ENERGY STAR® Product Specification for Electric Vehicle Supply Equipment

Eligibility Criteria
Draft 1 Version 1.0

Following is the Version 1.0 ENERGY STAR product specification for Electric Vehicle Supply Equipment. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

Note: The below section lists the definitions that EPA is considering using throughout the EVSE Program Requirements. This section has been moved to the specification from the test method. Changes to the definitions below are indicated by noteboxes explaining the revision from the previous draft.

A) Electric Vehicle Supply Equipment (EVSE): The conductors, including the ungrounded, grounded, and equipment grounding conductors, the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatuses installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle. Charging cords with NEMA 5-15P and NEMA 5-20P attachment plugs are considered EVSEs. Excludes conductors, connectors, and fittings that are part of the vehicle.[1]

1) Level 1: A galvanically-connected EVSE with a single-phase input voltage nominally 120 volts AC and maximum output current less than or equal to 16 amperes AC.[2]

2) Level 2: A galvanically-connected EVSE with a single-phase input voltage range from 208 to 240 volts AC and maximum output current less than or equal to 80 amperes AC.[2]

3) Fast DC: A galvanically-connected EVSE that includes an off-board charger and provides DC current greater than or equal to 80 amperes DC.

4) Wireless / Inductive: A non-galvanically-connected EVSE.

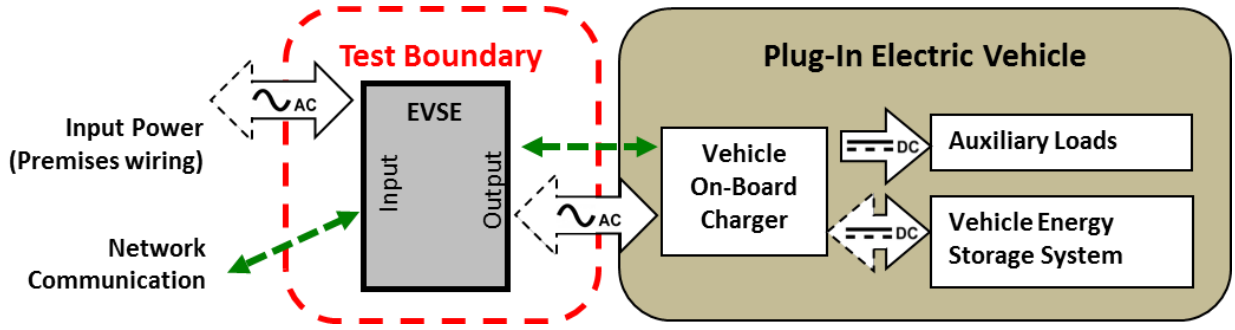

Figure 1: Schematic of Overall Plug-In Vehicle Charging System detailing EVSE Test Boundary

B) EVSE Functions:

1) Primary Function: Function providing the intended purpose. For EVSE, Primary Functions are:

[1] SAE J2894-1 Section 3.10.
[2] This definition is intended to be consistent with the requirements in SAE J1772, with some additional clarifications.

a) Providing current to a connected load.

2) Secondary Function: Function that enables, supplements or enhances a primary function. For EVSE, Secondary Functions are:

a) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a display or lamp as a function of ambient light.

b) Full Network Connectivity: The ability of the EVSE to maintain network presence while in Partial On mode. Presence of the EVSE's network services, its applications, and possibly its display is maintained even if some components of the EVSE are powered down. The EVSE can elect to change power states based on receipt of network data from remote network devices, but should otherwise stay in a low power mode absent a demand for services from a remote network device.

Note: Full Network Connectivity is not limited to a specific set of protocols. Also referred to as "network proxy" functionality and described in the Ecma-393 standard.

c) Occupancy Sensing: detection of human or object presence in front of or in the area surrounding an EVSE.

d) Communicating with the vehicle;

e) Illumination of display, indicator lights, or ambient lighting;

f) Public access control (RFID card, authorization, etc.);

g) Control Pilot Signal;

h) Wake-up function.

Note: EPA has removed safety functions from the functions list.

3) Tertiary Function: Function other than a primary or a secondary function.

Example: An EMC filter, status indication, and area lighting if present, provides their function in Off Mode, Partial On Mode, and On Mode.

