**NIST U.S. National Work Group**

**Measuring Systems for Electric Vehicle Fueling and Submetering**

**March 26, 2013 Meeting**

**Meeting Summary**

**Purpose:** The NIST U.S. National Work Group (USNWG) on Measuring Systems for Electric Vehicle Fueling and Submetering (EVF&S) was formed to develop proposed requirements for commercial electrical energy‑measuring devices (including those used to measure and sell electrical energy commercially delivered as vehicle fuel and those used in submetering electrical energy at residential and business locations) and to ensure that the prescribed methodologies and standards facilitate measurements that are traceable to the International System of Units (SI). This work is not intended to address utility metering in the home or business where the electrical energy meter is used by a public utility in connection with measuring electrical energy subject to the jurisdiction of a Public Utilities Commission or other municipality.

Table of Contents

[1. Welcome New Members and Introductions 2](#_Toc358047811)

[2. Summary of January 15-17, 2013 Meeting 2](#_Toc358047812)

[3. USNWG Operational Guidelines and Agenda Submission Form 3](#_Toc358047813)

[4. HB 130 Method of Sale Regulation for Electricity as Vehicle Fuel 4](#_Toc358047814)

[5. USNWG Position Statement on the HB 130 MOS Proposal 6](#_Toc358047815)

[6. EVSE Meter Test Procedure and Equipment Drafting Subcommittee 7](#_Toc358047816)

[7. Draft NIST Handbook 44 Code for Electric Vehicle Fueling and Submetering 8](#_Toc358047817)

[8. Next Meeting 8](#_Toc358047818)

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|  **Glossary of Acronyms** |
| CFR | Code of Federal Regulations | MOS | Method of Sale |
| EVF&S | Electric Vehicle Fueling and Submetering | NCWM | National Conference on Weights and Measures |
| EVSE | Electric Vehicle Supply Equipment | NEC | National Electrical Code |
| HB 44 | NIST Handbook 44 *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices* | NIST | National Institute of Standards and Technology |
| HB 130 | NIST Handbook 130 *Uniform Laws and Regulations in the Area of Legal Metrology and Engine Fuel Quality* | OWM | Office of Weights and Measures |
| kW | Kilowatt | PEV | Plug-in Electric Vehicle |
| kW·h | Kilowatt hour | SI | International System of Units |
| L&R | NCWM Laws and Regulations Committee | USNWG | U.S. National Work Group |
| This table is meant to assist the reader in the identification of acronyms used in this document and does not imply that these terms are used solely to identify these organizations or technical topics.  |

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| --- | --- | --- |
| **Attachment No.** | **Agenda Item** | **Meeting Summary Attachments** |
| 1 | 1 | **USNWG Team Roster and 26MAR2013 Meeting Attendees** |
| 2 | 2 | **Approved Summary of the January 15-17, 2013 USNWG Meeting** |
| 3 | 3 | **Approved USNWG Operational Guidelines** |
| 4 | 3 | **Approved USNWG Agenda Submission Form** |
| 5\* | 4\* | **NIST Handbook 130 Method of Sale for Electricity as Vehicle Fuel Proposal** |
| 6\* | 4\* | **Agenda Submission Form from Andrei Moldoveanu (NEMA)**  |
| 7\* | 4\* | **NEMA Proposed Changes to NIST Handbook 130 Method of Sale for Electricity as Vehicle Fuel Proposal**  |
| 8\* | 7\* | **Draft NIST Handbook 44 Device Code Requirements for Electric Vehicle Fueling and Submetering** |
| 9\* | 7\* | **USNWG Combined Comments on Proposal Documents** |

\*Not fully addressed during the March 26, 2013 meeting.

**Agenda Topics**

## 1. Welcome New Members and Introductions

The Chair called the meeting to order and welcomed new members. A quorum of the registered P-members was present (14 out of 30, or 47%). There were a total of 28 attendees. A complete list of attendees is provided as Attachment 1.

## 2. Summary of January 15-17, 2013 Meeting

**Background:** A meeting of the USNWG was held on January 15-17, 2013 at the NIST facility in Gaithersburg, MD. Members were able to participate in person and via web and telephone connections. A draft of the Meeting Summary was circulated to USNWG members as an attachment to the March 26, 2013 USNWG Meeting Agenda.

**Recommendation:** USNWG members were asked to approve the January 15-17, 2013 Meeting Summary.

**Discussion:** USNWG members agreed to make two changes to Agenda Item 4.b. Paragraph 2.XX.2. Method of Retail Sale in the draft Meeting Summary as outlined below.

