

DOCKETED

Docket Number:	20-TRAN-04
Project Title:	Electric Vehicle Infrastructure Project Funding
TN #:	238840
Document Title:	Ample Inc Comments Staff Pre-Solicitation Workshop for Light-Duty Electric Vehicle Infrastructure Projects
Description:	N/A
Filer:	System
Organization:	Ample, Inc.
Submitter Role:	Public
Submission Date:	7/13/2021 4:58:54 PM
Docketed Date:	7/13/2021

Comment Received From: Levi Tillemann
Submitted On: 7/13/2021
Docket Number: 20-TRAN-04

Ample Inc Comments Staff Pre-Solicitation Workshop for Light-Duty Electric Vehicle Infrastructure Projects Serving Rural and Mu

Additional submitted attachment is included below.



Levi Tillemann
Vice President, Policy and International
Outreach
Ample, Inc. 100 Hooper St.
Suite 25
San Francisco, CA 94107
ltillemann@ample.com

July 13, 2021

-VIA ELECTRONIC FILING-

California Energy Commission
1516 9th St, Sacramento, CA 95814

Re: Staff Pre-Solicitation Workshop for Light-Duty
Electric Vehicle Infrastructure Projects Serving
Rural and Multi-Unit Dwelling Residents

***Ample Inc. Comments Staff Pre-Solicitation Workshop for Light-Duty Electric
Vehicle Infrastructure Projects Serving Rural and Multi-Unit Dwelling Residents***

AMPLE, Inc. appreciates the opportunity to provide comments to the California Energy Commission (CEC) regarding the Staff Pre-Solicitation Workshop for Light-Duty Electric Vehicle Infrastructure Projects Serving Rural and Multi-Unit Dwelling Residents. We believe current plans underestimate the infrastructure challenges of electrifying the state's mobility system, and at the same time do not fully account for technological solutions to these challenges that are already operational in more developed EV markets such as China. Specifically, the CEC overestimates the utility of DC fast charging in reaching full electrification and overlooks the role battery swapping can play in filling this gap. Today, China accounts for over 80% of DC fast charging stations installed globally. Yet despite this robust charging network, over the last 18 months China has undergone a major policy shift to prioritize the deployment of battery swap enabled electric vehicles. We strongly urge the CEC to more fully account for this market trend and the various ways in which swapping can enable greenhouse gas reductions, air quality improvements, sustainable business models for repowering EVs, and promote equality of access in low-income and disadvantaged communities. This is particularly true with respect to providing charging services to multi-unit dwellings (MUDs) and rural communities. We also urge the CEC to recognize that battery swapping allows for many of the same operational benefits as hydrogen in light-duty applications but at a lower cost of infrastructure and with better interoperability with traditional EV charging infrastructure.

Ample, is a San Francisco-based company that has pioneered modular battery swap and solved the challenge of how to deliver energy to electric vehicles in under 10-minutes without straining the grid, while accounting for renewable energy intermittency and reducing the cumulative need for large



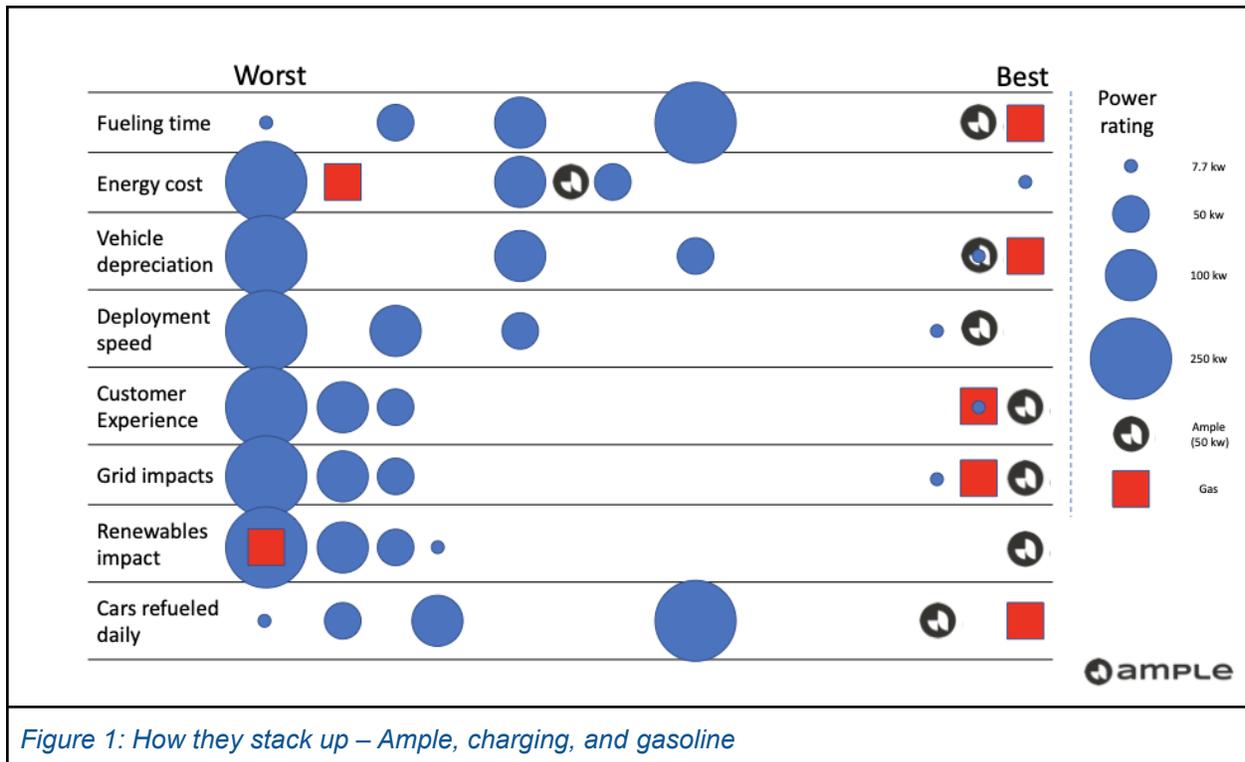
carbon-intensive EV batteries. Modular battery swapping represents a new generation of battery swap infrastructure that is economically self-sustaining, operationally flexible and has already been integrated into a dozen distinct vehicle models from five different OEMs. Not only is Ample's refueling fast and affordable, installation of swap stations is too. It is Ample's intention to install and maintain a significant network of battery swap stations within the state of California, throughout the United States, and internationally.

