ENERGY STAR®
Electric Vehicle Supply Equipment
Draft 1 Specification and Draft 3 Test Method
Webinar

March 16, 2016

ENERGY STAR Products Labeling Program

Webinar Details

- Webinar slides and related materials will be available on the EVSE Product Development Web page:
  - www.energystar.gov/NewSpecs
  - *Follow link to "Version 1.0 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

Webinar Agenda

- Introductions and Recap of ENERGY STAR specification development process
- Discussion of changes to the EVSE Test Method
  - Test Set-up
  - Test Conduct
  - Test Procedure
- Draft 1 specification overview
  - Updates on definitions
  - Data analysis and certification criteria
  - Connected functionality
- Discussion of Partner Commitments document
- Third Party Certification process

Webinar Agenda

Time	Topic
2:00–2:10	**Introductions and Specification Development Recap**
2:10–2:50	Draft 3 Test Method Updates
2:10-2:30	• New Test Setup methodology
2:30-2:50	• Remaining updates
2:50–4:00	Draft 1 Specification
2:50-3:10	• Definition updates
3:10-3:45	• Data analysis and certification criteria
3:45-4:00	• Connected functionality updates
4:00–4:15	Partner Commitments
4:15–4:30	Third Party Certification
4:30–4:45	Timeline
4:45–5:00	Open Comment

Introductions

Verena Radulovic
U.S. Environmental Protection Agency

Barney Carlson
Idaho National Laboratory

Matt Malinowski
ICF International

Ted Bohn
Argonne National Laboratory

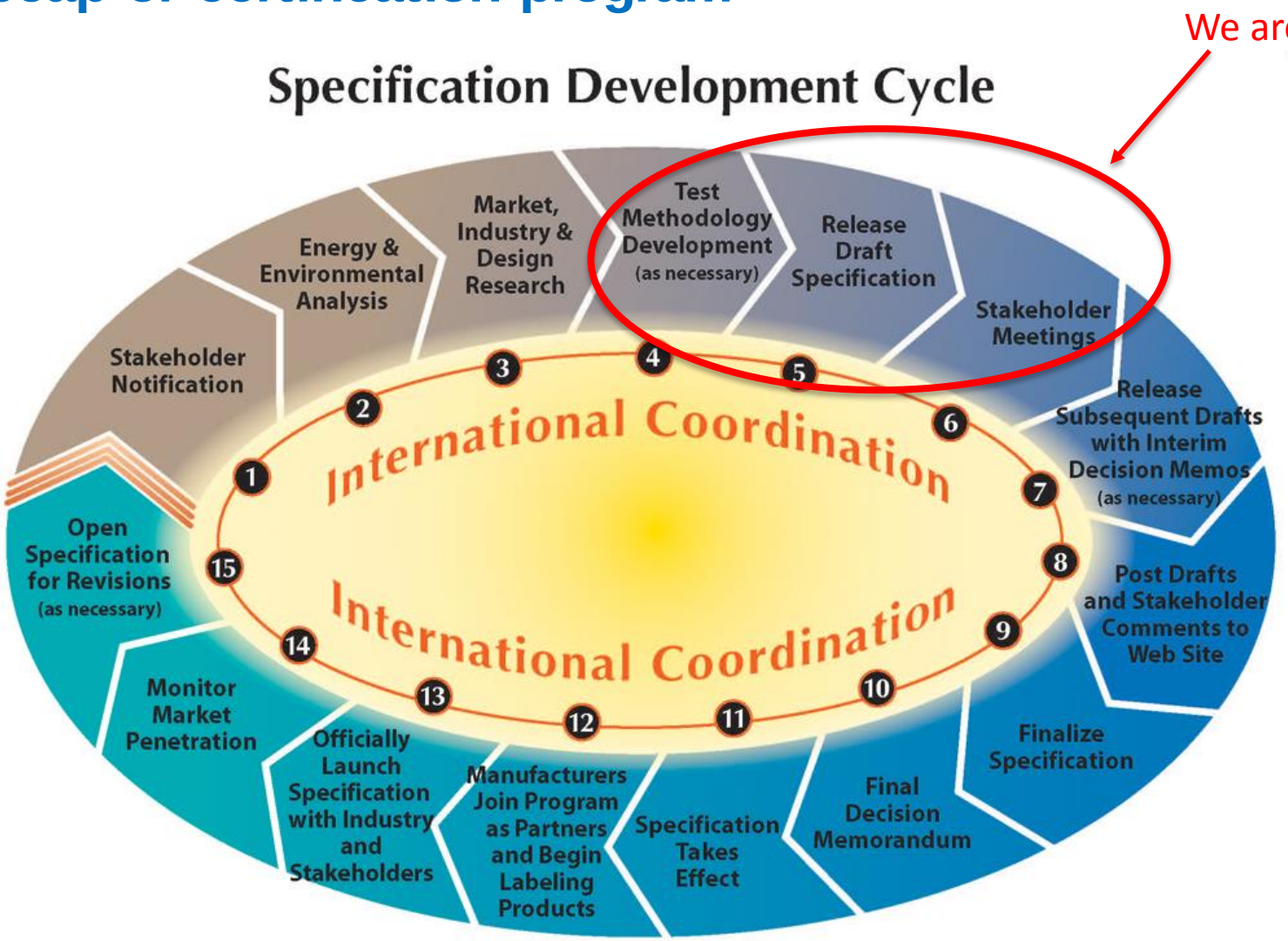
Emmy Phelan
ICF International

Doug Frazee
ICF International

Bruce Nordman
Lawrence Berkeley National Laboratory

Alan Meier
Lawrence Berkeley National Laboratory

Recap of certification program



Timeline to this point

Event	Date
Scoping Report Published	*September 2013*
EVSE Specification Development Launch and Draft 1 Test Method Published	*June 19, 2015*
Draft 1 Test Method Webinar	*July 9, 2015*
Draft 2 Test Method Published	*October 6, 2015*
Draft 2 Test Method Webinar	*October 21, 2015*
Draft 1 Specification and Draft 3 Test Method Published	*March 1, 2016*
Draft 1 Specification and Draft 3 Test Method Webinar	**March 16, 2016**

Draft 3 Test Method Updates

Time	Topic
2:00–2:10	Introductions and Specification Development Recap
2:10–2:50	**Draft 3 Test Method Updates**
2:10-2:30	• New Test Setup methodology
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Test Setup Update

- The changes outlined in the next slides will affect only the results from testing in Operation Mode.
- EPA has not set criteria for Operation Mode in the specification, only for Partial On and Idle Mode.
- The goal is to perfect Operation Mode testing to obtain data and analyze the savings potential for Operation Mode.
  - This will inform future versions of the specification.

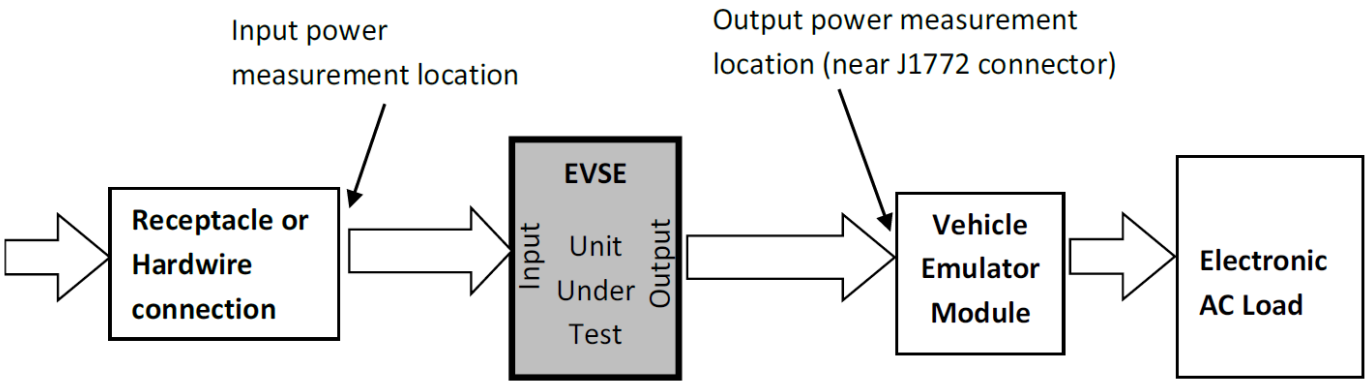


Figure 1a: Schematic of test setup connection

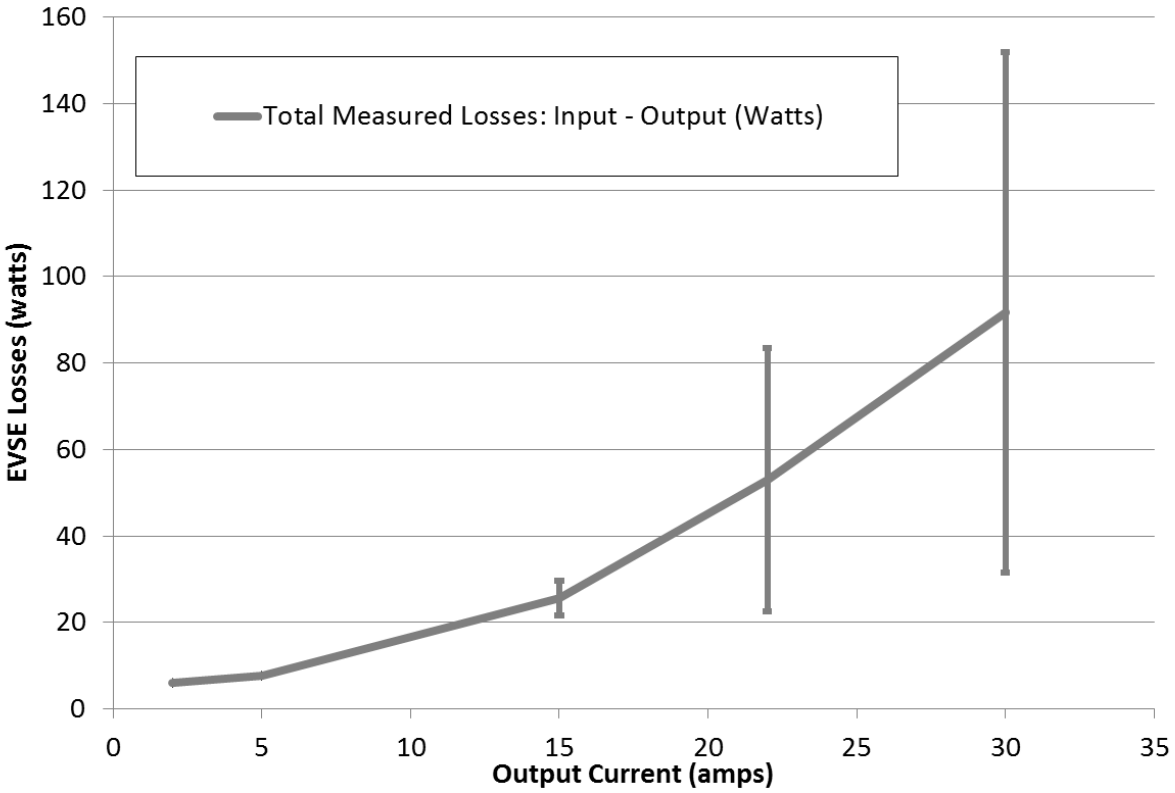
Test Setup – Hardwired vs. Plug and Cord EVSE

- Clarification of test setup for:
  - EVSE with input plug and cord
    - Current and voltage measurements taken at the receptacle side of the EVSE input cord
  - EVSE with hardwire input connection
    - Current and voltage measurements taken at EVSE hardwire connection location

