

FISCAL 2002 PROGRAM ACHIEVEMENTS

Environmental measures and activities FHI implemented as a manufacturer in fiscal 2002 are mentioned here under the processes of development, production, recycling and logistics. Besides environmental performance items such as fuel economy and exhaust emissions of automobiles as our main products, we will focus on recycling solutions further for the Automobile Recycling Law issued in July 2002.

1 Development Phase / Products

Automobile-related Products

Fuel Economy

When motor vehicles consume fuel, they emit carbon dioxide (CO₂) in proportion to the amount of fuel. Improving fuel economy can contribute to preventing global warming, which is caused by heat-trapping substances, including CO₂, as well as saving limited energy resources.

Subaru promotes the development of technology to improve fuel economy while taking advantage of features such as all-wheel drive (AWD) and high power engine, and produces cars that meet the fiscal 2010 fuel economy standards, which is a fuel economy target for gasoline-powered vehicles, into the market in sequence.



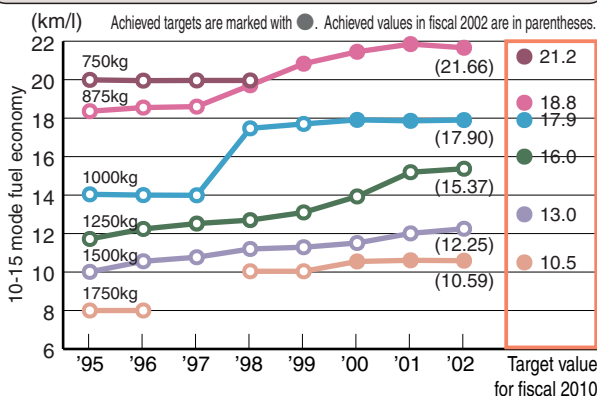
Impreza

Trends in Average Fuel Economy by Equivalent Inertia Weight

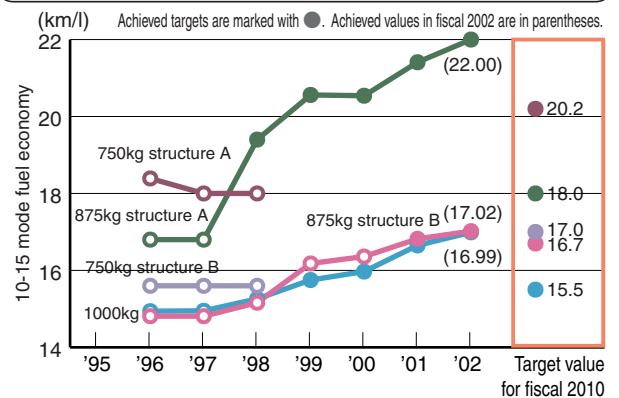
In an effort to meet fiscal 2010 fuel economy standards, we achieved the target in three ranks out of the five ranks of equivalent inertia weight for gasoline passenger cars. In gasoline mini-sized trucks, we succeeded in attaining the target in all the applicable ranks of the equivalent inertia weight.

To reach the targeted values in all the weight ranks by fiscal 2006, we are improving fuel economy further.

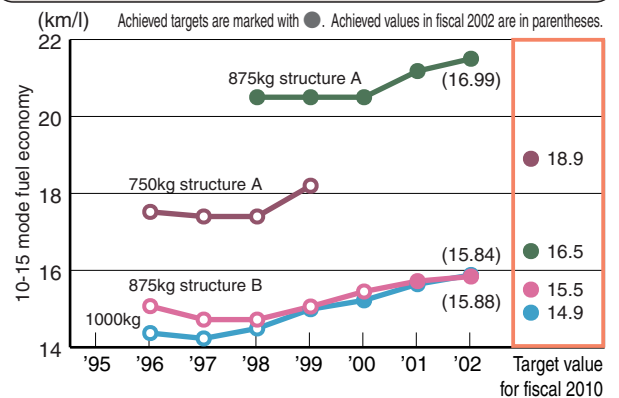
Trends in Average Fuel Economy by Equivalent Inertia Weight (Gasoline Passenger Cars)



