Electric Auto Association

SUBJECT: Comments on DC Fast Charger Installations for West Coast Electric Highway
FROM: EAA Electric Vehicle Corridor Charging Group
DATE: March 16, 2015

Introduction and Purpose

What follows is the our input for the completion of the West Coast Electric Highway (WCEH) in California with DC Fast Charger (DCFC) along corridors. We are addressing the following questions:

1. What is the order of the roll out by corridor and why?
2. Is a spacing of 40 miles between DCFCs acceptable?
3. Is starting with one CHAdeMO / SAE unit with conduit for additional chargers acceptable?
4. What are the minimum requirements for a site?

We believe a statewide Electric Vehicle (EV) infrastructure plan should be based on the following principles, and we used these criteria in making our corridor recommendations:

- Connect existing EV metro areas with corridors and complete the WCEH.
- Meet our state's obligation to the WCEH.
- Maximize population areas served.
- Provide leadership by investing in important corridors with locations that may not be attractive to private industry for economic or logistical reasons.
- Maximize benefits to Environmental Justice Communities.
- Maximize exposure to communities with low EV adoption with access to charging infrastructure that currently only exists in large metro areas.

A patchwork network of DCFC stations already exists in parts of California. Existing stations should be included in the WCEH if they meet the standards discussed in this proposal. To foster this, the state should consider providing grants to existing station responsible parties along the proposed WCEH route if they agree to the proposed California WCEH standards.

In applying these criteria, we have considered the needs of current EVs with driving ranges of 80 miles in addition to the potential 150-200 mile range cars that are expected in calendar year 2017 and beyond. Furthermore, older, lower range cars with long lifespans will also be available for modest sums in this period; opening up EV travel to a wider range of economic classes.

Corridor Roll Out Order Recommendations:

1. Our highest priority recommendation is to develop a charging corridor from the Oregon border at the town of Yreka, then south on Interstate 5 (I-5) to Red Bluff, then State Highway 99 (CA-99) through the Central Valley to connect to I-5 again south of Bakersfield, and finally to the US / Mexico border in San Diego. In considering the routing of the WCEH and evaluating the choice between the I-5 and CA-99 corridors, we strongly urge the selection of the CA-99 corridor. This route serves the heart of the Central Valley with its current population of 5.7 million. These counties combined had a faster population growth rate[1] than other regions of California. CA-99 connects the largest number of metro areas, can provide fast charging within these underserved communities, and supports air quality improvements in regions needing it most. The Valley's air quality remains at non-attainment levels throughout. The Valley has the most people at risk for asthma, bronchitis and emphysema.

   State support for the CA-99 corridor creates the opportunity for EV ownership for those who currently can't participate in the EV community. This will maximize the long-term investment the public has made in these vehicles by allowing the use of used EVs the ability to serve a wider geographic area where they are needed the most. Also, it opens up these routes for users who do not have the economic means to purchase new EVs. The per capita income of the Valley is significantly below the state average. While the cost of new EVs may make them beyond the reach of these residents, the used car market for EVs is showing these vehicles will likely be affordable if there is adequate public charging support to deal with the reduced range.

2. After the I-5 / CA-99 / I-5 North-South corridor is completed, then we recommend installing DCFCs on US Highway 101 (US-101) between Los Angeles and San Jose as the next highest priority. This will connect the San Francisco Bay Area and Santa Barbara / Santa Ynez regions with the Salinas Valley, Monterey, and the Central Coast (population 2.3 million). There will be approximately a 200 mile gap once the Sunspeed Network DCFCs are completed in San Luis Obispo later in 2015, and this gap could be filled with only 4 charging stations separated by approximately 40 miles. For example, these locations could be in Gilroy, Gonzales, San Lucas, and Paso Robles. The Gonzales and San Lucas stations are located in relatively remote regions of the Salinas Valley so it is important for the state to develop these locations than may not be attractive to private industry. This corridor could connect the Central Valley to the Central Coast.

Is a spacing of 40 miles between DCFCs acceptable?

We are concerned about ensuring that a failed station does not strand a driver. A 40 mile distance means a failed station requires an 80 mile range. This exceeds the range of the most common short range EVs such as the Nissan LEAF. The EPA range on these cars of 80 to 85 does not cover freeway speeds, or travel with significant heater or air conditioning use, or a reduced range expected after a few years of operation from "battery degradation", and / or the 80% maximum charge limit with some DCFCs.

[1] The Central Valley's population increased by 15.2% from 2000 to 2008, while the state average population increased 11.3%

The backbone of the Central Valley corridor should have stations in larger existing communities to maximize the overall goals of the program. Placing stations at Yreka, Weed, Dunsmuir, Redding, Red Bluff, Chico, Oroville, Yuba City, Sacramento, Lodi, Stockton, Modesto, Turlock, Merced, Madera Fresno, Selma, Tulare, Delano, Bakersfield, Lebec, Castaic serves these communities and provides a spacing between 14 and 40 miles. This will also provide service to the large number of Environmental Justice Communities identified in this corridor. In the rural areas north of Redding, it may be necessary for stations to be placed outside of a town.