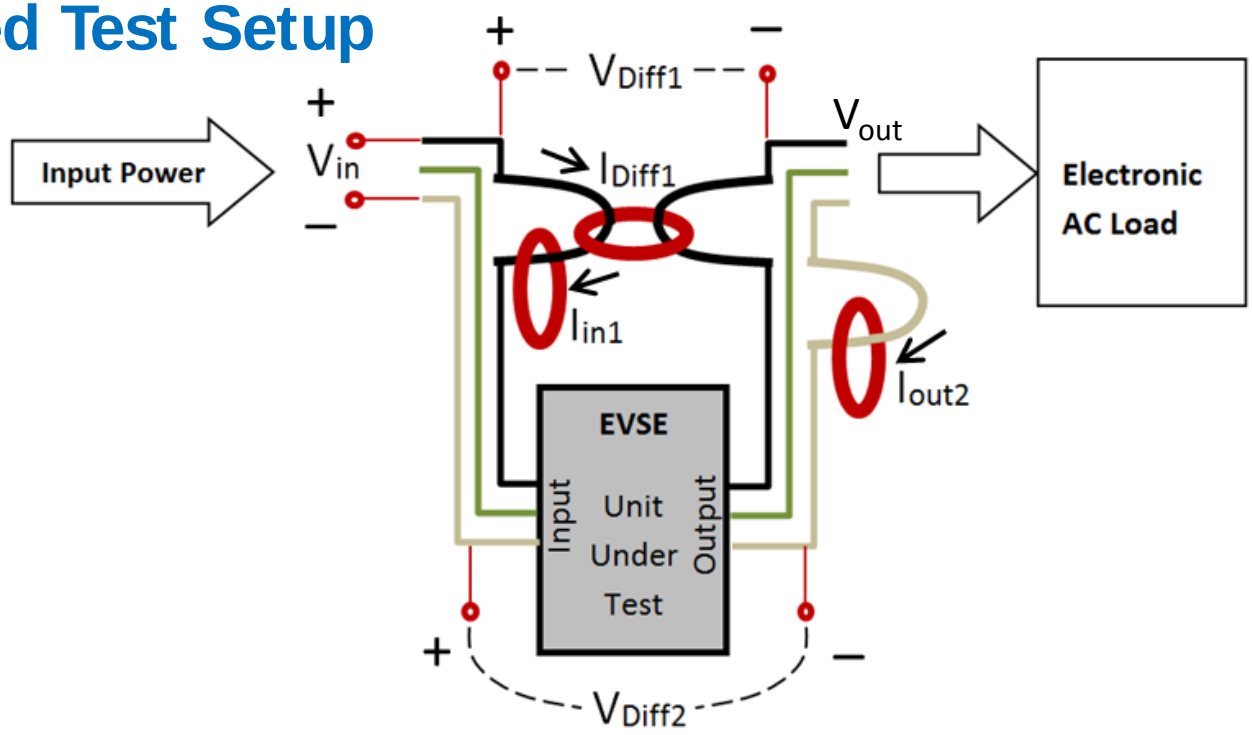
Test Setup - Instrumentation

A stakeholder noted that the test setup outlined in Draft 2 to calculate power measurement in **Operation Mode** may result in significant inaccuracies given that the error will be magnified by the large input and output current/voltage values.

It is important to note that EPA has not set criteria for Operation Mode in the Draft 1 Specification.



Updated Test Setup



The accuracy of the power measurement has been significantly improved. The new procedure measures power indirectly by multiplying differential current by input voltage and differential voltage by input and output current, thereby eliminating instances when meter inaccuracies are multiplied by both a large current and large voltage. EPA believes that this revised approach will result in acceptable accuracy.

Updated Test Setup

The total power loss shall be calculated as follows to account for the new test setup and to minimize inaccuracies:

Internal Power Consumption Resistive Losses

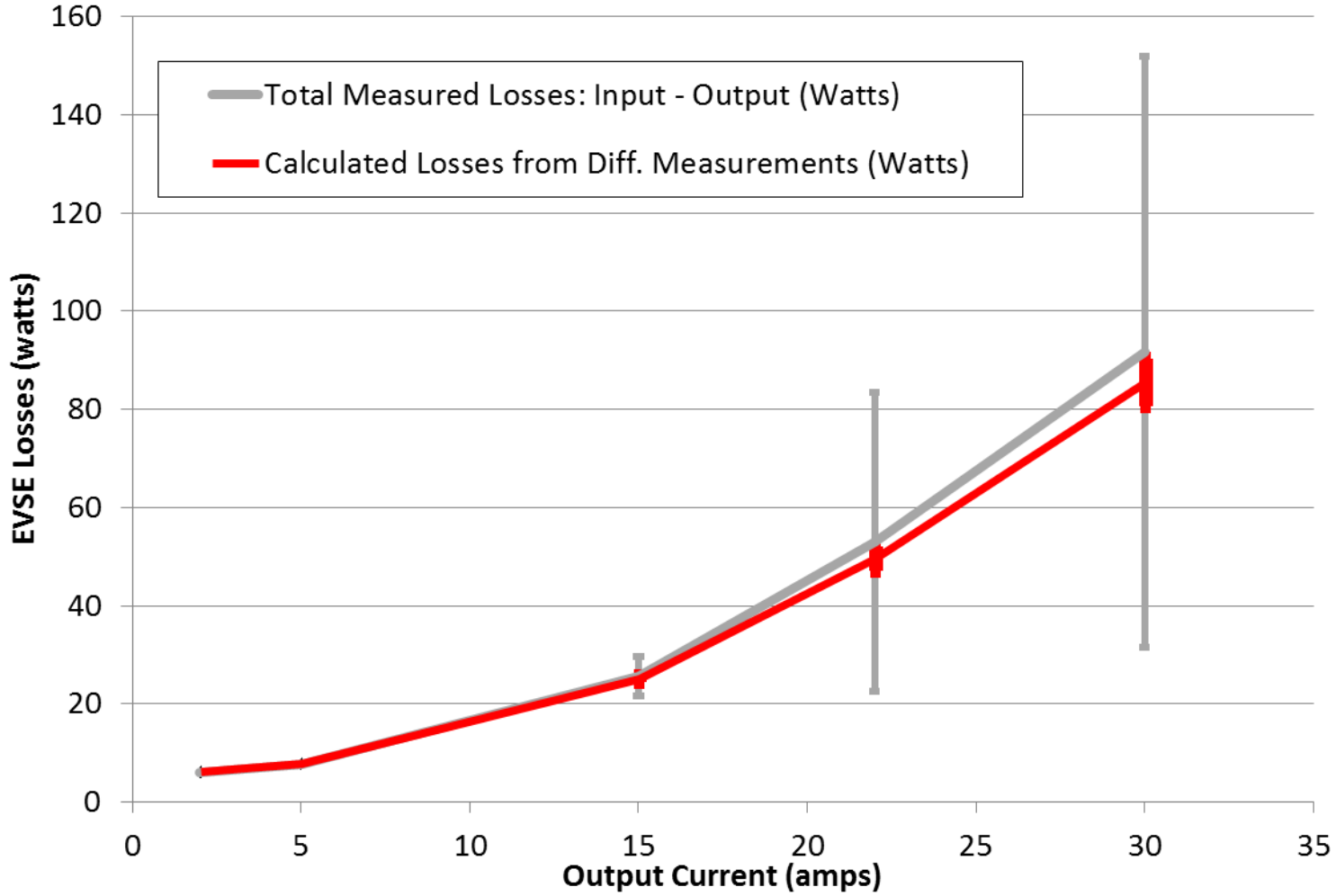
$$P_{loss} = I_{diff1} \times V_{in} + I_{in1} \times V_{diff1} - I_{out2} \times V_{diff2}$$

V_{in} : input voltage
V_{diff1} : differential voltage measurement of Line1 across the EVSE input to the EVSE output
V_{diff2} : differential voltage measurement of Line2 (or neutral) across the EVSE input to the EVSE output
I_{in1} : input current measurement of Line1
I_{diff1} : differential current measurement of Line1 across the EVSE input to the EVSE output
I_{out2} : output current measurement of Line2 (or neutral)

Comparison of Power Loss Measurement Methods

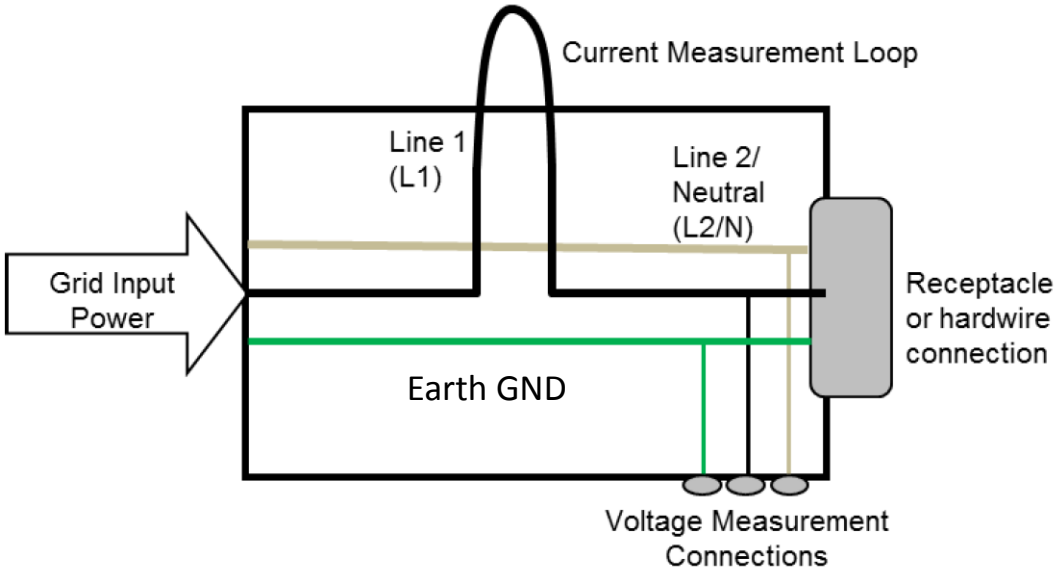
1) Direct Comparison: $P_{loss} = P_{in} - P_{out}$

2) Differential Current: $P_{loss} = P_{diff} + P_{cond}$ (P_{diff} = fixed losses, P_{cond} = conductor losses)



Updated Test Setup – Input Measurements

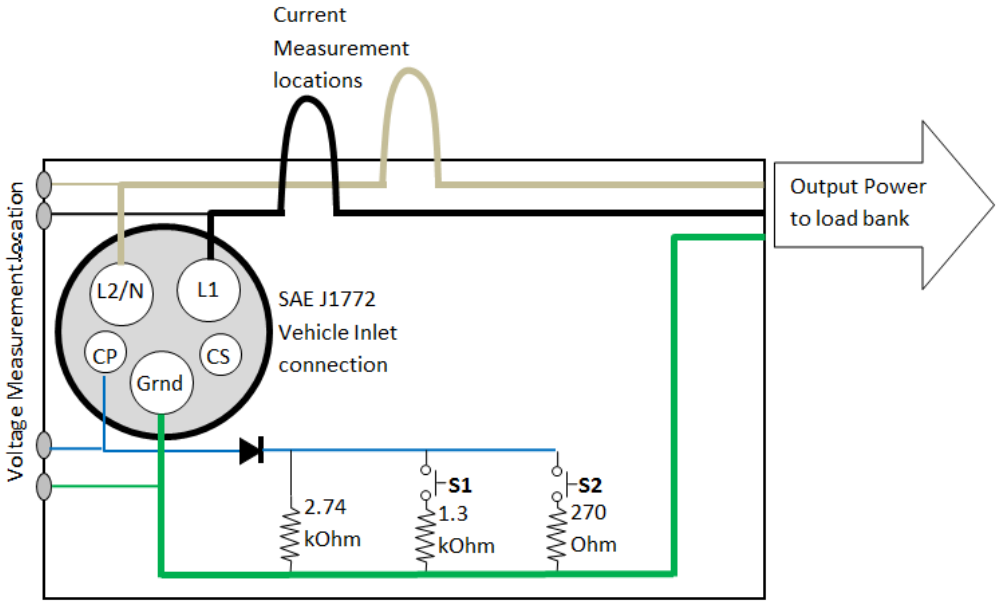
- EPA has updated all relevant figures to reflect this change.



