



CONSUMERS AND FUEL ECONOMY

AUTO ALLIANCE
DRIVING INNOVATIONSM

FUEL EFFICIENCY

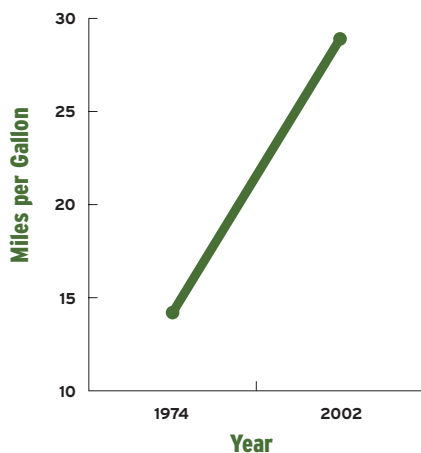
Continues to Grow Each Year

Since the early 1970s, new vehicles have continued to become more fuel efficient. According to EPA data, efficiency has increased steadily at nearly 2 percent per year on average from 1975 to 2002 for both cars and light trucks.

Fuel economy rates in cars have more than doubled in the past generation from 14.2 miles per gallon in 1974 to more than 28.9 miles in 2002.

Today's light truck gets better mileage than the compact cars from the 1970s.

Increase in fuel economy from 1974 to 2002



If fuel efficiency continues to increase each year, why has fuel economy remained static since the late 1980s?

There's a **big difference** between **fuel efficiency** and **fuel economy**.

Fuel efficiency is a measure of how effectively a vehicle uses the energy from fuel. Efficiency gains can be used to transport the vehicle more miles per gallon, to provide other attributes that consumers demand, or to overcome additional weight from new safety features.

Fuel economy is what consumers measure as they drive on the road –the miles per gallon that their vehicle provides– and what manufacturers report to the government. Although fuel economy for cars and light trucks has increased significantly since 1975, most of this increase occurred in the late 1970s to early 1980s in response to consumer demands due to high fuel prices.

While car and light truck fuel efficiency has continued to increase, the overall fleet fuel economy remained essentially flat since the mid-1980s because consumers demanded more advanced safety features, increased towing capacity, increased cargo carrying capacity, greater utility, and more comfort. In 2003, 56 percent of all new vehicles purchased were minivans, pickup trucks, SUVs and vans.

WHAT REALLY AFFECTS FUEL ECONOMY?

Fuel Economy

>> TECHNICAL
Advancements

Fuel
EFFICIENCY

Advanced
Safety

Increased
Towing

Increased
Cargo Room

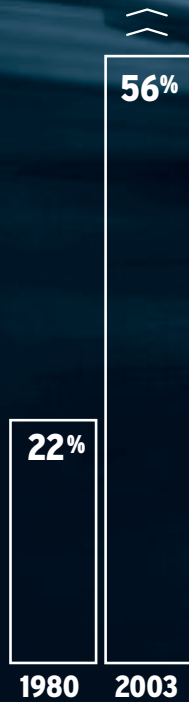
Increased
Comfort

CONSUMER <<
Demands



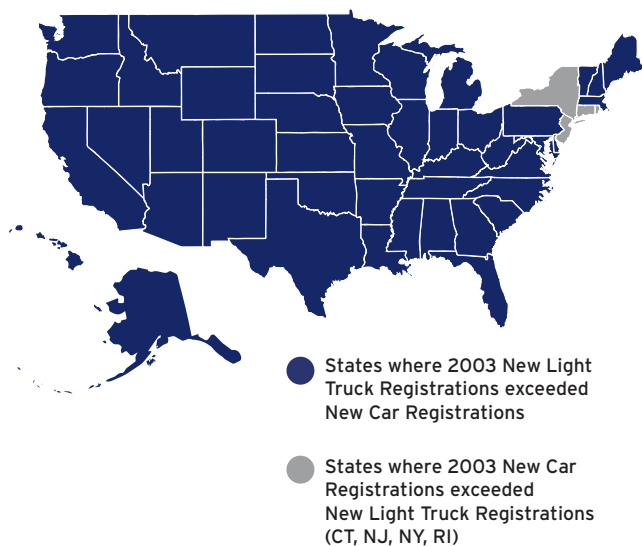
WHAT DO AMERICAN CONSUMERS WANT?

