

# Idaho National Laboratory develops, tests electric vehicle charging

By: [Sharon Fisher](#) November 14, 2019 0



The EVIL lab is where INL tests electric vehicle chargers and batteries. Photo by Sharon Fisher

IDAHO FALLS – Idaho National Laboratory is leading a charge for better battery technology in electric vehicles.

INL, a stalwart in the study of nuclear energy, also performs research in other technical areas as well, including electric vehicles.

Much of that work is done in the Electric Vehicle Infrastructure Laboratory. It's also INL tour guide Ryan Weeks' favorite lab because of its acronym, EVIL.

It's not on purpose, though. At least, he doesn't think so.

## **Fast vs. long-lived**



Eventually, electric vehicles could be charged in just a few minutes using high-speed chargers like these. Photo by Sharon Fisher

Electric vehicles have two primary components: The battery, and the charging system. INL has worked with more than 10,000 entities to obtain driving and charging data from them. It tested more than 4 million car chargers between January 2011 and December 2013 alone.

Thanks in part to INL, Idaho, as well as Utah and Wyoming, have more electric vehicle charging capability than one might expect from remote states. INL is working to site charging stations on 1,500 miles of interstate highway among the three states. In addition, the lab is working with Montana to study an electric vehicle corridor for the 450 miles between Yellowstone National Park's south entrance and Glacier National Park.

One impediment to electric vehicles is "range anxiety": concern that people have for driving too far, using up their battery, and then having to spend hours recharging it.

A system that INL is testing would charge a battery quickly, within just a few minutes. While such quick-charging batteries have been in existence for a while, people typically need to choose between a battery that charges quickly or a battery that lives a long time, Weeks said.

INL is now working on developing a system that offers both a quick charge and long-lasting battery life.

### **Wireless charging**



Like a wireless charger for smartphones, a wireless car charger wouldn't need to be plugged in.

Photo by Sharon Fisher

Other types of charging are even more futuristic. For example, some people have smartphones that can be charged wirelessly by placing them on a plate that is itself plugged in. One experiment INL is working on is developing a similar wireless charging system for electric vehicles.

The disadvantage of such a system for long-term charging in an enclosed area is that the electric field it creates also affects the magnetic field. Like early microwave ovens, that could mean problems for people with implants such as pacemakers, Weeks said.

On the other hand, the system could be used short-term, for example by installing it into a parking space to let the vehicle charge while it's there. Shuttle buses that travel between hotels to and from the airport could get their batteries topped off every time they stopped to pick someone up, Weeks explained.

Eventually, such systems might even get incorporated into the roadbed itself, to constantly provide a low-level charge to vehicles driving across them and eliminate having to charge a vehicle at all.

### **Skeuomorphism**

As electric cars have developed, the technology to charge them has changed as well. For example, there are several types of charging systems – one for Teslas, and two others that are primarily used with other vehicles, Weeks said. Some vehicles can connect to just one type of charger, though more modern vehicles tend to be able to connect to both types of the non-Tesla chargers.



Electric vehicle chargers don't need to look like gas pumps, but they do because of skeuomorphism – it's what we're used to. Photo by Sharon Fisher

Both chargers have been developed to resemble gas pumps and gas nozzles even though they don't need to look like that – an example of *skeuomorphism*, a design concept of making items resemble their real-world counterparts even though it is not necessary. People are used to “gassing up” their cars, so electric cars are designed to be “charged up” with a similar model, because that's what people are accustomed to.

All of this, though, requires security. Older charging models didn't include security, meaning a charger could be hacked to “fill up” a car too much or too fast, damaging or even destroying the battery. Newer models don't have that problem.