* The USNWG agreed that it is not correct to list specific States by name in the footnote under the “Commercial Use Cases” table on page 10 since the USNWG has not yet verified which States prohibit and which States permit the sale of electrical energy by measure of kW·h for PEV fueling by other than regulated utilities. Mr. Richard Lowenthal (ChargePoint) commented that, as a starting point, he would provide the most comprehensive list that he has which names those States that prohibit the sale of electrical energy by measure of kW·h for PEV fueling by other than regulated utilities. The final version of the footnote approved by the USNWG is shown below:

\* Several USNWG members indicated that this practice is currently prohibited in **~~NY, MD and other~~ most** State jurisdictions. Therefore, businesses offering vehicle charging in these jurisdictions must sell electrical energy by assessing a fee based on the length of time that the EVSE was in use.

* In response to a request from a USNWG member, the USNWG agreed to clarify the description of “contract services” in the second paragraph on page 11. The final version of the paragraph approved by the USNWG is shown below:

Contract (subscription) service must also measure electrical energy as it is delivered or the customer has no basis for value comparison. For example, a customer may decide to use a publicly available station that is outside the contract system to charge a vehicle, but **some members commented that** they would have no way to compare the value of that purchase to their contract purchases unless they have some knowledge of how much electrical energy (e.g., how many kW·h) they are receiving **~~from their contract provider~~** in exchange for the monthly fee they pay. Similarly, contract agreements that offer different rate plans that depend on usage thresholds must meet weights and measures requirements when making commercial measurements to determine if a customer has exceeded the allowance for their plan. Often, weights and measures officials have jurisdiction and respond if there is a complaint about the accuracy of measurement. One provider shared that their subscriber service offers **~~fifteen~~** **many** different rate plans **~~in the Mid-Atlantic Region alone~~**.

**Decision:** USNWGmembers unanimously agreed to approve the January 15-17, 2013 Meeting Summary with the two modifications noted above.

## 3. USNWG Operational Guidelines and Agenda Submission Form

**Background:** Draft copies of the USNWG Operational Guidelines and the Agenda Submission Form were distributed at the January 15-17, 2013 meeting. The USNWG was asked to consider these drafts and to prepare comments for the next USNWG meeting. Updated drafts with minor editorial changes were distributed by e-mail to USNWG members on March 19, 2013 for their review as attachments to the March 26, 2013 USNWG Meeting Agenda.

**Recommendation:** USNWG members were asked to approve the USNWG Operational Guidelines and the Agenda Submission Form.

**Discussion:** Several constructive suggestions to improve and clarify the “Voting Section” of the Operational Guidelines were recommended by Mr. Andrei Moldoveanu (National Electrical Manufacturer’s Association). Building on the suggestions from Mr. Moldoveanu, the following additions and changes to the Voting Section of the USNWG Operational Guidelines were proposed and discussed during the meeting.

* A quorum must be present to hold a vote during a meeting.
* A quorum is defined as at least 25% of the registered P‑members.
* P-members will be balloted, as needed, electronically or by postal mail ballot.
* Final versions of proposals for inclusion in NIST handbooks should be balloted to all P-members.
* Future meeting summaries will be circulated as soon as they are available and will be approved by ballot instead of during subsequent meetings.
* A balloted item is approved if, within 21 calendar days of the ballot being distributed (the required response period), a majority of the votes that are received from P-members are in favor of the item.
* The definition of a proxy vote was clarified.
	+ The policy of not accepting proxy votes remains in effect. However, a proxy vote was more clearly defined as a vote cast by any person from an organization that is different than the organization of the registered P‑member in question.
	+ Prior to a meeting, the P-member (entitled to cast a vote) may designate an alternate from the same organization to vote in their absence if they will not able to attend the meeting. This would not be considered to be a proxy vote.

USNWG members did not have any comments on the latest version of the Agenda Submission Form.

**Decision:** USNWG members unanimously agreed to approve the Operational Guidelines with the modifications to the Voting Section shown below and to approve the Agenda Submission Form without any further changes. The final versions of both documents are posted on the USNWG website at [http://www.nist.gov/pml/wmd/usnwg‑evfs.cfm](http://www.nist.gov/pml/wmd/usnwgevfs.cfm) and are also attached to this Meeting Summary as Attachment 3 and Attachment 4, respectively.

