THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

1225 I Street NW, Suite 900
Washington DC 20005
+1 202.534.1600
www.theicct.org

April 11, 2014

RE: Public comments for the March 11, 2014, Low Carbon Fuel Standard and Indirect Land Use Change Workshops.

Dear Air Resources Board,

The International Council on Clean Transportation (ICCT) welcomes the opportunity to provide comments regarding the material presented at the March 11, 2014, Low Carbon Fuel Standard (LCFS) Re-Adoption and Indirect Land Use Change Workshops. The ICCT is an independent nonprofit organization founded to provide first-rate, unbiased research and technical analysis. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation, as well as their fuels, in order to benefit public health and mitigate climate change.

The ICCT has long supported California's Low Carbon Fuel Standard. In line with this, we applaud the public process that the California Air Resources Board (ARB) has commenced to re-adopt the LCFS regulation in 2014 following the decision of the State of California Court of Appeal, Fifth Appellate District (Court) to uphold the regulation. The continued commitment of the ARB to a successful and transformative LCFS sends an important market signal to potential investors in advanced low carbon fuel technologies, as well as to promote best practices among providers of high-carbon fossil-based fuels. Below are our comments in response to staff presentations given at two public workshops held on 11 March 2014, regarding the LCFS re-adoption process and a revised iLUC analysis respectively.

We commend the Air Resources Board for its continuing efforts to promote cleaner, lower-carbon fuels and for the transparency of the consultative process. If there are any questions, Air Resources Board staff can feel free to contact our Fuels Lead, Dr. Chris Malins (chris@theicct.org).

Yours,

Fanta Kamakaté

Chief Program Officer

International Council on Clean Transportation

International Council on Clean Transportation comments in response to presentations made at the LCFS re-adoption and iLUC workshops held in Sacramento on March 11 2014

Several new amendments were proposed to the current LCFS regulation at the re-adoption workshop. Regarding the proposal to add an option to credit GHG reductions achieved at refineries, we believe that this proposal is appropriate and consistent with the technology-neutral performance-based underpinnings of the LCFS program. If refiners are able to undertake specific projects that deliver real emissions reductions, it is entirely appropriate that these should be eligible for crediting, just as innovative upstream emissions reductions are eligible. Regarding the proposal to consider 'curve-smoothing' of the LCFS compliance targets post-2015, we understand the basis for the ARB proposal, but we are also sympathetic to the opinion shared by some biofuel producers at the workshop that the freeze in compliance targets made necessary by the legal situation has in fact allowed suppliers to stockpile credits, and thus immediate post-2015 compliance may be easier for obligated parties because of the temporary freeze, rather than harder. We encourage ARB to undertake further analysis of the credit positions of the obligated suppliers as compared to possible compliance scenarios before making a final decision in this regard, and to give high priority in these considerations to the need to encourage investment in ultra-low carbon fuels as soon as is possible. We would also encourage the ARB to share information about their analysis and projections regarding potential excess credit accrual to inform this question among stakeholders.

Regarding refinery-specific incremental deficits, we understand the ARB staff's reasoning in proposing this as an option for smaller refineries, and we are broadly supportive of the initiative. We agree with ARB that very small refineries have no real control over the California average upstream emissions intensity, and thus giving such refineries an opt-out option to avoid being penalized with incremental deficits is laudable. We would encourage the ARB to continue to consider the introduction of refinery specific incremental deficits more generally, as a way to more actively manage the upstream carbon intensity of oil entering the California market.

Finally, regarding the proposed introduction of a two-tier system for pathway applications, we are supportive reducing the administrative burden for both companies and the ARB, providing that the incentive for suppliers to incrementally improve the carbon intensity of their fuel production pathways is maintained.

In addition to these new proposals, several LCFS amendments from 2013 were re-introduced at the workshop, and the ICCT supports these amendments. In particular, the ICCT remains supportive of the initiative to introduce a cost-containment mechanism. This mechanism will provide protection for obligated parties, consumers, and the regulation itself, should an adequate supply of low carbon fuels be unavailable in some future compliance period. At the moment, it is unclear what would happen should compliance become unviable at some point. Several stakeholders contend that this fundamental uncertainty has had a significant effect in undermining the LCFS as a driver of investment. An appropriate cost-containment mechanism would provide a clear guarantee that the LCFS will stay in place through any such period, and provide a clear indication of the value to obligated suppliers (and therefore the value to low carbon fuel producers) of each additional unit of compliance under market shortage conditions. The credit clearance market concept is particularly appealing as a way to limit the overall cost to obligated suppliers of any supply shortage, while maintaining the strength of the market pull on marginal additional volumes of ultra-low carbon fuel.

Indirect land use change

The second workshop on March 11th presented the provisional outcomes of new iLUC analysis undertaken using the GTAP model. The ICCT commends the commitment of ARB to continue to take into account emerging evidence on iLUC, to revise the calculated iLUC values at appropriate intervals and to engage experts and stakeholders in this process. It is commendable that ARB has given proper consideration to the recommendations resulting from its expert workgroup process from 2010. We have the following additional technical comments on specific aspects of the revised treatment.

