

YANMAR



Environmental Report 2005



Yanmar Co., Ltd.

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Editorial Notes

- Reference was made to the Environment Agency's guidelines on environmental reports in drawing up this document.
- The contents of this report are primarily based on activities in the 2004 business year (March 21, 2004 to March 20, 2005). They also include some activities of related companies, past activities etc.
- Yanmar Co., Ltd. underwent business restructuring in 2004 and, as a result, some structures, data representation units, etc. have been changed. Accordingly, some data in this report may diverge from those described in our last environmental report, published in September 2004.
- The term *Shiga Zone* is used in this report to refer to the small engine factories (at Nagahama, Biwa, Yamamoto and Kinomoto) and the precision equipment factories (at Omori and Nagahara) based in and around Shiga Prefecture. *Amagasaki Zone* refers to the large engine factory and the marine engine factory based in and around Amagasaki City, Hyogo Prefecture (Amagasaki Plant and Tsukaguchi Plant).

Greetings

Greetings

Our company has devoted itself to the waste-free use of energy resources by developing and diffusing extremely energy-efficient, outstandingly economical engines and machinery ever since its founding in 1912, with the consistent goal of creating enriched ways of life for all people through higher food production and industrial productivity.

The Yanmar company has developed in close dialogue with the natural world on both land and sea, recognizing the importance of coexistence from the early days and pioneering clean emission, low noise, low vibration and other advanced environmentally friendly features.

The spectacular social and industrial development of the 20th century has, even so, generated an environmental burden that exceeds the capacity of our physical world. We face a legacy of serious challenges for human society in the 21st century, ranging from global warming to the depletion of resources, environmental destruction and pollution.

The Yanmar group has stated, as its basic environmental philosophy, its commitment to the harmonization of development with the needs of the global environment, thereby contributing to the sustainable development of society. We are working to achieve these goals.

In January 2005, in order to make our environmental commitment definite, we established a corporate philosophy as our mission statement for all employees of the Yanmar Group:

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

2012 will be our corporate centenary, and we are now working on our environmental vision of how the conservation activities of the Yanmar Group should be by that time. We shall implement the new vision from the Yanmar Group's mid-term environmental plan that starts in the 2006 fiscal year.

In the meantime, it gives me great pleasure to present this comprehensive overview of our activities in the 2004 business year in this, the fourth edition of our annual environmental report.

I trust that this report will provide all readers with a thorough understanding of the environmental measures, stance and activities of the Yanmar group. We continue to depend, as ever, on your guidance and support.



Takehito Yamaoka
President

Outline of Yanmar

Yanmar Diesel Engine Co., Ltd. became Yanmar Co., Ltd. on July 1st, 2002 to serve as the holding company of the Yanmar group.



Trade Name : Yanmar Co., Ltd.
Head Office : 1-32 Chayamachi, Kita-ku, Osaka City
Founded : March 1912
Capital : 6.2 billion yen (July 1st, 2002)
Chairman : Tadao Yamaoka
President : Tatehito Yamaoka
Turnover : 161.3 billion yen (2004 business year)
Employees : 2,700 (as of March 20, 2005)

Our Products

With energy conversion technologies at the core, we research, develop, manufacture, sell and maintain hardware and software for use on land and sea and in other living spaces.

Industry and Construction



- Industrial Engines
- Construction Machinery
- Industrial Equipment

Energy



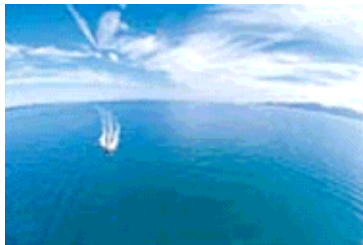
- Power Generation Equipment
- Air Conditioners
- Micro-gas Cogeneration

Agriculture



- Farm Machinery
- Farm Facilities
- Hobby Farming Machinery
- Unmanned Helicopters
- John Deere Tractors

Marine



- Pleasure boats
- Fish Farming
- Marine main & aux. engines

Environmental Protection



- Environmental system
- Garbage treatment equipment
- Cool containers
- Golf carts, etc.
- Household equipment

I Environmental Management Systems

1. 1 Yanmar's Global Environmental Pledge (Revised 2002 Edition)

Yanmar Co., Ltd. has long tackled environmental problems in its daily business activities on the basis of the company's corporate philosophy of seeking beautiful harmony between plentiful human lifestyles and the needs of the global environment.

Global warming, dwindling natural resources, waste and other problems all continue to pose serious threats to the global environment and society demands that countermeasures be taken.

Yanmar Co., Ltd. made its Environmental Pledge in 1995, and earned ISO environmental certification for all of its production plants in 1998. Much environmental work has already been done. In 2002, with the reinforcement of management structures across the Yanmar group, the Environmental Pledge has been revised as the pledge of the whole group, with the aim of furthering environmental management group-wide.

In January 2005, we established a new corporate philosophy based on offering products and services for the sustainable society as our mission for the strengthening of recycling activities.

We shall continue to seek always to supply unrivaled products and services for the sustainable society that can point the way for the most effective uses of energy.

Work is progressing on the group's environmental conservation activities for our corporate centenary in 2012. The vision for that shall be incorporated in the Yanmar group's mid-term environmental plan that begins in the 2006 fiscal year.

Corporate Mission

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

Environmental Philosophy

The Yanmar group aims to contribute to the sustainable development of society by constructing a harmonious relationship between group development and the needs of the global environment.

Action Guidelines

1. We position environmental conservation as one of the most important management objectives of the Yanmar Group for the purpose of group-wide environment management.
2. We observe the laws of all countries and the ordinances and regulations of all districts where we conduct production activities strictly and when necessary establish voluntary environmental regulation in order to achieve superior levels of environmental conservation.
3. The Yanmar Group Global Environment Committee establishes the environmental promotion guidelines and disseminates them throughout the group for the overall promotion of environmental conservation by the group.
4. We actively disseminate environmental conservation information internally and externally to promote the understanding of group companies and partners of the need for cooperation in the promotion of efficient environmental conservation activities.
5. We promote effective measures systematically and on a continuous basis in the following four environment fields:
 - Establishing technologies that contribute to environmental conservation and products and services that reduce environmental load.
 - Reducing environmental load in each stage of business operations
 - Joining forces and cooperating with external parties to contribute to local communities and disseminate environmental information.
 - Raising of environmental awareness among employees, internal environmental education, lifestyle innovation, etc.

● **Environmental Vision**

The vision for the environmental preservation activities to be achieved by our centenary in 2012 is now being prepared on the basis of the Yanmar Group Mission, Mid-term Management Policy and Yanmar Group Global Environmental Charter and with reference to external developments. We shall implement the vision from the next environmental mid-term plan that starts in 2006.

Environment Vision of Yanmar Group Towards Centenary Anniversary

<Yanmar Group Mission>

We, the Yanmar group, will strive to create new and meaningful value together in partnership with our worldwide customers. We will be innovators and leaders in harnessing energy, while contributing to an environmentally sustainable society, through the delivery of unrivaled products and services.

<External Factors>

- Environmental Regulations Domestic & Foreign
- Construction of the sustainable society — resource saving, re-use, recycling
 - Prevention of global warming, (Implementation of Kyoto Protocol) —Energy saving, alternative energy sources
 - Bans and restrictions on the use of harmful substance — Control of chemicals, products, parts, materials

<Yanmar Group Mid-Term Management Policy>

Raising corporate value (=brand value)

<2012 Environmental Vision>

The Yanmar Group, in full recognition that it does handle products that can impose environmental load, undertakes to:

- (1) Contribute to the growth of the sustainable, resource-recycling society
[Prevention of global warming, zero-emissions, re-use, recycling]
- (2) Provide unrivaled products that are compatible with both environmental and economic needs
[Clean exhaust gas, high product efficiency, reduced use of harmful substances]
- (3) Fulfill social responsibilities in cooperation with society at large
[Legal compliance, voluntary regulation, information disclosure, communication with the community]

To achieve these objectives, the group shall:

- (1) Construct exhaustive common environmental preservation systems for all group companies in Japan
- (2) Implement environmental preservation activities step by step, provide environmental products and raise the brand image and reliability of the Yanmar group as a whole
- (3) Stay one step ahead of the resource recycling requirements of legal compliance for the fullest possible prevention of global warming and reduction of harmful substance use
- (4) Expand environmental education for associated companies and dealers

**Environmental
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 - Raising of environmental awareness among employees, internal environmental education, lifestyle innovation, etc.

1.2 Implementation Structures

The Yanmar Group Environmental Committee was established in May 2002 with the participation of top executives from the group's companies. It is working to implement group-wide policy within clearly defined lines of responsibility and rights. At each group company, too, an Environmental Committee has been established to promote and implement environmental protection under the responsibility of top management. Two subsidiary companies engaged in the design of our products and Yanmar Construction Equipment Co., Ltd., a newly inaugurated company, joined the committee, this year.

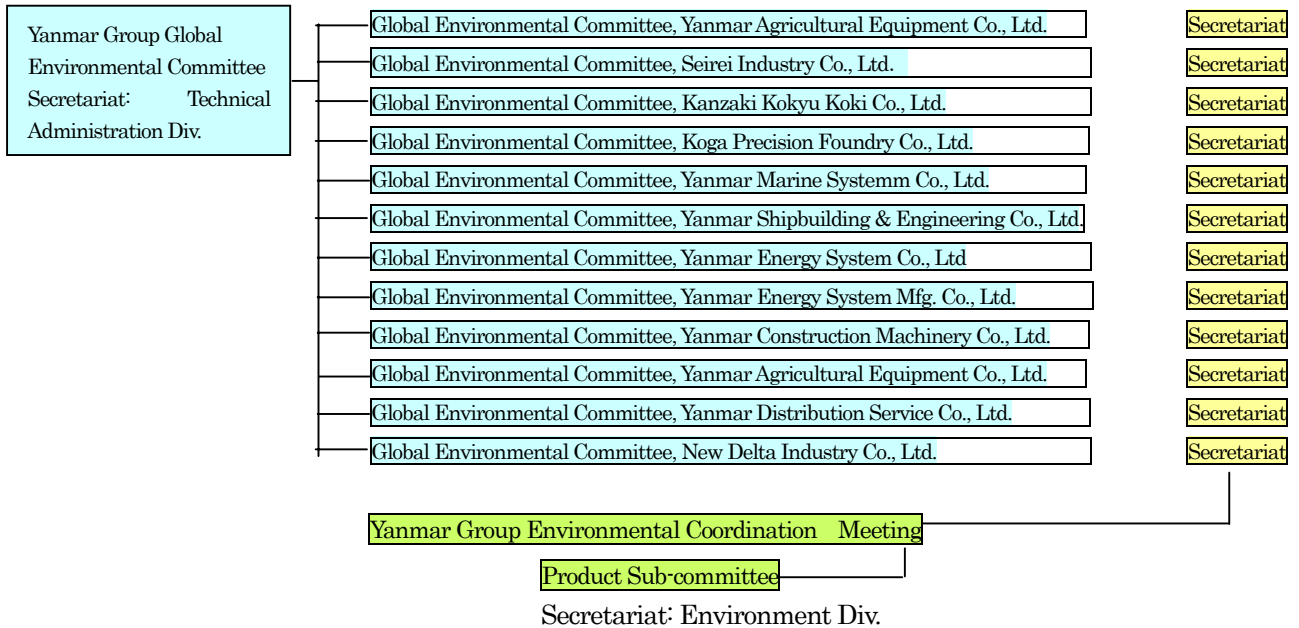
An Environmental Committee with the participation of top management is established at each group company to implement the policies of the Yanmar Group Environmental Committee.

The Yanmar Group Environmental Coordination Meeting, consisting of secretariat members of the Environmental Committees of each company, is established to communicate the relevant policies and review the progress of implementation. The Product Sub-Committee, consisting of development division managers of group companies, is established within the Yanmar Group Environmental Coordination Meeting with the purpose of raising the environmental performance of Yanmar products.

The Yanmar Co., Ltd. Global Environmental Committee has been dissolved and absorbed by the new Yanmar Group Global Environmental Committee.

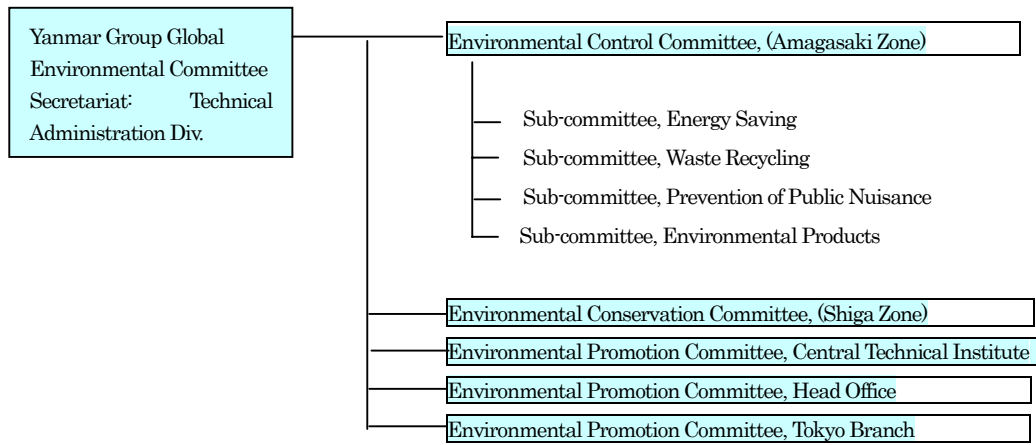
The Environmental Promotion Coordination Meeting administers environmental conservation activities, which are implemented by the sub-committees at each site.

Organization Chart of the Yanmar Group Global Environmental Committee



▲Yanmar Group Global Environmental Committee

Yanmar Environmental Promotion Coordination Committee



▲Yanmar Group Environmental Coordination Committee



▲Environmental Conservation Committee, Shiga Zone

1.3 Certification of the Environmental Management System

Our company's environmental management system is implemented for accreditation under the international ISO 14001 standard in the course of promoting full, defect-free environmental protection activities. New Delta Industry Co., Ltd., Yanmar Energy System Mfg. Co., Ltd., and Yanmar Agricultural Equipment Co., Ltd. were newly accredited under ISO 14001 in 2004.

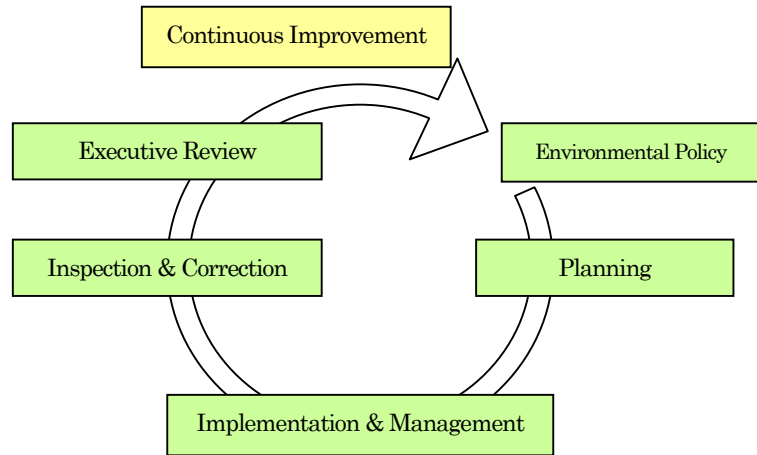
What is ISO 14001?

This is the standard for environmental management laid down by the International Standard Organization (ISO). The management system was revised in November 2004.

How is a Company Certified?

Certification is performed by a third party organ, which inspects to see whether the standards have been satisfied.

■ Continuous Improvement Under ISO1400



ISO 14001 Certification by Site

Yanmar Domestic Facilities

No.	Factory Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	Large Engine Marine Factory, (Amagasaki Zone)	Amagasaki Plant, Tsukaguchi Plant	LRQA	770250	Jun. 1997
2	Compact Engine / Precision Machinery Factories (Siga Zone)	Biwa / Kinomoto / Yamamoto / Omori / Nagahama / Nagahara Plants	JQA	JQA-E-90134	Mar. 1998

Group Companies

No.	Company Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	Yanmar Farm Machinery Mfg.	Head Office, Ibuki Plant	LRQA	4002304	Mar. 1999
2	Kanzaki Kogyukoki Co., Ltd.	Head office Plant	LRQA	772501	Mar. 1999
3	Seirei Industry Co., Ltd.	Okayama Plant	JQA	JQA-EM0277	Dec. 1998
4	Seirei Industry Co., Ltd.	Yamada / Nangoku Plants	JQA	JQA-EM0262	Dec. 1998
5	Yanmar Construction Machinery Co., Ltd.	Fukuoka Plant	JQA	JQA-EM0281	Dec. 1998
6	Matsue Diesel Co., Ltd.	Head Office Plant	LRQA	JBC-4002315	Aug. 2003
7	New Delta Industry Co., Ltd.	Head Office Plant	JICQA	JICQA-E840	May 2004
8	Yanmar Energy System Mfg. Co.	Head Office Plant	JIA-QA Center	JE0464A	Jul. 2004
9	Yanmar Agricultural Equipment Co., Ltd.	Head Office / Facility Div. / Development Div.	JQA	JQA-EM4278	Oct. 2004

Yanmar Group Overseas Companies

No.	Company Name	Accredited Business Units	Audit & Registration Organ	Register No.	Accredited Date
1	P.T. Yanmar Diesel Indonesia	Head Office Plant	KEMA Quality B.V	2032854	Jul. 2003

1.4 Audit of Environmental Management System

The sites certified under ISO14001 disclose their respective environmental policies to the public and perform audits on a periodical basis to ensure their effectiveness and sustainability.



