ANSI Electric Vehicle Standards Roadmap v2.0

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Project ID # VSS118

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Overview

Timeline

- Start: Oct 2010
- Finish: Spring 2013
- Phases 1, 2 and 3 – 95+% complete

Barriers Addressed

- Safety
- Interoperability
- Performance
- Cost

Budget

- Total project funding
  - DOE: $205K
  - Private Sector Cost:$386K
- DOE Funding received:
  - FY11: $108K
  - FY12: $57K
  - FY13: $40K

Partners

- American National Standards Institute (ANSI)
- Energetics
- Project Lead: Jim McCabe, ANSI; Partner: Fred Wagner, Energetics

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Relevance / Objectives – Consistent with Objectives of DOE Vehicle Technologies Program

- Foster coordination and collaboration among public and private sector stakeholders working on standards and codes for EVs and charging infrastructure
- Achieve policy objectives – reduce petroleum consumption, enhance economic growth, and lower greenhouse gas emissions
- Foster dissemination of safe / interoperable technology for EVs and charging infrastructure
- Respond to consumer expectations regarding safety, interoperability, performance, cost, environmental impact

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Milestones

DOE provides in-kind support via Energetics for ANSI Electric Vehicles Standards Panel (ANSI EVSP)

- Phase 2: Jul 2011 - Apr 2012
  - *Standardization Roadmap for Electric Vehicles, Version 1.0*, released April 2012. Free download at www.ansi.org/evsp.
  - *ANSI EVSP Standards Compendium*, a searchable spreadsheet of standards related to issues identified in the roadmap, also released
- Phase 3: May 2012 – Spring 2013
  - *Standardization Roadmap for Electric Vehicles, Version 2.0*, released Spring 2013. Free download at www.ansi.org/evsp.
  - *ANSI EVSP Standards Compendium v2.0*, a searchable spreadsheet of standards related to issues identified in the roadmap, also released

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Approach / Strategy for Deployment

- Identify, inventory and assess standards, codes and regulations, conformance and training programs, needed to enable safe, mass deployment of EVs and charging infrastructure in the U.S., with an eye toward international activities and harmonization
- Ascertain gaps and recommend solutions
- Identify prioritized timeframes for needed standards, and organizations that may be able to perform the work
- Focus is on-road plug-in EVs, both battery electric and plug-in hybrids, charging systems and associated support services
- 3 Domains: Vehicle, Infrastructure, Support Services
  - 5 Working Groups: Vehicle Systems, Charging Systems, Communications, Installation, Education and Training

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Technical Accomplishments and Progress v2.0

- 59 total issues explored and addressed (some data presented was still *under discussion* when this presentation was prepared)
- 44 gaps or partial gaps identified
  - 30 are near-term priorities (0-2 years)
  - 13 are mid-term priorities (2-5 years)
  - 1 is a long-term priority (5+ years)
- 15 issues where no gap identified
- 384 standards identified from 34 organizations
- Many SDOs (both U.S. based and non-U.S. based) produce globally relevant standards following an open, consensus-based process
  - SAE, UL, NFPA, IEEE, ISO, IEC et al.

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Roadmap Changes v2.0

- Gap statements now include:
  - an indication whether or not a gap is grid related
  - a descriptor of the status of progress in relation to the priority level assigned in version 1.0, as follows:
    - Closed (Completed) or, using a traffic light analogy, as
    - Green (Moving forward)
    - Yellow (Delayed in progressing)
    - Red (At a standstill)
    - Not started
    - Unknown
    - New gap (new for version 2.0)
  - An update statement summarizing any significant changes from version 1.0

Breakdown of Gaps
(Version 1.0 numbers in parentheses)

	Near-term	Mid-term	Long-term	Total
Gaps	30 (22)	13 (12)	1 (2)	44 (36)
Closed v1.0	4	-	-	4
New Gap v2.0	7	1	-	8
Still Open v1.0	19	12	1	32
No Gap Issues	-	-	-	15 (16)
Total Issues	-	-	-	59 (52)

