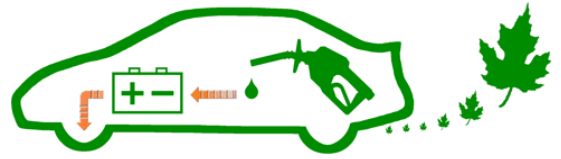


Being Green



Why do some still consider hybrids like Prius “alternative” vehicles, rather than mainstream family cars?

Isn't the technology just the next step in automotive advancement to reduce emissions & consumption?

Have you ever done the math, asking how being green isn't already so common that everyone supports it?

Unfortunately, there are some people called “greenwashers”, who intentionally mislead about the new clean & efficient technology. They hope you don't consider questions like that. In fact, they will even go as far as labeling anyone who shows interest in the topic as a “treehugger” with the hope to demean & intimidate. Don't allow them. That is easy to overcome and the information simple to understand. Their resistance to change will fade as more learn about what's included in this document.

Carbon Emissions

This is the type of emission is directly tied to vehicle efficiency. It is also the type that contributes to climate change. The specific pollutant involved is Carbon Dioxide. The higher the MPG, the less your impact is to the environment.

Smog Emissions

This type of emission has no relation to vehicle efficiency. In fact, some high MPG vehicles emit larger quantities of pollutants contributing to smog than those with lower MPG.

These pollutants are what this emission type consists of:

- **NMOG, NMHC, or THC** – Types of carbon-containing compounds, including hydrocarbons.
- **NO_x** – Oxides of Nitrogen, which combine with hydrocarbons to create smog.
- **PM** – Particulate Matter, tiny particles of solid matter that lodge in the lungs and deposit on buildings.
- **CO** – Carbon Monoxide, a colorless, odorless, poisonous gas.
- **HCHO** – Formaldehyde, a lung irritant and carcinogen.

The level of each is measured and the result is a rating label to identify which emission category the vehicle is in:

- **LEV** – Low Emission Vehicle
- **ULEV** – Ultra Low Emission Vehicle
- **SULEV** – Super Ultra Low Emission Vehicle
- **PZEV** – Partial Zero Emission Vehicle
- **AT-PZEV** – Advanced Technology PZEV
- **ZEV** – Zero Emission Vehicle

Fuel Saving

This is a popular misleading tactic used now. It takes advantage of the inherent shortcoming from depicting efficiency in terms of MPG (Miles Per Gallon). That type of measurement is relative, providing a forgiving illusion for large vehicles.

Consider a practical vehicle lifetime of 150,000 miles for a standard basis of comparison. This is how many gallons of fuel are consumed and the difference for each incremental improvement over that **Vehicle's Lifetime**:

| MPG | Gallons | Difference |
|-----|---------|------------|
| 15 | 10,000 | - |
| 20 | 7,500 | 2,500 |
| 25 | 6,000 | 1,500 |
| 30 | 5,000 | 1,000 |
| 35 | 4,286 | 714 |
| 40 | 3,750 | 536 |
| 45 | 3,333 | 417 |
| 50 | 3,000 | 333 |
| 55 | 2,727 | 273 |
| 60 | 2,500 | 227 |

Fuel saving is what often gets promoted, though it shouldn't. When a 5 MPG improvement is provided for a 15 MPG vehicle compared to a 45, the impression is the 2,500 gallon difference is better than 333. That seems sensible... until you notice how much fuel is used overall. But most people don't, since that data isn't readily available. So they don't realize that 4,500 more gallons used.