▲Environmental Policy in the Shiga Zone



▲Environmental Policy in the Amagasaki Zone

Audits are conducted both internally, to establish whether the environmental management systems are functioning effectively, and, on the basis of the results, by external third party audit according to the ISO 14001 requirements.

The third party audit in the current year was conducted in compliance with the 1996 edition. We plan to change the management system hereafter to comply with the 2004 edition.

Results of the Environmental Audit

We conduct an annual internal audit of all divisions throughout the company. The results are reported to the general manager of the business division for use in the environmental control review.

We also receive a surveillance and certificate renewal audit by a third party certification organization.

In 2004, we were instructed to improve three items in the Yanmar group and complied with those demands. Other requests were made regarding 23 items, and we enhanced our environment control systems accordingly.

External Environment Quality Rating

We presented our environmental management system at a hearing of the Development Bank of Japan in Jan. 2005 and, as a result of our explanation of our management, business and environmental measures, were awarded the highest rating, Class III, for our environmental systems.



▲Certificate of Environmental Quality Rating awarded by the Development Bank of Japan

II Environmental Products

2.1 Industrial and Construction Machinery

(a) Industrial Engines

The industrial engine represents the core business of Yanmar. The engines are produced by the Biwa Plant of the Compact Engine Division.

Yanmar engines work at the core of various types of industrial machinery and in many places behind the scenes to support the wellbeing of people in Japan and worldwide. Increasing emphasis has been placed worldwide on reducing the global environmental load in recent years, and it has become vital to provide products that comply with environment regulations of every country.

Yanmar uses the expertise and techniques fostered over many years and the latest technologies to implement rigid quality control for all engines produced and ensure that they satisfy the various regulations, including those for exhaust emissions, noise and harmful substance emissions.

● Vertical Water-Cooled Diesel Engine (TNV Series)

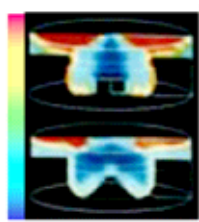
The use of Yanmar's own FIE has made it possible to comply with exhaust gas regulations of Europe, the U.S. and Japan. This engine series achieves extremely low vibration and noise levels with the use of sophisticated material analysis.



▲TNV Diesel Engine



▲Vibration Analysis



▲Combustion Chamber Fluidity Analysis

● Air-cooled Diesel Engine (L-V Series)

Clean & Silent is the basic concept of the L-V series. With further sophistication, the engine series has already satisfied the EPA's Tier II exhaust gas regulation, one of



▲Air-cooled Diesel Engine

the most rigid environment regulations in the world. Yanmar's air-cooled engines are the world leaders.

● Horizontal Water-cooled Diesel Engine (NF/TF/SSY Series)

China and Southeast Asia are big stages for Yanmar's horizontal water-cooled engines. These engines comply, of course, with the exhaust gas regulations of both Japan and the countries concerned.



▲ Horizontal WC Diesel Engine

The spirit of saving every last drop of fuel is in the DNA of Yanmar Diesel Engines, with their people and earth-friendly features.

(b) Construction Machinery

Yanmar Construction Machinery Co., Ltd., one of the Yanmar group companies, develops, produces and sells a wide range of construction machinery, including excavators, loaders and carriers. These feature energy-saving, environmental protection, compliance with legal requirements, easy recycling of materials, etc.

● Compliance with Exhaust Gas Regulation

We have succeeded in reducing the NOx and HC contained in exhaust gas using high-pressure fuel injection and optimum injection timing. The units comply with the second stage exhaust gas regulations of North America, Europe and Japan. The construction machinery has also satisfied the special vehicle regulations of Japan.



▲Excavator, ViO Series



▲Loader, V Series



▲Carrier, C Series

● Energy Saving

Better work performance and fuel economy have been made compatible in Yanmar construction machinery.

Yanmar excavators use Yanmar's own hydraulic system (ViPPS) for effective distribution of the hydraulic oil that the pump delivers to each actuator according to the job size.

The result is 20% more work for the same amount of fuel compared with equivalent 3-ton class machines.

- **Noise**

Mini-construction machinery is mostly used mostly in urban settings and has to be quiet. Yanmar construction machinery complies with the ultra-low noise and low vibration standard specified by the Land, Infrastructure and Transportation Ministry of Japan.

- **Recycling and Disposability**

Long use and the recycling of materials are basic design concepts of Yanmar construction machinery. The bonnet and other major external parts are made of steel plate that is easy to repair and re-use. Resin parts are made of materials that are easy to recycle and dispose of.

(c) Package Products

Yanmar Construction Machinery Co., Ltd. produces and supplies generator units, welders, etc.



▲Generator, AG Series

The generator units come in an ultra-low noise package. The AG series generators, in particular, operate continuously through the day and in most cases achieve the ultra low noise level of 53dB(A)—the level of quiet restaurant or cafe where people converse normally.

2.2 Energy

Yanmar produces and supplies diesel engines, gas engines, continuous-use gas turbine power generation systems, standby power generation systems, emergency use package power generation equipment, etc.

We also supply engines to drive pumps for drainage, sewerage, irrigation and the water supply.

- **Air Conditioning and Power Generation Systems**

Yanmar Energy System Co., Ltd., a Yanmar group company, applies the engine manufacturing technologies of Yanmar in the fields of air conditioning and power generation systems. The air conditioning business is based on the GHP (gas heat pump) and the power generation business on the gas cogeneration system. These are clean and economic energy systems.

- **Cogeneration System**

Various package diesel or gas cogeneration units are produced and supplied across a wide capacity range.

Yanmar's gas cogeneration system uses natural gas for fuel. Natural gas discharges approx. 60% and 80% less CO2 than coal and petroleum, respectively. It is clean energy with a small environmental load.

Whereas the efficiency of commercial power is about 37%, (at-market efficiency), that of the gas cogeneration system, which recycles the waste gas engine heat, is

approx. 80%. This system reduces running costs and makes effective use of limited energy resources.



▲ Gas Cogeneration Unit, Model EP350G

- **Micro Gas Cogeneration System**

Yanmar has developed small gas cogeneration units that have made introduction of the gas cogeneration system in small and medium-sized facilities possible.



▲ Micro Cogeneration, CP25VB

Yanmar's micro gas cogeneration system, coupled with the inverter system, features:

- (1) Low cost with no system connection panel
- (2) Small installation space
- (3) Low engineering cost

<Outstanding Energy-saving Award>

Micro gas cogeneration by Yanmar's CP10VB and the high compression ratio Miller cycle gas engine is extremely energy-efficient. This system received the outstanding energy-saving prize of the Chairman of the Japan Machinery Federation at the 25th energy-saving equipment exhibition in 2004.

RESS Remote Monitoring System

Yanmar Energy System Co., Ltd. connects the power generation units of customers with the central remote monitoring center over telephone lines for 24 hour monitoring of generator operation. The system helps to prevent trouble and protect the generator units through the prompt supply of services.



▲ Yanmar Super RESS 24 Hr Monitoring Center

- **Air Conditioning System**

The gas engine of the gas heat pump air conditioning system drives the compressor for cooling and heating by heat pump cycle. The system features:

- (1) Use of the engine's waste heat for heating. No defrosting operation is required and a warm and

comfortable temperature is obtained at a stroke. The comfortable heating holds firm even when the temperature outdoors drops.

- (2) The system requires only about 1/10th of the power of the equivalent electric system because the Yanmar system uses power only for the fan and auxiliary equipment. It is instrumental in reducing the use of commercial power, avoiding expensive power contracts, and enhancing power receiving and transforming equipment.
- (3) Use of economical gas fuel and lower running costs.
- (4) Economical and comfortable operation by an inverter system that controls the engine speed according to the indoor load.

The GHP uses natural gas for fuel and mitigates the peak power demand of summer due to air conditioners.

In April 2005, Yanmar released the high efficiency G1 series of gas heat pump air conditioners that achieves the highest thermal efficiency at COP1.6 in the industry.



▲ Gas Heat Pump, YNZ840G1

GHP Care-free Package Service

Yanmar offers the YES Partner maintenance contract service for GHP units where the equipment of customers is monitored day and night throughout the year. The service system features:

- (1) Remote monitoring for 24 hours throughout the year for sound operation of the equipment.
- (2) Servicing from the nearest base by networking all branches and offices of Yanmar throughout the country.
- (3) Quick servicing when a failure occurs, with full preparation based on the data sent from the remote monitoring center.
- (4) No repair cost. There is no unexpected expenditure since the inspection and repair costs are included in the maintenance contract.

The customer's GHP unit is monitored continuously and appropriate protection measures are provided in advance for constant operation in the very best condition. Energy is saved, failures are prevented and operation is longer.

2.3 Agriculture

Agricultural equipment is another core business of the Yanmar group. It is conducted by Yanmar Agricultural Equipment Co., Ltd. The company was established in July 1961 and has developed much high performance farm equipment, including tractors, combines and

rice-transplanters, nursery facilities, rice processing centers and horticultural equipment. In recent years, the company has released related products for use in both farming and urban areas.

(a) Agricultural Machinery

Much emphasis has long been placed on efficiency and size in this area. In addition, in recent years, a lot of attention has also been devoted to ease of operation, comfort and operational safety.

In the environmental aspects, we are tackling the reduction of harmful gas emissions from the diesel engines that drive farm machinery, and energy saving through better efficiency, lower power loss and lower weight. In efficiency, we have developed HMT transmission for use with the rice-transplanters, in which ease of operation and high transmission efficiency have been made compatible. These are released as the VP series rice transplanters. We will also introduce this highly efficient transmission system to other farm machinery. Concerning the reduction of power loss, we conducted 3D CAD structural analysis on tractors and have succeeded in reducing the power loss of the transmission by 3%. In the case of combines, we have succeeded in curtailing the power by about 40%, (GC695) by optimizing the clearance between the threshing section and the mesh, which consumes the primary power. In weight reduction, we have achieved 40% weight reduction in our mini-rice transplanter, (Pe-1) from the level of the previous model to slash fuel consumption by 50%.

We will continue to operate our agricultural businesses domestically and abroad with the goals of people- and environment friendliness.



▲ Tractor, EF650



▲ Combine, GC695



▲ Rice transplanter, VP8D



▲ Rice transplanter, Pe-1

(b) Farm Facilities

Yanmar Agricultural Equipment Co., Ltd. entered the farm facility business in 1963 and has delivered facilities in about 1,000 locations throughout the country.

These facilities include country elevators, soybean drying and control facilities, and color sorting equipment

that assesses rice grain by grain by high performance CCD camera.

Among nursery facilities, we offer the CMF greenhouse (in tie-up with CMF, the top greenhouse maker in France), an epoch making fruit sorting system that can measure each fruit wholly with the use of 5 CCD cameras, (converted from the unmanned paddy rice seedling transfer system), a free tray fruit sorting system, using IC chips, with no contact between fruits, and a leak pre-treatment and sorting facility.



▲ Country Elevator

(c) Hobby Farming Equipment

We offer power tillers for use in kitchen gardens and small paddy fields

The walk-behind tractor, *New My Tiller YOU* performs such jobs as tilling and ridging. The tractor features:

- Easy starting
- Convenient clutch
- Height adjustment handle
- Adjustment of transportation wheel height



▲ Walk-behind tractor, YOU

(d) Unmanned Helicopter

Yanmar has been an innovator in Japanese agriculture from the first, when Japanese farming was still highly labor intensive and at the mercy of the weather. Mechanization has brought labor and energy saving for agricultural modernization. The unmanned industrial helicopter is used in pest control. Its effectiveness is now widely recognized and it is taking over from the ordinary manned helicopter. Pest control by unmanned helicopter has grown into the mainstream business for extensive pest control. Yanmar Helicopter Service Co., Ltd. offers this pest control service.

● Environmental Friendly Unmanned Helicopter Pest Control

The use of unmanned helicopters in agriculture was started from 1991 with a service area of 6,000 ha. The service area has increased year by year to reach 640,000 ha in 2004 and the pest control service has become a major business.

Besides agriculture, the use of unmanned helicopter is expanding quickly in forestry pest control as well.



▲ Paddy rice pest control by AYH-3 unmanned helicopter

■ Advantages of Unmanned Helicopter Pest Control and Environmental Considerations:

- (1) Pest control at optimum time; high efficiency and low chemical use.
- (2) Use of low toxicity chemicals registered for use with unmanned helicopters.
- (3) The helicopter can fly low (3~4meters over the crop), so chemical drift is extremely slight.

☆ Unmanned Helicopter Business Results (Source: Agriculture & Forestry Aviation Ass., Feb.21, 2005)

No. of registered units	No. of operators	Pest control area (rice paddies)
2,013 units	10,765 persons	538,206 ha.

2.4 Marine

(a) FRP Boats

Yanmar Shipbuilding & Engineering Co., Ltd. in Oita Prefecture build FRP fishing boats and pleasure boats for sales through Yanmar Marine System Co., Ltd.

Besides building core pleasure boat series, (Salpa, Toprun and Hayakaza series), the shipyard also builds the ZD fishing boat series, (Hayashio, Arashio and Tobiuo).

We will soon release an environment-friendly sport fishing boat, the Toprun 24CS. The console is arranged in the middle of the deck, ensuring the largest breadth of this class at 2.71m. The boat is equipped with the 4 stroke gasoline outboard engine with a max. output of 184kW. The boat speed exceeds 40 knots. A high cruising speed and stability during halts have been made compatible by employment of a new hull bottom shape. Jigging, trolling and other sport fishing functions have been pursued in the new boat.

A buoyant material (urethane foam) is used at the hull bottom and sides of the boat to ensure level floatation—the boat has sufficiency buoyancy should the hull be breached. Riding comfort has also been improved by increasing the hull rigidity and the use of a new hull bottom shape.



▲ Toprun, 24CS

We pay especially close environmental consideration to the following points:

- (1) Long Service Life to Reduce Waste

In the conventional frame and bulkhead structure, the cruising wave impact is concentrated on the structural members. This can cause degeneration through fatigue. The urethane foam is instrumental in decentralizing the stress from the structural members and thereby achieving a longer service life for the hull. The disposal of waste due to scrapping is reduced.

(2) The Low Noise Level of a 4 Stroke Outboard Engine: 53dB(A) (during idling).

Reference: 69dB(A) (24-foot conventional boat with diesel engine)

(3) Resource-saving through common use of parts—Rate of common parts: 91%

(b) Marine Engines

Marine engines for pleasure boats, etc. are produced at our marine factory, (Tsukaguchi Plant).

Our marine engines comply with the NOx regulations of the IMO (International Maritime Organisation), the EPA's voluntary regulations for pleasure boat engines, the BSO (Bodensee, Switzerland) emissions regulations, etc.



▲ Int'l Air Pollution Prevention Engine Certificate

The domestic law (called the law on the prevention of oceanic pollution and hazard on the sea) in compliance with the IMO's NOx regulations, was enforced from May 19, 2005. Yanmar, prior to the enforcement of the law, had already attached EIAPP certificate (International Air Pollution Prevention Engine Certificate) and Technical File (the engine handling manual) to all engines for use with inland vessels, including fishing boats, shipped from our plant on and after March 21. In addition, the certification under RCD regulation, (EU directive), enforced from 2006 in the EU is now being applied to our engines.

We have introduced the 6LY3-ETP electronically controlled engine for overseas power boat markets. The engine complies with EPA's Tier II exhaust regulations and features clean and easy operation in addition to the lightness, compactness and high output of the conventional models. The output of the new engine was boosted by 30kW from the output of the previous model through the optimum control of fuel injection timing and injection amount.



▲ 6LY3-ETP Engine

Model	Cyl.No.·Bore x Stroke	RPM	Output
6LY3-ETP	6- φ 105.9x110mm	3300min-1	353kW

We will offer ever cleaner products in a timely manner to meet the needs of our customers constantly.

(c) Marine Propulsion & Auxiliary Engines

The Large Engine Factory of Yanmar (Amagasaki Plant) develops, produces and sells the new generation diesel engines, such as the AY and EY26 series, under the concept of *Diesel Engines that Harmonize with the Global Environment and Evolve Continuously in the 21st Century*.