C) EVSE Modes:

Note: The transition period to a different mode; whether automatically initiated, or via user action; does not constitute a mode.

1) Disconnected: Condition of the equipment during which all connections to power sources supplying the equipment are removed or galvanically isolated and no functions depending on those power sources are provided. The term power source includes power sources external and internal to the equipment.

2) Off Mode: Condition during which the equipment is connected to external power and is only providing tertiary function(s). Off Mode is intended to be the lowest-power mode of the EVSE that can only be entered or exited through a manual switch. Not all devices will have an Off Mode.

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]

[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.

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]

Note: Due to stakeholder feedback recommending the use of SAE 1772 definitions, EPA augmented the above definitions to make clear the harmonization between the SAE 1772 mode definitions and the EPA EVSE-specific mode definitions. EPA is maintaining the term Partial On Mode to be consistent with the IEC Standard 62542 "Environmental standardization for electrical and electronic products and systems - Glossary of terms", which defines modes in terms of functions available during these modes (primary, secondary, tertiary). In this way, diverse product categories have modes with the same names (On, Off, Partial On) so that they can be easily compared. The mode names describe the same general behavior, with product-specific details captured by the product functions. For example, a computer and monitor can both be in On Mode, making it easy to understand that they are providing their primary function and that their power draw can be added together or compared, while abstracting out the details of what those product-specific primary functions are.

5) Power Management: Automatic control mechanism that achieves the smallest power consistent with a pre-determined level of functionality.

D) Other:

1) Apparent power (S): The product of RMS voltage and RMS current, which is equal to magnitude of the complex power, and measured in volt-amperes (VA).

2) Average power (P) (also real power): The power in a circuit which is transformed from electric to non-electric energy and is measured in watts (W). For a two-terminal device with instantaneous current and voltage waveforms i(t) and v(t) which are periodic with period T, the real or average power P is[4]:

$$P = \frac{1}{T}\int_0^T v(t)i(t)dt$$

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).

4) Power Factor (PF): The ratio of the average power (P) consumed in watts to the apparent power (S), drawn in volt-amperes.

$$PF = \frac{P}{S}$$

[4] Average power is intended to align with the definition of real power in SAE J2894

Note: Stakeholders provided feedback that understanding the power factor of an EVSE could provide valuable insight regarding any potential power losses. Stakeholders also indicated that reporting the power factor would not be overly burdensome because power meters typically already measure power factor during power measurement. Therefore, EPA is re-introducing the definition of power factor and proposes requiring the manufacturers to report the power factor when certifying their EVSE to ENERGY STAR.

5) Unit Under Test (UUT): The specific sample of a representative model undergoing measurement which includes the base product and any accessories packaged with it.

6) Illuminance: means the luminous flux per unit area of light illuminating a given surface, expressed in units of lux.

E) 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.

Note: 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. With this draft, EPA is proposing requirements for Idle and Partial On modes, where output cable type and length do not appear to affect a product's energy performance. Should EPA propose On Mode requirements in a subsequent draft or in future revisions to this specification, EPA will account for the length and gauge of the cable in product testing and qualification.

F) 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.

[5] Federal Energy Regulatory Commission, http://www.ferc.gov/industries/electric/indus-act/demand-response/dem-res-adv-metering.asp

