NARUC Electric Vehicles State Working Group

AUGUST MEETING AUGUST 25, 2020

AGENDA (Eastern Time)

3:00 PM	Welcome and Introductions (5 minutes)		
	Agenda review		
	Roll call, by state		
3:05 PM	 Presentation and Q&A: Electric Power Research Institute (15 minutes) Dan Bowermaster, Program Manager for Electric Transportation, will provide a general overview of interoperability, describe the market and what is coming. 		
3:20 PM	 Presentation and Q&A: Greenlots (15 minutes) Erick Karlen, Policy Advisor at Greenlots, will discussing charging from the EV industry perspective. 		
3:35 PM	 Presentation and Q&A: EPA ENERGY STAR (15 minutes) Stacy Noblet, Senior Director of Transportation at ICF, will present on EPA ENERGY STAR standards for EV chargers from the perspective of both interoperability and energy efficiency. 		
3:50 PM	 Q&A (10 minutes) Speakers will take additional questions from working group members 		
4:00 PM	 Closed Door Discussion (30 minutes) Working group members will discuss their own views and the actions their states have taken to date. 		
4:25 PM	Next Steps and Announcements (5 minutes)		
4:30 PM	Adjourn		

Roll Call – Read from Webinar

Working Group Members

States:

- Arizona
- California
- Colorado
- Connecticut
- ▶ D.C.
- Florida
- 🕨 Georgia
- Hawaii
- Illinois
- Maryland

- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New Jersey
- New York
- North Carolina
- Ohio
- Oregon
- Puerto Rico

- South Dakota
- Texas
- Vermont
- Washington
- Wisconsin

Meet Jasmine McAdams, NARUC Program Officer

National/Federal Partners:

- NARUC
- U.S. DOE
- U.S. EPA

Interoperability and Standards for EV Charging

Pre-Read Materials

- Pages 37-38 (on interoperability and open standards) of NARUC's report, "<u>Electric</u> <u>Vehicles: Key Trends, Issues, and Considerations for State Regulators</u>"
- Joint eight-page paper by EPRI, EEI, ATE, APPA, and NRE on Interoperability of Public Electric Vehicle Charging Infrastructure



Electric Transportation

Charging Interoperability

Dan Bowermaster

Sr. Program Manager, Electric Transportation dbowermaster@epri.com Mobile: (650) 701-5099

NARUC August 25, 2020

EPRI's Mission

Advancing *safe, reliable, affordable* and *environmentally responsible* electricity for society through global collaboration, thought leadership and science & technology innovation



www.epri.com

Independent

Objective, scientifically based results address reliability, efficiency, affordability, health, safety, and the environment

Nonprofit

Chartered to serve the public benefit

Collaborative

Bring together scientists, engineers, academic researchers, and industry experts



OVERVIEW of the EV market

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Electric transportation is a global market

The future has more uncertainty than ever



US EV Sales 2018-2019



Source: https://mapchart.net/world.html

Europe EV Sales 2018–2019



Europe (2019): 3.6%

 Norway (53.9%) 	 Switzerland (5.5%) 	 – France (3.4%)
 Iceland (25%) 	 Denmark (4.3%) 	– Belgium (3.2%)
 Sweden (11%) 	 Germany (4%) 	

China EV Sales 2018–2019



EPEI ELECTRIC POWER RESEARCH INSTITUTE

But purchasing decisions are made locally

Adoption — What does it take for a customer to buy an EV?



Automotive OEMs



Car Dealers



Customers

- Does it meet my needs?
- Do I like it?
- Can I afford it today?
- How do I fuel it?



Of the top 25 best-selling cars, only one has a plug-in option today



Wild Card

Impact of COVID 19 and recession?

