

Light-Duty Automotive Technology and Fuel Economy Trends: 1975 Through 2004

Executive Summary

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NOTICE

*This Technical Report does not necessarily represent final EPA decisions or positions.
It is intended to present technical analysis of issues using data that are currently available.*

*The purpose in the release of such reports is to facilitate an exchange of
technical information and to inform the public of technical developments.*

Introduction

This report summarizes key fuel economy and technology usage trends related to model year 1975 through 2004 light-duty vehicles sold in the United States. Light-duty vehicles are those vehicles that EPA classifies as cars or light-duty trucks (sport utility vehicles, vans, and pickup trucks with less than 8,500 pounds gross vehicle weight ratings).

Model year 2004 light-duty vehicles are estimated to average 20.8 miles per gallon (mpg). The MY2004 average is within the 20.6 to 20.9 mpg range that has occurred for the past eight years, but six percent below the 1987-88 peak of 22.1 mpg.

Since 1975, the fuel economy of the combined car and light truck fleet has moved through four phases:

1. a rapid increase from 1975 continuing to the mid-1980s,
- b. a slow increase extending into the late 1980s,
- c. a gradual decline from then until the late 1990s, and
- d. a period of relatively constant fuel economy since then.

The fuel economy values in this report are adjusted, based on 'real world' estimates provided by the Federal government to consumers, and are about 15 percent lower than the fuel economy values used by manufacturers and the Department of Transportation (DOT) for compliance with the Corporate Average Fuel Economy (CAFE) program.

For model year 2004, light trucks are projected to account for 48 percent of all light-duty vehicles. After over two decades of steady growth, the market share for light trucks has been about half of the overall light-duty vehicle market since 2002. Most of this growth in the light truck market has been led by the increase in the popularity of sport utility vehicles (SUVs), which now account for more than one fourth of all new light-duty vehicles.

Model year 2004 light-duty vehicles are estimated to be heavier and more powerful than in 2003. This continues a twenty-plus year trend of increasing vehicle weight and power due to ongoing technological innovations commercialized by vehicle manufacturers in response to consumer demands.

Importance of Fuel Economy

Fuel economy continues to be a major area of public and policy interest for several reasons, including:

1. Fuel economy is directly related to energy security because light-duty vehicles account for approximately 40 percent of all U.S. oil consumption and much of this oil is imported.
2. Fuel economy is directly related to the cost of fueling a vehicle and is of great interest when oil and gasoline prices rise.
3. Fuel economy is directly related to emissions of greenhouse gases such as carbon dioxide. Light-duty vehicles contribute about 20 percent of all U.S. carbon dioxide emissions.

Characteristics of Light-Duty Vehicles for Three Model Years (numbers are sales-weighted averages)

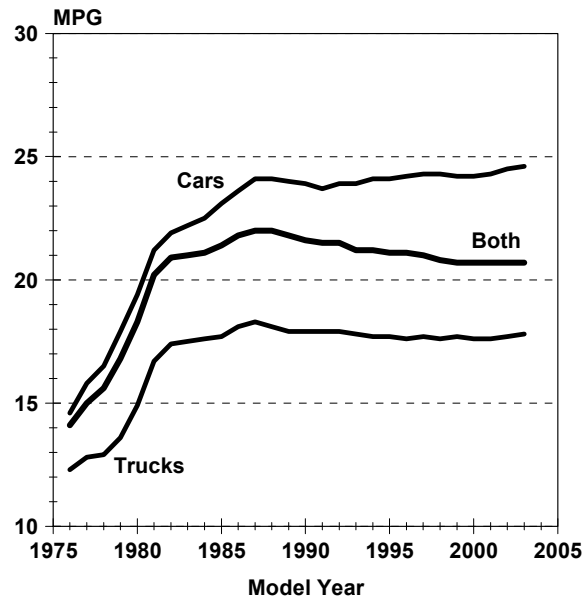
	1975	1987	2004
Adjusted Fuel Economy (mpg)	13.1	22.1	20.8
Weight (pounds)	4060	3220	4066
Horsepower	137	118	208
0 to 60 Time (seconds)	14.1	13.1	10.0
Percent Truck Sales	19%	28%	48%

Highlight #1: Fuel Economy Has Been Relatively Constant For Several Years.