EPA has updated the Schematic of the Input Measurement Apparatus (IMA) by adding a third voltage measurement connection to account for the update to the test procedure.

Updated Test Setup – Output Measurements

- EPA has updated all relevant figures to reflect this change.



EPA has updated the Schematic of the Vehicle Emulator Module (VEM)

Test Setup - Cords

A stakeholder recommended EVSE be tested with the cord shipped with the EVSE. If multiple options are available, then the cord with the highest losses should be considered.

1. EPA agrees that EVSE should be tested with the cord shipped with the model.
2. For EVSE with multiple charge cable options, EPA intends to permit an approach that includes:
   - Evaluation of construction and wire gauge,
   - Testing of only the longest available cable is appropriate, as long as the wire is same gauge.

However, the issue of the test setup for cords will only affect power measurements in Operation Mode, and EPA has not proposed Operation Mode requirements.

Test Setup – Power Factor and Apparent Power

A stakeholder recommended that EPA reconsider collecting power factor as lower power factors have the potential to create added stress on the electric power generation, transmission, and distribution systems.

6) Measurements and Calculations:
   a) Cable Length (ft.);
   b) Cable Gauge (AWG);
   c) Power Factor (PF)
   d) Apparent Power (S)
   e) Voltage (RMS);
   f) Current (RMS);
   g) Average Power (W); and
   h) Frequency (Hz).

EPA does not expect power factor to be a significant issue, however its measurement is likewise not overly burdensome. EPA is proposing to include power factor measurement *if it is of value to stakeholders.*

Test Conduct - Illuminance Conditions

A stakeholder suggested that EPA should reconsider:

- **The bright illuminance condition, and**
- **The dark illuminance condition**

as EVSE in parking structures will experience lower levels of lighting and those outdoors will experience much higher.

A measurement of 300 lux represents the highest level of achievable brightness with the particular light source selected. EPA has decreased the dark illuminance condition to 10 ± 1.0 lux to align with a study on Lighting for Parking Facilities that was done by the Illuminating Engineering Society that recommends 10 lux for concrete parking facilities during normal operating hours.

If stakeholders have any data on more appropriate lighting conditions for EVSE, EPA welcomes this additional feedback and data.

Test Procedures – Automatic Power Down (APD)

A stakeholder supported the addition of the APD test and encouraged EPA to add a use case for an EVSE that is not connected to a vehicle, since the response may differ.

EPA agrees with this stakeholder comment and has added an APD test to measure power when the vehicle is connected to the EVSE (States B1 and C), as well as when the vehicle is not connected to the EVSE (State A).

Test Procedures – Automatic Power Down (APD)

5.2 Auto Power Down (APD) Function

A) APD testing shall be conducted only for products that have an APD timer.

B) Conduct the UUT preparation procedure in Section 5.1.

C) Ensure the APD timing is set to the default value.

D) Ensure any demand-response functionality is disabled.

1) If demand-response functionality cannot be disabled and a demand-response function occurs during a test, the results from the test shall be replaced with results from a substitute test.

E) State C: Plug in the UUT output connection to J1772 vehicle inlet on VEM. Connect S1 in the VEM.

F) Begin measuring the elapsed time to APD after the product ceases performance of all Primary Function.

G) Measure and record the average power before APD over a 2 minute period.

H) Allow the UUT to automatically power-down.

I) Verify that the device is in the expected APD low-power state and record the time to APD.

J) Measure and record the average power after APD over a 2 minute period.

K) Power shall be measured according to IEC 62301 Ed 2.0-2011; with the additional guidance in Section 4 of this document.

L) Repeat steps A through K for States A and B1

Note: In response to stakeholder feedback that an APD response may differ if the EVSE is connected to the vehicle or not, EPA has added an APD test to account for any differentiation in power consumption.

Test Procedures – Warm-up Period

A stakeholder requested clarification on the purpose of the warm-up period used in the test procedure.

The goal of the warm-up period is to prevent any changes in resistance due to temperature. EPA has:

- Shortened the period to 5 minutes to reduce testing time
- Required that the unit be kept at ambient temperature for 30 minutes prior to testing

D) Warm-up

1) Ensure the unit is kept at ambient temperature for 30 minutes prior to the test.
2) Engage the AC load and draw full current output for 5 minutes or more.
3) Only one warm-up period of 5 minutes is required for each unit under test at the beginning of the test procedure.

Note: EPA has shortened the length of the warm-up period to 5 minutes to reduce testing time but will still require that the unit be kept at ambient temperature for 30 minutes prior to testing. This will prevent any changes in resistance due to temperature.

Test Procedures – Loading Conditions

A stakeholder noted that the nameplate maximum continuous current rating should be used instead of the pilot signal.

Based on testing data, EPA determined that there is a lack of difference in energy losses between the nameplate and pilot (less than 0.5% on average). Thus, EPA continues to propose that the control pilot duty cycle be used to calculate the available current. In addition, reading the control pilot is more representative of real-world conditions.

Calculate the available current from the measured Control Pilot Duty Cycle per Table 3.

Table 3: Available Current Calculation from Control Pilot Duty Cycle (SAE J1772)

Duty Cycle (%)	Available Current (A)
10% ≤ Duty Cycle ≤ 85%	% Duty Cycle x 0.6
85% < Duty Cycle ≤ 96%	(% Duty Cycle – 64) x 2.5

Draft 1 Specification

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Definitions – Level 1/Level 2 Functions

A stakeholder noted that residential and commercial EVSE vary in both function and energy demands.

One difference noted is that commercial systems will have *non-charging ancillary services* and should not be subject to any criteria that would reduce the utility of the EVSE, such as:

- **Automatic brightness control (ABC) or**
- **Auto-power down (APD)**

EPA appreciates stakeholder input on functional differences between residential and commercial EVSE that will drive differing energy consumption. EPA has proposed APD requirements in the Draft 1 Specification for all products.

EPA welcomes comments on the amount of power required for the additional features and services mentioned, including lighting and communications. Will EVSE with these features be able to meet the Partial On Mode requirements?

Definitions – Operating States

Two stakeholders requested changes to the operating states definitions:
1. Definitions for "A", "B", and "C" should be added and align with SAE J1772.

2. Harmonize any applicable definitions to the SAE J2894/2 standard as it is intended to address EVSE operating states.

3) On Mode: Condition during which the equipment provides at least one primary function or can promptly provide a primary function.

a) Operation Mode: Condition during which the equipment is performing at least one primary function.

Note: The vehicle-EVSE interface is in State C.[3]

EPA has referenced the definitions for States A, B1, B2, and C with the SAE J1772 standard. Also, EPA has provided footnotes referring to definitions in industry standards where appropriate.

[3] This mode is intended is typically associated with a vehicle/EVSE interface state (e.g., A, B, or C) as defined in SAE J1772, however, it may not always align as these modes refer to the entire EVSE (including networking and other functions), while the SAE J1772 states apply only to the interface.

Definitions – Operating States

A stakeholder suggested refining the definitions of Partial On Mode and Idle Mode as they appear to overlap.

b) Idle Mode: Condition during which the equipment can promptly provide a primary function but is not doing so.

Note: Idle mode is the condition within On Mode where the EVSE is connected to the vehicle or vehicle simulator but is not actively providing current. The vehicle-EVSE interface is in State B2 or C. [3]

4) Partial On Mode: Condition during which the equipment provides at least one secondary function but no primary function.

Note: The vehicle-EVSE interface is in state A or B1.[3]

EPA has amended the definitions for Idle Mode and Partial On Mode to remove the overlap between the two definitions and to reference SAE J1772.

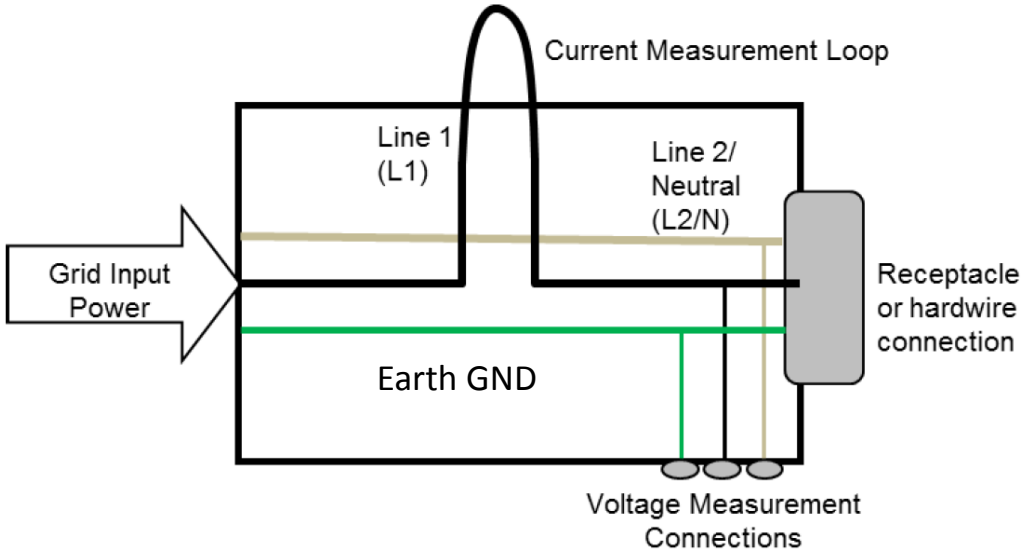
Definitions – Functions

A stakeholder noted that EPA should clarify whether the ability to promptly provide a primary function is the same as a Wakeup function.

EPA considers the wake-up functions as secondary functions. Promptly providing a primary function refers to transitory states where, for example, the product is already drawing higher power and is awaiting input (e.g., interface is in SAE J1772 state B2), rather than needing to first wake up.

Other Definitions

A stakeholder requested that EPA Define "L1", L2", and Duty Cycle.



EPA has clarified L1 and L2 and defined Duty Cycle.

3) Duty Cycle: The ratio or a given time interval of the uninterrupted duration at the high logic state to the total time.

Note: This duty cycle, lying between 0 and 1, may be expressed as a percentage.

Note: Per stakeholder requests, EPA has provided a definition for Duty Cycle (used when measuring and quantifying the pilot signal), based on the International Electrotechnical Vocabulary duty cycle definition for electric welding (IEV 851-12-03).

Definitions – Product Family

EPA has included a definition for Product Family to allow manufacturers to certify a group of models with similar characteristics using one test.

Under a product family, such variations between models would not affect energy consumption for qualification.

