

Will buying an electric car make an environmental difference?

April 11 2011, By Paul Rogers

Sure, you might get a carpool sticker and a tax break. But if you buy an electric car, will it make much environmental difference?

Experts say that depends on three factors: What were you driving before? How is your electricity generated? And how many other electric cars are going to be sold?

In many cases, people who trade gasoline-powered cars for electric ones won't be dramatically lessening the smog they emit. But when it comes to global warming, even when emissions from generating the electricity are taken into account, [electric vehicles](#) have a much smaller carbon footprint than gas-powered vehicles because they are much more efficient. However, it will take a decade or more until enough electric vehicles are on the road to make a significant impact.

"If you have a person who is driving a nice, newer car, having them switch to an electric car, there isn't going to be much benefit in reducing [smog](#)," said Tom Cahill, a professor emeritus of physics at University of California Davis. "But there could be a whole lot of gain in [climate change](#)."

Because all-electric vehicles like the Nissan Leaf burn no [fossil fuels](#), and plug-in hybrids like the Chevy Volt burn only small amounts of gasoline, tailpipe emissions from electric cars are basically zero. In smoggy cities like Los Angeles, driving one on summer days may actually clean the air because the tailpipe emissions contain less pollution

than the air.

Yet most people currently buying electric cars weren't driving old, smog-belching vehicles. They are often affluent motorists who drove newer-model gasoline cars. In California, because it has for 50 years had the toughest tailpipe standards in the nation, a 2010 gasoline-burning car puts out only 2 percent or less of the pollution spewed by a 1980s model.

Along with the national-security benefits of reducing America's use of foreign oil, the main societal benefit of electric cars might be their dramatically smaller global warming footprint.

A 2008 study by researchers at Carnegie Mellon University found that life-cycle greenhouse gas emissions, which include emissions from both manufacturing and operating a vehicle, are 32 percent less from plug-in hybrids than from gasoline-powered cars.

That finding was based on America's electricity mix: 45 percent of U.S. electricity is generated from coal, 23 percent from natural gas, 20 percent from nuclear, and 12 percent from dams, solar, wind and other sources.

The global warming footprint of electric cars varies by region. Some states get nearly all their electricity from coal, the most polluting fuel.

Using a nearly all-coal scenario for electricity, plug-in hybrids emit fewer greenhouse gases than gasoline-powered cars, the study found, but aren't as "clean" as ordinary hybrids like the Prius.

"The types of power plants installed in the next two decades will not only affect how much we can reduce emissions from electricity, but also from vehicles," said Carnegie Mellon engineer Kyle Meisterling, one of the study's authors.

In states with cleaner power mixes, plug-in hybrids have less than half the greenhouse gas footprint of conventional gasoline vehicles. Why? Efficiency, said Mark Jacobsen, a professor of civil and environmental engineering at Stanford University.

In cars with internal combustion engines, only 20 percent of the energy goes to move the car and 80 percent is wasted heat, he said. But in an electric car, 80 percent moves the vehicle and only 20 percent is wasted.

"Electricity is more efficient," Jacobsen said. "As a result, you just need less energy."

In a recent study, Jacobsen computed the carbon footprint of every major energy source, wondering which would be greenest if America converted all its vehicles to run on each. He found that electric vehicles powered by wind energy were best, with a 99 percent reduction in carbon and air pollution emissions from the current vehicle fleet. In fact, every vehicle in America could run on the electricity provided by 144,000 5-megawatt wind turbines, he concluded.

Building them sounds like a massive job, but he noted that the United States built 300,000 airplanes during World War II. Ethanol ranked last in his study, with the largest [carbon footprint](#).

"There's no technical reason we can't ramp up to a lot more electric vehicles," he said. "It's a question of whether society as a whole is motivated to do it."

Gas prices at \$5 a gallon might provide motivation. But even then, the transition is expected to be slow. Americans bought 11.6 million vehicles last year. Including the popular Prius, just 2.4 percent were hybrids. Only three automakers - GM, Nissan and French firm PSA - plan to produce more than 10,000 [electric cars](#) a year by the end of 2011.

"Almost anything you do won't have much effect for five to 10 years because you have all these used cars that stay on the road for so long," said Tom Turrentine, director of the Plug-in Hybrid Electric Vehicle Research Center at UC Davis. "It takes 10 years to really move through the fleet and change it. But you've gotta start somewhere."

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