A 40 mile separation can work if there are several L2 backing up failures of the DCFC. In the case of a DCFC failure, a limited range vehicle would have to take time to add additional miles with the L2 charge station. Assuming 1 hour of incremental L2 charge is necessary to reach the next station, two backup L2 chargers would handle an arrival rate of one per 30 minutes, and four would handle one per 15 minutes. In addition, L2 can serve local needs as well as a backup to a failed DCFC.

Shorter than 40 miles spacing will be required for corridors with significant elevation gain and / or cold climates. Approximately 6 miles of range are lost for every 1000 foot increase in elevation for a typical EV. This will affect the northern part of I-5 between Redding and Yreka and over the “Grapevine” between Bakersfield and Los Angeles.

Is starting with one CHAdeMO / SAE unit with conduit for additional chargers acceptable at each location?

Yes, a single station with both CHAdeMO and SAE charging standards should be the minimum. We recommend alternating 50 kW and 100 kW units to provide a network that is adequate for both the current short-range EVs (charge at 50 kW every 40 miles) and support the longer range EVs to be introduced in 2017 and later (charge at 100 kW every 80 miles).

As stated above, there needs to be at least two L2 charging stations at each location (with infrastructure to add more if needed) to serve as backup for failure as well as overflow capacity. More than two may be required for higher traffic areas and local needs.

Since no current 100 kW DCFC units are currently available, we recommend that these alternating sites have transformers and other infrastructure capable of 100 kW operation. All sites should have conduit installed to meet this future eventuality.

What are the minimum requirements for a site?

Sites should provide (in descending order):

- 24 hour / 7 day availability (not locked in a parking garage or limited access private area)
- Safety / security & comfort (lighting, adjacent to some services, etc)
- Highway exit signage that conforms to existing WCEH standards set by Oregon, Washington and British Columbia
- Parking lot signage with logical and easy to follow directions
- Parking stalls marked with California Vehicle Code (CVC) 22511 language

Highly valued criteria (in descending order):

- Restrooms
- Food service
- Shading from sun, possibly with solar PV panels

Additional Remarks

The DCFCs will have to be easy to use and be well maintained for long distance corridor charging networks to be successful. It would be ideal if all corridor DCFCs could accept at least one common form of payment, e.g., a credit card and optionally the addition of a common network card. Second, locating them close to the corridor highways (within 5 minute drive time). The stations need to be publically available at all times (24 x 7 x 365) to all compatible vehicles.

Reliability / Uptime

The CEC provided significant leadership in prior years to support the rollout of charging stations with significant value enabling EV sales growth. Unfortunately, we are seeing that several brands of DCFCs have shown high mortality rates and are undergoing expensive repairs and / or have long lead times to repair. Certainly, a downed charger increases costs, but beyond that, a downed station may create a break in the chain that prevents many EVs from transiting the corridor. Just as important, it takes away confidence in the use of public charging stations.

We recommend three actions:

- With respect to failure rates, require 10 year warranties on all equipment. The warranty might have two components, a 5 year base warranty by the DCFC manufacturer and / or distributor of that equipment, and an extended warranty which might be funded by the station owner. The warranty should cover parts and labor.
- A target of 99% uptime should be required. Each proposal for a station should have a manufacturer's preventive maintenance plan supported and implemented. The uptime requirement would be exclusive of rare preventive maintenance with published down times at late night. Lack of preventive maintenance is a high source of failures, particularly with high amperage equipment in hot locations, as is with much of WCEH.
- Reliability issues often arise from the payment and networking components. The individual DCFCs must be capable of operating when the network, card reader or fob reader doesn't work. **In other words, the default setting is that it ALWAYS works, and that the networking and payment methods are additions.** This is a significant change from the status quo. Care should be given to avoid solutions that increase station failure rate. It's not uncommon for us to see failures with credit card readers at gas stations. In that case, a gas car driver can switch to another reader or go inside a station to pay, ensuring they won't be stranded. We need a level of dependability and driver confidence on the same level as gas stations.

Maintaining the DCFCs in operational status with infrequent faults is essential for providing a reliable network. Status information (vacant / non-operational / in-use) must also be available via the internet (for instance, on the CalTrans site) or a mobile app (ideally in real time).

To win the struggle of our current and future transportation needs, we must decide to accept the challenges and move forward with funding and action. Let's demonstrate strong leadership for EV adoption through completion of the WCEH.

Thank you again for providing this opportunity to comment, and please do not hesitate to contact us in the future.

Sincerely,

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