Photo credit: Dan Bowermaster, EPRI



US electric vehicle sales exceed 1.5M through April 2020





County-level data shows EV sales progress June 2019 – May 2020

187 counties in 33 states have new EV market shares > 1.9% (US average)



New EV Market Share by County June 2019 - May 2020

Source: EPRI analysis of vehicle registration data, July 2020

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Trend: Customer choice of EVs is increasing

127 EVs available by 2023

www.epri.com



Updated 3/18/2020



These trends are also leading to the big EVs

www.epri.com

MONAN





















Photo credits: Mark Kosowski, Dan Bowermaster



Electric Vehicle CHARGING

The bulk of EV charging will be done at home and work

Some public charging is DC fast charging



Public Charging: Necessary for BEVs, but not PHEVs

> At-work Charging: Extends electric range of PHEVs and short-range BEVs

Home Charging: Charge at 120V AC or 240V* AC * Use an existing dryer outlet or install new circuit

The EPRI Charging pyramid, M. Duvall, EPRI, circa 2007; photo: Dan Bowermaster, EPRI



Public charging infrastructure density is increasing

Network





Source: PlugShare, February 2020







Interoperability of Public Electric Vehicle Charging Infrastructure Co-published with EEI, ATE, APPA, and NCERA, August 2019



This paper is a cooperative effort of the Electric Power Research Institute (EPRU), the Edison Electric Institute (EEI), the Aliance for Transportation Electrification (ATE), the American Public Power Association (APPA), and the National Rural Electric Cooperative Association (NRECA) to identify challenges, create awareness, and provide perspective

www.epri.com

This paper distills, at a high level, four key challenge areas related to interoperability:



CHARGING NETWORK-TO-CHARGING NETWORK



CHARGING STATION-TO-NETWORK



PHYSICAL CHARGING INTERFACE

https://www.epri.com/research/products/00000003002017164



VEHICLE-GRID

Interoperability affects numerous stakeholders

Key stakeholders:

- EV drivers
- Businesses
- EV charging site hosts
- EV charging companies
- EV manufacturers
- Electric utilities



Photo credit: Dan Bowermaster, EPRI



Physical/Electric Interoperability Manual Connection Charging

					?
Vehicle Size		AC Level 1 1.2 to 1.9kW	AC Level 2 Up to 19.2kW	DC Up to 350kW	DC > 350kW
	Light-Duty	Well-developed	Well -developed	Work in progress Test events continue	Not Applicable
	Medium- and Heavy- Duty	Not Widely Applicable	Work needed to validate interop	Work needed to validate interop	TBD



Physical/Electric Interoperability

Automated Connection Charging



Standard was just approved in January 2020

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Physical Characteristics of Equipment

Lack standard sizes, spacing, etc.

- Common hardware footprints?
- Common mounting schemes?
- No consistent vendor approach especially for high power DC charging





Interoperability

EV charging networks today are largely independent



Introduction: EV Charging Network Phone Apps

- 8 Examples





PlugShare; ChargePoint; Blink; and Greenlots iPhone Apps





Volta; OpConnect; Semaconnect; and Evconnect iPhone Apps











Introduction: What the Future of EV Charging Might Look Like





Looking ahead: Data-related Considerations

EV Charge Management = Intelligent use of Information



- Who has the data?
- How is it protected?
- Where does data flow to?
- Are there standards for data interchange?
- Is there one point of control or is it distributed?

- How does interoperability come in to play?
 - We need standards for data interchange
 - We need standards for control methodologies
 - Vendors need to verify their systems can play together with the standards

Together... Shaping the Future of Electricity





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Audience Questions

Does the working group have any clarifying questions for Dan?



ENERGY STAR® Certified EV Charging Stations

August 25, 2020



⇒EPA



Agenda

- ENERGY STAR Program Overview
- Current Program Highlights
 - Key Features of the Current Specification
 - Participating Manufacturers
 - Resources for Utilities, Business Owners, and Consumers
- Specification Updates Underway DC Fast and Connected Criteria
- Questions



ENERGY STAR Program

For more than **25 years**, EPA's ENERGY STAR program has identified the most energy-efficient products, buildings, plants, and new homes – all based on the latest government-backed standards.

Today, every ENERGY STAR label is verified by a rigorous third-party certification process.