Trends in Average Fuel Economy by Equivalent Inertia Weight (Gasoline Mini-sized MT Trucks)

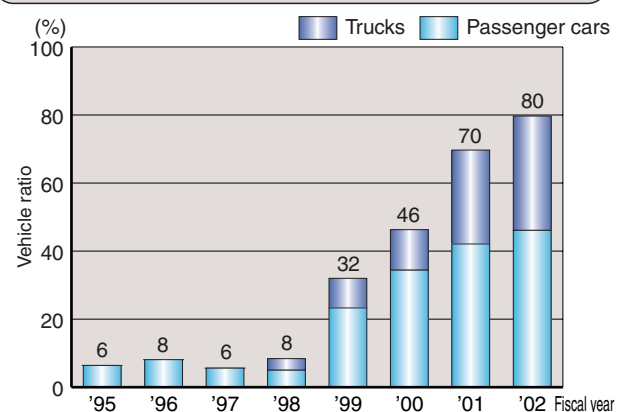


Trends in Average Fuel Economy by Equivalent Inertia Weight (Gasoline Mini-sized AT Trucks)



Trends in Attainment Rates for Fiscal 2010 Fuel Economy Standards

Trends in Attainment Rates for Fiscal 2010 Fuel Economy Standards



Note: The vehicle ratio is calculated by the volume at the time of shipment.

Reference Fiscal 2010 fuel economy standards (10-15 mode fuel economy)

Gasoline Passenger Cars

Equivalent inertia weight (kg)		-750	875	1000	1250	1500	1750	2000	2250	2500-
Vehicle weight (kg)	Lower limit	I	703	828	1016	1266	1516	1766	2016	2266
	Upper limit	702	827	1015	1265	1515	1765	2015	2265	I
Fiscal 2010 fuel economy standards (km/l)		21.2	18.8	17.9	16.0	13.0	10.5	8.9	7.8	6.4

Gasoline Mini-sized Trucks

Equivalent inertia weight (kg)		-750	875	1000-		
Vehicle curb weight (kg)	Lower limit	I	703	828		
	Upper limit	702	827	I		
Vehicle structure (Note)		Structure A	Structure B	Structure A	Structure B	-
Fiscal 2010 fuel economy standards (km/l)	AT	18.9	16.2	16.5	15.5	14.9
	MT	20.2	17.0	18.0	16.7	15.5

Note: Structure A indicates the structure that falls into the following two categories (excluding trucks). The Pleo vans are in this category among the Subaru products.
 1) Maximum load capacity/ gross vehicle weight ≤ 0.3
 2) FWD (front-wheel drive) vehicles or FWD-based AWD vehicles
 Vehicles other than Structure A fall into Structure B. The Sambar van and trucks are in this category among the Subaru products.

Exhaust Emissions

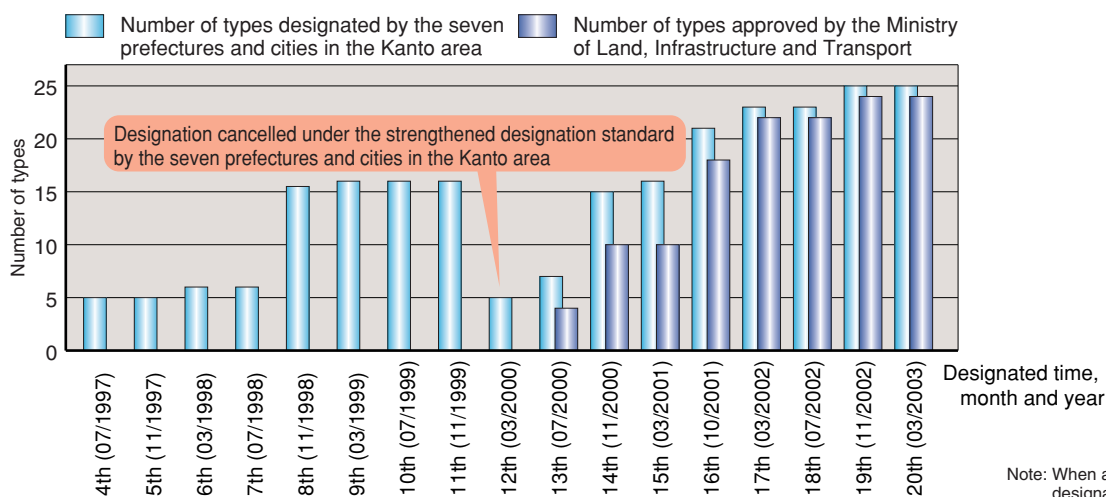
Substances such as carbon monoxide (CO), hydrocarbon (HC), nitrogen oxides (NOx), which are emitted from automobiles, are one of the causes of air pollution in metropolitan areas where there is intensive motor traffic. In order to improve the state of the air, Subaru produces low emission vehicles (approved by the Ministry of Land, Infrastructure and Transport) that meet the standard stricter than the regulation into the market in sequence.