After a decade of decline from 1988 to 1997, fuel economy has been constant for several years. The average fuel economy for all model year 2004 light-duty vehicles is estimated to be 20.8 mpg - 6 percent lower than the peak value of 22.1 mpg achieved in 1987-88. Average model year 2004 fuel economy is 24.6 mpg for cars and 17.9 mpg for light trucks.

Since 1975, the fuel economy of the combined car and light truck fleet has moved through several phases: (1) a rapid increase from 1975 to the mid-1980s, (2) a slow increase extending into the late 1980s, (3) a decline from the peak in the late 1980s, and (4) since then a period of relatively constant overall fleet fuel economy. Viewing new cars and trucks separately, the three-year moving average fuel economy for cars has increased 1.0 mpg since 1991, but that for trucks has been relatively constant.

**Adjusted Fuel Economy by Model Year
(Three-Year Moving Average)**

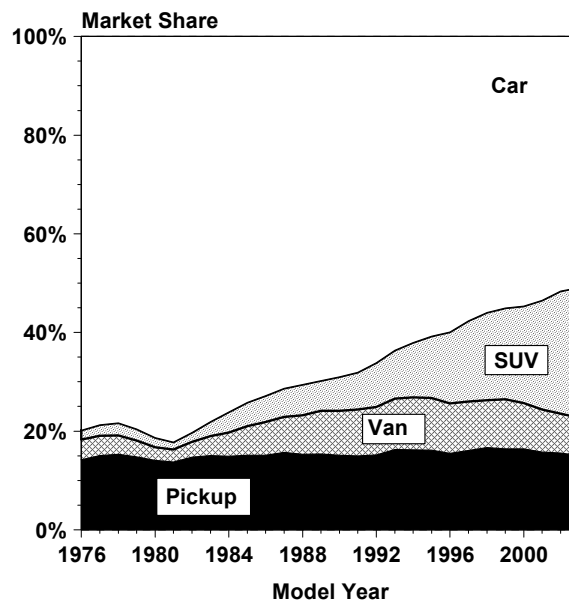


Highlight #2: Trucks Represent About Half of New Vehicle Sales.

Sales of light trucks, which include sport utility vehicles (SUVs), vans, and pickup trucks are now projected to make up 48 percent of the U.S. light-duty vehicle market -- more than twice their market share in 1984.

Growth in the light truck market has been led recently by the increase in the market share of SUVs. The SUV market share increased by more than a factor of ten, from less than two percent of the overall new light-duty vehicle market in 1975, to over 25 percent of the market now. Over the same period, the market share for vans increased by about three percent, while that for pickups remained relatively constant. Between 1975 and 2004, market share for new passenger cars and station wagons decreased from 81 to 52 percent. For model year 2004, cars are estimated to average 24.6 mpg, vans 20.0 mpg, SUVs 17.9 mpg, and pickups 17.0 mpg. The increased market share of light trucks, which in recent years have averaged more than six mpg less than cars, accounted for much of the decline in fuel economy of the overall new light-duty vehicle fleet from 1988 to 1997.

Sales Fraction by Vehicle Type
(Three-Year Moving Average)

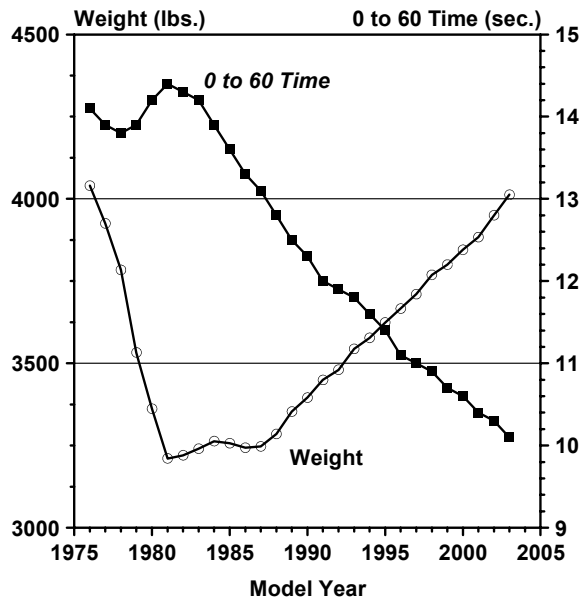


Highlight #3: As a Result of Technological Innovation, Vehicle Weight Has Increased and Performance Has Improved While Fuel Economy Has Remained Constant.

