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Re: Senate Transportation and Housing Committee Hearing "AB 32 Implementation: Light Duty Vehicles and Their Fuels"

Thank you for the opportunity to provide written comments to the Senate Transportation and Housing Committee Informational Hearing on AB 32 Implementation: Light Duty Vehicles and Their Fuels. I am a professor of Environmental Science and Policy at the University of California, Davis and direct the Sustainable Transportation Energy Pathways program at the campus' Institute of Transportation Studies[i]. I hold a Ph.D. in physics, and have over 30 years of experience studying energy systems and alternative fuels. I have written extensively on transition issues for alternative fuels and vehicles, including over 100 articles and 2 books, and have served on California state, national and international committees on these topics, including the ETAAC committee for AB32[ii], NRC committees assessing transition issues for hydrogen fuel cell vehicles[iii] and plug-in hybrid vehicles[iv] and the Intergovernmental Panel on Climate Change report on renewable energy[v]. The major focus of my work over the past 10 years has assessing technologies and strategies for achieving a low carbon future transportation system. I wanted to offer a few insights based on our group's work at UC Davis.

Achieving GHG Reduction Goals.
In California the transportation sector is the single largest source of greenhouse gas (GHG) emissions.[vi] Reducing GHG emissions from transportation is crucial for meeting California's overall GHG reduction goals and to achieve levels consistent with California's contribution to a more stable climate. UC Davis research indicates that a "portfolio" approach, combining higher vehicle efficiency, alternative fueled vehicles, and lower carbon fuels could achieve an 80% reduction in GHG emissions by 2050 (the "80in50 goal"). By 2050 the light duty vehicle sector would be radically different than today's, relying on a mix of electrified vehicles (hybrid, plug-in electric vehicles, and hydrogen fuel cells) and efficient vehicles that run on low carbon fuels.[vii] Importantly we found that there is no one "silver bullet" technology or "car of the future" that could replace the petroleum-fueled internal combustion engine vehicle and still meet all of our mobility needs and the 80in50 goal. A portfolio approach is key. This view is consistent with the approach of AB32 and other programs (e.g. AB118) supporting a range of options. This conclusion is also supported by other authoritative studies by the National Academies[viii], the US Department of Energy[ix] and the International Energy Agency.[x]

Transforming the vehicle fleet.
There are a range of promising new vehicle and fuel technologies that offer significant long term benefits in terms of GHG reduction, oil displacement, air quality, and green technology development. These new vehicle technologies are just entering the market in commercial volumes (plug-in vehicles) or nearing commercial readiness (hydrogen fuel cell vehicles). Because of the long lead time required to commercialize new types of vehicles and fuels, our research shows that we will need to start transforming the light duty fleet now to meet an 80% reduction by 2050.[xi] This means nurturing the early development of a range of new alternative fueled vehicle technologies that could provide significant public benefits, especially zero emission vehicle technologies (hydrogen fuel cells and plug-in electric battery vehicles).

Fueling infrastructure.
Getting the fueling infrastructure in place is an important enabling factor for introducing new types of vehicles, especially for zero emission hydrogen fuel cell vehicles. The initial introduction of H2 FCVs is likely in the 2015-2017 timeframe. According to some low carbon scenarios, hydrogen fuel cell vehicles might account for over half of the light duty fleet by 2050. Studies by UC Davis[xii], UC Irvine, and by the California Fuel Cell Partnership[xiii] suggest that in the near term 68-100 hydrogen stations would be needed statewide to support the 25,000 to 50,000 FCVs expected under the current ZEV regulation. This would require an investment in the range of $50-100 million over 5-7 years. Beyond this level, and assuming a successful, rapidly growing market for FCVs, it appears that hydrogen could be supplied to consumers at economically attractive prices.[xiv]

Need for Consistent Policy
It is important to nurture the early stages of alternative fuel adoption with strong and consistent policies that recognize the timelines needed for success. There is clearly a role for public support, since large public net benefits could be realized.

I would be pleased to provide additional information, as needed.

Sincerely,

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Wayne Leighty, Joan Ogden and Christopher Yang, op. cit.

[xii] Joan Ogden and Michael Nicholas, "Analysis of a "Cluster" Strategy for Introducing Hydrogen Vehicles in Southern California", *Energy Policy*, 39 (2011) 1923–1938.

[xiii] The California Fuel Cell Partnership "A California Road Map: Bringing Hydrogen Fuel Cell Vehicles to the Golden State," describing the infrastructure necessary to successfully launch commercial FCEVs. http://cafcp.org/RoadMap.

[xiv] Joan Ogden and Michael Nicholas, op. cit.