# EV-Grid Activities at the Idaho National Laboratory & Collaboration with the EU

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**This presentation does not contain any proprietary or sensitive information**

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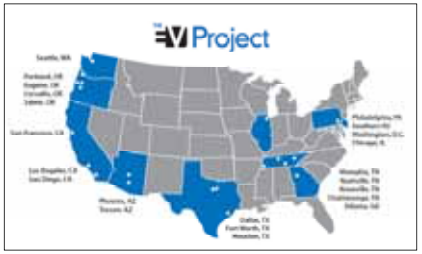
Idaho National Laboratory

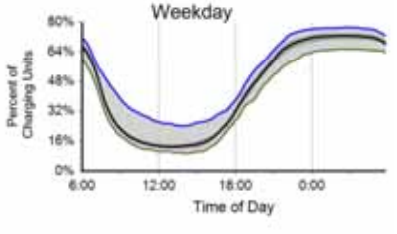
# INL Background

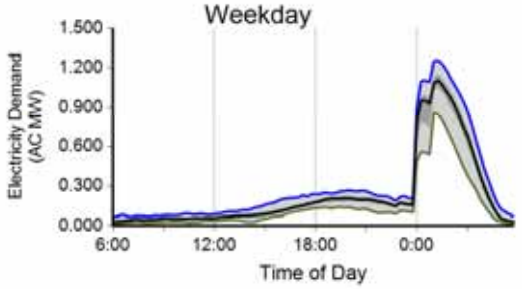
- INL conducts the light-duty vehicle portion of the Advanced Vehicle Testing Activity (AVTA) for the U.S. Department of Energy's Vehicle Technologies Office
- 103.5 million test miles accumulated on 11,500 electric drive vehicles and 18,000+ EVSE and DCFC
- Currently, 1 million test miles collected every 6 days
  - More of a focus on field-based real world testing and data collection activities
  - Includes the grid / vehicle infrastructure interface and fueling requirements
  - Following pages are examples of ongoing EV / grid related activities

# EV Project Infrastructure Reporting

- **21,000 discrete data sources (Vehicles, EVSE and DC Fast Chargers) from DOE's/ECOtality's EV Project. INL analyzes grid use and vehicle data for reporting**
  - **Supports the what, when, and where of grid infrastructure deployment decisions**
  - **Document impact when public EVSE costs money**
  - **Document economic incentives to shift charge times**
  - **Document drivers' real-world grid-use decisions**
  - **Document BEV versus PHEV grid use**
  - **Document regional grid-use variations**
  - **Provide electric utilities with service territory specific grid demand information**

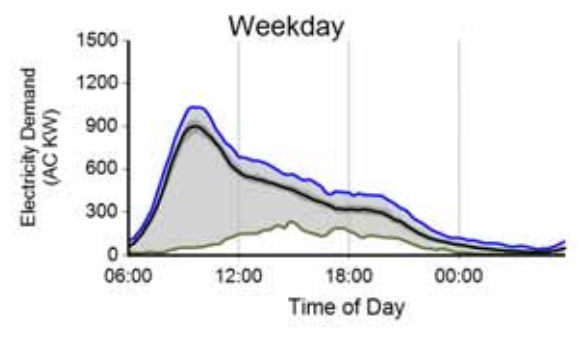



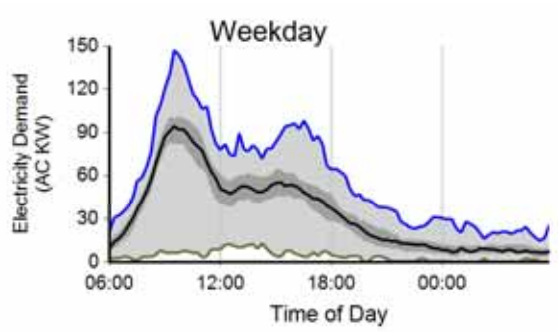
# ChargePoint Infrastructure Reporting

- **4,200 ChargePoint EVSE demonstration**
  - **Demonstrates residential, private commercial and public grid use**
  - **Supports what kind of and where grid infrastructure should be placed**
  - **Document regional grid-use variations**

