

Emissions worldwide—gas vs. battery-electric vehicles

November 9 2017, by Bernie Degroat



Credit: University of Michigan

Gasoline vehicles would produce lower emissions than the average battery-electric vehicle only if their fuel economy was higher than 51.5 mpg worldwide, say researchers at the University of Michigan.

In the U.S., it would have to be slightly higher at 55.4 mpg but nowhere near the required 169.5 mpg for gas-powered vehicles in Canada or the whopping 524.6 mpg in France.

In a new study comparing [greenhouse gas emissions](#) from driving a battery-electric [vehicle](#) (BEV) versus a traditional gas-powered vehicle, U-M researchers Michael Sivak and Brandon Schoettle say fuel-economy-equivalent values for the 143 individual countries examined vary greatly.

"The reasons for conducting such a country-by-country comparison are that the indirect emissions from BEVs depend on the mix of fuel sources used to generate [electricity](#) and countries differ widely in their fuel-source mix," said Sivak, a research professor at the U-M Transportation Research Institute.

The researchers use BEV miles-per-gallon equivalent values based on "well-to-wheels" emissions of various electricity [fuel sources](#) calculated by the Union of Concerned Scientists and country-specific electricity production by fuel source compiled by the International Energy Agency.

Sivak and Schoettle say their calculations were performed to evaluate the relative emissions from driving a BEV compared with driving a gasoline-powered vehicle. Emissions associated with manufacturing each vehicle type were not considered.

For BEVs, the analysis included emissions from extracting and delivering raw materials to the electric power plants, emissions generated by using the specific fuel in the process of producing electricity, electricity losses during electricity distribution and the fuel efficiency of the vehicle. For gasoline vehicles, the study included emissions from extracting crude oil, transporting the oil, refining the oil into gasoline, delivering the gasoline to a retail outlet and combusting the gasoline in

the vehicle.

Fuel-source categories for electricity production analyzed in the study include coal, oil, natural gas, geothermal, solar, nuclear, wind and hydro.

In comparing the [fuel](#)-economy-equivalent values for BEVs for each country, Sivak and Schoettle found that [gasoline](#) vehicles would have to get:

- Between 29 mpg and 51 mpg in 52 countries, including several African countries on the low end of the range, as well as India (35.7 mpg) and China (40 mpg).
- Between 52 mpg and 99 mpg in 54 countries, including Germany (52.1 mpg), Mexico (56.2 mpg) and Russia (70.7 mpg).
- Between 100 mpg and 1,000 mpg in 26 countries, including 155.9 mpg in Brazil and 990.3 mpg in Iceland.
- Greater than 1,000 mpg in 11 countries, including Albania, Paraguay and Nepal—all with mpg equivalents higher than 5,000.

Provided by University of Michigan

Citation: Emissions worldwide—gas vs. battery-electric vehicles (2017, November 9) retrieved 23 April 2024 from <https://phys.org/news/2017-11-emissions-worldwidegas-battery-electric-vehicles.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.