# Environment and Energy

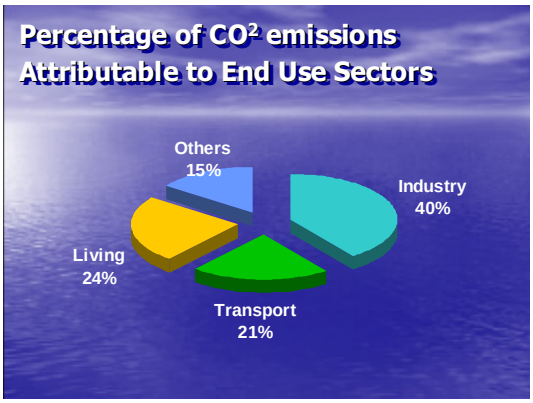
The rapidly increased number of vehicles on the road and intensifying traffic congestion in large cities caused serious air and noise pollution, and necessitated urgent and comprehensive measures to promote low emission vehicles. Auto emissions hinder many large cities from attaining the national environmental standard, especially in terms of nitrogen-oxide and particulate matter. In that context, the Diet passed a special-measures law (Auto-NOx Law in 1992) to reduce nitrogen-oxide emitted from automobiles. The law designated the specific urban areas required to reduce the total amount of nitrogen-oxide from automobiles, promoting the introduction of low emission vehicles. In 2002, the government formulated a certification system for low pollution vehicles with tax incentives to help reduce NOx and HC emissions and increase fuel efficiency. Battery electric vehicle and fuel cell vehicles that run directly on hydrogen emit no nitrogen oxides, hydrocarbons, carbon monoxide or suspended particulate matter.

The protection of the global environment became a key issue at the United Nations, and recognizing the importance of reduction of greenhouse gasses, 154 countries including Japan signed the United Nations Framework Convention on Climate Change at the Earth Summit in 1992. The convention requires the developed countries to reduce greenhouse gas emissions to their 1990 levels by the year 2000.

**PERCENTAGE SHARE OF GLOBAL $CO_2$ EMISSION**

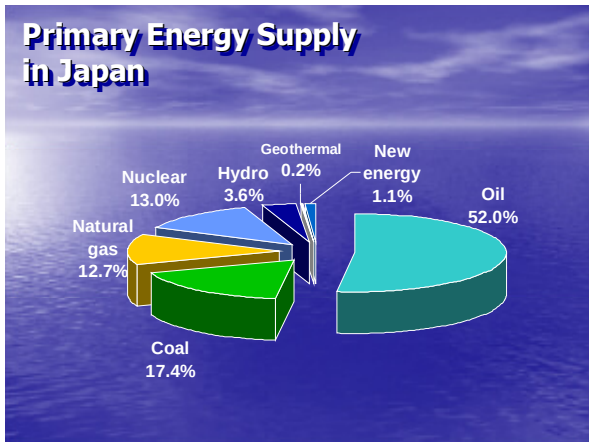
| Nation | Percent share % | Rank |
|---|---|---|
| United States | 22.2 | 1 |
| China | 14.1 | 2 |
| Russia | 6.6 | 3 |
| **Japan** | **4.9** | **4** |
| India | 4.2 | 5 |

Source: Oakridge National Laboratory, 1996




The carbon dioxide resulting from burning fossil fuels is the most potent greenhouse gas. Japan ranked fourth among all nations in terms of its contribution to world greenhouse gas emissions, producing about 5% of global carbon dioxide emissions in 1992. To achieve the said target, and further decrease emissions after 2000, it is critical to reduce the increase of carbon dioxide emissions from the transport sector, which actually produces 20% of the total carbon dioxide emissions in Japan. The government's action plan for the prevention of global warming includes measures to increase the fuel efficiency of automobiles and to

promote the introduction of low emission vehicles.




In Japan, the percentage of oil dependence is over 50 %, and 100 percent of its oil is imported. Road transport uses about 25% of oil. Reducing petroleum consumption by automobiles and increasing oil independence continues to be an important national concern.

The well-to-wheel energy efficiencies of battery, hybrid and fuel cell electric vehicles are estimated to be twice or more that of today's gasoline engine vehicles. $CO_2$ emissions from all stages of fuel production through driving are also significantly lower than those for gasoline powered vehicles. The widespread use of these vehicles is therefore expected to contribute to energy-saving society. Especially, fuel cell vehicles are expected to contribute to shift to hydrogen-based society producing hydrogen from renewable and clean energy sources. Hydrogen is the lightest gas on Earth without color and odor. When combusted, it forms water without producing toxic gases. If hydrogen is produced by using the electricity generated by natural energies such as solar power, wind power, etc., to electrolyze water, natural energies can be converted to hydrogen gas that is easy to store and transport. Unlike oil, which is produced in limited areas, hydrogen can be produced anywhere on Earth, which is the biggest advantage. Hydrogen is currently mass-produced from methanol, natural gas and gasoline, but in the future it is expected to be produced mainly from water by using natural energies.