

DOCKETED

Docket Number:	24-ALT-01
Project Title:	2024–2025 Investment Plan Update for the Clean Transportation Program
TN #:	257090
Document Title:	Ample Comment on CEC 2024-2025 Investment Plan Update for the Clean Transportation Program
Description:	N/A
Filer:	System
Organization:	Ample
Submitter Role:	Public
Submission Date:	6/19/2024 1:16:17 AM
Docketed Date:	6/19/2024

*Comment Received From: Ample
Submitted On: 6/19/2024
Docket Number: 24-ALT-01*

Ample Comment on CEC 2024-2025 Investment Plan Update for the Clean Transportation Program

Additional submitted attachment is included below.

From: Dr. Levi Tillemann (VP for Policy and International Outreach, Ample Inc.),
Matthew McGovern (Policy Counsel, Ample, Inc.)

To: California Energy Commission

Date: June 18, 2024

Re: 2024-2025 Investment Plan Update for the Clean Transportation Program

Ample appreciates the opportunity to comment on the California Energy Commission's (CEC) 2024-2025 Investment Plan Update for the Clean Transportation Program. The overarching goal of this comment is to suggest strategies for improving future Grant Funding Opportunities (GFOs) so they can better support the state's climate, energy resilience and economic development goals.

Innovation must be the keystone of any successful energy transition strategy. However, despite some progress opening up CEC grants to emerging technologies, many recent GFOs contain requirements that do just the opposite. They have the effect of entrenching existing players while excluding next generation zero emission vehicle (ZEV) solutions. Taken as a whole, CEC programs still place an uneven burden on innovators competing with incumbent technology providers.

Background on Ample.

Ample provides modular battery swapping services to fleet customers. The company manufactures all of the major components used in its battery swapping system, including battery modules and battery packs, at its facilities in Brisbane (California) and swapping stations in South San Francisco. Ample's Brisbane plant is supported by a \$14.7 million grant from the California Energy Commission, awarded on May 10, 2023.

Ample's swapping system repowers EVs faster than conventional DC fast-charging at a price lower than gasoline. The company has deployed a fleet of swap-enabled Nissan Leafs and Kia Niro EVs in the San Francisco Bay Area in partnership with Uber and the rideshare rental car company Sally. Ample is currently adding more swapping stations and swap-enabled EVs in the Bay Area as well as European and Asian markets (notably Spain and Japan).

Ample has become very familiar with CEC's grant programs in recent years. Besides the successful grant application awarded in 2023, Ample has submitted two other applications, and carefully reviews all CEC GFOs to determine whether Ample should apply. In addition to Ample's comment on the staff report, we have three suggestions for improving CEC funding opportunities: (1) Funding opportunities should be technology and business model neutral; (2) CEC should prioritize electrification of high-mileage fleet vehicles over electrifying



individually-owned vehicles; and (3) CEC should fund solicitations for clean technologies that are comparable in downtime to refueling at a gas station (e.g. battery swapping).

Battery Swapping Continues to Grow Rapidly in China and Europe.

Transportation is the number one source of carbon pollution in California. Fossil fuels also pollute the air we breathe, especially in disadvantaged communities. Despite aggressive statutory goals for electrifying transportation and rideshare fleets, California EVs are mostly driven by individuals who can charge at home overnight.

Historically, California has led development on policies for clean air and transportation electrification, but in many ways the state has fallen behind the federal government and other countries. For instance, in China (which is the world's largest auto market, with over 80% of the world's public DC fast chargers) the market for battery swapping EVs is growing rapidly. China has learned through experience that public fast charging alone is not sufficient to expand EV use beyond early adopters. As a result, most major OEMs in China now have battery swapping solutions for repowering electric vehicles.

For example, the Chinese company Aulton has deployed a platform for electric taxis and rideshare vehicles that use swappable batteries rather than conventional charging. Aulton announced that as of November, 2023, it had completed 83 million battery swaps to date, reducing carbon pollution by 940,000 tons.¹ NIO claims that it has installed 2,427 swapping stations in China and five European countries that collectively provide 68,000 swaps per day.² Battery swapping and China's long-term strategic support for its EV industry have helped BEVs reach a 26% market share for the first three months of 2024,³ compared to 7.3% in the US in Q1 of 2024.⁴

Battery swapping for medium and heavy-duty vehicles is also growing rapidly in China. China sold 36,000 electric trucks in 2022, while no other country sold more than 1,000.⁵ Half of the

¹ Aulton website, <https://www.aulton.com/index.php/en/list-4.html> (accessed June 14, 2024).