New Near-term Gaps

- Electromagnetic Compatibility (EMC) (4.2.1.4)
  - To complete IEC 61951-21, Parts 1 and 2, and SAE J2954 to address EMC issues related to EV charging
- Standardization of EV Sub-meters (4.2.2.3)
  - To develop standards / guidelines related to functionality / measurement characteristics of EV sub-meters (including those embedded in EVSE or EV)
  - NEMA and NIST U.S. National Working Group on Measuring Systems for Electric Vehicle Fueling and Submetering (USNWG EVF&S) potential developers
- Coordination of EV Sub-metering activities (4.2.2.3)
  - That organizations developing standards, guidelines or use cases related to EV sub-metering should coordinate their activities (NEMA, USNWG EVF&S, and SGIP V2G DEWG)

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New Near-term Gaps

- Cyber Security and Data Privacy (4.2.2.4)
  - To develop SAE J2931/7, revise ISO/IEC 15118-1 and NISTR 7628, volume 2, to address cyber security and data privacy concerns associated with PEVs and smart grid communications
- Telematics Smart Grid Communications (4.2.2.5)
  - To complete work on SAE J2836/5™, Use Cases for Plug-in Vehicle Communication as a Distributed Energy Resource
- Workforce Training – Charging Station Permitting (4.3.1.5)
  - To develop and promote a "Code Official Toolkit" related to EVSE permitting
- Electrical Energy Stranded in an Inoperable Rechargeable Energy Storage System (RESS) (4.3.1.4)
  - For NHTSA and the Argonne National Laboratory to research the issue of electrical energy stranded in a damaged or inoperable RESS
  - To complete work on SAE J3009 to address a similar scope

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New Mid-term Gaps

- Workforce Training – College and University Programs (4.3.1.5)
  - Develop higher education programs focused on EV charging infrastructure development from standpoint of land use, community planning and architecture *(under discussion)*

Status of Progress on v1.0 Gaps Still Open

	Near-term	Mid-term	Long-term	Total
Total	19	12	1	32
Green	14	4		18
Yellow	2	2	-	4
Red	-	1	-	1
Not Started	2	4	1	7
Unknown	1	1	-	2
Revised	9	1	1	11

Near-term Gaps Still Open
Significant Developments

- Charging of roaming EVs between EVSPs (4.2.2.2)
  - NEMA's EVSE section organized working group to develop a standard that supports roaming to allow charging services from a provider other than the home EVSP
    - Will include inter-operator interfaces to address various stages of a charging session (e.g., authentication / authorization, charging data records, billing record exchange)
    - Also looking to develop RFID credential
  - IEC 62831 Ed. 1.0, User identification in Electric Vehicle Service Equipment using a smartcard, initiated; describes physical and protocol layers of an RFID card used in charging spots
- Access control at charging stations (4.2.2.2)
  - NEMA's EVSE section set up working group that determined offline access control lists were a low priority and deferred action on offline access control to a later phase of work

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Mid-term Gaps Still Open
Significant Developments

- Locating and reserving a public charging station (4.2.2.2)
  - NEMA's EVSE section organized working group to develop a standard that permits EV drivers to universally locate a public charging spot
    - Decided that reserving a public charging spot was a low priority and deferred action on reservations to a later phase of work
- Accessibility for persons with disabilities to EVSE (4.2.3.7)
  - Text added describing two-step process for addressing accessible EV parking and charging in relevant standards and codes; non-accessible EV parking and charging also addressed

Roadmap Promotion

- IEC Strategic Group 6, Electrotechnology for Mobility
- EVS26 conference
- DOE Annual Merit Review
- NHTSA EV Safety Technical Symposium
- EPRI IWC
- China-U.S. Workshop on New Energy Standardization
- U.S.-China EV and Battery Technology Workshop
- Gridweek
- Coordination with SGIP V2G DEWG
- Transatlantic eMobility Standardization Roundtable
- Bilateral with German Standards Body DIN

