

Guidance for Requirements to be Included in State Grants for Publicly Funded Electric Vehicle Supply Equipment (EVSE)

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**Prepared by the Vermont Agency of Natural Resources
in collaboration with the Vermont Agencies of Transportation and Commerce and
Community Development, Public Service Department, Buildings and General
Services, Vermont Energy Investment Corporation and Northeast States for
Coordinated Air Use Management**

Guidance for Standard Requirements Included in State Grants for Publicly Funded Electric Vehicle Supply Equipment (EVSE)

Introduction and Purpose

In October 2013, Vermont joined seven other states (California, Connecticut, Maryland, Massachusetts, New York, Oregon, and Rhode Island) to coordinate actions to ensure the successful implementation of our state zero emission vehicle (ZEV) programs as detailed in the Zero Emission Vehicle (ZEV) Memorandum of Understanding (MOU).¹ As a result, the eight signatory states released the *Multi-State ZEV Action Plan* to develop infrastructure, coordinated policies, codes and standards and a consumer market ready to put 3.3 million ZEVs on the road by 2025.² The *Multi-State ZEV Action Plan* is designed to guide inter-state coordination and to inform state-specific action. The plan identifies priority actions to promote and accommodate market growth.

In September 2014, the Vermont Climate Cabinet released the *Vermont Zero Emission Vehicle Action Plan (Action Plan)*.³ The Vermont plan identifies state-specific actions and strategies to grow the ZEV market in Vermont in a manner that is consistent with state climate and renewable energy goals, ZEV program requirements, and the commitments in the ZEV MOU.

To aid in implementation of the *Action Plan*, this guide has been developed to promote uniformity across Vermont state agencies when administering grants for publicly funded electric vehicle supply equipment (EVSE). The Climate Cabinet recommends that state agencies consistently apply the standards and requirements in this document when entering into agreements to fund the installation and operation of EVSE.



¹ See State Zero-Emission Vehicle Programs Memorandum of Understanding (signed October 24, 2013) available at: http://anr.vermont.gov/about_us/special-topics/climate-change/initiatives/zev

² See Multi-State ZEV Action Plan (released May 29, 2014) available at: http://anr.vermont.gov/about_us/special-topics/climate-change/initiatives/zev

³ See Vermont Zero Emission Vehicle Action Plan (released September 22, 2014) available at: http://anr.vermont.gov/about_us/special-topics/climate-change/initiatives/zev

Actions that Address EVSE

The *Action Plan* directs the Climate Cabinet to write a guidance document that includes a number of standard requirements that should be included in state grants for publicly funded EVSE.⁴ This guidance document addresses multiple strategies that support the successful implementation of actions identified in the *Action Plan*. These actions include:

Action #6 – Promote ZEV infrastructure planning and investment by public and private entities

Strive to ensure that all appropriate charging/fueling installations receiving public funding be open to the public and accessible to all plug-in electric vehicle (PEV) / fuel cell electric vehicle (FCEV) drivers.



Action #9 – Promote access, compatibility, and interoperability of the plug-in electric vehicle charging network

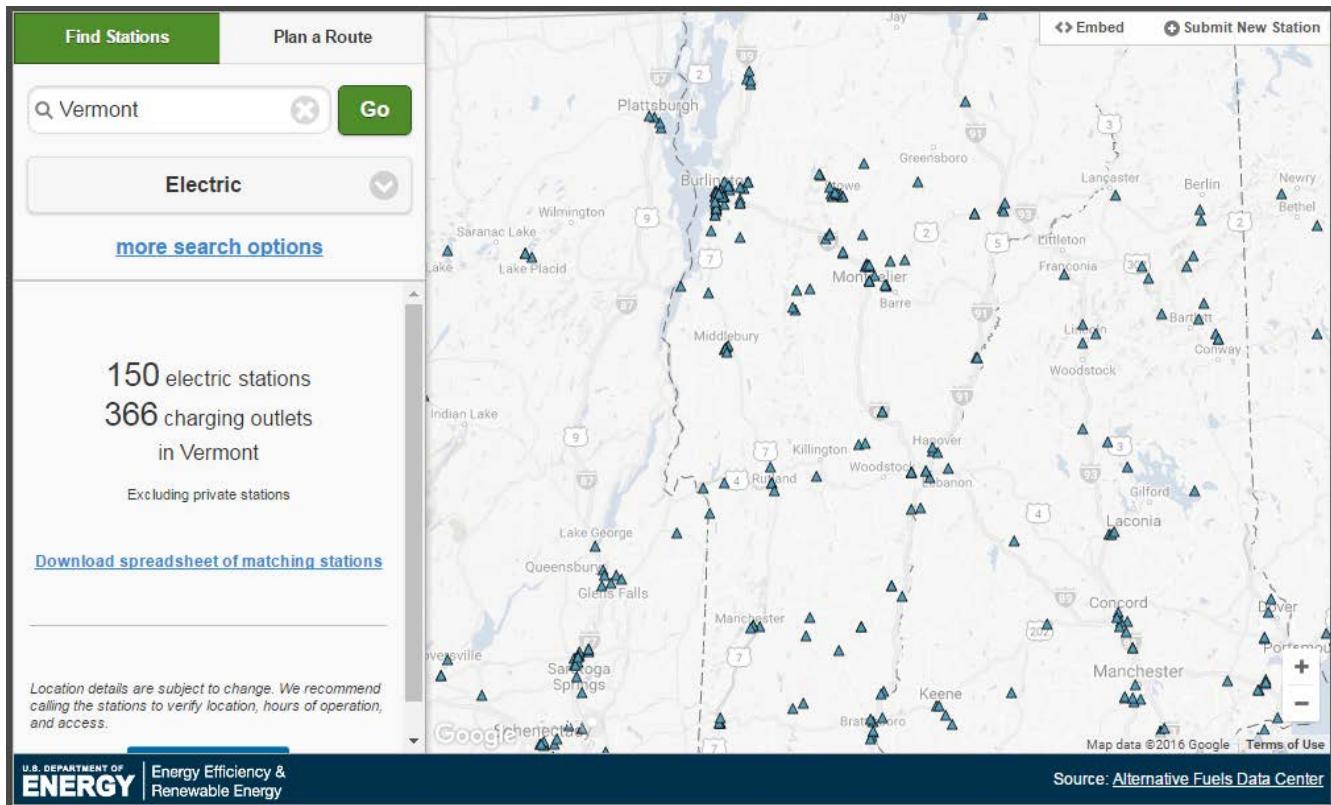
Ensure that all ZEV charging/fueling installations are registered with the National Renewable Energy Lab's Alternative Fuels Data Center database to provide a simple means for PEV drivers to locate available charging stations and determine charging costs.