² *Nio provides average of 68,084 battery swap services per day in May*, Lei Kang, CNEV Post, June 4, 2024 <https://cnevpost.com/2024/06/04/nio-average-68084-battery-swaps-per-day-may-2024/> (accessed June 14, 2024); *Nio reaches 30 Power Swap Stations in Europe and over 2,200 worldwide*, Natalie Middleton, Fleetworld, January 2024 <https://fleetworld.co.uk/nio-reaches-30-power-swap-stations-in-europe-and-over-2200-worldwide/> (accessed June 14, 2024).

³ *BYD dominates China's EV market as price cuts take effect*, Autovista 24, May 3, 2024 <https://autovista24.autovistagroup.com/news/byd-dominates-chinas-ev-market-as-price-cuts-take-effect/#:~:text=In%20the%20first%20three%20months,a%20market%20share%20above%2040%25.> (accessed June 14, 2024).

⁴ *EV Sales Growth Slows; Market Leader Tesla Stalls*, Cox Automotive, April 11, 2024 <https://www.coxautoinc.com/market-insights/q1-2024-ev-sales/#:~:text=In%20the%20first%20quarter%20of,growth%20rate%20has%20slowed%20notably.> (accessed June 14, 2024).

⁵ *China is propelling its electric truck market by embracing battery swapping*, ICCT, Hongyang Cui, Yihao Xie, and Tianlin Niu, August 9, 2023 <https://theicct.org/china-is-propelling-its-electric-truck-market-aug23/> (accessed November 20, 2023).



electric trucks sold in China in 2023 were swap-enabled, up from 32% in 2021.⁶ According to Bloomberg New Energy Finance:

“Many of these trucks are operating in industrial sites, port warehouses, mines and steelmaking factories. Lighter commercial vehicles with swappable batteries also are being used in urban deliveries, an area where BNEF expects to see more growth as better economics and tightened emission requirements draw more attention to electric models.”⁷

But similar to the EV sector as a whole, rapid growth in the battery swapping industry is dependent on supportive government regulations and access to EV incentives.

California can learn from China’s EV policy leadership in this space. California has adopted aggressive air quality regulations and funding programs to reduce carbon pollution from transportation, including a \$10 billion investment in ZEV deployment over five years in the Budget Acts of 2021 and 2022. These policies have helped make California the national leader in EV market share. But almost all of California’s commercial fleet vehicles still run on fossil fuels and the vast majority of vehicle miles traveled are powered by internal combustion engines.

In order to expand California’s EV market beyond early adopters, the CEC should make sure that its programs are open to the full suite of technologies that will be required to enable 100% electrification of VMT. CEC should make sure that all of its GFOs are open to innovations in faster, more convenient EV repowering methods such as battery swapping. CEC should also focus on cleaning up high-intensity fleets, including last-mile delivery fleets, rideshare fleets, and taxis. Electrifying a fleet vehicle delivers three times the climate and clean air benefits as electrifying a privately owned vehicle, because they are driven on average three times as many miles annually.

The CEC should not allocate additional funds for hydrogen LDVs beyond the statutory minimum as proposed in the Draft Staff Report: 2024–2025 Investment Plan Update for the Clean Transportation Program.

CEC’s continued prioritization of hydrogen in the light duty space stands out as an area for improvement. California law requires CEC’s Clean Transportation Program to spend a minimum of \$15 million per year on hydrogen through 2030. CEC staff have recommended spending an

⁶ *China’s Clean-Truck Surprise Defies the EV Slowdown Narrative*, BNEF, Colin McKerracher, March 12, 2024 <https://about.bnef.com/blog/chinas-clean-truck-surprise-defies-the-ev-slowdown-narrative/> (accessed June 18, 2024).

⁷ *China’s Clean-Truck Surprise Defies the EV Slowdown Narrative*, BNEF, Colin McKerracher, March 12, 2024 <https://about.bnef.com/blog/chinas-clean-truck-surprise-defies-the-ev-slowdown-narrative/> (accessed June 18, 2024).



additional \$34 million (from a canceled agreement with Shell) on hydrogen infrastructure, which could include new or existing light-duty vehicle hydrogen stations.⁸

Ample does not support this reprogramming of funds for hydrogen LDVs. Instead, Ample suggests that the remaining \$34 million be allocated to technology neutral ultra-fast repowering solutions for zero emission vehicles. For light-duty vehicles (LDVs) the goal of hydrogen was to provide a fast alternative to battery charging. However, as the BEV market has grown, alternatives have emerged to hydrogen that are just as fast and fully backward compatible with the EV charging ecosystem and electrical grid. There is no reason that hydrogen should be privileged over fast refueling methods such as battery swapping.

