations due to further enhancements in fuel efficiency
- First to feature next-generation electronic control technology that controls the machine with precision

Z125/Z125PRO (2016MY)

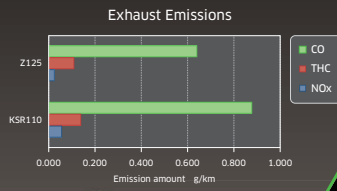


2016
Kawasaki
Green Product

Kawasaki Heavy Industries, Ltd.

Deliver sporty and powerful rides on top of excellent fuel performance and low exhaust emissions

The Z125/Z125PRO offer a 13% increase in output from the KSR110, a 13% improvement in WMTC fuel economy, and significant reductions in carbon monoxide, total hydrocarbons and NOx in exhaust gas.



Product Description

Successor models to the KSR110 that provide significant improvements in fuel economy and exhaust emissions, these super-naked bikes are lightweight, compact and feature low seat heights for easy maneuverability.

Special Features

- Feature air-cooled, single-cylinder engines that deliver both excellent fuel performance and power for sporty rides
- Intake system switched from carburetor to fuel injection, and exhaust system fitted with honeycomb catalyst and O₂ sensor for enhanced environmental performance

Control Valve KMX13RB

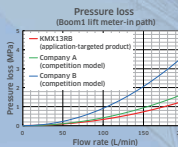


2016
Kawasaki
SUPER Green Product

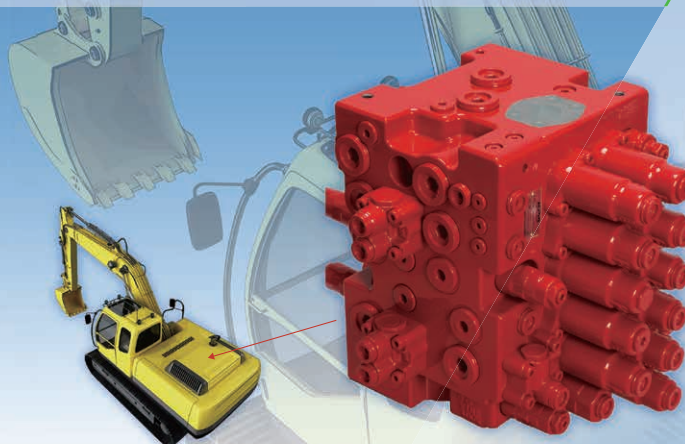
Kawasaki Heavy Industries, Ltd.

Control valve for hydraulic excavator boasting greater fuel economy and power density that surpasses competitors' products

The KMX13RB realizes 30% reduction in pressure loss compared with competition models, which leads to an approximate 3% improvement both in fuel economy and CO₂ emission volume. It features a 14% upgrade in power density as well.



Item	KMX13RB	Competitors' products	
		Company A	Company B
Maximum pressure	38MPa	35MPa	35.3MPa
Maximum flow	180L/min	160L/min	170L/min
External dimensions	350×437×360mm (55,062cm ³)	346×423×466 (68,203cm ³)	368×443×385 (62,764cm ³)
Weight	120kg	154kg	120kg



Product Description

A compact, lightweight hydraulic valve that enables the actuators for hydraulic excavator to perform complex movements and thus achieves high operability and greater fuel economy.

Special Features

- Optimized casing design realizes reduced pressure loss, boosts power density, and reduces size and weight as well as improves functions
- Reduced pressure loss improves fuel economy of hydraulic excavators

Dual-Arm SCARA Robot: duAro



Kawasaki Heavy Industries, Ltd.

Easy-to-implement, energy-saving robot that also contributes to resource savings in building a system

The duAro boasts excellent mechanical efficiency and contributes to energy-saving operations across a wide spectrum of applications. Safety features, which facilitate side-by-side work with humans, and two-arm flexibility help to reuse, simplify and reduce peripheral components, such as safety fences, tools and work jigs, thereby contributing to reduced use of resources in building a system.



duAro

Product Description

New concept dual-arm SCARA robot easily enables robots to execute tasks performed by humans.