Require all publicly funded chargers that are accessible to the public and networked to apply the Open Charge Point Protocol communication standard that allows charging stations and central systems from different vendors to communicate.

Encourage dual-compatibility for all new public DC fast charge stations to ensure that all PEVs can utilize any public charging station, whether equipped with CHAdeMO or Society of Automotive (SAE) charging ports.

⁴ See Vermont Zero Emission Vehicle Action Plan (released September 22, 2014), page 14, available at: http://anr.vermont.gov/about_us/special-topics/climate-change/initiatives/zev

Public Electric Vehicle Charging Stations in Vermont



Source: U.S. DOE Alternative Fuels Data Center, December 2, 2016

Definitions

Plug-in Electric Vehicle (PEV): refers to a vehicle which plugs into the electric grid to recharge a battery used to provide motive power. Includes All Electric (also referred to as Battery Electric) vehicles which are powered solely by energy stored in a battery as well as Plug-in Hybrid (PHEV) vehicles which can be powered by battery or gasoline or diesel for extended range.

Electric Vehicle Supply Equipment (EVSE): refers to a PEV charging station; a device used to provide electricity to a PEV for the purpose of charging the vehicle's onboard battery. The EVSE is designed to provide a safe connection between the source of electricity and the vehicle and communicates with the vehicle's control system to ensure electricity flows at the proper voltage and current.

There are three types of EVSE depending on their power output as described in the table below. Any of the three charge methods are eligible for public funding assistance.

Charge Method	Power Supply Voltage	Branch Circuit Breaker Rating	Approximate Charging Power	Power Supply Connector	Vehicle Plug Connector
AC Level 1	120 V AC	20 A	1.9 kW	Portable equipment comes with vehicle and plugs into standard 120 V outlet, or hardwired directly into electrical service	SAE J1772 or Tesla
AC Level 2	208 to 240 V AC	40-80 A	3.3 -7.7 kW for most PEVs	Hardwired or portable (NEMA standard 208/240V outlet)	SAE J1772 or Tesla
DC Fast Charging*	208 to 480 V AC	Up to 200 A	25-50 kW for most PEVs	Hardwired	CHAdeMO, SAE Combo or Tesla Supercharger

Notes:

1. AC – alternating current, DC – direct current, V – volts, A – Amps, and kW – kilowatt.
2. *DC Fast charging is sometimes referred to as Level 3, but is technically referred to as DC Level 2 in the SAE standard.

Additional information on charging devices, including approximate costs and location recommendations is available on the Drive Electric Vermont Electric Vehicle Charging Installation guide:

<http://driveelectricvt.com/charging-stations/installation-guide>

Networked EVSE or Smart EVSE: offers communication with the user, site host, utility grid, and/or the Internet, depending on model and manufacturer. They also offer the option of collecting fees for the charging session and detailed reporting capabilities.

Non-Networked EVSE or Basic EVSE: means EVSE that communicates only with the vehicle as the charging session begins and ends when the vehicle's charging session is completed or the charging session is interrupted by the EVSE or uncoupling. It does not need any connection other than the electrical infrastructure and is usually adequate for fleet charging, employee parking, or where fee collection and usage monitoring is not a priority.

Open Charge Point Protocol: refers to an open standard EVSE communication protocol allowing for interoperability between multiple EVSE vendors and network operators.