- **The Agro-Ecological Zone – Emissions Factor Model**
  Based on the documentation we have seen for the revised AEZ-EF model, this represents an excellent contribution to the field of iLUC modeling, and to land use change emissions factor assessment more generally, and we are convinced that it does indeed represent a meaningful improvement over the previously used Woods-Hole emissions factor model. Our only concern in this area relates to the way that the calculation is undertaken of converted peat area in Indonesia and Malaysia. It is our understanding that it has been assumed in the model that 33% of new oil palm in deforested areas will result in peat loss. However, work by the European Joint Research Centre[1] and ICCT[2] supports an assumption that at least one third of **all** oil palm expansion is likely to occur on peat swamp, based on historical data. The fraction of palm affecting peat in deforested areas should therefore certainly be higher than 33%. We would therefore recommend that the modeling should be revised to assume that a third of all palm expansion in Malaysia and Indonesia occurs on peat. Given that most peatland is indeed currently forested, if this fraction exceeds the total expansion on forest predicted by the GTAP model, this would suggest that GTAP is underestimating the likely impact of palm demand on forests in Indonesia and Malaysia, and that the elasticity of land substitution between oil palm cropland and forest should be increased to match observed dynamics of oil palm expansion.

- **Yield Price Elasticity (YPE)**
  The ICCT supports ARB's efforts to undertake additional analysis on the appropriate magnitude of yield responses in GTAP modeling. As we have previously noted, the econometric evidence for a strong yield effect (strong in the sense of being comparable to or larger than the overall area expansion effect) is weak, and we believe that the value of 0.25 for the yield effect adopted by GTAP and some other economic modeling is likely to be optimistic. ARB presented 'recent' evidence for a range of yield elasticity assumptions from 0.0 to 0.3. It was noted that these values tend to be based on US data but applied globally. We are supportive of ARB's use of a range of values, and believe that this is an appropriate approach given the lack of consensus in the literature. ARB noted that a value of 0 is not consistent with the structural demands of the GTAP model, and that therefore the lowest value modeled was 0.05. While we understand the need to make simplifications to recognize model limitations, we note that leaving out the lowest yield elasticity value in the range will tend to skew the results to a larger yield

[11] JRC (2010). *Indirect Land Use Change From Increased Biofuels Demand - Comparison of Models and Results for Marginal Biofuels Production from Different Feedstocks.* Roberts, E., Mulligan, D., Marelli, L. http://publications.jrc.ec.europa.eu/repository/handle/111111111/15324

[2] Miettinen, J., Hooijer, A., Tollenaar, D., Page, S., Malins, C., Vernimmen, R., ... & Liew, S. C. (2012). *Historical analysis and projection of oil palm plantation expansion on peatland in Southeast Asia*. International Council on Clean Transportation, Washington D.C. http://www.theicct.org/historical-analysis-and-projection-oil-palm-plantation-expansion-peatland-southeast-asia

effect. Within the chosen methodology of running a set of scenarios across the range of reported values, it would therefore be appropriate to apply an additional weighting to the lower end somehow – for instance, by counting the YPE = 0.05 scenario twice or three times in the averaging. If the results show a somewhat linear (or otherwise readily functionally fitted) response to YPE, an alternative approach could be to extrapolate the modeled iLUC results to estimate an appropriate set of values for YPE=0, and include those in the averaging.

Beyond this, ARB described a distinction in GTAP between an 'endogenous' YPE (a yield response internal to the structure of GTAP, and operating independently or pseudo-independently of the YPPE parameter), and an exogenous yield response based on the YPE parameter. In the example given, the endogenous effect had the equivalent impact of increasing the YPE parameter by 0.14. If this representation of the function of the GTAP model is correct, then the YPE parameter values imposed by ARB (0.05 – 0.30) actually result in a span of results with a 'realized' total YPE with a range of 0.19 – 0.44 (assuming that the endogenous effect is invariable with respect to the exogenous yield parameter, which was not made explicit in the presentation). This range is no longer consistent with the referenced literature (the ARB presentation referenced a range from 0 in Berry and Schlenker to 0.29 in Pérez). We would therefore encourage ARB to consider whether it would be appropriate to adopt a narrower range for the 'exogenous' YPE parameter (e.g. 0.05 – 0.16), or otherwise weight more heavily the lowest YPE cases. More generally, it became apparent during the workshop that the modeling team at Purdue does not accept this characterization of a dual yield effect. It would therefore be very useful to see documentation of the basis for ARB's conclusions in this regard, and of the calculation that enabled ARB to assign an estimated value of 0.14 to the endogenous YPE.

