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**TeraWatt Infrastructure Comments for CEC MDV HDV Charging  
Infrastructure Workshop**

*Additional submitted attachment is included below.*



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California Energy Commission  
715 P Street  
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Dear Commissioners, Energy Commission Staff:

TeraWatt Infrastructure appreciates the opportunity to provide comments on the CEC Workshop on Funding Allocations for Future Medium- and Heavy-Duty Charging and Refueling Infrastructure Projects held on February 28, 2022.

TeraWatt Infrastructure was established to provide solutions for large-scale electric vehicle charging required to meet the unique needs of large commercial fleets. Whether for an urban mobility hub, a last mile fleet operator, or long-haul electric trucking, TeraWatt brings the talent, capabilities, and capital to create reliable, cost-effective solutions for customers on the leading edge of the transition to zero-carbon transport.

TeraWatt offers comments pertaining to the following solicitations for the CEC's consideration:

## **1. Truck Parking EV Charging and Hydrogen Refueling**

A. What types of entities should be eligible to apply?

Private fleets may not be able to invest in this infrastructure on corporate balance sheets due to the high upfront cost and challenge of fully utilizing private infrastructure. Therefore, entities best suited to install and operate these sites may include incumbent fuel providers and specialty infrastructure capital providers.

B. What would be the best way to integrate truck parking charging and refueling with a freight corridor?

Truck parking and refueling can be integrated in one of two ways:

1. Colocation: A truck charging facility can theoretically integrate truck parking and charging along freight corridors by installing high-powered charging stations with an adjacent parking lot for drivers to rest. Given

greater demand for land, these sites are more viable in rural or extended ex-urban areas where property costs are lower. However, in the future, these sites will host numerous 1MW or larger chargers, when these units are commercialized. A pricing model for truck parking may also be required to recoup the costs of additional land through means other than charging costs.

2. Planned Coordination: In locations where additional parking cannot be secured for trucks at rest, especially in higher property cost areas, an off-site but convenient location on the same route could be utilized for parking. These sites could incorporate low power charging infrastructure at each stall, such as 48-80A Level 2 EVSE for trucks to plug into while drivers are resting. This charging power would enable trucks to maintain a state of charge while parked, but using parasitic HVAC which would otherwise deplete state-of-charge while the driver observes mandated rest hours. These sites could be similar to existing Truck Stop Electrification (TSE) sites serving ICE vehicles at rest to avoid idling emissions. These sites would have to be separate from existing public rest stops because of prohibitions on rest stop commercialization.

C. Which geographic locations should be targeted for these funds?

Truck Parking and EV Charging sites should be located along highway corridors with high medium- and heavy-duty truck traffic, which may include the I-5, I-10, CA-99, I-15, and I-80, as well as feeders and urban belts serving such highway systems.

## **2. Warehouse and Regional Trucking**

A. Should infrastructure be shared between organizations/businesses?

Warehouse and Regional Trucking charging sites will be developed as single- and multi-tenant sites, depending on fleet needs. However, multi-tenant hubs will enable higher utilization of the charging infrastructure, which creates more revenue and enables projects to become profitable more quickly. Multi-tenant hubs are also more efficient from a new electric service delivery perspective: it is more efficient to develop one greenfield site to serve two area fleets, than to attempt to increase service to two existing facilities.

B. Should geographic areas be targeted for these funds?

Warehouse and regional trucking charging sites should be located in the area of logistics hubs, including but not limited to Los Angeles, Inland Empire, San Diego, San Francisco Bay Area, Stockton / Tracy / Modesto Triangle, Sacramento, and Bakersfield regional areas.

- C. Is depot charging/home-base charging sufficient or is public charging or opportunity/destination charging necessary?