Recommended Requirements for EVSE

To achieve uniformity across state government, and conformity with the goals of the *Action Plan*, the Climate Cabinet recommends that state agencies utilize the following standards when entering into grant agreements for the installation and operation of publicly funded EVSE. Please note that additional grant agreement language, including the standard state language, may be necessary depending on the specific EVSE installation or the nature of the grant or program being funded.

1. Accessibility⁵

The EVSE must be available to the public 24 hours per day, seven days per week, except during routine maintenance. The EVSE availability shall remain at the host site for a minimum of three years from the date of first operation. Ownership issues shall not affect the availability of the EVSE during the initial three year period.

The use of the EVSE will be made available to the public at no cost or at a rate that covers the operational, maintenance expense associated with the equipment including any expense incurred associated with equipment and installation. Grant programs that fully or partially fund EVSE purchase and installation should prioritize applications that propose a reasonable profit margin. All fees for use of the EVSE must be fully disclosed prior to charging the consumer.⁶

In most cases, the EVSE must be located at a major traffic generator such as a town hall or downtown area that is central to destinations. In some cases, the EVSE, especially DC Fast Chargers, may be located along major travel corridors to facilitate long distance travel and to increase range confidence. In either case, the EVSE must be easily accessible via a route that can safely and conveniently accommodate electric vehicles of all types, sizes, and weights.

Host site or owner agrees to keep access to the EVSE clear from obstructions and snow accumulation that would otherwise make the unit inaccessible.

In most cases, the EVSE site should be restricted to PEV charging only through the use of signage and wayfinding symbols consistent with the Manual of Uniform Traffic Control Devices (MUTCD)⁷. Additionally, the Federal Highway Administration (FHWA) has issued interim approval for the alternative general service sign identifying electric vehicle charging, version D9-11b (shown to the right)⁸. See the ZEV Program Implementation Task Force publication entitled *Electric Vehicle Charging Signing: Recommended Practices*⁹ for more information.



D9-11b Interim Alternative General Service Sign

⁵ EVSE should be ADA compliant, pursuant to the standard state grant agreement, which requires compliance with all state and federal laws.

⁶ Disclosed fees should include any additional network roaming charges that may apply to nonmembers.

⁷ Available at: <http://mutcd.fhwa.dot.gov/resources/policy/rsevcpfmemo/>

⁸ Available at: http://mutcd.fhwa.dot.gov/resources/interim_approval/ia13/index.htm

⁹ Available at: <http://www.zevstates.us/wp-content/uploads/2015/09/EV-Charging-Signing-Recommended-Practices.pdf>

EVSE should be located so that when in use they do not create a tripping hazard to the user or the public such as cords obstructing paths designed for walking or biking use.

EVSE should be installed so that all battery electric and plug-in electric hybrid vehicles can utilize them. Currently there is no industry standard for where the outlets on vehicles are located. Therefore, EVSE should be placed with access to parking spots where a vehicle could easily park facing forwards or backwards.

2. Network and Communications

The EVSE's geographic location, type of charging available, accessibility information, and other relevant information must be disclosed to the National Renewable Energy Laboratory Alternative Fuels Data Center for listing in their database as a publicly available PEV charging location. This will also automatically populate the Drive Electric Vermont map of public charging stations.

If a Networked EVSE is used, it should have a data acquisition system capable of recording the utilization of each individual charging unit and remotely displaying values such as utilization, power, energy, voltage and current in real-time.

3. Equipment and Maintenance

The EVSE installed may be Level 1, 2 or DC Fast Charging depending on the location.

A minimum one year warranty on the EVSE unit and cable management system is required, three years is recommended.

The EVSE system shall operate with a maximum of 20% downtime per month, unless circumstances exist that are outside the control of the host site operator.

The EVSE system shall be rated for outdoor operation by a nationally recognized testing laboratory.

The EVSE host site with a DC fast charger should have 3-phase power availability, and the transformer must have adequate capacity to serve a DC fast charger.

EVSE shall be installed in accordance with all current National Electrical Codes and the Vermont Electrical Safety Rules¹⁰.

¹⁰Available at: <http://firesafety.vermont.gov/licensing/electrical>

4. Interoperability

Equipment Dual Compatibility: DC fast charging EVSE must be compatible with all plug-in electric vehicles whether they are equipped with either CHAdeMO or SAE Combo charging ports.

Network Open Standard Protocol: The Networked EVSE shall use an open standard protocol, such as the Open Charge Point Protocol, ensuring that EVSE hardware is not “locked” to a single service provider in perpetuity. Proprietary protocols may be added to the system as long as the site host or owner is able to revert to the open standard protocol if necessary.

Charging Open Access: The EVSE network shall not require payment of a subscription fee or require membership in order to use the EVSE. The EVSE shall accept all major credit cards and debit cards with no additional obligations at payment (promotional sign-up, unsubscribed communications, etc.). The EVSE should accept all other reasonable forms of payment, such as radio-frequency identification card, or mobile point of sale technology. Industry-standard security protocols for electronic transaction processing shall be used.

Conclusion

Successful implementation of the strategies and actions identified in the *Action Plan* will require coordination across state government. Ensuring that a consistent set of equipment, network, and accessibility requirements exist for each grant to fund EVSE will make great strides toward achieving these commitments.

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