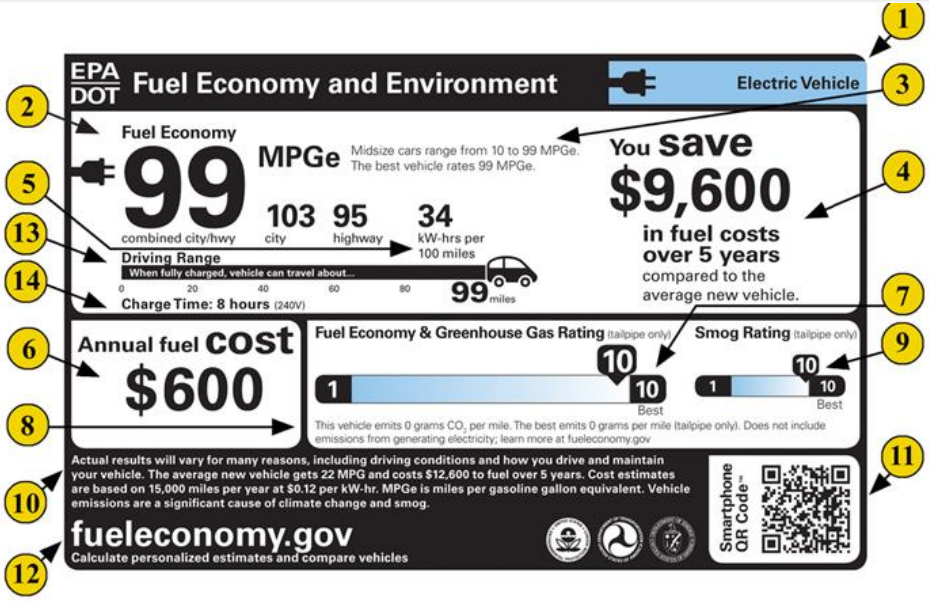
Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a Product Family. For EVSE, acceptable variations within a Product Family include:

1) Color,
2) Output cable, and
3) Housing.

Scope – Excluded Products

A stakeholder asked why power electronic components were excluded from scope, despite high energy use.

EPA already maintains a fuel efficiency vehicle labelling program, which includes labeling electric vehicles and calculating battery charging efficiency.



Scope – Excluded Products

A stakeholder asked why the following were excluded from scope, despite high energy use:

- **DC EVSE,**
- **Wireless/Inductive EVSE**

With a significantly greater installed base, national savings from AC EVSE are expected to be significantly higher than from DC EVSE.

- EPA will continue to monitor the market and will consider the following for future versions of the EVSE specification:
  - DC fast chargers,
  - DC slow chargers, and
  - Wireless/Inductive EVSE

Scope - Cords

A stakeholder requested that the test method or specification exclude the output cable because the losses in the wiring are much greater than those in the EVSE itself. For this reason, the stakeholder also recommended excluding Level 1 EVSE, where the cable resistance is an even greater contributor to energy consumption.

EPA is proposing to separate fixed losses from conductive losses to account for the difference in impact between losses in the output cable and the EVSE circuitry. Nonetheless, *EPA is not proposing requirements for Operation Mode at this time* due to the relatively longer paybacks for efficiency improvements in this mode.

The energy saving benefits of the non-operational mode requirements that are in Draft 1 will apply to both Level 1 and Level 2 EVSE.

Efficiency Criteria – Operation Mode

- EPA not proposing Operation Mode requirements for Draft 1
  - Relatively longer paybacks for efficiency improvements
  - Thicker output cables for increasing efficiency

AWG	Ω per 1000 ft	Max Current (A)	Wholesale Price ($/ft)	Retail Price at 25 ft ($)	Resistance of 2 Runs at 25 ft (Ω)	Conductive Losses at 30 A (W)	Annual Energy Losses at 8% Duty Cycle (kWh)	Annual Energy Losses at $0.12 Electric Rate ($)
10	0.9989	30	$2.00	$150	5	45	32	$3.78
8	0.6282	74	$3.00	$225	0.03	28	20	$2.38
			Cost Savings	**–$75**				**$1.40**
			Payback (yrs)					**53**

Efficiency Criteria – Operation Mode

- Assumptions: 3x markup wholesale–retail
- Payback of 19 years with $0.34 average Hawaii electric rate
- Worse paybacks for private nonresidential and publicly accessible (6% and 2% duty cycle)

EPA invites stakeholders to share Operation mode data for EVSE to further inform any energy savings potential, using the new differential measurements procedure in the Draft 3 Test Method.

Efficiency Criteria – Auto-Power Down (APD) Requirements

- APD functionality should be available **on all products**
  - Enabled by default
- APD timing ≤ 2 hours, with exceptions:
  - Users can modify in 10 minute intervals
  - Product may initiate APD immediately upon receiving signal via a networking or control protocol

APD Timing Default Settings shall be as follows:

i. APD Timing ≤ 30 minutes: This timing option is acceptable for use as a default setting. If APD timing is set by default to no more than 30 minutes and APD cannot be disabled or increased to greater than 30 minutes, products do not have to meet Idle State power requirements.

ii. 30 minutes < APD Timing ≤ 2 hours: This timing option is acceptable for use as a default setting. If APD can be disabled, or if APD timing can be set to greater than 30 minutes, products shall meet Idle State power requirements.

iii. APD Timing > 2 hours: This timing option may only be enabled by the end user and is not available for use as a default setting. If APD can be disabled, or if APD timing can be set to greater than 30 minutes, products shall meet Idle State power requirements.

Data Analysis - Methodology

- EPA dataset contains data from:
  - One stakeholder
  - Models that were tested previously by DOE
    - Testing done prior to development of ENERGY STAR Test Method, however, the methodology was used to inform ENERGY STAR Test Method
    - EPA believes the data is comparable to that submitted by stakeholders

ENERGY STAR® Electric Vehicle Supply Equipment Version 1.0 Draft 1 Specification Data

Enclosed are the ENERGY STAR EVSE data obtained directly from stakeholders. These data served as the foundation for the proposed performance levels in the Draft 1 Version 1.0 ENERGY STAR Specification for EVSE published on March 1, 2016. There are several models included in this dataset that were obtained from published information on the Department of Energy website. This testing was done prior to the development of the ENERGY STAR EVSE Test Method however this testing methodology was used to inform the ENERGY STAR Test Method. In this regard, EPA believes this data is comparable to that submitted by stakeholders.

The following tabs are included in this workbook:
1. Partial On and Idle Allowances
2. Relay Power
3. Stacked Bar Charts
4. Allowances used in the V1.0 Draft Specification.

Data Analysis - Methodology

- 20 models included in dataset
  - All analyzed for Partial On Mode power consumption
  - 9 were analyzed for Idle Mode power consumption

- Allowance and adders developed based on these values to allow 25% of the models to meet the criteria
  - 10 different manufacturers represented in the dataset
  - Base allowance of 2.2 Watts is proposed from analysis to achieve goal of capturing top quartile of products
  - 3 models contain network connectivity functionality
    - EPA proposes networking/control protocol allowances based on experience and knowledge of consumer electronic and information technology products

Efficiency Criteria – Partial On Mode

Partial On Mode Power Allowances	
Product Function	**Partial On Mode Power Allowance (watts)**
Base Allowance for All Products	2.2
In-use Wi-Fi or Gigabit Ethernet Protocols with Wake Capability	1
In-use Cellular with Wake Capability	1
Other In-use LAN (Local Area Network) Protocol with Wake Capability	1
In-use Occupancy Sensor	0.3

- None of the models in the dataset had an occupancy sensor, however, EPA has heard that they can be common in EVSE.
  - This allowance developed based on ENERGY STAR experience with sensor technology but EPA would appreciate feedback on if this is appropriate for EVSE.

Efficiency Criteria – Partial On Mode

To calculate the maximum Partial On Mode Power Requirement for a given model, Equation 1 from the specification can be used:

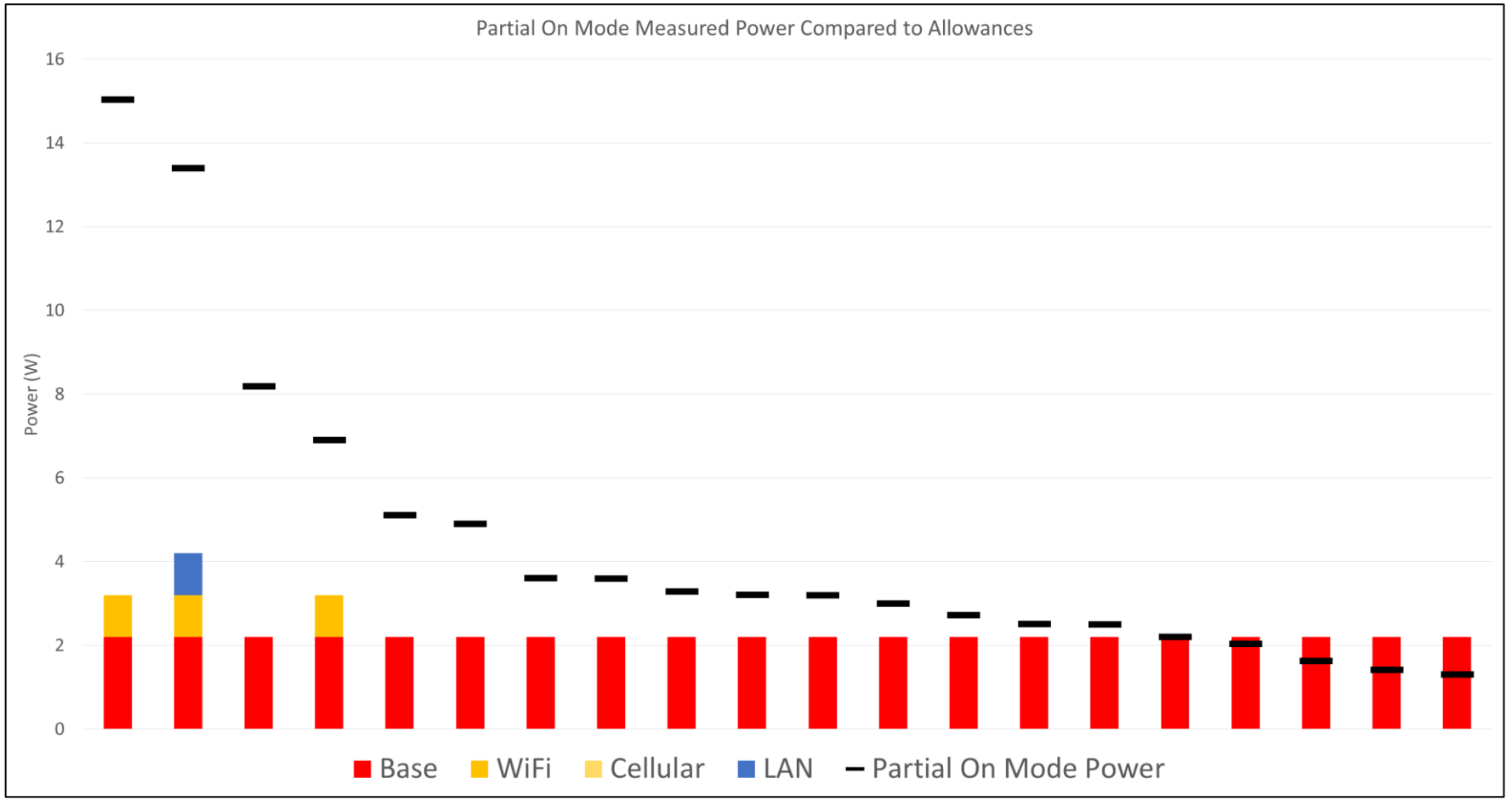
Equation 1: Calculation of Maximum Partial On Mode Power Requirement

$$P_{PARTIAL\_ON\_MAX} = P_{PARTIAL\_ON\_BASE} + \sum_{i=1}^{n} P_{WAKE\_i}$$

Where:

