



- [Home \(https://www.greencarcongress.com/\)](https://www.greencarcongress.com/)
- [About \(https://www.greencarcongress.com/about3-1.html\)](https://www.greencarcongress.com/about3-1.html)
- [Contact \(https://www.greencarcongress.com/about3.html#contact\)](https://www.greencarcongress.com/about3.html#contact)
- [RSS \(https://feeds2.feedburner.com/greencarcongress/TrBK\)](https://feeds2.feedburner.com/greencarcongress/TrBK)
- [GCC Twitter \(https://twitter.com/GreenCarCongres\)](https://twitter.com/GreenCarCongres)
- [Newsletter \(https://www.greencarcongress.com/newsletter-subscription.html\)](https://www.greencarcongress.com/newsletter-subscription.html)

[Home \(https://www.greencarcongress.com/\)](https://www.greencarcongress.com/) [About \(https://www.greencarcongress.com/about3-1.html\)](https://www.greencarcongress.com/about3-1.html) [Contact \(https://www.greencarcongress.com/about3.html#contact\)](https://www.greencarcongress.com/about3.html#contact) [RSS \(https://feeds2.feedburner.com/greencarcongress/TrBK\)](https://feeds2.feedburner.com/greencarcongress/TrBK) [GCC Twitter \(https://twitter.com/GreenCarCongres\)](https://twitter.com/GreenCarCongres) [Newsletter \(https://www.greencarcongress.com/newsletter-subscription.html\)](https://www.greencarcongress.com/newsletter-subscription.html)

Fraunhofer ISI/ICCT analysis of PHEV data finds real-world CO₂ emissions 2-4x higher than official values (<https://www.greencarcongress.com/2020/09/20200928-isi.html>)

28 September 2020 (<https://www.greencarcongress.com/2020/09/20200928-isi.html>)

A new analysis (<https://theicct.org/publications/phev-real-world-usage-sept2020>) of the real-world usage of more than 100,000 plug-in hybrid electric vehicles shows (<https://theicct.org/news/press-release-PHEV-usage-sept2020>) a large deviation between on-road CO₂ emissions and fuel efficiency and the official vehicle type-approval values. The results of the joint study, released by German Fraunhofer Institute for Systems and Innovation Research ISI and the International Council on Clean Transportation (ICCT), suggest that incentives to promote a higher share of electric driving would increase the potential for plug-in hybrid vehicles to reduce emissions.

For the study, the authors analyzed a comprehensive dataset of the real-world usage patterns for plug-in hybrid vehicles in Europe, North America, and China. For their statistical analyses, the researchers made use of anonymized data that vehicle drivers had voluntarily reported to online portals such as Spritmonitor in Germany and MyMPG in the United States. The researchers also took into account data on company cars that had been provided by fleet managers.

On average, the real-world fuel consumption and CO₂ emission values of plug-in hybrid vehicles for private drivers in Germany are more than twice as high as according to the official test procedure. For company cars, the deviation is even four times the official values.

—Dr. Patrick Plötz, Coordinator of the Business Unit Energy Economy at Fraunhofer ISI and lead author of the study

As a result, the gap between official and real-world values is much larger for plug-in hybrid vehicles than for conventional combustion engine vehicles.

The real-world share of electric driving for PHEVs, on average, is about half the share considered in the type-approval values. For private cars, the average utility factor (UF)—the portion of kilometers driven on electric motor versus kilometers driven on combustion engine—is 69% for NEDC type approval but only around 37% for real-world driving. For company cars, an average UF of 63% for NEDC and approximately 20% for real-world driving was found. There are noteworthy differences between the markets analyzed, with the highest real-world UF found for Norway at 53% for private vehicles and the United States at 54% for private vehicles. The lowest UFs were for China at 26% for private vehicles, Germany with 18% for company cars and 43% for private vehicles, and the Netherlands with 24% for company cars.

