

Could Conventional Cars Be Converted to EVs to Fight Climate Change?

Olivia Rosane

Reprinted with permission from EcoWatch's blog on February 19, 2023 at <https://www.ecowatch.com/conventional-cars-to-evs.html>.

As the world transitions to electric vehicles (EVs), what should happen to all the gas guzzlers that will remain on the roads?

This is an important question because even if the U.S. achieves President Joe Biden's goal of 50% new EV car sales by 2030, many people will still be driving their older fossil fuel-powered rides.

"This is something that's not being talked about enough," EVAdoption CEO Loren McDonald said, as The Guardian reported. "We're buying more new gas-powered vehicles each year than we are electric. So the supply of gas car vehicles keeps rising ... and people are holding on to their vehicles longer."

One potential solution to this problem is to convert conventional vehicles into EVs. In theory, it's a simple process, according to the U.S. Department of Energy (DOE).

"Although uncommon, a vehicle with an internal combustion engine can be converted to an all-electric vehicle by completely removing the engine and adding a battery pack, one or more electric motors, high-voltage cables, and instrumentation," the DOE explained, adding that it's important to make sure that the converted car both has the space for and can support the weight of the new battery and motors while still meeting emissions and crash-safety standards.

However, in practice EV conversions are pricey and therefore out of reach for many, as The Guardian noted.

For example, the San-Diego-based conversion company Zelectric Motors said its conversions usually start at around \$70,000, five thousand dollars more than the average cost of a new EV at \$65,000.

"It's not a \$5,000 to \$10,000 retrofit that's going to save your old car," the company's CEO David Benardo said, as The Guardian reported.



Volkswagen Beetle electric conversion. (Flickr/Albert)

The reason is both the current cost of batteries and the fact that each car has different requirements, demanding specialized labor. The company mostly retrofits vintage Porsches and Volkswagens and only works on around six to eight conversions annually.

There was a potential sign of hope in January when Toyota debuted two green versions of its classic 1980s Corolla GT-S at the 2023 Tokyo Auto Salon, as KTSM 9 News reported at the time.

"The reality is that we cannot achieve zero carbon emissions in 2050 simply by switching all new cars sales to EVs," Toyota CEO Akio Toyoda said in a speech announcing the conversions.

However, Toyota further told The Guardian that the company did not have plans at the moment to convert its older models en masse.

The two cars displayed at the show were converted differently. One, the AE86 BEV, was electrified using a Toyota Tundra Prime pickup truck motor and a Prius hybrid plug-in hybrid battery pack. The second, the AE86 H2, maintained the combustion engine but ran on

hydrogen instead.

So-called clean fuels like hydrogen are the solution pushed by the Rhodium Group in a 2021 paper. Transportation is currently the U.S. sector that emits the most greenhouse gas emissions, and even the highest possible uptake of EVs won't see it reaching net zero by 2050. Even if almost 90 percent of light-duty vehicle sales are electric by 2035, transportation would still emit 525 million tons of greenhouse gas emissions by 2050. The report argued that the remaining emissions could be cut by switching to decarbonized fuels such as biofuels, electro fuels, or fossil fuels that are successfully offset. Another solution? Making travel more efficient.

"The most direct way to reduce emissions from transportation is to move people and goods more efficiently—either by improving the fuel economy of cars, trucks, buses, ships and airplanes, or reducing how many miles those vehicles need to move people or goods," the report authors wrote.

Finally, instead of converting private fossil fuel cars to EVs or running them on alternative fuels, we can move away from a one-person-one-car transportation model altogether. C40 Cities Executive Director Mark Watts said that one of the most important things urban leaders could do to tackle the climate crisis was to prioritize pedestrians and cyclists in transportation design over private motor vehicles.

"A global shift away from cars to more active forms of travel is exactly what the world needs right now," he said. "Replacing a trip by car with active travel is a highly effective way to cut emissions quickly."