Manufacturers continue to apply technological innovations to the new light-duty vehicle fleet to increase light-duty vehicle weight and acceleration performance in response to consumer demands. EPA estimates that had the new 2004 light-duty vehicle fleet had the same distribution of performance and the same distribution of weight as in 1987, it could have achieved about 20 percent higher fuel economy.

Technologies-such as engines with more valves and more sophisticated fuel injection systems, and transmissions with lockup torque convertors and extra gears-continue to penetrate the new light-duty vehicle fleet. The trend has clearly been to apply these new technologies to accommodate increases in average new vehicle weight, power, and performance while maintaining a constant level of fuel economy. This is reflected by heavier average vehicle weight, rising average horsepower, and faster average 0 to 60 mile-per-hour acceleration time.

Weight and Performance
(Three Year Moving Average)



Important Notes With Respect to the Data Used in This Report

Unless otherwise indicated, the fuel economy values in this report are based on laboratory data and have been adjusted downward by about 15 percent, so that this data is equivalent to the real world estimates provided to consumers on new vehicle labels, in the EPA/DOE *Fuel Economy Guide*, and in EPA's *Green Vehicle Guide*. These adjusted fuel economy values are significantly lower than those used for compliance with CAFE standards as, in addition to the 15 percent downward adjustment for real world driving, they also exclude credits for alternative fuel capability and test procedure changes that are included in the CAFE data reported by the DOT.

The data presented in this report were tabulated on a model year basis, but several of the figures in this report use three-year moving averages which effectively smooth the trends, and these three-year moving averages are tabulated at their midpoint. For example, the midpoint for model years 2002, 2003, and 2004 is model year 2003. All average fuel economy values were calculated using harmonic, rather than arithmetic averaging.

The source database used to generate the tables and graphs in this report for all years, other than MY2003, was frozen in October 2003. When comparing data in this report with those in previous reports in this series, please note that revisions are made in the data for some recent model years for which more complete and accurate sales and fuel economy have become available.

Through model year 2002, the fuel economy, vehicle characteristics, and sales data used for this report were obtained from the most complete databases used for CAFE standards and "gas guzzler" compliance purposes.

Where available, the model year 2003 data in this report is based on CAFE compliance data submitted to EPA by March 31, 2004. For those MY2003 cases for which compliance data was yet not available, EPA used data that included confidential sales projections submitted to the Agency by the automotive manufacturers, but updated the sales data to take into account information reported in trade publications.

For model year 2004, EPA has exclusively used confidential projected sales data that the auto companies are required to submit to the Agency.

Over the last five years, the final fuel economy values have varied from 0.1 mpg lower to 0.3 mpg higher compared to the original estimates based exclusively on projected sales.

For More Information

Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2004 (EPA420-R-04-001) is available electronically on the Office of Transportation and Air Quality's (OTAQ) Web site at:

www.epa.gov/otaq/fetrends.htm

Printed copies are available from the OTAQ library at:

U.S. Environmental Protection Agency
Office of Transportation and Air Quality Library
2000 Traverwood Drive
Ann Arbor, MI 48105
(734) 214-4311

A copy of the *Fuel Economy Guide* giving city and highway fuel economy data for individual models is available at:

www.fueleconomy.gov

or by calling the U.S. Department of Energy's National Alternative Fuels Hotline at (800) 423-1363.

EPA's *Green Vehicle Guide* provides information about the air pollution emissions and fuel economy performance of individual models is available on EPA's web site at:

www.epa.gov/greenvehicles

For information about the Department of Transportation (DOT) Corporate Average Fuel Economy (CAFE) program, including a program overview, related rulemaking activities, research, and summaries of individual manufacturers' fuel economy performance since 1978, see:

www.nhtsa.dot.gov/cars/rules/cale/index.htm