

90 years of U.S. fuel economy data shows the power of incentives, dangers of stagnation



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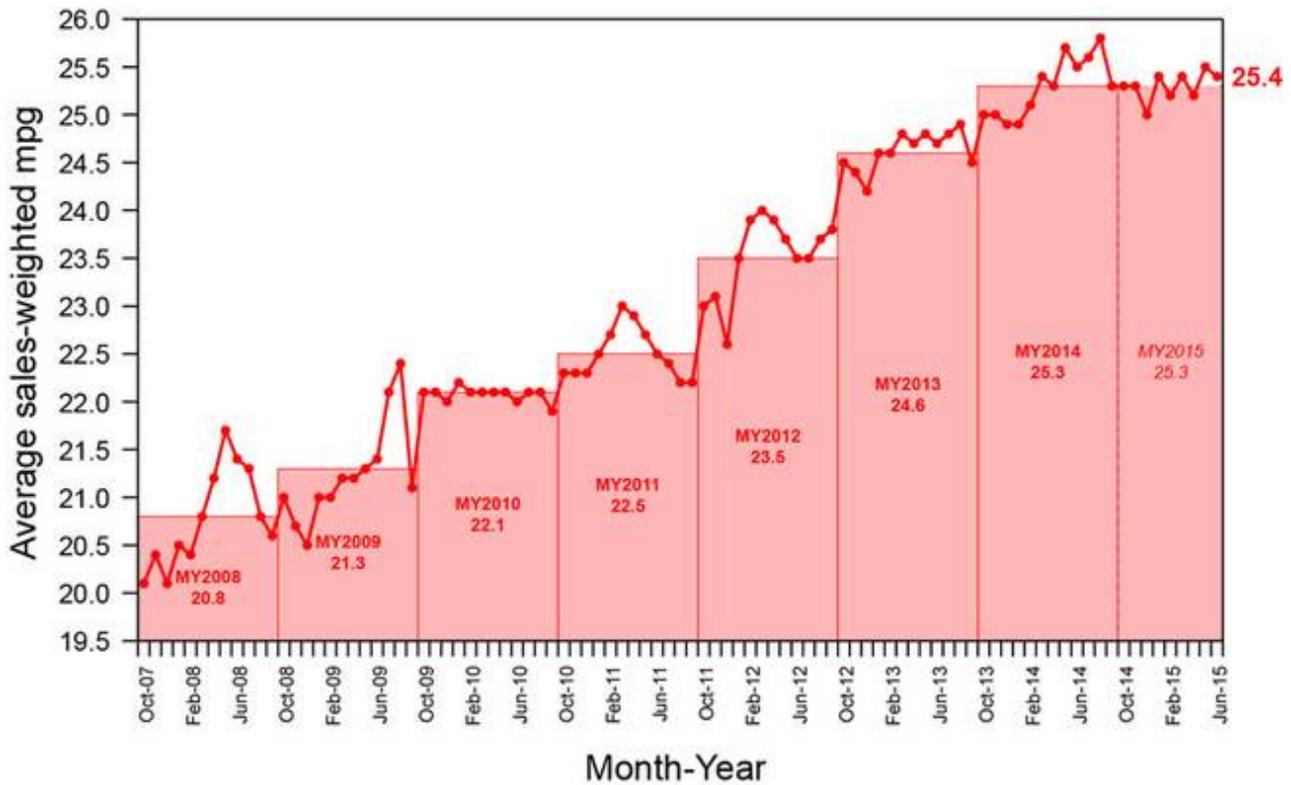
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While the best long-term scenario for transportation is to seriously reduce the emphasis on individual cars, increase walking, biking, mass transit, car-sharing and cars-for-hire ([self-driving EVs someday?](#)), the fact is that right now there are hundreds of millions of vehicles on the road, and that the transition to a different model will take time and will be slower in some places than others (faster in dense, urban areas, slower in spread out, rural areas with fewer alternatives to cars), so it matters tremendously how clean and efficient these vehicles are. They produce a significant fraction of the air pollution and greenhouse gases that our civilization produces (along with [buildings](#), which also need to be seriously improved).