Application Status of Low Emission Vehicles

In the annually-changed models of the Sambar van and truck in the fall of fiscal 2002, the supercharger vehicles were modified into excellent low emission vehicles (E-LEV). Excluding a part of the models (Impreza 2L Turbo Sti: The 2000 regulation satisfied), we successfully reached the goal that all the vehicles should be shifted to excellent low emission vehicles and good low emission vehicles (G-LEV). We are starting to input ultra low emission vehicles (U-LEV) with the new Legacy launched in the spring of 2003.

Trends in the Number of LEV Types Approved by the Ministry of Land, Infrastructure and Transport and Designated by the Seven Prefectures and Cities in the Kanto Area

Trends in the Number of LEV Types Approved by the Ministry of Land, Infrastructure and Transport and Designated by the Seven Prefectures and Cities in the Kanto Area

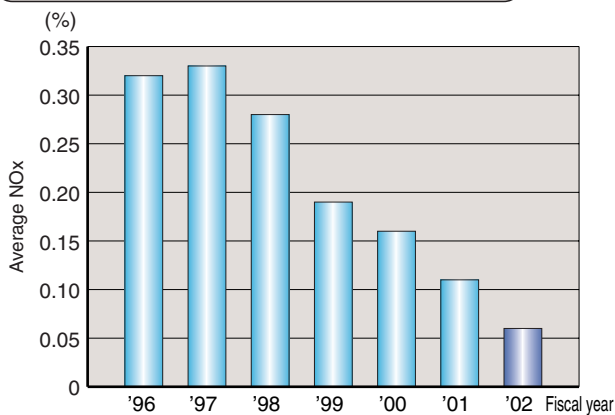


Note: When a part of the model is subject to designation, it is counted as 0.5.

Trends in NOx Averages

By putting the low emission vehicles designated by the seven prefectures and cities in the Kanto area and approved by the Ministry of Land, Infrastructure and Transport into the market, Subaru has been able to reduce the average amount of NOx emitted by Subaru vehicles every year, as the chart below shows.

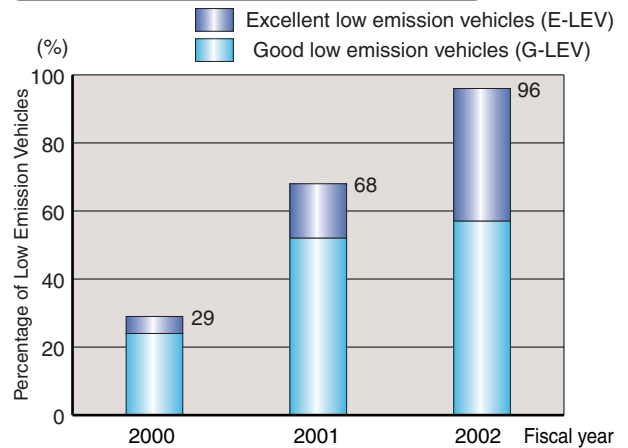
Trends in Average NOx Emissions of Subaru Vehicles



- Note 1: The figures were calculated from the regulation values and the standard values at the time of shipment.
- Note 2: The figures for the low-pollution vehicles designated by the seven prefectures and cities in the Kanto area were calculated by using the designation standard values.
- Note 3: The figures after the cancellation under the strengthened designation standard were calculated by using the standard values at the time of designation.

