METERING FOR ELECTRIC VEHICLES

Edison Electric Institute TD&M Fall 2013 Conference
Brent Cain
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OVERVIEW

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- Electric Vehicle Metering Terminology
- Background
  - Electric Vehicle Charging & Energy Consumption
  - California Public Utility Commission Rulemaking
  - ANSI Electric Vehicle Standards Panel Roadmap
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  - EVSE Coalition
- Group Involvements
  - NIST US National Work Group for Electric Vehicles
  - NEMA Section 5EV/Submetering Work Group
  - Smart Grid Interoperability Panel / PAP22
  - ANSI C12 Submetering Work Group
- Summary
- Resources
PURPOSE

- Purpose
  - Provide background information about Electric Vehicle Metering
  - Awareness on related activities involving:
    - Metering Electric Vehicle Charging
    - Policies and Standards.
ELECTRIC VEHICLE METERING TERMINOLOGY

- **Embedded Meter** - An electric device integrated within an EVSE that measures energy delivered to an EV. It may function as a submeter.

- **Submeter** - A low end meter downstream from a utility meter. It may provide separate energy and power quality information from the main meter which is specific to a particular load within the premise.

- **EV** – Electric Vehicle of an automotive-type for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, etc. Primarily powered by an electric motor that draws current from a source of electric current.

- **EVSE** – Electric Vehicle Supply Equipment. Product for charging an EV. Sole purpose to transfer energy between the premise wiring and an EV. May provide secondary functions such as over-limit safety, two way communications, and monitoring consumption.

- **EVSP** - Electric Vehicle Service Provider.
BACKGROUND
Metering for Electric Vehicles
EV CHARGING AND ENERGY CONSUMPTION

- Incorporates a utility based submeter along with the main (premise) meter.
- Records consumption separate from the premise load.
- Submeter can be downstream or parallel with the main meter.
- Issue – Cost of installing a 2\textsuperscript{nd} utility based meter.
BACKGROUND – CPUC RULEMAKING

- R.09-08-009 initiated in 2009 by the Commission.
- Considers the impact EVs may have on the state’s electric infrastructure.
- “We intend to develop consistent statewide policies and standards to guide and encourage development of electric vehicle metering, home electric vehicle charging infrastructure, commercial and public charging infrastructure, tariff schedules, and, if advisable, incentive programs.”
- Basic interpretation – IOUs need to propose some type of submetering protocol for EVSEs.
BACKGROUND – ANSI EVSP ROADMAP

- Electric Vehicle Standards Panel established March 2011.
- “To assess standards and conformance programs to facilitate safe mass deployment of Electric Vehicles and the charging infrastructure in the US.”
- Automotive, Utilities, and Electrotechnical sectors as well as those from SDOs and government agencies.

Produce a standardization roadmap for EVs that:
- “Facilitate development of a comprehensive, robust, and streamlined standards & conformance landscape.”
- “Maximize the coordination and harmonization of the standards and conformance environment domestically and with international partners.”
- Identifies, inventories, and assesses existing standards and gaps along with recommended solutions.
- Addresses safety, affordability, interoperability, performance, and environmental.
- 365 standards and 36 gaps/partial gaps identified.

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BACKGROUND – PEVSMP STRAWMAN

- Proposal for EV submetering protocol in response to CPUC Rulemaking.
- Developed by PG&E, SCE, SDG&E.
- Specifies minimum standards for safety, accuracy, reliability and security of Standards for meter products, communications, data management, installation, maintenance, testing & calibration.
- Includes recommendation for ANSI C12 standards.
- Work in progress
BACKGROUND – EVSP COALITION

- Comprised of Coulomb Technologies, ECOtality, and BetterPlace.
- Requested CPUC to reject Strawman PEVSMP:
  - Not a reasonable starting point for developing statewide EV submetering technical and tariff requirements.
  - Proposal does not address “appropriate standards for EVSE sub meters, not enable billing to providers of EV services, and includes burdensome and inappropriate certification, testing and data management rules that are unnecessary for EVSE sub meters.”
  - Encourages technology where requirements can only be satisfied with socket-based utility meters.
background – evsp coalition

- Request CPUC to issue a ruling that reaffirms EVSE submeter and subtractive billing requirements and establish a process to timely develop a reasonably simple sub metering protocol.

- Some specifics include:
  - Protocol to include appropriate standards for submeters embedded within an EVSE.
  - Include straightforward process for EVSE submeter certification & Testing, such as a process implemented by the Bureau of Weights & Measures.
  - Enable bill splitting by customers from a premise meter and EVSE submeter.
  - Include consumer safer guards – customer authorization and clear and defined communication to resolve disputes.
GROUP INVOLVEMENTS

Metering for Electric Vehicles
NIST USNWG FOR ELECTRIC VEHICLES

- Webinar held August 2012 by Weights & Measures to discuss developing a uniform method of sale of electricity involving EVs and measuring standards.
- Created USNWG to provide a recommendation for method of sale and device standards and incorporate into NIST handbooks HB130 and HB44.
- Benefits would provide consumer protection, consumer confidence, and healthy competitive environment.
NIST USNWG FOR ELECTRIC VEHICLES

- NIST HB130
  - Provides laws and regulations in areas of legal metrology and engine fuel quality, but no regulation model for the sale of electricity.

- NIST HB44
  - Deals with specs, tolerances and other technical requirements for weight & measuring devices. However, no code for measuring electricity.