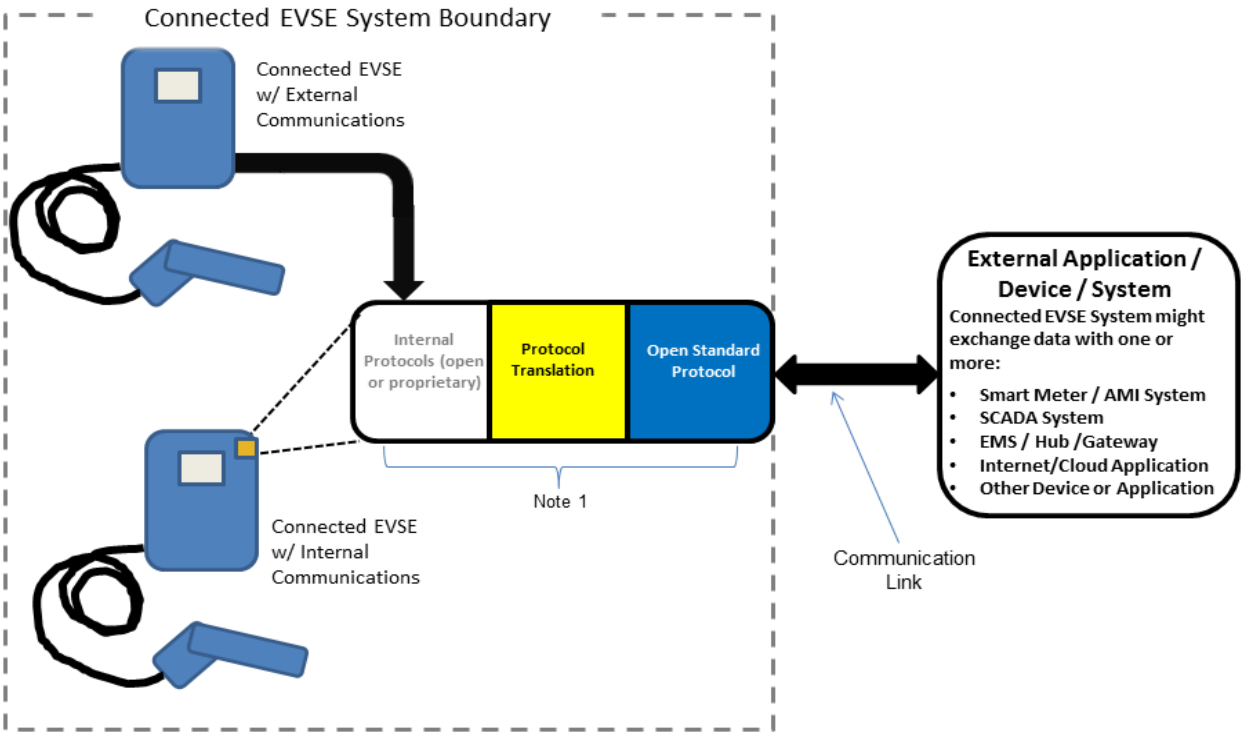

Figure 2: Connected EVSE System

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.

Note: In the Draft 2 Test Method, EPA discussed its interest in addressing Connected Functionality in EVSE to ensure benefits to both consumers and to the grid. As such, EPA has added definitions that fall under the umbrella term "connected functionality" to underpin criteria proposed in Section 3.5.

G) 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).

[6] http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

[7] http://www.nist.gov/smartgrid/upload/NIST_Framework_Release_2-0_corr.pdf

Note: EPA's proposed definition for open standards harmonizes with definitions in other ENERGY STAR specifications that include connected functionality. Several stakeholders suggested that the 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 for an open standard, its use with another open protocol or cloud service that meets the definition of open standard will fulfill the criteria as proposed in this Draft 1 specification. This allows manufacturers the flexibility to determine which open communication standard they will use in combination with OCPP or another protocol of their choice for communication with the EVSE.

H) **Acronyms:**

1) °C: Degree Centigrade
2) A: Ampere
3) ABC: Automatic Brightness Control
4) AC: Alternating Current
5) APD: Automatic Power Down
6) DC: Direct Current
7) DOE: U.S. Department of Energy
8) DR: Demand Response
9) EPA: Environmental Protection Agency
10) EPS: External Power Supply
11) EVSE: Electric Vehicle Supply Equipment
12) Hz: Hertz
13) IEC: International Electrotechnical Commission
14) IEEE: Institute of Electrical and Electronics Engineers
15) IPMA: Input Power Measurement Apparatus
16) lx: lux
17) NEMA: National Electrical Manufacturers Association
18) SAE: Society of Automotive Engineers
19) UPS: Uninterruptible Power Supply
20) USB: Universal Serial Bus
21) UUT: Unit Under Test
22) V: Volt
23) VEM: Vehicle Emulator Module
24) W: Watts

2 SCOPE

Note: The below section lists the types of products that EPA proposes including within the scope of the EVSE program. This section has been moved to the specification from the test method.

2.1 Included Products

2.1.1 Level 1 EVSE.

2.1.2 Level 2 EVSE.

2.1.3 Dual input Level 1 & Level 2 EVSE.

2.2 Excluded Products

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/specifications.