Depot and public charging will serve complementary roles in successfully operating a wide variety of electric fleets. In many cases, particularly for large fleet customers, depot charging will be the primary charging solution, with public charging playing a secondary role for unexpected circumstances (depot charging issues, insufficient range to return to home-base). In other cases, fleet operators may require both types of charging to accommodate for schedules where vehicles travel more than their range or do not domicile at a home-base every day. These operations are common amongst some last-mile delivery truck routes and heavy-duty regional haul truck routes. In addition, many large fleets will be phasing in electric vehicles and public charging infrastructure can help fill in any infrastructure gaps that may arise when the development timeline for depot or home-base charging does not exactly match to the date of vehicle delivery.

### **3. Mobility-as-a-Service Models**

- A. What current models exist and how could they be innovated/improved?

Existing mobility-as-a-service models include:

- Charging-as-a-Service, which bundles charging hardware and software costs into a recurring operational cost (kWh, daily, monthly, yearly). Most of these models limit this financing model to smaller scale charging sites without significant uncertainty in construction costs.
- Energy-as-a-Service, which adds charging site construction costs into the recurring operational costs. This requires a more sophisticated customer or site developer/sponsor to take on the risk of cost overruns.
- Trucking-as-a-Service, which bundles vehicle charging hardware, software and construction costs into a recurring operational cost.
- Maintenance-as-a-Service, which bundles ongoing operations and maintenance services for charging infrastructure operators, software providers, and hardware providers.

- B. How can this concept specifically target the drayage sector, which is heavily composed of independent owner operators (IOOs), who may be unable to purchase ZEVs or finance their own infrastructure upfront?

Infrastructure-as-a-Service models provide Energy-as-a-Service, but also incorporates land rent costs in the cost of charging. These models can directly address the needs of the drayage sector, specifically those of independent owner operators (IOOs) that do not have the capacity to finance, install, and operate private infrastructure. Infrastructure

providers, like TeraWatt, can own and operate charging infrastructure so that IOOs will only need to pay a usage fee whenever they come to charge.

C. What component of these models would be the most advantageous for the CEC to fund (ex. construction of ZEV infrastructure)?

The CEC should consider funding the charging hardware, construction, charge management software and operations & maintenance. Most critically, CEC funding can supplement in the absence of utility make-ready program infrastructure, particularly in areas where utility make-ready programs are exhausted, not available or do not accommodate medium- and heavy-duty charging infrastructure.

#### **4. Large Scale Ultra-Fast Charging Stations**

A. What is the industry accepted minimum for ultra-fast charging?

Ultra-fast chargers meet or exceed 1MW of power capacity. Large-scale charging stations with megawatt-dispensers are critical to enabling widespread freight electrification, particularly fleets that are traveling multiples of miles more than their vehicle ranges. Existing fast charging stations can enable a charging session for a class 8 truck from 10% to 80% state of charge in a little over an hour, which is unrealistic for long-haul trucks that do not domicile at a home-base. A megawatt charger would reduce the charging sessions of the next generation of heavy-duty trucks to less than 30 minutes, which could make heavy duty fleet electrification more accessible to all fleet and operator types.

B. How many entities would be able to apply to this sort of solicitation, due to the large scale?

Private fleets may not be able to invest in large scale ultra-fast infrastructure on corporate balance sheets given the high upfront cost and the utilization inefficiencies of owning and operating private refueling sites. Whereas, a sufficient number of incumbent fuel providers and specialty infrastructure capital providers would be sufficiently able to apply to this type of solicitation.

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Investments in medium- and heavy- duty charging infrastructure in California can result in decarbonization of trucking fleets in California but also induce such change in fleets that support interstate commerce in the region. In addition, the lessons learned by private fleets from truck electrification in early adopting states, like California, serve as a roadmap to adoption elsewhere in the country and beyond.

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TeraWatt appreciates the opportunity to provide comments on the CEC Workshop on Funding Allocations for Future Medium- and Heavy-Duty Charging and Refueling Infrastructure Projects. We look forward to the release of these solicitations and the continued collaboration between stakeholders, participants, and the CEC in order to best support medium- and heavy-duty electrification in California.



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