Introduction to the EV Project: the Largest Deployment of Electric Vehicles and Electric Vehicle Charging Infrastructure Ever Undertaken

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Presentation Outline

- Overview of the EV Project scope
- Product specs
- Project objectives
- Plan for reporting of results
- Project status and timing



The EV Project

- **Purpose**: Build and study mature EV charging infrastructure in 9 U.S. regions in 16 cities and on interstate corridors
- \$230 million project funded by U.S. Department of Energy (DOE) Vehicle Technologies Program as part of the American Recovery and Reinvestment Act
- 50% cost share by private sector and nonfederal government partners
- Outcome: Use lessons learned to enable efficient mass deployment of charging infrastructure and plug-in electric vehicles





Project Partners

Sponsor



Primary Partners



ECOtality North America



Nissan North America



Chevrolet



Idaho National Laboratory









ECOtality North America

- DOE grant recipient and project leader
- Provider of infrastructure solutions for plug-in electric vehicles
- Partner with INL in conducting light duty vehicle testing for DOE's Advanced Vehicle Testing Activity (AVTA)





Idaho National Laboratory

- Multi-disciplinary DOE lab
- Responsible for EV Project data collection, analysis, reporting
- Manages light duty vehicle testing for AVTA

Nissan, General Motors

- Integrated processes with ECOtality NA for new customer charging unit installation
- Supporting data collection





EV Project Strategic Partners include:







ATX / Cross Country Automotive*



Bovis Lend Lease*



BP America*



Center for Sustainable Energy (CA)*



City of Chattanooga*



Chattanooga EPB



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City of Tucson*



Eaton Corporation*



Electric Power Research Institute

GRIDPUNT

GridPoint*



Hamilton County (TN)*

JOHNSTONMARKLEE





Oak Ridge National Laboratory*



Ohio State University*



PacifiCorp



Pima Association of Governments (AZ)*



Portland General Electric*



Puget Sound Energy*



Salt River Project*



San Diego Association of Governments (CA)*



Snohomish County PUD*



State of Oregon*



State of Tennessee*



State of Washington*



Tacoma Power*



Tennessee Valley Authority*



Tucson Electric Power*









Davidson County





Nashville Electric Service*



Qualcomm



San Diego Clean Fuels Coalition*

SDGE A Sempra Energy usiny" San Diego Gas & Electric*



San Diego Miramar College*



Seattle City Light*





Knoxville Utilities Board*





Maricopa Association of Governments (AZ)*



Best Buy



University of California-Davis*

VANDERBILT VUNIVERSITY MEDICAL CENTER

Vanderbilt University Medical Center



Yazaki North America*









EV Project Locations



Infrastructure and Vehicle Deployment

Vehicles

- 5,700 Nissan LEAF[™] vehicles included in EV Project^{*}
- 2,600 Chevrolet Volts included in EV Project *
- **Electric vehicle supply equipment (EVSE)**
- 8,300 residential AC level 2 EVSE for participating Nissan LEAF and Chevrolet Volt customers
- 6,350 AC Level 2 public-use EVSE
- 125 additional AC Level 2 EVSE in ORNL Solar Project

DC fast chargers

310 DC level 2 fast charger ports in cities and on interstate corridors

* Number of vehicles in EV Project only. Does not represent regional or national production volumes





Idaho National Laboratory

Product Specs



ECOtality Blink[™] charging equipment



Nissan LEAF[™]



Chevrolet Volt







Blink charging equipment



AC level 2 residential and commercial EVSE

- 240 VAC single phase, 6.6 kW
- Single J1772 connector per EVSE
- Networked, with data collection
- Touch screen user interface, RFID authentication, subscription service



DC level 2 commercial fast charger

- 480 VAC 3 phase, 60 kW
- Two CHAdeMo connectors per charger
- Networked, with data collection
- Touch screen user interface, RFID authentication, subscription service



Nissan LEAF



Battery electric vehicle (BEV)

- 24 kWh battery pack
- J1772 AC level 2 inlet
- CHAdeMO DC fast inlet on all EV Project LEAFs
- Event data collected via vehicle telematics



Chevrolet Volt







Product Specs



Chevrolet Volt



Extended-range electric vehicle (EREV)

- 16 kWh battery
- J1772 AC level 2 inlet
- No fast charging
- Event data collected via vehicle telematics









