



November 10, 2008

Mary D. Nichols, Chairman
California Air Resources Board
Headquarters Building
1001 "I" Street
P.O. Box 2815
Sacramento, CA 95812

Dear Chairman Nichols,

We write you in response to a series of letters and statements that argue for excluding indirect land use effects in California's Low Carbon Fuel Standard (LCFS) and EPA's rulemaking for the Renewable Fuel Standard (RFS). The letters include one by the New Fuels Alliance (NFA) representing 30 companies and individuals, dated October 23, 2007 [1]; a statement by Duncan McFetridge, representing the NFA, to Chairman Nichols, and one by scientists and biofuels industry executives addressed to the Honorable Stephen Johnson of the U.S. EPA, dated October 21, 2008. We urge you to continue on ARB's current path of recognizing the best available estimates of market-mediated land use change carbon releases in estimating any fuel's global warming index.

The NFA letter in particular raises a series of arguments against adding the best estimates of greenhouse gas (GHG) releases from land use change (LUC) to those induced directly by biofuel production in implementing the LCFS. Specifically, for any given fuel, CARB contemplates not only estimating direct GHG emissions from agriculture (e.g., tractor diesel fuel) and ethanol conversion (e.g., natural gas for distillation) on a per-MJ basis, but also adding to those the GHG emissions resulting from market-mediated land use change, typically occurring far from the cultivation of the actual fuel, when existing carbon stocks in trees, plants, and underground are released by fire and decay following land clearing. The salience of this decision lies in the size of current estimates of these indirect emissions: added to typical direct emissions values, they indicate that substituting certain biofuels, especially corn ethanol, for gasoline will actually increase the global warming (GW) intensity of motor fuel, or decrease it so little (depending on how it is calculated) that it will not be a practical compliance path for the LCFS.

The arguments for the NFA position are mostly familiar from other correspondence and debate, such as the exchange of letters to Chairman Nichols in the summer of 2008. We summarize these arguments and respond to each:

1. *The NFA claims that estimates of LUC are too uncertain to use in policy decisions.*

Our response: The estimates do indeed come with substantial uncertainty (though there is plenty

of uncertainty in the direct emissions values assigned to biofuels as well). But NFA provides no measure of this uncertainty, and no standard by which it could be decided that any particular estimate is “too uncertain” to use in policy, and there is no shortage of laws and regulations based on science and judgment incorporating wide error bands: the NFA is in effect proposing a complete change in the criteria for government action. CARB has long regulated vehicle emissions on the basis of air transport and chemical transformation models whose uncertainty regarding (i) the concentrations in a particular place of (ii) a given quantity of released pollutants, (iii) the health effects of these releases, and (iv) the economic costs of the effects have very wide error bands owing to data sampling error, meteorological variability, and public health models. Engineered product systems such as biofuels produced on arable land carry risks to human health and Earth’s climate; those risks are uncertain, but a variety of methods are available and are being employed for their estimation. Understanding the boundaries and limitations of those methods is critical to informing policy. Excluding use of these methods because of alleged “severe data and technical shortcomings” as put forward in the NFA letter would result in open-ended comparisons that ignore the principle of “compared to what” and imply no action.

Estimates of direct GHG emissions from corn ethanol production include some very uncertain factors, most notably in the nitrous oxide emissions related to fertilizer application [2]. Indeed, LCA results are generally uncertain, owing to data gaps, aggregation, arbitrarily constructed system boundaries, handling of co-products, and more [3-5]. If “uncertain” means “we have to ignore it”, then all these elements of direct emission also need to be omitted, greatly (and absurdly) reducing the calculated GW intensity for ethanol, but to include one and not the other would be completely inconsistent.

*2. In various forms, NFA presents a group of arguments that misunderstand what is being predicted as LUC releases. **Our response:*** For example, whether US agricultural land has decreased while output has increased, or corn exports have increased while ethanol production has increased, or lots of other policies affect land use change, are entirely beside the point. LUC models estimate the GHG releases from the land use changes caused by increased biofuel use *relative to what they would be, considering all those other things that matter without the biofuel use*. This independent effect of biofuel increase would occur, with small variation, if the biofuels are cultivated in conditions of high food prices and shortages, or low prices and abundance.

Some conditions do affect the size of the LUC effect importantly: higher agricultural yields, and a greater yield response to food prices, for example, would make the LUC discharges lower than otherwise, which is why we modeled a wide range of these critical variables in scenarios that will help inform CARB’s decision making.

*3. NFA flatly misrepresents the findings of current LUC modeling. **Our response:*** We have not found that an acre of fuel production requires “almost an acre of crop development somewhere else”. In fact each acre of “gross” corn ethanol land use induces less than a third of an acre of “net” land use change because ethanol production does not use all the food value in corn, leaving DDGS to go back in the animal feed market, and the market responds to the price increase that draws corn into ethanol use by increasing yields and decreasing other consumption of food commodities.¹

¹ Although decreased food demand reduces the land requirement and thus the GHG emissions from LUC, this effect can hardly be treated as a benefit, since it comes at the cost of human suffering. In this letter, however, we are focused on GHG accounting.

