

Meeting the Goals of AB 32: Fuels of the Future

**An Informational Hearing of the
Senate Transportation and Housing Committee
October 24, 2011 – 1:00 PM
State Capitol, Room 112**

FINAL REPORT

Purpose and Summary

The Senate Transportation and Housing Committee held an informational hearing entitled “Meeting the Goals of AB 32: Fuels of the Future” on Monday October 24, 2011 at the State Capitol. The hearing examined the long-term viability of available fuels to meet California's transportation demands – demands that reflect state policies on air quality and greenhouse gases. Senator Mark DeSaulnier chaired the hearing, and Senators Kehoe, Pavley, and Rubio attended.

The hearing consisted of three panels. The first set of panelists gave an overview of California's future fuel needs, the regulatory framework under which these fuels will be provided, and fuel and vehicle technologies. The members of the first panel were Mary D. Nichols, Chairman of the California Air Resources Board; Daniel Kammen, Class of 1935 Distinguished Professor at the University of California, Berkeley; and Dawn Manley, Deputy to the Vice President at Sandia National Laboratories in Livermore, California.

Members of the second panel spoke about providing fuels of the future. The second panel consisted of Catherine Reheis-Boyd, President of the Western States Petroleum Association; Denise Gitsham, Director of Corporate Affairs and Legislative Counsel for Sapphire Energy, Inc., representing the Advanced Biofuels Association; Eileen Tutt, Executive Director of the California Electric Transportation Coalition; Catherine Dunwoody, Executive Director of the California Fuel Cell Partnership (CaFCP); and Tim Carmichael, President of the California Natural Gas Vehicle Coalition (CNGVC).

The third panel focused on the impacts of future fuels. Members of the third panel included Simon Mui, Clean Vehicles and Fuels Scientist with the Natural Resources Defense Council; Don Anair, Senior Analyst and Engineer with the Union of Concerned Scientists; Bonnie Homes-Gen, Executive Director of Air Quality and Public Health for the American Lung Association of California (ALAC); Jane Williams, Executive Director of California Communities Against Toxics (CCAT); David Campbell, Secretary-Treasurer of the United Steelworkers Union (USW) Local 675; and Bob Epstein, co-founder of Environmental Entrepreneurs.

The hearing concluded with public comment from Gene Erbin, representing the Alliance of Automobile Manufacturers and two Conoco Phillips refinery workers from Rodeo, who are also members of USW Local 675.

Panelists' testimony is attached as appendices to this report.

Issues of Discussion

The background paper for the hearing raised the following issues for discussion:

- Achieving AB 32's goals
- Fuel properties comparison
- The Low Carbon Fuel Standard (LCFS) and carbon intensity (CI) values
- Fuel source and supporting infrastructure
- Co-evolution of technologies

These issues are further described below in the context of the hearing proceedings.

Achieving AB 32 Goals. Transportation is the largest single contributor of greenhouse gas (GHG) emissions in California, making up 38 percent of emissions. It is, therefore, unlikely that without significant reductions derived from lowering the GHG emissions of transportation fuels that we could achieve the required GHG reductions.

Chairman Nichols described in her testimony an integrated approach to meeting the state's air quality and climate change goals. She described that the fuels of the future would simultaneously achieve air quality and climate goals while providing energy security and economic stability, accelerating the transition of these new sources of energy and fuels despite large investment in infrastructure. She highlighted three approaches: the LCFS, sustainable biofuels, and Zero Emission Vehicles (ZEVs).

The LCFS requires the suppliers of transportation fuels to reduce those fuels' CI by 10 percent below 2010 levels by 2020. Chairman Nichols stated that the LCFS is a technology-neutral, performance-based standard and a unique regulation because it accounts for the lifecycle emissions of a product. Under the regulation, carbon reductions will begin modestly and become stricter with time, allowing regulated parties to come into compliance at minimal cost. The regulation is still a work-in-progress, and the ARB will consider amending it in December 2011

to increase flexibility for oil refiners, fully account for emissions from crude oil, and increase the availability of credits. Nevertheless, Chairman Nichols noted that as 2020 approaches, compliance will likely require developing lower carbon ethanol and “drop-in” biofuels (substitutes for conventional fuel that are completely interchangeable with petroleum fuel and compatible with current engine technology), expanding use of E85 flex-fuel vehicles, and encouraging greater use of natural gas, electricity, and hydrogen fuel.

ARB’s vision for sustainable biofuels is that they complement electric vehicles in the fleet or be used in heavy-duty and off-road applications that are difficult to electrify. Chairman Nichols stressed the importance of an integrated approach to biofuels that would prioritize waste reduction and landfill diversion, protect air and water quality, promote forest health, and target projects that are most cost-effective and offer the greatest economic and environmental co-benefits.

