



Cleaner Grids Needed for Electric Cars to Outperform Gasoline Hybrids, Study Finds

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A 2024 study published in *Scientific Reports* explores the conditions under which electric vehicles (EVs) outperform hybrid gasoline vehicles in reducing greenhouse gas emissions. Researchers from Stanford University and other institutions developed a novel metric, the Critical Emissions Factor (CEF), to evaluate the emissions intensity required for EVs to match or surpass the environmental benefits of efficient hybrids like the Toyota Prius and Honda Accord.

The study reveals significant regional disparities in emissions performance. While EVs such as the Nissan Leaf and Chevrolet Bolt outperform hybrids in most of the U.S., including the West, Texas, and New England, their lifecycle emissions are higher in parts of the Midwest and South where electricity grids rely heavily on coal and natural gas.

The findings also highlight that long-range EVs like the Tesla Model S generally emit more than hybrids unless the grid achieves substantial decarbonization. In some regions, grid emissions would need to decrease by up to 342 gCO₂/kWh for EVs to achieve carbon parity with hybrids.

The researchers emphasize that cleaner grids are essential to maximize the environmental benefits of EV adoption. Policies retiring coal plants and imposing stricter standards on fossil fuel generators are deemed more effective in reducing emissions than merely expanding renewable capacity in the short term.

This study underscores the need for coordinated efforts between vehicle electrification and power grid decarbonization to meet climate goals effectively. With transportation contributing nearly 29% of U.S. greenhouse gas emissions, cleaner grids could unlock the full potential of electric vehicles in curbing emissions nationwide.

Read more at: <https://www.nature.com/articles/s41598-024-51697-1>