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U.S. / European Cooperation

- Transatlantic eMobility Standardization Roundtable held November 2012 in Brussels, co-organized by ANSI and European Standards Organizations CEN and CENELEC
  - Continue efforts to harmonize / align technical standards for coupler safety / interoperability; wireless charging; communications; safety of infrastructure and batteries
  - Support WGs on EV safety and environment at World Forum for the Harmonization of Vehicle Regulations and work to harmonize / align regulations
  - Support EV-Smart Grid Interoperability Centers established by DOE and EU's Joint Research Centre under Transatlantic Economic Council's eMobility work plan

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Collaboration / Coordination with Other Institutions

- 100+ private and public sector organizations involved from automotive, utility, electrotechnical industries, standards developing organizations (SDOs), government agencies
  - Representatives of DOE national labs participated in working groups
- Coordination with NIST
  - Smart Grid Interoperability Panel Vehicle-to-Grid Domain Experts WG
  - US National WG on Measuring Systems for EV Fueling and Submetering
- Input/Comments/Discussions
  - DOE EV Everywhere Grand Challenge
  - Transportation Climate Initiative Northeast EV Networks Stakeholder Advisory Group
  - SAE International
  - ANSI CEN CENELEC Transatlantic eMobility Standardization Roundtable
  - ANSI Bilateral with German Standards Body

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Potential Future Work
FY13 and FY14

The following are <u>in discussion stage</u> only:

- Publish one or more periodic reports on progress to address gaps with updates on significant standardization activity
- Convene additional workshops to explore topics of concern (TBD) in greater depth
- Influence policy and technical discussions in other national, regional, and international standards and conformance bodies
  - Continue dialogue w/Europeans on opportunities to harmonize / align standards

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Summary

- *Standardization Roadmap for Electric Vehicles – Version 2.0* will soon be available
  - Identifies standards, codes, and regulations that exist or that are in development, gaps where new / revised standards are needed, conformance and training programs, harmonization efforts
  - Includes prioritized timelines for when standardization should occur and identifies organizations that may be able to do the work
  - Progress on v1.0 gaps has been documented, as well updates summarizing any significant changes
  - New gaps have been identified
- More info: www.ansi.org/evsp and evsp@ansi.org

