Transportation & Innovation Expo

Wisconsin Clean Cities
City of Madison Fleet Service
Alliant Energy
Argonne National Lab DOE Megawatt Charging Requirements Study Industry Work Group
Argonne National Lab EV-Smart Grid Interoperability Center

ANL hosts the US EV-Smart Grid Interoperability Center, in conjunction with JRC in Ispra Italy, to develop and validate EV charging standards as well as research grid impacts.

Smart Energy Plazas at bldgs 300 and 362

ANL Workplace Charging Resources
- 50 AC EVSEs Site-wide
- PV Fed Charging- 80kW
- DC Fast Chargers: 25kW, 50kW, 200kW, 350kW
- Wireless: 50kW
Overlapping Areas Of Common Benefit to MD/HD Electric Vehicle Charging (≥MW and other levels)

DFMEA Failure Analysis

Utility Connection, Load Management

Infrastructure planning services, physical implications of parking/charging

DCaaS, DC Conversion, Distribution to EVS

Couplers, cables, cooling systems, ergonomics

Mechanized Systems, Charging Interlocks

Cyber-Everything

MD/HD MW+ EV Charging

Sub-MW level charging (ChaoJi) {1500v/600A=.9MW}

Sub-MW level charging, over night, opportunity

Sub-MW wireless charging
Overview of Charging Levels (from CharIN)

Level 1
- 120V
- 15-20 AMPS
- 7-8 miles of i3 range per hour charging
- 1.4 kW power delivery

Level 2
- 240V
- Up to 80 AMPS
- 10 - 26 miles of i3 range per hour charging
- 3.7 - 7.7 kW power delivery

CCS DC charging
- 1000V
- 500 (800) AMPS
- CCS can deliver up to around 200Amps with traditional copper cables, while higher currents are delivered via cooled cables.
- Up to 80% of 100kWh battery in less than 20 minutes
- Up to 350kW power delivery, Some units up to 500/800kW

Commercial Vehicle High Power (proposed)
- 1500V
- 3000 AMPS
- The High Power Commercial Vehicle charging standard would allow users to recharge their large, commercial vehicles (Classes 6, 7 & 8) in 20-30 minutes.
- Up to 80% of Class 8 truck, carrying 500kWh, in 20 minutes
- Up to 4.5 MW power delivery

Notes:
- Level 1 chargers use standard 120V electrical outlets. 120V circuits are also used by most home electronics.
- Level 2 chargers use 240V electrical circuits. 240V circuit are also used by electric dryers & electric stovetops.
Example Charging Equipment Site Layout

350kW max per port, w/AC coupled storage

Single and dual output dispensers at curb

480vac to DC power converter cabinets in back

480vac switchgear and local peak shaving energy storage
Proposed Modular Prefabricated Charging Station Power Electronics/Battery

(1MW Delta Electronics Factory Built Data Center Power Source)