Kawasaki Green Product Promotion Activity

Kawasaki Green Product Conformity Assessment

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 KHI 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.

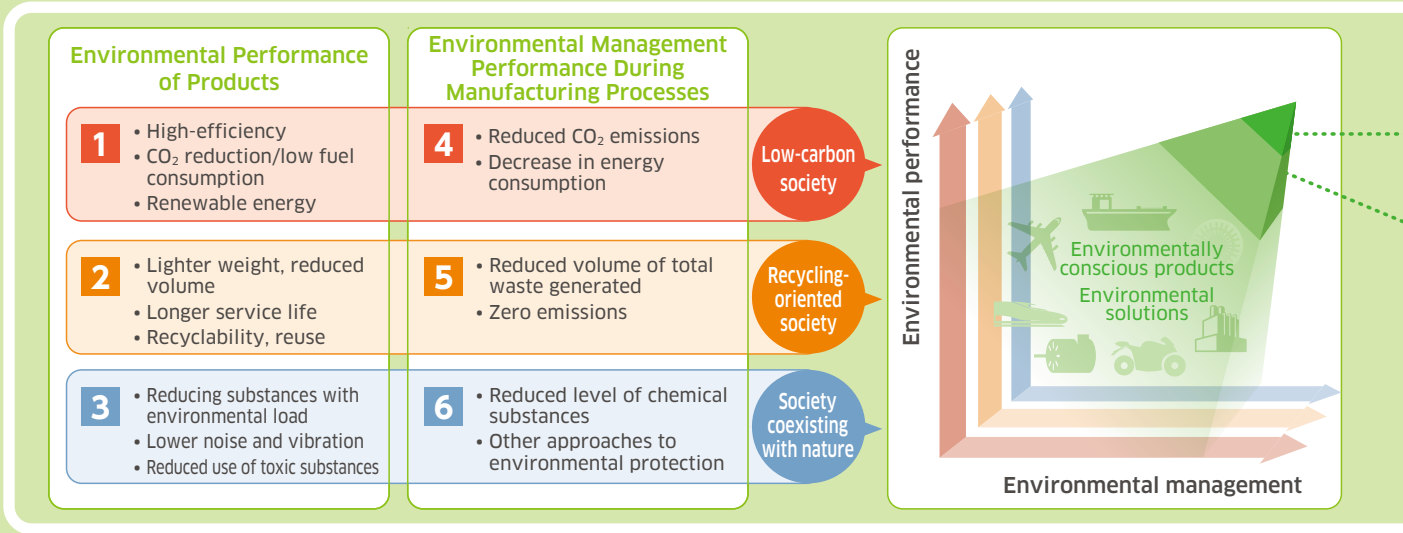
* Please refer to page 15-18 of the Kawasaki Report 2014 digest and full report.

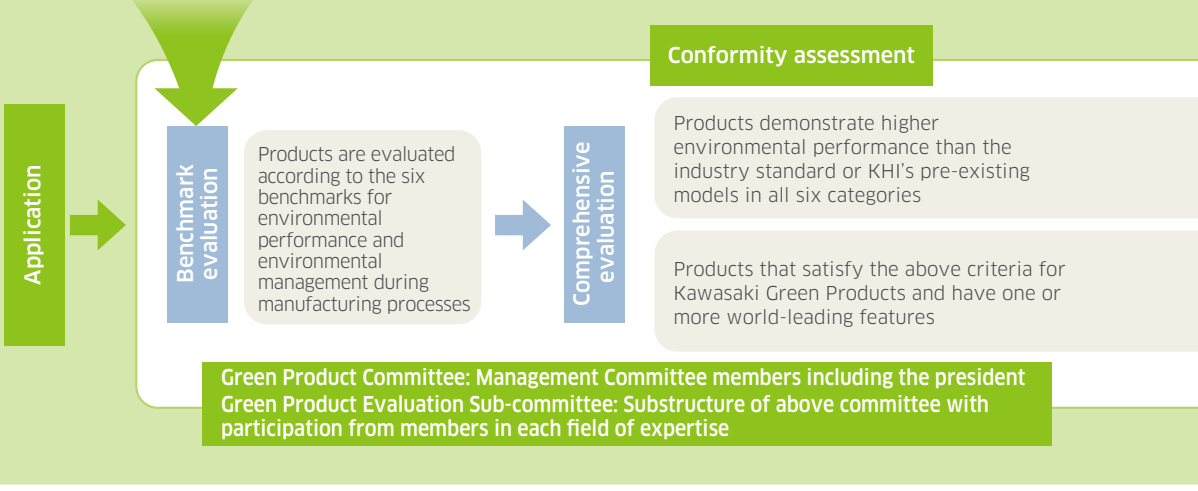
Product Applications, Overall Evaluation Criteria

Of KHI's environmentally conscious products and environmental solutions, those boasting particularly outstanding performance from the perspective of contribution to a low-carbon society, a recycling-oriented society and a society coexisting with nature may be submitted by any division within the Company for consideration in the Kawasaki Green Products program.