—“Real-World Usage Of Plug-In Hybrid Electric Vehicles”

As plug-in hybrid vehicles are equipped with a combustion engine as well as an electric motor, their potential for reducing emissions depends strongly on daily driving patterns. Plug-in hybrid vehicles often are not recharged regularly, which implies driving is often performed on the combustion engine.

Statistically, private users of vehicles in Germany re-charge their plug-in hybrid vehicle only on three out of four days. Company car users, on average, re-charge only every second day. The low frequency of recharging reduces the share of electric driving and thereby increases fuel consumption and CO₂ emissions of plug-in hybrid vehicles in real-world driving. On average, private plug-in hybrid vehicles are driven only 37% of their mileage in electric mode; for company car vehicles it is only 20%.

The Fraunhofer ISI and ICCT researchers offer concrete recommendations from their analysis. The European Commission should update the testing procedures for plug-in hybrid vehicles and limit any credits as part of the EU CO₂ regulation for new cars to those plug-in hybrid vehicles that demonstrate a high share of electric driving in real-world.

National governments should provide fiscal incentives only for those plug-in hybrid vehicle models that offer a high electric range and limit the power of the built-in combustion engine.

—ICCT Director Dr. Peter Mock

Furthermore, any subsidies or reduced taxation rates should be tied to the vehicle owner demonstrating predominantly electric driving. Meanwhile, legal and financial barriers for installing home charging devices should be reduced.

Vehicle manufacturers should also take action: By increasing the electric range of plug-in hybrid vehicles from today's average of 50 kilometers to 90 kilometers and limiting the power of the built-in combustion engine, manufacturers can provide an incentive for drivers to regularly re-charge their vehicles and to drive predominantly with electricity.

Fleet managers should limit the available budget for gasoline or diesel and instead offer employees the option to re-charge plug-in hybrid vehicles easily and at low cost. In doing so, the share of electric driving for plug-in hybrid vehicles could be increased.

Posted on 28 September 2020 in Behavior (<https://www.greencarcongress.com/behavior/>), Electric (Battery) (https://www.greencarcongress.com/electric_battery/), Emissions (<https://www.greencarcongress.com/emissions/>), Hybrids (<https://www.greencarcongress.com/hybrids/>), Market Background (https://www.greencarcongress.com/market_background/), Plug-ins (<https://www.greencarcongress.com/plugins/>) | Permalink (<https://www.greencarcongress.com/2020/09/20200928-isi.html>) | Comments (3) (<https://www.greencarcongress.com/2020/09/20200928-isi.html#comments>)



Comments



GH gases like methane and oxides of nitrogen are important too.

Posted by: SJC (<https://profile.typepad.com/6p0112790f78c028a4>) | 28 September 2020 at 02:18 PM (<https://www.greencarcongress.com/2020/09/20200928-isi.html?cid=6a00d8341c4fbe53ef0263e9696fe2200b#comment-6a00d8341c4fbe53ef0263e9696fe2200b>)



A bigger battery would help, and so would wireless charging (as an option), or a solar roof (say 600w x 5 hours = 3Kw = 10 extra miles).

You have to charge it every day you drive it for it to be effective.

You could give black marks for days when it is used uncharged and nag the driver into charging it.

What you want to get to is a plug in with a range extender, rather than today's PHEV.

And it has to be as cheap as possible.

Posted by: mahonj (<https://profile.typepad.com/jamesmahon>) | 29 September 2020 at 12:28 AM (<https://www.greencarcongress.com/2020/09/20200928-isi.html?cid=6a00d8341c4fbe53ef0263e9698daa200b#comment-6a00d8341c4fbe53ef0263e9698daa200b>)



Hmmmm I thought the UK had already proven this. They abruptly ended the incentives on plug in hybrid when they realised how few people actually charged them.

I think this was a good move as there are lots of disincentives to change a phev...

My phev only came with a granny cable meaning it can charge slowly at a plug socket. I can't use public chargers as it didn't come with one and BMW wanted £300+ for one. This wasn't economical on an 18 month lease.

