Chapter II

Environment

Climate change and the depletion of energy resources are problems that society must face and solve together. As part of its contribution, Honda seeks to offer products with the lowest CO_2 emissions possible by means of corporate activities with the lowest CO_2 emissions possible.

1951

First four-stroke engine motorcycle introduced

Honda released the Dream E after thorough testing on the steep inclines of Hakone Pass.

1966

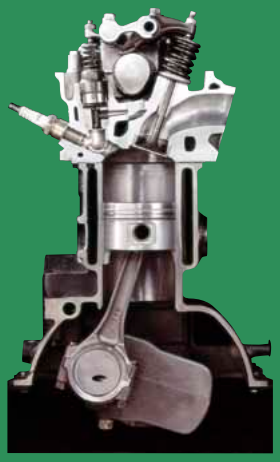
Air Pollution Laboratory established

Honda created this organization to reduce pollution even before the Basic Law for Environmental Pollution Control and the Air Pollution Control Law took effect in Japan.

1972

CVCC engine introduced

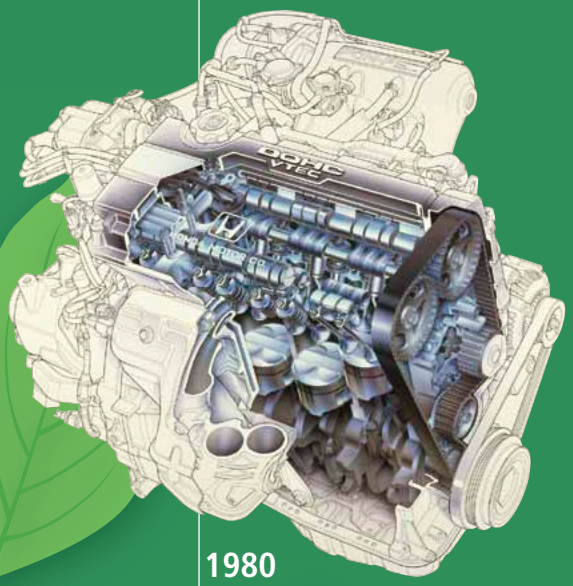
With the world's automakers believing it impossible to comply with the United States' Clean Air Act Extension of 1970, Honda took the lead by achieving this objective with the CVCC engine.



1988

VTEC engine introduced

Featured in many advanced Honda engines, next-generation VTEC technology combines power with superior fuel economy.



1950 1960 1970 1980

Developing and popularizing advanced environmental technologies for a mobility society in harmony with the environment

Honda was helping combat pollution when the problem gained greater recognition in the 1960s. In the middle of the 1980s, when the global scope of environmental problems began to be recognized, Honda was working proactively to develop environmental technologies. Today, Honda strives to reduce the environmental footprint of every product throughout its life cycle: planning, development, production and disposal.

Enhancing automobile fuel economy is one of Honda's most important environmental goals, since this directly reduces CO_2 emissions, a key cause of global warming. Going beyond the corporate average fuel economy (CAFE) standards introduced in Europe and the United States, since 2006 Honda has implemented strict, voluntary standards for each vehicle category worldwide. In addition, Honda has established and is working to attain global voluntary reduction targets in per-product CO_2 emitted during manufacturing.

Honda implements high-efficiency engines and advanced fuel control to make fuel combustion more complete and three-way catalytic converters to reduce exhaust emission impurities. The result is a reduction in non-methane hydrocarbons, nitrogen oxide and carbon monoxide, and cleaner emissions overall.

Honda continuously develops and enhances its original environmental technologies, such as its catalytic converter that uses the heat of exhaust gas and increased exhaust-contacting surface area for enhanced purification. Taking the lead in developing and implementing gasoline engines with reduced emissions, Honda continues to set the benchmark for environmental technologies worldwide.

Launching and popularizing hybrid vehicles and researching and developing fuel cell technologies, Honda is contributing to CO_2 emission reductions and helping to solve the problem of dwindling fossil fuel resources. Honda will continue to respond to the needs of the times with advanced technologies, creating products with a reduced environmental footprint and contributing to the growth of mobility society in harmony with the environment.

1990

1992

The Honda Environment Statement introduced

1997

EV Plus battery electric vehicle announced

Honda announced the development of a battery electric vehicle—technology that has the potential to help combat climate change and the depletion of energy resources.

1998

Home-use cogeneration system developed

Supplying hot water and generating electricity with 80% energy utilization, Honda's unit was the first in the world small enough for home use.

ISO 14001 certification attained throughout Japan

Having attained certification for all factories in Japan, Honda continues to work on attaining certification at production facilities around the world.