Project Objectives

- Build mature EV charging infrastructure in nine regions and study:
- Infrastructure deployment process
- Customer driving and charging behavior
- Impact on electric grid





Infrastructure deployment process

- Systematic selection of public charging locations for maximum benefit to vehicle owners, charger hosts, and community
 - ℝ Targeting where people shop, play, gather for 1 3 hrs

 - Marketing to commercial hosts (final decision makers)
- Proving ground for codes, standards, and permitting

 in their various stages of maturity or development





Studying customer behavior

- Vehicle customer driving and charging behavior
 Residential vs. public charging station utilization
 AC level 2 vs. DC fast charging utilization
 Influence of infrastructure availablity
- Distinctions in usage of two different vehicle types (BEV and EREV)
- Changes in behavior over time







Studying impact on electric grid

- Vehicle charging demand relative to system peak
- Vehicle charging demand relative to local distribution
- Influence of smart charging and incentives

▲ Electric utility time-of-use rates









Reporting of results

- Individual participants access their own information on a web portal
 - Vehicle owners with residential or fleet EVSE
 Commercial EVSE/charger hosts
- General public can see project results in quarterly fact sheets on EV Project and INL websites
- Deep-dive studies will be presented in various forums





Quarterly reports to public

- Aggregated reports by project region
- Overview report for at-a-glance project status
- Infrastructure-focused charging report
- Vehicle-focused charging report







Infrastructure-focused report

- Metrics given for each charging unit type
 - Residential / AC level 2
 - Private nonresidential / AC level 2
 - Publicly available / AC level 2
 - Publicly available / DC fast charger
 - In city
 - On intercity / interstate corridors





Infrastructure-focused report

- 117 metrics and plots, including:
- Electricity consumed
- Charging unit utilization
- Aggregate charging demand vs. time of day and day of the week
- Individual charging event metrics
 - How often, how long, how empty, how full









Vehicle-focused reports

Separate reports for LEAF and Volt 39 (Volt) and 47 (LEAF) metrics and plots, including:

- Distance driven, other trip statistics
- Percent of distance driven in charge depleting vs. charge sustaining mode (Volt only)
- Battery state of charge at the start and end of charge
- Percent of charging events performed at home vs. away from home (LEAF shows line items for DC fast charging)



Frequency of Charging by Charging Unit Location and Type









Deep-dive study topics

- Change in BEV customer "used range" over time
- Geospatial Information Systems density analysis
- Charge clustering impact to local distribution
- San Diego Gas & Electric TOU study
- UC Davis human behavior studies
- Studies by other partners









Confidentiality of data

- Raw data is protected by non-disclosure agreements
- Contains customer personal information
- Information is shared, data is not
- Preserving customer confidence that their data will remain secure is paramount to future of connected vehicles





Status

- Systematic planning process for each EV Project region is complete
- Regional stakeholder teams have developed unique deployment plans for each region
- Infrastructure deployment guidelines and long range plans were issued for each region





Infrastructure deployment guidelines

- Outline equipment installation process for various EVSE/charger types and locations
- Stress the need for coordination with
 - Local governments, permitting authorities
 - Auto manufacturers
 - Electric utilities and local electrical contractors
 - Other local groups such as home owner assoc.
- Summarize codes and standards applicable to each project region





Infrastructure deployment guidelines

Give practical guidelines and recommendations for:

- Site layout
- Protection of equipment
- ADA accessibility
- Site flooding potential
- Ownership, liability

- Load management strategy
- Trouble reporting
- Lighting
- Signage
- etc.

Focus is on customer safety, security, and convenience.

www.theevproject.com/documents









Status

- Blink AC level 2 wall-mounted EVSE is UL listed
- ECOtality NA Stakeholder Services executing regional deployment plans, also signing national accounts









Timing

- Residential EVSE installation underway
- Public EVSE installation starting mid Feb 2011
- First reports issued after Q1 2011
- Launch curve through Sep 2011
 - Just-in-time infrastructure installation vacant charging stations do not promote EV adoption
- Data collection continues through Dec 2012





There's no substitute for a test drive!









Acknowledgement

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For more information

- EV Project: www.theevproject.com
- ECOtality North America: www.ecotalityna.com
- Blink: www.blinknetwork.com
- INL / Advanced Vehicle Testing Activity: http://avt.inl.gov



