



ENERGY STAR®

Electric Vehicle Supply Equipment

Version 1.1 Test Method Working Session #2

September 12, 2018

ENERGY STAR Products Labeling Program



Meeting Details

- Slides and related materials will be available on the EVSE Product Development Web page:
 - www.energystar.gov/RevisedSpecs
 - *Follow link to “Version 1.1 is in Development” under “Electric Vehicle Supply Equipment”*
- Audio provided via teleconference:
 - Call in:** +1 (877) 423-6338 (U.S.)
+1 (571) 281-2578 (International)
 - Code:** **773-366 #**
 - Phone lines will remain open during discussion
 - Please mute line unless speaking
 - Press *6 to mute and *6 to un-mute your line



Meeting Agenda

- Introductions and activities to-date
- Outcomes from Working Session #1
- Scope
- Appropriate Loading Conditions
- Accounting for DC EVSE Features/Functions
- Timeline



Introductions

James Kwon

U.S. Environmental Protection Agency

Peter Banwell

U.S. Environmental Protection Agency

Matt Malinowski

ICF

Stacy Noblet

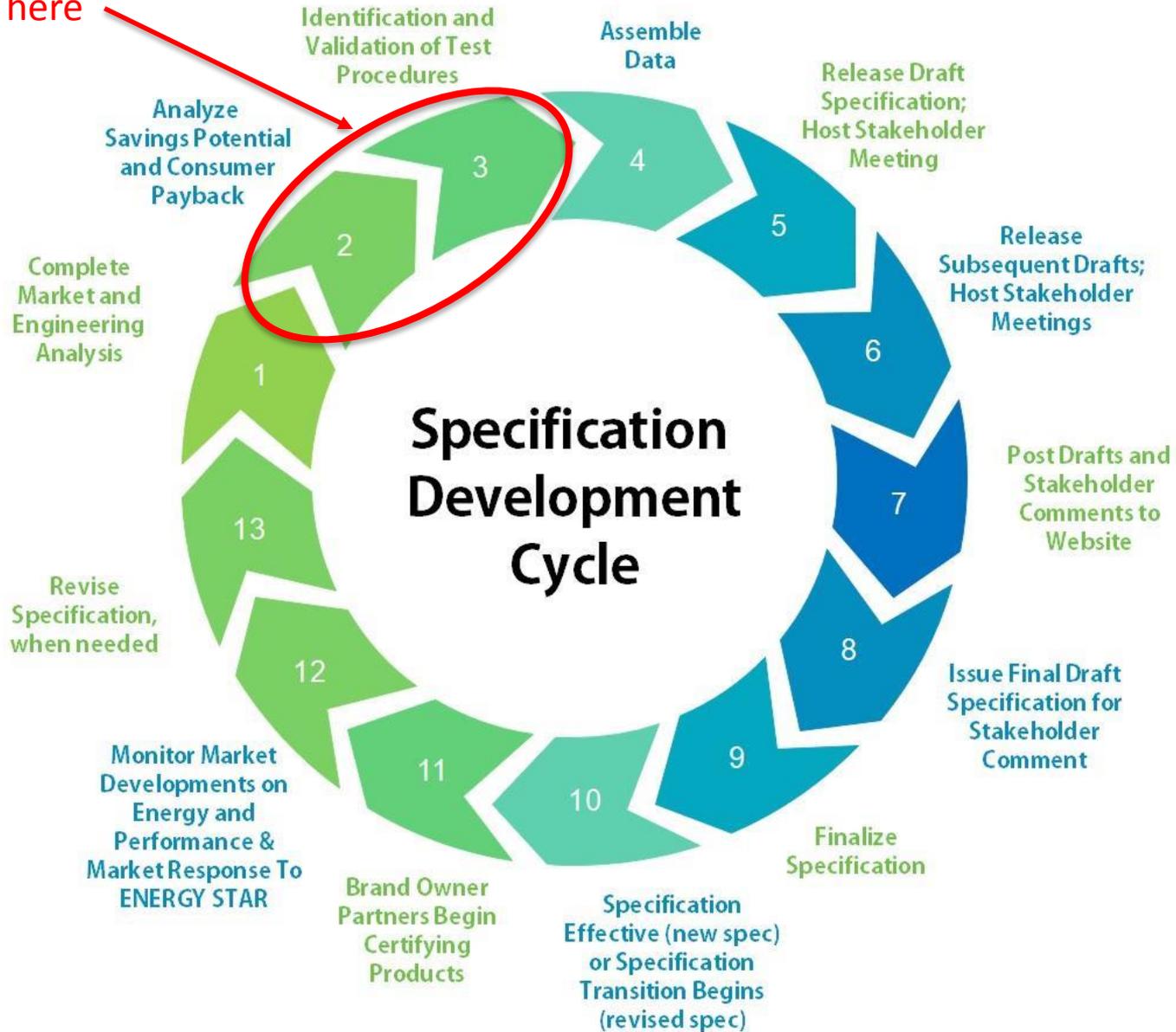
ICF

Emmy Feldman

ICF



We are here





Key Topics for Discussion

Testing Varying Product Configurations

DC EVSE are typically configured in one of two ways:

1. All-in-One: where the product has all of the components included in one enclosure
2. Cabinet/Dispenser: where the product has components included in two separate enclosures – one including the power conversion equipment (cabinet) and another that connects to the vehicle and has the user interface (dispenser)

AC/DC Converter Cabinet

Dispenser



- ❖ The test method should permit comparisons between the two configurations. Based on stakeholder feedback, EPA proposes testing cabinets and dispensers together, as one system.



Testing Varying Product Configurations

Stakeholders noted that testing Cabinet/Dispenser products with the shortest possible cable length connecting the components will allow for the fairest comparison between Cabinet/Dispenser and All-in-One products.

- ❖ EPA proposes testing Cabinet/Dispenser products with the shortest possible cable connecting the cabinet and dispenser components

Testing in Relevant Modes of Operation

- In the Discussion Guide, EPA proposed a test procedure for **No Vehicle Mode** and **Operation Mode** as the most relevant modes for DC EVSE, since EV drivers are encouraged to disconnect vehicles at the end of a charging session.