2000

2004

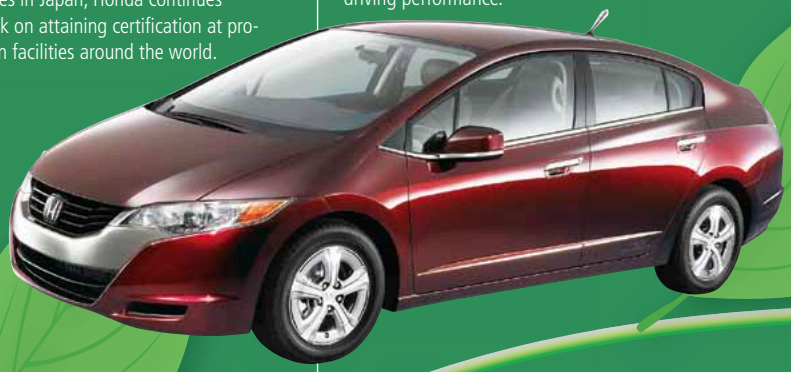
World's first 50cc motorcycle with PGM-FI introduced

Honda introduced Programmed Fuel Injection on a scooter, enhancing both performance and fuel economy.

2007

All-new FCX Clarity fuel cell vehicle announced

Thanks to a newly developed fuel cell stack, the FCX Clarity represented dramatic advances in both environmental and driving performance.



Hybrids for Everyone

Feature

Bringing hybrid vehicles within reach

Since environmentally responsible products have a beneficial effect only when many people can purchase and use them, Honda created the all-new Insight hybrid vehicle to make hybrid technology as accessible as possible.

Creating a hybrid vehicle for a new era of transportation

In recent years, fuel cell vehicles and battery electric vehicles have gained prominence as next-generation automobiles with the potential to reduce environmental impact, and Honda continues to develop its own CO_2 emissions-free fuel cell vehicles. To popularize these next-generation vehicles, however, it will be necessary both to develop adequate infrastructure to supply the hydrogen and electricity they require and to overcome several remaining constraints on their performance. Since these steps will take time, Honda is currently placing special emphasis on popularizing gasoline-electric hybrid vehicles, which use existing gasoline station infrastructure.

Honda began researching gasoline-electric hybrid technology in the early 1990s and, in November 1999, announced the original Insight hybrid vehicle, which offered fuel economy of 35 km/L in Japan's 10·15 mode. The original Insight's two-seat packaging, however, limited its appeal in the market. Honda continued to refine the Insight's hybrid system, implementing it on the Civic Hybrid in 2001 and on the Accord Hybrid in 2004 (North American market only).

Several years before launching the all-new Insight, Honda had conceived of an affordable hybrid vehicle that would be purchased and used by a larger number of people, thereby providing a proportionately larger environmental benefit. The name Insight itself denotes "insight" into a new era in which hybrid vehicles come within reach of most car buyers.

Although the all-new Insight does not attain the government-recognized fuel economy of its forerunner, it nevertheless boasts industry-leading real-world fuel economy. Priced below ¥2,000,000 in Japan, it also offers the affordability that was a key objective for Honda.

To share the advantages of hybrid technology with even more people, Honda plans to launch the CR-Z hybrid sports car and apply its hybrid system to an even wider range of compact vehicles.

Tomohiko Kawanabe
Senior Managing Director
Honda Automobile R&D Center

Honda's original hybrid system: IMA

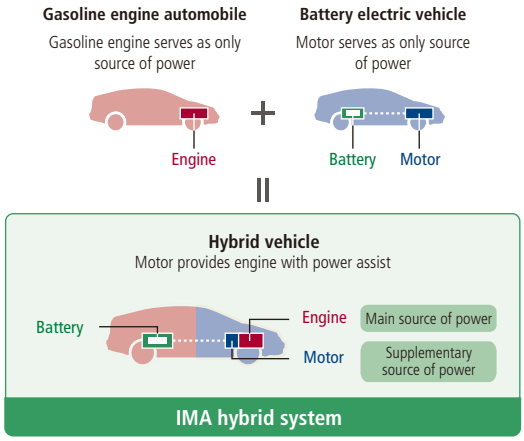
Combining performance, fuel economy, clean emissions, affordability and compactness

» The engine is the main power source and the motor assists as required

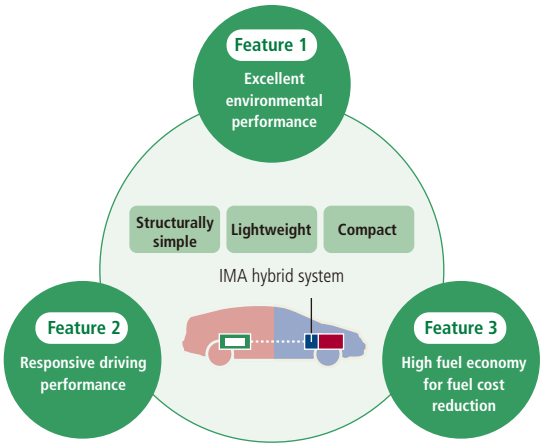
In Honda's proprietary Integrated Motor Assist (IMA) hybrid system, the engine with its generous power band serves as the main source of power while the electric motor provides power assist during off-the-line starts, overtaking and other situations in which extra power is required. IMA offers superior acceleration performance in city driving. At lower speeds, IMA permits cruising on motor power alone with no gasoline consumption, thereby enhancing fuel economy and reducing CO_2 and other emissions. During deceleration, the motor serves as a generator to charge the system's nickel-metal (NiMH) hydride battery and store energy for the motor's power assist function.