Trends in Percentages of Low Emission Vehicles

Trends in Percentages of Low Emission Vehicles



Note: Calculation was based on the number of shipped vehicles. The system to authorize LEVs started in April 2000.

Reference

Exhaust emission regulation values, LEV authorization standard by the Ministry of Land, Infrastructure and Transport, and designation standard by the seven prefectures and cities in the Kanto area

Gasoline and LPG Passenger Cars

	10-15 mode (g/km)			11 mode (g/test)			Remarks	
	CO	HC	NOx	CO	HC	NOx		
1978 Exhaust Emission Regulations	2.10	0.25	0.25	60.0	7.00	4.40		
—	↑	↑	0.12	↑	↑	↑	Designation standard by the seven prefectures and cities in the Kanto area (Applied until the end of March 2000)	
2000 Exhaust Emission Regulations	0.67	0.08	0.08	19.0	2.20	1.40		
LEVs	G-LEVs	↑	0.06	0.06	↑	1.65	1.05	Designation standard by the seven prefectures and cities in the Kanto area (Good low-pollution vehicles)
	E-LEVs	↑	0.04	0.04	↑	1.10	0.70	Designation standard by the seven prefectures and cities in the Kanto area (Excellent low-pollution vehicles)
	U-LEVs	↑	0.02	0.02	↑	0.55	0.35	Designation standard by the seven prefectures and cities in the Kanto area (Ultra low-pollution vehicles)

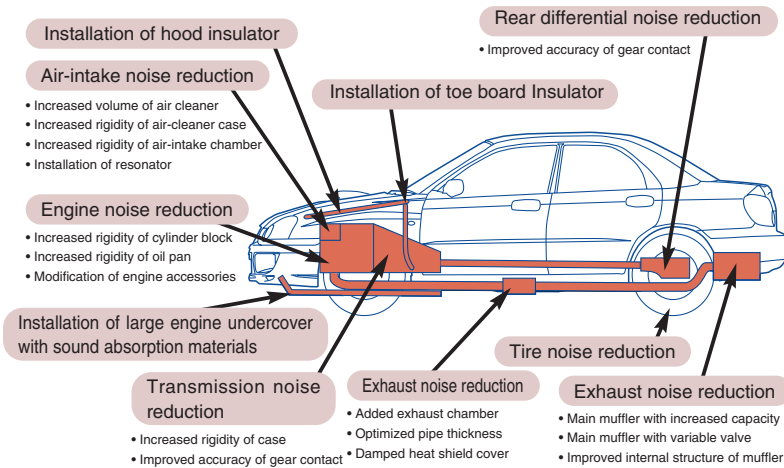
Gasoline and LPG Mini-sized Trucks

	10-15 mode (g/km)			11 mode (g/test)			Remarks	
	CO	HC	NOx	CO	HC	NOx		
1990 Exhaust Emission Regulations	13.0	2.10	0.50	100	13.0	5.50		
—	↑	↑	0.25	↑	↑	↑	Designation standard by the seven prefectures and cities in the Kanto area (Applied until the end of September 1998)	
1998 Exhaust Emission Regulations	6.50	0.25	0.25	76.0	7.00	4.40		
—	↑	↑	0.12	↑	↑	↑	Designation standard by the seven prefectures and cities in the Kanto area (Applied until the end of October 2001)	
2002 Exhaust Emission Regulations	3.30	0.13	0.13	38.0	3.50	2.20		
LEVs	G-LEVs	↑	0.10	0.10	↑	2.63	1.65	Designation standard by the seven prefectures and cities in the Kanto area (Good low-pollution vehicles)
	E-LEVs	↑	0.07	0.07	↑	1.75	1.10	Designation standard by the seven prefectures and cities in the Kanto area (Excellent low-pollution vehicles)
	U-LEVs	↑	0.03	0.03	↑	0.88	0.55	Designation standard by the seven prefectures and cities in the Kanto area (Ultra low-pollution vehicles)