Regarding ZEVs, Chairman Nichols noted that to meet the climate change goals of 2050, 87 percent of the light-duty fleet would need to be battery electric, fuel cell, or plug-in hybrid using renewable fuel in the form of electricity, hydrogen, or biofuels. Furthermore, she stated that the ARB will consider updating regulations as part of the Advanced Clean Cars package, which would lead to about 15 percent of new vehicle sales being ZEVs by 2025.

Fuel Properties Comparison. The background paper included a table that compared fuel source, energy content, energy security impacts, number of fueling stations, price, and maintenance for light-duty vehicle fuels. The inter-relationships among these properties are complex. The committee staff provided the table as a point of reference about the fuels that would be discussed at the hearing, and it is included again as the first appendix of this report.

The LCFS and CI values. The LCFS contains CI values for a variety of fuel pathways (fuels and their production and distribution processes) that ARB staff have analyzed. These CI values are the crux of the LCFS regulation for fuel providers.

Some are concerned that the LCFS has the potential to cause fuel “shuffling,” particularly with High Carbon Intensity Crude Oil (HCICO). Shuffling refers to the shipping of product from the point of production to another region of the world for refining and use. The HCICO provision of the LCFS identifies and discourages significant use of HCICOs in California refineries because they require more energy to produce and result in higher carbon emissions over the lifecycle of the fuel. Under the LCFS, North American HCICOs could be shipped to other parts of the world for refining and use, while lighter crudes are shipped to the U.S. in order to meet environmental standards.

Shuffling could also occur with ethanol. Corn-based ethanol from the U.S. has a CI value that is relatively high compared to other alternative fuels because of the carbon emissions associated with crop production. Brazilian sugarcane ethanol has a lower CI than corn ethanol, and thus, to meet the requirements of the LCFS, Brazil could send sugarcane ethanol to the U.S. while U.S. producers send corn ethanol to other parts of the world.

While there is vast support for the LCFS among alternative fuel, environmental, and public health groups, the issue of shuffling still needs resolution. This issue could lead one to question what impact our LCFS policy is having on climate change – a global phenomenon – if we are merely shifting product, and therefore problems, to other parts of the world.

Fuel source and supporting infrastructure. A larger, alternatively-fueled vehicle fleet will increase demand for alternative energy sources and require new supporting infrastructure. Examples of challenges include:

- The federal Renewable Fuels Standard (RFS2) specifies the use of renewable biofuels. A transition from petroleum fuels blended with 10 percent ethanol to petroleum blended with 15 percent ethanol would help to achieve RFS2 quantity goals. Such a transition necessitates cooperative fuels and vehicle research, and a public-awareness campaign, to ensure appropriate functioning of the vehicles and supporting infrastructure with this new blend. This example illustrates that mandates cannot progress successfully without adequate research and transition time.
- Synergies between fuel providers and auto makers will be important in driving consumer acceptance of alternative technologies. Hydrogen fuel stations, for example, must be available in advance of vehicles so customers have confidence that they can get fuel when they need it. The CaFCP surveys hydrogen-vehicle automaker members every year, and the members have consistently reported that by 2017 more than 50,000 passenger fuel cell vehicles will be on California roads.
- As the state strives to meet its 33 percent Renewables Portfolio Standard, the state should also consider how to manage increasing energy demands from an expanded electric vehicle fleet with protecting open space, critical habitat, and farmland. SB 618 (Wolk), Chapter 596, Statutes of 2011, took steps in protecting prime farmland – a non-renewable resource – by allowing the development of solar projects on marginal farmland with degraded soil conditions. Encouraging urban renewable energy projects, energy efficiency, and reduced consumption are ways to achieve energy goals while still protecting natural resources.
- Hydraulic fracturing to acquire fossil fuel natural gas is expected to increase from 15 percent of the U.S. supply to 50 percent, according to the CNGVC. While member companies of the CNGVC supported AB 591 (Wieckowski) – a bill that would have required the reporting of chemical constituents used in hydraulic fracturing fluid – 87 percent of the natural gas used in California comes from out-of-state. Thus, California legislation would have no bearing on the acquisition of the bulk of the natural gas used in California.

Co-evolution of technologies. Alternative fuels are in their early generations, and it could be argued that a co-evolution of technologies is needed to support energy objectives while progressing toward the environmental objectives of AB 32. Continued research and lifecycle assessments would provide a better understanding of how fuel and vehicle technologies could fill niches in the present and future.

During her testimony, Dawn Manley of Sandia National Laboratories spoke about scenario analysis, which is research methodology that enables scientists to consider transition pathways

from a current to a future state. The dominant engine on the road today is the internal combustion engine, and fueling infrastructure has developed around it. Currently, the internal combustion engine is about 30 percent efficient in its conversion of fuel to energy, but laboratory research has demonstrated that 50 percent efficiency is achievable.