Olivia Rosane is a freelance writer and reporter with a decade's experience. She has been contributing to EcoWatch daily since 2018 and has also covered environmental themes for Treehugger, The Trouble, YES! Magazine and Real Life. She holds a Ph.D. in English Literature from the University of Cambridge and a master's in Art and Politics from Goldsmiths, University of London. 🌱

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JD POWER'S EV CUSTOMER SATISFACTION

Rivian R1T Ranks Highest Overall; MINI Cooper Electric Ranks Highest among Mass Market Brands

As more battery electric vehicle (BEV) models become available for purchase, owners' satisfaction with their overall experience is shifting to more traditional factors such as quality and styling. According to the J.D. Power 2023 U.S. Electric Vehicle Experience (EVX) Ownership Study, SM released today, the shift is most evident in the respective premium and mass market segment award recipients, Rivian R1T and MINI Cooper Electric.

In its first year of eligibility, the Rivian R1T ranks highest overall with a satisfaction score of 794 (on a 1,000-point scale). Owners have high levels of satisfaction with the driving enjoyment and interior-exterior styling factors. MINI Cooper Electric ranks highest in the mass market segment with a score of 782, supported by the highest satisfaction score of any EV model in the study's highest-weighted index factor, quality and reliability.

"The electric vehicle landscape is changing quickly, and newer models are bringing in more mainstream, first-time EV buyers," said Brent Gruber, executive director of the EV practice at J.D. Power. "Recent vehicle launches from both new brands and traditional automakers have had a profound effect on what factors are most important in the ownership experience. Today's EV owners are looking for quality, reliability, driving enjoyment, safety and technology features."

Following are key findings of the 2023 study.

- **Differences notable between premium and mass market segments:** For a third consecutive year, owners of mass market BEVs cite infotainment as the most problematic category (19.2 problems experienced per 100 vehicles, or PP100). Among premium BEV owners, the most problematic categories are squeaks and rattles (17.5 PP100) and exterior (13.6 PP100). The largest gap in satisfaction between owners of premium and mass market BEVs is availability of public charging, which is greatly influenced by the Tesla network of chargers. Among premium BEV owners, satisfaction with public charging availability is 589, while satisfaction among mass market BEV owners is 341. "The EV marketplace is dynamic and the important factors that manufacturers need to watch will vary based on their history and experience," Gruber said. "First-time EV buyers who are more mainstream will compare their EV's build quality to what they know about gas-powered vehicles."

- **Towing more satisfying for EV truck owners:** New to the study this year are survey questions specific to EV trucks regarding towing. Interestingly, satisfaction is higher among EV truck owners who have used their vehicle for towing (779) than among owners who have not towed (753). Satisfaction with driving range is higher among owners who have towed (635) than among those who have not towed (617), and

Cont'd on p.6



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CHOOSING A HOME EV CHARGER

Barb and Greg Whitchurch

There are more than 16 million electric vehicles (EVs) on the roads now. Many of us have been driving them for several years, and we live everywhere, from the equator to the Arctic Circle.

Let's quickly get past some disinformation FUD (fear, uncertainty and doubt). The batteries last far longer than most ICE (internal combustion engine) cars last: www.bit.ly/old-batts. Battery fires are far less likely than ICE and hybrid fires: www.bit.ly/veda-car-fires. There, done!

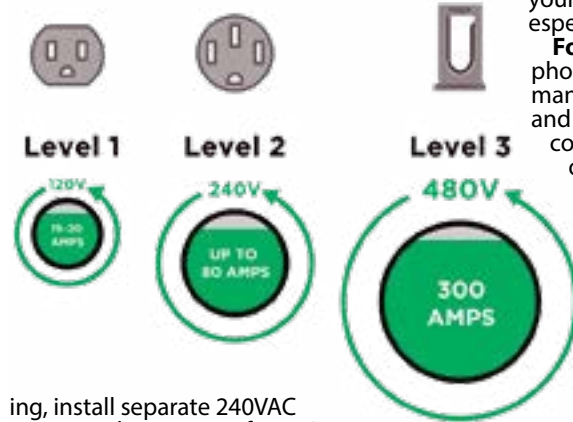
Many who live in condos and apartment buildings charge at work, where they shop, at charging stations, in parking garages, or along streets with combination parking meters and chargers. Since electricity and batteries are so much safer than gasoline, the possibilities seem almost endless.

At home we ourselves just plug the Level 1 (L1) chargers that came with our cars (new ones cost about \$200 and are level one and level two combined!) into a regular wall socket in our garage. Some folks run a heavy-duty extension cable (10- or 12-gauge, not more than 25 feet) out a window or door to the charger that came with the car. The charging ports and plugs are designed for exposure to bad weather.