ENERGY STAR Program

- ENERGY STAR has more than 75 residential *and commercial* product categories (e.g., commercial food service and data center products)
- Consumers, utilities, and retailers rely on ENERGY STAR to highlight products that deliver consumer savings and give partners tools to differentiate their efficient products
 - In 2017, more than 2000 manufacturers and 2500 retailers partnered with ENERGY STAR to make and sell millions of ENERGY STAR certified products





ENERGY STAR EVSE Specification Today

Key Features:

- 1. Energy Savings, 40% in Standby Modes
- 2. Safety
- 3. Open Communications

Communications Details:

- Grid Communications
- Open Access
- Consumer Override





ENERGY STAR Charging Partners

blink



-chargepoint

EVBOX

NUVVE **flo**



CLIPPERCREEK, INC.

enel x





lcop
ev charging network











New ENERGY STAR EV Charging Website

https://www.energystar.gov/products/other/ev_

<u>chargers</u>

- Consumer Buying Guidance (including <u>Qualified</u> <u>Products List</u>)
- Online Tools:
 - EV Model Search
 - Incentives List for Electric and Plug-in Hybrid Vehicles
 - <u>Locator Tool</u> for Public EV Charging Stations
- One-pagers for EV-ready <u>Commercial</u> <u>Buildings</u>, <u>Homes</u>, and Charging EVs with <u>Green Power</u>
- Available Research of Electric Models
- <u>Procurement Language</u> for Fleet Managers





Overview of Version 1.1



ENERGY STAR Specification Development Update – Version 1.1

- Reasons for including DC charging:
 - Provide shorter charge times
 - Potential to increase the range of EVs, especially through charging corridors for cross-country EV transportation
 - Differentiating products based on energy efficiency:
 - A 50 kW DC station with a 10% utilization and 92% active charging efficiency, would have
 3.8 MWh/year of operation mode losses alone
 - More prescriptive connected criteria



Chart 6.6 Annual DC EVSE Unit Sales by Region, World Markets: 2014-2023

(Source: Navigant Research)



ENERGY STAR Version 1.1 Test Method – Released June 2020

- From 2018 2020, EPA worked with stakeholders to develop an appropriate <u>test method</u> to measure energy efficiency before considering criteria to recognize the most efficient products
- Key Topics addressed in the test method:
 - EPA developed a test procedure for:
 - No Vehicle Mode,
 - Partial On Mode,
 - Idle Mode, and
 - Operation Mode
 - Accounting for various connector types:





Optional Connected Criteria

• Goal of the Revision

- Make connected criteria more useful and add clarity
- Criteria designed with long dwell time applications in mind, as these provide the most load flexibility resource





Optional Connected Criteria

- Grid Communications
 - Open Standard Communication required through use of Open Charge Point Protocol (OCPP), SEP 2.0, CTA-2045A, or OpenADR 2.0
- Product Requirements
 - Scheduling ability for consumers to set and modify a charging schedule
 - Remote Management capability to receive and respond to consumer authorized remote requests
 - Consumer Feedback ability to provide at least two types of messages relevant to optimizing energy consumption
 - Consumer Override capability of vehicle, EVSE, or consumer to override a DR request



Utility Collaboration Opportunities

- Educate Customers about ENERGY STAR EV Chargers
 - link to resource, qualified products list
- Incorporate the ENERGY STAR into EV Programs
 - procure ENERGY STAR EV chargers
 - highlight ENERGY STAR certified equipment on vendor lists, RFPs
- Inform Program Developments
 - Version 1.1 DC EVSE stakeholder process



ENERGY STAR. The simple choice for energy efficiency.