Light Truck Market Share of Total Vehicle Sales



Since 2001, American consumers have purchased more light trucks than passenger cars. In 2003, for the third year in a row, pickup trucks, minivans, vans and SUVs outsold passenger cars.

In 46 states consumers bought more light trucks than passenger cars.



What do consumers want?

Consumers Value Different Types of Vehicles

2003 U.S. Light Vehicle Sales

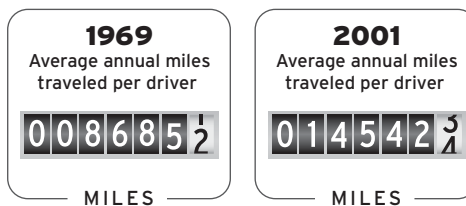
Vehicle Type	2003 Sales	% Share
Sport Utility	3,958,033	28.7%
Pickup	2,722,376	19.8%
Midsize Car	2,415,353	17.6%
Economy Car	1,775,557	13%
Luxury Car	1,069,690	7.7%
Minivan & Van	1,050,025	7.6%
Sports Car	482,732	3.5%
Large Car	255,791	2%
TOTAL	13,744,870	100%

Why Consumers Choose What They Choose

Between 1980 and 2003, the light truck market share increased from 22 percent to 56 percent of total vehicle sales. When considering what kind of vehicle to buy, consumers evaluate all of the different uses they will demand of their new car or light truck. Most consumers select vehicles that best serve their peak uses, whether carrying kids, carpooling adults, towing trailers, hauling supplies, accommodating the handicapped, handling adverse terrain and weather, addressing recreational needs and/or meeting job/business demands—even if these attributes may not be used every day.

AMERICANS ARE DRIVING MORE THAN EVER.

Taking advantage of increased vehicle fuel efficiency and gasoline prices, Americans are driving their vehicles more miles per year. In 1969, the average annual miles traveled per driver was 8,685 miles; by 2001, the average annual miles had grown to 14,542 miles—an increase of 67 percent.



What is CAFE?

CAFE is a program Congress adopted in 1975 to reduce U.S. dependence on foreign oil by reducing fuel consumption. There is a regulatory process underway to determine CAFE standards.

The Energy Policy and Conservation Act (EPCA) directs National Highway Traffic Safety Administration (NHTSA) to set fuel economy standards at the "maximum feasible" level. This regulatory process is intended to consider key elements such as technological feasibility, cost, safety, emissions controls, consumer choice and effects on American jobs. Automakers oppose legislative increases in fuel economy standards because Congress is not required to consider these key elements.

The Alliance is working constructively with the NHTSA on a multi-year rulemaking process to improve the fuel economy of America's light truck fleet. In December 2002, NHTSA announced that CAFE averages for light trucks must increase from the current 20.7 mpg to 22.2 mpg by model year 2007.

How does CAFE work?

CAFE requires each automaker to meet an average fuel economy level of 27.5 miles per gallon (mpg) for all new cars it sells in a year (this is the "fleet fuel economy"). Each manufacturer must meet an average fuel economy level of 22.2 mpg by 2007 for all the light trucks (minivans, vans, sport utility vehicles and pickup trucks) it sells in a year.

Automakers cannot meet CAFE standards alone.

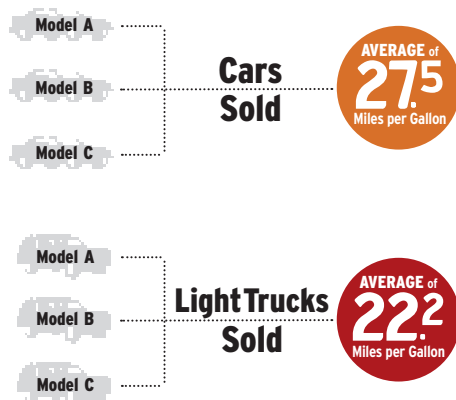
While the law holds manufacturers responsible for meeting CAFE standards, in reality, consumer purchases (the types of vehicles consumers buy) actually determine whether a manufacturer meets, exceeds or falls short of the standard in any given year.