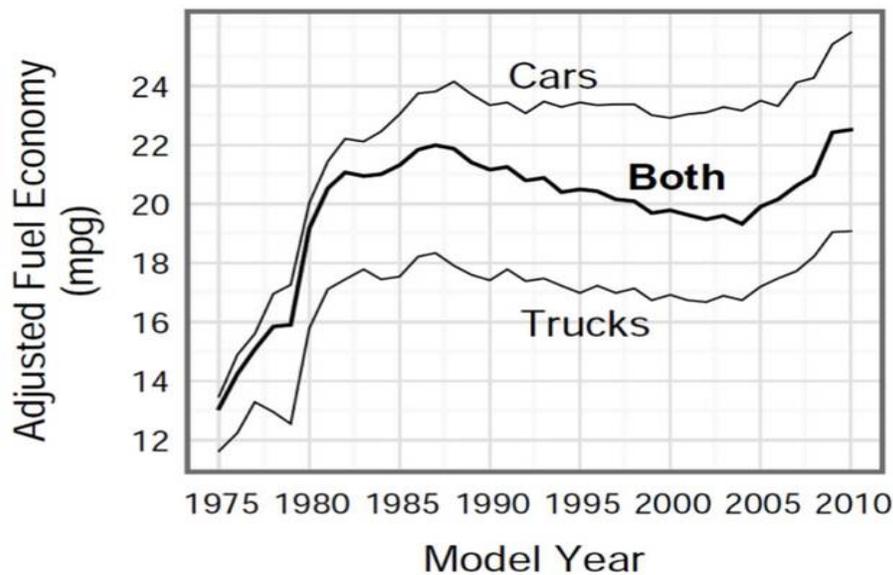
So how have we been doing on that front, and what's the best way to get things moving faster? Fuel economy data gives us some insight.



Michael Sivak and Brandon Schoettle
University of Michigan Transportation Research Institute

[UMTRI/Promo image](#)

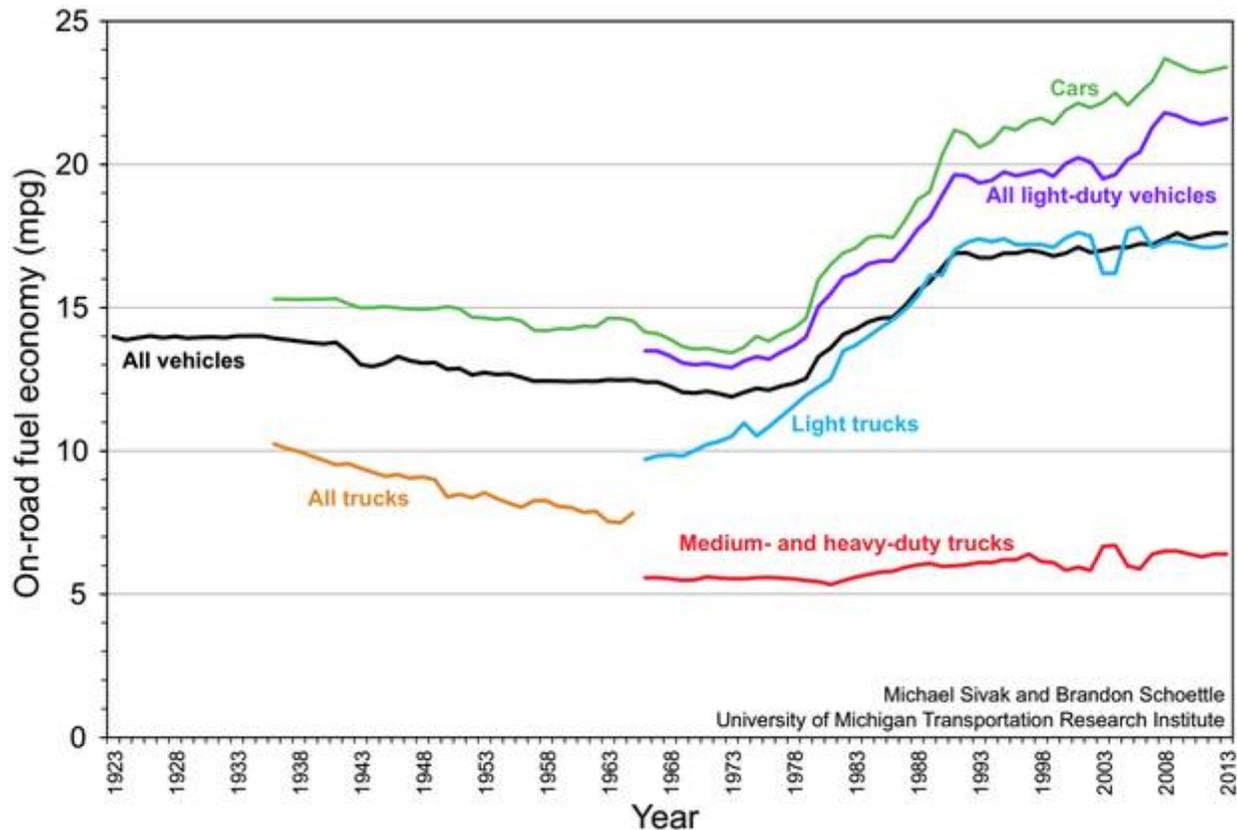
If you look just at [recent fuel economy figures](#) (above), things look pretty good. Steady upward progress. This can partly be attributed to tightened CAFE standards after years of unchanged rules and higher oil prices (especially the shock caused by hurricane Katrina, which woke a lot of people up).