Products undergo comprehensive evaluation to ensure that they meet all criteria established by KHI for environmental performance as well as environmental management during manufacturing processes, in each of three key areas crucial to global environmental sustainability—a low-carbon society, a recycling-oriented society and a society coexisting with nature.

Six Evaluation Benchmarks





The program logo embodies KHI'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.

Kawasaki Green Product Promotion Activity

Program logo

Product Application, Overall Evaluation Standard

After careful evaluation by the team, comprising members in each field of expertise, the Green Product Committee, with participation from members of the Management Committee including the president, determines the conformity assessment level of the products according to ISO 14021.

Products are placed into two categories: Kawasaki Green Product, which exceeds either the industry standard for environmental performance or the level reached by pre-existing models of KHI products; and Kawasaki Super Green Product, which has some of the most outstanding environmentally conscious features in the industry today.

Kawasaki Super Green Product

Products with some of the most outstanding environmental features in the industry

Kawasaki Green Product

Products with environmental features that exceed either the industry standard for environmental performance or the level reached by pre-existing models of KHI products

- Kawasaki Green Product
- Kawasaki Super Green Product

→ Registration

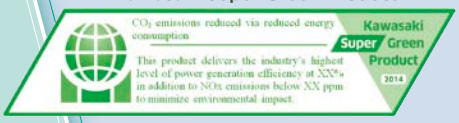
Environmental Label

To promote compliance with ISO 14021, two labels—designated as either a Kawasaki Green Product label or a Kawasaki Super Green Product label, indicating levels of environmental performance—are given to products based on their conformity assessment level.

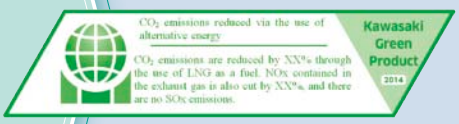
The label shows the registration year. Content is reconfirmed every three years, and labels are renewed accordingly.

Sample labels

Kawasaki Super Green Product



Kawasaki Green Product



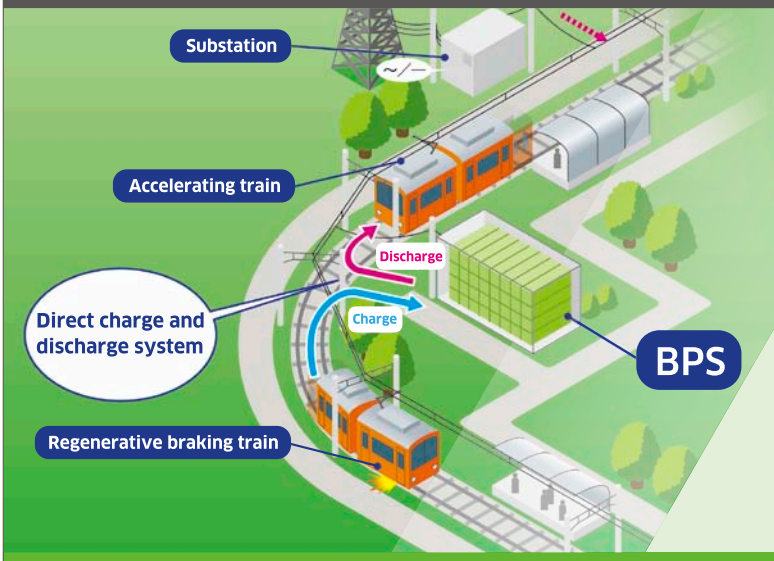
What is ISO 14021?

ISO 14021 is an international standard developed by the International Organization of Standardization for "Environmental labels and declarations—Self-declared environmental claims (Type II environmental labeling)." This standard enables companies to set their own standards and label products that meet these standards. The environmental claims are therefore self-declared by the company that makes said products. Environmental labels that comply with ISO 14021 are called Type II environmental labels.