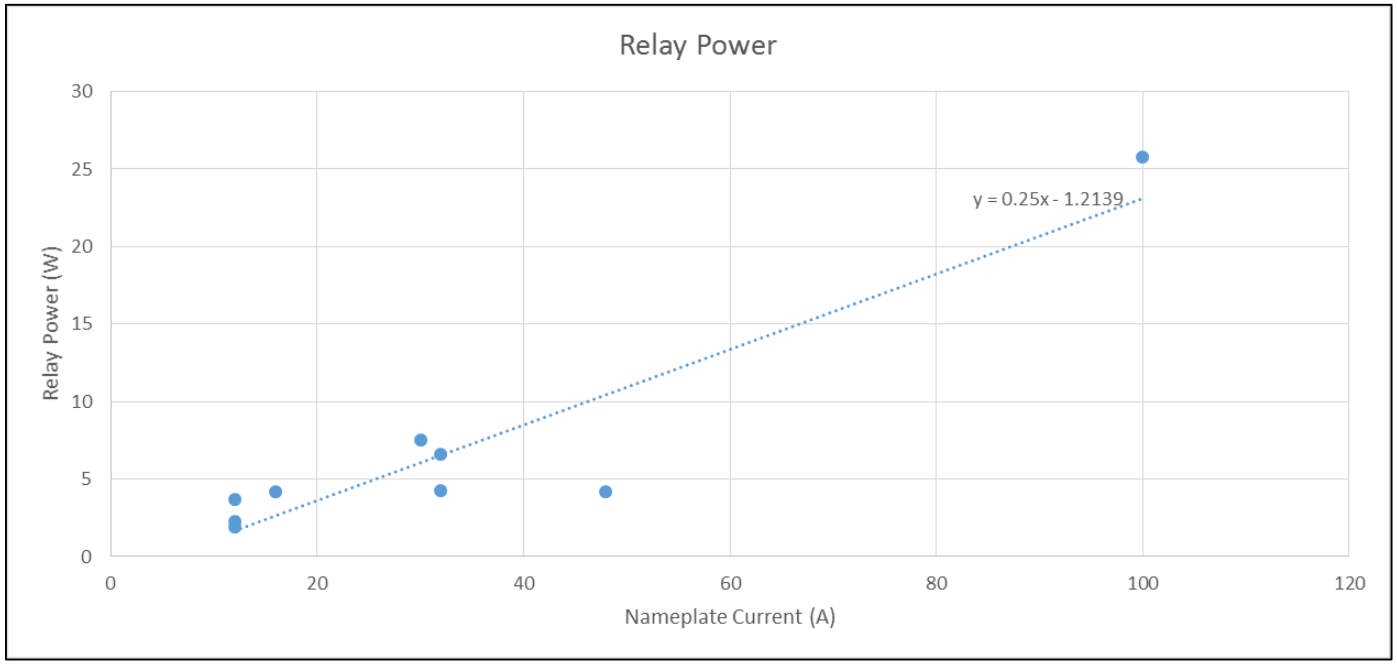
- $P_{PARTIAL\_ON\_MAX}$ *is the Maximum Partial On Mode Power Requirement;*
- $P_{PARTIAL\_ON\_BASE}$ *is the base Partial On Mode power allowance for all products, as specified in Table 1;*
- P_{WAKE_i} *is the Partial On Mode power allowance for each active, in-use networking/control protocol that provides remote hosts with the capability to wake the product from Partial On Mode, as specified in Table 1, for a total of n such allowances.*

Efficiency Criteria – Partial On Mode



Efficiency Criteria – Idle Mode

- 9 models in dataset analyzed for Idle Mode
- A new allowance term was introduced to the calculation for Idle State Power Requirement to reflect relay power, which increases with nameplate current
  - Seemingly the relay power varied with maximum nameplate current by a factor of 0.25 in a linear fashion



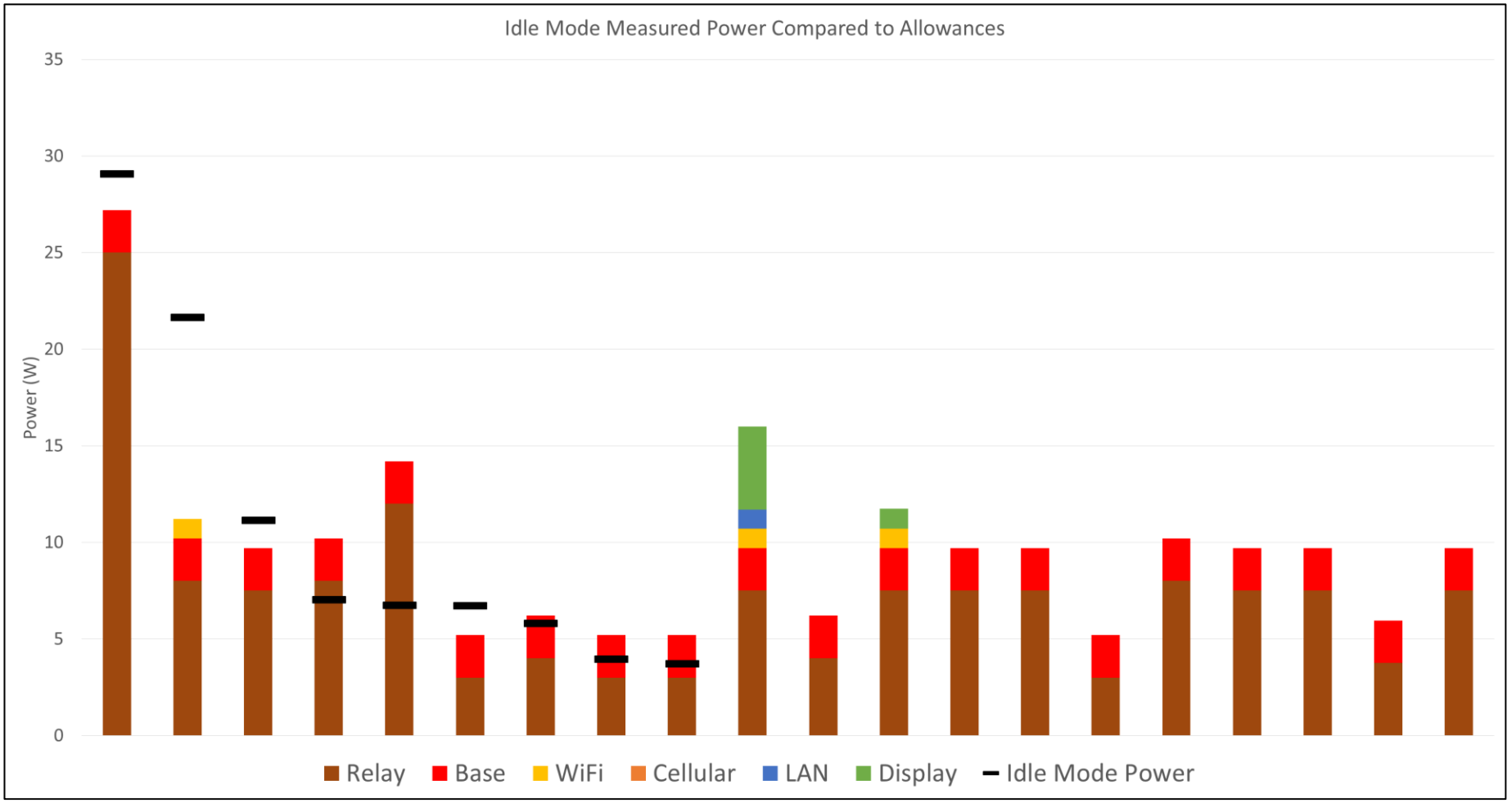
Efficiency Criteria – Idle Mode

- EPA proposes identical base criteria and network connectivity allowances for Idle Mode as power draw for these features is not expected to change
- EVSE with an embedded display:
  - Likely intended for outdoor use so allowance in line with Version 7.0 Displays specification On Mode requirements for Signage Displays

Idle State Power Allowances

Product Function	Idle State Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
Base	2.2
In-use Wi-Fi or Gigabit Ethernet Protocols with Wake Capability	1
In-use Cellular with Wake Capability	1
In-use LAN (Local Area Network) Protocol with Wake Capability	1
In-use Display	$(4.0 \times 10^{-5} \times l \times A) + 119 \times \tanh[0.0008 \times [A-200.0] + 0.11) + 6.0$ Where: • A is the Screen Area in square inches; • l is the Maximum Measured Luminance of the Display in candelas per square meter, as measured in Section 6.2 of the ENERGY STAR Test Method for Determining Display Energy (Rev. Sep-2015); • tanh is the hyperbolic tangent function; and • The result shall be rounded to the nearest tenth of a watt for reporting.

Efficiency Criteria – Idle Mode



Definitions – Connected Functionality

Connected Functionality Definitions

1) Communication Link: The mechanism for bi-directional data transfers between the EVSE and one or more external applications, devices or systems.
2) Demand Response (DR): Changes in electric usage by demand-side resources from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized[5].
3) Demand Response Management System (DRMS): The system operated by a program administrator, such as the utility or third party, which dispatches signals with DR instructions and/or price signals to the ENERGY STAR EVSE and receives messages from the EVSE.
4) EVSE System: As shown in Figure 2, it includes the ENERGY STAR certified EVSE, integrated or separate communications hardware, and additional hardware and software required to enable connected functionality.
5) Load Management Entity: DRMS, home energy management system, and the like.

Definitions – Connected Functionality

Open Standards: Standards that are:

1) Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,[6] and/or
2) Included in the National Institute of Standards and Technology (NIST) Smart Grid framework Tables 4.1 and 4.2,[7] and/or
3) Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force (IETF).

EPA's proposed definitions for open standards harmonizes with definitions in other ENERGY STAR specifications. Several stakeholders suggested that Open Charge Point Protocol (OCPP) is the de-facto industry standard for EVSE. Though OCPP as a standalone protocol does not meet the proposed definition, its use with another open protocol or cloud service will meet the definition.