We believe that the battery swapping (and Ample's modular approach to battery swapping in particular) answers a number of key questions confronting the CEC with respect to its efforts to provide charging to rural residents and Californians living in multi-unit dwellings. These questions include:

How can California accelerate deployment of EV charging infrastructure for MUDs and rural communities?

Battery swapping is the most cost-effective and scalable approach to electrifying and decarbonizing mobility for MUDs and rural communities. Because Ample is designed to be assembled onsite and requires no construction (trenching, pouring concrete pads, etc.), Ample stations can deploy in days. Perhaps most importantly, Ample can slowly charge batteries with renewable energy when it is available and deliver charged batteries to an EV quickly when energy is needed. This energy storage capacity fills a critical gap in our energy supply system. Deploying an Ample pod costs less than deploying a DC fast charger, but fast swap times and integrated storage mean that Ample achieves much higher capacity factors – without high demand charges or costly grid upgrades. On average, DC fast chargers operate less than 5% of the time. Ample can charge batteries up to 100% of the time because batteries can charge while the vehicle is in use. This means that Ample can deliver a roughly 10X utilization improvement over today's fast chargers (25+ vehicles/day for an Ample pod with a 50kw connection). Ample enables a step change in California's ability to meet EV charging needs by means of public charging and reduces the cost of installing infrastructure for EVs (see Figure 1).

Because of the speed and efficiency with which Ample can swap batteries, the system's throughput is the equivalent to a gas or hydrogen station and unlike charging modular battery swapping is economically profitable.



Because of this, Ample’s modular battery swapping is a cost-effective means of transitioning drivers without access to overnight EV charging to electric vehicles. Currently, we are supporting a fleet of high-mileage Uber drivers in the Bay Area. All of these drivers have transitioned to Ample’s zero emission EV platform from internal combustion engine vehicles. Without Ample’s quick refueling these drivers would not be able to rely on electric cars and would be significant sources of GHG and criteria emissions. The drivers utilizing Ample’s platform come from low-income communities that have not been prioritized by many EV-incentives to date and their shift toward electrification translates directly into improved environmental, noise and air quality outcomes in affected communities. This deployment demonstrates the viability of utilizing battery swap to decarbonize miles driven by multi-unit dwelling (MUD) residents, in communities where street parking is the norm and by fleets.

How can California reduce the systemic costs of electrifying mobility?

The built-in storage capacity of swapping systems will dramatically reduce the systemic cost of decarbonization. The Boston Consulting Group (BCG) estimates that the cost of upgrading the grid for electric vehicles will be between \$1,700 and \$5,800 per car.¹ Assuming annual auto sales of 1.7 million in the state, 100% EV sales would equate to between \$2.9 billion and almost \$10 billion in grid system upgrades annually. According to BCG’s analysis, the bigger EV market gets, the more expensive these upgrade costs will be on a per vehicle basis. By separating the process of charging from the action of transferring energy into an electric vehicle, battery swap turns EV batteries into a storage asset.

¹ Sahoo, Anshuman, et al. “The Costs of Revving Up the Grid for Electric Vehicles.” *United States - EN*, United States - EN, 8 Jan. 2021, www.bcg.com/en-us/publications/2019/costs-revving-up-the-grid-for-electric-vehicles.



The path forward

EV charging will be part of the solution for refueling electric cars. However, the speed at which vehicles charge, economics of EV infrastructure, interoperability and deployment challenges for L1, L2 and fast charging mean that battery swapping should also be viewed as a primary mode of public EV refueling. This shift is already under way in more developed EV markets like China, where government policy is now preferentially incentivizing swap-enabled EVs. Major Chinese EV manufacturers have already announced capacity for battery swap stations capable of servicing 40+ million vehicles by 2025. In Europe, Nio is importing battery swap infrastructure to Norway and Renault CEO Mateo de Luca has publicly stated that the company is revisiting battery swapping for EVs. California cannot afford to ignore this powerful trend.

Ample's modular battery swapping system allows electric vehicles to refuel in minutes and pay for energy on a per-mile basis -- just like gasoline. It can also work with virtually any electric vehicle. The Ample system bridges the gap between sustainability and convenience by absorbing renewable energy when it is available, storing it and refueling electric vehicles within minutes. As Ample deploys its modular battery swapping system at scale in 2021 and beyond, we urge the California Energy Commission to find ways to support this effort and integrate swap into future planning and funding efforts.