Since IMA consists of a motor and a battery added to a gasoline engine, the system allows for the conversion of gasoline models to hybrid vehicles at a lower cost and this simple, lightweight, compact structure also provides for a spacious interior and responsive performance. Developed through many years of research and proven in a wide range of successful models, IMA is the culmination of Honda's hybrid technologies and expertise.

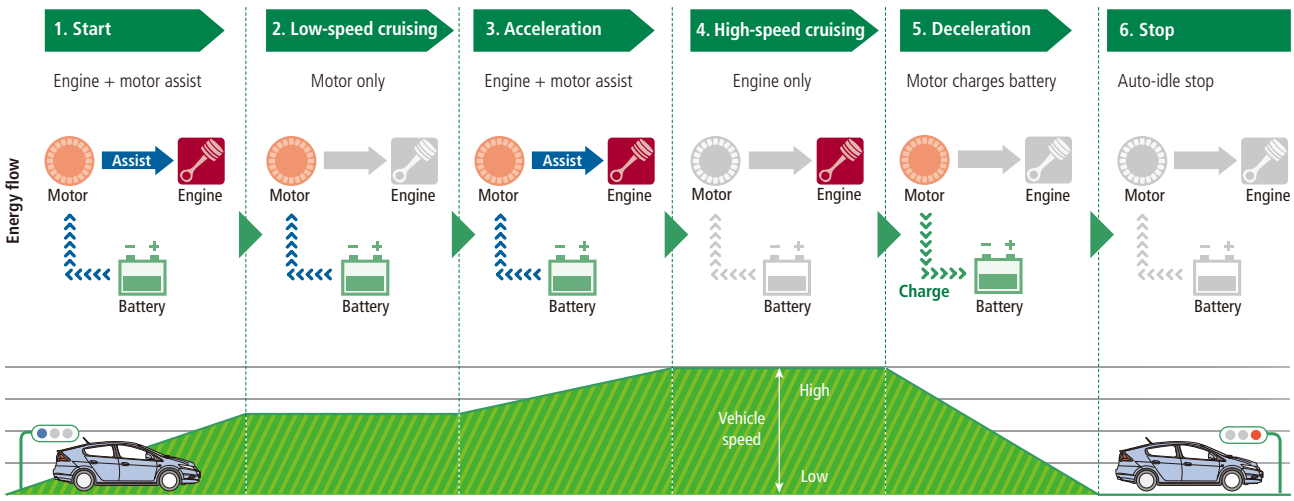
Integrated Motor Assist (IMA) concept



Features of Honda's hybrid vehicles



Function of IMA hybrid system



Popularizing hybrid vehicles

The all-new Insight: developed for affordability

Eco Assist™ supports enjoyable, fuel-efficient driving

As is true of any automobile, the fuel economy of a hybrid vehicle depends not only on the fuel efficiency of the vehicle itself but also on the fuel-efficient driving practices of the driver. Honda developed the Ecological Drive Assist System (Eco Assist™) to support fuel-efficient driving in an easy-to-understand, enjoyable manner.

The system comprises three functions. The ECON Mode button automatically enhances fuel economy without further driver input. The Eco Guide function uses the changing speedometer background color to indicate the level of fuel efficiency of driving practices in real time, while the Eco Scoring function uses 'leaves' to display fuel-efficient driving scores for both the most recent trip and cumulative performance. These latter two functions can also assist the driver in developing fuel-efficient driving habits over time.

To help fulfill its environmental responsibility as a mobility product manufacturer, Honda plans to add Eco Assist™ not only to future hybrid vehicles but also to select gasoline engine models.

Certified as having emissions 75% lower than 2005 emission standards

Attains 2010 fuel economy standards + 25%

Enhanced safety performance

Enhanced safety performance is an essential part of Honda's initiative to popularize hybrid vehicles. Twice as bright as ordinary halogen headlights, the Insight's high-intensity discharge projector-beam headlights enhance visibility during driving at night or in the rain. In addition, the Advanced Compatibility Engineering (ACE) body structure in the front of the Insight helps minimize the potential for under-ride or over-ride during head-on or offset frontal collisions with a larger or smaller vehicle.

High-intensity discharge projector-beam headlights

Advanced Compatibility Engineering (ACE) body structure in front of vehicle

The three functions of Eco Assist™

Eco Scoring function

The number of 'leaves' displayed indicates the fuel-efficient driving score for the most recent trip, as well as cumulative performance

Fuel-efficient driving score for last trip

The more 'leaves,' the higher the score

Cumulative performance

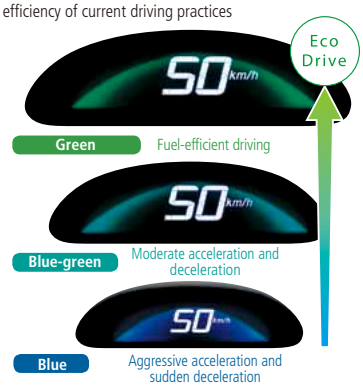
'Leaf' growth and bar length indicate current stage

ECON Mode button

Pushing the button engages automatic support of environmentally responsible driving

Eco Guide function

Speedometer background color changes to indicate fuel-efficiency of current driving practices



» Working with suppliers to achieve cost reductions

To allow the largest number of people to take advantage of the all-new Insight's excellent environmental performance, Honda made affordability a priority from the beginning. Honda knew that reducing the cost of the IMA system alone would not be enough to achieve a price under ¥2,000,000.