As a final observation on YPE, we note that Wally Tyner of Purdue argued in his intervention at the workshop that the short-run econometric estimates of yield elasticity that have been quoted by ARB are not an appropriate basis for setting this parameter. We are somewhat sympathetic to this argument, as we recognize that the value that can be econometrically estimated is not an exact match for the idealized parameter value in the GTAP modeling. However, we are not aware of a strong alternative justification for a specific value of 0.25, and indeed in the past the use of this value in GTAP has indeed been referenced to short-run econometric studies. One approach could be to calibrate the YPE that would be measured by econometric analysis of the results coming from GTAP, i.e. to adjust the YPE parameter until the results from the model would give values of observed YPE in the range 0 – 0.3. As the YPE is clearly a critical parameter for the iLUC analysis, we feel that it would be unsatisfactory in any event to adopt a value of 0.25 without a clearly defined basis for that assumption.

- **Land transformation elasticities (ETL) and land nesting**
  It is difficult to comment directly on the elasticities assumed for land use changes (the ETL parameters) in each region, because as noted by the staff presentation the literature on these elasticities is not particularly rich. We agree that in general there is a higher elasticity of land use change between crops than between the higher-level land use categories (forest and pasture). In some regions, the ratio shown in the staff presentation between ETL2 and ETL1 is very high indeed (up to 75:2 in some cases) and we note that this will presumably have the effect of strongly limiting any expansion of the total cropped area in these regions. We would encourage ARB to consider carefully whether these high ratios are fully justified. We note that in only one region, Malaysia-Indonesia, the elasticity of transformation between land types is higher than

the elasticity of transformation between crops. As palm oil is likely to be the most important crop in Mala_Indo for the modeling results, and as it is clear from historical evidence that most oil palm expansion has occurred at the expense of forest and in many cases peatland in recent years,[3] this reversed hierarchy seems appropriate. We would encourage ARB to compare the model outcomes to historical land use change patterns in this and other regions. If the model is systematically predicting rates of deforestation that are lower than historical patterns, we would suggest that CARB should re-calibrate and increase the relative value of the ETL1 parameter compared to ETL2 in those regions.

- **Elasticity of crop yields to area expansion**
  The latest GTAP modeling has been updated to use net primary productivity (NPP) ratios based on modeling with the terrestrial ecosystem model (TEM). This has replaced the previously estimated value of 0.66. The use of TEM was recommended by the expert workgroup, and further discussed at the LCFS Advisory Panel in 2011. It is our recollection that during those discussions it was not at all clear whether the use of NPP (and specifically C4 NPP) as a proxy for crop yield was scientifically justified, and we have been concerned that the adoption of TEM may reflect a desire to replace a simple assumption with a more complex assumption more than it represents a genuine analytical improvement. In particular, we note that within any area with a moderate history of agriculture, it would be economically rational for farmers to utilize the most productive land in favor of less productive land. Given the resolution of TEM, this is likely to be happening within each pixel. It is therefore arguable that comparing the average NPP within pixels is inappropriate. In pixels where there is already cultivation, achieved yields should be higher than indicated by the average NPP. TEM could therefore be expected to underestimate the ETA parameter, even if it can be demonstrated that NPP is a useful proxy for yields. It would be of considerable value to see analysis assessing the correlation on existing framed areas between the TEM predicted NPP and the achieved yields – if the correlation is strong, that would support the use of TEM, but if it is weak or non-existent it would suggest that TEM may not add any value.

- **Managed and unmanaged forestry**
  We see the lack of an unmanaged forestry land category in GTAP, and the consequent wood-product deficit following any deforestation, as a major flaw in the GTAP model, given the importance of deforestation to the emissions calculation. We commend ARB for confronting this issue, and look forward to hearing more about the solution that is being implemented shortly according to the presentations at the workshop. We note that IFPRI-MIRAGE, which has a similar model structure to GTAP, has already implemented an overall land expansion elasticity to allow the representation of overall managed land expansion.

- **Presentation of results**
  For the latest round of GTAP modeling, ARB has adopted an approach based on using parallel computing to allow a large number of simulations to be run, and the results to be based on the average of those runs. We believe that this type of approach is appropriate and justified, but we note that this reliance on results averaged across many sets of output data makes it difficult for stakeholders to understand what the

[3] C.f. Mietinnen et al., 2012 (http://www.theicct.org/historical-analysis-and-projection-oil-palm-plantation-expansion-peatland-southeast-asia), ICCT comments on the EPA palm oil NODA (http://www.theicct.org/news/epa-palm-oil-pathway-notice-data-availability)

model is actually predicting that underlies the headline iLUC numbers. It would greatly aid our assessment of the modeling exercise if it was possible to publish data regarding how yields are predicted to change, where land use expansion is predicted, which crops grow and which shrink, how food consumption changes, and so forth. We believe that in principle this could be done as an average of all runs undertaken. It would also be useful although less representative to see the results of one or a few 'central' runs, using the central values of all varied parameters. Whichever way ARB staff choose to approach this, we therefore request that spreadsheets should be released containing more detailed data on changes in areas under each land type and crop, yields and food consumption in each region in the model Without access to such detailed data, it is very difficult to conclude whether the model is producing plausible or implausible results. We recognize that ARB has taken the step of making the modified model code available. However, most stakeholders do not have existing access to the computational tools and databases required to run the model, nor necessarily have the skillset to run it successfully.