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Comment Received From: Jaleh Donaldson
Submitted On: 3/18/2022
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MHD Allocations

Please accept our letter on behalf of the undersigned organizations.

Additional submitted attachment is included below.

Hydrogen Means Business in California!

March 18, 2022

Elizabeth John
Office Manager
Medium and Heavy-Duty Zero Emission Technologies Office
California Energy Commission
1516 9th Street
Sacramento, Ca 95814

Re: February 28 Staff Workshop on Funding Allocations for Future Medium- and Heavy-Duty Charging and Refueling Infrastructure Projects

Dear Ms. John,

On behalf of the undersigned associations and companies want to thank the California Energy Commission (CEC) for its time and effort to develop the solicitation proposals presented at the February 28 workshop. California has a great opportunity to launch the medium-duty and heavy-duty (MD/HD) hydrogen fuel cell electric vehicle (FCEV) sector with the 2021 appropriated and 2022 proposed budget funds if administered equitably and accompanied by supporting policies like the low-carbon fuel standard (LCFS). With the appropriate allocation of funds California can develop the 200 dedicated heavy-duty hydrogen refueling stations (HRS) envisioned in the California Fuel Cell Partnership's Truck Vision providing truck fleet operators with a nearly one to one replacement for diesel trucks[1] while successfully meeting regulatory zero-emission truck targets.

As proposed in the current hydrogen solicitation concept and EnergIIZE hydrogen funding lane, we do not believe the combination of these will adequately launch the heavy-duty hydrogen station network or support the transition from fossil fuels to low-carbon and renewable hydrogen or support the transition to zero in goods movement and transportation.

On the assumption that CEC is aiming for programmatic success, industry self-sufficiency, and welcomes industry input, we submit the following feedback to address fundamental concerns raised by the information presented during the workshop. First, the CEC should recognize the cumulative total of funding across all California state agencies and budget line items to ensure equitable distribution of the unassigned budget (as of date of this letter). These funds are necessary to develop the MD/HD ZEV infrastructure that is critical to enable the transition away from internal combustion engines. Second, the hydrogen community would like to rework the solicitation concepts as it proposes taking funding from light-duty infrastructure to support heavy-duty infrastructure. While there will be some fungibility in refueling stations used for certain segments of the medium-duty market (somewhere around class 5), the CEC should support both light and heavy-duty hydrogen markets with their own dedicated refueling infrastructure funding and not support one at the exclusion of the other. We will wrap up our input by highlighting which items in the proposed EnergIIZE funding plan are driving factors for our core concerns

[1] http://www.cafcp.org/truckvision

around programmatic development at the CEC for heavy-duty and off-road hydrogen refueling infrastructure funding.

Less than $0.04 per $1 of California Zero-Emission Vehicle Infrastructure Funding Supports Hydrogen Refueling

By June 15th of 2022, we anticipate California will have committed over $6.85 billion[2] toward the build out of ZEV infrastructure. This total includes all taxpayer, feepayer, ratepayer and settlements dollars spent, allocated, and proposed in recent budgets for ZEV infrastructure (excluding school bus charging, GGRF and POU programs) to date. Of this total over $3.7 billion has already been dedicated to charging and only $259.82 million has been dedicated to hydrogen refueling. There is currently just under $3 billion in unassigned funds. The hydrogen community urges the State and CEC to use this decision point to equitably distribute the proposed ZEV Infrastructure Grants and unassigned funding as follows:

- $1 billion to launch the heavy-duty hydrogen refueling network,
- $300 million to support statewide light-duty hydrogen refueling network self-sufficiency, and
- $300 million to support California transit agencies who are adopting fuel cell electric buses.