4. *NFA correctly notes, in effect, that LUC emissions can be attributed to anything that competes with food for land.* **Our response:** It is true that the LUC global warming effect applies to using agricultural land for houses or highways or parks, and we agree that it would be even better policy if the state considered this important environmental effect of a large set of policies. But demanding that a solid scientific finding be excluded from incorporation into state policy until it is implemented pervasively is a counsel of complete paralysis. Failure to control emissions from home fireplaces until this year was never proposed as a reason not to control them from cars and industry over the past three decades.

5. *NFA suggests that a variety of non-GW-related benefits of crop ethanol use outweigh the GW effects of LUC.* **Our response:** This may be true; crop ethanol has non-GW benefits and non-GW costs, but no analysis has been presented to show how they balance out. In any case, this decision was made with the implementation of the LCFS, a judgment that lower carbon fuels were worth their costs. To knowingly misrepresent the carbon intensity of these fuels, which is what it would mean to simply ignore LUC that has been shown to be positive in every model anyone has presented to date, published or not, completely undermines the concept of the LCFS. Furthermore, houses, highways, and parks are not designed with the intent of reducing climate change, the fuel standards in question are.

Of course future biofuels, whether from wastes or cellulosic feedstocks or algae or anything else, should be individually assessed for their real climate benefits, and those that will, if used, reduce transportation emissions of GHG should see wide use under the LCFS. Also, if evidence (not just assertion) shows corn ethanol's LUC emissions to be very low, negative or zero, that evidence should be used by CARB in LCFS implementation.

In addition, the letter by Duncan McFetridge repeats the assertions from the NFA letter about the uncertainties in computational general equilibrium (CGE) modeling but provides no more evidence for them being a barrier to recognizing LUC as nearly as we can measure it. His suggestion that only biofuels are "penalized for indirect effects" misrepresents CARB's plan to estimate direct and indirect land use GW effects for all fuels under the LCFS. Work is underway to estimate direct land use GW effects for both conventional and unconventional oil (tar sands and oil shale); these are expected to be included in their GWIs. As it happens, LUC from other fuels (possibly excluding open-pit and mountaintop-removal coal) is almost certainly very low, (because the amount of energy obtained by disturbing a unit of land to get at them is very high), just as fossil fuels are distinguished by having very high intrinsic GW from the carbon in the fuel that biofuels do not.

As to the GW emissions from coal and NG in the PHEV system, presumably CARB will estimate these and should.

The NFA also asserts that assigning a value to crop-based ethanol LUC in the LCFS would be catastrophic for advanced biofuels development. This is claimed without evidence, and indeed it seems most unlikely. The infrastructure required to increase the ethanol content of vehicle fuel is not especially complicated or even expensive, and could be provided rapidly if a biofuel with lower GW than gasoline is offered to the market. Little experience remains to be gained from handling corn ethanol that is needed for managing other kinds. Moreover, bio-based

hydrocarbons currently under development by several companies will be compatible with existing petroleum fuel infrastructure. If these fuels obtain a low GW rating and can be produced economically, there would be no barriers to their widespread use.

These letters represent the views of interested parties who have invested heavily in various crop-based biofuels, perhaps too quickly. The signatories are not climate scientists, economic modeling experts, nor in general expert in the fields involved in estimating LUC. The letters have an underlying implication that CARB should be implementing the LCFS in a way that benefits the biofuel industry in its present form (crop-based), but there is nothing in the authorizing legislation to indicate that it was intended to be a protectionist mechanism to favor a particular industrial group. They also suggest that biofuels have intrinsic virtues apart from GW reduction that CARB should recognize in the LCFS, but the LCFS is a GW program, not a general and broad environmental enterprise; in any case, these virtues would need to be defined and demonstrated, not merely asserted.

The idea that not knowing everything about a complicated process means we know nothing about it, or cannot make useful predictions for regulation or investment, verges on the bizarre. The influences on human behavior are as complicated and as imperfectly understood as the social influences on land use change; friends, entertainment, employment, financial incentives, religion, appetites, and more. Nevertheless we uncontroversially regulate behavior with rules that have less than perfect consequential certainty: if some drivers are cited and fined for speeding, we are quite sure that there will be less speeding by most or all drivers, and we think the regulatory program will have its own effect, whether or not the state is simultaneously investing in public education of drivers, and whether gasoline prices are high or low.

That some land will be brought from natural conditions into cultivation, with accompanying rapid carbon emissions from the existing vegetation, when ethanol demand is added to whatever other corn the world market would otherwise use, is an inference from absolutely foundational and uncontroverted elementary principles of human behavior, such as the law of demand. Exactly how large the effect is requires sophisticated predictive models and will never be as precise as measuring the specific gravity of ethanol, but to act as though the effect is nil is simply obscurantist and unscientific. No principle of law or regulatory practice or common sense dictates that the state must regard any uncertain value as zero.

This is not something on which a political compromise makes any sense; it's not about benefits to this or that group, nor redistribution, but about our best estimate of carbon discharges.

Sincerely,

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