 - However, stakeholders noted that there are applications where DC EVSE may be connected to a vehicle, but not actively charging for significant periods of time – including fleet-based applications, future residential applications, and when a battery storage system is present.
 - As a result, the modes in which there is a vehicle connected to the EVSE but the EVSE is not providing current may be relevant



Testing in Relevant Modes of Operation

- ❖ As a result of this discussion with stakeholders, EPA is considering proposing a test procedure for Partial On/Idle Modes in the Draft 1 Test Method.
- ❖ In addition, one stakeholder commented against measuring Operation Mode; however, given the large savings potentially available in Operation Mode, EPA continues to propose testing in this mode.



Photo by Dennis Schroeder, NREL 39251



Open Discussion



Scope

- In the Discussion Guide, EPA proposed including all DC EVSE that provide a maximum current greater than or equal to 80 A in the scope of the Version 1.1 specification.
 - However, stakeholders commented that there are DC EVSE that provide less than 80 A, and those products should be included in the scope of the specification.

❖ EPA proposes including DC with a maximum nameplate current less than 80 A in scope.



Scope

- Several stakeholders have also noted that EPA should consider limiting the scope because certain technologies are new to the market and still being developed.
 - They noted that these products may be inadvertently excluded from participating in ENERGY STAR because they are not properly accounted for at the time of the test method development
 - They specifically stated that higher-power DC EVSE, custom-built products, and those intended for large commercial use cases (e.g., charging buses) should be excluded

EPA would like to discuss the scope with stakeholders to determine what should be included in the Version 1.1 specification.



Open Discussion



Appropriate Loading Conditions

- In the Discussion Guide, EPA proposed a test procedure for Operation Mode – to test at various loading conditions to demonstrate efficiency at max power output and as the charge begins to ramp down
- EPA expects that testing at each loading condition will be brief (~5 minutes)
- The proposed testing conditions were based on levels that EPA has seen in the market or understands are under development
 - The voltages were based on popular EV battery pack voltages at full charge