Because CAFE is based on the vehicles sold each year, whether a manufacturer meets the CAFE standard or not depends not only on what products are offered, but also on what products consumers purchase.

Manufacturers Offer a Wide Range of Products Today

Automakers today offer more than 30 vehicles (including various powertrain combinations) that achieve more than 30 miles per gallon. These fuel-efficient vehicles are available today in showrooms and on dealership lots.

HOW DOES CAFE WORK?



WHAT IS CAFE?

>> CAFE Calculation Technique (gasoline vehicles only)

Fuel economy values are calculated from the emissions generated during the tests using a carbon balance equation (we know how much carbon is in the fuel, so by measuring the carbon compounds expelled in the exhaust we can calculate the fuel economy).

Label values are calculated for different vehicle models by sales weighting the projected sales and fuel economy of one or more test vehicles.

The equation for calculating the city or highway average mpg is:

$$\text{FE average} = \frac{\text{TOTAL SALES}}{\frac{\text{SALES1}}{\text{FE1}} + \frac{\text{SALES2}}{\text{FE2}} + \dots + \frac{\text{SALESn}}{\text{FE}_n}}$$

Combined fuel economy is a harmonically weighted average of the city (55%) and highway (45%) fuel economy (mpg) values. The equation is:

$$\text{FE combined} = \frac{1}{\frac{.55}{\text{city FE}} + \frac{.45}{\text{hwy FE}}}$$

* SOURCE: Environmental Protection Agency, Office of Air and Radiation, Office of Transportation and Air Quality



WHAT ABOUT SAFETY AND FUEL ECONOMY?

1,300-2,600
Fatalities

“the downweighting and downsizing that occurred in the late 1970s and early 1980s, some of which was due to CAFE standards, probably resulted in an additional 1,300 to 2,600 traffic fatalities in 1993.”

National Academy of Sciences (NAS) Study on CAFE, July 2001

Safety + Fuel Economy

ADVANCED TECHNOLOGY VEHICLES

Even as automakers have increased fuel economy 100 percent in a generation, we have continued to enhance safety features. This despite the fact that safety improvements often decrease fuel economy because they add weight to a vehicle. Manufacturers have had to significantly improve fuel efficiency just to maintain current fuel economy performance.



Additional safety features add weight and must be overcome by increasing fuel efficiency technology to maintain current levels of fuel economy.

Consumers are demanding increased safety performance from their vehicles beyond government requirements. Cars and light trucks today are safer than ever before and automakers are developing and integrating the latest safety technology advancements in new vehicles. Automakers are offering a wide range of safety options now, including antilock brakes, traction control and stability control, giving consumers the ability to choose safety options which best fit their family's needs. However, these add weight that must be overcome by additional fuel efficiency technology to maintain the current levels of fuel economy.

Auto companies face the challenge of maintaining vehicle safety, size and other attributes that consumers want while working to improve fuel economy. We can meet these goals by using more alternative fuels and advanced technologies. Government can help by providing incentives such as consumer tax credits to help make these types of vehicles more affordable for consumers in the near term.



"Federal 'corporate average fuel economy (CAFE) standards' effectively forced people into less safe, smaller cars, and 46,000 have died as a result, according to a USA Today analysis." (USA Today editorial, "Are Lives Really an Acceptable Price for Fuel Efficiency?" July 8, 1999)

WHAT IS THE ANSWER? ADVANCED TECHNOLOGY VEHICLES.

Throughout the automobile's history, few industries have worked harder to keep their promises to an eager public.

Engaging designs. Higher performance. And the most important promise of all: creating exciting automobiles that are cleaner, safer, smarter, more reliable and more fuel efficient.