Fuel Usage

Rather than the number of miles traveled per gallon, think about how much fuel it takes to travel a specific distance. The method most of the world outside of the United States measures efficiency is stated in terms of Liters per 100 Kilometers instead. It makes being misled is much more difficult. To see why, consider **Gallons per 100 Miles**:

| MPG | Liters per 100 KM | Gallons per 100 Miles |
|-----|-------------------|-----------------------|
| 15 | 15.7 | 6.7 |
| 20 | 11.8 | 5.0 |
| 25 | 9.4 | 4.0 |
| 30 | 7.8 | 3.3 |
| 35 | 6.7 | 2.9 |
| 40 | 5.9 | 2.5 |
| 45 | 5.2 | 2.2 |
| 50 | 4.7 | 2.0 |
| 55 | 4.3 | 1.8 |
| 60 | 3.9 | 1.7 |

Even if you weren't aware of the fact that driving 150,000 miles with a vehicle which gets 20 MPG uses 4,500 more gallons of fuel than one which gets 50 MPG, the per-distance measure makes true efficiency obvious.

Don't be fooled by "saving" claims. Proper determination of efficiency should be based upon overall gallons used.

Actual Sales

Tired of the “*saves gas*” propaganda?

Whether or not a new hybrid technology is superior to another really doesn't matter if only a few are actually sold.

Taking a look at the sales data, you may be surprised by the overall impact. Quantity makes a huge difference. If only a small number were actually sold, it's just “halo marketing”.

The total number of Two-Mode vehicles sold in 2008 for all models was 6,992. The estimated efficiency was 21 MPG. Figuring each is driven 15,000 miles per year, the annual gas consumption calculates to 714 gallons. Comparing that to the 15 MPG estimate for the traditional models using 1,000 gallons annually, the difference is 286. Multiplied by actual sales quantity, the overall impact is **2.0** Million gallons saved.

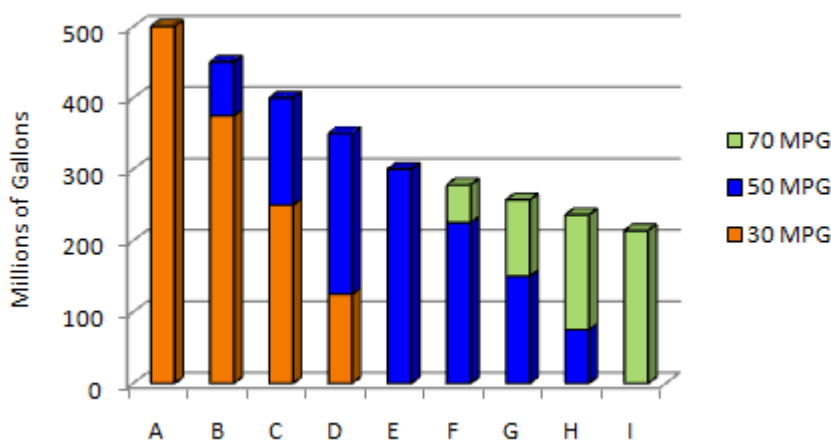
The total number of Prius sold in 2008 in the United States was 158,884. The estimated efficiency was 46 MPG for that second generation model. Figuring each is driven 15,000 miles per year, the annual gas consumption calculates to 326 gallons. Comparing that to an equivalent non-hybrid model (built for emphasis on efficiency) with a 35 MPG estimate using 429 gallons annually, the difference is 103. Multiplied by actual sales quantity, the overall impact is **16.4** Million gallons saved.

If the same amount of the third generation model of Prius is sold within a year, its 50 MPG estimated efficiency increases the difference to 129. The overall impact then becomes **20.5** Million gallons. That seemingly small 4 MPG improvement alone ends up *saving* twice as much gas as the Two-Mode vehicles total.

Big Picture

Consumers require new vehicles to purchase. The preference would be that they are hybrids rather than traditional. Not all hybrids are the same. Some are more efficient than others. In a side-by-side comparison, it's easy to determine which will use less gas. But reality is rarely that simple. There will be a mix of hybrids along with a wide variety of traditional vehicles. Over time, the fleet of cars & trucks will be replaced by increasingly more efficient models.

In general, that progressive advancement for the entire market will resemble something like this:



The graph represents one million vehicles driven 15,000 miles per year. Each category (indicated by a letter) shows the drop in consumption when 25% replacement occurs. Each hybrid contributes, but the resulting outcome is still affected by those other vehicles which still use more fuel. This is why looking at the “big picture” is so important.