Idaho National Laboratory

ELECTRIC VEHICLE

Infrastructure Laboratory

With the push toward electric vehicles (EVs), a major question looms:

Can EVs be charged quickly and efficiently?

While industry works to answer that question, the Electric Vehicle Infrastructure (EVI) laboratory provides the independent, third-party testing and standardization necessary to ensure accuracy and consistency among EV charging products. The EVI lab, an integral part of Idaho National Laboratory's Advanced Transportation activities, also works closely with other INL teams and industry collaborators to enable successful integration of EV charging devices with future smart-grid technologies and renewable energy resources.

Testing Capabilities:
The EVI lab testing capabilities cover conductive and wireless charging devices for:

120 Volt AC
(a regular home outlet)

240 Volt AC
(a clothes dryer outlet)

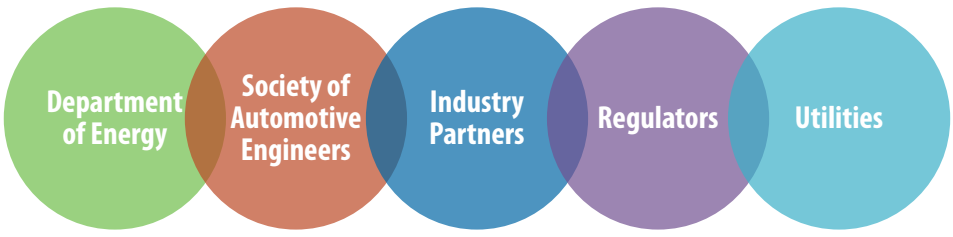
480 Volt AC
(at gas stations)

The team measures:

Third-party, Independent Testing:
The EVI team tests each charging device, provides feedback, suggests improvements, and ensures accurate, high-quality results.

- The efficiency of the charging system
- The power quality of the charging system
- The electro-magnetic fields for wireless charging systems
- The cybersecurity vulnerabilities

Results from all EVI tests are available to the public and can be found at https://at.inl.gov



Benchmarks for Safety and Efficiency

Researchers from the EVI laboratory collaborate with teams across the country to develop and validate codes and standards for safe, efficient charging stations. EVI testing ensures that:

- Levels of efficiency meet industry standards
- Wireless charging systems detect potentially hazardous interactions with the electromagnetic field
- Automated systems shut down when a hazard is detected
- Charging systems work consistently across brands

Smart Grids and Renewable Resources

The EVI research group collaborates with teams across INL to safely integrate EV charging systems and renewable resources into the power grid, using smart grid communication technology. This involves:

- Analyzing communication capabilities between utility companies and EVs for
  - blackouts and brownouts
  - peak energy loads
  - fluctuations of renewable resources on a microgrid
- Assessing cybersecurity vulnerabilities associated with linking EV charging systems to smart grids

1884
THOMAS PARKER BUILT THE EARLIEST KNOWN PLUG-IN ELECTRIC VEHICLE IN THIS YEAR

THREE
TYPES OF EVS TESTED AT EVI: PLUG-IN HYBRIDS, EXTENDED RANGE & BATTERY ELECTRIC

20
NUMBER OF CHARGING STATIONS ANALYZED IN THE EVI LAB AS OF SUMMER 2015

www.at.inl.gov

INL Idaho National Laboratory