These are attainable goals with the combined unassigned funds appropriated in 2021-2022 state budget and this year's 2022-2023 proposed budget. Each of these targets is a low-risk maximum benefit strategy to meet the total fleets' needs in advance of their respective technology transition deadlines set by Governor Newsom's Executive Order N-79-20.[3]

Separate Funding Lanes for Public Retail, Public Transit, and Commercial Fleets

The current internal combustion technology fleet knows only a select number of fueling locations where public and commercial fleets comingle. These "connector" or "travel stop" locations are the exception and not the rule - the average California driver does not typically refuel at the same location as class 5 through 8 trucks or buses. We are concerned that the CEC is not proposing adequate funding from the surplus 2021 budget funds for the development of a heavy-duty HRS network. Similarly, the light-duty retail hydrogen station network is expected to serve 7.5 million vehicles[4] and should therefore be funded accordingly. To achieve our state decarbonization goals we must build networks for commercial fleets, public transit, and the public retail fleet. We urge the CEC to not minimize hydrogen end-use funding with merged and de minimis funding sources.

We appreciate the funding to date, however, when compared to other zero-emission technologies it has been minimal and unpredictable[5]. Our global climate partners with economies of similar size are doubling down on their commitments to hydrogen and fuel cells across vehicle weight classes.

- Japan – 160 operating stations, with a goal of 320 by 2025, and 1,000 by 2030[6]

[2] Attachment 1 – Preliminary Analysis of Proposed, Allocated, and Spent ZEV Infrastructure Funds, EXCLUDING GGRF, POU charging, and School Bus charging funds.
[3] https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf
[4] https://ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf
[5] 4.5 year delay in ARFVTP/CTP funding
[6] https://hydrogen-central.com/japan-1000-hydrogen-stations/

- Germany – 91 operating stations[7] with a €3 billion in additional dedicated hydrogen investment
- Korea – 34 operating stations, 310 by the end of 2022[8], with a goal for 6.2M FCEVs, and 1,200 hydrogen refueling stations by 2040
- France – 29 operating stations, 100 stations by 2023, and 400-1,000 by 2028[9]. €7.2 billion in clean hydrogen investment between 2021 and 2030.

Californians deserve similar ambition, dedication, and steadfast implementation to ensure optionality of zero-emission options across the entire range of vehicle weight classes. Both ZEV technologies are in competition with internal combustion, and it is premature to declare one the victor over the other in 2022. Neither have taken hold nor are they capable of serving all use cases. As such, the state should prudently invest in moving both charging and hydrogen refueling networks toward scale and self-sufficiency.

While we agree with CEC staff that there is a need for connector stations as part of a statewide network, we need dedicated funding for regional goods movement along freight corridors and urban commercial fleet operations as well as light-duty stations to serve the medium duty pickup fleet used by our construction industry. We believe some of the concepts in this solicitation proposal could be used to assist scoring in competitive grant solicitations but should not be the basis of the solicitation. Additionally, initial fleet utilization of connector stations likely requires additional policy in the low-carbon fuel standard to support these unique stations.

We urge staff to work directly with the California Hydrogen Coalition, California Hydrogen Business Council, and California Fuel Cell Partnership to redesign the solicitation concept in the next few weeks.

> **Is there interest in developing such projects?** *There is interest in connector stations, but they should not be the focus of this solicitation, nor should this solicitation contain geographic restrictions on station locations.*
>
> **Should a MD/HD fueling component be optional or required?** *HD funding should be separate from LD funding. The scale of HD stations is vastly different from LD in terms of development site footprint, hydrogen capacity and fill-rate, operational performance, etc. MD depending on the fleet may access both. For example, the construction fleet (class 2b-4) often utilize light-duty and heavy-duty stations depending on the jobsite and most convenient fueling option.*
>
> **At what minimum daily capacity and number of fueling positions?**
> *This largely depends on whether the station is designed for light-duty or heavy-duty as their needs are drastically different. Again, we should focus on the most common stations in both the HD and LD spaces to build statewide networks and not the most*

[7] https://h2.live/en/
[8] https://www.glpautogas.info/en/hydrogen-stations-south-korea.html
[9] https://www.tresor.economie.gouv.fr/Articles/120903c7-34bc-49b1-a324-b1f6ba0dbf53/files/5828cf4a-96d5-4eb5-9966-c3cfff882fe2

uncommon station type which will need to uniquely serve two different customer segments each with distinct demands.