My brother got a new phev as a work car. Work then gave him a petrol station card to pay for all his petrol but refused to reimburse him for electricity or pay for a home charging point. (he left that company) Why would he ever charge it up? It actually costs him money and time to run in electric even though it was a no personal trips vehicle rather than a company car.

Posted by: Am0283 (<https://profile.typepad.com/am0283>) | 29 September 2020 at 04:37 PM (<https://www.greencarcongress.com/2020/09/20200928-isi.html?cid=6a00d8341c4fbe53ef026be4160dfc200d#comment-6a00d8341c4fbe53ef026be4160dfc200d>)

The comments to this entry are closed.



<https://www.greencarcongress.com/2020/10/20200923-sivakindex.html>

In Brief

[Hyundai Motor Group joins IONITY high-power charging network \(https://www.greencarcongress.com/2020/11/20201106-ionity.html\)](https://www.greencarcongress.com/2020/11/20201106-ionity.html)

[\\$8K EV cleared for California roads; Kandi America's Model K27 \(https://www.greencarcongress.com/2020/11/20201104-kandi.html\)](https://www.greencarcongress.com/2020/11/20201104-kandi.html)

[Kawasaki Motors Corp. USA pays \\$160k in penalties for small engine violations in California \(https://www.greencarcongress.com/2020/11/20201103-kawasaki.html\)](https://www.greencarcongress.com/2020/11/20201103-kawasaki.html)

[Autonomous tech company Sea Machines completes a \\$20M B-round; Toyota AI Ventures in \(https://www.greencarcongress.com/2020/11/20201102-seamachines.html\)](https://www.greencarcongress.com/2020/11/20201102-seamachines.html)

[European shipbuilder awards hydrogen fuel cell contract to Proton Motor \(https://www.greencarcongress.com/2020/10/20201031-proton.html\)](https://www.greencarcongress.com/2020/10/20201031-proton.html)

[Electrify America launches new business unit to offer customized business-to-business charging solutions \(https://www.greencarcongress.com/2020/10/20201028-ea.html\)](https://www.greencarcongress.com/2020/10/20201028-ea.html)

[Rosatom launches Li-ion battery business \(https://www.greencarcongress.com/2020/10/20201026-rosatom.html\)](https://www.greencarcongress.com/2020/10/20201026-rosatom.html)

[Gulf Energy Information introduces hydrogen data with new platform \(https://www.greencarcongress.com/2020/10/20201023-gei.html\)](https://www.greencarcongress.com/2020/10/20201023-gei.html)

Tweets by @mmlilkin

Archives (<https://www.greencarcongress.com/archives.html>)



Mike Millikin
@mmlilkin

[lower emissions polyacetal family \(https://www.greencarcongress.com/2020/10](https://www.greencarcongress.com/2020/10)

November 2020 (<https://www.greencarcongress.com/2020/11/index.html>)

October 2020 (<https://www.greencarcongress.com/2020/10/index.html>)

September 2020 (<https://www.greencarcongress.com/2020/09/index.html>)

- August 2020 (<https://www.greencarcongress.com/2020/08/index.html>)

- July 2020 (<https://www.greencarcongress.com/2020/07/index.html>)

- June 2020 (<https://www.greencarcongress.com/2020/06/index.html>)

- May 2020 (<https://www.greencarcongress.com/2020/05/index.html>)

- April 2020 (<https://www.greencarcongress.com/2020/04/index.html>)

- March 2020 (<https://www.greencarcongress.com/2020/03/index.html>)

- February 2020 (<https://www.greencarcongress.com/2020/02/index.html>)

General Electric sets goal of achieving carbon neutrality for its operations by 2030 (<https://www.greencarcongress.com/2020/10/20201018-ge.html>)

[Ballard sells UAV business to Honeywell \(https://www.greencarcongress.com/2020/10/20201016-ballard.html\)](https://www.greencarcongress.com/2020/10/20201016-ballard.html)

