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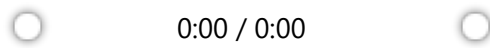
# Roads That Charge While You Drive: Can This Fuel a Future for EVs?

*Danny Lewis*

8–10 minutes

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Imagine driving an electric vehicle on a [highway that recharges your battery](#) as you travel.

Stefan Tongur has been hoping to make this futuristic tech a reality since 2010, when he was working on his doctorate at Sweden's KTH Royal Institute of Technology in Stockholm. In 2019, he joined Electreon, an Israeli startup that aims to [bring this technology to roadways](#) around the world. Later that year, the company began construction of its first pilot project on public roads, in Gotland, Sweden.

Since then, Electreon has expanded its projects to several cities around the world, including its first in the U.S.—a pilot on public streets at the Michigan Central Station tech hub in [Detroit's Corktown neighborhood](#). The initial phase was completed in November and included a quarter of a mile of roadway set up to

wirelessly charge an electric bus retrofitted to work with the system. Tongur says it will stretch for a full mile when the project is completed.

Charging rates can vary depending on several factors, including the size of the battery and how many receivers the vehicle has, Tongur says. For an EV with just one receiver, he says Electreon's wireless charging is comparable to what are known as level 2 plug-in chargers. They can charge a battery to 80% from empty in four to 10 hours. A larger vehicle with more receivers could have rates similar to [level 3 fast chargers](#) that can fill a battery to 80% in 15 minutes to an hour.

There's a lot of road to cover to get from pilot projects to widespread wireless charging on streets and highways—and having electric vehicles with the technology to use it. In a conversation during the Journal's Future of Everything podcast, Tongur, Electreon's vice president of U.S. business development, discussed how wirelessly charging electric vehicles works and how it could change the way we drive.

### **What got you to Electreon and trying to figure out how to wirelessly charge cars?**

There are a lot of companies in Sweden—Scania, Volvo and others—trying to figure out how do we electrify trucks. Because loading them with a bunch of big batteries could be challenging in terms of cargo. So the idea emerged: Why don't we charge these vehicles while they drive? Then you can have a smaller battery.

It's not just about the technology. It's about, how does the technology shift impact business models? Because essentially it

challenges the dominant business model of internal-combustion engines and how we fuel our cars, if we bring the fueling to the road.

### **How does Electreon's charging system actually work?**

In essence, you have two coils, similar to other inductive charging. You put the coil underneath the road surface, connected to what we call a "cabinet" with a grid connection and the cloud. Under your vehicle, you have a secondary coil. The infrastructure would detect you, and you will get a charge wirelessly. That could happen while you're standing still on that coil, or it could happen while you drive, coil by coil.

### **What's the coil made of?**

It's a copper coil enclosed in a rubber material. You can put it underneath the road and resurface afterward. It's a very durable kind of material, and flexible and cost-effective.

### **When you're driving, if you're turning on coil by coil, how fast does the system power?**

It's milliseconds. It happens seamlessly, very fast. We've done testing in places like Sweden and others where we have driven more highway speed. It's a very smart system in that it can orchestrate multiple coils in one segment as you have cars driving.

You can also see it from the other side, of slower things. Imagine a taxi queue. Now you can slow drive and you can charge these vehicles while they are in the queue. It's mainly fleet customers

that can use that time for charging and thereby naturally extend the range.

**Speaking of fleets, what are the vehicles we are talking about? Do you have to build this into future models or do you have a retrofit solution?**

We work with both. We have a collaboration, the project in Detroit with Ford, where we have retrofitted and integrated a receiver into that vehicle. How do we retrofit existing vehicles? It's kind of easy. You smack up the receiver underneath the vehicle. You connect it to the high-voltage battery and the software system.

Once you've done it with one, then you have a pathway to scale it to the same models. And then eventually when this scales, you also have it from the factory. So you can order: Hey, do you want it with the receiver or not? We are working in standardization committees, like SAE [International], so that this is cross-industry and not just Electreon.

**And on the infrastructure side, you can just dig slightly deeper?**

The first time you do things, it's a lot of coordination, a lot of education. What happens when we connect this electric road to our grid? How do we put asphalt on top of it? There are a lot of questions when you do first things, and that's why it's important to do a pilot—not for technology per se, but it's really to get the stakeholders on board, from the grid company, from the construction company, the engineering companies, the departments of transportation.

You need to work with the partners in the ecosystem of today and bring a level of innovation to them where they embrace it, instead of saying let's do everything from scratch. Because that's not, I think, how progress will be driven, especially in these public spaces where roads have been there for over a century.

### **How does the maintenance work with your technology?**

There are a lot of safety features that make sure that the road isn't electrified when [no vehicles are] on it. So it's totally safe from that aspect. And as you mill and resurface, you only do that for an inch and a half, 2 inches. So we have placed the coils at 4 inches underneath, so you don't hurt or touch the coils when you do that. It's perfectly safe to come and do that maintenance without impacting the electric road.

### **What keeps it from being electrified when it's not in use? If an animal happens by while a car is charging, would it be a risk?**

Absolutely not. Think about it like your cellphone. You need a SIM card. Then you need the subscription. It's the same thing here: You need to have some sort of model where if you aren't identified as an authorized user, you won't even be able to activate the system.

There's a lot of safety features. And there are international standards that put limits on electromagnetic fields. We've done testing in the places we are and make sure that we obey them and are well underneath them. When we bring this to the market here and find new applications, this will continue to be tested, continue to be pioneered, making sure this is safe for people walking, animals, people in the car.

## **Charging stations are very much the same model as gas stations. Could wireless charging do something very different?**

Yes, I think we'll have that [charging station] model as well, but the way electrons work, they are slower to fill up the battery. The way the electrons work compared with fuel is different. And so we can utilize the idling time that we have anyhow—focusing on fleets again, taxi queues, port queues, loading docks, bus terminals—and electrify subsequent stages, like main corridors where you have traffic. This is not to say, let's electrify every road. That's not Electreon's vision.

## **With your electric roads, are you targeting heavier-use places?**

Think about bus lines, rapid transit lines. Think about port to warehouses. Think about airport lines, university shuttles. A lot of use cases that we can target are kind of ripe for this already. And then, we can bring in the passenger cars, where you can even have it in your garage with wireless charging. If you drive on the road, it will charge where the infrastructure is.

## **Where do you see this technology going in the next five, 10 years?**

In five, 10 years I definitely see this connecting regions. I definitely see this as a solution for having folks go to electric vehicles not worrying about range, not worrying about availability and the sustainability of batteries because we have smaller and more sustainable batteries. And don't worry about, "I need to stop now"

or “I need to have two vehicles, one for my long trips and one I can use just in urban areas.”

*Interview has been condensed and edited.*

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