The funding program should be structured to advance the state of HD hydrogen station design which will inform future rounds of HD hydrogen station development funding.

Conformance to which MD/HD fueling protocols should be required?
J2601 for H70 and J2601-2 for H35 are still applicable, however, this solicitation should not preclude the additional faster fueling protocols currently in the development phase. Recently the U.S. Department of Energy and hydrogen industry funded the establishment of a HD hydrogen fueling protocol working group at NREL. While these advancements for the HD hydrogen fueling technologies are in the RD&D phase, station developers are adapting LD station components for to the HD applications to enable initial deployment of HD fuel cell trucks and buses. A LD hydrogen refueling nozzle delivers energy equivalent to 4MW which is substantial if compared to other zero-emission energy transfer rates.

What amount of grant funds per station is appropriate for a station that has both LD and MD/HD components? *LD and HD grant funds should be held in separate pots as they support different needs in drastically different use cases. Station demands are also drastically different and should not be merged for the purposes of minimizing the HRS networks into one. GFO 19-602 levels are sufficient for LD stations. HD stations will be designed at a significantly larger scale, physically and volumetrically, requiring substantially more land area, storage capacity compression capability, and ultimately, cost. Specific to the existing LD retail hydrogen fueling network, the majority of stations cannot physically accommodate vehicles class 6 and bigger.*

Should grant funding be limited to equipment costs, or should it be for all CEC budget categories (i.e., labor, subcontracts, indirect costs)? *The grant program should incentivize and accelerate the development of the initial network of stations. These development projects will need support from the other categories similar to the initial LD stations, to improve the business case and stimulate private investment for future HD hydrogen fueling station development.*

Should this concept include support for onsite, direct renewable hydrogen production? *No. While we fully support the integration of refueling and production, this funding program should focus on methods to expedite the construction of HD hydrogen fueling sites and the cost-effective delivery of hydrogen to commercial transportation applications. Station funding should support what is necessary for delivering hydrogen to the vehicle fleet at that station.*

There is $50M for potential biomass to (hydrogen) fuel production in the 2021 budget and $100M proposed electrolytic hydrogen production grants in this year's budget. Mass production and storage of hydrogen is likely more cost-effective in the near term as we

develop policies and necessary tariffs to support widespread deployment of hydrogen production technologies. The initial HRS networks will likely not be able to cost-effectively support both electrolytic production and refueling, just as charging does not support on-site solar or wind projects. It is more important to build refueling capacity and a statewide network than it is to demonstrate production and refueling at the same location with these initial HD stations.

For refueling locations that can accommodate the onsite solar (until tariffs are adopted to allow for grid connected renewable electricity), electrolyzer, compressors, and other production equipment there should be the ability to apply for both refueling and production grants administered by the state in a joint proposal.

Which production technologies should be eligible, at what minimum production capacity, and at what funding level? *Any LCFS, CARB approved, eligible hydrogen production pathway should be eligible. Additionally, grants for charging stations do not restrict the content of electricity as measured at the fueling interface at the time of fueling that can be used. However, at this time we do not believe station funds should support onsite production as that will severely limit the ability to efficiently build out a statewide network. Should a developer or fleet operator decide to produce hydrogen onsite they should be allowed to couple their application with that from other funding sources for production or use private capital.*

EnergIIZE Concerns

In addition to the solicitation concepts discussed we want to address our concerns with the funding proposed in the EnergIIZE program. Combined, both of these CEC-managed proposals are sending the wrong signal to the hydrogen community. Limiting the hydrogen solicitation concept by taking from newly assigned light-duty funds and applying the 30% cap in the EnergIIZE program signals preferential treatment of one technology over another. Further, identifying a $2,000,000 station cap without an industry-informed fueling station cost analysis sends the wrong market signals to station developers, indicating that the state will not support their private investments. With this funding cap, it is highly likely station developers will not be able to commit to construction of appropriately sized HRS and the supporting infrastructure necessary for heavy-duty fuel cell electric fleets.