In general, when one reduces NOx emissions, fuel consumption and smoke volume increase and have an adverse impact on the environment. Yanmar's next generation diesel engine series, the Eco Diesel SAVETEN, features, besides oceanic environment friendly considerations, the use of the epoch-making ASSIGN combustion system, which, while reducing NOx emissions, also slashes fuel consumption.

Yanmar has already acquired the air pollution prevention certificate based on the IMO's regulation for almost all engine models as a result of having fostered technologies for oceanic environment preservation over many years.



▲ 6EY26 Marine Propulsion Engine



▲ Air Pollution Prevention Treaty Certificate by IMO (NK)

● Electric Propulsion System

In ordinary vessels, it is common for the main propulsion diesel engine to drive the propeller while the power for lighting or motors is supplied by engine generators. Yanmar has furthered the use of electric propulsion systems for vessels in recent years to make engine systems friendlier to the environment.

In the electric propulsion system, there is no main propulsion engine to drive the propeller directly, but several generator units work as the core plant that powers the motor that drives the propeller and, at the same time, provide for onboard power needs, including lighting.

The Yanmar Electric Propulsion System is based on the environmentally friendly generator engines and comprises the package of propulsion equipment, electric equipment, control panels, etc. The system contributes to environmental preservation by optimizing the control of propulsion and power generation according to the ship's operational condition.

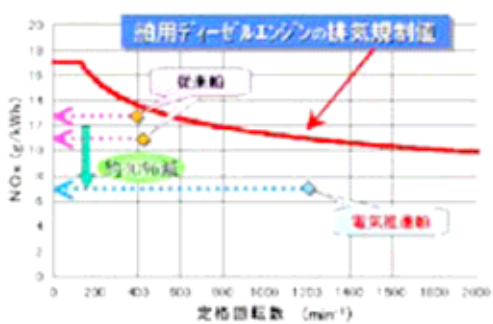
The NOx and CO2 emissions of the system are reduced as follows:

- (1) Automatic operation of the necessary numbers of generator units according to power needs for the most efficient operation.
- (2) The motor and the propeller shaft system drive the propeller, thereby removing restrictions on the hull shape of most vessels and allowing for the ideal hull

shape with the least water resistance, i.e., a hull shape that consumes less energy.

- (3) Use of medium/high speed generator engines with low NOx emissions.

Yanmar generator engines feature low vibrations and noise. The vibration/noise levels on vessels powered by the Yanmar electric propulsion system have been reduced largely. The system is people-friendly, too.



▲ NOx Emissions of Electric Propulsion Ship

(d) Oceanic Equipment

The Environmental Plant Engineering Division of Yanmar produces and sells oceanic equipment. We offer various types of equipment for the sanitation and freshness of fishery products to satisfy the needs of fishing ports throughout the country. We thus help to add value to the aquatic products of coastal fishing and achieve the low-waste use of such products.

● Chilled Seawater Making Equipment

Quick cooling of freshly caught aquatic products in seawater at 0~2 °C (pre-cooling) is effective for maintaining their freshness. When this pre-cooling is employed, the use of ice for cooling and storage can also be curtailed.



▲ Chilled Seawater Making Equipment

Yanmar supplies chilled-seawater making equipment and recommends the use of equipment with a capacity of 10~50t/day in the cases of coastal and fixed net fisheries.

● Seawater Ice Making Equipment (Flake Ice)

Ice is used in large quantities to maintain the freshness of aquatic products during the period from just after hauling until they reach the area of consumption.

Yanmar's seawater ice making equipment produces seawater flake



▲ Seawater Ice Making Equipment

ice that is suitable for cooling aquatic products. The seawater flake ice has a higher cooling effect on fish than crushed ice and is more effective in keeping the freshness of the aquatic products. In addition, the fish are less prone to damage and, by changing the salt density, it is possible to control the discoloration of fish bodies. No thermal energy is required to remove ice in plate ice making. The seawater ice-making equipment can produce 1~25tons per day.

(e) Boat School

Shiga Kanko Co., Ltd. of Yanmar the group runs a training school for the operation of marine boats and licenses. The training courses are given at 7 sites, (Moriyama, Kobe, Kishiwada, Amagasaki, Hanahaku, Otsu and Tanba) and skill practice is given at 3 sites, (Kanzakigawa, Kishiwada and Moriyama). Total enrollment to now is about 500 persons.

2.5 The Household and the Environment

(a) Environmental Business of the Yanmar Group

The Yanmar group manufactures and sells various types of environmental equipment and facility.

[Environmental Equipment]

- Green shredder (to dispose of plant cuttings and waste wood)
- Commercial-use garbage disposer
- Sludge concentration meter
- Raw water purification equipment

[Environmental Facility]

- Food waste feed making facility
- Carbonization/compost disposal facility
- Sludge reduction equipment
- Sewage treatment tank
- Livestock dung disposal facility
- Plant deodorizing equipment
- Plant waste water disposal/recycling facility
- Farming/fishing village community waste water treatment facility.

In recent years, we have also developed the:

- Biomass Power Generation System
- Wind-power Generation Equipment

(b) Environmental Plant Engineering Business

- Yanmar's Environment Plant Engineering Division promotes the environmental businesses of farming/fishing village community waste water treatment facilities and sludge reduction equipment

● Sludge Reduction System

Yanmar has been tackling the development of a sludge reduction system that uses cavitation, (the impact produced when rapidly pressurized water boils at normal temperatures), in

cooperation with the local government of Shiga Prefecture since 2001.

Shiga Prefecture, where Lake Biwa, Japan's largest lake, is located, is promoting the improvement of farming village community waste water facilities and the disposal of waste sludge. These are big problems because of insufficient incinerator capacity, bans on oceanic disposal of the sludge, etc.

The Yanmar sludge reduction system has reduced sludge by over 75% and ensures good water quality upon disposal. The system features:

- (1) Reduction of sludge production by over 75% by a completely physical removal process.
- (2) Simple machinery composition for easy operation and maintenance.
- (3) No use of chemicals. The sludge can be returned to farmland after treatment and requires no secondary treatment cost.



▲ Sludge reduction system

(c) Environmental Business of Yanmar Agricultural Equipment Co., Ltd. (Material Recycling Business)

Manure compost facilities are another theme promoted by Yanmar.

It is forbidden to heap or bury livestock excreta in open fields. On the other hand, many farm crop producers wish to reduce the use of chemical fertilizers and perform organic farming. To meet their needs, manure compost facility construction is being promoted throughout the country and Yanmar offers various facilities that meet user requirements.



▲ Rotary fermentation equipment

Yanmar's manure compost equipment comprises both open (rotary & scoop) and closed labor-saving equipment. The ventilation system with fine air circulation promotes efficient microorganism



▲ Closed fermentation equipment

decomposition.

To prevent public nuisance, Yanmar uses deodorant equipment of both organic treatment and absorption types.

Our concept for manure compost making is to recycle the livestock excreta, instead of disposing of it, to grow safe and delicious agricultural crops.

(d) Environmental Business of the Distribution Equipment Division of Yanmar (Cool Containers)

The Distribution Equipment Division of Yanmar manufactures, sells and rents cool containers refrigerated by air-cooled diesel driven cooling machine.

The increase of CO2 emissions and resultant global warming threaten to have a large impact on our living environment and the measures to prevent the greenhouse effect are variegated and moving ahead worldwide. One of the major measures for reducing CO2 emissions in the transportation sector is the modal shift in which truck transportation is replaced by mass and efficient transportation by railway and sea surface.

Assuming, for instance, that we use the cool container to send aquatic products from Tokyo to Fukuoka every day by railway instead of by truck, we can curtail CO2 emissions by 281 tons annually. Cool containers sent by railroad must be operated unmanned with no temperature adjustment for many hours. Accordingly, the cool containers must have high reliability and durability. The Yanmar cool container is the fixed temperature cool container developed for use in railroad transportation.

Our cool containers for railroad transportation contribute to the preservation of the environment by curtailing CO2 emissions.



▲ Cool Container

Table 1 CO2 Emissions Unit requirement by Transportation Means

Transportation Means	CO2 Emissions Unit requirement
Railroad	21g-CO2/t.km
Coastal ships	38
Commercial truck	174
Captive use truck	338

Source: Home Page, Land, Infrastructure and Transportation Ministry.

III Environmental Protection Activities

3.1 Medium-term Environmental Protection Plan

Yanmar implemented its first medium-term plan for the promotion of environmental activities from fiscal 1995 to 2000. The second plan is running from fiscal 2001 to 2005. We aim to achieve the following goals for fiscal 2005 with the records of 2000 as the benchmark.

Goals of the Second Medium-term Environmental Plan

Category	Sub-category	Controlled Item	Mid-term Goal
Product System	Product Cleanliness	Average NOx Emission Volume	Cut of at least 15% on average for combined annual engine production of each division
		Average CO2 Emission Volume	Control of average CO2, total CO2 and total NOx emission for combined annual engine production of each division
Business Operations	Energy Saving	Energy Use	Cut of energy used in production of at least 3.5% as a unit requirement of the entire company's sales turnover
		CO2 Emission Volume	Cut of CO2 emission during production of at least 3.5% as a unit requirement of the entire company's sales turnover
	Other Resource Saving and Recycling	Water Use	Reduction of at least 10% as a unit requirement of the entire company's sales turnover
		Waste Processing	Reduction of at least 10% as a unit requirement of the entire company's sales turnover
	Control of Dangerous Materials	Quantity Handled (total)	Reduction of at least 10% of chemicals covered by PRTR handled (used) annually by the whole company (2001 fiscal year as base)
Pollution Prevention	Extra Provisions	With regard to legal regulations for preventing pollution, extra 15% in addition to provisions for the whole company	
Local Society	Local Society	Community Activities	No numerical objectives
Public Relations	Public Relations	PR Activities	No numerical objectives

Note: Except where noted, fiscal 2000 is the base year, and 2005 the target year

3.2 R&D for Environmental Protection

3.2.1 Yanmar Central Research Institute

The Yanmar Central Technical Research Institute was opened in Feb. 2000 at Maibara, Shiga Prefecture, as the core R&D center for the Yanmar Group. The building design weighed harmony with the surrounding environment and

the demands of lower emissions and more recycling. The institute has the latest R&D equipment and IT technologies and tackles various R&D themes. Some examples are shown below



▲ Central Technical Research Institute

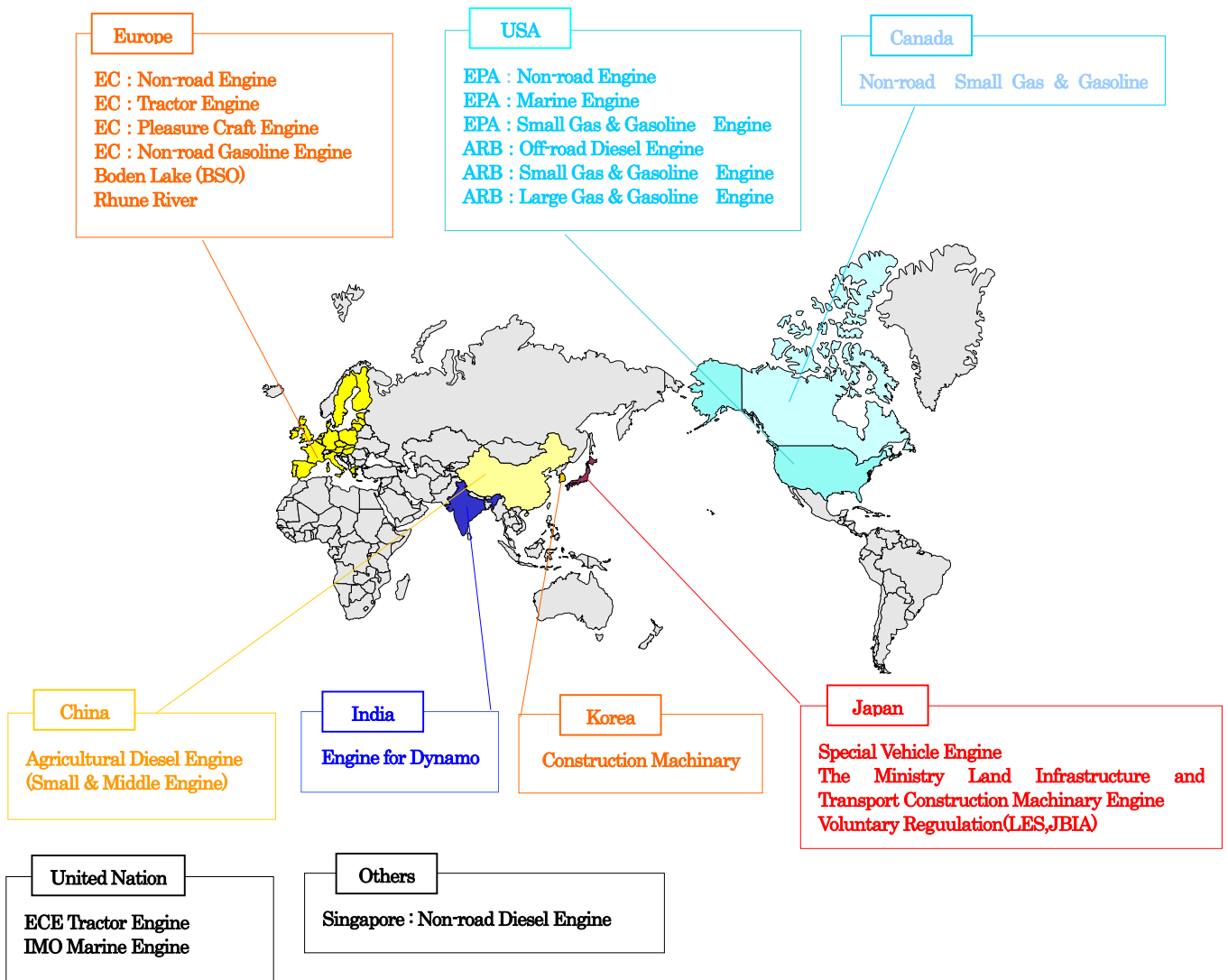


▲ Entrance hall

3.2.2 Meeting Global Emissions Requirements

Regulatory authorities around the world have set various requirements with the purpose of cleaning the atmosphere, and the mandatory values get stricter by the year. Emissions regulation of special vehicles was effectuated in Japan in 2003, and exhaust gas emission for regulation of construction machinery has also since been introduced in Korea. Similar regulation is effected in China.

Besides the above, exhaust gas emitted from stationary engines is regulated, too, in many countries.



Non-road Engine Exhaust Emission Regulation around the World

3.2.3 Engine Technologies

- **Low Emissions**

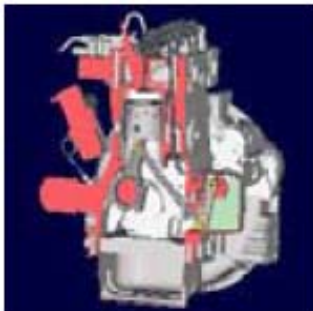
Continuous efforts are made to develop the exhaust gas emission reduction techniques needed for full compliance with the exhaust gas regulations of the world. In the field of diesel engines, in particular, this issue has been positioned as a permanent development theme. We conduct R&D on not only the improvement of engine combustion but also electronic controls and exhaust gas after-treatment equipment to achieve extremely low exhaust emissions.



▲ Diesel Engine Exhaust Gas Measuring Equipment (Dilution Tunnel)

- **Reliability & Durability**

Microscopic diesel engine performance is measured with the latest measuring equipment. Based on abundant findings from element tests, engine reliability and durability are being constantly improved.



▲ Measurement of Piston Temperature

- **Fuel Cost Reduction of Engines**

In order to keep on raising the already high thermal efficiency intrinsic to diesel engines, we conduct R&D on air movement inside the cylinder, FO spraying simulation, etc. for combustion improvement, and on engine intake and exhaust losses, mechanical losses, etc. to reduce horsepower loss.



▲ Combustion Test

- **Low Vibrations and Low Noise**

The reduction of vibrations and noise emitted from engines, besides the exhaust gas prevention measures, represents an important theme for environmental improvement. At Yanmar, our own computer analysis system, VINAS, analyses engine structures and noise in the design stage. Appropriate modifications in subsequent stages achieve engines with low vibrations and noise. Yanmar has also developed an active noise offset system, (offsetting noise with noise) for use with marine engines and other applications.



▲ Noise level measurement in soundproof room

3.2.4 System Technologies

Studies are advancing on highly efficient total energy systems based on engines to answer the needs of society.

- **Raising System Efficiency**

Demand continues to rise for highly efficient energy-saving air conditioning systems and the use of CFC coolant alternatives to prevent global warming.



▲ Coolant Cycle / Control Technology

Research is advancing on various coolant cycle and control technologies.