Appropriate Loading Conditions

	Test Conditions	Example for 500 kW capable UUT	Example for 350 kW capable UUT	Example for 150 kW capable UUT
Loading Condition 1	Max Available Power Output $\pm 2\%$ and Voltage = $P_{out} / 0.4 A + 300 V \pm 2\%$.	500 kW	350 kW	150 kW
Loading Condition 2	350 kW ± 7 kW and 900 V ± 18 V	350 kW	Tested above	Do not test
Loading Condition 3	150 kW ± 3 kW and 400 V ± 8 V	150 kW	150 kW	Tested above
Loading Condition 4	50 kW ± 1 kW and 350 V ± 7 V	50 kW	50 kW	50 kW
Loading Condition 5	30 kW ± 0.6 kW and 350 V ± 7 V	30 kW	30 kW	30 kW

It is important to note that the loading conditions proposed in this table may be impacted by the outcome of the discussion of scope, specifically if specific maximum output powers are excluded.



Appropriate Loading Conditions

- Stakeholders submitted feedback in support of test conditions at voltages/currents representative of charging rates for existing vehicles.
-
- Should EPA consider any additional or different loading conditions than those specified to determine efficiency of the EVSE during Operation Mode charging?
 - Will these test conditions appropriately capture the efficiency of a variety of DC EVSE power levels on the market today and planned for the future?



Test Equipment for Operation Mode

- Testers will need to use specialized test equipment that will be able to communicate with the EVSE. EPA plans to reference SAE J1772 Appendix F regarding signaling for DC EVSE. *Do stakeholders have suggestions regarding what equipment/controls will be needed to communicate these test conditions to the EVSE?*



Open Discussion

Accounting for DC EVSE Features – Cooling/Heating

- In the Discussion Guide, EPA proposed testing DC EVSE at three different temperatures because efficiency can vary significantly based on ambient conditions.
- DC EVSE can have varying cooling/heating strategies to maintain the temperature of the system and the cables during charging or based on ambient temperature.
- EPA has learned that cooling systems for EVSE will typically turn on after the EVSE reaches a particular temperature (either due to the ambient temperature or internal heating from operating at high power).





Accounting for DC EVSE Features – Cooling/Heating

- Three stakeholders recommended measuring total DC EVSE energy usage, including the energy used for heating/cooling.
 - Are heating/cooling systems installed in all DC EVSE sizes (e.g., 50 kW stations and those with less power output)?
 - How should EPA best account for the power required to provide liquid cooling to the cables during testing?
 - What are the typical operating characteristics of cooling systems?
 - How should EPA structure and sequence tests so they are representative? Specifically, concerning the order of the tests, their duration, and wait times between them.