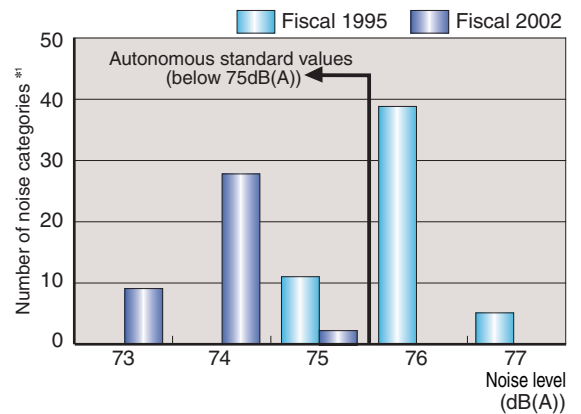
Noise

Subaru works to reduce the noise generated from the engine, transmission, air-intake and exhaust and tires in order to reduce the noise of a vehicle. In addition, Subaru also reduces the noise emitted by the rear differential of AWD vehicles. In 2002, Subaru drastically reviewed the intake and exhaust system for the annually-changed model of the Impreza for further noise reduction. Also in other models, Subaru promotes noise reduction by increasing the capacity of the exhaust system and promoting adoption of a large undercover.

Main Items for Noise Reduction



Trends in Noise during Driving Acceleration (Domestic/Passenger cars)



*1 Number of noise categories: Categorized because the same model can be in a different noise category depending on the engine output and transmission type

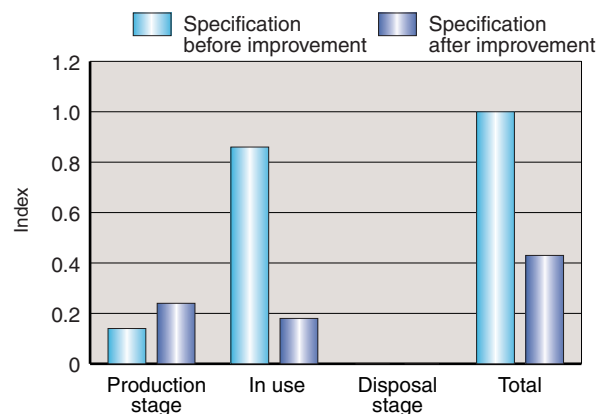
LCA Activities

In April 2002, the LCA Utilization Investigative Commission, which was composed of Development Department, Manufacturing Department and Headquarters Department, was established. In fiscal 2002, the Commission improved the LCA software by collecting the latest plant data and arranging a system for data management.

With LCA, for example, we assessed an undercover that flattens the under floor and reduces air resistance. The additional undercover improvement increases CO₂ emission in the production process. Meanwhile, the cars emit less CO₂ due to improved fuel economy. Taking the car life cycle into consideration, we found that the additional undercover improvement decreased CO₂ emission, which resulted in contributing to prevention of global warming.

This is just one of the cases. The utilization of LCA in the development stage enables us to have broader perceptions. Accumulating LCA data, we will develop more cars with less environmental impact.

Inventory Results on Undercover (CO₂)



Conditions for assessment

Specification before improvement: 3 items
 Specification after improvement: 5 items
 Increase in weight after improvement: 2.7kg

Major material: polypropylene
 Mileage: 100,000km
 Driving mode: 10-15 mode

Note: In the above chart, index indicates the volume of CO₂ emission, related to the undercover (Total before improvement = 1).