To achieve this goal, Honda worked closely with suppliers, examining with them every material and part contained in the vehicle, including steel plating, batteries, motor magnets and electronic parts. In addition to maintaining performance and quality while reducing cost, Honda and the suppliers strove to reduce the total amount of raw materials used, creating new technologies that lowered both the weight and environmental impact of the system as a whole.

Proactively creating what one needs to get the job done is an important part of Honda's manufacturing culture. By sharing this culture with suppliers, Honda succeeded in its effort to reduce costs and was able to offer the all-new Insight at the low, industry-first price of ¥1,890,000 (consumption tax included).

» Aiming for global popularization

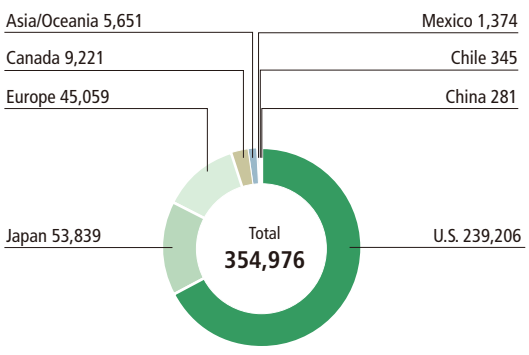
Honda launched the all-new Insight in Japan in February 2009, in the United States in March and in Europe in April. By the end of March, Honda had sold 10,900 units to owners who wish to make a difference in conserving the environment. The Insight is also recognized as being of significant importance in Honda's compliance with new CAFE (corporate average fuel economy) regulations set to go into effect in Europe and the United States in 2012.

Planning for the future of hybrid vehicles, in April 2009, Honda concluded a joint venture agreement with GS Yuasa Corporation, establishing Blue Energy Co., Ltd. to develop and produce high-performance lithium-ion batteries for hybrid vehicles. Demand for lithium-ion batteries is expected to increase, since they offer higher energy and power density than the nickel-metal hydride batteries that Honda currently uses.

Honda expects hybrid vehicles soon to reach a new level of popularity based on people's increasingly strong perception of them as the best choice for reducing CO_2 emissions. Honda plans to accelerate the trend of hybrid popularization by developing and manufacturing hybrid vehicles and batteries that offer enhanced performance for even higher customer satisfaction.

Honda hybrid vehicle sales history

Units sold 1999 – May 2009



Manufacturing associate's perspective

Cost-reducing initiatives

Fujio Hara
Automobile New Model Center

Producing the all-new Insight at an affordable price required us to produce the IMA hybrid system at a lower cost. To produce three times as many motors as before, we needed to apply everything we had learned in producing IMA for the Civic Hybrid and create a dedicated motor production line for the Insight.

Honda's design and manufacturing experts cooperated in designing and verifying every process in the new motor line, from component production to final assembly. As a result, the line is able to produce on a large scale with highly consistent quality.

Associates engaged in research and technological development cooperated in analyzing and selecting raw materials for parts matched to the production equipment, and everyone involved came together in implementing cost-reducing measures.

The success we achieved in developing our production system for the all-new Insight is definitely something we will carry forward in establishing commercial production for other new models.

All-new Insight

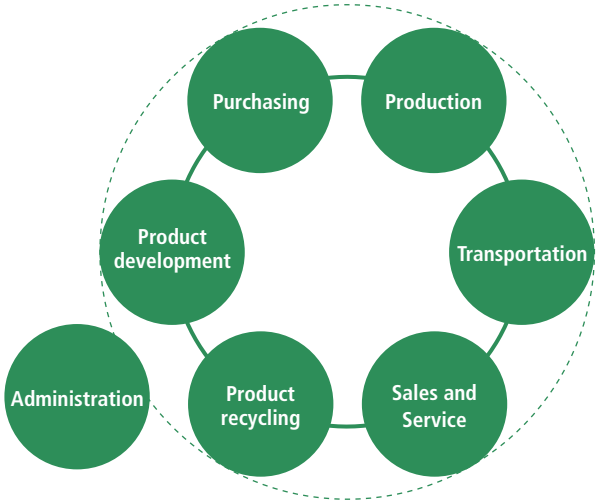
WEB For more information on Honda environmental reporting, see **http://world.honda.com/environment/**

Assessing environmental impact

Honda is aware of its responsibility for the environmental impact generated by its corporate activities and the use of its products, and is committed to minimizing it.