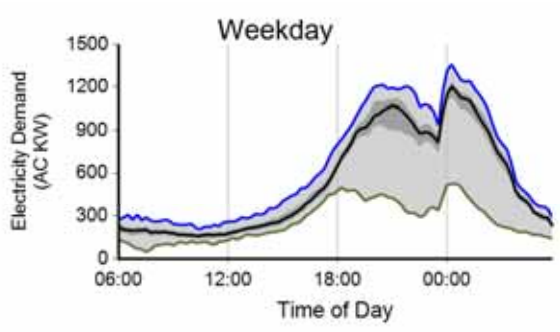
**Public Demand**




**Commercial Demand**

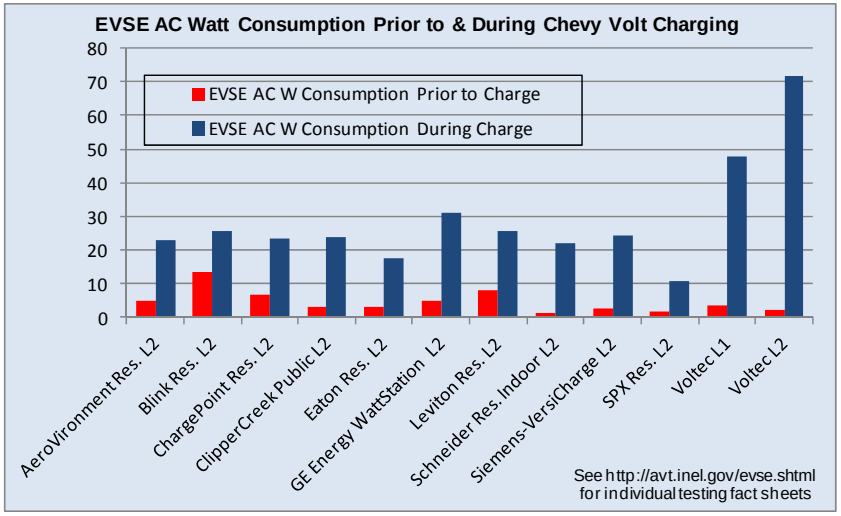



**Residential Demand**



# Conductive EVSE & DCFC Testing

- Tested and reported 13 Levels 1 & 2 EVSE, and DC Fast Chargers (DCFC), with additional units in the test queue
- Developing with SAE multi EVSE, DCFC and PEV compatibility testing regime
  - Benchmarks grid-to-vehicle and grid-to-battery efficiencies, standby power requirements, power quality feedbacks
  - Reduces SAE J1772 incompatibility problems



# Wireless Charging Testing

- Testing two lab and vehicle based Wireless Charging systems with additional NDA's being signed
- Developing with SAE wireless charging testing procedures
  - Benchmark grid-to-vehicle and grid-to-vehicle wireless efficiencies, standby power requirements, power quality, FCC compliance, and safety
  - Supports SAE's development testing procedures
  - Independent assessments of alternative charging technology

# Other Grid Infrastructure Activities

- Fleet grid demand reduction demonstration in AZ
  - Demonstrating DCFC grid demand reduction use at existing test fleet with distributed energy storage
- "Reduce Your Use" electric utility demonstration in CA
  - Demonstrate 24-hour forecast of peak demand and grid communications capabilities to reduce on peak charging with human override (start next month)
- EVSE Grid Study for DOE Office of Electricity
  - Time of use rate impacts on pricing elasticity
- Cyber security testing of 5 Level 2 EVSE CY-13
  - Examines vulnerabilities from EVSE to back office operations, and potentially connected utilities
- Eventual cyber security testing wireless charging
  - Will examine wireless vulnerabilities

# Other Grid Infrastructure Activities – cont'd

- New York City electric taxi and infrastructure study
  - For the NYC Taxi and Limousine Commission and DOE, document BEV taxi travel and EVSE and DCFC grid use in highly congested environment
  - Supports inner city EVSE and DCFC planning
- Dublin Ireland electric taxi study
  - Signing NDA to document BEV taxi travel and EVSE and DCFC grid use in EU congested environment
  - Supports US/EU partnership and comparison to NYC

# Other Grid Infrastructure Activities – cont'd

- Singing NDA for I-5 DCFC travel corridor study
  - For DOTs of Oregon and Washington, document DCFC use for multi-leg and single-leg trips
  - Supports USDOT and state DOTs: where to place interstate travel corridor EVSE & DCFC quandary
- NYSERDA 580 EVSE L2 data collection. 6+ Manufacturers
  - Demonstrates private commercial and public grid use in challenging environments in New York State
  - Supports the where of grid infrastructure
- Grid and vehicle study at three DOD bases. Fourth base EVSE deployment and data collection
  - Determines DOD base grid suitability to support new EVSE and DCFC based on travel patterns
  - Supports DOD's petroleum reduction and DOE/DOD MOU

# Other Grid Infrastructure Activities – cont'd

- Nissan Leaf DCFC Testing
  - Grid and battery impacts from DCFC charging
  - Probable secondary use distributed storage study
- Battery Mule Testing of advanced batteries
  - Traction battery testing will provide secondary use battery for distributed energy study
- Chevy Volt and other OEM demonstrations
  - Demonstrates BEV, PHEV and EREV grid use
- Grid Interaction Technical Team
  - Project(s) selection and execution as team member

**This presentation is available alphabetically in the Publications section of the AVTA website: http://avt.inl.gov**

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