- **GHP Gas Engines**

The R&D themes include combustion, exhaust gas after-treatment and engine control technologies for high efficiency, low exhaust emission engines.

Recent engines feature an air-fuel ratio sensor for the optimum control of fuel injection. They achieve high efficiency even while the NOx emissions are low.



▲ R&D on GHP Gas Engine

- **GHP Monitoring System**

Yanmar Central Research Institute is wholly air conditioned by a stable, centrally monitored GHP system.

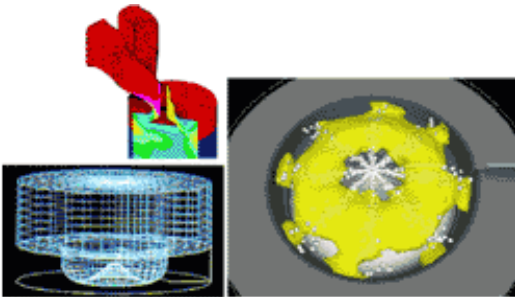


▲ Decentralized GHP Air Conditioning ▲ GHP Monitoring

3.2.5 Basic Technologies

- **Combustion Chamber Analysis**

Studies are progressing on port shape, fuel mist flow inside the cylinder, numerical fluid analysis of the fuel-air mixing process inside the combustion chamber, etc. for high output and low emissions.

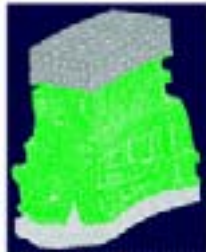


▲ Analysis of Intake Port & Combustion Chamber

- **Analysis of Vibrations (for Noise Reduction)**

We use modal analysis to obtain the optimum structures and shapes for noise and vibration reduction.

The example comes from the analysis of cylinder block vibration mode.

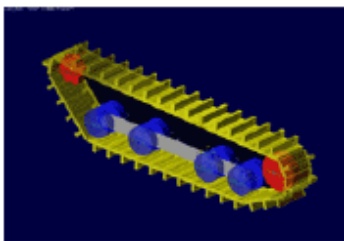


▲ Modal Analysis

- **Analysis of Vibrations**

3D models are used to analyze mechanical vibration for the improvement of operating comfort.

The example is an analytical model of crawler vibration. We analyze the vibrations of tractor and combine undercarriages to improve operation and operating comfort.

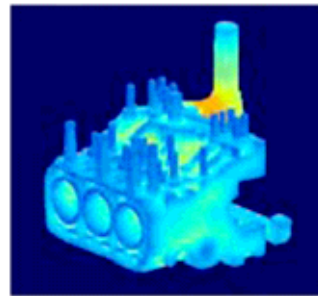


▲ Analysis of Crawler Vibrations

- **Analysis of Casting**

We analyze the solidification process in casting to discover possible defects or failures and make extremely efficient casting plans.

The example shows an analysis of a 3-cylinder cyl. block.

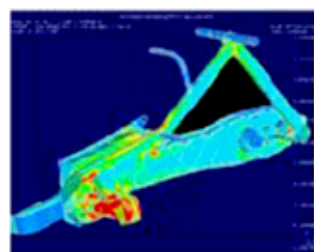


▲ Casting Analysis

- **Structural Analysis**

We use the finite element method (FEM) to know the areas of stress concentration in advance and achieve highly reliable structures.

The example is the 3D truss structure of an aluminum transmission case assembled on the chassis frame of the mini-ride-on rice transplanter.

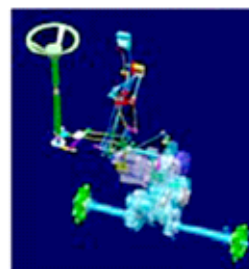


▲ Structural Analysis of Rice Transplanter

- **Analysis of Mechanisms**

The 3D model of a new mechanism is analyzed to assess the performance characteristics and make it highly reliable.

The example shows an analysis of a combine's steering wheel mechanism with the purpose of achieving smooth turning performance and high operational efficiency.



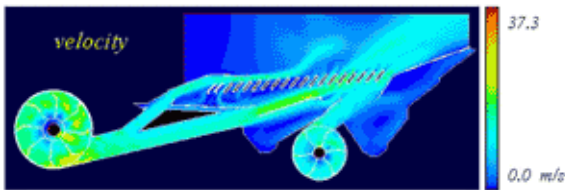
▲ Analysis of Combine's Steering Wheel Mechanism

- **Fluid Analysis**

We use numerical analysis software to analyze air flow in the invisible areas of machinery.

The example shows numerical fluid analysis of a

combine's grain threshing section to obtain the optimum air flow and air volume.



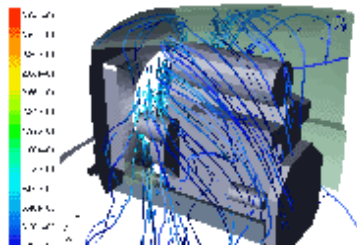
▲ Fluid Analysis of Combine's Threshing Section

3.2.6 Applied Technologies

Besides the R&D for the core engine and agricultural businesses, Yanmar also conducts R&D in many other business areas.

- **Construction Machinery**

We use the techniques of hydraulic and fluid analysis to simulate the hydraulic drive performance and air flow inside the engine compartment in order to manufacture construction machinery that functions quietly and smoothly.

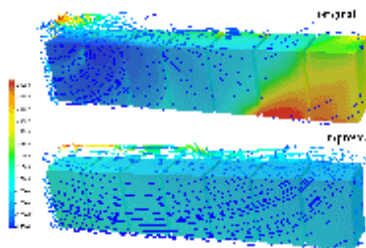


▲ Air Flow Analysis inside Engine Compartment of Construction Machinery

- **Distribution Equipment**

For the distribution equipment business, we use fluid analysis to learn the air flow inside the cool containers and develop coolant applications.

The example shows analytical results for air flow and temperature distribution inside the cool container. The bottom photo shows the uniform temperature distribution after improvement.

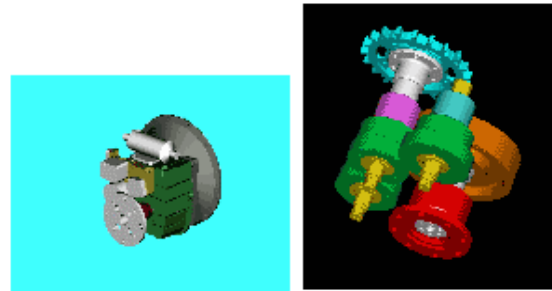


▲ Analysis of Air Flow inside Cool Container

- **Transmissions**

We use the techniques of structural and hydraulic

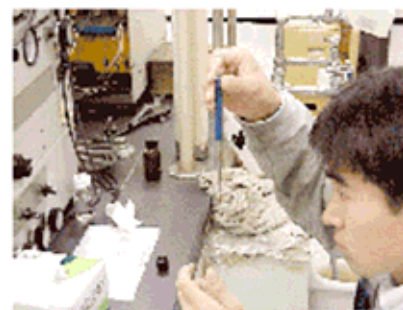
analysis in strength and performance simulation for the transmissions of marine engines and tractors.



▲ Marine Transmission and Internal Parts

- **Waste Recycling and Purification Systems**

We promote R&D on the recycling of organic wastes, recycling systems, water purification, etc.



▲ Water Quality Analysis

Introducing the Yanmar Marine Farm

Japan is a nation surrounded by seas with a long-established fishing tradition. Today, however, a shift is being made from fish catching to fish farming.

Yanmar is promoting the modernization of fishing at the Yanmar Marine Farm, a fish farming R&D facility opened in Oita in 1988 beside Yanmar Shipbuilding & Engineering, Oita. The work has progressed ever since and substantial results have been achieved.

[R&D Themes]

- Farming System Development

- Large and low cost larva production systems

- Environmental Control System Development

- Oxygen supply systems; Carbon dioxide removal systems

- Automation and Labor-Saving Systems :

- Underwater Fish Farming Net Cleaning Robots;

- Automatic Incubation, Harvesting and Feeding Systems;

- Continuous Monitoring Systems



▲ Yanmar Marine Farm

Location

3.2.7 Agricultural Technologies

Yanmar's Central Research Institute develops new technologies and ideas for the future shape of farming in Japan.

- **Ecology & Economy**

The energy-saving and environmentally friendly Yanmar ECO tractor is equipped with the electronic governor controlled ECO diesel. The tractor features low fuel consumption, high work efficiency and curtailed CO2 emissions. It has high, persevering output, too.



▲ Yanmar ECO Tractor

- **Easy Operation**

FDS (Forced Differential Steering) is a new steering system with a passenger car type round steering wheel and outstanding traveling performance on wet paddy fields.

The photo shows the example of a combine equipped with this round steering wheel.



▲ Steering Wheel Operation Combine

- **Seedling Transplanting**

The rice transplanter performs ultra-precise seedling transplanting with such sophisticated techniques as the transplanting pawls with noncircular planetary gears for optimum dynamic locus movement, and level control by a membership function.



▲ Rice Transplanter

- **Highly Efficient Pest Control System**

The GPS hybrid inertial navigation system is used in

the advanced helicopter pest control system to achieve highly focused and efficient pest control.

3.2.8 Planning for Recycling

We weave in waste-reducing characteristics for safe disassembly and recycling at the end of the product life from early in the development stage, envisaging each machine's disassembly, recycling performance and the environmental loads. Ease of disassembly, recycling and environment-friendliness must satisfy clear targets for improvement under each parameter and in each product category.



▲ Outdoor Unit



▲ Collecting Heat Exchanger



▲ Collecting refrigerant



▲ Collecting Exterior Steel

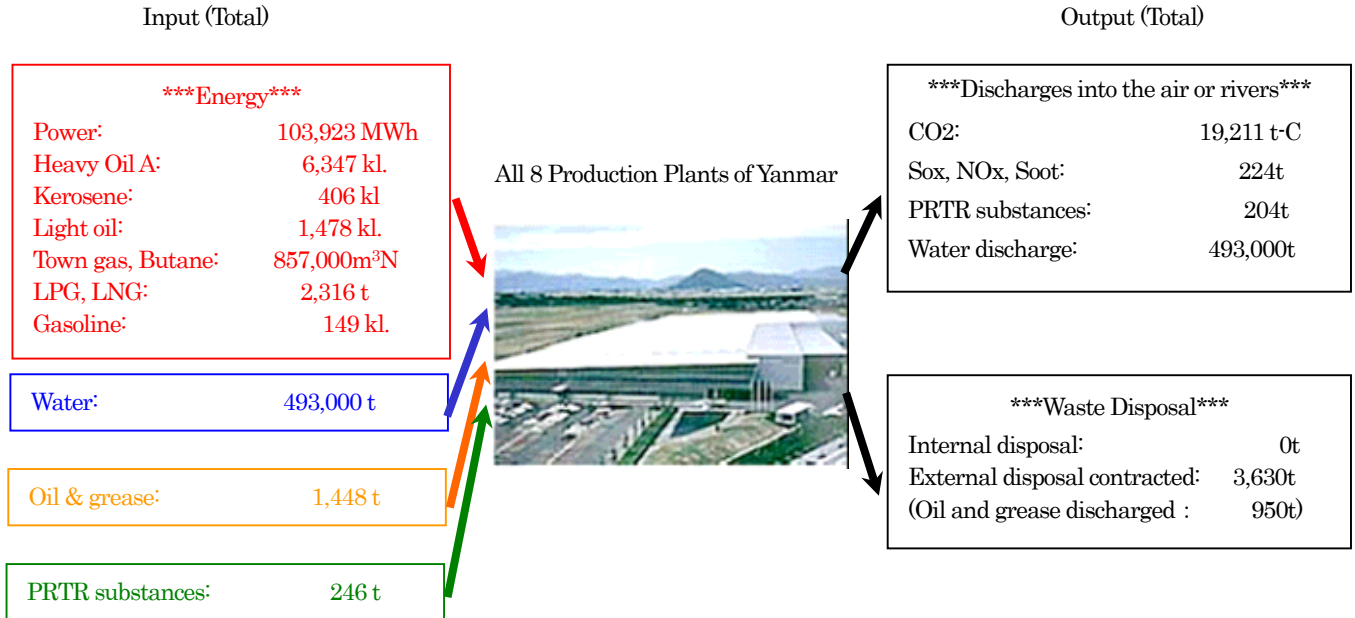


▲ Collecting Copper Pipes

3. 3 Environmental Protection in Production Activities

3.3.1 ECO Balance

Production activities necessarily produce an environmental burden in the form of emissions of greenhouse gases and pollutants and the consumption of natural resources. Our company constantly gauges this environmental burden and endeavors to reduce it wherever possible and recycle waste materials. Environmental load increased in all categories this year on account of production increases.



3.3.2 Energy Saving (Preventing Global Warming)

The fuel, electric power etc. used in the course of production is being reduced in a planned manner in order to prevent global warming. In this fiscal year, too, we promoted the following targets:

- ① Improved power efficiency through the use of high efficiency transformers.
- ② Reduced power consumption with the use of energy-saving fluorescent lamps
- ③ Improved energy efficiency using GHP air conditioning equipment
- ④ Improved efficiency for cooling towers.
- ⑤ Optimum control of heating boiler according to outside temperature.

In addition to the above, we introduced the regular gas cogeneration system to the Amagasaki Plant, following its application to the Biwa Plant last year, to curtail both energy and CO2 emissions. The photos show the example of improved power efficiency through the introduction of highly efficient transformers. As a result, the power transforming



▲ Introduction of high efficiency transformer, 3-phase 100KVA



▲ Single phase, 20KVA

efficiency has been improved by 20%, saving 2670kWh per year. CO2 emissions have been reduced by 0.28t-C.

Fluorescent lamps are being replaced by energy-saving fluorescent lamps that reduce power consumption by 30%. Changes in the plant layout have reduced the number of lamps by 12. Together, these have reduced power consumption by 3240kWh per year and CO2 emissions by 0.34t-C.

In addition, the introduction of high efficiency GHP for air conditioning in the plant and use of city gas has saved energy and reduced CO2 emissions by 3.2t-C.



▲ Outdoor GHP units 20PS x 2 units ▲ Indoor GHP unit

The company's annual energy use for the current fiscal year is shown in terms of crude oil. CO2 emission is described in terms of carbon conversion. Incremental and reduction ratios are in comparison to the figures for 2000.

Energy Unit Requirement and CO2 Emissions Unit Requirement in 2004

	Energy unit requirement (Crude Oil kl/¥100mil.)						CO2 Emission unit requirement (t-C)/¥100mil.)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	33.4	—	37.6	—	25.1	—	16.7	—	17.9	—	14.1	—
Fiscal 2001	32.6	-2.6	37.5	-0.3	24.3	-3.1	16.3	-2.3	17.9	-0.1	13.5	-4.1
Fiscal 2002	33.5	0.1	37.8	0.5	25.4	1.4	16.8	0.9	18	0.7	14.5	3.0
Fiscal 2003	33.1	-1.0	37.8	0.6	24.4	-2.9	16.5	-1.0	17.9	0.1	13.8	-2.0
Fiscal 2004	31.6	-5.6	36.6	-2.5	22.0	-12.3	15.5	-6.9	17.1	-4.4	12.4	-11.7

The gross energy use and CO2 emissions in 2004

	Energy consumption (Crude Oil kl)						CO2 Emission t-C					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	40,038	—	30,127	—	9,911	—	19,931	—	14,373	—	5,558	—
Fiscal 2001	33,180	-17.1	24,017	-20.3	9,163	-7.5	16,566	-16.9	11,480	-20.1	5,086	-8.5
Fiscal 2002	36,009	-10.1	26,471	-12.1	9,538	-3.8	18,085	-9.3	12,652	-12.0	5,433	-2.2
Fiscal 2003	36,471	-8.9	27,068	-10.2	9,403	-5.1	18,163	-8.9	12,845	-10.6	5,318	-4.3
Fiscal 2004	39,152	-2.2	29,716	-1.4	9,436	-4.8	19,211	-3.6	13,892	-3.3	5,319	-4.3

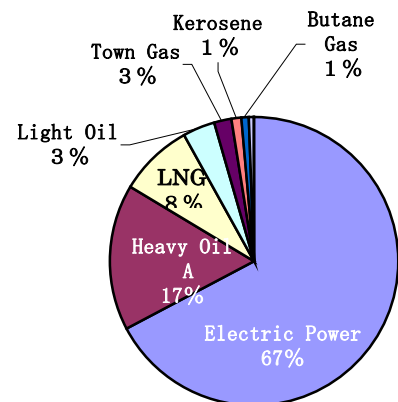
Yanmar's energy consumption fell largely in 2001 and is now increasing gradually. This is attributable to the increased production in the Shiga Zone. In terms of unit requirements, there was only marginal change in the previous year, but big improvements have been made in the current fiscal year.

In the Shiga Zone, energy consumption increased on account of the increased production, but the unit requirement levels improved.