A Sandia colleague of Dr. Manley – Robert Carling, Ph.D – wrote the following in an article entitled, “An engine we still need, How we can save energy with combustion technology,”

Because transportation represents such a sizable portion of oil use in the United States, we can achieve a 30 percent reduction in overall oil consumption if we can arrive at a 50 percent reduction in fuel use in automobiles and trucks. This is very doable from a scientific standpoint. ... We [scientists] take the call for research into alternative energy solutions very seriously. But don't forget the combustion engine. It remains the most proven and the most cost-effective near-term method for reaching the nation's transportation energy goals.

This statement illustrates how improvements to current technology can help us meet energy and environmental goals. One could argue that we should consider how to incentivize these efficiency advancements in the internal combustion engine as near to mid-term technologies in addition to incentivizing advanced biofuels, electric, and other fuel technologies.

Other Points of Discussion

The committee may wish to consider these other points of discussion that were raised during the hearing.

AB 118 funds. AB 118 (Núñez), Chapter 750, Statutes of 2007, created the Alternative and Renewable Fuel and Vehicle Technology Program, which the California Energy Commission (CEC) administers to provide grants, revolving loans, loan guarantees, loans, or other appropriate funding measures to public agencies, vehicle consortia, businesses, consumers, academic institutions and others to develop and deploy innovative technologies that transform California fuel and vehicle types to help attain the state's climate change policies.

Funding of approximately \$100 million annually for this program comes from additional fees on vehicle registrations, special identification plates for various vehicles, and vessel registrations, plus \$10 million annually from the Public Interest Research, Development, and Demonstration Fund, which is derived from a portion of electric utility rates. The CEC, through a competitive process and pursuant to an appropriation in the state budget, allocates these funds to alternative fuel and vehicle technology projects, and Chairwoman Nichols noted that some of these funds have been used to co-fund, for example, hydrogen fueling stations. Nevertheless, the fees that support AB 118 grants are due to expire at the end of 2015. With the passage of Proposition 26 last year, an extension of the fees would require a two-thirds vote. Thus, the future of AB 118 grant funds is uncertain.

Renewable natural gas. Renewable natural gas (RNG) is sourced from landfills, agricultural operations such as dairies, and waste water treatment plants, and according to ARB's analysis for the LCFS, landfill gas has the lowest CI of all alternative fuels. Nevertheless, California law hinders the piping of natural gas produced at California landfills. That existing law, AB 4037 (Hayden), Chapter 932, Statutes of 1988, prohibits a gas producer from knowingly selling, supplying, or transporting landfill gas to a gas corporation and from knowingly purchasing landfill gas, if that gas contains vinyl chloride in a concentration that exceeds a certain risk level. (Vinyl chloride is a colorless, flammable gas that can result from the microbial breakdown of chlorinated solvents. Vinyl chloride is listed by the Environmental Protection Agency as an air pollutant and carcinogen.) Every company that produces, sells, supplies, or releases landfill gas for sale offsite to a gas corporation must test the gas at the point of distribution for carcinogenic chemicals, like vinyl chloride, and pay a fee.

AB 4037 applies uniformly to all California landfills (hazardous and non-hazardous) despite technology advancements that could remove vinyl chloride from landfill gas. Additionally, the law only applies to California landfill gas inserted into and withdrawn from pipelines in California. It does not apply to landfill gas inserted into pipelines in other states and withdrawn from pipelines in California. Given the controversy around hydraulic fracturing, and given ARB's analysis showing very low CI from landfill gas, perhaps it is timely to consider allowing California to use some of its own landfill natural gas to produce low carbon fuels for transportation.

Impacts. The impacts of fuels of the future are not only environmental but also societal. Bonnie Homes-Gen of ALAC testified that for an average 16 gallon tank of gasoline, under current tailpipe emissions standards, a local community incurs over \$7 of damages to public health. Thinking globally, Jane Williams of CCAT stated, "We [California] consume more like a country than a state," and noted that the biofuel mandates and subsidies of the European Union and U.S. are contributing to global poverty and hunger. Nonetheless, David Campbell of USW Local 675, who represents 2200 workers at 10 refineries cautioned to "be careful about how this [LCFS] is implemented." He noted that refineries are built to run a specific type of crude, and that it is important that policies allow time for companies to come into compliance or plan for a conversion such that workers and communities are prepared for change.

Conclusion

In considering fuels of the future, some are filled with anxiety while others are filled with hope. Certainly, the length of the agenda for the hearing illustrated that many want to influence the fuels of the future. For some, recent reports that CO₂ emissions increased by six percent from 2009 to 2010 will cause anxiety, and policies such as AB 32 give hope. For others, climate policies cause the anxiety due to uncertainty about how their implementation will change the business and work environment in California. Probably the best leveler of anxiety and hope will be an integration of approaches and technologies to transition California to the desired energy security and environmental goals. On this, all panelists seemed to agree.