FEG/Public Domain

If you go back further (graph above), things start to look different. You can see periods of rapid progress, such as the late 1970s-early 1980s, and periods of stagnation and regression, like most of the 1990s and early 2000s. Again, incentives play a big role in shaping that chart; the oil shock in the 1970s made people look for higher MPG and smaller vehicles while low oil prices in the 1990s and early 2000s and complacent politicians gave an excuse for stagnation.

Now, for the first time that I know of, Michael Sivak and his team at the [University of Michigan Transportation Research Institute](http://www.umTRI.org) (UMTRI) have compiled a much longer term dataset that shows how U.S. fuel economy evolved overall and for various subsets of the transportation sector for the past 90 years:



UMTRI/Screen capture

The black line shows the average of all types of vehicles, and each colored line represents a different subset of the overall data (ie. cars in green, light trucks in blue, medium and heavy-duty trucks in red). Note that light-duty vehicles have been improving much faster than medium and heavy ones. This could be a low-hanging fruit...

By category:

- All on-road vehicles. From 1923 through 1935, on-road fuel economy stayed approximately constant at around 14 mpg. Starting in 1936, fuel economy gradually declined, falling to its lowest level, 11.9 mpg, in 1973. In 1974, fuel economy

began to increase rapidly to 16.9 mpg in 1991. Thereafter, improvements have been small.

- Cars. On-road fuel economy decreased from 1936 to 1973, followed by major improvements from 1973 to 1991. Improvements since 1991 have been small, with fuel economy at 23.4 mpg in 2013.
- All trucks. For all trucks combined, the on-road fuel economy decreased from 10.2 mpg (23 l/100 km) in 1936 to 7.8 mpg (30 l/100 km) in 1965.
- Light trucks. On-road fuel economy of light trucks increased rapidly from 9.7 mpg (24 l/100 km) in 1966 to 17.0 mpg (13.8 l/100 km) in 1991. However, the improvements since 1991

have been small, with fuel economy at 17.2 mpg in 2013.

- Medium- and heavy-duty trucks. Since 1966, on-road fuel economy of medium- and heavy-duty trucks has improved from 5.6 mpg (42 l/100 km) to 6.4 mpg (36.7 l/100 km) in 2013.

This longer-term view is, in my opinion, quite scary. It shows how long things can not only stagnate, but deteriorate, when there's no incentive for improvement. During that long period between 1923 and the 1970s, it's not that engineers weren't improving engines and transmissions. It's that there was no incentive for higher fuel economy, but there were big incentives (in the marketplace) for faster acceleration, more comfort, larger vehicles, etc. So all the improvements were eaten up by these things while fuel economy was sacrificed.

Hopefully we're not headed into another period of stagnation (see also: [Should we be worried? After years](#) Via [UMTRI](#), [GCC](#))

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[of improvement, fuel economy has hit a new plateau in U.S.](#)) because we really can't afford to; we need rapid progress to deal with global warming and other pollution problems. I hope that the lower oil prices that we've seen recently won't lead us to repeat the mistakes of the past...

But what's even scarier is to extrapolate this to other sectors. Is there another industry that has misaligned incentives that make it waste resources simply because nothing is pushing it to do better? For a long time, computers were all about performance and the energy-efficiency was an afterthought. Then came the mobile revolution and now power/watt is what it's all about, so incentives aligned there and our computing devices are more power-efficient than ever before. But what about buildings? Urban planning? Are we moving fast enough there? What's currently under the radar that we'll wish later that we paid attention to earlier?