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# Why Automakers Keep Beating Government Standards

*Annie Sneed*

8-10 minutes

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For the fourth consecutive year, U.S. automakers have [exceeded](#) the federal government's requirements for greenhouse gas emissions, and they have also achieved record fuel efficiency. In two reports released last month, the EPA [said](#) that manufacturers had surpassed the emissions standards for 2015 passenger vehicles by an average of 7 grams of CO<sub>2</sub> per mile. At the same time, fuel economy rose to an all-time high of 24.8 miles per gallon average. Thanks to these regulations, automakers have prevented emissions of 130 million metric tons of carbon dioxide—equivalent to a year's worth of electricity use for 20 million homes.

It's perhaps surprising that automakers continue to overachieve, because federal auto standards have ratcheted up every year and automakers routinely complain that the requirements are difficult to meet. Consumers are also buying more SUVs, which get lower gas mileage. Industry experts say that a mixture of technology, regulations, and high gas prices from previous years are largely driving this

trend—however, some believe the picture might be more complicated than what the government has shared with the public.

In recent years, engineers have redesigned vehicles with more fuel-efficient technology, including gasoline direct injection engines paired with turbocharging, which results in smaller engines that burn less gas while retaining power. Transmissions with more gears (as many as 10) and continuously variable transmissions help the vehicles operate more efficiently. Lighter materials, such as aluminum and high-strength steel, cut down on fuel use as well. Smaller technical improvements also help make a difference, including better tires and air-conditioning systems, glazed windows to keep out heat, and idle stop-start systems that turn the engine off when a vehicle is standing still.

Carmakers actually invented many of these technologies years ago, before the standards were in place, but a good number of them either sat on the shelf or were used in vehicles for purposes other than fuel efficiency (such as turbochargers for more power). Now automakers are actually putting this tech into vehicles to boost miles per gallon and reduce emissions—technology that many experts are calling “low-hanging fruit” because it’s relatively easy and affordable to implement.

Hybrid and electric cars, which have very high mileage and very low emissions, can also pull up an automaker’s overall average for its fleet, although the effect can be small

because the vehicles are still a small part of the market. “It’s really about engineering progress across the board,” explains John DeCicco, a research professor at the University of Michigan Energy Institute.

Of course, there are bigger reasons why automakers have gone further than the government has asked.

For one, the regulations include a credit system. If automakers exceed standards in early years, they can bank credits to use in future years with stricter standards. “With the low-hanging fruit—the least expensive technologies—you get the best bang for your buck. It just makes sense to over-comply early on using relatively inexpensive technology,” says Jim Kliesch, environmental regulatory affairs manager at American Honda Motor Company. “If they generate credits for the future, it eases the transition when standards ratchet up later.”

This cushioning helps automakers because they typically only redesign a model every five years or so and they don’t redo the entire fleet at one time. Because the design process is staggered, the credits help smooth things out. Even for model year 2015 vehicles, which the EPA evaluated for its latest reports, only nine of the 12 automakers actually met or exceeded the standards—FCA, Mercedes, and Kia did not. But those three companies had banked enough credits from earlier years that they were able to comply.

Another factor helping automakers is that federal standards apply differently to different sizes of passenger vehicles

—bigger vehicles comply with weaker standards compared to smaller vehicles in any given year. So even though SUV sales have recently risen, it doesn't hurt an automaker's ability to comply. While that means that carbon emissions rise as more consumers buy SUVs, experts say it's not all bad news. "These market shifts are happening independent of the standards—they likely would have happened anyway," explains Luke Tonachel, director of the clean vehicles and fuels project at the Natural Resources Defense Council. "At least now standards are pushing those much larger vehicles to be more efficient."

High gas prices from past years have also helped automakers outrun federal standards. Although pump prices are low [now](#), gasoline cost an [average](#) of about \$3.20 per gallon from the late 2000s until 2014. Those heavier prices pushed consumers to demand more fuel-efficient vehicles. But because it takes at least four years for a car model to go from the design lab to market, there is a lag in greater efficiency. "It's technology gains that were put in the pipeline years ago, which are now finally being put in the showroom," says DeCicco.

Some experts also think the EPA's reports may not reveal the whole story. "Passenger vehicle" regulations only apply to vehicles up to 8,500 pounds, which include cars, minivans, vans, light duty pick-up trucks and SUVs. The government regulates vehicles above that cutoff point, but the standards are weaker because the EPA considers them work vehicles. It doesn't share its figures on them (though starting with

model year 2011 vehicles, the EPA [began](#) including SUVs and vans—but not trucks—above the 8,500 pound limit in its passenger vehicle category).

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DeCicco thinks that automakers may be designing more pickup trucks to be heavier, so that they fall above that 8,500 pound limit. “There are a lot of cars on the road that people are using, like the Ford F-250 Super Duty, that are fashion statements,” says DeCicco. “I would suspect that if you really counted the whole population of personal vehicles ... fuel economy may have started to go back down.” DeCicco notes that he can’t confirm this, because the EPA doesn’t release those numbers, but he has monitored the industry for decades. “I know that the sales of those vehicles have been doing great,” he explains.

The EPA says this isn’t the case. “We’re well aware of the theory and it would be of great concern to us if it was happening, but we haven’t seen any data to show that yet,” an EPA official told *Scientific American*. “We’re convinced that the majority of those bigger vehicles are still largely used for work applications—but it’s certainly something we’re going to be monitoring going forward.”

Industry watchers also wonder how much longer automakers will be able to comply with standards, much less outperform

them, having picked the low-hanging fruit. “As standards get tougher to meet, the only way we’ll be able to meet them is with more expensive technology—automakers will have to march up the cost curve to meet requirements,” says Kliesch. “I suspect we’ll see over-compliance diminish.”

And then there’s Donald Trump. The auto standards are up for an obligatory [mid-term review](#)—the EPA will decide whether to adjust the emissions standards and the National Highway Traffic Safety Administration will announce its final fuel economy standards for model year 2022–2025 vehicles. Even though the agencies have already started their evaluations, they won’t finish them until 2018 (though the Obama administration may [now](#) be trying to finalize the rules before Trump steps into office). That means “the Trump administration could revise them,” says Ann Carlson, a professor of environmental law at the University of California, Los Angeles. “And there’s a lot of pressure from the auto industry to back away from them.” If Trump follows through on his campaign promises to lessen regulations on industry, that’s likely what his administration will do.