In the Amagasaki Zone, energy consumption fell from the level of the benchmark year. The same tendency applies to the unit requirement levels, too.

The energy used by our company breaks down by energy type as shown in the diagram on the right. Electric power consumption comprises the largest part. It is apparent that we must attach importance to reduced energy consumption.

The consumption of heavy oil (JIS A) was second. The major use was in air conditioning of the plants. The consumption of LNG increased due to the introduction of the gas co-generation system to the Biwa Plant.

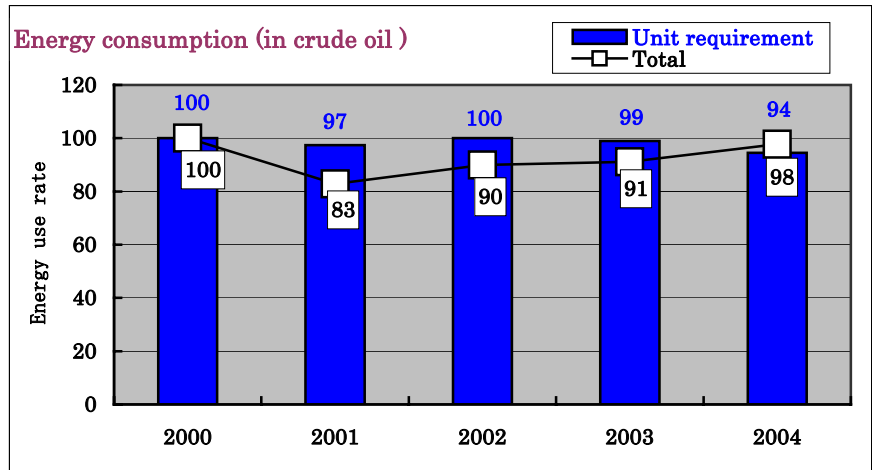


▲ Energy consumption by type (in crude oil)

[Changes of Energy Use]

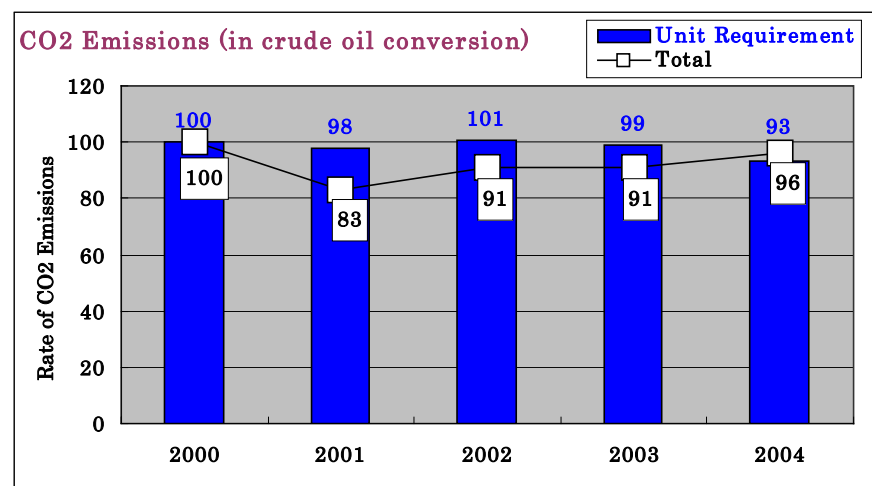
The changes in energy consumption and CO2 emissions with the base year (2000) as 100% are shown in the diagrams on the right.

The energy consumption, following the reduction in 2001, has been rising gradually. There were only marginal changes in term of the unit requirement levels last year, but we have achieved a big reduction to 94% this year. This reflects improved efficiency through reorganization of our production system



[Tendency of CO2 Emissions]

The tendency of CO2 emissions is comparable to that energy consumption. However, the CO2 emission unit requirement in 2004 improved largely to 93% of the level of the benchmark year in both the Shiga and the Amagasaki Zones, reflecting the efficiency improvements obtained through reorganization of the production system and the introduction of the cogeneration system.



CO2 reduction will continue to be an important issue for us with the effectuation of Kyoto Protocol, and we shall carry on promoting CO2 reduction with great vigor.

Topics

Co-generation System Introduced to Amagasaki Plant

Following introduction of gas engine cogeneration system to the Biwa Plant last year, we also introduced the same system to the Amagasaki Plant, the core large engine plant of Yanmar, for regular operation from October 2004.

The co-generation system consists of a gas engine power generation unit run by 13A city gas and an exhaust gas boiler. The total power generation output is 800kW, (400kW x 2 units), which is sufficient to supply 20% of the annual power requirement of the plant. In addition, the heat recovered by the exhaust gas boiler is used to heat the cleaning fluid of cleaners used in the assembly process.

Thanks to these efforts, energy consumption fell by 4.4%(crude oil conversion), and CO2 emissions by 3.3%.



▲ Overall view of gas cogeneration facility

3.3.3 Resource Saving and Recycling (Waste Reduction)

The water consumption and waste production of our company for the current year are shown below. The rate of increment/decrease is to the base year (2000).

Unit Requirement for Water Consumption and Waste Production in 2004

	Unit Requirement of Water Consumption (ton/¥100 million)						Unit Requirement of Waste (ton/¥100 million)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	536.3	—	311.2	—	993.2	—	3.22	—	4.10	—	1.43	—
Fiscal 2001	559.4	4.3	281.3	-9.6	1032.2	3.9	3.37	4.8	4.54	10.9	1.37	-4.0
Fiscal 2002	527.3	-1.7	253.2	-18.6	1039.5	4.7	2.86	-11.1	3.76	-8.3	1.17	-17.7
Fiscal 2003	440.7	-17.8	260.6	-16.3	774.8	-22.0	3.22	-0.1	4.17	1.8	1.46	2.4
Fiscal 2004	397.7	-25.8	249.5	-19.8	678.3	-31.7	2.93	-8.9	3.79	-7.5	1.30	-8.8

Total water consumption and waste volumes in 2004

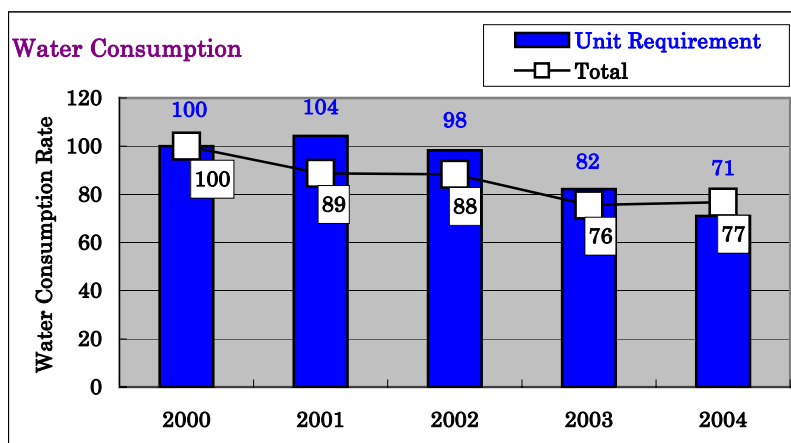
	Water Consumption (ton)						Production of Waste (ton)					
	Whole Company		Shiga Zone		Amagasaki Zone		Whole Company		Shiga Zone		Amagasaki Zone	
	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease	Unit requirement	Increase/Decrease
Fiscal 2000	641,918	—	249,596	—	392,322	—	3,849	—	3,286	—	563	—
Fiscal 2001	569,451	-11.3	180,294	-27.8	389,157	-0.8	3,429	-10.9	2,913	-11.4	516	-8.3
Fiscal 2002	567,336	-11.6	177,508	-28.9	389,828	-0.6	3,075	-20.1	2,635	-19.8	440	-21.9
Fiscal 2003	485,459	-24.4	186,700	-25.2	298,759	-23.8	3,547	-7.8	2,985	-9.2	562	-0.2
Fiscal 2004	492,687	-23.2	202,241	-19.0	290,446	-26.0	3,630	-5.7	3,075	-6.4	555	-1.4

(1) Water Consumption

The water consumption of the company had fallen substantially in the previous year and continued at the almost the same level in the present fiscal year. The water consumption increased by a large amount in Shiga Zone, but fell in the Amagasaki Zone, producing just a slight increase for the company overall. The water consumption of both the Shiga and the Amagasaki Zones decreased in terms of the unit requirement, showing that water has been saved company-wide.

The higher water consumption in the Shiga Div. is attributable to the increased production but, in terms of the unit requirement, the level improved by 4.3% from the previous year. In the Amagasaki Zone, where water consumption fell, the unit requirement value rose by 12.5% from the level of the previous year.

The changes in water consumption against 2000 as the base year (100) are shown in the diagram on the right. The water consumption of the whole company increased slightly this year but is 23% lower than in the base year. In terms of unit requirement, the value improved by 11% to 71% from 82% in 2003, reflecting successful water economy.

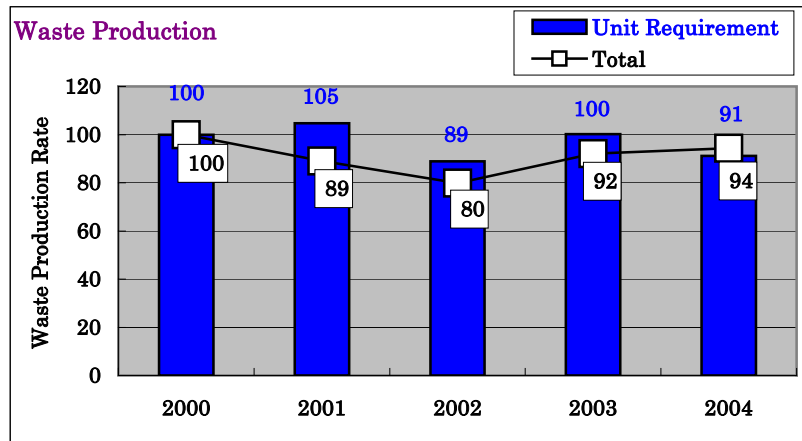


(2) Waste

The production of waste has been decreasing, but waste production increased from last year because waste production in the Shiga Zone outweighed the reduction in the Amagasaki Zone.

The growth of waste in the Shiga Zone was attributable to the waste materials disposed of on account of the change of plant layout.

Changes of waste production with the base year as 100 are shown in the diagram on the right. Although the total volume of waste increased slightly, the unit requirement value improved by 9%.



3.3.4 Environmental Risk Management (Control of Dangerous Materials)

Yanmar pursues complete pollution prevention and is tackling the reduction of the use of chemicals, in compliance with the laws and regulations of Japan and local governments, in order to prevent the environmental risks associated with our production activities.

● Compliance with Laws and Regulations and Pollution Prevention

Yanmar abides by the periodic reporting of measurements and keeping of records in compliance with the laws and regulations of Japan and local governments. We measure and check the water quality of waste water discharged into rivers and drains according to a voluntary standard more rigorous than the regulations demand on a weekly basis. Waste water that did not meet this voluntary standard was, regrettably, briefly discharged into a river from the Nagahama Plant in 2004. This did not come from a facility regulated by law, but we reported the situation to the municipal government and took measures to prevent its recurrence. For details, please refer to the site data under 3.7.

● Removal of Boilers from Nagahama Plant

With the closedown of the Nagahama Plant, we ended the use of heating boilers and presented the report on this to the administrative authorities. We plan to remove the boilers in 2005.

● Closure of Underground Tank

With the closedown of the Nagahama Plant, we ended the use of underground tanks and presented a report on this to the administrative authorities. We filled the tank with sand for safety.

● Treatment of Rainwater

Water used at the Biwa Plant is treated and discharged to the public sewers, while rainwater is discharged into the river. The rainwater discharge outlets to the river do have shut-off devices but, in view of the danger that oil may be discharged together with rainwater in cases of delay, we have provided oil/water separator tanks at the outlet terminals for use in an emergency. One tank was installed at the south outlet in 2003 and the other at the north outlet in 2004.

● Oil Spill Prevention in Water Discharge System

At the Tsukaguchi Plant, the oil/water separator tanks have been installed in the cooling water and rainwater discharge channels. Floating oil recovery equipment has been added to the tanks for further purification of the discharged water.



▲ Rainwater Discharge Outlet Oil/Water Separator Tank



▲ Water Discharge System Oil/Water Separator Tank

- **Control of Chemical Substances**

- **Elimination of Asbestos**

Our products do not use asbestos.

- **Elimination of Toxic Heavy Metal in Paint**

The Yanmar Group Global Environment Committee decided to eliminate toxic heavy metal from paint in 2002. Yanmar promotes the development of alternative paint for use with the corporate color, etc. in cooperation with the paint maker. The development of alternative paints was mostly completed mostly this year and we plan to eliminate toxic heavy metal from all paints in 2005.

- **Control and Elimination of Chemical Substances**

The Yanmar Group has begun studies to draw up a list of various chemical substances whose use by Yanmar is or will be banned in order to develop environmentally friendly products and reduce environmental risk. The goal is to prevent the use of these substances at our plants.

[Chemical Substances Whose Use is Banned]: Asbestos, CFC, triethanolamine, PCB

[Chemical Substances of Whose Use Must be Examined]: 6 groups

- **Supervision of PCBs**

Each plant controls and stores condensers etc. that contain PCBs with great strictness and reports their status each year to their respective prefectural governor. The PCB-related laws shall continue to be observed and the control and processing of PCBs enhanced. Equipment containing PCBs is stored at each site as follows:

No. of PCB equipment of Yanmar

Div.	Shiga Div.	Large Eng. Factory	Marine Factory	Technical Institute	Head Office	Total
PCB equipment	739	322	1	0	0	1062

No. of PCB equipment of Yanmar group companies are stored as follows:

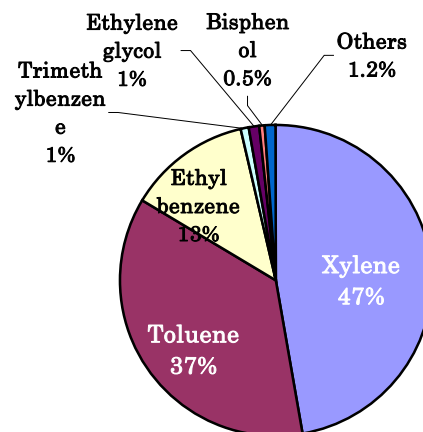
Div.	Seirei	Kanzaki	Matsue Diesel	Koga Foundry	Yanmar Energy System	New Delta	Yanmar Farm Machinery
PCB equipment	24	5	2	23	89	1	2

- **PRTR Substances**

The chemical substances used at plants are all checked for the consumption volume, discharged volume to outside environment, waste disposal and the volume transferred to products for control based on the law, (PRTR law).

The annual consumption of chemicals regulated under the PRTR Regulation is listed in Table 1. Details of the uses of chemicals exceeding the regulated level are reported to the agencies of the national or local governments in accordance with their regulations.

The PRTR chemical substances of Yanmar break down as shown in the diagram at the right. The organic solvent(toluene, xylene and ethyl benzene), comprising the major part is the solvent for paint. We will continue to curtail the use of these VOC chemicals.



▲ Use of PRTR substances

Table 1. Consumption of Chemicals by Yanmar, Covered by the PRTR Law (Results for fiscal 2004)

: Use reported to the agency highlighted

Unit: kg

No	Names of Chemicals / Site	Reg. No.	Biwa	Yamanoto	Nagahama	Kinonoto	Omori	Nagahara	Amagasaki	Tsuikaguchi	Total
1	Water soluble zinc compound	1	0	0	0	0	6	30	0	0	36
2	2-aminoethanol	16	357	206	19	0	154	126	0	0	861
3	Straight chain alkyl Benzenesulfonic acid & its salt	24	0	0	0	0	1	0	0	0	1
4	Bisphenol A Epoxy resins	30	1,136	3	0	0	0	0	0	0	1,139
5	Ethyl benzene	40	17,546	710	554	5,954	95	19	5,511	533	30,921
6	Ethylene glycol	43	0	4	415	2,073	0	0	0	0	2,492
7	Xylene	63	93,541	2,169	2,509	8,181	70	102	7,381	2,144	116,096
8	Chrome and trivalent chrome	68	0	0	0	0	0	0	0	51	51
9	Sexivalent chrome	69	0	0	0	6	0	0	10	14	30
10	Ethylene glycol Monoethylacetate	101	0	0	0	0	13	0	0	563	576
11	Organic tin compound	176	0	0	0	45	0	0	0	0	45
12	Trichloroethylene	211	4	0	0	0	0	0	0	0	4
13	1,3, 5-trimethylbenzene	224	718	14	55	479	9	33	1,090	155	2,553
14	Toluene	227	59,173	4,257	3,674	8,806	793	0	6,339	6,731	89,772
15	Lead and lead compounds	230	0	0	0	29	0	0	46	7	83
16	Hydrazine	253	0	0	0	0	0	26	0	0	26
17	Phthalic acid di-N-butyl	270	46	11	0	0	2	0	6	0	65
18	Phthalic acid di-2-ethylhexyl	272	1	0	0	0	0	0	63	0	64
19	Benzene	299	67	176	253	0	4	0	0	0	500
20	Polyoxyethylene=alkylphenylether	307	163	0	4	0	0	4	0	0	171
21	Polyoxyethylene=nonylphenylether	309	98	0	0	2	70	231	0	0	401
22	Molybdenum & its compounds	346	1	1	0	0	1	0	0	0	2
Total			172,850	7,549	7,483	25,580	1,217	566	20,447	10,197	245,889

The PRTR chemical substances handled by Yanmar group companies per year are shown in the table below.

