Electric Vehicles & the Environment

Skeptics sometimes argue that plug-in electric vehicles (EVs, for short) simply shift the emissions source from the tailpipe to the smokestacks. However, the inherent efficiency advantages of electricity over internal combustion still generally make EVs a better environmental choice, and an even better long-term solution to promote energy security, combat climate change, and improve air quality. And, unlike conventional vehicles, EVs also become greener as energy production technology for electricity continues to improve. As a result, the environmental footprint from driving an EV will continue to decline as we transition to cleaner, renewable energy sources like wind, solar, and biomass.

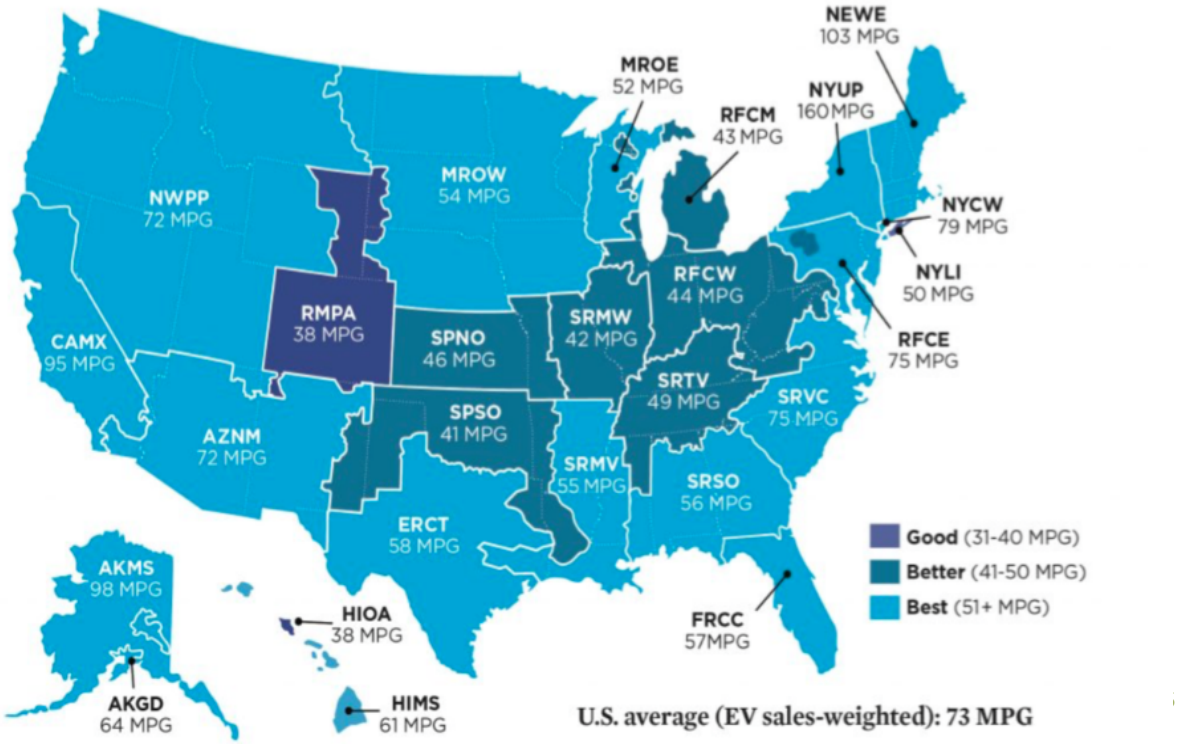
Michigan's Current State of Charge

A 2015 Union of Concerned Scientists report, *Cleaner Cars from Cradle to Grave: How Electric Cars Beat Gasoline Cars on Lifetime Emissions* compared quantities of global warming emissions from electric vehicles against those from gasoline-powered vehicles in each region of the U.S. electricity grid. The report shows that areas with the "cleanest" electricity grids also have EVs with the lowest greenhouse gas-related emissions, while regions that use greater amounts of coal have the highest. These emissions can be expressed in terms of mpg_{GHG}, with a national average of 73 mpg_{GHG}, up significantly from just 54 in 2012.

Michigan, which operates in one of the highest GHG-emitting regions in the nation, nonetheless falls within the "good" range of global warming emissions. Michigan's EVs achieve approximately 43 mpg_{GHG} or approximately equivalent fuel economy to the best gasoline or average hybrid models available today (see figure below).