The authors have been driving EVs for seven years and only EVs for five years, and charging is accomplished at home with L1 "trickle" chargers. This method supplies about four miles of range every hour, which easily covers 95% of their driving needs. They charge "away" when traveling more than 200 miles. For instance, they regularly drive 1100 miles round-trip to see grandkids in Canada (where there are still many more chargers than here in New England).

Think this through a bit. How many miles do you drive per day? Per week? You didn't fill up your ICE car every day; you don't need to do so for your EV either. Some owners only fully charge while shopping on the weekend: www.bit.ly/get-ev-110. The authors charge their EVs to 70% at home unless they're going on a trip.

Level 2 (L2): While L1 chargers draw less power than a hair dryer or toaster, a L2 might be the biggest load at your house. Some folks who drive 150 miles every business day (and don't yet have charging available at work) and want faster charging,



ing, install separate 240VAC wiring to their carport for an L2 installation.

L2 chargers often come with the car as well; some dealers and car manufacturers will pay for their installation, too. The authors' Bolt EUV came with L1 and L2 and free installation. These deals vary, so check ahead. And don't forget to look into the federal, state and local utility incentives. (Pages 16-17 of any G.E.T. issue can help.)

Possible Deal Breakers: (1) If your utility transformer - the big "can" out on the pole, which you might share with another house or two -- can't handle the L2 load you're planning, you'll have to wait and pay for an upgrade from your utility first! (2) Your home's entrance panel might not be fit for the new load --- a very expensive replacement or upgrade, but probably a good thing to do for older homes anyway. (3) Finally, the car determines the maximum L2 power it'll accept; if you provide more, it'll just not be used. But you could split the power to two vehicles from one two-car L2 charger.

Caution: As with other home wiring projects, safe installation is important. Long-duration heavy loads are often not anticipated in standard home wiring specifications; see www.bit.ly/charger-warning. An experienced and well-informed electrician is important. An electrician familiar with solar and backup battery installations might be a good choice. Do not overlook the normal criteria of whether they are licensed and insured.

A 30-amp L2 can give you 300 miles in 12 hours overnight. But some L2s can draw 80 amps! This would be a HUGE draw on your service panel, main breaker and pole transformer. If you turned on

every electrical appliance in your house, a high-powered L2 charger could double your draw. Be careful what you wish for, especially if you don't really need it.

Focus on the future. Our cell phones, computers and TVs (and for many, our doorbells, water heaters and security cameras) are all being connected through the IoT (internet of things). Soon enough our car batteries, home solar PV panels, backup batteries and water heaters, as well as the grid, will communicate with one another in order to keep our bills lower and the grid stable: www.bit.ly/get-geb.

Homeowners will sell grid stabilization service (e.g., peak shaving) and their excess energy storage and solar PV production back to their utility providers. Our cars, backup batteries and solar panels will back up our homes when the grid does fail. More and more EVs are coming with vehicle-to-load (V2L: sockets for 120VAC and 240VAC) capability built in so that they can serve as mobile power sources!

Search: Newer chargers are offering more and more options -- although less so in the U.S., where we are way behind in EV adoption. But things are changing fast. Look for something that offers vehicle-to-home (V2H, bi-directional) backup. Some will charge two cars at once. Look for something that works with the solar PV you might have soon, and which works cooperatively with any home backup battery system you might get www.bit.ly/ct-why-vpp.

Some specifics: L2 chargers are evolving quickly, and satisfaction is pretty dependent upon installation and use. A colleague swears by her portable Grizzle-E charger which she uses at home and when she visits her dad. Start looking here: www.bit.ly/mt-l2, www.bit.ly/cd-l2, www.bit.ly/forbes-l2, www.bit.ly/cnet-l2, www.bit.ly/pm-l2, and www.bit.ly/nyt-l2.

Some will install right at your meter on the power pole or your outside wall: www.bit.ly/mtr-charger! Others will share the clothes dryer 220 amp socket or wiring, selecting between the two automatically: www.bit.ly/dryer-charger. Others can integrate directly with your solar PV array: www.bit.ly/mtr-charger. They can be installed on the incoming power lines before they enter your panel. If you live where re-wiring possibilities are very limited, refer to www.DCCElectric.com/.

See the V2G article in this issue for much more on what to look for in L2 chargers. There are so many options. But consider depending on your L1 just to start --- you might be very pleasantly surprised.