Group Companies: Consumption of Chemicals Covered by the PRTR Law (Results for fiscal 2004)

: Use reported to the agency highlighted

Unit: kg

No	Names of Chemicals	Reg. No.	Seirei	Kanzaki	New Delta	Matsue Diesel	Koga Foundry	Yanmar Farm Machinery	Yanmar Energy System	Shipbuilding YMR	Construction YMR	Total
1	Zinc water soluble compounds	1	2,996	0	0	0	0	0	0	0	1,109	4,105
2	2-aminoethanol	16	9	0	0	0	0	0	0	0	0	9
3	Antimony	25	0	0	0	0	2,358	0	0	0	0	2,358
4	Bisphenol A Epoxy resins	30	2,093	0	0	0	0	0	0	0	0	2,093
5	Ethyl benzene	40	29,890	110	3,347	526	0	3,223	0	0	11,891	48,987
6	Ethylene glycol	43	5,700	0	0	0	0	87,901	128,794	0	0	222,395
7	Epsiloncaprolactam	61	0	0	0	0	0	0	0	0	115	115
8	Xylene	63	153,506	1,551	4,981	990	0	12,077	0	0	45,801	218,906
9	Chrome and trivalent chrome compounds	68	0	0	0	224,222	46,865	0	0	0	0	271,087
10	Hexachrome compounds	69	625	0	0	0	0	0	0	0	55	680
11	Chlorodifluoromethane (HCFC-22)	85	70	0	0	0	0	0	0	0	0	70
12	Ethylene glycol Monoethylacetate	101	4	0	0	0	0	0	0	0	0	4
13	Dichloromethane (ethylene dichloride)	145	0	0	0	0	0	83	0	0	0	83
14	Organic tin compounds	176	0	0	0	0	0	164	0	0	307	471
15	Styrene	177	0	0	0	0	0	0	0	173,176	0	173,176
16	1,3, 5-trimethylbenzene	224	1,293	0	0	51	0	1,335	0	0	1,552	4,231
17	Toluene	227	32,099	6,928	2,830	2,493	0	18,275	0	0	19,364	81,988
18	Lead and lead compounds	230	131	0	0	127	0	0	0	0	273	531
19	Nickel compounds	231	0	0	0	0	394	0	0	0	0	394
20	Nickel compounds (Nickel nitrate II hexahydrate)	232	8	0	0	0	0	0	0	0	118	126
21	Barium	243	0	0	0	0	3,488	0	0	0	0	3,488
22	Phenol	266	0	0	0	9,009	516	0	0	0	0	9,525
23	Phthalic acid ·N-butyl	270	0	0	0	0	0	0	0	0	9	9
24	2-(tert-butylphenoxy)cyclohexyl 2-propynyl sulfite;propargite;BPPS	279	0	0	0	0	0	381	0	0	0	381
25	Benzene	299	0	0	0	0	0	381	0	0	0	64
26	Polyoxyethylene=alkylphenylether	307	152	0	0	0	0	0	0	0	0	152
27	Polyoxyethylene=nonylphenylether	309	173	0	0	0	0	245	0	0	8	426
28	Formaldehyde	310	78	0	0	0	0	0	0	0	0	78
29	Manganese and manganese compounds	311	0	0	0	35,713	51,708	0	0	0	4,112	91,533
30	Molybdenum & its compounds	346	12	0	0	0	1,960	1	0	0	0	1,973
Total					228,838	8,589	11,159	273,131	107,288	123,685	128,794	173,176

3.4 Green Procurement and Purchasing

Yanmar, as a member company of the Green Purchasing Network inaugurated by the Japan Environment Foundation, promotes the use of designs that minimize the environmental load imposed by product parts, materials and products during production, use and disposal.

● Green Procurement

We establish guidelines on items for which special attention is required during the design and development stages and for use in procuring parts and materials. We check the chemicals contained in the materials and parts supplied by the suppliers on the basis of these guidelines.

We started the Green Procurement Survey of items purchased centrally by the head office in December 2003 and extended the survey to decentralized purchase items in July 2004. In March 2004, we held a Green Procurement Explanation Meeting and solicited the cooperation of the managers of suppliers and associated companies.

We will continue to tackle the elimination of harmful chemical substances on the basis of the green procurement results.



▲ Yanmar Green Procurement Guideline

● Purchasing of Environmental Commodities by Convenience Network

We endeavor to purchase office and stationery supplies that are friendly to the environment. The purchase of such ecological commodities in 2004 through the Yanmar Purchasing Network amounted to 52,003 items and 15.8 million yen. The figures for items covered by the Green Purchase Law were 33,242 items and 6.61 million yen, or 64% and 42%, respectively. The purchase of ecological commodities through the Convenience Network is being promoted by each group company.

The results for the group's purchases of ecological commodities in 2003 are corrected as follows for comparison with the results for 2004.

Purchase of Ecological Commodities of Yanmar

Year	ECO commodities	Money Amount	No. of items qualified under Green Purchasing Law	Monetary Amount (under Green Purchasing Law)	Proportion of Items under Green Purchasing Law	Proportion of Amount under Green Purchasing Law
2003	66,301 pcs.	¥23.93 mil.	32,520 pcs.	¥6.74 mil.	49%	28%
2004	52,003 pcs.	¥15.80 mil.	33,242 pcs.	¥6.61 mil.	64%	42%

Convenience Network Group Companies

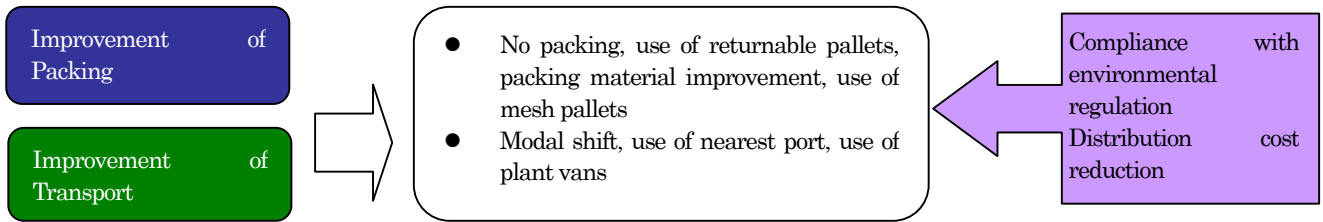
No.	Company Name	No.	Company Name
1	Yanmar Co., Ltd.	11	Yanmar Noki Shikoku Co., Ltd.
2	Yanmar Agricultural Equipment Co., Ltd.	12	Yanmar Noki Kyushu Co., Ltd.
3	Yanmar Marine System Co., Ltd.	13	Yanmar Farm Machinery Mfg. Co., Ltd.
4	Yanmar Energy System Co., Ltd.	14	Yanmar Distribution Service Co., Ltd.
5	Yanmar Construction Machinery Sales Co., Ltd.	15	Yanmar Engineering Co., Ltd.
6	Hokuto Yanmar Co., Ltd.	16	Yanmar Credit Service Co., Ltd.
7	Yanmar Noki Kanto, Co., Ltd.	17	Yanmar Business Service Co., Ltd.
8	Yanmar Noki Niigata Co., Ltd.	18	Yanmar Technical Service Co., Ltd.
9	Yanmar Noki Hokuriku Co., Ltd.	19	Yanmar Information System Service Co., Ltd.
10	Yanmar Noki Tokai Co., Ltd.	20	Yanmar Dream Agency Co., Ltd.
		21	Yanmar Helicopter Service Co., Ltd.

3.5 Environmental Preservation in Distribution

● Activities of Yanmar Distribution Service

● Transportation

The packing, covering and transportation are rationalized as follows:



[Packing Style for Products]

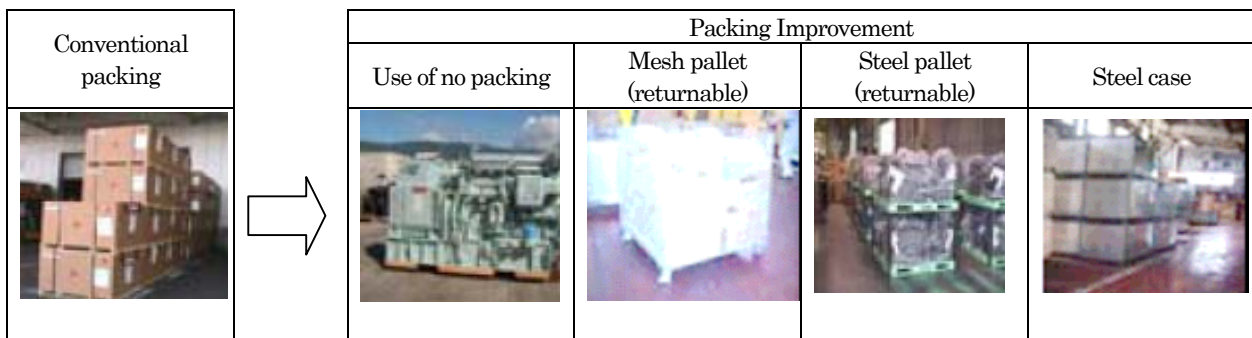
We tackled the improvement of packing from 1978, and promoted the non-use of packing and use of returnable pallets from 1995. The improvement of packing systems was completed in 2001 in general. The improved system has been in regular use since 2002. The wooden crating and corrugated cardboard were saved as follows with the use of returnable pallets and no packing.

[Reduction of Packing Material]

No.	Packing Material		Unit	2001	2002	2003	2004
1	Packing Material Reduction		Ton	1,727	2,624	2,383	3,216
2	Material	Wooden	Ton	1,000	1,605	1,559	2,278
3		Cardboard	Ton	727	1,019	824	938

[Packing for Products]

We regard the packing as a part of our product and continue the effort to minimize environmental load. We have stopped the use of throwaway wooden packing and corrugated cardboard packing. We have switched to the use of steel pallets that can be used repeatedly to save wood. We use small items, too, such as adhesive tape, buffer materials and other small packing items that impose a smaller environmental load in terms of their toxic characteristics and ease of recycling.



[Transportation of Products]

We have promoted the modal shift from truck transportation to the transportation by railway and sea to reduce environmental load in distribution. In transporting engines from the Biwa Plant to Seirei Fukuoka Plant, for example, we have switched from truck transportation to Japan Railways container transportation. These efforts save wood, curtail CO2 emissions, and reduce transportation costs.

In future, we plan to survey and grasp the overall distribution load related to our company's activities by allocating a manager responsible for energy-saving promotion to each business unit and transportation company to proceed with the improvement activities.



▲ Engine transportation by railway container



▲ Carrying container to railway station

● **Curtailement of Power Consumption of Warehouses**

We use the infrared light timer sensor for automatic turning on/off of lights to reduce the power consumption of our warehouses. This resulted in a large reduction of power consumption at our distribution center.

[Example of Chugoku Distribution Center]

The racks of the distribution center have two types. One is the laminated racks, where parts are carried out and brought in manually, and the other the heavy racks. They have about the same amount of space. The laminated racks are three layered and each layer uses about 710 fluorescent lamps (total of 2,130 lamps in 3 layers). The other locations use mercury lamps. The heavy racks use 97 mercury lamps and the packing and unpacking yard uses 32 lamps.

In October 2003, we improved the lighting system of one of the lamination rack layers with 437 fluorescent lamps at the Chugoku Distribution Center, as follows:

	Conventional	Improved
Lighting apparatus	40W fluorescent lamp →Old type; not very bright	32W fluorescent lamp →Lighter than conventional lamps
Switches	Concentrated SW box at each layer inlet →Turning off when unnecessary requested, but lamps always lit during service hours.	Infrared light timer sensor installed in the passage. →Automatic turning on by sensor; turned off automatically after a fixed time. Lamps lit only when necessary.

With the successful energy-saving results above, we extended the same improvements to the 2nd layer. Concerning the 3rd layer, we have concentrated the slow-moving parts there and turn on the lights when necessary. As a result, the power consumption of Chugoku Distribution Center in 2004, dropped to 84% of the previous year's figure and 73% compared to the year before that.

Since the energy-saving measures tried at the Chugoku Distribution Center turned out to be very effective, we applied the same measures to our distribution centers in the Tohoku, Kanto and Kyushu regions in March 2005. We can expect a large reduction in power consumption at each distribution center as a result in 2005.



▲ Installation of Infrared Light Timer Sensor

● **Introduction of Low Emission Cars**

We systematically replace company cars with hybrid, low emission cars upon renewal. The ratio of low emission cars to all company cars in this fiscal year was 31%. We will continue this systematic introduction of low emission cars.

Introduction of Low Emission Cars

	2002	2003	2004		2010 goal
Ratio of Low Emission Cars	12%	22%	31%		Below 70%

3.6 Other Activities

3.6.1 Activities of Administrative Divisions

Our head office, research institute, branches and other administrative divisions promote the following activities. This year, the divisions situated in the Umeda Center Building and Osaka Parts Center joined our Environmental Preservation Promotion Committee in environmental activities.

- (1) Use of recycled paper, copying on both sides of paper, classification of wastes for recovery and recycling.
- (2) Use of rear side of photocopying mistakes.
- (3) Optimum temperature setting for air conditioners, removal of neckties, turning off of lights, etc. during lunchtime.
- (4) Use of power-saving mode of PCs; power saving through screen saving during lunchtime.
- (5) Recycling of utensils, provision, etc. for reducing waste in general.

The Central Research Institute and Osaka Parts Center also promote the reduction of industrial waste.

The no necktie campaign was adopted in 2003. The power consumption of the head office building during the three summer months of that year was reduced by 10.6%, so we continued the same campaign this year, too. This time, the saving was only 5.8% compared with 2002, probably on account of the summer being much hotter than in 2003.

3.6.2 Environmental Exhibitions

The environmental products of Yanmar and group companies were displayed and presentations made at the 7th Lake Biwa International Environmental Business Messe (Fair) in Shiga Prefecture in October, 2004. Yanmar also participated in the Environmental Exhibition of the Agriculture, Forestry and Fishery Ministry held at the International Exhibition Site (Makuhari Messe) of the Japan Convention Center. We participated in the New Environment Exhibition in Tokyo together with our group companies, too.



Exhibits at the Int'l Environmental Business Fair, Lake Biwa
 Vertical Water Cooled Diesel Engine
 Biomass Power Generation System
 Commercial use garbage treatment equipment
 Household garbage treatment equipment
 Sludge Reduction Equipment
 Outside Tank Installation Diaphragm Unit
 Panel Exhibition (Oceanic equipment, Closed compost plant, Waste water treatment system)

▲ Lake Biwa Environmental Business Messe



Exhibits at the New Environment Exhibition

- Household Garbage Treatment Equipment (Bio & dry types)
- Commercial Use Garbage Treatment Equipment (Bio type)
- Environmental Facilities Panel Presentation (Hybrid wind power generation, manure compost plant)

▲ New Environment Exhibition, Tokyo



▲ Agriculture, Forestry and Fishery Ministry Environmental Exhibition

5th Agriculture, Forestry & Fishery Environmental Exhibition

- Biomass Power Generation System
- Commercial Use Dry Type Garbage Treatment Equipment
- Sludge Reduction Equipment
- Outside Tank Installation Diaphragm Unit
- Ascend/Descend Sludge Dissolved Oxygen Concentration Meter
- Aqua Product Sanitation Control (Panel)
- Sea Clam Lava Feeding (Panel)
- Overall Environmental Business (Panel)

3.6.3 Environmental Education

(1) Executive Seminar

A seminar on approaches to environmental management was held for Yanmar executives and the presidents of group companies prior to the launch of the Yanmar Group Environmental Committee. An instructor from outside the company was invited to talk on *Manufacturing with Thought for Mankind and the Earth – Thinking about Environmental Management*. The main points of the lecture were published in Yanmar’s internal magazine, *Echo*, to inform all members of company staff about the importance of paying attention to environment issues in the course of product development.



▲ Executive Seminar

(2) Environmental Education for New Recruits

New company recruits in 2004 received explanations of the company’s environmental methods from the Environmental Division in April and May and were instructed to pay full attention to environmental issues in their places of work.