To achieve this, it is essential that we identify specific issues and set targets for action. We set specific goals in the context of our Life Cycle Assessment system, which is used to measure, assess and analyze environmental impact.

Honda's Life Cycle Assessment concept



Major initiatives to deal with environmental impact

Domain	Concerns	Environmental impact	Major initiatives
Product development	CO_2 Exhaust emissions Noise	Global environmental issues Global warming	• Exhaust emissions reduction • Fuel economy improvements • Noise reduction • Enhanced recyclability
Purchasing	CO_2 Waste Wastewater Exhaust emissions Noise Chemicals	Ozone depletion	• Green purchasing
Production		Resource depletion	• Green Factories
Transportation	CO_2 Waste	Air pollution	• Green logistics
Sales and Service	CO_2 Removed parts Fluorocarbons Waste	Waste	• Green Dealers (automobiles, motorcycles and power products)
Product recycling	CO_2 End-of-life products	Water pollution Soil pollution	• Recovery, recycling and reuse of parts • Technical support for the proper disposal and recycling of end-of-life products
Administration	CO_2 Waste	Noise Local environmental issues	• Green offices

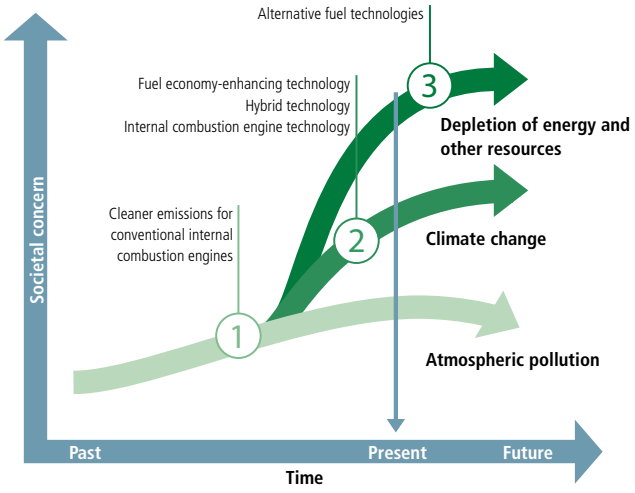
Honda's approach to environmental issues

The following graph provides a visual illustration of Honda's approach to some of the environmental issues that face us. Honda has long been aware of the need to tackle issues related to atmospheric pollution, developing such combustion technologies as the CVCC engine (introduced in 1972) to comply with the U.S. Clean Air Act—the world's most stringent emissions regulations at the time. Honda has since continued to develop its catalytic converter and other clean-emissions technologies, with the result that, over the past 40 years, vehicle emissions have been reduced to 1/1,000 of 1970 levels, when the U.S. Clean Air Act became law. Honda believes that, as the use of vehicles with outstanding emissions performance becomes more widespread, the effect of vehicles on the world's atmosphere will be further mitigated.

Mobility is indispensable to improving the quality of people's daily lives, and as a company, Honda is aware that it is of utmost importance to address the issues of climate change and depletion of energy and other resources in all of its corporate activities. Honda is addressing climate change—thought to be caused by the sudden rise in atmospheric concentrations of CO_2, CFCs, and other greenhouse gases—through the introduction of hybrid and other fuel economy-enhancing technologies that reduce CO_2 emissions from Honda vehicles, while at the same time reducing CO_2 emissions throughout the entire spectrum of its corporate activities. Honda is also addressing concerns over energy resource depletion by developing technologies to support a sustainable society, including fuel cell technologies as embodied in the FCX Clarity, engaging in solar cell development, researching biofuels, and developing energy-saving technologies.

Honda is pursuing the goal of developing products with the lowest in-use CO_2 emissions through corporate activities with the lowest possible CO_2 emissions, realizing the dream of continuing to deliver new value to customers.

Honda's approach to environmental issues



Environmental management

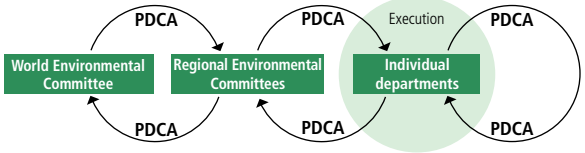
In December 1991 Honda created what is now referred to as the Japan Environmental Committee, whose role is to play a central part in addressing environmental issues in Japan. Subsequently, the organizational framework was extended to Honda's other five regions. In March 1995 the World Environmental Committee was established to create and promote global plans in keeping with the company's 3-year midterm business plans. Continuing its focus on issues common to the global organization, the company initiated the Green Factory project[1] in 1997 and the LCA Project in 2000. The Green Factory Promotion Center[2] was established in 2004 to intensify environmental initiatives in the production domain and to advance the Green Factory initiative.

Based on midterm policies determined by the Executive Council, environmental action plans are developed by individual departments. These plans are then discussed and approved by Regional Environmental Committees. Next, individual departments take responsibility for implementation based on the commitments specified in their plans. Results are evaluated by Regional Environmental Committees, and, on the basis of their guidance, plans and targets are developed in each of Honda's six regions, completing the PDCA[3] cycle at the regional level. Issues considered to be global in scope are referred to the World Environmental Committee, which is chaired by the President and CEO in his role as Chief Environmental Officer. The deliberations of the World Environmental Committee are reflected in midterm policy statements.