We've come a long way toward fulfilling these promises. For starters, the computer technology in today's autos is 1,000 times more powerful than that which guided the Apollo moon mission. Computers handle everything from airbag safety systems and anti-lock brakes to GPS systems and fuel efficiency. Today's vehicles are also better for the environment. They run 99% cleaner than their counterparts from the 1970s.



► The Ford Escape Hybrid features an electric drivetrain to augment its fuel-efficient, 4-cylinder gasoline engine. With regenerative braking and nearly instantaneous start-stop capability, the Escape Hybrid will be especially fuel-efficient in city traffic.



◀ The new Prius is the first Toyota product to employ Toyota's Hybrid Synergy Drive, a third-generation, electric-gas hybrid powertrain technology.

In 2001, the National Academy of Sciences (NAS) released a study titled, "*Technologies for Improving the Fuel Economy of Passenger Cars and Light-Duty Trucks.*"

The study identified several fuel-efficient technologies:

- Multi-valve, overhead camshaft valve trains; Variable valve timing (VVT) and variable valve lift and timing (VVLT); Engine downsizing and supercharging (includes turbocharging);
- Direct-injection diesel engines; Advanced Transmissions (Five-speed and/or six-speed automatic transmissions, continuously variable transmissions, automatic shift/manual transmissions; and
- Hybrid electric vehicles

A survey of the currently available model year 2003 and 2004 cars and trucks for sale in the US found that some or all of these technologies are already available to consumers:

80%

197 of 245 models, or 80% of models had at least one fuel-efficient technology available.

42%

103 of 245 models, or 42% of models had at least two technologies available.

16%

40 of 245 models, or 16% of models have at least three technologies available.

More good news is on the way.

Automakers are working on multiple pathways for advanced technology. With these new technologies, auto manufacturers can economically meet or exceed environmental and safety requirements – while still producing the vehicles consumers want most.



► The BMW 745h is a five-passenger luxury-performance sedan, powered by a 4.4 liter V8 engine, which runs on either liquid hydrogen or gasoline.

► The diesel electric hybrid Dodge Ram heavy-duty pickup has an integrated starter-generator powertrain that produces up to 10 percent better fuel efficiency and enhanced performance on the road.

◀ Hy-wire is so advanced that GM has more than 30 patents in progress covering business models, technologies, and manufacturing processes. The Hy-wire's fuel cell propulsion system is housed entirely in an 11-inch thick skateboard-like chassis.

◀ The Mazda RX-8 Hydrogen RE powered by the Mazda RENESIS hydrogen rotary engine is now undergoing running tests. The hydrogen version of RENESIS is the latest example of the company's efforts to satisfy the demand for both environment-friendliness and exhilarating performance. By making the most of the unique rotary-engine technologies, Mazda was able to develop this powerplant as one proposal for alternative-energy vehicle technologies aimed at a future hydrogen-based society.

◀ The Audi A8 TDI, a premium sports sedan, gets 29 MPG, compared to 20 MPG for the gasoline version.



Already, drivers are learning a new vocabulary.

Fuel cell. Hybrid electric. Clean diesel. Hydrogen. Alternative fuels. Cylinder deactivation. All of these terms are becoming familiar thanks to the billions of dollars that members of the Alliance of Automobile Manufacturers have invested in research, development and deployment of advanced technology vehicles.

To make advanced technology vehicles more appealing to consumers, the Alliance supports consumer tax incentives for the purchase of such vehicles. Instead of pushing new technology on customers by regulating higher CAFE, the government and manufacturers should motivate consumers to adopt and purchase new technologies that reduce fuel consumption.

WANT TO KNOW MORE?

Visit the Alliance at www.autoalliance.org.



The Alliance of Automobile Manufacturers

is a trade association of 9 car and light truck manufacturers including

BMW Group, DaimlerChrysler, Ford Motor Company,

General Motors, Mazda, Mitsubishi Motors, Porsche, Toyota and Volkswagen.

One out of every 10 jobs in the U.S. is dependent on the automotive industry.

No other industry is linked to so much U.S.

manufacturing or generates more retail business and employment.

For more information, visit the Alliance website at

www.autoalliance.org.

BMW Group

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The Alliance of Automobile Manufacturers

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