Over 1.4 million EVs were sold in the US in 2023, which is an increase of 50% compared to 2022 sales.⁹ But only 2,978 hydrogen powered vehicles were sold in the US in 2023. And 2024 began with a quarterly drop in sales of hydrogen powered vehicles of 70%.¹⁰ Globally, there were more Ferraris sold than fuel cell cars.¹¹ Just as importantly, hydrogen gas itself is a greenhouse gas. This means that leaks can cancel out any climate benefit of switching from conventional fossil fuels to hydrogen.¹²

Technologies such as battery swapping are as fast as hydrogen and capable of providing battery storage for renewables and grid services. Indeed, a 2023 peer-reviewed study comparing the systemic costs of decarbonization of ground transportation between conventional EV charging, battery swapping, and hydrogen found that battery swapping achieved the lowest total cost, while hydrogen was the most expensive.¹³

Accordingly, we recommend that CEC focus on technology-neutral GFOs for fast, zero emission methods of repowering EVs – establishing a field of competition for promising emerging technologies.

CEC has made progress in releasing GFOs that are technology and business model neutral.

⁸ *Draft Staff Report: 2024–2025 Investment Plan Update for the Clean Transportation Program*, p. 29-30 <https://www.energy.ca.gov/publications/2024/2024-2025-investment-plan-update-clean-transportation-program> (accessed June 18, 2024).

⁹ Statement by U.S. Energy Secretary Jennifer M. Granholm on 2023 EV Sales, US Department of Energy, January 5, 2024 <https://www.energy.gov/articles/statement-us-energy-secretary-jennifer-m-granholm-2023-ev-sales#:~:text=%22Today%2C%20I'm%20delighted.50%25%20increase%20in%20one%20year>. (accessed June 7, 2024).

¹⁰ U.S. *Hydrogen Car Sales Plummet by 70% in Q1 2024*, Mark Kane, Inside EVs, <https://insideevs.com/news/716100/us-hydrogen-car-sales-2024q1/#:~:text=For%20reference%2C%20in%202023%2C%20%2C978.10%25%20more%20than%20in%202022> (accessed June 7, 2024).

¹¹ Colin McKerracher, BNEF, Twitter message, June 12, 2004 <https://x.com/colinmckerrache/status/1800902187234771314> (accessed June 18, 2024).

¹² Ocko, I. B. and Hamburg, S. P., *Climate consequences of hydrogen emissions*, Atmos. Chem. Phys., 22, 9349–9368, <https://doi.org/10.5194/acp-22-9349-2022>, 2022.

¹³ AM Valleria, *The transition: Why we need battery swapping for the future energy and transport systems*, University of Lisbon, Faculty of Sciences, Instituto Dom Luiz, Lisbon, Portugal, 2023, ISBN 978-972-9348-25-9, <https://doi.org/10.56526/10451/55274>



Ample appreciates the technology-neutral criteria CEC has included in several GFOs. For example, the RDWDS GFO-22-609 included a funding lane for EV charging hardware and software providers which was technology neutral as it did not require specific connector types or power levels. GFO-22-615 for medium and heavy-duty vehicle charging applications made an explicit effort to embrace technology neutrality and provided examples of eligible technologies for potential applicants:

[E]lectric vehicle (EV) charging applications, including, but not limited to the following: innovative business models (e.g., truck parking, truck stops/charging hubs, charging corridors, and mobility/charging-as-a-service); and innovative technologies (e.g., large scale ultra-fast charging, interoperability, battery swapping, fuel-cell powered EV charging, wireless charging, inductive charging, overhead catenary, and vehicle-to-everything (V2X) technology)¹⁴

The inclusion of examples is especially useful to potential applicants as they decide whether to devote the time and resources required to submit an application. Awarding points for “replac[ing] gasoline vehicle mileage” in the scoring system for the FAST GFO-22-611 is another example of technology neutral criteria that encourages pollution reduction, which is the whole point of the CEC transportation program.¹⁵

Too many recent GFOs still penalize innovative charging solutions and fleet customers.

When designing GFOs, the CEC should keep in mind that the purpose of its funding programs is to rapidly decarbonize transportation, not to favor one technology or business model over another. Nonetheless, recent GFOs include many instances of language that effectively disqualifies emerging technologies that would be valuable to highly-utilized fleets and individuals without access to overnight charging.

The Fast and Available Charging for All Californians (FAST) GFO-22-611 (released April 5, 2023) was intended to support commercial fleet charging for on-demand transportation services, car rental agencies, and car sharing. These are ideal applications for battery swapping. But the solicitation had several requirements that made battery swapping ineligible – despite the fact that battery swapping was listed as an eligible technology. For example, the solicitation would have required battery swapping companies to install DC fast chargers in addition to swapping stations – effectively making them fast charging companies. It would have required swapping companies to find sites with sufficient electrical power to run battery swapping stations and at least four DC fast chargers. (“Each site must include a minimum of four 150 kW Combined

¹⁴ *GFO-22-615 Innovative Charging Solutions for Medium and Heavy Duty Vehicles Application Manual* p. 5

<https://www.energy.ca.gov/solicitations/2023-05/gfo-22-615-innovative-charging-solutions-medium-and-heavy-duty-electric> (accessed June 18, 2024).