The Whitchurches live cheaply and securely with their EVs at their solar-powered Net Zero+ Passive House. For related articles: www.bit.ly/get-w-ev.

Note: links are clickable in the online edition of this article at www.greenenergy-times.org.



EV charging at your home is convenient. (AdobeStock/485082167)



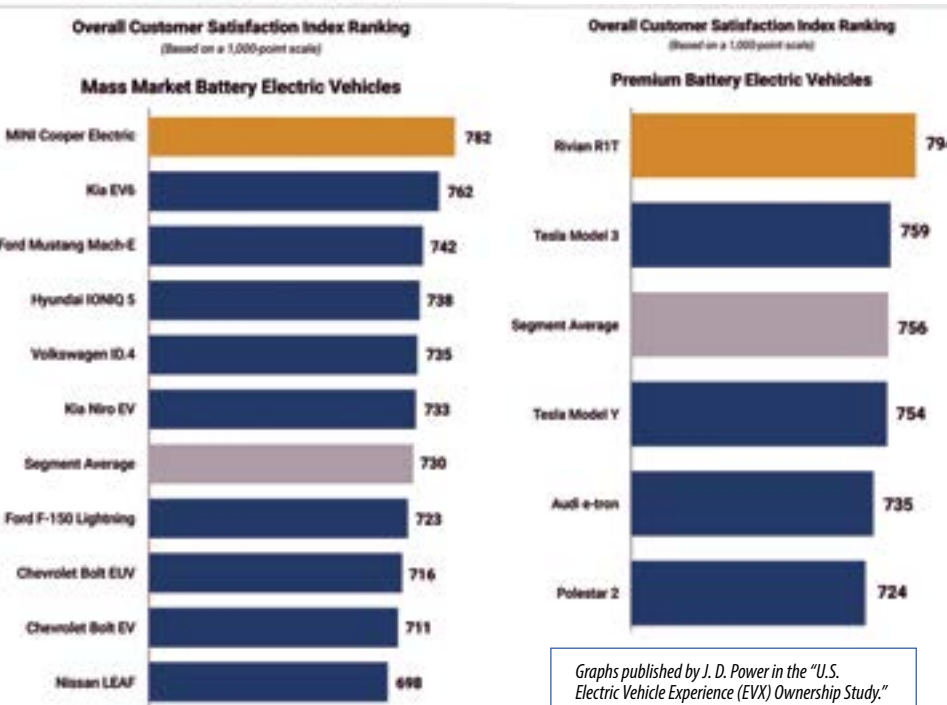
J.D. POWER'S EV SATISFACTION

Cont'd from p.4

satisfaction with accuracy of stated range also is higher (707 vs. 680, respectively). Truck manufacturers that communicate the effect that towing has on range—like they do with gas mileage—seem to help set owner expectations.

• Changing landscape of first-time BEV owners: The study shows an increase of 11 percentage points from 2022 in the rate of first-time BEV ownership, rising to 85% from 74%. However, with a host of new product offerings, the mass market BEV segment is attracting new owners at a more rapid rate, as the percentage of first-time BEV owners in the segment jumped to 89% from 67% in 2022. While more vehicle shoppers are being drawn to EV ownership, satisfaction among first-time BEV owners is higher than among veteran BEV owners in only one category: vehicle quality and reliability (756 vs. 749, respectively). In the mass market segment, 68% of first-time BEV owners say that expected lower running costs and tax credits/incentives were the primary reasons for purchase, while driving performance is the most

J.D. Power 2023 U.S. Electric Vehicle Experience (EVX) Ownership Study™



Graphs published by J. D. Power in the "U.S. Electric Vehicle Experience (EVX) Ownership Study." Rankings are based on numerical scores, and not necessarily on statistical significance.

frequently cited purchase reason (75%) among first-time premium BEV owners.

Study Rankings

Rivian R1T ranks highest overall and highest in the premium BEV segment with a score of 794. Tesla Model 3 (759) ranks second.

MINI Cooper Electric ranks highest in the mass market BEV segment with a score of 782. Kia EV6 (762) ranks second and Ford Mustang Mach-E (742) ranks third.

The number of award-eligible models in the premium segment has grown from four to five year over year, while award-eligible mass market models have nearly doubled (from six to 10). Satisfaction among owners of premium EVs averages 756, while satisfaction among mass market EV owners averages 730.