Definitions – Connected Functionality

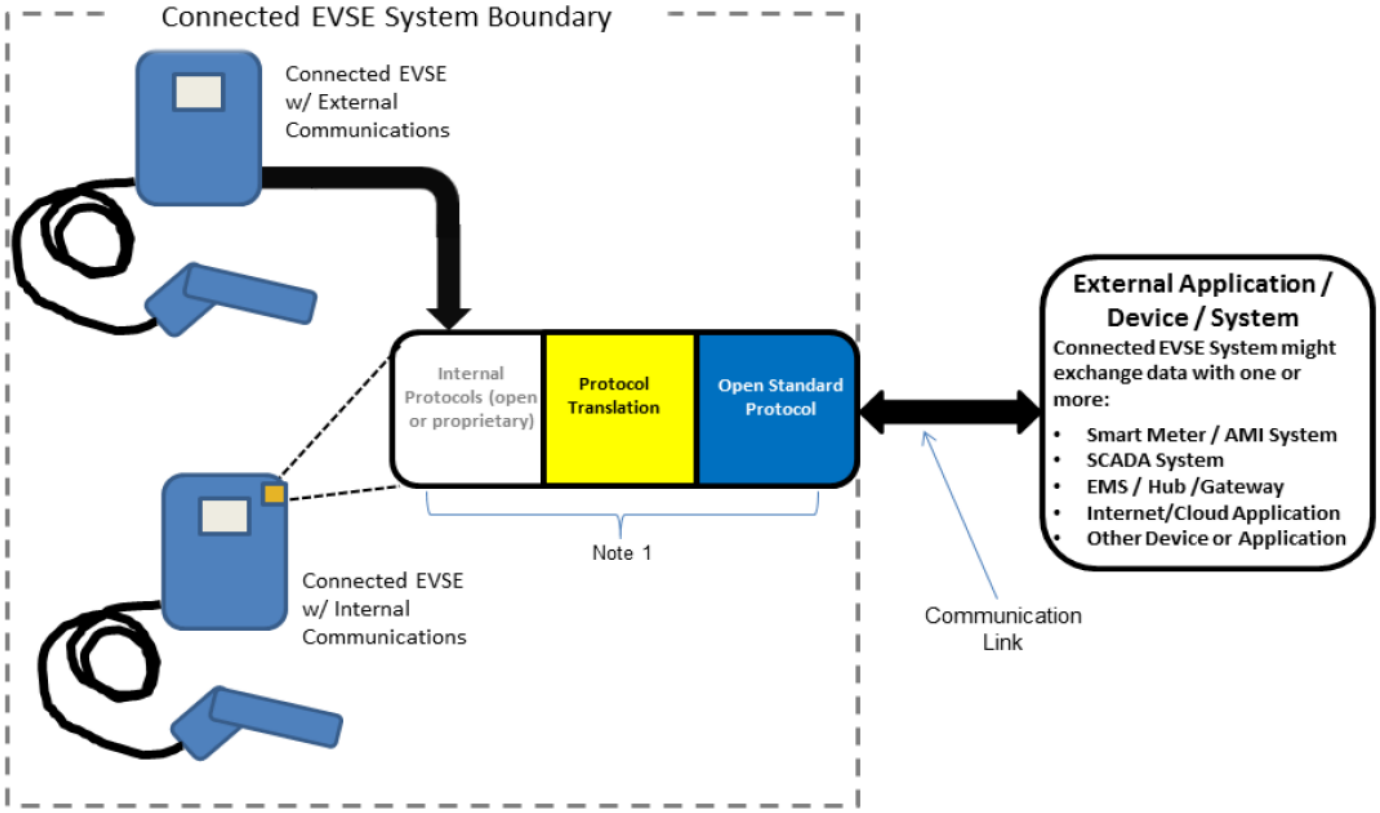


Figure 2: Connected EVSE System

Note 1: Communication device(s), link(s) and/or processing that enables Open Standards-based communication between the EVSE and external application / device / system(s). These elements, either individually or together, could be within the EVSE, and/or an external communication module, a hub/gateway, or in the Internet/cloud.

Connected Functionality (CF) – Stakeholder Feedback

- Widely varying comments on considered criteria were received:
  - CF should not be required for ENERGY STAR EVSE
  - We are still in the R&D stage for Grid connectivity
  - EVSE with CF should be AutoDR capable per California Title 24
  - EVSE with CF should respond to both price and reliability signals
  - Open Charge Point Protocol (OCPP) commonly used for EVSE communications
  - Testing and certification of EVSE smart grid capabilities is of high importance
  - Some DR programs place limits on consumers' ability to override DR
  - Metering in EVSE with CF should be optional
  - EVSE with CF may need persistent communications

Connected Functionality – Draft 1

- EVSE with Demand Response (DR) criteria:
  - Grid Communications: include a communication link that uses open standards, for all communication layers to enable DR
  - Open Access: an interface specification, application programming interface (API) or similar documentation that enables DR functionality shall be readily available

    Note: Products that enable direct, on-premises, open-standards based interconnection are preferred, but alternative approaches, where open-standards connectivity is enabled only with use of off-premise services, are also acceptable.
  - Consumer Override: Consumers shall be able to override their product's response to any DR signal

Connected Functionality – Draft 1 (cont)

- Capabilities Summary: A ≤250 word summary description of the EVSE system's and/or associated Service Provider's DR capabilities/services shall be submitted. Noting the following, as applicable, is recommended:
  - Capabilities model, e.g., DR aggregator vs. uniquely addressable EVSE
  - Supported DR modes, e.g., load dispatch, ancillary services, price notification, price response
  - Response configurability/flexibility by the consumer and/or Load Management Entity
  - Feedback to Load Management Entity, e.g., verification/M&V, override notification
  - Measures to limit consumer impacts, if any

Partner Commitments

Time	Topic
2:00–2:10	Introductions and Specification Development Recap
2:10–2:50	Draft 3 Test Method Updates
2:10-2:30	• New Test Setup methodology
2:30-2:50	• Remaining updates
2:50–4:00	Draft 1 Specification
2:50-3:10	• Definition updates
3:10-3:45	• Data analysis and certification criteria
3:45-4:00	• Connected functionality updates
4:00–4:15	**Partner Commitments**
4:15–4:30	Third Party Certification
4:30–4:45	Timeline
4:45–5:00	Open Comment

Partner Commitments - Overview

Becoming an ENERGY STAR partner

- As part of the partnership commitments, partners commit to:
  - Measure, track, and benchmark energy performance
  - Develop and implement a plan to improve energy performance, adopting the ENERGY STAR strategy
  - Educate your staff and public about your partnership and achievements with ENERGY STAR

ENERGY STAR® Program Requirements for Electric Vehicle Supply Equipment

Draft Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

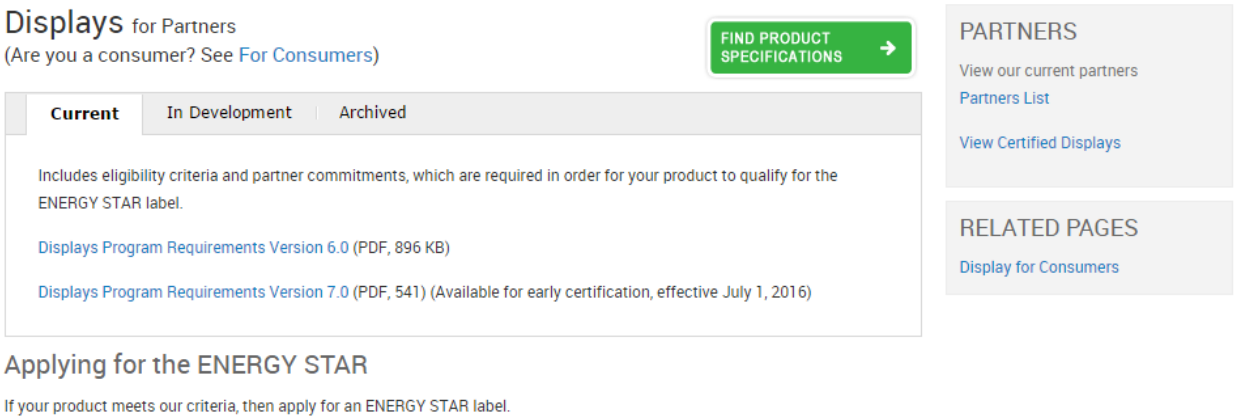
Partner Commitments

Qualifying Products:

1. Comply with Eligibility Criteria
2. Obtain written certification from Certification Body
3. Ensure model meets RoHS regulations and has generally accepted attributes of a recyclable products

Provide Information to EPA Outlined in Partner Commitments, such as:

- Unit Shipment Data
- Notify EPA of change in designated contacts



Partner Commitments

Verify Ongoing Product Qualification

Training and Consumer Education, for example on:

- Energy savings potential
- Financial savings potential
- Environmental benefits

Performance for Special Distinction

- Voluntary measures for additional recognition such as:
  - Provide quarterly, written updates on efforts undertaken by Partner
  - Ensure power management feature is enabled on all ENERGY STAR qualified products in company facilities
  - Partner of the Year Awards

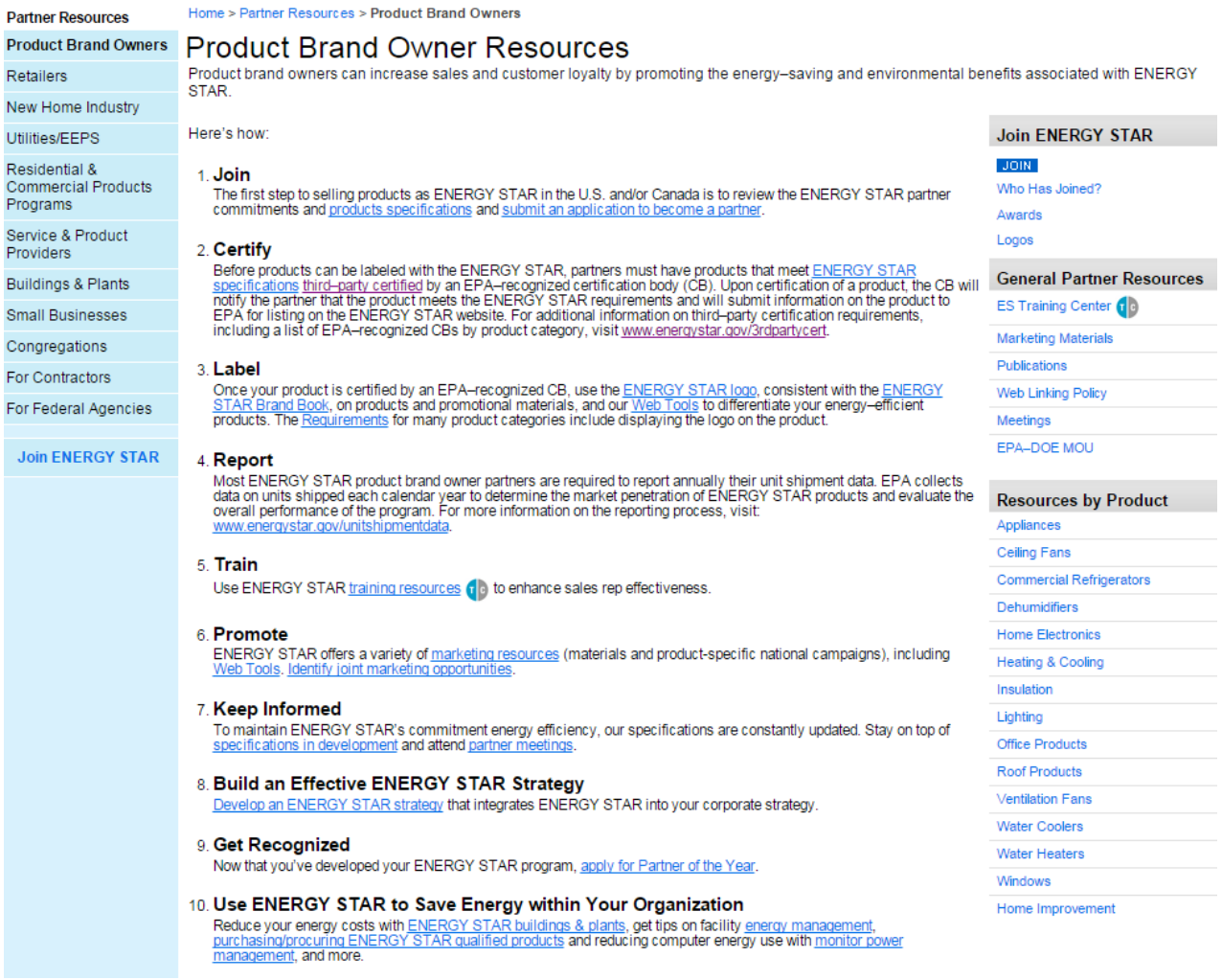
Partner Commitments - Labeling

Follow outlined guidance on using ENERGY STAR Name and Marks

- Labeling a product:
  - Must be clearly displayed and permanently affixed to front of product or on/next to machine nameplate
    - Option for electronic labeling
  - In product literature
  - On product packaging
  - On manufacturer's internet site

EPA prefers that manufacturers use a physical ENERGY STAR label but understands in certain circumstances that an electronic label may be more appropriate. EPA has proposed to offer electronic labeling as an alternative to a physical label and seeks feedback on whether the suggested options best reflect incorporating an electronic labeling for EVSE.