Special Features

- Human-sized, dual-arm SCARA robot where 2 coaxial arms and single controller are integrated
- Easy installation, thanks to structure where arms are on the cart
- Safety features that allow people to work nearby
- Dual-arm, cooperative movement facilitates simplification of jigs and tools
- Easy teaching by operation through tablet and direct teaching

High-Speed Palletizing Robot CP Series

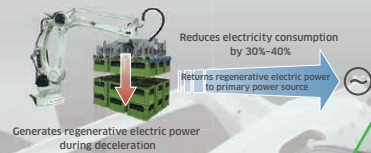


Kawasaki Heavy Industries, Ltd.

New-generation palletizing robots that offer both high-speed load capacity and energy savings

Robots with class-leading load capacity are first equipped as standard with power regenerative function. Realizes reductions of up to 40% in power consumption over models without power regenerative functions.

Equipped as standard with power regenerative function



Product Description

Palletizing robots that offer the high load capacity needed at logistics sites.

Special Features

- Extensive work envelope with pallet area of 1,100mm² and vertical reach of up to 2,062mm
- Three lines of palletizing robots with maximum payloads of 180kg, 300kg, and 500kg
- Powerful drive system for high-speed load capacity
- Robots are first equipped in industry as standard with power regenerative function, contributing to energy savings and lower electricity costs

Universal Controller

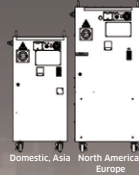


Kawasaki Heavy Industries, Ltd.

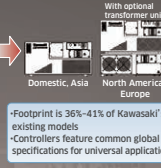
Built to common global specifications, this high-performance controller is the smallest and lightest in the industry

It achieves dramatic reductions in electrical components of motor circuits, thanks to functional safety technology. Used as a controller for robots with payloads between 6kg and 500kg, it is the smallest and lightest controller in the industry.

Existing controllers (Kawasaki)



Universal controllers



-Footprint is 36%-41% of Kawasaki's existing models
-Controllers feature common global specifications for universal application



Product Description

A universal controller is built to common global specifications and integrates the extensive features of Kawasaki-brand robots into the smallest and lightest units in the industry

Special Features

- Used as a controller for robots with payload ranging from 6kg to 500kg, it is the smallest and lightest controller in the industry and contributes to space-saving operations
- Universal specifications that meet safety standards in all countries
- Allows voltage differences, using optional transformer unit
- E03 controller for palletizing robots boasts first built-in power regenerative function in the industry

Approaches by the Motorcycle & Engine Company

Reducing Exhaust Emissions

In fiscal 2016, we began sales of ZX-10R, a model that exemplifies our efforts to achieve cleaner exhaust gas from motorcycles on a world-caliber level.

The fully electronic throttle actuation system enables the ECU to control the volume of both fuel (via fuel injectors) and air (via throttle valves) delivered to the engine, continually generating ideal fuel injection and throttle valve position. This not only results in smooth, natural engine response and ideal engine output but also enhances fuel efficiency and reduces emissions.

Ninja ZX-10R (overseas model)



Promoting the 3Rs

Since October 2004, we have operated an independent motorcycle recycling system in cooperation with three other motorcycle manufacturers and 12 importers in Japan. In fiscal 2016, we achieved a recycling rate of 96.7%. Since October 2011, the user burden of recycling costs has become completely free of charge.

For new-model motorcycles, we emphasize environmentally conscious designs highlighting reduced materials and more recycling, right from the development phase. We conduct preliminary evaluations of efforts related to the 3Rs—reduce, reuse and recycle—before commencing design, prototyping and mass production phases. In particular, we seek to increase recyclability through greater use of materials that are easy to recycle and we have achieved a potential recycling rate exceeding 90% on every model, with most models exceeding 95%. This potential recycling rate was calculated based on the Guidelines for Definition and Calculation Method on the Recyclability Rate for New Vehicles (1998 Japan Automobile Manufacturers Association).

Reducing and Eliminating Environmental Substances of Concern

For new-model motorcycles sold in Japan, we already meet the voluntary targets of reduced environmental substances of concern (lead, mercury, hexavalent chromium and cadmium) set by the Japan Automobile Manufacturers Association, and we have also achieved voluntary targets for older models still being sold.

For general-purpose engines and JET SKI watercraft, there are no Japanese regulations such as the JAMA voluntary reduction targets, but we are making elimination and reduction efforts that follow those applied to motorcycles, and we had achieved voluntary reduction targets for lead, mercury and cadmium by fiscal 2008. Hexavalent chromium had been contained to a very small amount, but we completed its elimination in fiscal 2009.