▲ Education for New Recruits

(3) On-site Environmental Education

Education on general environmental issues, the methods and techniques of conservation and ISO14001 is given to all staff at each place of work once a year. Special education and training is also provided for members of staff who work with facilities and techniques that have a large environmental impact.

In addition, education etc. is provided for members of staff to earn environment-related qualifications from external educational institutions.

(4) Spreading Environmental Awareness through Internal Publications

The in-company magazine, *Echo*, carries environment-related articles in each issue, both informing members of staff about the latest environmental information and raising their awareness. This year’s articles were:

Spring: Vehicular regulations

Summer: Summary of the issues raised in the executive seminar on *Manufacturing with Thought for Mankind and the Earth*

Autumn: Look! The Yanmar Environmental Report

New Year: Looking Ahead to Promulgation of the Kyoto Protocol

(5) Environmental Education for Group Companies

A seminar for members of the Central Research Institute was held on the themes of environmental law and the laboratories’ legal obligations to support Yanmar Agricultural Equipment’s activities for ISO14001 certification.

A seminar on items that must be observed with respect to the environmental regulations of Europe and the United States was organised to raise the awareness of Yanmar Co., Ltd. staff in the case of exports.

Education at Yanmar and Group Companies

No.	Staff Category	General Education	Special Education
1	Staff in special fields	-	Work practices for boilers, liquid waste processing facilities, etc.
2	Internal environmental auditors	-	ISO audit methods 1. ISO environmental regulations and Yanmar standards 2. Legal stipulations 3. Processes for reaching environmental targets / Auditing techniques
3	General staff	Environmental targets and implementation by business division	-
4	New recruits	Introduction to environmental issues	-
5	Executives	Executive seminar	-

Numbers of Staff with Major Environmental Qualifications (Yanmar Co., Ltd.)

No.	Qualification	Site	Shiga Zone	Amagasaki	Tsukaguchi	Research Institute	Head Office	Total
1	Pollution Control Manager (Water Quality)		15	2	1	2	6	26
2	Pollution Control Manager (Air Quality)		13	4	2	1	5	25
3	Pollution Control Manager (Noise)		11	2	1	2	2	18
4	Pollution Control Manager (Vibrations)		4	1	2	2	1	10
5	Industrial Waste Control Manager		19	3	1	0	0	23
6	Energy Control Manager (Electricity)		4	1	0	0	0	5
7	Energy Control Manager (Heat)		3	1	2	0	1	7
8	High Pressure Gas Control Manager		6	1	1	1	1	10
9	Chief Electrician		14	2	2	6	3	27
10	Boiler Maintenance Man		24	4	2	2	3	35
11	ISO 14001 Auditor Assistant		2	1	0	0	1	4
12	Internal Environmental Auditor		38	18	8	0	2	66
13	Total		153	40	22	16	25	256



▲Audit by Internal Auditors

3.6.4 Environmental Accounting

The purpose of environmental accounting is to grasp and analyze the costs of environmental conservation in business activities and the resulting effects quantitatively as far as possible and provide feedback for business activities. The processes are disclosed to persons concerned both externally and internally in order to secure their understanding of the company's activities. The methods of compilation comply with the Environmental Accounting Guidelines of the Ministry of the Environment.

● Environmental Conservation Costs

The total cost in the 2004 fiscal year amounted ¥3,798 million, 91% of which was for R&D. Since the principal businesses of Yanmar are the manufacture and sale of engines and R&D to develop new engines with improved environmental performance, such as raised fuel economy and cleaner exhaust, almost all R&D costs of our company fall within the category of environmental conservation.

- **Effects of Environmental Conservation Activities**

We have been successful in reducing CO2 emissions per production unit volume.

- **Future Developments**

We started the disclosure of environmental accounting information last year. We will continue to disclose this information for use in environmental management tools and indices. We also plan to hold seminars on environmental accounting for group companies so that their accounts can be compiled.

environmental conservation costs

unit: ¥1 million

No.	Classification of environmental conservation costs	Main items	Investment	Cost amount
1	Cost of Controlling Environmental Load within Business Areas:		58.1	261.6
	(1) Public nuisance prevention cost	Air quality, water quality, wastes, vibrations and noise	39.3	200.7
	(2) Global environment conservation cost	Prevention of greenhouse effect, energy-saving, raising distribution efficiency	15.9	31.0
	(3) Resources recycling cost	Reduction of oil & grease, water and wastes	3.0	29.9
2	Cost of controlling environmental load up & down stream	Green procurement, removal of products from market, recycling, etc.	0	0
3	Environmental conservation cost in administrative activities	Environmental education, EMS, greenery promotion, information disclosure, environmental advertising, management personnel cost, etc.	0	68.0
4	Environmental conservation cost in R&D activities	Engine exh. gas improvement; R&D to improve environmental performance	190.0	3,465.9
5	Environmental conservation cost in social activities	Environmental volunteer, etc.	0	2.0
6	Costs of repairing environmental damage		0	0
Total			248.1	3,797.5

Quantitative Effects

No.	Outline of Effect	Environmental effect index	Reduction volume	2004
1	CO2 emissions per production volume	t-C/¥1 million	1.0	15.5
2	Oil/grease consumption per production volume	Kl/¥1 million	0.1	1.2
3	Water consumption per production volume	ton/¥1 million	33.8	397.6
4	Discharge of waste per production volume	ton/¥1 million	0.3	2.9

Economic Effects

No.	Outline of Effect	Economic items	2004
1	Income from recycling	Sales of wastes, etc.	87.3
2	Cost reduction through energy saving	Raising equipment efficiency, use of cogeneration system, production process restructuring	182.6
3	Cost reduction through resource-saving	Oil and grease, water recycling	6.8
4	Reduction of waste treatment cost	Improved yield, recycling, simple packing	2.9

Compilation Method

- (1) Period of compilation: Mar. 21, 2004~Mar.20, 2005
- (2) Range: Yanmar only, not consolidated.
- (3) Method complies with Environmental Accounting Guideline of Environment Ministry.
- (3) Cost amount includes personnel cost and depreciation cost
- (4) For complex items, the portion relating to environmental improvement is extracted or calculated proportionally.
- (6) The R&D for new engine development relate mostly to combustion and exhaust gas improvements. Accordingly, almost all such costs have been appropriated
- (7) For economic effect, only the measurable items are appropriated; no assumed effect is appropriated.

3.6.5 Social Activities

(1) Participation in Local Clean Up Activities

[Shiga Zone]

Yamamoto Plant carries out cleanup activities around the plant every month based on the ECO Foster System of the Environmental Promotion Committee. Weeding and pruning is conducted on local hillsides in summer.

At the Kinomoto Plant, we conduct weeding, pruning and cleaning along the road between Nos.1 and 2 factories twice a year.

At the Nagahara Plant, fallen leaves and soil are raked up so that they will not go into the river.

At the Nagahama Plant, we clean up the nearby river and side ditches.

We donate the costs of cleaning equipment and materials to the sponsoring organization of the annual Biwa Day activities on July 1.



▲Local Cleanup Campaign by the Nagahama Plant

[Amagasaki Zone]

Neighborhood and commuting road cleaning campaigns were implemented this year, too, in the Amagasaki Zone

At the Tsukaguchi Plant, we cleaned the side ditch at the south of the plant.



▲Local Cleanup Campaign at Amagasaki Plant

[Head Office Area]

In the head office area, we conduct cleaning of roads



▲Cleaning roads in head office area

around the head office twice a month. This campaign has continued for more than 10 years.

(2) Local Cleaning Activities by Group Companies

The Yanmar Group Global Environmental Committee regards these cleaning campaigns as environmental conservation measures and encourages group companies to implement such cleaning. Presently, 12 cleaning campaigns are being conducted on a periodic basis. Some examples include:

[Kanzaki Kokyukoki Mfg. Co.]

The staff of the general affairs division conduct cleaning of the commuting road from the railway station to the plant once a month. This campaign was initiated in September 2004.



▲Cleaning Commuting Road at Kanzaki

[New Delta Industry Co.]

All employees of the plant participate in the cleaning of side ditches inside the plant and water channels outside the plant once a year. This campaign started in 2003.

[Koga Precision Foundry Co.]

All employees of the plant participate in the cleaning inside the plant once a month. In addition to this, the security personnel and volunteers together clean the neighbouring roads every season. The plant plans to implement cleaning of the neighbouring roads on a periodic basis in 2005.

(3) Beautifying Plant Sites

Flower beds are arranged around the plant at Nagahara, located at the north of Lake Biwa. People can enjoy flowers in every season through this voluntary activity.



▲Beautifying Plant, Nagahara; volunteers

This campaign was initiated over a decade ago by the shop unit of the plant as a part of the plant cleaning campaign.

This campaign to plant flowers of each season was implemented this year, too, on a voluntary basis.

(4) Prize Essay Contest for Students

Yanmar Agricultural Equipment Co., Ltd. launched a prize contest on the theme, *Proposal to Agriculture by Students*, in 1990. We held the 15th essay contest this year.

The contest started at a time of deep pessimism in Japanese farming households, the agricultural machinery industry, and political and economic circles and throughout Japan. Too many people were stressing only the depressing aspects of the Japanese agriculture, believing that its days were numbered. We noted, however, the existence of a new generation and vigorous farming households with new approaches to the challenges of agriculture in Japan. We knew, too, about the global population problem, worsening global environment and concern about food shortages.

We thought it necessary, at this turning point for Japanese agriculture, to make proposals that were full of optimism and bright dreams for the future, and we wanted those proposals to come from the young people who would be the leaders of the future. Through the 15th contest, we have received:

1,672 theses from 2,057 persons

2,186 essays from 2,186 persons

Prize-winning theses and essays have been compiled as a booklet and 10,000 copies distributed to the relevant organs. Some of these are also posted on the Yanmar home page. This program is backed up by the following organizations:

Ministry of Agriculture, Forestry and Fisheries

City and Rural Village Exchange Promotion Foundation

Japan Farming Village Youth Education Association



▲Prize Ceremony

(5) Scholarship

Yamaoka Scholarship Foundation was established by Magokichi Yamaoka, the founder of Yanmar with his

private fortune in 1950 when Japan stepped out into reconstruction of the country from the ashes of defeat.

Magokichi Yamaoka, born in a poor farmhousehold in Shiga Prefecture, overcame many hardships to found Yamaoka Engine Manufacturing Co., Ltd. (the present Yanmar Co., Ltd.) and build it into a global engine maker.

“Beautiful World With Sincere Thankfulness”

This was the motto of Magokichi Yamaoka, who regarded his success as an entrepreneur to be a result of the cooperation and assistance he received from many friends and acquaintances. From this same sense of gratitude and the spirit of social service, Magokichi Yamaoka established a foundation with the objective of fostering people who could contribute to global peace and prosperity and the advancement of culture.

The spirit of Magokichi Yamaoka was inherited by the foundation's present director, Tadao Yamaoka, and the foundation continues to replenish the treasury for the expansion of its scholarship operations. Presently, the foundation gives scholarship to graduate school students engaged in natural science research and foreign students studying in Japan. The foundation disburses a combined total of about 100 million yen in scholarships to these students, thereby helping to foster future leaders for Japan and the world.

About 5,000 people have already received these scholarships and moved on to perform core roles in many fields. Their contributions to society are intangible assets of the Yamaoka Scholarship Foundation.

(6) Children's Picture Exhibition

Yanmar Agricultural Equipment Co., Ltd. backs up the *Countryside Paddies and Streams* Children's Picture Exhibition organized by the Japan Land Improvement Organization Federation.

This exhibition aims to make children more aware of the beautiful scenery and charms of farming areas by having them to depict the paddies, terracing, irrigation ponds and farmwork. We also aim to feed back the results to grownups, as messages from the children.



▲Picture Exhibition



▲2004 Yanmar Prize Pictures

entries from children throughout the country. The award ceremony and exhibition of prize winners were held at the Yaesu Underground Mall near Tokyo Station. We sponsored the Yanmar Prize in the wish that some of the children would take up the challenges of environmentally friendly agriculture in the future.

3.6.6 Affiliated Environmental Organizations

We participate in the following environmental organizations for the promotion of environmental conservation activities:

- Environmental Committee, Japan Machinery Federation
- Internal Combustion Engine PRTR Committee, Japanese Marine Equipment Association
- Small Boat Exhaust Gas Committee, Japan Small Boat Inspection Organization.
- Kansai Environmental Committee, Japan Machinery Center for Trade and Investment.
- Environmental Committee, Osaka Chamber of Commerce
- Japan Forum, LCA, Japan Environment Management Association for Industry
- Japan Audit and Certification Organization for Environment and Quality
- Eco Brain Selection, Dai-ichi Hoki Co.
- Green Procurement Network

3.6.7 Environment Conservation Activities of Group Companies

The Yanmar group, including subsidiary companies, works in a unified manner to promote environmental conservation activities.

The environmental conservation activities of each group company are administered by a Product Sub-committee, the Group Environmental Coordination Committee, and the Yanmar Group Global Environmental Committee. Some examples of successful environmental conservation activities by group companies in 2004 are shown below:

(1) Matsue Diesel Co., Ltd. (Recycling & energy-saving)

● Recycling of Slag

The company tackled the recycling of slag and succeeded in recycling 10%, or 313 tons, of 3,132 tons of slag this year.

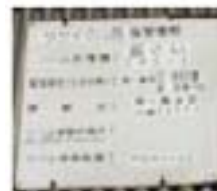
Conventionally, slag produced in casting has been disposed of as industrial waste, but the company further classified the slag as follows:

- Silicone-based waste
- Iron-based dust

- Other slag

The company succeeded in recycling the silicone-based waste as roadbed material.

Recycling of the iron-based dust was temporarily suspended due to the situation of the recycling contractor, but it was established that this dust could be recycled. It has been decided that the dust shall be recycled in a specialized recycling facility. In 2005, the plant expects to recycle 30% of all slag.



▲Signboard made from recycled material



▲Silicone Dust Yard



▲Iron Dust Yard

The foundry factory uses a large amount of fuel, so the company is eager to reduce fuel oil use. It has succeeded in curtailing the use of heavy oil by 5.4% from the base year, 2001. This was partly due to improved production efficiency as a result of line layout changes.

(2) Kanzaki Kogyokoki Mfg. Co. (Energy-saving & Recycling)

● Energy-saving

As a result of focused energy-saving operations, the company has achieved 6% energy-saving by unit requirement in comparison to 2000, the base year. Some examples of their energy-saving activities are as follows:

① Introduction of Energy-saving Equipment at New Factory

The GHP air conditioning system was introduced in the new factory. It is estimated that the GHP system has reduced power consumption by 800,000kWh, the energy saving has reached 246,000 kWh and CO2 emissions have been curtailed by 94 tons.



▲GHP Outdoor Unit

② Concurrent Operation of Grinding Machine and Dirt Collector

The dirt collector is only started when the grindstone moves into operation and stops ten minutes after it stops. Power consumption is reduced by 186,000 kWh.

● Reduction of Waste Production

The reduction of waste production has been promoted and waste production has fallen to 372 tons from 389 tons in the base year, 2000, or by 18% in terms of unit requirement. The fine examples of waste reduction include the following:

The completed products were conventionally transported to the shipping yard, in wrapping film to prevent the cargo piles from collapsing. The film was discarded afterwards. The wrapping film was replaced by a belt with a metal fixture that could be used repeatedly. This has reduced waste by one ton.



▲Conventional Wrapping ▲New Method

(3) Okayama Plant, Seirei Industry Co., Ltd. (Energy-saving by Introduction of Cogeneration System)

The Seirei Okayama Plant produces combines and rice transplanter.s. We introduced the gas engine cogeneration system to this plant and regular operation with it commenced in June 2004.

This system consists of a gas engine power generation unit operated on natural gas and an exhaust gas boiler. The generating power is 400kW x 3 units (a total of 1200kW), which manages about 34% of annual power consumption of the plant. The heat from the exhaust gas boiler is collected (in hot water or steam) for use in the plant's painting line. We also changed the fuel of the burner and boiler from LPG to natural gas (supplied by pipeline.) These



▲Gas Cogeneration Facility

improvement in energy saving of 7.6% in crude oil conversion and a 17% reduction of CO2 emissions.

The utmost care is accorded to harmony with the surrounding environment and minimizing the environmental load.

(4) Yanmar Shipbuilding and Engineering Co., Ltd. (Environmental and Safety Education)

Yanmar Shipbuilding builds FRP boats and uses a large quantity of organic chemicals in boatbuilding.

Styrene monomer accounts for 30-45% of the unsaturated polyester resin and gel coating that are the main materials of FRP. The handling of this organic solvent is regulated. We use masks during work and operate ventilators to discharge air from indoors. We constantly monitor the working environment and inspect the health of employees twice a year. We also carry out safety education sessions twice a year.

We use materials with low styrene content in order to minimize the discharge volume of this organic solvent.