Steps to Participate for Brand Owners



Partner Resources

- Product Brand Owners
- Retailers
- New Home Industry
- Utilities/EEPS
- Residential & Commercial Products Programs
- Service & Product Providers
- Buildings & Plants
- Small Businesses
- Congregations
- For Contractors
- For Federal Agencies

Join ENERGY STAR

Home > Partner Resources > **Product Brand Owners**

Product Brand Owner Resources

Product brand owners can increase sales and customer loyalty by promoting the energy–saving and environmental benefits associated with ENERGY STAR.

Here's how:

1. **Join**
   The first step to selling products as ENERGY STAR in the U.S. and/or Canada is to review the ENERGY STAR partner commitments and products specifications and submit an application to become a partner.
2. **Certify**
   Before products can be labeled with the ENERGY STAR, partners must have products that meet ENERGY STAR specifications third–party certified by an EPA–recognized certification body (CB). Upon certification of a product, the CB will notify the partner that the product meets the ENERGY STAR requirements and will submit information on the product to EPA for listing on the ENERGY STAR website. For additional information on third–party certification requirements, including a list of EPA–recognized CBs by product category, visit www.energystar.gov/3rdpartycert.
3. **Label**
   Once your product is certified by an EPA–recognized CB, use the ENERGY STAR logo, consistent with the ENERGY STAR Brand Book, on products and promotional materials, and our Web Tools to differentiate your energy–efficient products. The Requirements for many product categories include displaying the logo on the product.
4. **Report**
   Most ENERGY STAR product brand owner partners are required to report annually their unit shipment data. EPA collects data on units shipped each calendar year to determine the market penetration of ENERGY STAR products and evaluate the overall performance of the program. For more information on the reporting process, visit: www.energystar.gov/unitshipmentdata.
5. **Train**
   Use ENERGY STAR training resources to enhance sales rep effectiveness.
6. **Promote**
   ENERGY STAR offers a variety of marketing resources (materials and product-specific national campaigns), including Web Tools. Identify joint marketing opportunities.
7. **Keep Informed**
   To maintain ENERGY STAR's commitment energy efficiency, our specifications are constantly updated. Stay on top of specifications in development and attend partner meetings.
8. **Build an Effective ENERGY STAR Strategy**
   Develop an ENERGY STAR strategy that integrates ENERGY STAR into your corporate strategy.
9. **Get Recognized**
   Now that you've developed your ENERGY STAR program, apply for Partner of the Year.
10. **Use ENERGY STAR to Save Energy within Your Organization**
    Reduce your energy costs with ENERGY STAR buildings & plants, get tips on facility energy management, purchasing/procuring ENERGY STAR qualified products and reducing computer energy use with monitor power management, and more.

Join ENERGY STAR

JOIN
Who Has Joined?
Awards
Logos

General Partner Resources

ES Training Center
Marketing Materials
Publications
Web Linking Policy
Meetings
EPA–DOE MOU

Resources by Product

Appliances
Ceiling Fans
Commercial Refrigerators
Dehumidifiers
Home Electronics
Heating & Cooling
Insulation
Lighting
Office Products
Roof Products
Ventilation Fans
Water Coolers
Water Heaters
Windows
Home Improvement

Program Marketing

- ENERGY STAR network includes more than 650 utilities and program sponsors, states, municipalities, and cities. EPA is also partnering with DOE's Clean Cities program.
  - Work within this network to promote purchasing of labeled products
- Determining best venue for a 'launch' for marketing efforts, such as an industry event – after finalization of specification

Stakeholders are encouraged to submit feedback on potential venues for a new program launch. In addition, marketing staff can contact Peter Banwell at Banwell.Peter@epa.gov or Becky Duff at Rebecca.Duff@icfi.com for ideas on promising approaches for program marketing for EVSE.

Program Marketing

ENERGY STAR Partner Meetings

Develop an ENERGY STAR Strategy

ENERGY STAR Marketing Tools and Resources

- ENERGY STAR Mark
- ENERGY STAR Graphics
- Promotional Materials
- ENERGY STAR Publications

Web-Based Tools for Partners

TOOL	EXAMPLE
ENERGY STAR Certification Mark	Before mouse roll-over
ENERGY STAR Certification Mark after mouse roll-over	After mouse roll-over

Third Party Certification

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2:00–2:10	Introductions and Specification Development Recap
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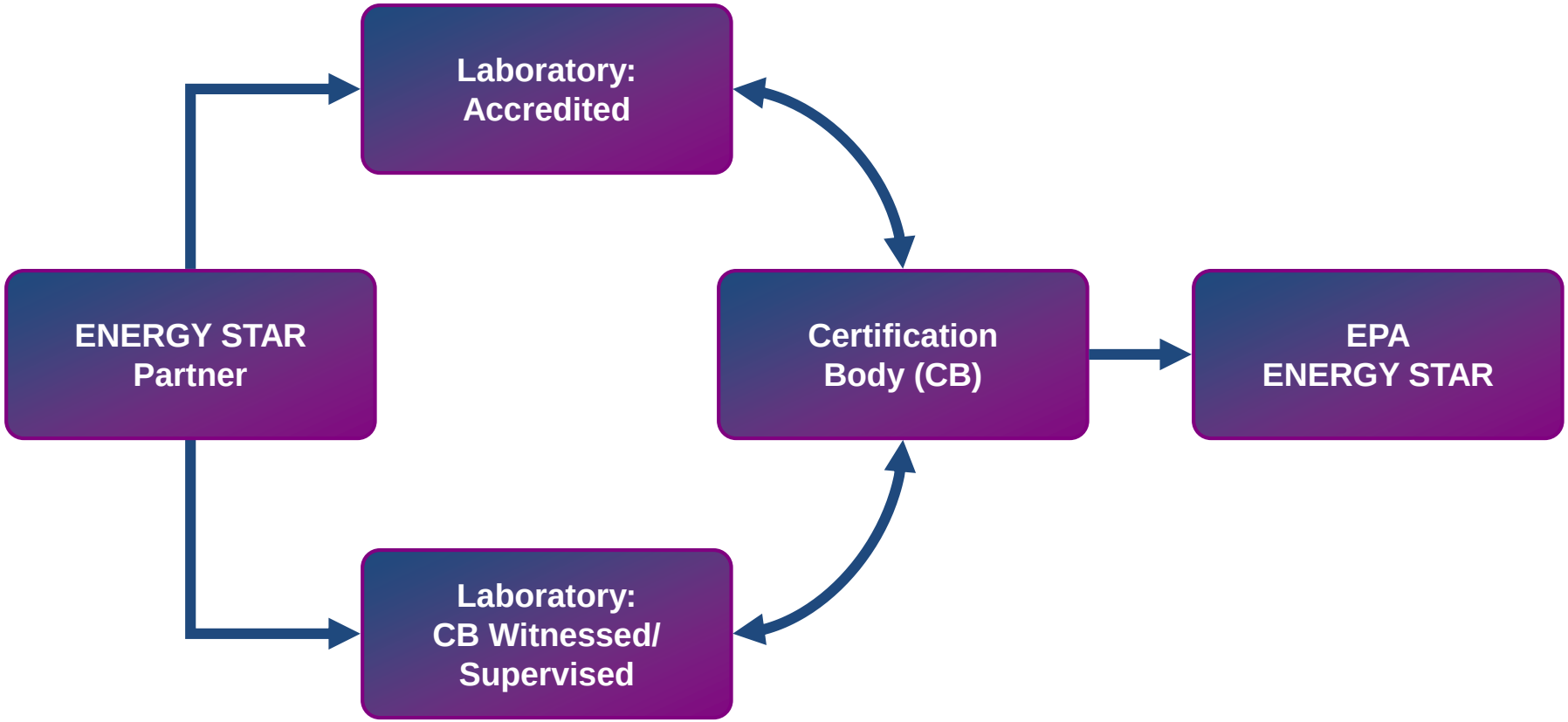
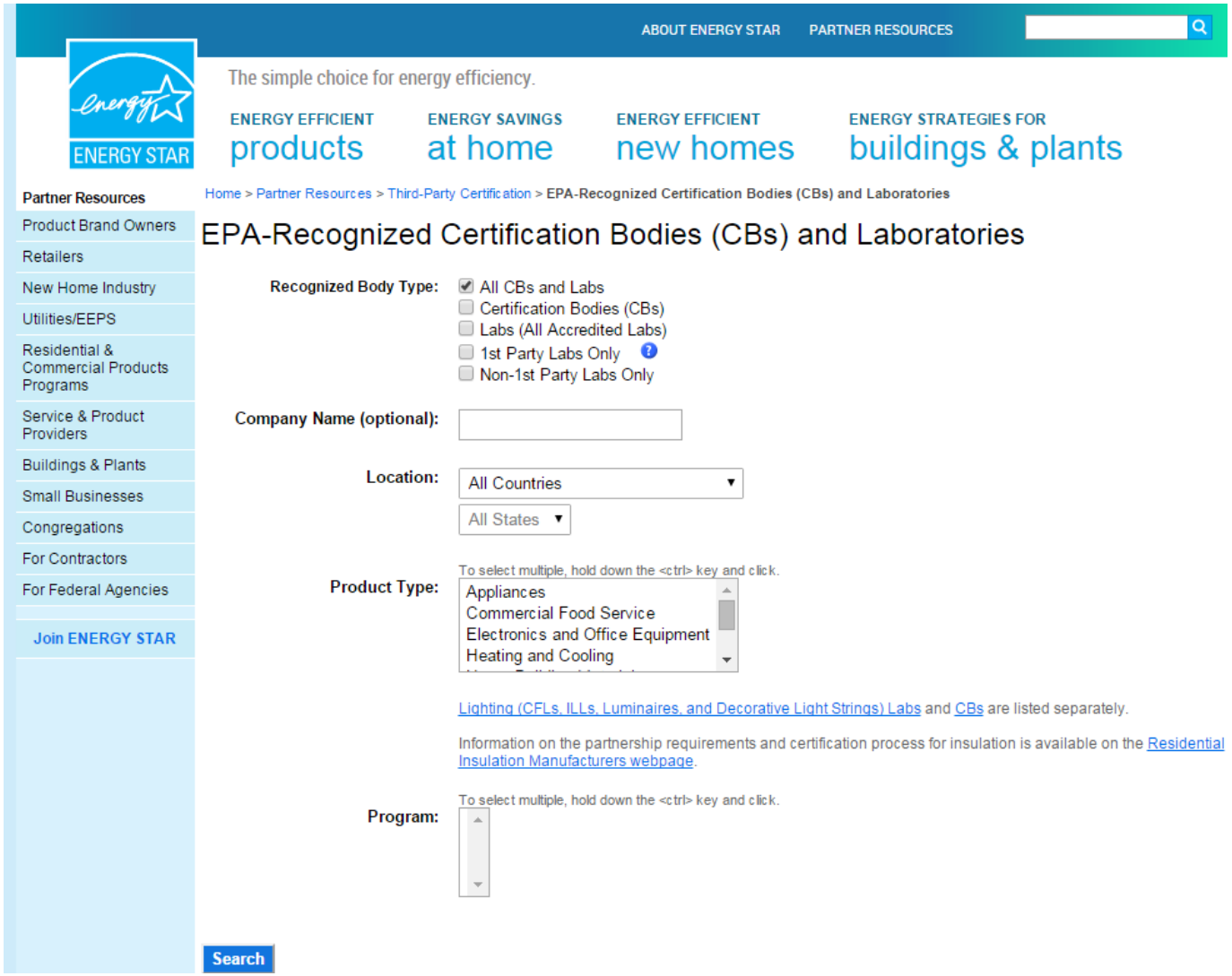
Product Certification Process



