

**Commuter Connections - Employer Outreach TERM  
Electric Vehicle Charging Stations – Outline for Evaluation Method  
April 20, 2015**

**Background and Overview**

Some employers in the Washington metropolitan region are installing electric vehicle (EV) charging stations at their worksites to encourage and facilitate employees' use of electric vehicle and hybrid electric vehicles for commuting. Employees' use of such installations might produce measurable commute vehicle emission reduction. The Employer Outreach TERM does not currently capture impacts of EV charging stations, but could do so if an acceptable method could be implemented to estimate the TERM-related impacts.

Note that this strategy does not eliminate or reduce use of a vehicle, thus the impacts would be entirely emission reduction; there would be no congestion / traffic mitigation impact from this strategy. Additionally, although electric vehicles do not directly produce emissions, emissions are produced by the production of the electricity that powers the EV. The vehicle emissions reduced by use of the EVs would need to be offset by emissions produced through the electric power generation and the level of emissions from power generation would depend on the type of fuel used in the power plants.

The evaluation outlined in this document would calculate impacts through the following steps:

- 1 Document (or estimate) the number of commuters at a participating worksite who use EVs for commuting
- 2 Determine the average number of days each employee uses the EV for commuting and the mode(s) the employees would be using if the EV charging stations were not available
- 3 Calculate the EV vehicle trips and VMT and the trips and VMT in the absence of charging stations
- 4 Estimate the average one-way travel distance for employees who use EVs
- 5 Calculate the emissions reduced by use of EVs
- 6 Calculate the emissions generated by producing the electric power used by the EVs
- 7 TERM emission reduction = EV emission reduction – Electric power generation emission

Following is a brief summary of evaluation issues specific to EV charging stations that would need to be addressed and data needs and possible sources.

**Evaluation Issues**

- Number and type of charging stations – The impact would be related to the number and type of EV charging stations installed and an average per-vehicle charging time. Several types of stations are available, with varying levels of power output and typical charging times from 8 hours for the lowest output “Level 1” stations to less than 30 minutes for commercial-grade “DC Fast Charging” stations and the mix of charger types would set a baseline for charging capacity.
- “Effective” capacity of charging stations – It seems likely that vehicles would be plugged in with varying levels of existing charge, so the number of vehicles that could be accommodated by a charging station over the course of a day could be higher than the minimum defined by the charger type. Additionally, if not all the vehicles at the site would need to be charged each day, the number of EVs the charging stations could effectively support could be more than the number that could be charged in one day.

- Actual use of charging stations – The charging capacity defined above sets the maximum potential for vehicles charged. The impact should be calculated, however, on the actual number and types of vehicles that are charged and the commute characteristics of employees using the vehicles (e.g., number of days per week driving the EV, travel distance, etc). A precise count of vehicle use would require data from the employer or firm that manages/maintains the stations and registration or other documentation of users. If these data are not available, the evaluation could use an interim estimate from another source.
- Emissions from electric power generation – The emissions produced by an electric power plant vary with the type of fuel used – e.g., coal, nuclear, gas, wind/hydro, etc. The evaluation would need to define a regional average power plan and the emissions generated in producing the average energy (Kilowatt-hr) needed to operate an EV a given number of miles.

Data Needs and Sources

The following data are needed to assess EV charging station impacts. Ideally, data on the use of worksite EVs and the travel patterns of EV users would be compiled from actual data at participating worksites. It is likely however, that some data would not be readily available, either because employers were not collecting the data or because they chose not to share the data with outside organizations. The sources noted would be the preferred sources, however, if any of the needed items are not available, a substitute national or regional source would be identified.

Data Need

- Number/type of charging stations by worksite
- Number of employees driving EV
- Average duration of charging
- EV users’ travel patterns (frequency, miles)
- Average regional vehicle emissions factors
- Emissions from power generation

Data Source

- Employer / ACT! Database
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- Employer / station management
- EV user survey
- MWCOG staff
- DOE / EPA