Union of Concerned Scientists

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James Boyd, Vice Chair; Presiding Member, Transportation Committee
Jeffrey Byron, Commissioner; Associate Member, Transportation Committee
Robert Sawyer, Chairman, CARB
California Energy Commission
Docket Office
Attn: Docket 06-AFP-1
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Dear Commissioner Boyd, Commissioner Byron, and Chairman Sawyer:

UCS appreciates the opportunity to comment on the state's Full Fuel Cycle Assessment (February 2007) pursuant to AB 1007. We strongly support the prudent use of alternative fuels to wean our state from dependence on high-carbon fossil fuels. We also support the efforts of the California Energy Commission (CEC) and California Air Resources Board (CARB) to evaluate the lifecycle impacts of various fuels and to develop policies that move California towards a low-carbon sustainable transportation system.

We commend the state for embarking on a process to better understand full fuel cycle impacts. As California implements policies to significantly expand alternative fuel use, we have a unique opportunity to hold fuels accountable for their lifecycle emissions and impacts. The challenge we face is that we have limited understanding of the carbon and sustainability implications of certain upstream processes, particularly land use changes. The state must continue to invest in research to better understand and quantify upstream impacts using consistent metrics. Policies to expand alternative fuels should drive domestic and foreign fuel producers towards sustainable use of land, water, and soil resources.

Below we present overarching comments on the Full Fuel Cycle Analysis, as well as specific comments on the well to wheels (WTW) analysis.

General Comments:

Acknowledge Data Uncertainties

There are significant gaps in our understanding of upstream impacts, resulting in considerable uncertainty in the quantification of these impacts. The Full Fuel Cycle

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Analysis should discuss current mechanisms for evaluating upstream impacts and identify where significant data gaps exist. This is particularly important for biofuels, where upstream impacts can vary greatly depending upon the previous use of the land, feedstock crop, farming practices, and whether biofuels displace food production, pushing agricultural systems into virgin forests. The report should also provide a frank assessment of the quality of data used to estimate greenhouse gas emissions and other upstream impacts for each feedstock. Where considerable uncertainty exists, the range in estimated GHG impact values should be broadened.

Expand Analysis of Land Use Impacts

The report should highlight the data available on land use impacts from feedstock and fuel production, particularly for ethanol and biodiesel, both in the U.S. and abroad. Where quantitative data is lacking, the report should provide qualitative information on feedstock land use implications for different feedstocks and processes. The report should discuss the climate change implications of land use and agricultural practices.

Provide Data Sources

The report does not identify sources of information used to estimate GHG and criteria pollutant impacts. To promote transparency and allow for full external review, the report should cite the original research, particularly where there is considerable controversy or uncertainty over the estimated impacts.

Specific Comments (WTW Assessment)

3.1.1. Baseline Gasoline Vehicle

The report should include an evaluation of a gasoline vehicle equipped with GHG reduction technologies and fuels. There are numerous technologies and aerodynamic improvements available today and anticipated tomorrow that can reduce a gasoline vehicle's GHG. In addition to the hybrid-electric vehicle, the report should include an advanced gasoline vehicle case based upon CARB's evaluation of GHG reduction technologies for vehicles.[1]

The report should discuss the implications of California's GHG standards for vehicles (also called "Pavley"). If the Pavley standards survive legal challenge, they will translate into a 27 percent reduction in GHG from light duty vehicles in 2030. Thus, the average gasoline vehicle will become significantly cleaner in 2030 compared with a 2012 vehicle.

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[1] See, for example, CARB's Staff Report, Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, dated August 6, 2004.

The report should also discuss the potential emissions impact of low-blend ethanol used in off-road equipment. Gasoline blended with small amounts of ethanol (less than 10 percent) can cause an increase in emissions of smog-forming pollution from on-road vehicles like cars and trucks, as well as off-road equipment, like lawn mowers and pleasure boats.[2] While the California Air Resources Board believes that gasoline can be reformulated to counteract the smog-forming pollution from low blends of ethanol used in ***on-road*** vehicles, there is currently no solution in sight for reducing the smog-forming pollution from ***off-road*** vehicles that use ethanol. From the limited data available, CARB estimated that by 2020, the emissions increase from permeation in off-road engines could equal nearly 8% of all ozone-forming pollution from gasoline engines. There is currently emissions data from a handful of lawnmowers, and more data is needed to accurately assess the problem and develop mitigation strategies.

The benefits of E10 relative to today's gasoline (E5.7) appear to be overstated. According to Appendix A-3, E10 provides a 2% reduction in GHG relative to G1. This implies that gallon for gallon, ethanol provides a 46% GHG emissions reductions benefit over E0. This far exceeds published estimates of the emissions benefits of ethanol. For example, a recent UC Berkeley study found ethanol reduces GHG 18% relative to gasoline on an energy-equivalent basis.[3]

The baseline data on gasoline emissions (Table 3-1) does not match the detailed data in Appendix A-3. For example, Table 3-1 states that E10 provides a 1% GHG benefit relative to the baseline, but Appendix A-3 indicates E10 provides a 2% GHG benefit.