Third Party Certification



ENERGY STAR Recognized Bodies for Certification

Type	Total
Accreditation Bodies	25
Certification Bodies	25
Laboratories (Accredited and W/SMTLs)	615

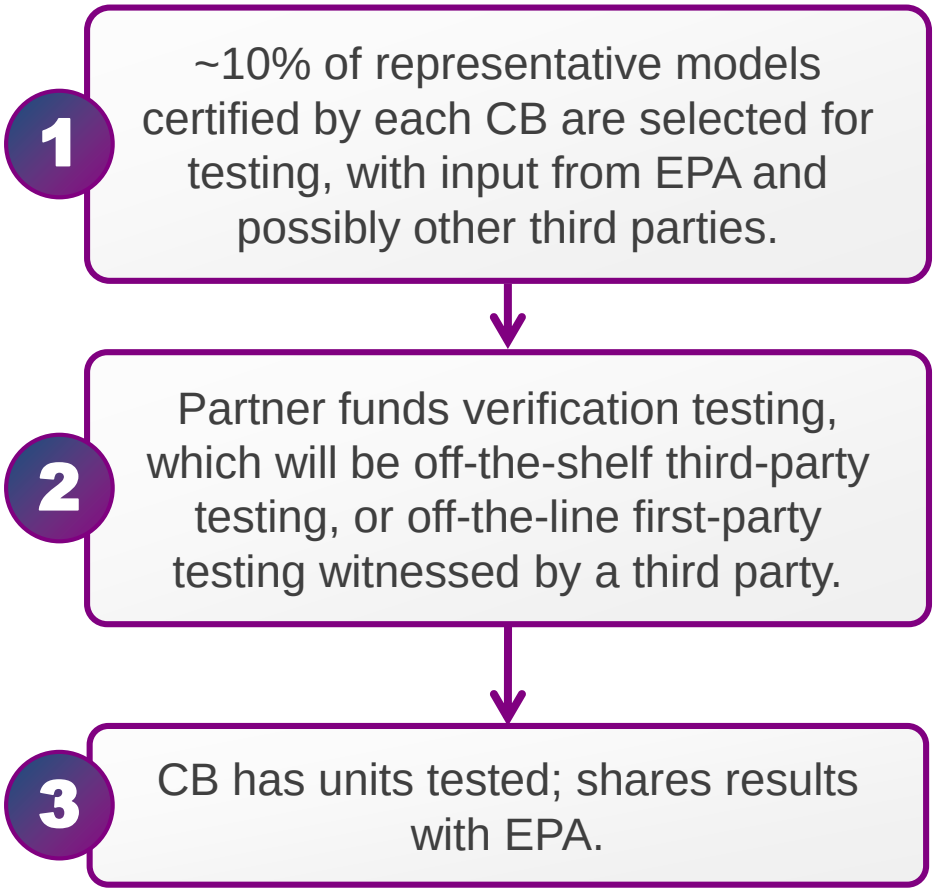
Laboratories by Location				
Country	Accredited Laboratories	SMTLs	WMTLs	Totals
Australia	1	0	0	1
Austria	0	1	0	1
Brazil	2	0	0	2
Canada	12	11	7	30
China	82	39	26	147
Denmark	0	0	1	1
Germany	8	4	4	16
Guatemala	1	0	1	2
Hong Kong	3	0	0	3
India	1	0	0	1
Italy	3	1	2	6
Japan	16	14	6	36
Malaysia	2	2	0	4
Mexico	1	9	1	11
Netherlands	2	1	1	4
New Zealand	0	2	0	2
Singapore	2	0	0	2
South Korea	18	13	4	35
Spain	2	0	0	2
Sweden	1	1	0	2
Taiwan	39	3	14	56
Turkey	0	4	0	4
United Kingdom	3	2	0	5
United States	92	102	48	242
Totals	**291**	**209**	**115**	**615**

Looking ahead:
Once specification is finalized - 3rd Party Certification

- The U.S. Environmental Protection Agency (EPA) requires all ENERGY STAR products to be third-party certified.
  - Products are tested in an EPA-recognized laboratory and reviewed by an EPA-recognized certification body before they can carry the label.
- Representative models and product families will be established for EVSE
  - Test results from one model can be used to represent other models that have the same core components.
  - Reduces time and testing burden for certification.

Verification Testing

Ensure models meet ENERGY STAR requirements post-certification



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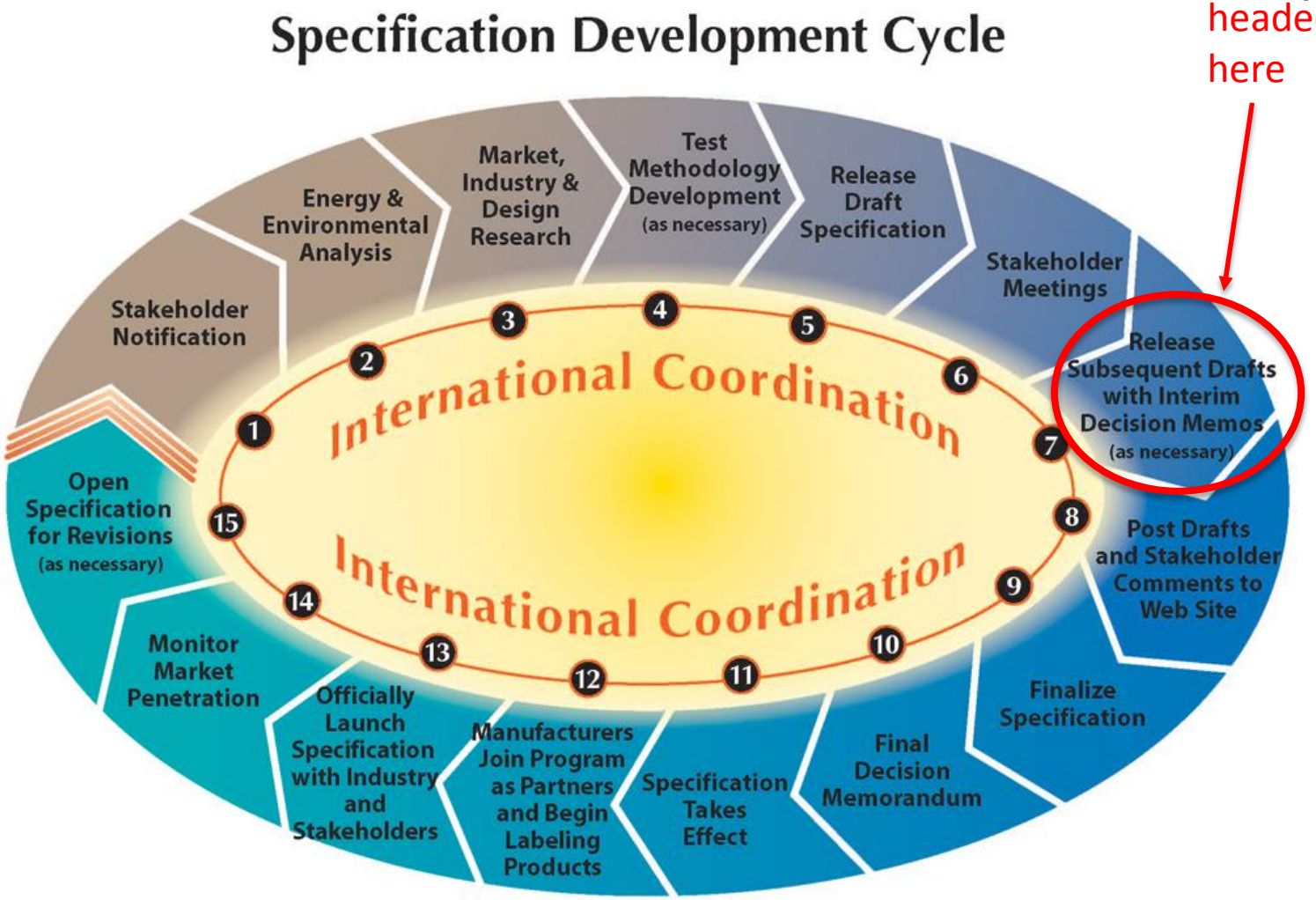
Next Steps: After Data Assembly and Stakeholder feedback

We are headed here



Next Steps

Event	Date
Scoping Report Published	*September 2013*
EVSE Specification Development Launch and Draft 1 Test Method Published	*June 19, 2015*
Draft 1 Test Method Webinar	*July 9, 2015*
Draft 2 Test Method Published	*October 6, 2015*
Draft 2 Test Method Webinar	*October 21, 2015*
Draft 1 Specification and Draft 3 Test Method	*March 1, 2016*
Comments Due	**March 30, 2016**
Draft 2 Specification and Final Draft Test Method	**May 2016**
Final Specification Effective/Marketing Efforts Begin	**Target Date: Late Summer 2016**

Comments

- Again, comments and data are due on **March 30, 2016.**
- Please send all comments to:

EVSE@energystar.gov

- Unless marked as confidential, all comments will be posted to the EVSE product development page at www.energystar.gov/products/spec/electric_vehicle_supply_equipment_pd
- Accessible through www.energystar.gov/NewSpecs and clicking on "Version 1.0 is in development" under "Electric Vehicle Supply Equipment"

Open Comment

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Thank you!

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

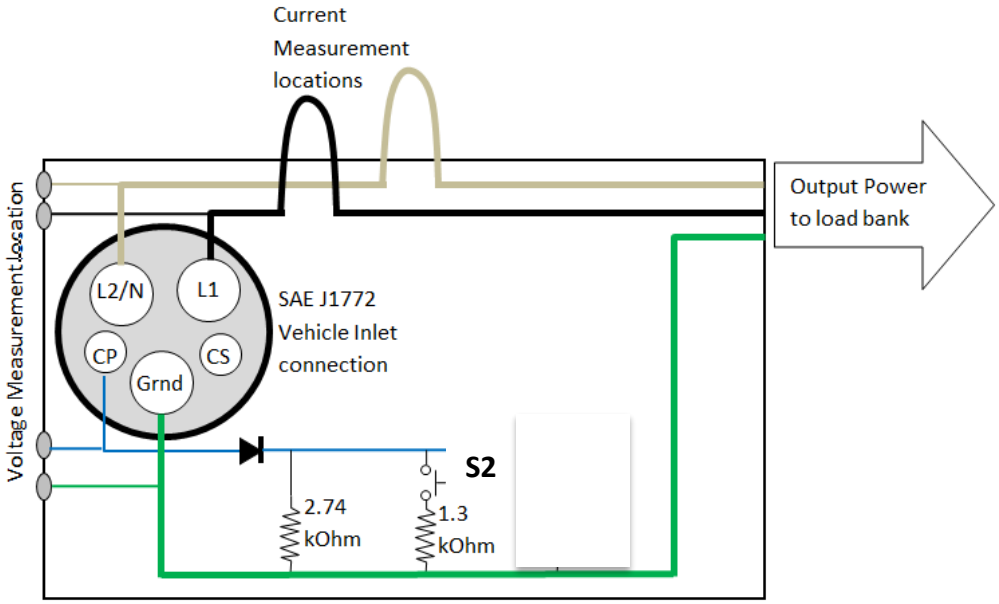
EVSE@energystar.gov.

Verena Radulovic
Product Manager, ENERGY STAR
(202) 343-9845
Radulovic.Verena@epa.gov

www.energystar.gov/productdevelopment

Updated Test Setup – Output Measurements

- EPA has updated all relevant figures to reflect this change.



EPA has updated the Schematic of the Vehicle Emulator Module (VEM)

In reference to Slide 16