

Wireless charging for electric cars inching closer to reality

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Someday soon, plug-in cars may no longer need a plug. Electric car drivers would simply pull into a specialised parking space when it's time to power up, wait for a light on their dashboard to switch on, and then hop out of the car and go about their day.

This is the promise of wireless EV charging, an inductive transfer of electrons that would eliminate the need for all those pesky cords. Multiple startups have spent years working towards a world in which wireless charging goes mainstream, and as EV adoption picks up, momentum is building to make that dream a reality. Companies are coalescing around standardised technology, automakers are embarking on wireless experiments, and municipalities are mapping out use cases. Even Tesla Inc. is interested.

But major hurdles remain, chief among them slow charging speeds and the money and interest needed to build

stations and get more carmakers on board. While charging without a cord sounds great on paper, the technology faces the same paradox that's impacting the rollout of public plugs: Stronger consumer demand could push car companies to take up wireless charging, but growth in EV demand is stymied in part by anxiety about public charging.

"If I was a car manufacturer, I'd probably be reluctant to put it on a vehicle today just because there's not any wireless chargers out there," says Michael Weismiller, program manager for electrification R&D in the US Department of Energy's Vehicle Technologies Office. Wireless, or inductive, EV charging works by using magnetic resonance and a charging pad to generate a power-transmitting field. When a coil in a receiver under the car aligns with a coil in the charging pad, the receiver captures that energy and feeds it to the car's battery. The technology is similar to wireless phone charging, which also requires a receiver and aligned coils; but EV systems can work with up to 10 inches



PHOTO: REUTERS

(250 millimeters) of separation.

Speed is an issue, though. Most wireless chargers are on par with a Level 2 charger (the kind you'd use at home) and not the DC fast chargers available at many public stations. Electric cars also need to be designed with wireless charging in mind. While retrofitting EVs is doable, in practice it can void the car's battery warranty, says Amaiya

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Khardenavis, an analyst at Wood Mackenzie. For carmakers, enabling wireless charging is still difficult to justify: It's expensive, and there aren't yet

charging stations to make it a compelling perk for car buyers. Alex Gruzen, chief executive officer at Massachusetts-based WiTricity Corp, says his company's wireless charging capability will cost automakers several hundred dollars per car, and consumers at least \$2,500 to start — both figures he sees falling over the next five years.

These hurdles mean that, for now at least, wireless EV charging mostly exists in the form of pilot projects. Some automakers in China and South Korea are testing the technology on new passenger cars, but many wireless-charging trials are geared at commercial vehicles, which tend to have consistent routes and the luxury of powering up overnight in fixed parking spaces. In Los Angeles County, the Antelope Valley Transit Authority uses inductive systems made by Wave Charging to help power its fleet of electric buses. Indianapolis, too, is using wireless charging for its electric buses, which are made by Chinese EV giant BYD Co In 2019, the city partnered with

Pennsylvania-based charging startup InductEV (then called Momentum Dynamics Corp)

Brooklyn-based wireless charging startup Hevo Inc. is working with the DOE's Oak Ridge National Laboratory and Stellantis NV to trial a 50-kilowatt wireless system on the carmaker's Chrysler Pacifica hybrid, after completing a demo with a Level 2 wireless charger last year. In perhaps the most critical signal of wireless charging's potential for passenger cars, Tesla design chief Franz von Holzhausen in December confirmed that the company is pursuing its own version of the technology. "We are working on inductive charging, so you don't even need to plug something in at that point — just pull in your garage, drive over the pad and it's charging," von Holzhausen said during an appearance. Tesla's vote of confidence is spurring interest. "That's the major wake-up call," McCool says. "Until that happened, wireless charging was still considered a fringe technology. Now it's a trending technology."