The U.S. Electric Vehicle Experience (EVX) Ownership Study, now in its third year, implements a methodology change for 2023 by narrowing the satisfaction index to focus on the first year of ownership. The overall EVX ownership index score measures electric vehicle owner satisfaction in both premium and mass market segments. The 2023 study includes 10 factors (in *Cont'd on p.7*

The 'Why and How' of Vehicle-to-Grid (V2G)

Greg Whitchurch

Note: Space restrictions limit explanations, but the online, clickable links clarify everything.

Charging your electric vehicle (EV) with power from your home is pretty straightforward. But what about allowing your EV to send some of that power back to the grid? Why would I do that, you ask? Two answers: money and grid stability.

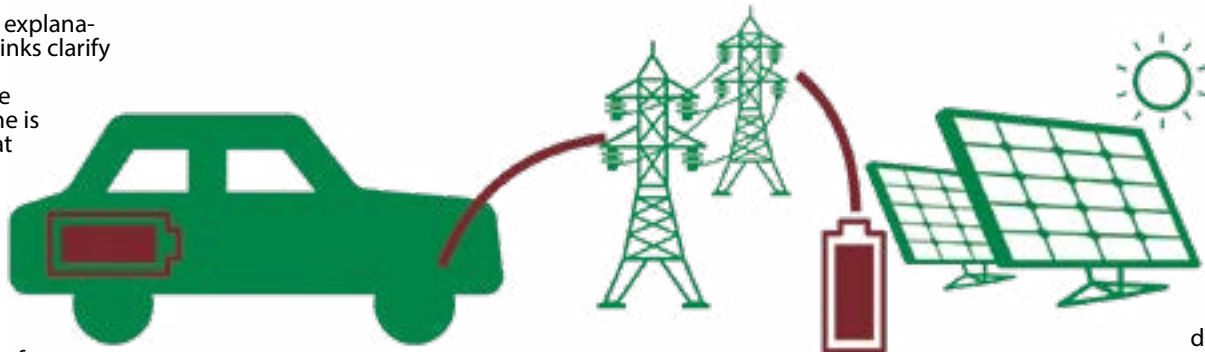
You might know people who are taking advantage of Time-of-Use (TOU; aka: time-of-day (TOD)) pricing for their domestic water heater (DHW), which the utility adjusts for lower electrical rates. TOU DHW acts like a battery, as far as your utility is concerned (www.bit.ly/dhw-batt); and it works even better when the tank is well-insulated: www.bit.ly/dhw-jacket.

Perhaps you have heard of utilities paying homeowners for tapping into their home backup batteries to flatten out power peaks: e.g., www.bit.ly/gmp-vpp. The vehicle-to-grid (V2G) option refers to using EV batteries in this same way.

These three strategies are part of virtual power plants (VPPs): www.bit.ly/ct-vpp. With VPP, the electricity supplied to your home comes from your utility in the usual way, plus some of it comes from backup batteries, EV batteries, and solar PV panels from within a large area: www.bit.ly/rmi-vpp! Whole communities, including their businesses, factories, schools, etc., participate in VPPs: www.bit.ly/uk-vpp

Part of the fear, uncertainty and doubt (FUD being spread by fossil fuel (FF) supporters suggests that "too many EVs will cripple the grid." As you can see, the opposite is true: www.bit.ly/wired-v2g!

What's all this to you? Don't worry,



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you set the terms, and it is beneficial all-around. The Renewable Energy Vermont 2022 conference featured a program in Connecticut, where low-income underserved renters benefited both financially and with home battery backup coverage during blackouts: www.bit.ly/low-bkp-vpp.

And, beyond VPP, is grid-interactive efficient buildings (GEB), which makes all of this perhaps the most effective solution we have for air pollution and the Climate Crisis: www.bit.ly/get-geb. GEB means that the building envelope is efficient (properly insulated and airtight); heat pumps and induction cooking reduce energy demand; and solar panels, backup batteries and EVs all contribute toward sharing the electrical supply.

As you're probably aware, the U.S. is pretty far behind most First World and even many Second World countries in EV adoption and some other green-energy technologies. But all of these pieces are being employed here and there in the U.S. already, and it won't be long before VPP and GEB will be coming to a town near you!