2.2.2 DC output EVSE.

2.2.3 Wireless/Inductive EVSE.

2.2.4 Power electronic components inside the vehicle.

3 CERTIFICATION CRITERIA

3.1 Significant Digits and Rounding

3.1.1 All calculations shall be carried out with actual measured (unrounded) values. Only the final result of a calculation shall be rounded.

3.1.2 Unless otherwise specified within this specification, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.

3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 Auto-Power Down (APD) Requirements

3.2.1 APD functionality shall be available on all products.

3.2.2 APD functionality shall be enabled by default, with APD timing less than or equal to 2 hours, subject to the following exceptions:

i. Products may offer users the option (e.g., via system menu or physical switch) to modify APD timing in 10 minute intervals, or to disable APD entirely.

ii. Products may initiate APD immediately upon receipt of authoritative control instruction via an active Networking / Control Protocol.

3.2.3 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.

Note: EPA is introducing APD requirements to encourage power management in EVSE, building on ENERGY STAR's experience with incentivizing low power states in consumer electronics and information technology products. EPA considers that APD has the potential to effectively reduce a product's energy consumption and has thus proposed one option for products to employ APD in less than or equal to 30 minutes in lieu of meeting the Idle State requirements. Under APD, EPA's intent is for the EVSE to resume functionality as soon as an end user engages the EVSE. EPA has proposed in Section 3.2.1 that APD functionality be available on all products. Given that many EVSE are deployed in commercial settings, EPA seeks to understand under which circumstances APD would not be feasible.

3.3 Partial On Mode Requirements

3.3.1 Measured Partial On Mode power ($P_{PARTIAL\_ON}$) shall be less than or equal to the Maximum Partial On Mode Power Requirement ($P_{PARTIAL\_ON\_MAX}$), as calculated per Equation 1.

i. If a product's Idle State meets the Partial On Mode power requirements, a distinct and separate Partial On Mode is not required to be implemented.

ii. For products with ABC enabled by default, the average Partial On Mode power in high and low illuminance conditions shall be used in place of $P_{PARTIAL\_ON}$, above.

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.*

Table 1: Partial On Mode Power Allowances

Product Function	Partial On Mode Power Allowance (watts)
Base Allowance for All Products ($P_{PARTIAL\_ON\_BASE}$)	2.2
In-use Wi-Fi or Gigabit Ethernet Protocols with Wake Capability *(P_{WAKE_i})*	1.0
In-use Cellular with Wake Capability *(P_{WAKE_i})*	1.0

Product Function	Partial On Mode Power Allowance (watts)
Other In-use LAN (Local Area Network) Protocol with Wake Capability *(P_{WAKE_i})*	1.0
In-use Occupancy Sensor (P_{WAKE_i})	0.3

Note: With this Draft 1, EPA proposes criteria to recognize efficiency in both Partial On and Idle Modes.

To determine power consumption levels that reflect the top performing products on the market today, EPA assembled Partial On data for 20 models, three of which contain network connectivity, from 10 manufacturers. Despite the call for data with the release of the Draft 2 Test Method, EPA received limited or no data from manufacturer stakeholders. The dataset mostly reflects test data submitted by Idaho National Labs and input from Argonne National Labs.

From its data analysis, EPA proposes a 2.2 Watt limit for Partial On as a base allowance. EPA's proposed allowances for networking/control protocols are based on EPA's experience and knowledge of consumer electronic and information technology products. Similar allowances can be found in ENERGY STAR product specifications for Audio Video, Displays, and Telephony, where EPA has tracked the downward trend of power consumption for Wi-Fi and Ethernet functions. For example, the recently released Version 7.0 Displays specification provides a Wi-Fi allowance equivalent to 0.3 W for computer monitors. Given EPA's experience with network connected products and products with additional functions such as occupancy sensors, EPA proposes adder allowances consistent with the approach taken in these other specifications.

Under the proposed base criteria and allowances, 5 products from three manufacturers would qualify for the ENERGY STAR. With this Version 1.0 specification, EPA seeks to recognize the top quartile of models from more than one manufacturer to ensure a good selection of models for consumers.