3.1.2 Diesel Fueled Light-Duty Vehicles

The report should discuss how the US Corporate Average Fuel Economy (CAFE) Standards and California's Pavley standards impact GHG from diesel vehicles. Because CAFE is based upon fuel economy, in miles per gallon, and not the carbon content of the fuel, ***an increase in the number of diesel vehicles sold in the US has the perverse impact of actually increasing overall GHG***. California is currently protected from this spike in GHG from diesel LDV through the Pavley standards, which hold all vehicles to the same GHG performance standard. If the Pavley standards do not survive legal challenge, increasing diesel sales in California will result in higher GHG from vehicles.

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[2] Under current law, CARB is required to ensure that the fuel formulation of RFG3 does not lead to an increase in pollution. CARB evaluated emissions from highway vehicles and found that today's fuel formulation is indeed causing an increase in smog-forming pollution. CARB is in the process of evaluating whether excess emissions from highway vehicles can be completely mitigated through fuel formulation. But CARB lacks sufficient data to accurately evaluate emissions and mitigation potential from offroad equipment.

[3] "Ethanol can contribute to energy and environmental goals"; Farrell, A.E., R.J. Plevin, B.T. Turner, A.D. Jones, M. O'Hare, and D. Kammen; *Science*, 311. 506 - 508 (2006). See http://rael.berkeley.edu/EBAMM/

The report provides inaccurate data on diesel criteria pollutant emissions (Table 3-4). NOx emissions should be higher than gasoline, and PM may be as well. Diesels are expected to just meet LEVII emissions standards, not exceed them, as gasoline SULEVs can do today.

The report should provide additional information on emissions concerns regarding diesels. Diesel vehicles are currently not subject to smog-check and it is unclear whether diesel on-board diagnostics (OBD) will be able to match the performance of OBD for gasoline LDVs. As a result, there could be higher criteria pollutant emissions from diesel LDV than vehicle certification tests indicate.

3.2 Ethanol

There should be references for all of the data on ethanol emissions reductions to provide transparency and permit review of the original research. Some of the estimates of the GHG emissions reductions from ethanol are highly optimistic and merit special attention. For example, the report estimates that E 85 from CA corn reduces GHG 30 to 50% (Table 3-5) and E-85 from sugar cane (Table 3-6) reduces GHG by a whopping 80%. These are very aggressive projections for E85 benefits, particularly given that 20% of E85 is conventional petroleum. The report should discuss how these estimates were derived and conditions necessary for their attainment.

We urge the CEC and CARB to exercise caution when estimating emissions benefits from ethanol, particularly when produced in other countries, such as Brazilian sugar cane. There is no conclusive life-cycle assessment that takes into account all emissions from different types of land-use change and from soil erosion and fertilizer use. If the Amazon rainforest is displaced by cropland as a result of expanding sugar can production, there may be an overall increase in GHG. Thus, it is important to be circumspect in estimating emissions benefits, particularly in other countries, and to recognize that land use changes play a vital role in calculating emissions impacts. Rather than an optimistic estimate, the report should provide a wide range of possible GHG impacts, recognizing that land use changes and farming practices are critical to the assessment. The report should also discuss research gaps and uncertainties in the analysis.

3.3 Biodiesel

Like ethanol, biodiesel can be derived from a host of different feedstocks, each with different implications for GHG, criteria pollutants, land use impacts and other key impacts. The CEC has identified palm oil from countries like Indonesia as one of the cheapest potential sources of biodiesel. This raises concerns about whether native forests, which currently are major carbon sinks, will be displaced by palm crops with less carbon sequestering potential. The emissions impacts of biodiesel are very dependent on the previous use of the land, feedstock crop, agricultural practices, and whether food

production is pushing agricultural systems into virgin forests. The report should discuss these uncertainties and for GHG, should provide a wider range of emissions impacts.

Biodiesel criteria pollutant emissions impacts (Table 3-10) are incorrect. Estimated criteria pollutant emissions are based upon today's heavy duty vehicle tests using pre ULSD fuel. With new emissions standards for both LDV and HDV, it is not clear whether there will be any emissions impact on 2012 vehicles. The report should clearly state that there is not currently emissions data to evaluate B20 on 2012 compliant vehicles.

We appreciate the opportunity to work with CEC and CARB to develop better metrics for lifecycle analysis, and to promote sustainable energy systems that reduce global warming pollution, promote air quality, and preserve our environment.

Sincerely,

Patricia Monahan
Deputy Director, Clean Vehicles