First Kawasaki Green Products Announcement 2014

Battery Power System (BPS)

Super Kawasaki Green Product 2014



Introducing a cutting-edge high-performance battery with energy-saving potential and no electrical noise emissions

Kawasaki's wayside battery power system (BPS) utilizing GIGACELL® contributes to CO_2 emissions reduction. The fact that the BPS does not generate electrical noise emissions, it can be used for application in railway operations as an environment-friendly solution.

GIGACELL® unit

Product Description

The BPS consists of Kawasaki's nickel metal hydride GIGACELL®, which connects directly to the main DC power line (i.e., an overhead catenary line or third rail) without any inverters or converters, and as a result, it has the advantage of high response time during power load fluctuations in the railway system, as well as ensuring safety during operation.

Special Features

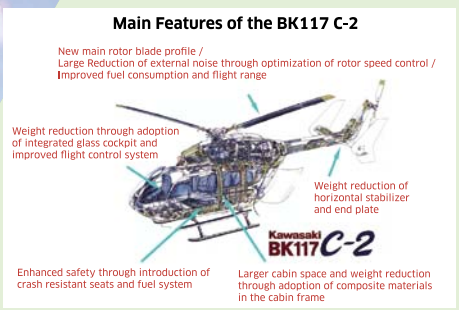
- Benefits of installation
  Energy savings, peak demand reduction, regenerative energy use, line voltage drop prevention, substitution for substations, and provides emergency power to move trains when main power fails
- System features
  Direct connection to the main power line without inverters or converters, facilitating good cost performance, high energy conversion efficiency, high charging and discharging efficiency, and no noise

BK117 C-2 Helicopter

Super Kawasaki Green Product 2014

World's Most Quiet Helicopter

The C-2 achieves a large margin (6.7 EPNdB: approx. 50% reduction) from the external noise regulation standard set by Japan's Civil Aeronautics Act, making it one of the quietest helicopters in its class.



Product Description

The BK 117 is a twin-engine, multi-purpose, high-performance helicopter, jointly developed with Airbus Helicopters Deutschland (AHD) of Germany. It was certified in 1982 by JCAB as the first domestically manufactured helicopter in Japan. As the latest model, the C-2 features improved performance, owing to composite materials and a one-piece cabin frame, among others.

Special Features

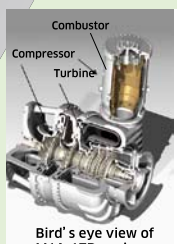
- The quietest helicopter in the world. 3.8EPNdB external noise reduction compared with C-1 model
- Weight reduction through introduction of composite materials and one-piece cabin frame. 25% weight reduction per unit area compared with C-1 model
- 3% improved fuel consumption compared with C-1model
- Reduced environmental impact through introduction of chrome-free primer and sealant

M1A-17D Gas Turbine

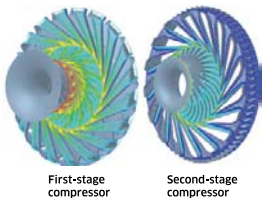
Super Kawasaki Green Product 2014

Highest power generation efficiency in its class with lowest NOx emissions, made possible by KHI's integrated technology

With improved generating efficiency (2.4% higher than the previous model), the M1A-17D is among the most efficient gas turbines in its power class and has the industry's lowest level of NOx emissions, at 35 ppm (converted at 0% O_2).



Bird's eye view of M1A-17D engine



Results of compressor computational fluid dynamics analysis

Product Description

Power generation gas turbine boasting higher efficiency, thanks to a change in the flow passage geometry of the compressor and turbine as well as structural improvements along with a DLE (Dry Low Emission) combustion system, which ensures low-NOx emissions

Special Features

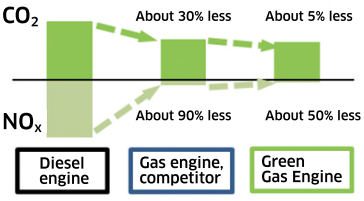
- Highest performance in its class, thanks to enhanced efficiency through aerodynamically optimized design for compressor and turbine
- Among the industry's highest levels of environmental performance, thanks to low NOx achieved through improvements to combustor burner and passage shape
- Highly reliable, thanks to adoption of previous model's basic structure

Green Gas Engine

Super Kawasaki Green Product 2014

The world's highest power generation efficiency in its class

The Green Gas Engine boasts the world's highest power generation efficiency at 49.0%, with a variable turbine nozzle area (VTA) turbocharger in addition to optimized combustion performance.