Unlike charging infrastructure, hydrogen refueling is not supported by the California Public Utilities Commission, so parity is already skewed in the favor of one market actor. Neither battery or hydrogen technology in the medium and heavy-duty sector are fully commercialized so preferential funding at this time only serves to pick a winner which was not intended in the appropriation.

While CALSTART explained this funding ratio as based on transit agency rollout plans submitted under the CARB Innovative Clean Transit Rule, we question the inference connecting public bus fleets decisions to apply to the commercial transportation fleet sector. The use case and operations of a commercial truck fleet are not like that of a public transit bus fleet. Even if they were similar, data from Alameda

County-Contra Costa Transit Agency[10] would indicate the diversity in geography and routes of the fuel cell electric option provides better operational uptime. Therefore, EnergIIZE should support equal funding that is necessary to ensure the state provides options to different operations within the heavy-duty fleet. As such, we take the position that in the initial tranches of EnergIIZE funding there should at least be a 50:50 parity in funding between charging and hydrogen refueling for at least five years.

The proposed station cap of $2,000,000 to $3,000,000 (with Jump Start[11]) is insufficient to fund heavy-duty hydrogen refueling station capable of meeting fleet performance requirements. It appears a simple doubling of the average public cost from station awards in CEC GFO-19-602 for light-duty retail stations.[12] The light-duty refueling sector has had some advances which helped halve the cost of stations part of the most recent grant. These changes are aided by the Low-Carbon Fuel Standard's Hydrogen Refueling Infrastructure (HRI) credit which has allowed station developers to build larger stations ahead of fleet adoption.

The throughput scale of a heavy-duty hydrogen refueling station will be between six and eight times larger than a light-duty vehicle retail hydrogen refueling station and requires applicable capital equipment for higher volumes, refueling rates, and redundancy necessary for a commercial fleet. A heavy-duty fuel cell electric truck will consume between 25 and 80 kilograms of hydrogen daily compared to a light-duty fuel cell electric vehicle consuming 0.7 kilograms a day. Industry has forecasted the average station capacity to be around 8,000 kg, and possibly more.

This initial tranche of stations will likely need around $4,000,000 to $5,000,000 in incentives to simply cover half of the equipment costs. We propose incentivizing of 50% station equipment in the first five years to allow for station developers to plan and de-risk their investments, build market confidence and allow for supply chain scale up, which will drive down cost over time. Competitive grant criteria could include daily throughput capacity, energy delivered, importance to support a statewide network or freight corridor as per the California Transportation Commission's work (SB 671), and ability to leverage other funding sources. We believe the emphasis on cost-effectiveness in GFO-19-602, specifically state funds per capacity and per GHG reductions are important design elements to carry forward.

Conclusion

While we opine the current and proposed approach as flawed to achieve programmatic success and industry self-sufficiency, we do appreciate the thought and effort CEC and CALSTART staff are putting into developing these solicitations. The hydrogen transportation sector has distinct needs that are different than the regulated regional monopolies in the electric sector. To this end hydrogen's refueling markets and supporting infrastructure requires unique design and consideration. As an industry significant work has gone into developing what is necessary for the hydrogen market and it is our desire to have these solicitations support those plans. We look forward to working collaboratively with CEC staff to address the infrastructure needs of the hydrogen fleet and develop solutions necessary to launch a new market. If you have any questions please contact Teresa Cooke and Sara Fitzsimon.

[10] https://www.actransit.org/sites/default/files/2021-12/ZETBTA%20Volume%202.pdf
[11] EnergIIZE Impelmentation Manual – Q1 2022 Revision, Pages 13-14
[12] https://www.energy.ca.gov/sites/default/files/2022-01/NOPA_GFO-19-602_2nd_Revised_2022-01-10_ADA.xlsx

On behalf of the undersigned hydrogen partners, we thank you and we look forward to discussing further.

