

# Five game-changing innovations in electric vehicle chargers

## Power Smart for Schools

**Electric vehicle charger companies are innovating at a pace that matches electric automakers.**

By Chris Young

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The electric vehicle (EV) industry is a key player in combatting climate change; carmakers are increasingly turning electric as Europe's EV regulations kick in and next year one million EVs are expected to be sold in Europe alone.

Innovations in electric vehicles are widely reported, but what of the chargers and infrastructures that power this growing industry?

Here are a few innovations we are seeing EV charger companies embrace to keep up to speed with the rapidly changing technology of the automotive industry.

### 1. Bidirectional chargers

Energy demands are surging with the rise of electric vehicles. This means energy companies often give drivers better rates for charging at times when energy demands are lower — at night time, for example.

However, demand is only going to get higher and energy companies will actually need help from EV owners to balance the grid at the same time as incentivizing them to help out.

That's where the bidirectional charger comes in.

As the name suggests, bidirectional chargers allow electricity to travel both ways. EV owners can charge their cars, but they can also send electricity the other way through vehicle-to-grid (V2G) energy transfer. EV owners can actually get paid by the energy companies to send electricity back when demand is high.

One company, Wallbox, has even created the "first bidirectional charger for your home." By also allowing electricity to be transferred to the home, they claim their technology will change the way we use energy — imagine a self-sufficient home where a car could be used as storage for excess solar power.

Virta, meanwhile, recently opened a public bidirectional EV charging point attached to a solar power plant in Finland.

### 2. Wireless power

Wireless charging is a technology that is being developed largely with the future in mind. The change in vehicle ownership that EVs and autonomous vehicles will bring about — namely an increase in shared vehicle services — means that fast, easy methods for charging electric vehicles will be essential.

Take Hyundai's automated parking system (video below), which would allow drivers, or companies, to send cars to a garage where their vehicle would simply need to drive onto a spot and start charging.

Much like bidirectional charging, wireless power could change the way energy works in our homes. For a future in which fleets of autonomous vehicles will drive us around, it will be key for powering transport.

As Alex Gruzen, CEO of the Massachusetts-based wireless charging company WiTricity, told SmithsonianMag. "There's no one to plug them in. There's no driver. They need to be able to go on-demand and charge themselves as the batteries get low."

Though it's a technology for the future, one huge project is already in development for wireless charging. Fortum announced this year that it is developing the first wireless fast-charging infrastructure for taxis — with the aim of making Oslo's taxis emission-free by 2023.

### **3. Solar charging**

Solar charging for vehicles is being developed in two different branches; chargers that convert solar energy into electricity for EVs and cars that have solar panels attached to their roofs.

The former currently shows more potential, though interesting steps are also being taken in solar-powered cars. Envision Solar has developed "Solar Tree" arrays that can be quickly deployed and ready to charge vehicles. Solar Edge, meanwhile, manufactures a solar charger inverter that can be installed in homes and allows EV owners to charge their cars faster with solar.

Lightyear, a Dutch startup, has built "the world's first long-range solar charging car."

While the thought of a car running solely on solar energy is an incredible prospect, the truth is that we are likely far from that becoming a reality.

As Forbes points out Hyundai's solar roof charging car needs to be constantly parked in the sun to give owners only two miles worth of electricity per day. Solar charging systems, rather than vehicles, are the more effective option.

### **4. Extreme high-speed chargers**

We could be on the verge of seeing incredibly high-speed electric vehicle charging. Currently, the most common fast-charging system on the market is Tesla's Supercharger, which charges EVs up to 80 per cent in around 30 minutes.

Porsche and BMW recently partnered up and think they can do quite a lot better, as Automotive News reports. The system adds 62 miles (99 kilometers) of range to an EV battery in just three minutes. However, there's a big catch.

The Porsche-BMW prototype system charges at 450 kilowatts, but there are no EVs on the road that could currently withstand that much current. For example, BMW's i3 has a cap of 50 kW and Tesla's Supercharger charges at a maximum capacity of 120 kW.

Systems are being tested, however, including modified cooling systems that would allow for this type of charging to work. It could be the last piece in the puzzle for extremely fast EV charging.

### **5. Autonomous robotic charging**

We've all seen the Tesla robotic EV charging arm prototype by now. It looks like something a James Bond villain might use in their secret hideout, and unfortunately, it still remains at the prototype stage.

However, plenty of other companies have taken up Tesla's mantle and are creating their own models.

As TechCrunch reports, Electrify America plans to open an autonomous charging site in San Francisco by early 2020. It will use robotic arms and will allow a similar convenience to wireless charging.

Several other companies have joined the race, including Kuka and Aiways — two firms that have developed their own robotic charging arms.

As electric vehicles, and indeed autonomous driving technologies continue to develop, more companies are looking to win the race to develop the best method for electric vehicle charging.

Most interestingly of all, EV charging might soon also play a part in self-sustainable homes as cars are transformed into more than just a transport vehicle. Cars of the future might also be our own personal moving energy storage facilities.