Comparison of Emissions Volume

Product Description

Using clean natural gas, the Green Gas Engine achieves the world's highest level of power generation efficiency in its class and low NOx emissions, owing to resourceful efforts to optimize the shape of the combustion chamber, achieve a leaner burn and optimize the control system.

Special Features

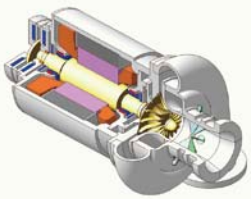
- The world's best in terms of power generation efficiency–49.0%– in its class, as of April 1, 2014
- Top level in environmental performance, with NOx emissions at less than 200 ppm
- Wide continuous operation range at 30%–100% and maintains high power generation efficiency, even at partial loads

MAG Turbo

Super Kawasaki Green Product 2014

Domestic industry's highest level of efficiency and low environmental impact achieved through use of magnetic bearings

Featuring a high-speed motor with magnetic bearings, the MAG Turbo outperforms overall efficiency of existing sewage aeration blowers in all air volume ranges domestically.
Furthermore, the MAG Turbo does not require the use of lubricant, minimizing environmental impact.



Blower

Product Description

This new type of sewage aeration blower has an impeller attached directly to the rotor shaft of an inverter-driven, high-speed motor. The rotor levitates by magnetic bearings. This mechanism allows high-speed rotation without mechanical loss.

Special Features

The following features are possible because of the blower's inverter-driven, high-speed motor with magnetic bearings.

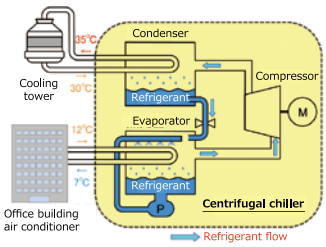
- High efficiency (a maximum of about four points higher than existing models, according to Japan Sewage Works Agency specifications)
- No lubricant or cooling water necessary
- Low noise, low vibration

Centrifugal Chiller Using Water as Refrigerant

Super Kawasaki Green Product 2014

Epoch-making HFC-free, high-efficiency chiller cuts greenhouse gas emissions

This HFC-free chiller, using water as a refrigerant, delivers efficiency comparable to existing chiller models. Its compact design makes it a viable alternative to existing chillers.



Refrigerant Explanatory Drawing

Product Description

This centrifugal chiller uses water as the refrigerant and is therefore free of hydrofluorocarbons. This choice of refrigerant can contribute to protection of the ozone layer while preventing global warming. The chiller features a new type of compressor as well as key components developed in-house. Its compact design facilitates its use as a replacement model for existing equipment.

Special Features

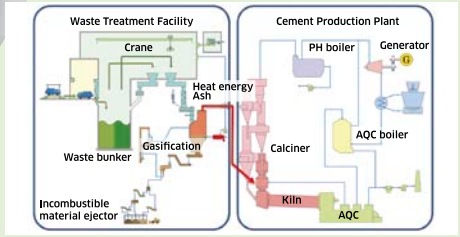
- Water refrigerant
  Selected for potential to protect the ozone layer and prevent global warming
- High efficiency
  Developed new type of compressor, boasting high performance and high pressure ratio
- Compact design
  Key components developed in-house and compact size, excellent as a replacement model for existing equipment

CKK System

Super Kawasaki Green Product 2014

Conserving energy and resources through effective use of waste

"The CKK System–Conch Kawasaki Kiln System–" integrates a waste incinerator into existing cement plants, requiring 70% fewer components than the installation of a waste incinerator alone would require. It effectively uses heat energy and ash generated from waste incineration to reduce CO_2 emissions.



Product Description

The CKK System integrates a waste incinerator into an existing cement plant, thereby combining cement manufacturing with waste processing, and effectively utilizes the heat energy and ashes resulting from the incineration of waste as fuel and raw materials, respectively, for cement-making operations.

Special Features

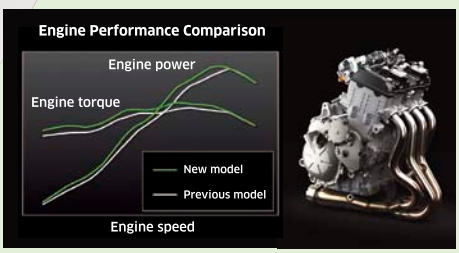
- **Lower fuel costs**
  By effectively utilizing the heat energy generated during gasification of waste as a power source for cement production, fuel costs for cement calcination have gone down 5%.
- **Reduced volume**
  Since a cement plant can process exhaust gas and ashes at existing facilities, this combined structure requires far less in the way of equipment than a stand-alone waste incineration facility would need.