Sincerely,

Teresa Cooke
Executive Director
California Hydrogen Coalition

Sara Fitzsimon
Policy Director
California Hydrogen Business Council

Joe Fawell
Vice President, Government Affairs
Air Liquide

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Trillium

Cc: Senate Budget Committee
Senate Transportation Committee
Assembly Budget Committee
Assembly Transportation Committee
Ms. Lauren Sanchez, Senior Climate Advisor, Office of the Governor
Ms. Karen Douglas, Senior Energy Advisor, Office of the Governor
Commissioner Patricia Monahan, California Energy Commission
Mr. Drew Bohan, Executive Director, California Energy Commission
Mr. Hannon Rasool, Deputy Director, California Energy Commission
Mr. Richard Corey, Executive Officer, California Air Resources Board
Mr. Craig Segall, Deputy Executive Office, California Air Resources Board
Ms. Alycia Gilde, Senior Director, CALSTART

ATTACHMENT 1

Preliminary Analysis EXCLUDING GGRF, POU charging, and School Bus charging Investments

Program		Agency	Unassigned	BEV	FCEV	Total Appropriated *(in millions)*
IOU TE (SB 350)	LDV	CPUC	0.00	756.26	0.00	756.26
	MHDV	CPUC	0.00	718.72	0.00	718.72
	Off-Road	CPUC	0.00	10.88	0.00	10.88
	Public DCFC	CPUC	0.00	44.38	0.00	44.38
IOU TE subtotal				1,530.24	0.00	1,530.24
ARFVTP/CTP to 8/21	LD Charging	CEC	0.00	192.60	0.00	192.60
	MHD	CEC	99.11	58.34	0.00	157.45
	H2 incl O&M	CEC	0.00	0.00	166.82	166.82
22-23	LD Charging	CEC	0.00	30.10	0.00	30.10
	MHD	CEC	0.00	0.00	0.00	0.00
	H2 incl O&M	CEC	0.00	0.00	20.00	20.00
23-24	LD Charging	CEC	0.00	30.10	0.00	30.10
	MHD	CEC	0.00	0.00	0.00	0.00
	H2 incl O&M	CEC	0.00	0.00	10.00	10.00
Carl Moyer	Vehicle Charging at State Buildings	ARB	0.00	37.00	0.00	37.00
Carl Moyer	Vehicle Charging on State Highways	ARB	0.00	20.00	0.00	20.00
NRG Settlement		CPUC	0.00	100.00	0.00	100.00
VW Mitigation		ARB	0.00	10.00	0.00	10.00
VW Settlement	Cycle 1 including O&M	ARB	20.00	180.00	0.00	200.00
VW Settlement	Cycle 2	ARB	17.00	163.00	0.00	180.00
VW Settlement	Cycle 3	ARB	0.00	180.00	5.00	185.00
VW Settlement	Remaining	ARB	240.00	0.00	0.00	240.00

21 Budget	ZEV Infrastructure Grants	CEC	0.00	259.00	41.00	300.00
	Equitable at-home Charging	CEC	0.00	0.00	0.00	0.00
	Drayage Infra	CEC	470.00	0.00	0.00	470.00
	Drayage Infra Pilot	CEC	65.00	0.00	0.00	65.00
	Transit Infra	CEC	290.00	0.00	0.00	290.00
	Transportation Package ZEV	CEC	407.00	33.00	17.00	407.00
21 Subtotal			1,232.00	292.00	58.00	1,532.00
22 Budget	ZEV Infrastructure Grants	CEC	0.00	600.00	0.00	600.00
	Equitable at-home Charging	CEC	0.00	300.00	0.00	300.00
	Drayage Infra	CEC	475.00	0.00	0.00	475.00
	Drayage Infra Pilot	CEC	0.00	0.00	0.00	0.00
	Transit Infra	CEC	460.00	0.00	0.00	460.00
	Transportation Package ZEV	CEC	383.00	0.00	0.00	383.00
22 Subtotal			1,318.00	900.00	0.00	2,218.00
Budget Subtotal			2,550.00	1,192.00	116.00	3,750.00
Total w/o School or POU charging infra			2,926.11	$3,723.38	$259.82	$6,859.31
Percent of total w/o School or POU charging Infra			42.66%	54.28%	3.79%	100.00%