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Technical Back up Slides

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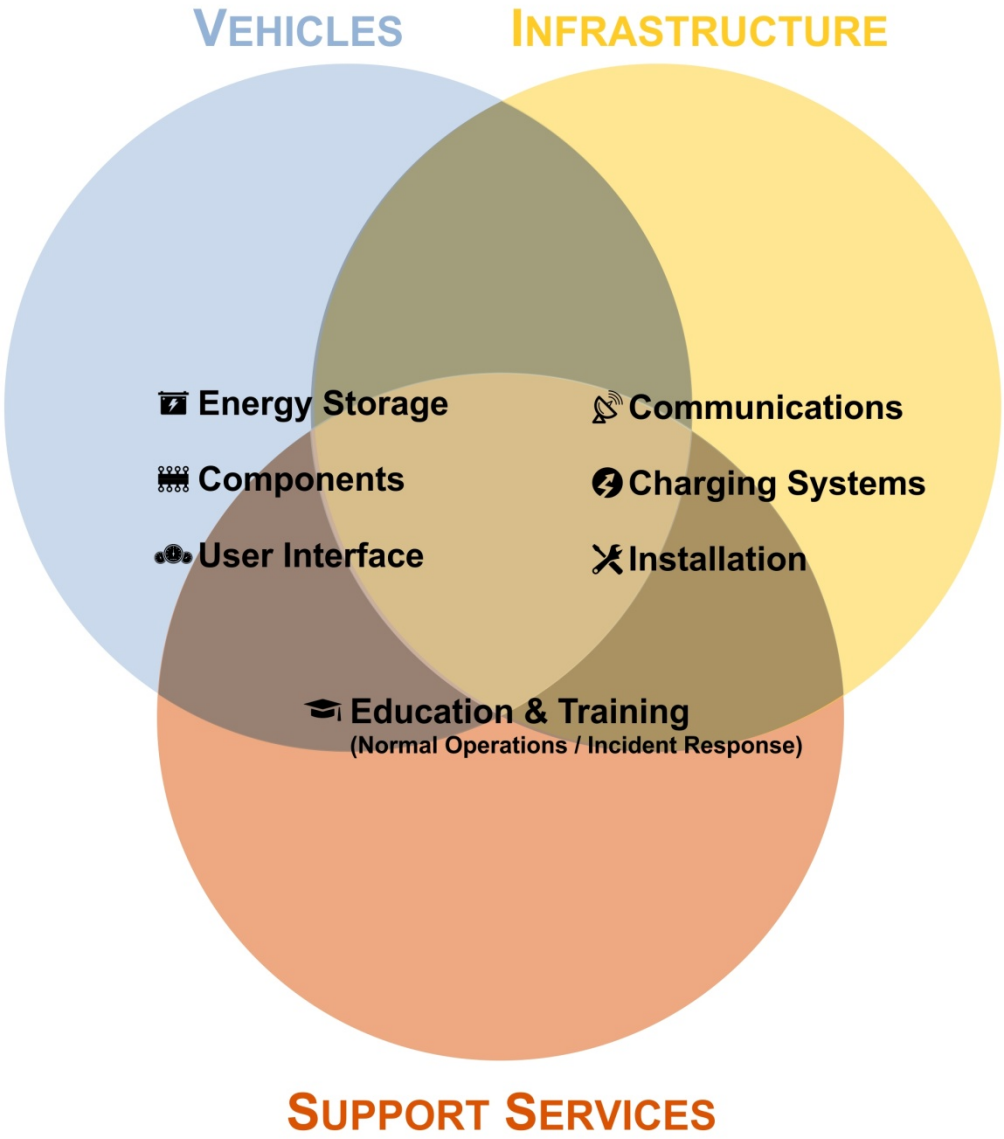
Approach



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Vehicle Domain Issues

Energy Storage Systems

- Power Rating Methods
- Battery Safety
- Battery Testing – Performance and Durability
- Battery Storage, Packaging, Transport, and Handling
- Battery Recycling
- Battery Secondary Uses
- Crash Tests / Safety

Vehicle Components

- Internal High Voltage Cables, On-Board Wiring, Component Ratings, and Charging Accessories
- Vehicle Diagnostics – Emissions
- Audible Warning Systems

Vehicle User Interface

- Graphical Symbols
- Telematics – Driver Distraction
- Fuel Efficiency, Emissions and Labeling

Terminology

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Infrastructure Domain Issues

Charging Systems

- Wireless Charging
- Battery Swapping
- Electric Vehicle Supply Equipment (EVSE)
- Electromagnetic Compatibility
- Vehicle as Supply
- Use of Alternative Power Sources

Infrastructure Communications

- Communications Architecture for EV Charging
- Communications Requirements for Various EV Charging Scenarios
- Communication and Measurement of EV Energy Consumption
- Cyber Security and Data Privacy
- Telematics Smart Grid Communications

Infrastructure Installation

- Site Assessment/Power Capacity Assessment
- EV Charging – Signage and Parking
- Charging Station Permitting
- Environmental and Use Conditions
- Ventilation – Multiple Charging Vehicles
- Guarding of EVSE
- Accessibility for Persons with Disabilities to EVSE
- Cable Management
- EVSE Maintenance
- Workplace Safety

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Support Services Domain Issues

Education and Training

- Electric Vehicle Emergency Shutoff – High Voltage Batteries, Power Cables, Disconnect Devices; Fire Suppression, Fire Fighting Tactics, and Personal Protective Equipment
- Labeling of EVSE and Load Management Disconnects for Emergency Situations
- OEM Emergency Response Guides
- Electrical Energy Stranded in an Inoperable RESS; Battery Assessment and Safe Discharge following an Emergency Event
- Disaster Planning / Emergency Evacuations Involving Electric Vehicles
- Workforce Training

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