**Voting**

In the event that a consensus cannot be reached on an issue or when substantial changes are made to a meeting summary or any technical document, then the USNWG must approve that project/action by a vote. **A quorum consisting of at least 25% of the registered P-members must be present for a vote.** In the event that a **~~majority of the USNWG P membership~~** **quorum** is not present for a vote**,** the Technical Advisor shall ballot the entire USNWG **~~for their vote.~~** **P-membership.**

USNWG members may vote **~~in-person~~** during the conduct of a meeting **where a quorum is present** or be balloted electronically or by a postal mail ballot. A majority **~~vote~~** **of the votes cast within 21 calendar days of the ballot being sent** is required to approve a project/action **~~under these circumstances~~**. **Members shall include an explanation of their reason(s) (and alternative language, when appropriate) when casting a negative ballot.**

Each entity (company, agency, organization, etc.) represented on the USNWG has one vote. **~~A response from a majority of the USNWG P-members is necessary for a valid vote.~~** No proxy votes are accepted (to ensure each vote is cast based on an examination of the latest data, discussions, etc. by all groups affected by a(n) project/action). **~~An O-Member may not vote. No response to a balloted vote after 21 days constitutes a yes vote.~~ A proxy would be defined as a vote by any person from a different organization than the registered P-member. Alternates from the same organization may vote, so long as they are designated by the P‑member prior to the meeting and there is only one vote per registered P-member.**

## 4. HB 130 Method of Sale Regulation for Electricity as Vehicle Fuel

**Background:** After reviewing and revising the proposed new HB 130 Method of Sale (MOS) Regulation during its January 15-17, 2013 meeting, the USNWG voted 12 to 1 to recommend to the NCWM L&R Committee that the proposal is ready for a vote for adoption at the July 2013 NCWM Annual Meeting. After adoption, the requirements would be included in the 2014 edition of HB 130. The USNWG recognized that some members needed to further vet the revised proposal within their organizations, but expected this process to be completed within a few weeks of its January 2013 meeting. The Technical Advisor submitted the USNWG’s proposal and recommendation to the NCWM L&R Committee on January 23, 2013.

At the January 27-30, 2013 NCWM Interim Meeting, the L&R Committee agreed to designate the HB 130 MOS proposal as Voting Item 232-5 on the Committee’s Agenda. The proposal will be presented for a vote at the 2013 NCWM Annual Meeting held July 14-18, 2013 in Louisville, KY.

Some USNWG members have since submitted additional comments to amend the original proposal following vetting that took place after the January 15-17, 2013 meeting. These comments were forwarded to the USNWG members as they were received and prior to the March 26, 2013 meeting.

**Recommendations:**

* Members of the USNWG were asked to consider the comments submitted that had been forwarded to them separately as they were received.
* Members were asked to consider a NIST OWM recommendation to revise paragraph 2.XX.3.(a) in the HB 130 MOS proposal as shown below to require the unit price to be displayed in whole cents.
1. A computing EVSE shall display the unit price in whole cents (e.g., $0.12) ~~or tenths of one cent (e.g., $0.119)~~ on the basis of price per megajoule (MJ) or kilowatt‑hour (kW·h). In cases where the electrical energy is unlimited or free of charge, this fact shall be clearly indicated in place of the unit price.
* Members were asked to share any other results of their vetting of the proposal since the January meeting.

**Discussion:** The USNWG discussed some of the comments received. While many of the comments were editorial and/or proposed minor clarifications, there were some comments that required considerable discussion.