A hallmark of Honda environmental initiatives is that planning and execution are not delegated to specialists; rather, associates in all departments are directly involved. All associates are engaged with environmental issues as part of their duties.

[1] In addition to the Green Factory initiative, energy conservation and waste reduction measures are being implemented at Honda factories worldwide.
[2] The Green Factory Promotion Center oversees environmental initiatives in the production domain, supervising and coordinating environmental measures implemented at Honda factories. The Center serves as a secretariat for internal environmental audits conducted by Honda factories and monitors the administration of environmental management throughout the organization.
[3] The Plan, Do, Check, Act cycle.

Environmental preservation based on the PDCA cycle



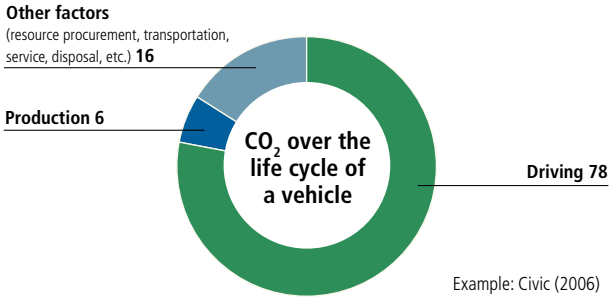
2010 CO_2 reduction targets and progress

To address the issue of climate change, Honda has led the industry in establishing worldwide CO_2 emission reduction targets and implementing initiatives to attain them.

Believing that the internal combustion engine will remain the principal source of mobility power until at least the year 2020, Honda views fuel efficiency and fuel economy enhancement as a key issue. Stringent regulations such as Corporate Average Fuel Economy (CAFE) standards have been introduced in the U.S., Europe and other regions to mandate fuel economy improvement for automobile fleets. Recognizing the need for global initiatives, Honda is moving from measuring regional fuel economy averages to measuring global fuel economy averages, and from fuel economy averages based on vehicle categories to average targets for its entire worldwide vehicle lineup.

Honda is also committed to further improving the efficiency of its worldwide manufacturing processes and reducing CO_2 emissions. To this end, in 2006, Honda established global targets for average per-unit CO_2 emissions in manufacturing and is working steadily to reach these targets.

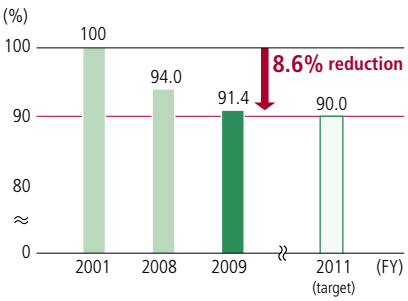
CO_2 emissions over the life cycle of a vehicle (%)



FY2009 results

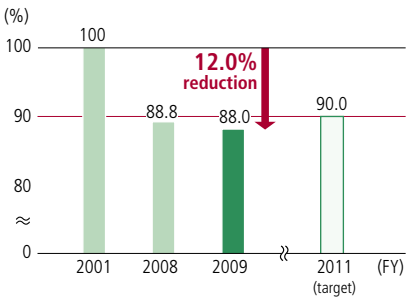
Product CO_2 reduction

Automobiles



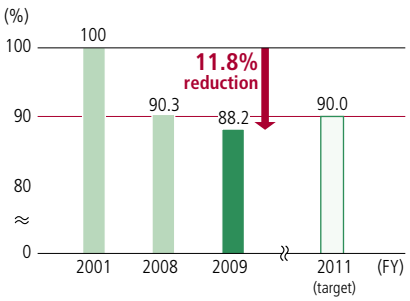
Due to a shift toward smaller automobiles and enhanced engine efficiency, Honda has reduced the CO_2 emissions of its automobiles.

Motorcycles



Having already attained its FY2011 target, Honda has further reduced CO_2 emissions since FY2008 by implementing PGM-FI on small motorcycles and expanding the use of low-friction engines.

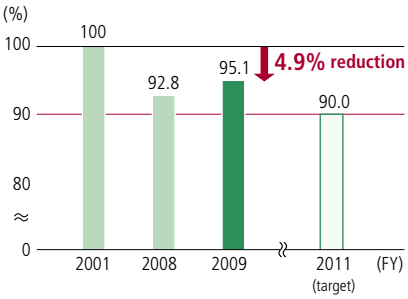
Power Products



Honda has reduced average CO_2 emissions by increasing the percentage of mid-sized and hand-held engines sold and further enhancing fuel efficiency.

Production CO_2 reduction

Automobiles

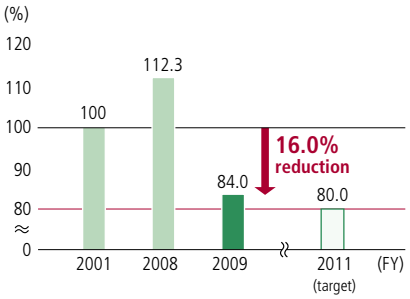


Per-unit CO_2 emissions have increased due to a decrease in production caused by the worldwide economic downturn.