Clean Energy Vehicles

Clean energy vehicles have features such as emitting only little global warming substances (carbon dioxides) and air-pollutants (carbon monoxides, hydrocarbons, nitrogen oxides, etc.) and having less effect on the environment than the gasoline vehicles. However, there are technical problems related to price and driving distances. Subaru has been developing clean energy vehicles that have features of the gasoline vehicles, such as driving performance and convenience.

Development of Hybrid Vehicles and Secondary Batteries (Chargeable Batteries) for Fuel Cell Electric Vehicles

In May 2002, FHI established NEC Lamilion Energy, Ltd. jointly with NEC Corp. as a planning and development company for automotive manganese lithium-ion combination batteries.

By utilizing NEC's laminate-type manganese lithium-ion battery cell technology and FHI's automotive combination battery technology, the new company will develop secondary batteries for hybrid, electric and fuel cell electric vehicles, which are much thinner, lighter, cheaper yet of higher performance than existing ones. The company will also develop secondary batteries that will be accepted as international de facto standards.

Electric Vehicles

Subaru released Sambar EV, a first-generation electric vehicle (EV) in April 1995, and sold 46 vehicles by March 1999.

As for New Sambar EV, which was released as its successor in November 2000, 11 vehicles were sold by March 2003 and its production was ceased.



Electric vehicle
New Sambar EV

Natural Gas Vehicles

The Legacy B4 CNG was limitedly introduced to the market in fall 2002. To local governments and gas companies, 10 vehicles were delivered in fiscal 2002, and 2 vehicles at the beginning of fiscal 2003 for data collection and practical evaluation through actual operation. In addition, the car was exhibited at 15 sites including low-pollution car fairs (see the table below) so that people could actually view and drive the NGV.

The NGV based on the New Legacy in spring 2003 will be launched in spring 2004.



Natural gas vehicle
Legacy B4 CNG

	LEV fair	Session	Venue	Sponsors
1	Eco Car World 2002	June 1 (Sa) – 2 (Su)	Yoyogi Park	Ministry of Environment, etc.
2	Automotive Engineering Exposition	July 23 (Tu) – 25 (Th)	Pacifico Yokohama	Society of Automotive Engineers of Japan
3	LEV Fair Nagoya 2002	Sept. 21 (Sa) – 22 (Su)	Tsuruma Park (Nagoya)	Nagoya City
4	LEV Fair in Osaka	Oct. 16 (W) – 19 (Sa)	INTEX-OSAKA	Osaka City
5	Family Car Big Festival	Oct. 20 (Su)	Romantic Village (Utsunomiya)	Tochigi Automobile Service Promotion Association, etc.
6	Industrial Fair	Oct. 23 (W) – 26 (Sa)	Osaka Gas Akanejima Area	Osaka Gas
7	Global Citizens' Day	Oct. 27 (Su)	Shiroato Park (Takasaki)	Takasaki City
8	Urban Energy System Fair	Oct. 30 (W) – Nov. 2	Osaka Gas Akanejima Area	Osaka Gas
9	Ota City Industrial & Environmental Festival-Consumption Life Exhibition	Nov. 10 (Su)	Ota City Hall	Ota City
10	NGV Show	Nov. 13 (W) – 15 (F)	Shinjuku Park Tower	Japan Gas Association
11	Business EXPO	Nov. 15 (F) – 16 (Sa)	AXES-SAPPORO	Hokkaido Bureau of Economy, Trade and Industry
12	OSAKA LEV Fair	Nov. 22 (F) – 23 (Sa)	Osaka Business Park	Osaka Prefecture
13	EPOC Eco Car Forum (Test-ride Event)	Feb. 1 (Sa) – 2 (Su)	Colorful Town Gifu	Chubu Bureau of Economy, Trade and Industry, etc.
14	Environment & LEV Fair	Mar. 22 (Sa)	NAVIOS-YOKOHAMA	Organization for the Promotion of Low Emission Vehicles, etc.
15	Nagoya International Conference on the Environment and Traffic	Mar. 23 (Sa) – 25 (Tu)	Nagoya Congress Center	Ministry of Environment, Ministry of Land, Infrastructure and Transport, etc.