* Some members suggested revising the MOS proposal to exclude those installations (e.g., time-based sales, fixed fee sales, etc.) where the sellers do not voluntarily choose to measure the electrical energy. According to this suggestion, the MOS regulation would only apply to those installations where the seller elected by choice to measure electrical energy. In all other installations, no MSO regulation would apply. This suggestion was met with opposition by other members who contended that these exceptions would defeat the purpose of establishing a single uniform model method of sale. If compliance with the MOS is rendered as entirely optional, conditions of sale may vary from installation to installation; customers may not consistently receive the information they need to make value comparisons among competing offers and businesses may not be able to compete fairly.
* Similarly, some members suggested that sales of electric vehicle refueling service on the basis of a time measurement or a fixed fee should be specifically recognized as an alternative to the proposed MOS (that is based on the measurement of the electrical energy in units of kW·h or MJ). This suggestion was met with opposition by other members who contended that, without a reported measurement of the electrical energy that was received, fixed fees and time-measured access fees for electric vehicle refueling service do not provide sufficient information about the electrical energy that was actually received for customers to be able make value comparisons between competing offers. These members also noted that the lack of a single, uniform MOS also hampers the ability of businesses to fairly compete.
* Mr. Michael Krauthamer (NRG EV Services - eVgo) introduced the term “Transportation Fuel Service” as a possible new definition (new paragraph 2.XX.1.6.) for “service that provides access to electricity (whether such service is fixed or variable) for the purposes of electric vehicle refueling.” The purpose of this new term would be to recognize the sale of access to electricity for electric vehicle refueling as an alternative to the sale of the electrical energy itself. This suggestion was met with opposition by other members who contended that the sale of access to electrical energy with no corresponding measurement and accounting of the amount of electrical energy that was received does not provide the information that is necessary for customers to make value comparisons between competing offers and it will not provide businesses with the ability to fairly compete.
* Some members proposed new language in paragraph 2.XX.2 Method of Retail Sale to include specific mention that pricing of $0.00 per kW·h is permitted. This suggestion was met with opposition by other members who contended that NIST HB 130 is not intended to impose any guidelines or restrictions on the setting of price values. Instead, HB 130 is intended to only address how prices are displayed, represented, and communicated.

**Decision:** The USNWG did not reach a conclusion regarding all the comments that had been submitted. The USNWG decided that the next meeting must be focused on completing the vetting process and the review of any outstanding comments. It is critical for the USNWG to complete this vetting and review process in order for the USNWG to provide the NCWM L&R Committee with final amendments and a position statement prior to the July 2013 NCWM Annual Meeting. Should the USNWG fail to provide the L&R Committee with a final position statement, it may hinder the adoption of the proposed MOS regulation.

## 5. USNWG Position Statement on the HB 130 MOS Proposal

**Background/Discussion:** In order to assist NCWM members as they consider and vote on the HB 130 MOS proposal, the USNWG will develop and submit a position statement that: (1) provides background information on why a MOS is essential to establish the commercial EVSE infrastructure; (2) describes the USNWG efforts in this area; and (3) encourages NCWM members’ support for the proposed uniform MOS. A draft USNWG Position Statement on the HB 130 MOS Proposal (as shown below) was provided to USNWG members within the March 26, 2013 USNWG Meeting Agenda.

**DRAFT USNWG Position Statement**

In August 2012, NIST formed the USNWG EVF&S in response to requests from U.S. stakeholders for uniform legal metrology (measurement) requirements to address equipment used in electric vehicle refueling applications. The USNWG includes members representing vehicle charging equipment and electric meter manufacturers; State and local weights and measures jurisdictions; energy distribution companies and service providers; national laboratories; standards organizations; technical committees (e.g., ANSI C12); industry associations; and NIST.

Establishing a method of sale for a commodity is a critical first step in the development of a fair and competitive marketplace for any commodity. History has shown that when products are introduced into the marketplace without the existence of a legally defined standard, confusion and unfair competitive practices can quickly evolve and potentially harm the consumer’s perception of the product and the business reputations of the sellers. When commercial applications arise that do not have the benefit of nationally recognized uniform standards, State and local jurisdictions often are forced to independently develop and enforce Weights and Measures requirements for the application until nationally recognized uniform standards become available.

The USNWG wishes to convey a sense of urgency for establishing a clearly defined method of sale for commercial electric vehicle refueling stations. As the number of electric vehicles and hybrid electric vehicles on the road continues to increase, the number of publicly accessible commercial systems installed for refueling these vehicles is growing. Advances in vehicle charging technology have resulted in fast charging systems that make roadside stops of 15 to 20 minutes to charge an electric vehicle a practical refueling experience for customers. These and other advances are only likely to accelerate the number of commercial systems that are installed to serve the public. Clarity on the method of sale in these applications is urgently needed to facilitate a successful and efficient deployment of these systems.

In January 2013 the USNWG submitted a proposal to include a new method of sale regulation in NIST Handbook 130 that recognizes retail sale of electrical energy for vehicle refueling applications. The USNWG supports the proposal which appears in Item 232-5 in the 2013 NCWM L&R Committee Interim Report with the following minor modifications:

* + *Insert final modifications agreed upon by the USNWG*

The USNWG encourages NCWM members to adopt the item with these modifications at the July 2013 NCWM Annual Meeting. The USNWG acknowledges that not all U.S. jurisdictions adopt the NIST Handbook 130 Model Method of Sale Regulation directly. However, the USNWG believes that this proposal will promote uniformity in the rapidly growing industry of commercial electric vehicle refueling.