EPA invites stakeholders to submit new data and provide feedback on the proposed Partial On Mode requirements and allowances for network connected products. In particular, EPA seeks feedback on the extent to which EVSE network connected products exhibit similarities or differences when compared to other electronic products.

3.4 Idle Mode Requirements

3.4.1 Measured Idle State power (P_{IDLE}), shall be less than or equal to the Maximum Idle State Power requirement (P_{IDLE_MAX}), as calculated per Equation 2, subject to the following requirements:

i. Products with a default APD timing less than or equal to 30 minutes and that cannot be disabled or increased to greater than 30 minutes shall be excluded from the requirement.

ii. For products with ABC enabled by default, the average Idle State power in high and low illuminance conditions shall be used in place of P_{IDLE}, above.

Equation 2: Calculation of Maximum Idle State Power Requirement

$$P_{IDLE\_MAX} = (0.25 \times Max\ Current) + P_{IDLE\_BASE} + \sum_{i=1}^{n} P_{IDLE\_i}$$

Where:

- *P_{IDLE_MAX} is the Maximum Idle State Power Requirement, in watts;*
- *Max Current is the Nameplate Maximum Current; and*

- P_{IDLE_BASE} *is the base Idle Mode power allowance for all products, as specified in Table 2;*
- P_{IDLE_i} *is the Idle State power allowance for each applicable product function listed in Table 2, for a total of n such allowances.*

Table 2: Idle State Power Allowances

Product Function	Idle State Power Allowance (watts, rounded to the nearest 0.1 W for reporting)
Base (P_{IDLE_BASE})	2.2
In-use Wi-Fi or Gigabit Ethernet Protocols with Wake Capability (P_{IDLE_i})	1.0
In-use Cellular with Wake Capability (P_{IDLE_i})	1.0
In-use LAN (Local Area Network) Protocol with Wake Capability (P_{IDLE_i})	1.0
In-use Display (P_{IDLE_i})	$(4.0 \times 10^{-5} \times \ell \times A) + 119 \times \tanh(0.0008 \times [A - 200.0] + 0.11) + 6.0$ *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.

Note: Based on its analysis, EPA proposes identical base criteria and network connectivity allowances for Idle Mode as is proposed for Partial On Mode, since EPA does not expect power draw for these features to change between Partial On Mode and Idle State.

EPA proposes a new allowance term in the calculation for the maximum Idle State power requirement that reflects the variable of maximum nameplate current multiplied by a factor of 0.25 because the relay power consumption increases with the nameplate current. Plotting the relay power versus nameplate current with the data showed a linear increase between the two values of a magnitude of approximately 0.25. EPA seeks stakeholder feedback on whether a relationship between nameplate current and relay power is most accurately captured by a linear fit versus an exponential allowance.

Since EVSE with an embedded display are likely intended for outdoor, commercial use, EPA's proposed allowance for a display harmonizes with EPA's approach in the Version 7.0 ENERGY STAR Displays specification On Mode requirements for Signage Displays, which are also intended for public, outdoor use and typically maintain higher luminance than indoor displays.

EPA welcomes stakeholders to submit additional data and feedback on the proposed Idle Mode requirements.

Operation Mode: With this Draft 1, EPA is not proposing requirements for Operation Mode due to the relatively longer paybacks for efficiency improvements in this mode, which result primarily from using thicker output cables. Although EPA found that conductor size can achieve savings of approximately 10 kWh/yr for a 30 A EVSE, these savings would not be cost effective for the average user. In particular, the low utilization of EVSE and high cost of EVSE-rated cable likely extends the payback beyond the expected lifetime of the EVSE.

EPA used the following assumptions when calculating the payback and seeks stakeholder input on the validity of these assumptions:

- Utilization: 8% of time in Operation Mode for residential, 6% for private nonresidential, and 3% for publicly accessible (EV Project Electric Vehicle Charging Infrastructure Summary Report, July 2014)
- Wholesale EVSE cable cost: $2/foot for 10 AWG and $3/foot for 8 AWG (EVSE manufacturer source, 2016)
- Combined manufacturer and retailer markup: 3x.

In addition, EPA invites stakeholders to share additional Operation Mode data for EVSE to further inform any energy savings potential. For stakeholders performing Operation Mode testing, EPA notes the new differential measurements in the Draft 3 test method. These revised measurement instructions should address measurement uncertainty issues and ensure that any data shared with EPA can be reliably used to calculate the Operation Mode savings potential.