[9 companies in Japan launch preparatory committee for Japan Hydrogen Association \(JH2A\) \(https://www.greencarcongress.com/2020/10/20201014-jh2a.html\)](https://www.greencarcongress.com/2020/10/20201014-jh2a.html)

[Electrify America installing 36 ultra-fast EV charging stations at Meijer stores in Illinois and Michigan \(https://www.greencarcongress.com/2020/10/20201011-ea.html\)](https://www.greencarcongress.com/2020/10/20201011-ea.html)

[GKN Automotive, Tata to establish advanced global e-mobility software engineering center in India \(https://www.greencarcongress.com/2020/10/20201009-gkn.html\)](https://www.greencarcongress.com/2020/10/20201009-gkn.html)

[Mayor of London launches new heavy vehicle scrappage scheme \(https://www.greencarcongress.com/2020/10/20201007-london.html\)](https://www.greencarcongress.com/2020/10/20201007-london.html)

[2020 NGV America Industry Summit moves to virtual format this October \(https://www.greencarcongress.com/2020/10/20201006-ngvamerica.html\)](https://www.greencarcongress.com/2020/10/20201006-ngvamerica.html)

[NIO hits new record for monthly deliveries of EVs \(https://www.greencarcongress.com/2020/10/20201006-nio.html\)](https://www.greencarcongress.com/2020/10/20201006-nio.html)

Categories (<https://www.greencarcongress.com/archives.html>)

- 3D printing (<https://www.greencarcongress.com/3d-printing/>)
- 48V (<https://www.greencarcongress.com/48v/>)
- 5G (<https://www.greencarcongress.com/5g/>)
- 800V (<https://www.greencarcongress.com/800v/>)
- Additives (<https://www.greencarcongress.com/additives/>)
- Africa (<https://www.greencarcongress.com/africa/>)
- AI (<https://www.greencarcongress.com/ai/>)
- Algae (<https://www.greencarcongress.com/algae/>)

- Algal Fuels (https://www.greencarcongress.com/algal_fuels/)
- Ammonia (<https://www.greencarcongress.com/ammonia/>)
- Arctic (<https://www.greencarcongress.com/arctic/>)
- ARPA-E (<https://www.greencarcongress.com/arpa-e/>)
- ATJ (<https://www.greencarcongress.com/atj/>)
- Australia (<https://www.greencarcongress.com/australia/>)
- Auto X-Prize (<https://www.greencarcongress.com/auto-x-prize/>)
- Autonomous driving (<https://www.greencarcongress.com/autonomous-driving/>)
- Aviation (<https://www.greencarcongress.com/aviation/>)
- B2U (<https://www.greencarcongress.com/b2u/>)
- B2V (<https://www.greencarcongress.com/b2v/>)
- Batteries (<https://www.greencarcongress.com/batteries/>)
- Behavior (<https://www.greencarcongress.com/behavior/>)
- Big Data (<https://www.greencarcongress.com/big-data/>)
- Bio-hydrocarbons (<https://www.greencarcongress.com/biohydrocarbons/>)
- Bio-hydrogen (<https://www.greencarcongress.com/biohydrogen/>)
- Bio-polymers (<https://www.greencarcongress.com/biopolymers/>)
- Biobutanol (<https://www.greencarcongress.com/biobutanol/>)
- Biodiesel (<https://www.greencarcongress.com/biodiesel/>)
- Biogasoline (<https://www.greencarcongress.com/biogasoline/>)
- Biomass (<https://www.greencarcongress.com/biomass/>)
- Biomass-to-Liquids (BTL) (https://www.greencarcongress.com/biomasstoliquids_btl/)
- Biomethane (<https://www.greencarcongress.com/biomethane-1/>)
- Biomethane / RNG (<https://www.greencarcongress.com/biomethane/>)
- Biorefinery (<https://www.greencarcongress.com/biorefinery/>)
- Biotech (<https://www.greencarcongress.com/biotech/>)
- Black carbon (<https://www.greencarcongress.com/black-carbon/>)
- Blockchain (<https://www.greencarcongress.com/blockchain/>)
- Brazil (<https://www.greencarcongress.com/brazil/>)
- Brief (<https://www.greencarcongress.com/brief/>)
- Bus (<https://www.greencarcongress.com/bus/>)
- Canada (<https://www.greencarcongress.com/canada/>)
- Car Sharing (https://www.greencarcongress.com/car_sharing/)
- Carbon Capture and Conversion (CCC) (<https://www.greencarcongress.com/carbon-capture-and-conversion-ccc/>)
- Carbon Capture and Storage (CCS) (https://www.greencarcongress.com/carbon_capture_and_storage_ccs/)
- Catalysts (<https://www.greencarcongress.com/catalysts/>)
- Cellulosic ethanol (https://www.greencarcongress.com/cellulosic_ethanol/)
- China (<https://www.greencarcongress.com/china/>)
- Cities (<https://www.greencarcongress.com/cities/>)
- City car (https://www.greencarcongress.com/city_car/)
- Climate Change (https://www.greencarcongress.com/climate_change/)
- Climate Change Adaptation (https://www.greencarcongress.com/climate_change_adaptation/)
- Climate models (https://www.greencarcongress.com/climate_models/)
- Co-Optima (<https://www.greencarcongress.com/co-optima/>)
- Coal (<https://www.greencarcongress.com/coal/>)
- Coal-to-Liquids (CTL) (https://www.greencarcongress.com/coaltoliquids_ctl/)
- Compressed Air Engines (https://www.greencarcongress.com/compressed_air_engines/)
- Concept Engines (https://www.greencarcongress.com/concept_engines/)
- Conferences and other events (https://www.greencarcongress.com/conferences_and_other_events/)