- USNWG Objectives:
  - Provide a forum for developing uniform standards, both domestic and international.
  - Provide recommendation to include the sale of electricity for EVs in HB130.
  - Provide recommendation for specs, tolerances, and user requirements for measuring devices pertaining to EV charging.
NEMA SUBMETERING WG

- Led by Ken Brown of Leviton (Chair) & Andrei Moldoveanu of NEMA (Program Manager).
- Liaison to ANSI C12, Brent Cain.
- 5EV Section approved formation:
  - Inventory activities related to EVs and EVSEs.
  - Define NEMA’s position in respect to solutions that would be included in standards, codes, and regulatory documents.
  - Define the best way to represent NEMA in these activities.
- Catalyst - ANSI EVSP roadmap.
- Proposed outcome to be an application guide for metering of EVSEs.
NEMA EMBEDDED SUBMETERING GUIDE

- ANSI EVSP roadmap identifies:
  - Gaps dealing with EV sub meters. Standards … need to be developed to address performance, security/privacy, access and data aspects.
  - Recommends to develop standards or guidelines related to the functionality and measurement characteristics of new types of sub-meters for EVs and embedded sub-meters in EVSEs.
  - Standards should address form factors, capabilities, installation, certification.
  - Potential developers - NEMA, USNWG EV.

- Guide responds to two major regulatory inputs:
  - For public stations - NIST Handbooks, HB130 and HB44.
  - For residential applications – CPUC Strawman PEVSMP protocol.
NEMA EMBEDDED SUBMETERING GUIDE

- Guide will use:
  - related codes, standards, and recommended practices.
  - identify embedded metering applicable requirements.
  - identify related performance/testing methods, including hardware & communications.
  - will consult international standards such as ISO/IEC, CEN/CENELEC where requirements are not covered domestically.

- Key objectives:
  - Identify potential gaps
  - Evaluate which SDO will best address, such as SAE, ANSI C12, NEMA, NIST, NEC, UL, etc.
  - Initiate project requests with the SDO
  - Publish the guide
NEMA EMBEDDED SUBMETERING GUIDE

Purpose:
- Provide guidance for EVSE applications that include an embedded meter incorporating a communication protocol for monitoring or monitoring and control.
- Point to specific existing codes & standards specific to meter accuracy and communication protocols that are relevant to EVSE metering.
- Identify potential gaps

Scope:
- Encompass NA meter types emerging within EVSEs, including embedded.
- Address different form factors, capabilities, installations, and certifications.
- Determine optimal authority and jurisdictional span for certification.
- Recommend a tiered key functionality, including tamper resistance, accuracy, calibration, communication, security, and reliability.
Key take-away points:
- Embedded meter allows for monitoring EV power consumption economically.
- EVSP likely to communicate meter data to utility.
- Communication likely to be Internet. (A simple and efficient option.)
- Residential installation will likely require & implement subtractive billing.
SGIP PAP22 “EV FUELING CONSUMPTION”

- Led by George Bellino of General Motors.
- Catalyst - California IOUs and CPUC looking for cheaper alternative to second premise meter.
- Compile high level requirements that applies to form factor, accuracy, performance, security, data format, and certification for embedded, portable and stationary applications.
- Develop use cases, identify gaps and coordinate with the SDO’s to develop standards for sub metering of EV electricity fuel consumption.
- Focusing on 4 Use Cases:
  - **Utility Revenue Submeter** – Utility owned billing. Dedicated circuit between panel and EVSE. AMI capable.
  - **3rd Party Revenue Submeter** – Same as utility owned. Embedded, portable, and fixed form factors. Special EV tariffs. 3rd party provider.
  - **Non-Utility Revenue Submeter** – Informational or tenant billing.
  - **DER Submeter** – For V2G capabilities.
ANSI C12 SUBMETERING WG

- Created under ANSI C12 MAIN
- Chaired by Alex Yan of PG&E.
- Original intent to provide a centralized collaboration point for other groups working on submetering activities. To ensure no duplication of work and help close gaps.
- Initial point of interest – California activities in regard to CPUC Rulemaking and Strawman PEVSMP proposal.
- Scope later shifted to assist the NEMA Submeter WG with EVSE Embedded metering guide.
SUMMARY

- **NEMA Embedded SubMeter WG**
  - Continuing to develop Guide. Once complete will determine which SDO to develop a standard from it.
  - Assisting NIST USNWG with HB comment reviews. Both HB130 and HB44 revisions are still in process.
  - Publication is expected by year end, 2013.

- **SGIP PAP22**
  - Continuing to develop use cases and identify gaps.
  - Maintaining collaboration with NEMA and ANSI Submetering work groups.
  - Next F2F at SGIP conference in Nov in Palm Beach FL.

- **ANSI C12 Sub Metering WG**
  - Under discussion on how far to expand the scope.
  - WG meets this week to discuss further.
  - Joint coordination effort of NEMA, PAP22, and ANSI C12 will ensure knowledge sharing and non-overlap of work.
OTHER RESOURCES

- **NEMA Submetering Work Group**
  - Kenneth Brown, Leviton Manufacturing Co., Inc.
    - Director Engineering, C&I
    - Email: kbrown@leviton.com  Ph.: 619-205-8704
  - Andrei Moldoveanu, NEMA
    - Technical Director
    - Email: and_moldoveanu@nema.org  Ph.: 703-841-3290

- **SGIP PAP22**
  - George D. Bellino, General Motors
    - Staff Project Engineer
    - Email: george.bellino@gm.com  Ph.: 714-878-5671

- **ANSI C12 Submetering Work Group**
  - Alex Yan, Pacific Gas & Electric
    - Supervising Engineer
    - Email: APY1@pge.com  Ph.: 415-973-3389

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THANK YOU

BRENT CAIN
Principle Engineer - Strategic Industry Standards, Office of the CTO
Brent.Cain@itron.com
864-718-6605