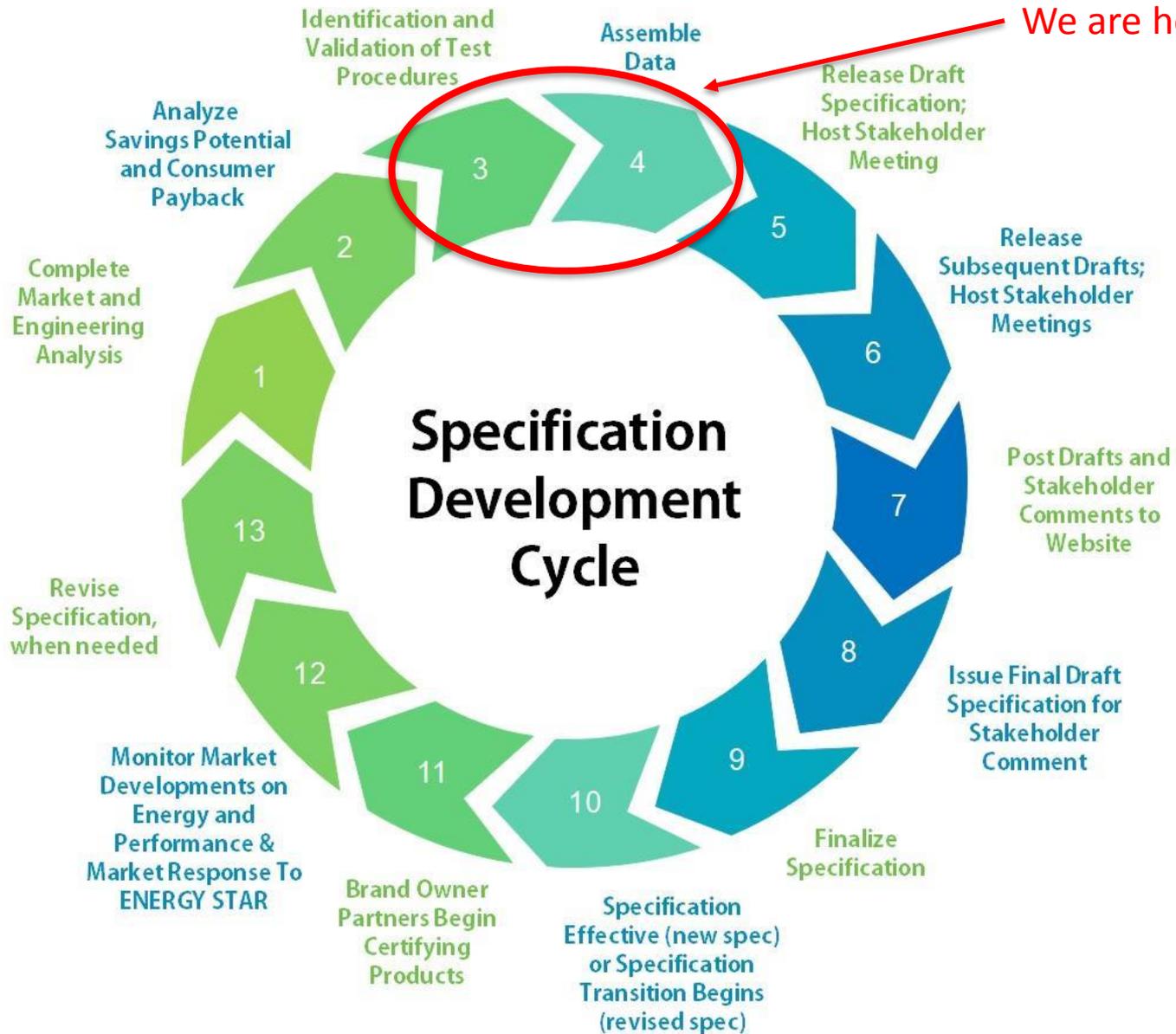
Accounting for DC EVSE Features – External Battery Storage

- EPA has learned that some EVSE may contain battery banks for the purposes of backup power or reducing peak demand (kW).
- Three stakeholders recommended requiring testing these units without the battery installed (if sold in this configuration) **and** with the battery installed but disabled.

- Should EPA account for the charge/discharge losses due to the battery, or try to exclude them by disconnecting the battery?
 - Alternatively, should EPA require that the battery be disabled for one test and enabled for a second test?
- Finally, if including the battery, how should EPA ensure that the Operation Mode test exercises the battery in a representative fashion (sufficient discharge and recharge)?



Open Discussion



We are headed here



Next Steps

Event	Date
<i>Version 1.1 Discussion Guide Published</i>	<i>May 24, 2018</i>
<i>Version 1.1 Discussion Guide Webinar</i>	<i>June 4, 2018</i>
<i>Comments Due</i>	<i>June 25, 2018</i>
<i>Test Method Working Session #1</i>	<i>August 22, 2018</i>
Test Method Working Session #2	September 12, 2018
Version 1.1 Draft 1 Test Method Expected	October 2018
Release Subsequent Drafts of Test Method	Fall 2018 and Winter 2019
Release Version 1.1 Draft 1 Specification	Spring 2019
Release Subsequent Drafts of Specification	Summer 2019
Version 1.1 Effective Date	Fall 2019



Next Steps – Draft 1 Test Method

- EPA will compile the feedback from this working session and the proposals resulting from the first working session and develop a Draft 1 Test Method for stakeholder review.
- After releasing this draft to stakeholders, there will be a 4-week comment period and a webinar to outline the document with stakeholders for discussion.
- All information associated with the development of the Version 1.1 can be found on the specification development webpage:
https://www.energystar.gov/products/spec/electric_vehicle_supply_equipment_version_1_1_pd



Thank you!

To be added to EPA's stakeholder listserve to receive specification updates, please email:

EVSE@energystar.gov

James Kwon
Product Manager, ENERGY STAR
(202) 564-8538

Kwon.James@epa.gov

www.energystar.gov/productdevelopment