- [Connected vehicles \(https://www.greencarcongress.com/connected_vehicles/\)](https://www.greencarcongress.com/connected_vehicles/)
- [Controls and controllers \(https://www.greencarcongress.com/controls-and-controllers/\)](https://www.greencarcongress.com/controls-and-controllers/)
- [Conversions \(https://www.greencarcongress.com/conversions/\)](https://www.greencarcongress.com/conversions/)
- [COVID-19 \(https://www.greencarcongress.com/covid-19/\)](https://www.greencarcongress.com/covid-19/)
- [CV2X \(https://www.greencarcongress.com/cv2x/\)](https://www.greencarcongress.com/cv2x/)
- [D-I-Y \(https://www.greencarcongress.com/diy/\)](https://www.greencarcongress.com/diy/)
- [Deepwater \(https://www.greencarcongress.com/deepwater/\)](https://www.greencarcongress.com/deepwater/)
- [Diesel \(https://www.greencarcongress.com/diesel/\)](https://www.greencarcongress.com/diesel/)
- [DME \(https://www.greencarcongress.com/dme/\)](https://www.greencarcongress.com/dme/)
- [DMF \(https://www.greencarcongress.com/dmf/\)](https://www.greencarcongress.com/dmf/)
- [Driver Assistance Systems \(https://www.greencarcongress.com/driver-assistance-systems/\)](https://www.greencarcongress.com/driver-assistance-systems/)
- [Electric \(Battery\) \(https://www.greencarcongress.com/electric_battery/\)](https://www.greencarcongress.com/electric_battery/)
- [Emissions \(https://www.greencarcongress.com/emissions/\)](https://www.greencarcongress.com/emissions/)
- [Engines \(https://www.greencarcongress.com/engines/\)](https://www.greencarcongress.com/engines/)
- [Environmental Justice \(https://www.greencarcongress.com/environmental-justice/\)](https://www.greencarcongress.com/environmental-justice/)
- [Enzymes \(https://www.greencarcongress.com/enzymes/\)](https://www.greencarcongress.com/enzymes/)
- [Ethanol \(https://www.greencarcongress.com/ethanol/\)](https://www.greencarcongress.com/ethanol/)
- [Europe \(https://www.greencarcongress.com/europe/\)](https://www.greencarcongress.com/europe/)
- [Exascale computing \(https://www.greencarcongress.com/exascale-computing/\)](https://www.greencarcongress.com/exascale-computing/)
- [Fleets \(https://www.greencarcongress.com/fleets/\)](https://www.greencarcongress.com/fleets/)
- [Forecasts \(https://www.greencarcongress.com/forecasts/\)](https://www.greencarcongress.com/forecasts/)
- [Friction \(https://www.greencarcongress.com/friction/\)](https://www.greencarcongress.com/friction/)
- [Fuel Cells \(https://www.greencarcongress.com/fuel_cells/\)](https://www.greencarcongress.com/fuel_cells/)
- [Fuel Efficiency \(https://www.greencarcongress.com/fuel_efficiency/\)](https://www.greencarcongress.com/fuel_efficiency/)
- [Fuels \(https://www.greencarcongress.com/fuels/\)](https://www.greencarcongress.com/fuels/)
