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H2FCP feedback on Potential Growth of Hydrogen workshop

Additional submitted attachment is included below.

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9/22/2023

Commissioner Monahan
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

SUBJECT: Feedback regarding the California Energy Commission's IEPR Commissioner Workshop on the Potential Growth of Hydrogen
Docket No. 23-IEPR-06

Dear Commissioner Monahan,

The Hydrogen Fuel Cell Partnership (H2FCP) is pleased to be able to provide feedback on the CEC IEPR workshop to discuss the potential growth of hydrogen to help decarbonize the electric generation and transportation sectors, as required by SB 1075.

For over two decades the California/Hydrogen Fuel Cell Partnership has worked as a public-private collaboration to advance hydrogen and fuel cell technologies as a tool to help California achieve its essential environmental and economic objectives. We have worked collectively to develop foundational codes and standards, advance the technology from R&D to commercial readiness, demonstrate the benefits to society, create the commercial marketplace, and align stakeholders on the actions required for success. As we have done with CEC in the past, the comments and suggestions below are intended to foster dialogue and progress towards achieving our common objectives.

Our feedback is focused on hydrogen's potential to accelerate the decarbonization of California's mobility applications and can be summarized as *hydrogen fuel cell technologies work*, *hydrogen fuel cell vehicles are needed* to achieve California's objectives, and hydrogen fuel cell vehicles *need continued government support* in the early market phase.

Hydrogen Fuel Cell Vehicle and Infrastructure Technologies Work

Today there are numerous commercially available fuel cell vehicles (FCVs) – cars, buses, and trucks – in California and around the world, supported by publicly accessible retail and privately funded hydrogen station networks. All major global vehicle makers have active fuel cell research and development activities underway, even those not currently offering public FCV sales, and are often publicly stating that a 100% ZEV future will require significant consumer options and choice to be successful. These vehicles meet all the relevant and required safety standards of their traditional and ZEV counterparts, and a growing number of light-, medium-, and heavy-duty vehicle manufacturers are showing off new makes and models around the world in anticipation of sufficient hydrogen infrastructure to support them.

California has been at the forefront of FCV deployment, having boasted the largest vehicle and station deployment for nearly a decade due to the State's robust policy framework and support mechanisms. The early light-duty FCV rollout has helped leverage the burgeoning expansion of fuel cell buses and a growing number of heavy-duty truck deployments. California not only led

the early market development for the technology, but it also paved the way for other U.S. states and countries around the world to follow. Although other markets have begun to outpace California's FCV and hydrogen infrastructure rollout, no other region has the experience or vehicle-to-station ratio, highlighting California's continued importance in expanding hydrogen fuel cell vehicle mobility to reach our environmental and economic objectives.

Although great progress has been made, the market is still emerging, and California is uniquely positioned to both capitalize on its early success and continue to lead the world in overcoming these early technical, cost, and coordinated rollout challenges. Current fuel cell and hydrogen infrastructure technologies are still nascent and there is increasing progress being made towards a sustainable hydrogen economy. Like the battery electric vehicle and charging market at the beginning of their introduction a decade or so ago, the market is still developing technologically, expanding to reach scale and reducing costs. The collective effort of stakeholders working together towards the ZEV objectives, including the CEC and its many programs and activities, will continue to be critical to achieving success. With the first commercially available hydrogen infrastructure and FCVs launched less than a decade ago, and as we witness the exciting progress yet continued work still required to scale up battery electric vehicles since their initial introduction in the late 90's, we can and must continue to advance our early success into a fully sustainable zero-emission future.

A great deal of analysis has been done to identify the potential for hydrogen mobility in California and across the globe, demonstrating the importance of hydrogen's role in decarbonizing transportation. Hydrogen is expected to play a key role in decarbonizing the heavy-duty applications, including trucks and buses (both under new zero-emission regulations in California). Trucking reports are finding the efficiency, range, and infrastructure systems needed for hydrogen fuel cell trucks make it the key contender for net-zero trucking[1]. Hydrogen truck projects are working in the Port of Los Angeles[2], launching in Oakland[3], and developing across the state and world rapidly.

While studies are showing both hydrogen and battery electric buses are becoming increasingly competitive with traditional buses, hydrogen is proving more potential than originally imagined. Prior to a head-to-head study[4] on competing bus technologies for the East Bay transit fleet the original zero-emission bus (ZEB) transition plan was to be 70% battery electric and 30% hydrogen fuel cell. However, after a thorough analysis on how to most effectively transition to 100% ZEBs the updated and optimized transition plan was shifted to 70% fuel cell and 30% battery. Transit agencies globally are increasingly operating hydrogen buses in real world routes and expanding the role of hydrogen to meet their fleet operational and budget needs.

The most thorough analysis for hydrogen's mobility potential to decarbonize California transportation has come from a CARB analysis on the potential of the light-duty hydrogen network to become self-sufficient[5]; the very objective of the original ZEV mandate and

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[1] Zero Emission Long-Haul Heavy-Duty Truck, Clean Air Task Force. March 2023
[2] ZANZEFF Shore to Shore Project, Port of Los Angeles
[3] NorCAL Zero-Emission Regional and Drayage Operations Project, Port of Oakland
[4] Zero Emission Transit Bus Technology Analysis Vol 4, AC Transit. December 14, 2022
[5] Hydrogen Self Sufficiency Report, California Air Resources Board. October, 2021

supporting state programs. This analysis found that the light-duty hydrogen infrastructure network could become self-sufficient within a decade, provided continued State support and industry capital to scale up the market. While this is exciting for the LD hydrogen market, it may also portend growing bus and truck market opportunities to develop a truly sustainable zero emission vehicle and infrastructure market.