(5) Yanmar Agricultural Equipment Co., Ltd. (Simultaneous ISO9001 and 14001 QC Management System Certification)

Affiliated companies of Yanmar Agricultural Equipment Co., Ltd. had already obtained ISO9001 and 14001 certification. The head office's function is to serve as the hub for development, production, sales and servicing. The company made strenuous activities in QC and environmental management for more than a year and obtained both the QC and environment management certifications at the same time.

The company is determined to improve the quality control and environment management systems further based on the 8 principles on the requirements are based:

- (1) Customer-oriented stance
- (2) Leadership
- (3) All-hands participation
- (4) Process approach, (headwater control)
- (5) Systematic approach to management
- (6) Continuous improvement, (PDCA cycle)
- (7) Decision making based on the facts
- (8) Co-existence with suppliers.



▲ISO certificate conferment ceremony

3. 7 Site Date

The major products, business outline and environmental activities (energy-saving, recycling and reduction of waste) by major plant of Yanmar are shown below.

Outline of Business and Environmental Preservation Activities by Site

No.	Business Unit	Biwa Plant	Yamamoto Plant	Nagahama Plant	Kinomoto Plant
1	Location	Kawamichi 1009-2, Biwa-cho, Higashi Azai-gun, Shiga Pref.	Yamamoto 3198, Kohoku-cho, Higashi Azai-gun, Shiga Pref.	Sanwa-cho 7-35, Nagahama, Shiga Pref.	Kuroda 650, Kinomoto-cho, Ika-gun, Shiga Pref.
2	Tel.	0749-72-5151	0749-79-0305	0749-65-3008	0749-82-332
3	Products	Vertical WC diesel engines, Gas engines	Air-cooled gasoline engines, Horizontal WC & Vertical air-cooled diesel engines; Casting of aluminum alloy parts	Diesel outboard engines, Saildrive units, Metal molds	Tractors, Golf carts and related equipment.
4	Business Outline	Integrated production (development, machining, assembly, test operation, painting, and shipping) of vertical WC diesel engines for use with farm machinery, construction equipment and industrial equipment in general; assembly of gas engines for air conditioning	Casting and machining of aluminum alloy parts for engine weight reduction. Integrated production (assembly, test operation, painting and shipping) of air-cooled gasoline engines, horizontal WC engines and Vertical air-cooled engines.	Design and development of engines for agriculture, construction machinery, industrial machinery and marine uses; Design and manufacturing of jig and tools for engine parts; Distribution center of the products from 6 plants in Shiga Zone.	Tractor and golf carts (production, test operation and shipping) ; crankshaft and cyl. head machining, tractor parts machining, press, welding, resin shaping and coating.
5	Environment Preservation Activities	<p>1. Energy conservation</p> <p>(1) Compressor load reduction (air leakage prevention)</p> <p>(2) Efficient FO use</p> <p>(3) Efficient use of cogeneration</p> <p>(4) Reduction of standby electricity.</p> <p>2. Resource Saving</p> <p>(1) Efficient use of oil and grease.</p> <p>(2) Prevention of water supply leakage</p> <p>3. Waste reduction (paint, plastics, wooden chips, etc.)</p> <p>4. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Efficient use of compressor</p> <p>(2) Raising melting furnace combustion efficiency</p> <p>2. Efficient use of oil & grease (cutting oil, hydraulic oil)</p> <p>3. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Efficient use of compressor</p> <p>(2) Truck FO reduction by raising loading efficiency</p> <p>2. Leakage prevention of water supply</p> <p>3. Product assessment</p> <p>4. LCA implementation</p> <p>5. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Compressor load reduction</p> <p>(2) Kerosene consumption reduced by FO-saving operation of heaters</p> <p>2. Resource saving</p> <p>(1) Efficient use of oil & grease (cleaning fluid, cutting oil, paint, thinner)</p> <p>(2) Prevention of water supply leakage, (check of piping packing)</p> <p>3. Recycling of grinder slag</p> <p>4. Legal compliance</p>

No.	Business Unit	Omori Plant	Nagahara Plant	Amagasaki Plant	Tsukaguchi Plant
1	Location	Shigenori 354, Takatsuki-cho, Ika-gun, Shiga Pref.	Sho 18, Nishi-azai-cho, Ika-gun, Shiga Pref.	Higashi-dori 1-1-1, Nagasu, Amagasaki	Honcho 5-3-1, Tsukaguchi, Amagasaki
2	Tel.	0749-85-3000	0749-89-1151	06-6489-8005	06-6428-3122
3	Products	FO injection pump	FO injection pump	Large diesel engines, gas engines, gas turbines	Medium diesel engines
4	Business Outline	Integrated production (machining, assembly, test operation, shipping) of FO injection pump, which represents the core of diesel engines.	Integrated production (machining, assembly, test operation, shipping) of FO injection pump, which represents the core of diesel engines.	Integrated production (machining to test operation) of marine main and aux. engines, large industrial diesel and gas engines and gas turbines.	Integrated production (machining to test operation) of marine main & aux. engines, industrial & gas engines and compressor
5	Environment Preservation Activities	<p>1. Energy conservation</p> <p>(1) Compressor load reduction</p> <p>(2) HFO consumption reduced by changing fuel oil supply nozzle of heater.</p> <p>(3) LPG consumption reduced by timer setting</p> <p>2. Oil leakage prevention</p> <p>3. Wooden pallet abolished.</p> <p>4. Recycling of cleaning oil</p> <p>5. Legal compliance</p>	<p>1. Energy conservation</p> <p>(1) Reduction of compressor load</p> <p>(2) Reduced consumption of boiler fuel oil</p> <p>(3) Reduced LPG consumption for nitriding furnace</p> <p>2. Resource Saving</p> <p>(1) Recycling of cleaning oil</p> <p>(2) Extending service life of cleaning fluid and water soluble coolant</p> <p>3. Legal compliance</p>	<p>1. Harmony with Community: use of mesh fence</p> <p>2. Energy Conservation: Use of cogeneration system and energy-saving equipment; use of city gas fuel for air conditioners</p> <p>3. Prevention of air pollution: HFO and kerosene changed to city gas for heater fuel.</p> <p>4. Water used for test operation load equipment recycled.</p> <p>5. Reduction of Waste: Old papers, fluorescent lamps and mercury lamps recycled; use of longer service life pallets.</p>	<p>1. Harmony with Community: Use of mesh fence; greenery expanded.</p> <p>2. Air Pollution Prevention: Fuel of heaters changed to HFO to city gas</p> <p>3. Prevention of Noise: reducing black smoke and noise during test operation</p> <p>4. Energy Conservation: Reduced consumption of test operation fuel; use of energy-saving equipment</p> <p>5. Prevention of Water Pollution: Water quality control of test operation water tank; prevention of oil& grease effusion</p> <p>6. Reduction of Ind. Waste: Simple packing and recycling of packing material.</p>

Remarks :

AAA) The TN content in water discharged to sewage although complied with the regulatory standard, exceeded the voluntary control standard.

Measure: Do meter diaphragm be cleaned and replaced on a periodic basis.

BBB) (1) Quality of Water Discharged to River:

BOD and COD contents exceeded the standard. The cause was the entry of anti-freeze into the engine cooling water tank. Although the discharge of water was intermittent and the discharge amount was small, we reported the discharge to the administrative authority. Figure in parenthesis () shows the max. value when we excluded the abnormal values.

Measure: Alarm system provided to warn the leakage of anti-freeze and stop the operation.

SS value, although complied with the regulatory standard, exceeded the voluntary standard. We confirmed with the administration that BOD and SS values, during and soon after the rainfall should be within the standard values and those in fine weather be below 5ppm (voluntary standard: below 4ppm).

(2) Quality of Water Discharged to Sewage

TN value, although complied with the regulatory standard, exceeded the voluntary standard.

Measure: The high density waste water is once flown to a separate tank for adjusting the treatment volume and mitigating the load of the treatment facility.

CCC) COD value in water discharged to river, although complying with the regulatory standard, exceeded the voluntary standard.

Measure: Appears to be the extemporary case and the cause could not be identified. We implemented follow-up watch for 3 months and checked that there appeared no abnormality. As a measure, we plant to increase the cleaning times of the purification tank.

DDD) (1) The quality value of water discharged to river, although complied with the regulatory standard, exceeded the voluntary standard.

Measure: Concerning the oil content in discharged water, we renewed the oil collecting equipment and the effectiveness is now being verified in 2005.

(2) The temperature rise of water discharged to sewage in summer exceeded the voluntary standard.

Measure: Cooling tower was renewed. Filler material of existing cooling tower was cleaned.

IV. History of Yanmar Group Environmental Activities

Year	Yanmar Group Activities	Movement of Japan and World
1993		11. The Basic Environment Law established.
1994	06. Environmental Division established.	07. Waste Disposal Law revised. 12. Environment Basic Plan guidelines
	09. Yanmar Global Environment Committee established	
	12. First Global Environment Committee held.	
1995	02. Yanmar Global Environmental Charter established and distributed.	04. Foul Smell Control Law revised. 06. Containers and Packing Recycling Law established.
	03. Environmental voluntary plan submitted to MITI.	
	12. Environmental Preservation Basic Rule and organization implementation rules established.	
1996	06. Standard for selecting and displaying resin parts established.	05. Air Pollution Control Law revised. 06. ISO 14001 Standard issued. 06. Water Pollution Control Law revised. 10. JIS 14001 established.
	09. Environmental Preservation Activities Mid-Term Plan (1999~2003) formulated.	
	10. Survey on environment load of administrative divisions	
1997	06. Large Power Products Operations Div. certified under ISO14001.	04. New Energy Use Special Measures Law (RPS Law) established. 06. Environmental Impact Assessment Law established. 12. Kyoto Protocol
1998	03. Six plants of Small Power Products Operations Div. certified under ISO14001 together.	06. Energy Saving Law revised. 06. Electric Appliance Recycling Law established. 10. Global Warming Prevention Law established.
	11. Participated in the 1 st Lake Biwa Environmental Business Messe.	
	12. Three plants of Seirei Industry Co. Ltd. certified under ISO14001 together.	
1999	03. Three plants of Kanzaki Kokyukoki Mfg. Co. Ltd. certified under ISO14001 together.	07. Dioxin Special Measures Law established. 07. Toxic Substance Control Law, (PRTR), established.
	11. Recycling goal established for major products	
	12. Showa Precision Machinery Co., Ltd. certified under ISO14001.	
2000	06. Voluntary Action Plan submitted to Kansai Economic Federation.	05. Green Procurement Law established. 05. Construction Recycling Law established. 06. Recycling Society Formation Basic Law established. 06. Food Recycling Law established. 06. Resources Recycling Law revised.
	06. Annual Environmental Report disclosed in internet home page, (2001 edition).	
	09. Environmental accounting approach introduced.	
	12. The 2 nd Stage Environmental Preservation Mid-Term Plan formulated, (2001~2005)	
	12. Standardization and unification of environmental data of all group companies.	
2001	12. Environmental Performance Assessment Standard for Products formulated, (recycling, etc.)	
	01. Rationalization of packing & wrapping fully in progress	01 Environment Ministry inaugurated.
	08. Yanmar Group arranged measures to comply with PCB Special Measures Law.	06. Automobile Nox / PM Regulation revised. 06. PCB Special Measures Law established.
	09. Complied with Electric Appliance Recycling Law by using GHP system.	06. Freon Recovery & Destruction Law
	11. The 1 st Group Environmental Coordination Meeting held.	

2002	03. Purchasing Division started green procurement.	05. Soil Pollution Control Law established. 05. Automobile Nox / PM Regulation revised. 05. Law on Waste Disposal & Cleaning revised. 07. The Basic Environment Law revised. 07. Global Warming Prevention Law established. 07. Disused Automobile Recycling Law established. 12. Oil Alternative Energy Law established. 12. New Energy Use Special Measures Law (RPS Law) revised. 12. Nature Revitalization Promotion Law established.
	03. All production sites abolished the use of organic chlorine-based compounds	
	04. The 1 st Group Global Environmental Committee held.	
	06. Yanmar Group arranged measures to comply with PRTR law.	
	12. Yanmar Global Environment Charter revised. 12. Environmental Report 2002 Edition disclosed on HP.	
2003	04. Green Procurement Guideline established.	05.. Law on Waste Disposal & Cleaning revised 05. Chemical Assessment Law revised. 06. Fire Defense Law revised. 07. Environmental Education Law established.
	05. The 2 nd Group Global Environmental Committee held.	
	07. YADIN certified under ISO14001.	
	08. Matsue Diesel certified under ISO14001.	
	12. Environmental Report, 2003 edition disclosed on HP	
2004	05. New Delta Industry Co., Ltd. certified under ISO 14001.	05. POPs Treaty effected. 05. Law on Waste Disposal & Cleaning revised 05. Air Pollution Control Law revised. 05. Environment-conscious Promotion Law established. 11. ISO14001 Standard revised.
	06. The 3 rd Group Global Environmental Committee held	
	07. The 1 st Product Sub-committee held.	
	07. Yanmar Energy System Mfg. Co., Ltd. certified under ISO14001.	
	09. Yanmar Global Environmental Committee integrated to Yanmar Group Global Environmental Committee.	
	09. Environmental Report, 2004 edition disclosed on HP.	
	Participated in the 7 th Lake Biwa Environmental Business Messe	
	10. Yanmar Agricultural Equipment Co., Ltd. certified under ISO9001 and ISO 14001 concurrently.	
2005	01. Yanmar Group Management Philosophy represented in Missions	02. Kyoto Protocol brought into effect.
	02. The 2 nd Product Sub-committee held	
	05. Environmental Vision 2012 formulated.	

V. Explanation of Terms

Emissions	Properties of exhaust gas in engines; wastes discharged from plants.
Environment Management	Efficient corporate activities with important positioning of environment preservation activities.
Green procurement	Preferential purchasing of materials, parts, products, etc. with small environmental load from the supplier so as not to impose environmental load.
Cogeneration system	High efficiency energy supply system using both power generated and waste heat recovered; Instrumental in reducing CO ₂ emissions.
Dioxin	Harmful chemicals combinations of hydrocarbon and chlorine produced by garbage incineration, etc.
CFC's substitute	CFC with no ozone depletion potential developed for substitution with specific CFC that can cause ozone layer depletion.
Heat balance	Heat flow distribution; heat emitted from the engine is efficiently radiated from the driven machinery body so that heat will not be trapped inside.
Wheel base	The length of front and rear axles. The longer the axle, the more riding comfort is improved.
ARB	Air Resources Board of California, U.S.A. Controls exhaust gas from engines, etc.
BOD	The amount of oxygen required for decomposition of organics contained in water. The higher the value, the worse the contamination.
COD	The amount of oxygen required by the chemicals for decomposition of organics contained in water. The higher the value, the worse the contamination.
dB	Logarithmic unit to measure noise and vibrations; decibel
dB(A)	Noise compensated by human auditory sense; Low and high frequency noise measured to be small.
EC	European Commission
ECE	Economic Commission for Europe.
EPA	Environmental Protection Agency, U.S.A.
HST	Hydrostatic drive system; variable speed changes by the power from the hydraulic pump and motor.
HMT	The drive system that combine HST with gear transmission in parallel for variable speed change and high transmission efficiency
ISO 14001	The international standard set by International Standardization Organization. The environmental preservation management system requirements for a corporation. Revised in November 2004.
IT	Information Technology
NO _x	Nitrogen oxide produced by combustion; causes acid rain, smog, etc.
PCB	Polychloride biphenyl. An organic chloride compound. Used in insulator oil, heat transfer, additives. Production now banned.
PH	Hydrogen-ion concentration contained in solution; represents the acidity and alkalinity.
PRTR system	The system whereby the chemical amount discharged to the environment or waste transferred is reported to the administrative organization for public disclosure.
PM	Fine particles that can cause air pollution.
SO _x	Sulfur oxide produced by combustion of sulfur content in fossil fuels. Can cause acid rain.
SS	Suspended matter in water. Shows the extent of water turbidity.
TN	Total nitrogen amount in water
TP	Total phosphate amount in water

VI More Information

Yanmar wants to inform society at large about the effects of its business operations on the environment and environmental protection activities, in order to that these may be developed arm in arm with the whole community.

Two-way communication is essential. This environmental report is Yanmar's fourth publication of this kind but we may not have included everything you wanted to see. Please let us know your opinions, impressions and questions so that we can improve future editions. We look forward to receiving your comments at the address shown below.

[Inquiries about this Environmental Report](#)

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[Yanmar Home Page and other Inquiries](#)

The latest business activities of Yanmar and Yanmar group companies are described in a simple and attractive format. The Environment page introduces various other environmental activities not covered in this report.

To send inquiries via the net, please visit the site shown below.

Yanmar Home Page
<http://www.yanmar.co.jp>

Yanmar welcomes all inquiries on both environmental and other subjects via the inquiry corner on the home page. Please feel free to contact us at any time.