- [Fusion \(https://www.greencarcongress.com/fusion/\)](https://www.greencarcongress.com/fusion/)
- [Gas-to-Liquids \(GTL\) \(https://www.greencarcongress.com/gastoliquids_gtl/\)](https://www.greencarcongress.com/gastoliquids_gtl/)
- [Gasification \(https://www.greencarcongress.com/gasification/\)](https://www.greencarcongress.com/gasification/)
- [Geoengineering \(https://www.greencarcongress.com/geoengineering/\)](https://www.greencarcongress.com/geoengineering/)
- [Geothermal \(https://www.greencarcongress.com/geothermal/\)](https://www.greencarcongress.com/geothermal/)
- [Graphene \(https://www.greencarcongress.com/graphene/\)](https://www.greencarcongress.com/graphene/)
- [Green Chemistry \(https://www.greencarcongress.com/green-chemistry/\)](https://www.greencarcongress.com/green-chemistry/)
- [Health \(https://www.greencarcongress.com/health/\)](https://www.greencarcongress.com/health/)
- [Heavy-duty \(https://www.greencarcongress.com/heavyduty/\)](https://www.greencarcongress.com/heavyduty/)
- [High Octane Fuels \(https://www.greencarcongress.com/high-octane-fuels/\)](https://www.greencarcongress.com/high-octane-fuels/)
- [High Performance Computing \(https://www.greencarcongress.com/high-performance-computing/\)](https://www.greencarcongress.com/high-performance-computing/)
- [HMI \(https://www.greencarcongress.com/hmi/\)](https://www.greencarcongress.com/hmi/)
- [Hybrids \(https://www.greencarcongress.com/hybrids/\)](https://www.greencarcongress.com/hybrids/)
- [Hydraulic Hybrid \(https://www.greencarcongress.com/hydraulic_hybrid/\)](https://www.greencarcongress.com/hydraulic_hybrid/)
- [Hydrogen \(https://www.greencarcongress.com/h2/\)](https://www.greencarcongress.com/h2/)
- [Hydrogen Production \(https://www.greencarcongress.com/hydrogen_production/\)](https://www.greencarcongress.com/hydrogen_production/)
- [Hydrogen Storage \(https://www.greencarcongress.com/hydrogen_storage/\)](https://www.greencarcongress.com/hydrogen_storage/)
- [Index \(https://www.greencarcongress.com/index/\)](https://www.greencarcongress.com/index/)
- [India \(https://www.greencarcongress.com/india/\)](https://www.greencarcongress.com/india/)
- [Industry 4.0 \(https://www.greencarcongress.com/industry-40/\)](https://www.greencarcongress.com/industry-40/)
- [Infrastructure \(https://www.greencarcongress.com/infrastructure/\)](https://www.greencarcongress.com/infrastructure/)
- [Intelligent Transportation Systems \(ITS\) \(https://www.greencarcongress.com/intelligent_transportation_systems_its/\)](https://www.greencarcongress.com/intelligent_transportation_systems_its/)
- [Internet of Things \(https://www.greencarcongress.com/internet-of-things/\)](https://www.greencarcongress.com/internet-of-things/)
- [Japan \(https://www.greencarcongress.com/japan/\)](https://www.greencarcongress.com/japan/)