Hydrogen mobility – including heavy-, medium- and light -duty applications – are working today in California and presenting an increasing potential to decarbonize the state's transportation systems.

Hydrogen Vehicles are Needed to Reach California's Decarbonization Goals

California leads the country, quite possibly the world, in policy leadership and support to decarbonize energy and transportation systems. This has occurred through decades of steadfast leadership, fuel-neutral approaches, and a focus on the end goal; now readily accepted as the 100% transition to ZEVs and decarbonized energy systems. Hydrogen fuel cell and battery electric vehicles have long been recognized as the two technologies that, together, will achieve California's environmental objectives.

Hydrogen FCVs are a complement to BEVs. They have similar underlying technologies and components and provide zero-emission mobility in similar yet different methods via an electron or molecule. Where BEVs excel at urban, short range, and smaller vehicle technologies, FCVs excel in long range, fast fill, and larger applications. While BEVs have a decade's head start in development and deployment, neither technology is likely to be the "silver bullet" to replacing combustion vehicles, and each is still nascent in its development compared to traditional technologies. *Both ZEV technologies are needed*.

Hydrogen is expected to play a greater role in heavy-duty mobility applications, such as trucks and buses, due to greater energy density and scaling potential of hydrogen infrastructure. Many refer to this as hydrogen's role in the "hard to abate" sectors (including non-mobility uses such as industrial applications). ZEV heavy-duty mobility technologies are still in the early rollout and demonstration phase, with some commercial vehicle availability yet generally lagging the light-duty market. These heavy-duty applications and demonstrations will continue to progress and develop, with the final mix of hydrogen/battery technologies playing out over time, and complimentary to light-duty applications.

Many believe that the market for light-duty ZEVs has been decided, that a decade's head start, availability of numerous makes and models, and public awareness for BEVs has made this fait accompli. However, as noted above and identified in growing analysis when focusing on the end goal of 100% ZEVs; BEVs *and* FCVs will be necessary and complementary in the light-duty sector as well. This is due to there being similarly "hard to abate" elements in light-duty applications and charging scaling issues for BEVs that hydrogen FCVs can fulfill and complement towards the road to 100% ZEVs. Most U.S. consumer vehicle sales are for SUVs and pickup trucks, a space where BEVs have begun to penetrate and show some success. However, many of these drivers need farther ranged vehicles, require shorter fueling capabilities, live in apartments or in rural areas where chargers are less accessible, thus requiring more ZEV options and choice. Hydrogen infrastructure can also support hundreds of ZEVs a day, enabling greater ZEV miles and

adoption, and complimenting BEV charging limitations. While light-duty FCVs may make up to a quarter of the total 100% ZEV light-duty market or less, hydrogen FCVs *are necessary* to achieve our full ZEV adoption, as noted by CARB's Mobile Source report[6].

It is not a question of if hydrogen FCVs will play a role across heavy-, medium-, and light-duty applications, it is a question of how many and how fast we can deploy more ZEVs.

Hydrogen Mobility Needs Continued Government Support *(and Private Capital)*

The development of any new technology, especially one that upends more than one market or application (as ZEVs do by impacting and relying upon expanded energy production and new fueling infrastructure) is an enormous undertaking. The laudable and necessary transition to a decarbonized zero-emission transportation system is both challenging and urgent. California continues to lead the country in decarbonization progress, and this has only been possible due to the steadfast dedication of the state officials who recognize the important role of government in setting the vision and providing early market support to enable success. A fundamental principle in this effort has been to set the targets and vision and remain neutral to the technologies that get us there. Continued government leadership is still necessary to fulfil the goal of the ZEV transition, supporting both battery and hydrogen fuel cell technologies to reach our goals.

Year over year the AB8 analysis reports highlight hydrogen FCVs as an important piece of the states future ZEV fleet and recommend continued government support to send industry the signals that continued and expanded private investment is needed to reach our ZEV goals. CARB's hydrogen self-sufficiency report echoes this need along with the opportunity to achieve a sustainable ZEV market; the first and only sustainable market pathway identified thus far. The actions stakeholders make today will set the foundations for a successful, robust ZEV transition, and California's leadership in hydrogen and FCVs can continue to lead the world. The state has demonstrated that the technology works, that it is needed to achieve our most urgent environmental objectives and requires additional government support. Neither government nor industry cannot do this alone, and the decades of ZEV progress has been a collaborative effort and the Hydrogen Fuel Cell Partnership stands with CEC and all the public and private stakeholders to facilitate the development of this important ZEV market opportunity. For all our citizens, today and in the future.

We look forward to the opportunity to continue our collaborative efforts to reach our 100% ZEV objectives and appreciate everything CEC has done, and will do in the future, to ensure hydrogen fuel cell transportation has every opportunity to succeed and support our common objectives.

Sincerely,

William Elrick
Executive Director

[6] 2020 Mobile Source Strategy, California Air Resources Board. October 2021