Ninja ZX-6R

Kawasaki Green Product 2014

New model revamped for lower CO_2 emissions and enhanced recyclability

Starting with the 2009 model, the Ninja ZX-6R's displacement was increased by 37cm³ for greater output while fuel consumption was trimmed by 3%. The model was also designed for better environmental performance, particularly enhanced recyclability.



Product Description

This motorcycle features an engine that combines both improved performance in the low- to mid-speed range and better fuel efficiency, thanks to extra engine displacement over the previous model, which scored successes on the racetrack as well as the road. The Ninja ZX-6R also boasts advanced suspension, electronic traction control and a low environmental impact exterior, while allowing riders to enjoy high performance with greater confidence.

Special Features

- **Lower fuel consumption**
  Good balance of improved performance and better fuel efficiency
  Lower CO_2 emissions
- **Less environmental impact**
  Better recyclability
  Less paint used following review of surface treatment
- **Improved safety**
  Traction control, motorsport-responsive ABS

Hydraulic Pump for Excavators (K7V)

Super Kawasaki Green Product 2014

A world leader in environmental performance, offering higher efficiency and lower noise

The K7V's pump efficiency is improved by 1.5 points and its noise level reduced by 3 dB (A) compared with the K3V series, its widely popular predecessor, to make it one of the world's top environmental performers on both counts.

Deformation volume　　Surface pressure distribution

Pump Casing Deformation Analysis

Product Description

Used widely in construction machinery, particularly hydraulic excavators, the K7V series of hydraulic pumps meets recent market requirements for high efficiency, low noise, compact size and high reliability.

Special Features

- Improved efficiency, because leakage from sliding parts and torque loss are reduced
- Lower noise and vibration, thanks to suppression of surge pressure and higher casing rigidity
- Complete review of dimensional data resulted in shorter total length
- Longer service life achieved through use of thicker shaft and large-capacity bearings

Spot Welding Robot (BX200LS)

Super Kawasaki Green Product 2014

Industry's lightest, slimmest and most compact spot welding robot minimizes footprint

The BX200LS has a smaller footprint and is more lightweight than any comparable model in the industry. Since cables and hoses can be stored in the robot's arm and wrist, interference with adjacent robots or peripheral devices is minimized. This allows for installation in higher-density applications compared with earlier models.

Product Description

This energy- and resource-saving spot welding robot facilitates higher density installation and boosts production efficiency, which leads to lower production equipment costs. It is high-speed, compact and lightweight, and its cables are internally routed between the robot's wrist and base.

Special Features

- **Internally routed cables**
  Hollow arm and wrist of robot reduces area of interference where exposed cables and hoses would get in the way
- **Compact**
  Installation area is less than 60% of same-class products in the industry
- **Lightweight**
  Optimized design and reduced number of components make this the industry's most lightweight spot welding robot in its class

Other activities

Product Assessment

For newly developed and designed products, as well as for particularly important products, KHI 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

Focus 2 Approach by the Motorcycle & Engine Company

Cleaner Exhaust Gas

In fiscal 2014, we continued to tackle technologies that make exhaust from motorcycles cleaner, from a world standard perspective, and launched sales of the Ninja 1000 (Z1000SX), matching the appeal of a supersport model with practical features. The Ninja 1000 (Z1000SX) conforms to European emission standards, thanks to improvements in the air intake and exhaust systems, and demonstrates high environmental performance. Within the air intake system, the electronic fuel injection system is equipped with dual throttle valves*1 for precise fuel control, matching all types of riding conditions. This ensures superior engine performance while producing cleaner exhaust gas.

Ninja1000 (Z1000SX)

*1 Dual throttle valve: a device that achieves optimal control of air intake volume through coordination between an electronically operated throttle and a manually operated throttle.

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 2014, we achieved a recycling rate of 97.1%. 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.

Source: Japan Automobile Manufacturers Association, Reduction Targets for Environmental Substances of Concern for New Vehicles

Substance	Reduction target
Lead*2	Use 60 g or less in and after January 2006 (for 210-kg weight vehicle)
Mercury	Use prohibited in and after October 2004 (Exception for the use of minute quantities in parts that are necessary for traffic safety*3)
Hexavalent chromium	Use prohibited in and after January 2008
Cadmium	Use prohibited in and after January 2007

*2 Used batteries are already recycled and excluded from the target values
*3 Combination lamps, discharge headlamps, etc.