- Land use (<https://www.greencarcongress.com/land-use/>)
- Latin America (https://www.greencarcongress.com/latin_america/)
- LCFS (<https://www.greencarcongress.com/lcfs/>)
- LFG (<https://www.greencarcongress.com/lfg/>)
- Li-metal (<https://www.greencarcongress.com/li-metal/>)
- Li-O2 (<https://www.greencarcongress.com/li-o2/>)
- Li-Sulfur (<https://www.greencarcongress.com/li-sulfur/>)
- Lifecycle analysis (https://www.greencarcongress.com/lifecycle_analysis/)
- Lighting (<https://www.greencarcongress.com/lighting/>)
- LNG (<https://www.greencarcongress.com/lng/>)
- Low Temperature Combustion (<https://www.greencarcongress.com/low-temperature-combustion/>)
- LPG (<https://www.greencarcongress.com/lpg/>)
- LSV/NEV (<https://www.greencarcongress.com/lsvnev/>)
- Lubricating Oils (https://www.greencarcongress.com/lubricating_oils/)
- Manufacturing (<https://www.greencarcongress.com/manufacturing/>)
- Mapping (<https://www.greencarcongress.com/mapping/>)
- Market Background (https://www.greencarcongress.com/market_background/)
- Materials (<https://www.greencarcongress.com/materials/>)
- Methanol (<https://www.greencarcongress.com/methanol/>)
- Micro-mobility (<https://www.greencarcongress.com/micro-mobility/>)
- Micromobility (<https://www.greencarcongress.com/micromobility/>)
- Microprocessors and controls (<https://www.greencarcongress.com/microprocessors-and-controls/>)
- Middle East (https://www.greencarcongress.com/middle_east/)
- Mining (<https://www.greencarcongress.com/mining/>)
- Mobility (<https://www.greencarcongress.com/mobility/>)
- Mobility services (<https://www.greencarcongress.com/mobility-services/>)
- Motors (<https://www.greencarcongress.com/motors/>)
- Motorsport (<https://www.greencarcongress.com/motorsport/>)
- Nanotech (<https://www.greencarcongress.com/nanotech/>)
- Natural Gas (https://www.greencarcongress.com/natural_gas/)
- Nuclear (<https://www.greencarcongress.com/nuclear/>)
- Ocean acidification (https://www.greencarcongress.com/ocean_acidification/)
- Off-road (<https://www.greencarcongress.com/offroad/>)
- Oil (<https://www.greencarcongress.com/oil/>)
- Oil sands (https://www.greencarcongress.com/oil_sands/)
- Oil Shale (https://www.greencarcongress.com/oil_shale/)
- Open Source (<https://www.greencarcongress.com/open-source/>)
- Opinion (<https://www.greencarcongress.com/opinion/>)
- Optima (<https://www.greencarcongress.com/optima/>)
- Other Asia (https://www.greencarcongress.com/other_asia/)
- Other Powertrains (https://www.greencarcongress.com/other_powertrains/)
- Personal Transit (https://www.greencarcongress.com/personal_transit/)
- Personalities (<https://www.greencarcongress.com/personalities/>)
- Perspective (<https://www.greencarcongress.com/perspective/>)
- Plastics (<https://www.greencarcongress.com/plastics/>)
- Plug-ins (<https://www.greencarcongress.com/plugins/>)
- Polar (<https://www.greencarcongress.com/polar/>)
- Policy (<https://www.greencarcongress.com/policy/>)
- Ports and Marine (https://www.greencarcongress.com/ports_and_marine/)