The USNWG is also actively developing a new NIST Handbook 44 Tentative Code for Electrical Energy‑Measuring Systems to address legal metrology requirements for the design, performance, installation, testing, and use of this equipment. Once complete, the USNWG plans to submit the code to the NCWM Specifications and Tolerances Committee for consideration. The scope of this proposed new code will include electrical energy-measuring systems used in both electric vehicle refueling and in utility-type submetering applications that fall under the authority of weights and measures jurisdictions. The scope of the proposed new code will not apply to electrical energy-measuring devices that are already regulated under the jurisdiction of Public Utility Commissions and other municipalities.

**Recommendation:** USNWG members were asked to approve a USNWG Position Statement on the HB 130 MOS Proposal including any modifications based on discussions at the March 2013 meeting.

**Decision:** The USNWG adjourned the March 26, 2013 meeting before addressing this item. The item will be deferred until the next USNWG meeting.

## 6. EVSE Meter Test Procedure and Equipment Drafting Subcommittee

**Background/Discussion:** The EVSE Meter Test Procedure and Equipment Drafting Subcommittee was formed during the January 15-17, 2013 USNWG meeting to accomplish the following tasks:

* Prepare a test procedure for conducting safe, efficient, and traceable field testing of EVSE electrical energy-measuring devices that clearly addresses accurate measurement from the point where the test connection occurs relative to the vehicle connection (for both plug-in and wireless systems).
* Prepare a list describing the fundamental test equipment that must be available to conduct reliable, safe, efficient, and traceable field testing of EVSE electrical energy-measuring devices.
* Review and further develop language for the draft HB 44 tentative code proposal to adequately address field testing.

The time frame for the EVSE Meter Test Procedure and Equipment Drafting Subcommittee to complete a draft test procedure will parallel the USNWG’s work to fully develop the proposed new HB 44 tentative code. The USNWG anticipates completing a final draft of the HB 44 proposal by the fall of 2013, which marks the start of the Weights and Measures standards development cycle for 2014.

The USNWG unanimously elected Mr. Ted Bohn (Argonne National Laboratory) as the Chair for the EVSE Meter Test Procedure and Equipment Drafting Subcommittee. The following is a list of USNWG members who volunteered to serve on the subcommittee.

**EVSE Meter Test Procedure and Equipment Drafting Subcommittee**:

* **Chair:** Ted Bohn (ANL)
* **Technical Advisor:** TBD
* Tim Morgan (Duke Energy)
* Richard Lowenthal (ChargePoint)
* Either Don McComas or Derrik Weeks (Eaton)
* Andrei Moldoveanu (NEMA)
* Jim LeClare (Maxim Integrated)
* Steve Brown (UL)
* Marc Buttler (NIST)
* Steve Cook (CA DMS)
* Tom Nelson (NIST)
* Ambler Thompson (NIST)

**Recommendation:** Members were asked to confirm the Subcommittee roster. The Subcommittee Chair was asked to provide the USNWG with and update on the Subcommittee’s plans at the March 2013 meeting.

**Decision:** The USNWG adjourned the March 26, 2013 meeting before the USNWG was able to address this item. The item will be deferred until the next USNWG meeting.

## 7. Draft NIST Handbook 44 Code for Electric Vehicle Fueling and Submetering

**Background:** The Draft HB 44 Tentative Code Requirements for Electric Vehicle Fueling and Submetering Proposal was distributed by e-mail to USNWG members on November 29, 2012. USNWG members were asked to submit comments to the Technical Advisor by January 8, 2013.

**Recommendation:** The Technical Advisor was asked to lead a discussion to outline a plan to fully develop the proposed device code.

**Decision:** The USNWG adjourned the March 26, 2013 meeting before discussing this item. The item will be deferred until a future USNWG meeting.

## 8. Next Meeting

**Decision:** The USNWG agreed that the next meeting should be held as soon as possible and should focus on completion of any final amendments to the proposed new HB 130 MOS Regulation and the USNWG Position Statement on the HB 130 MOS Proposal. It is important for the USNWG to reach a consensus on a final recommendation in a timely manner and forward this language to the NCWM L&R Committee so that a uniform and appropriate MOS is ready for consideration prior to the July 2013 NCWM Annual Meeting.