Contact the ENERGY STAR Team with Questions

- Questions related to ENERGY STAR marketing/promotion:
 - Peter Banwell: <u>Banwell.Peter@epa.gov</u>
 - Stacy Noblet: <u>Stacy.Noblet@icf.com</u>
- Questions related to ENERGY STAR specification development:
 - James Kwon: <u>Kwon.James@epa.gov</u>
 - Emmy Feldman: <u>Emmy.Feldman@icf.com</u>







Context for Connected Criteria

- **Optional:** EVSE do not need to meet these criteria to be certified
 - Those that do meet will be identified as "connected"
- Architectures for connected EVSE:
 - EVSE service provider aggregates load flexibility from groups of chargers and sells load control as a service: for this, the service provider knows what it needs the EVSE to do
 - 3rd party aggregates load control from groups of chargers and sells load control as a service: uniform responses from chargers of various brands makes it easier to integrate chargers, giving customers broader choice of charger brands
 - Utility controls groups of chargers directly: uniform responses from chargers of various brands makes it easier to integrate chargers, giving customers broader choice of charger brands
- ENERGY STAR Connected criteria intended to support the last two cases since standardization isn't needed for the first
- Appendix A intended to provide a useful framework for aligning the previous requirements with CTA 2045-A, OpenADR 2.0b, and OCPP



Optional Connected Criteria

Demand-Response Requests – the EVSE must support the following open standard defined DR signals:

- Charge now (Load Up): If a vehicle is plugged in and it is not fully charged, EVSE will begin
 charging the vehicle, continuing as normal until the vehicle is fully charged. For use in a case where
 the scheduling of charging occurs outside of the product, the EVSE service provider has no control
 over the charging schedule. Both immediate events and events scheduled in advance will be
 supported.
- **Curtail Charge:** The EVSE will not begin or continue charging at greater than 50% of its maximum rated output power. Both immediate events and events scheduled in advance will be supported.
- Delay Charge: The EVSE will not begin or continue charging. Both immediate events and events scheduled in advance will be supported.
- Return to Normal Operation: The EVSE will return to default standby mode.
- Are these DR signal appropriate for long dwell time use cases?
- Appropriate percentage level of maximum rated output power to restrict curtailed charge signal?

Audience Questions

Does the working group have any questions for Stacy, Dan, or Erick?

Please type in your questions or raise your hand so we can unmute you to ask.

Peer Discussion – Commissioners and Commission Staff Only

Facilitators

- Working Group Chair Maria Bocanegra and Illinois Commerce Commission Staff
- Working Group Vice-chair Jason Stanek and Maryland Public Service Commission Staff

- 1. Has your Commission taken or considered any actions to address EV charging interoperability?
 - Have you provided any direction to utilities investing in chargers re: interoperability or standards (guidance or requirements)?

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 - Have you provided any direction to utilities investing in chargers re: interoperability or standards (guidance or requirements)?
- 2. What collaborations do you think are essential for addressing interoperability issues?

- Has your Commission taken or considered any actions to address EV charging interoperability?
 - Have you provided any direction to utilities investing in chargers re: interoperability or standards (guidance or requirements)?
- 2. What collaborations do you think are essential for addressing interoperability issues?
- 3. What role do you anticipate commissions will play in solving EV interoperability issues?

- Has your Commission taken or considered any actions to address EV charging interoperability?
 - Have you provided any direction to utilities investing in chargers re: interoperability or standards guidance or requirements?
- 2. What collaborations do you think are essential for addressing interoperability issues?
- 3. What role do you anticipate commissions will play in solving EV interoperability issues?
- 4. Have you ever personally charged an EV? What type of connection point did it use?

Announcement: Share Your Feedback

- NARUC is looking for your feedback on EV State Working Group activities by 9/4/20.
- See EVSWG 8/24 email from Danielle for link to survey: <u>https://www.surveymonkey.com/r/NARUC-EVSWG</u>

Upcoming EV SWG Calls: Always on a Tuesday, 3-4:30pm ET / 12-1:30pm PT

Next webinar: September 22: Regional Coordination

- Registration link will be live next week; watch listserv
- Dates for your calendar: October 27, November TBD (likely annual meeting session), December 15 (moved from 12/22)
- EVSWG Listserv: <u>NARUC-EVSWG@lists.naruc.org</u>
- Presentations and recordings of past EVSWG events: <u>www.naruc.org/cpi-1/energy-infrastructure-</u> <u>modernization/electric-vehicles/</u>