The good news is that EV-related emissions in Michigan will continue to decline as the state takes steps to improve its electricity grid with its

Electric Vehicle Global Warming Pollution Ratings and Gasoline Vehicle Emissions Equivalents by Electricity Grid Region



renewable energy standard of 15 percent by 2021. The state has the potential to reduce its global warming emissions even more in the years ahead as it considers options for increasing its standard to as high as 35% renewables. (See Michigan's Energy Future report at: http://michigan.gov/energy.)

Michigan's Future State of Charge

An analysis by the Michigan-based Ecology Center shows emissions from new EVs in the state **have improved to 50 mpg $_{GHG}$** since Michigan met its 10% RES target in 2015. If the State of Michigan were to bolster its grid-generated mix of renewable energy to 25% of electricity produced in 2025, emissions from EVs could advance to 97 mpg. The figure below illustrates this emissions scenario, assuming also that overall vehicle efficiency continues to increase over time.

Today, driving an EV in Michigan still contributes less global warming emissions than driving a comparable gasoline vehicle. But driving that same EV will result in even fewer emissions over the coming decade as Michigan increases the amount of electricity generated from renewable sources. For those EV owners installing their own renewable energy systems, emissions have the potential to achieve near-zero levels—or very high mpg$_{GHG}$. In short, by coupling EVs with renewable energy, we can take Michigan into a new era of sustainable transportation and energy

Who We Are

Built by Michigan brings together businesses, workers, families, electric-vehicle owners, environmental organizations and community leaders to advance the manufacture and sale of electric vehicles in Michigan. We work with cities and industry leaders to develop and disseminate best practices for electric-vehicle integration and adoption at the municipal level. Visit the link below for more information on the case for electric vehicles and renewable energy.

Built By Michigan | www.builtbymichigan.org
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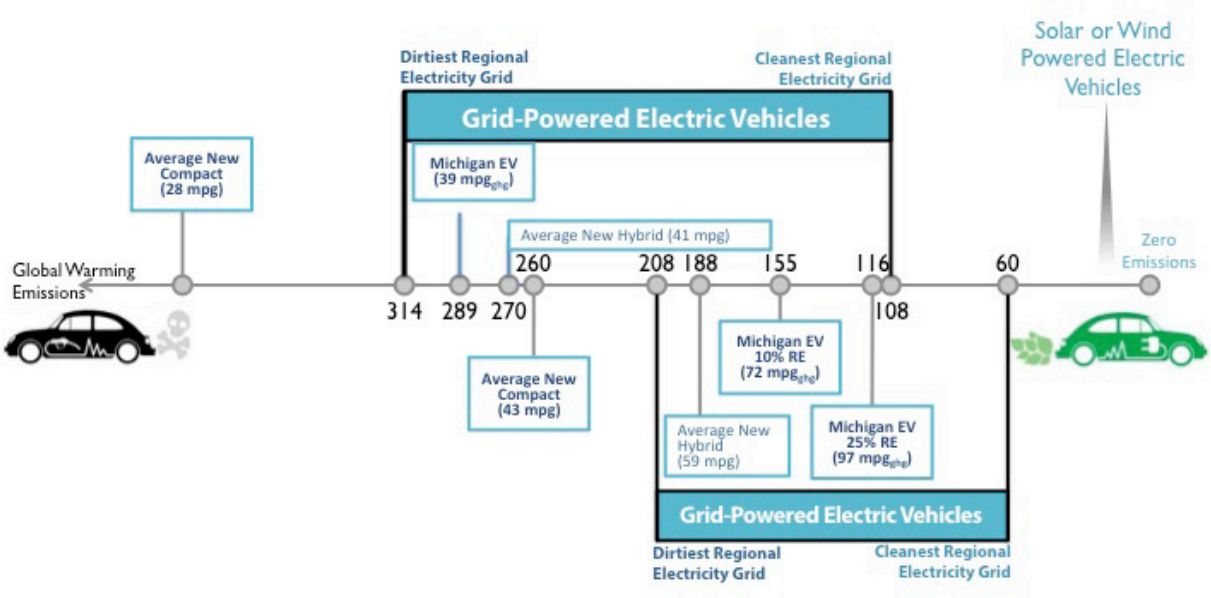
2010 This side shows the range of EV charging-related emissions across the U.S. and in Michigan (RFCM) in 2010.



2025 This side shows what 2025 may look like. Michigan could remain at 10% renewable energy (RE), but increasing RE to 25% would give EVs much better emissions.