Motorcycles

Honda has attained and gone beyond its per-unit production emissions target by combining production lines for greater efficiency and optimizing production facilities.

Power Products



Honda has reduced per-unit production emissions by combining production lines for greater efficiency and optimizing production facilities.

Reducing environmental footprint in Japan

Working to protect the environment since the 1960s

Honda has been implementing proactive measures to help resolve environmental challenges since the 1960s, when concerns about air pollution began to grow. In the 1990s Honda strengthened its organizational structure to reflect its commitment to the environment and published the Honda Environment Statement to define its approach. Honda has continued to strengthen initiatives in accordance with this statement. In 1999, Honda defined specific environmental targets, primarily for cleaner exhaust emissions and higher fuel economy, and implemented the measures necessary to achieve them by the end of FY2006. In 2006, Honda became the world's first automaker to announce voluntary targets for reduction of CO_2 emissions by FY2011. Recognizing the importance of reducing the environmental impact of its corporate activities on a regional basis, in FY2008 Honda set new targets for FY2011 for the reduction of its environmental impact in Japan. In June 2007, Honda announced new environmental reduction targets for its Japan operations. A leader in environmental conservation, Honda is setting high standards and working ever harder to attain them.

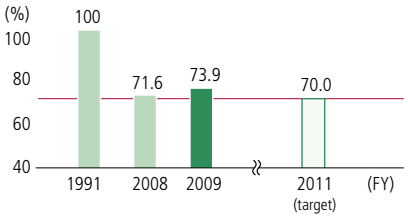
Reducing environmental impact: targets for FY2011

In FY2008 Honda announced its environmental impact reduction targets for FY2011 for Japan, and is seeking to reduce CO_2 emissions produced in transportation, reduce the output of substances having a negative environmental impact, and increase the cyclical use of resources. Honda established voluntary targets in eight separate categories: CO_2 emissions, VOC (volatile organic compound) emissions, landfill waste, waste, water use, use of packaging materials, ASR recycling rate and motorcycle recycling rate (see adjacent graph).

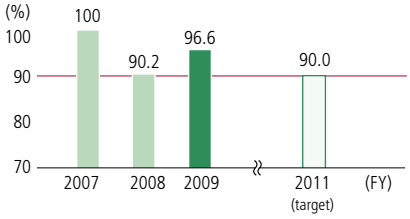
The company announced targets for reducing environmental impact from all products and production operations by FY2011 as part of its overall strategy for the reduction of CO_2 emissions worldwide announced in May 2006. Honda is intensifying efforts to attain these targets.

FY2009 results

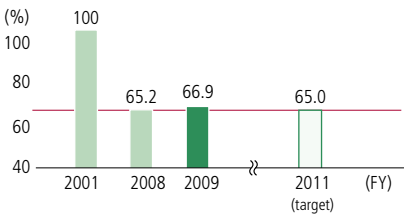
Production CO_2 reduction
(Units of energy used)



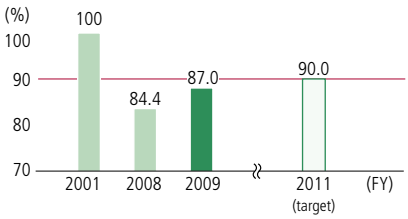
CO_2 emissions in transportation
(As % of revenue)



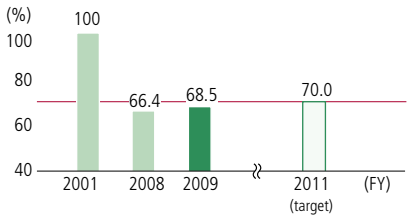
VOC emissions in production
(Per automobile painted)



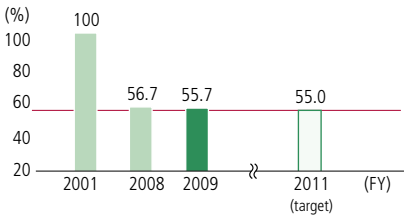
Waste in production
(As % of revenue)



Water use in production
(As % of revenue)



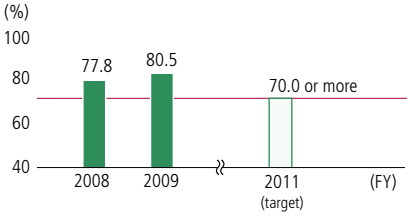
Use of packaging materials in transportation
(As % of revenue)



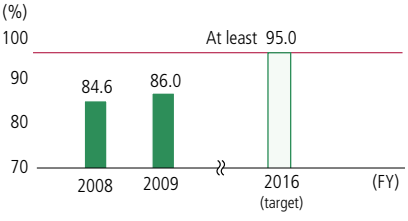
Landfill waste
(All corporate activities)

Zero waste for all facilities
(48 companies)

ASR recycling rate (Automobiles)



Recycling rate (Motorcycles)



FY2009 initiatives

Initiatives in product development

Leasing of FCX Clarity fuel cell vehicle begun

The new FCX Clarity fuel cell vehicle was introduced in the U.S. in August 2008, and then in Japan in November 2008. Perhaps the ultimate clean vehicle, the FCX Clarity emits no carbon dioxide in operation and is powered by Honda's original V Flow FC Stack. In FY2009, Honda began making the FCX Clarity available to customers outside the Honda Group, leasing six vehicles in the United States and two in Japan.