¹⁵ *GFO-22-611 FAST Application Manual*, p. 37

<https://www.energy.ca.gov/solicitations/2023-04/gfo-22-611-fast-fast-and-available-charging-all-californians> (accessed June 18, 2024).



Charging System (CCS) connectors. Half of all connectors installed for a project must be CCS connectors.”¹⁶

The Critical Paths GFO-22-611 released on September 26, 2023 was intended to support clean medium or heavy-duty fleets, but excluded battery swapping. Electric charging applicants had to provide at least 10 150 kW DC fast chargers at each location. The requirement that the EVSE be open to the general public 24-hours a day, seven days a week, also made this GFO impractical for fleet customers. It is important to make EVSE convenient for drivers. But the biggest problems with public charging infrastructure is the unpredictable nature of breakdowns, software glitches that take chargers offline, and the high costs of EV infrastructure for fleet operators. Rigid grant requirements on hours of operation foreclose the possibility of the state supporting certain innovations that have the potential to resolve these issues.

CEC should be especially flexible with respect to fleet-focused solicitations. Fleet infrastructure will be used primarily by fleet customers which have a sophisticated perspective on their charging needs. Fleet electrification is particularly important because fleet vehicles are more intensively utilized than private vehicles, which means that every electrified fleet vehicle will deliver a disproportionately large decarbonization benefit.

The EnergiIZE Commercial Vehicles program is funded by CEC to replace diesel-powered medium and heavy-duty vehicles with clean vehicles, but battery swapping is excluded. Applicants interested in public EV charging are eligible for up to \$500,000 per project, or \$750,000 when combined with other incentives, but only for DC fast chargers of 150 kW or greater.¹⁷ Excluding battery swapping from such programs limits optionality for fleet owners and sends a market signal that the state does not support battery swapping as a technology pathway.

Like EnergiIZE, the CALeVIP program is funded by the CEC and administered by Calstart, for the purposes of funding public charging infrastructure to accelerate EV adoption. Battery swapping is not eligible for CALeVIP funding, because the program is limited to DC fast charging infrastructure “to ensure the best driver experience.”¹⁸ This is especially troubling in light of the abysmal reliability record of public DC fast charging stations. Funding opportunities like EnergiIZE and CALeVIP should be open to battery swapping and other technologies that can improve “driver experience” and accelerate the transition to clean vehicles.

¹⁶ *FAST GFO-22-611 FAST Application Manual*, p. 10

<https://www.energy.ca.gov/solicitations/2023-04/gfo-22-611-fast-fast-and-available-charging-all-californians> (accessed June 18, 2024).

¹⁷ *EnergiIZE Commercial Vehicles Fact Sheet*

<https://energiize.org/static/media/5.%20EV%20Public%20Charging%20Lane%20Factsheet.51439fd5.pdf> (accessed November 20, 2023).

¹⁸ CALeVIP website

<https://calevip.org/about-calevip#:~:text=CALEVIP%202.0.disadvantaged%20communities%20%E2%80%93%20to%20focus%20on> (accessed November 20, 2023).



Finally, CEC should be aware that funding opportunities can unintentionally disfavor the infrastructure and hardware necessary for the clean energy transition if cost efficiency is a major scoring factor and hardware solutions are placed in direct competition with software solutions. For instance, the scoring formula for project costs in the REDWDS solicitation resulted in Ample receiving zero points in this important section. Scoring was done on an S curve and Ample's capital-intensive swapping stations were fundamentally uncompetitive against proposals that often merely required pushing out a software update to existing EV chargers. Such an approach is self-defeating, as it will not incentivize the buildout of new, innovative EV infrastructure. Building new infrastructure will almost always be more expensive than developing software to optimize existing infrastructure. But California will need new infrastructure in order to meet its legal obligations to reduce carbon pollution.

Conclusion

Ample is encouraged by recent solicitations that are open to battery swapping or specifically mention it as an eligible technology. We are looking forward to working with the CEC to help California meet its climate goals by decarbonizing transportation, beginning with California fleets. Accordingly, Ample encourages CEC to design technology-neutral funding opportunities for clean vehicle infrastructure that are performance-based (i.e. which target outcomes rather than promoting technology standards). It is critically important that the industry be incentivized to develop technologies which can repower clean vehicles as quickly as a gas pump. Setting that target and allowing for robust competition among diverse technology pathways (e.g. fast charging, battery swapping, hydrogen, or other clean technologies) gives California the best chance of achieving the state's decarbonization goals.