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Ample Inc Comments on 21-ALT-01, California Energy Commission Investment Plan Update for the Clean Transportation Program

Additional submitted attachment is included below.

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Ample Inc. Comments on 21-ALT-01, California Energy Commission Investment Plan Update for the Clean Transportation Program

AMPLE, Inc. appreciates the opportunity to provide comments to the California Energy Commission (CEC) regarding use of funds for the state's Clean Transportation Program. We believe battery swapping can strongly support the CEC's goals surrounding greenhouse gas reductions, air quality improvements, investments and equality of access in low-income and disadvantaged communities, cost effective use of funds, significant petroleum displacement as well as bringing high impact technologies to market. Battery swapping also fulfils many of the same use-cases as hydrogen for light-duty applications but at a lower cost of infrastructure and with better interoperability characteristics for traditional EV charging infrastructure. We encourage the CEC to proactively integrate battery swapping into its forthcoming Clean Transportation Program Investment Plan.

Ample, Inc. is a San Francisco-based company that is in the process of deploying battery swap-based energy delivery service for electric vehicles. 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. 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.

Not only can Ample's battery swap technology help decarbonize California's mobility system, it can also contribute to transitioning mechanics, technicians and gas station attendants into long-lasting jobs that are part of the clean energy economy. Ample expects to support a significant workforce in three relevant areas:

- Installing swap stations that will service fleets and private individuals
- Maintaining and operating swap stations
- Manufacturing and installing Ample's modular battery packs

Our expectation is that each battery swap station will require local labor to install and roughly one-half full-time employee to maintain. If half of California's 15 million vehicles were to run off of Ample's battery swap-enabled electric cars, we predict that would result in 50,000 associated maintenance jobs, and thousands of jobs in onsite assembly, manufacturing, and potentially associated retail.

Ample encourages California Energy Commission to support the deployment of battery swap infrastructure by placing it on an equal footing with hydrogen stations and fast charging in funding plans.

What is Ample and what is modular battery swap?
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 massive carbon-intensive EV batteries. Modular battery swapping represents a new generation of battery swap infrastructure that is economically self-sustaining, flexible and has already been integrated into ten distinct vehicle models from five different OEMs. Not only is Ample's refueling fast and affordable, installation of swap stations is too.

How can Ample accelerate deployment of EV charging infrastructure?
In order to limit climate change to no more than 1.5C, emergency measures must be taken to reduce carbon emissions. In America, transportation is the largest contributor to energy-related GHG emissions, and globally emissions must fall by roughly 50% within a decade. Over the same period demand for mobility will grow by ~70% thanks to economic expansion in countries like China, India and regions like Sub-Saharan Africa. The world needs technologies and business models that serve customers far beyond suburban America's two-car garages. Electrification must reach into cities with high-rise apartment buildings and densely packed street parking, low-income neighborhoods, rural communities, corridors for interstate travel and commerce, and mobility fleets – which will account for a disproportionate share of vehicle miles traveled. Ample's solution fills this gap.

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

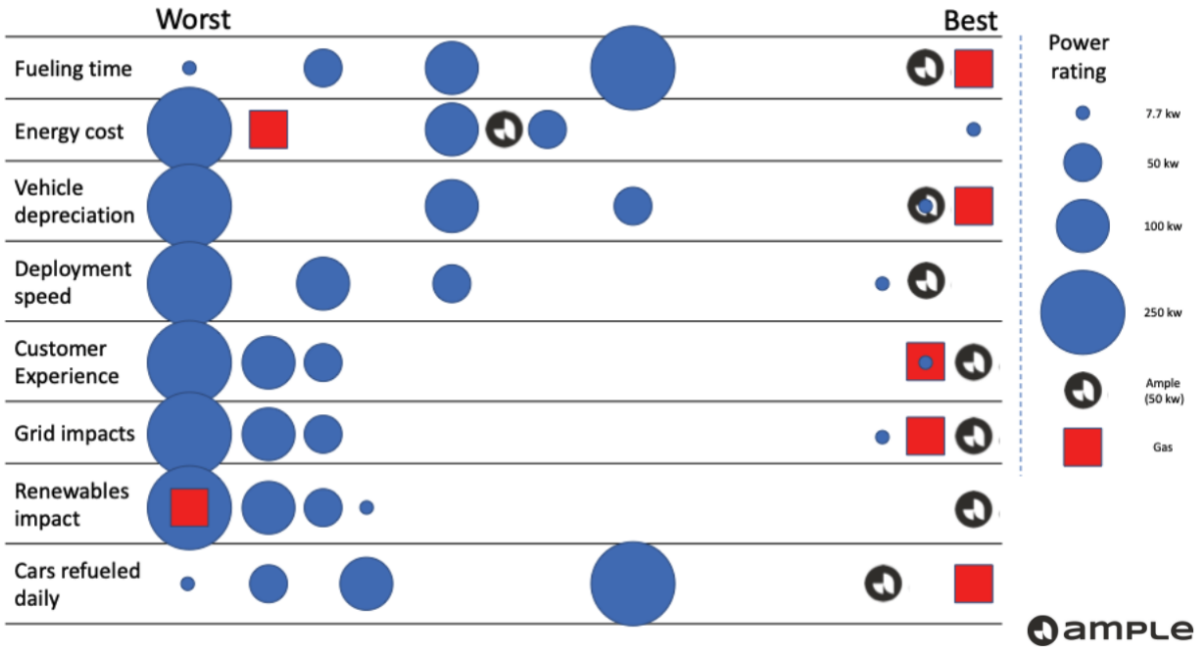

Figure 1: Ample, Charging and Gasoline: How they stack up

(25+ vehicles/day for an Ample pod with a 50 kw 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 is also economically profitable.

The path forward

EV charging and hydrogen will be part of the solution for refueling electric cars. However, the economics and speed at which vehicles charge and infrastructure, interoperability and deployment challenges for both hydrogen 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 has kicked off the deployment of battery swap infrastructure in Norway and Renault CEO Mateo de Luca has publicly stated that the company is revisiting battery swapping for EVs.

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.

Today's pace of electrification is not nearly fast enough to achieve critically important climate goals and the economics do not pencil out absent massive and sustained government subsidies for charging. Battery swapping will be necessary to dramatically accelerate this process. 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. California needs to support a new generation of battery swap, because the critical work of decarbonizing mobility needs to accelerate in order to achieve the state's goals for a sustainable mobility future.