FCX Clarity

World's first flexible-fuel motorcycle

In March 2009, Honda began sales of the flex-fuel CG150 TITAN MIX in Brazil, where environmentally responsible bio-ethanol made from sugar cane processing waste is widely available. This motorcycle features Honda's proprietary Mix Fuel Injection, the world's first flexible-fuel system for motorcycles, which allows users to mix gasoline and ethanol in any proportion while complying with Brazil's new Promot3 emission standards (equivalent to Europe's Euro 3 emission standards).

CG150 TITAN MIX

Pianta FV200 gas-powered mini-tiller

In February 2009, Honda introduced the Pianta FV200 gas-powered mini-tiller, which runs on home-use butane gas canisters and produces approximately 10% less CO_2 per hour of work than a gasoline-powered unit of the same output. When the user releases the throttle lever, engine rpms automatically decrease for enhanced fuel economy. The model's butane fuel also contributes to reduced CO_2 emissions.

Pianta FV200

Japan

Honda Soltec solar panels help power dealership

On October 11, 2008, Honda Cars Mito Katsuta Kita reopened as the first Honda dealership with a solar power generation system. Manufactured by Honda Soltec Co., Ltd., the 9 kW thin-film compound solar panel system powers part of the facility, helping reduce CO_2 emissions. The dealership's proactive use of clean energy helps demonstrate to customers Honda's commitment to reducing CO_2 emissions and fighting global warming.

Honda Cars Mito Katsuta Kita dealership in Ibaraki Prefecture

North/Central America

New Green Factories begin production

In FY2009, Honda opened two new Green Factories in North America. In October 2008, Honda Manufacturing of Indiana, LLC, Honda's seventh automobile plant in North America, began commercial production of Civic Sedans as a zero-waste-to-landfill facility. The use of waterborne primer and basecoat painting processes help further reduce the plant's environmental footprint.

Honda Manufacturing of Indiana begins operations

South America

Green Factory initiative in Brazil

One of Honda's main automobile production affiliates in South America, Honda Automoveis do Brasil Ltda., is engaged in a variety of environmentally responsible initiatives. In FY2009, with a view to further reducing CO_2 emissions, the company introduced a high-efficiency compression system to supply compressed air to a wide range of production processes and a natural light system with human presence sensors to achieve more energy-efficient use of lighting. In the area of training and associate development, the company published an environmental newspaper for associates and screened videos about environmental issues. In addition, the company began holding regular meetings for associates to report on and learn about current environmental initiatives.

Environmental initiatives meeting

Europe/Middle East/Africa

New paint technologies reduce VOC emissions in Spain

From 2007 to 2008, motorcycle manufacturing and sales affiliate Montesa Honda S.A. of Barcelona, Spain, introduced a new system of applying paints that dramatically reduced emissions of VOCs (volatile organic compounds). In 2005, Montesa Honda introduced a waterborne paint system for frames and forks and more recently completed the project by applying the system to plastic parts and fuel tanks. As a result, Montesa Honda has complied with the VOC emission standards established by the European Union in 1999 and reduced overall VOC emissions by more than 70%. Montesa Honda is the first Honda motorcyle manufacturing affiliate in the region to implement this technology.


Montesa Honda S.A.

Asia/Oceania

Honda Automobile (Thailand) opens Green Factory

In October 2008, Honda Automobile (Thailand) Co., Ltd. began production at its second factory with the Accord as the facility's first product. This factory is Honda's first in the Asia/Oceania region to employ a special waterborne painting process that helped the plant immediately attain its initial target VOC (volatile organic compound) emissions of 27 g/m^2. A high-efficiency bell-shaped spray applicator increases process speed while reducing wasted paint, and each applicator includes an air-processing unit to recycle atomized paint. Other green advances in the factory include 100% recycling of water with zero effluent, and a solar generation system. As a result, the company expects to attain CO_2 emissions per automobile produced that are 10% lower than the 2005 level.


Honda Automobile (Thailand)

China

Guangqi Honda begins marine transport of automobiles

Going beyond conventional truck transport of automobiles, Guangqi Honda Automobile Co., Ltd. built a rail yard next to its factory to take advantage of the higher efficiency and lower environmental burden of rail transport. Then, in 2009, Guangqi Honda began weekly shipments of automobiles on specialized automobile transport ships to three northeastern provinces, with trucks transporting the automobiles from the ports to the dealerships. This new transport method is not only more environmentally responsible, it reduces secondary transport distances and reduces transport losses, resulting in enhanced customer satisfaction.


Specialized automobile transport ship