3.5 Connected Functionality

3.5.1 Only EVSE that are capable of demand response functionality shall meet the following criteria:

i. Grid Communications: The product shall include a communication link that uses open standards, as defined in this specification, for all communication layers to enable DR functionality.

ii. Open Access: To enable interconnection with the product over the communication link, an interface specification, application programming interface (API) or similar documentation shall be made readily available that, at a minimum, enables DR functionality.

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.

iii. Consumer Override: Consumers shall be able to override their product's response to any DR signal.

iv. Capabilities Summary: A ≤250 word summary description of the EVSE system's and/or associated Service Provider's DR capabilities/services shall be submitted. In this summary, EPA recommends noting the following, as applicable:

i. Capabilities model, e.g., DR aggregator vs. uniquely addressable EVSE.

ii. Supported DR modes, e.g., load dispatch, ancillary services, price notification, price response.

iii. Response configurability/flexibility by the consumer and/or Load Management Entity.

iv. Feedback to Load Management Entity, e.g., verification/M&V, override notification.

v. Measures to limit consumer comfort impacts, if any.

Note: In the Draft 2 Test Method, EPA introduced a placeholder for verifying connected functionality in EVSE that would enable benefits to both consumers and to the grid. Based on written feedback and follow-up discussions with several stakeholders, EPA proposes criteria applicable to products with connected functionality that address open standards, open access and consumer override functionality in order to strike a balance between incentivizing beneficial functionality and recognizing that such functionality is still evolving. EPA considers that the proposed criteria reflects the current state of development of EVSE demand response (DR) capabilities and associated utility programs without hindering their further development. To help consumers understand how they can utilize and benefit from connected functionality among EVSE, EPA has also included a requirement for each partner to submit a DR capabilities summary that will be available for each qualified EVSE system on the ENERGY STAR website

In the Draft 2 Test Method, EPA introduced the umbrella term 'grid response' which also included DR and possibly ancillary services. A recent edit to the Federal Energy Regulatory Commission (FERC) definition of DR also encompasses price response. EPA has therefore reverted to using the term 'demand response' in lieu of 'grid response' to harmonize with the FERC definition.

EPA also clarifies that the connected functionality criteria only apply to EVSE with such capability; EVSE without connected functionality are still eligible for ENERGY STAR.

Note: Products intended for sale in the US market are subject to minimum toxicity requirements. Please see ENERGY STAR® Program Requirements for Electric Vehicle Supply Equipment: Partner Commitments for details.

Note: To ensure that product designers are aware of Partner Commitments specific to toxicity and recyclability, EPA has inserted the above note.

4 TESTING

4.1 Test Methods

4.1.1 Test methods identified in Table 3 shall be used to determine certification for ENERGY STAR.

Table 3: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Electric Vehicle Supply Equipment	ENERGY STAR Electric Vehicle Supply Equipment Test Method (Rev. TBD)
Electric Vehicle Supply Equipment with In-use Display	ENERGY STAR Test Method for Determining Display Energy (Rev. Sep-2015)

4.2 Number of Units Required for Testing

4.2.1 Representative Models shall be selected for testing per the following requirements:

i. For certification of an individual product model, the Representative Model shall be equivalent to that which is intended to be marketed and labeled as ENERGY STAR.

ii. For certification of a Product Family, the highest energy using model within that Product Family can be tested and serve as the Representative Model. Any subsequent testing failures (e.g., as part of verification testing) of any model in the family will have implications for all models in the family.

4.2.2 A single unit of each Representative Model shall be selected for testing.

4.3 International Market Qualification

4.3.1 Products shall be tested for qualification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

5 EFFECTIVE DATE

5.1.1 Effective Date: The Version 1.0 ENERGY STAR Electric Vehicle Supply Equipment specification shall take effect on **TBD**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.

6 CONSIDERATIONS FOR FUTURE REVISIONS

6.1.1 EPA will continue to monitor the market for DC fast, DC slow and wireless EVSE and evaluate the opportunity to differentiate such products based on energy performance. Should the potential for significant energy savings exist among these products, EPA will consider expanding the scope of this EVSE specification to include them in a future revision.