Green Car Congress (<http://WWW.GREENCARCONGRESS.COM/>) © 2004-2020 BioAge Group, LLC. All Rights Reserved.

6
Top

- Power Electronics (https://www.greencarcongress.com/power_electronics/)
- Power Generation (https://www.greencarcongress.com/power_generation/)
- Power-to-Gas (<https://www.greencarcongress.com/power-to-gas/>)
- Power-to-Liquids (<https://www.greencarcongress.com/power-to-liquids/>)
- Powertrain materials (<https://www.greencarcongress.com/powertrain-materials/>)
- Quantum computing (<https://www.greencarcongress.com/quantum-computing/>)
- Racing (<https://www.greencarcongress.com/racing/>)
- Rail (<https://www.greencarcongress.com/rail/>)
- Recycling (<https://www.greencarcongress.com/recycling/>)
- Regulations (<https://www.greencarcongress.com/regulations/>)
- Research (<https://www.greencarcongress.com/research/>)
- Resilience (<https://www.greencarcongress.com/climate-resilience/>)
- Resources (<https://www.greencarcongress.com/resources/>)
- Ridesharing (<https://www.greencarcongress.com/ridesharing/>)
- Robotics (<https://www.greencarcongress.com/robotics/>)
- Russia (<https://www.greencarcongress.com/russia/>)
- Safety (<https://www.greencarcongress.com/safety/>)
- Sales (<https://www.greencarcongress.com/sales/>)
- Science (<https://www.greencarcongress.com/science/>)
- Security (<https://www.greencarcongress.com/security/>)
- Sensors (<https://www.greencarcongress.com/sensors/>)
- Simulation (<https://www.greencarcongress.com/simulation/>)
- Smart charging (<https://www.greencarcongress.com/smart-charging/>)
- Smart Grid (<https://www.greencarcongress.com/smart-grid/>)
- SMR (<https://www.greencarcongress.com/smr/>)
- Solar (<https://www.greencarcongress.com/solar/>)
- Solar fuels (<https://www.greencarcongress.com/solar-fuels/>)
- Solid-state (<https://www.greencarcongress.com/solid-state/>)
- SSVs (<https://www.greencarcongress.com/ssvs/>)
- Standards (<https://www.greencarcongress.com/standards/>)
- Surveys (<https://www.greencarcongress.com/surveys/>)
- Sustainability (<https://www.greencarcongress.com/sustainability/>)
- SVO (<https://www.greencarcongress.com/svo/>)
- Synthetic Biology (https://www.greencarcongress.com/synthetic_biology/)
- TEF (<https://www.greencarcongress.com/tef/>)
- Telematics (<https://www.greencarcongress.com/telematics/>)
- Thermoelectrics (<https://www.greencarcongress.com/thermoelectrics/>)
- Tires (<https://www.greencarcongress.com/tires/>)
- Transmissions (<https://www.greencarcongress.com/transmissions/>)
- Trials (<https://www.greencarcongress.com/trials/>)
- UMV (<https://www.greencarcongress.com/umv/>)
- Urban Air Mobility (<https://www.greencarcongress.com/urban-air-mobility/>)
- Urban mobility (<https://www.greencarcongress.com/urban-mobility/>)
- V2X (<https://www.greencarcongress.com/v2g/>)
- Vehicle Dynamics (<https://www.greencarcongress.com/vehicle-dynamics/>)
- Vehicle Manufacturers (https://www.greencarcongress.com/vehicle_manufacturers/)
- Vehicle Systems (https://www.greencarcongress.com/vehicle_systems/)
- Waste Heat Recovery (https://www.greencarcongress.com/waste_heat_recovery/)
- Water (<https://www.greencarcongress.com/water/>)

- Wave and Tidal (<https://www.greencarcongress.com/tidal/>)
- Weight reduction (<https://www.greencarcongress.com/weight-reduction/>)
- Wind (<https://www.greencarcongress.com/wind/>)
- Wireless (<https://www.greencarcongress.com/wireless/>)