You'll have the option of joining in on the savings, extra income (www.bit.ly/tx-vpp), efficiency, security, resiliency and pollution reduction that these technologies offer. So, avoid buying soon-to-be-out-of-date technology and being stuck with replacing it or being left out when the time comes. As it happens, V2G technology is available to you now - perhaps through your upcoming purchase of a Level 2 EV charger! (See the article on home chargers in this issue.)

Those Powerwall-type home backup batteries hold about 10 - 13 kWh, whereas EV batteries typically start around 65 kWh now -- some more than 100 kWh. The authors have 130kWh of EV power parked in their garage. You already own your EV. Unlike the Powerwall, your EV's battery isn't a stand-alone, one-trick device which you hope you never have to use. Your EV can run your critical circuits at home for days longer than a couple of Powerwalls can. Then it can be driven to a place where there is power for recharging (www.bit.ly/v2g-demo).

With V2H and an EV or two you could "island" your home when the grid fails -

essentially become off-grid and independent until the grid comes back up - some solar PV at your home would make this even easier. A high-performance home running on heat pumps, induction cooking and LED lighting with some solar PV would be perfect.

Step 1: Nowadays, weather disasters are more frequent, widespread and damaging. The grid goes down more frequently and for longer periods. Grids that didn't go down before are going down now. All because the old top-down approach of utility distribution

isn't capable of handling our worsening climate. Buying the right Level 2 charger could be your foot in the door to a future partnership with your utility company where you cooperate to keep the juice flowing and your energy costs low!

You might not yet have solar PV, or TOU DHW electricity price reduction, or even a home backup battery system, but you can get started with a bi-directional V2G charger. Chargers able to handle solar and TOU and battery backup and EV charging are available now: www.bit.ly/enphase-pv2ev2h2g.

Ask your car dealer (or charger seller) if your particular car can share its battery power. Ask your solar installer if the inverter can tie into batteries, EV chargers and the grid. Ask your EV charger installer if the charger supports V2G. Don't be left behind. Embrace the future!

The Whitchurches live cheaply and securely with their EVs, heat pumps and induction range at their solar-powered Net Zero+ Passive House. For related articles: www.bit.ly/get-w-ev. ♻️

No More Gas Hookups in Beacon, NY

Beacon, NY Adopts All-Electric Construction Law

On March 20, the Beacon City Council (Beacon, New York) passed environmentally friendly legislation, which will require all-electric construction beginning in 2024.

"We think it's the right thing to do," said City Councilman George Mansfield. "We will be leading by example and hopefully others will follow suit."

Mansfield and others gathered at a park across from city hall prior to the city council meeting to praise residents for supporting this legislation.

"There will be no more gas hookups, no more oil heat," said Mansfield. "It will be all-electric, and then ultimately we hope all-electric will be generated in sustainable ways."

Beacon becomes the third city in New York state, after New York City and Ithaca, NY, to pass bans on new building construction using fossil fuels as part of the design. Buildings are considered the

largest polluters in the state, releasing 32% of the state's greenhouse emissions.

The State Assembly and Senate recently endorsed statewide bans on fossil fuels in new construction in their budget proposals.

And Dan Aymar-Blair, a Beacon city council member, thinks Beacon should do its part, too. "Beacon has to do its part in cutting emissions," he said.

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[Note from G.E.T. for a good decision: All of us here at Green Energy Times (G.E.T.) would like to commend the city council members for upholding these important environmental standards. This decision will serve the community in ways they may not realize yet. The health of our children and future of the planet will benefit greatly.] ♻️

JDPower's EV Satisfaction - Cont'd from p.6

alphabetical order): accuracy of stated battery range, availability of public charging stations, battery range; cost of ownership, driving enjoyment, ease of charging at home, interior and exterior styling, safety and technology features, service experience, and vehicle quality and reliability.

The study is conducted in collaboration with PlugShare, the leading EV driver app maker and research firm. This study sets the standard for benchmarking satisfaction with the critical attributes that affect

the total or overall EV ownership experience for both BEV and PHEV vehicles. Survey respondents for the study include 7,073 owners of 2022 and 2023 model-year BEVs and PHEVs. The study was "fielded in" from August through December 2022.

For more information about the U.S. Electric Vehicle Experience (EVX) Ownership Study, visit <https://bit.ly/EVX-study>.

See the online press release at <https://bit.ly/JDP-press-release>. ♻️



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