NESTE OIL

November 14, 2008
California Environmental Protection Agency
Air Resources Board
Attention: Christina Zhang-Tillman
Sent by e-mail to: czhangti@arb.ca.gov

**Re: Comments for Draft LCFS Regulation October 2008**

Thank you for the opportunity to comment on the **"Draft LCFS Regulation"**. Neste Oil commends the California Environmental Protection Agency and the Air Resources Board for its environmental leadership. Neste Oil supports California's efforts to develop alternatives to petroleum-based transportation fuels and respectfully offers the following discussion and comments to the LCFS Outline

**Definition of Biomass-based diesel, renewable diesel, biodiesel, and renewable biomass**

It is beneficial that the proposed definitions of biomass-based diesel, renewable diesel and biodiesel are consistent with that contained in Federal legislation. However, some minor edits and additions are needed to make the definitions consistent throughout the draft.

§95420 (a)(1)(J) Refers to biomass based diesel as B100. Yet §95427 states "B100" means biodiesel…" Reference to "(B100)" in §95420 (a)(1)(J) should be deleted. As references to renewable diesel appear before it is defined in §95427, the following edit should also be made:

§95420 (a)(1)…
(J) Pure Biomass-based diesel that includes
(i) Biodiesel (mono alkyl esters) (B100) and
(ii) Renewable diesel (non-ester) (R100), and…

§95422 (a)(4) Table 3. The phrase "Vehicles using B5, B20" should be replaced with "Vehicles using biomass-based diesel blended or neat"

§95423 (a)(2)(A) References to "biodiesel" and "B100" be replaced by "biomass-based diesel" as appropriate to read as follows:

(A) For purposes of this regulation, "diesel fuel and diesel fuel blends" (collectively referred to hereinafter as "diesel fuel") means finished diesel fuel, diesel-alternative fuel blends, E100 used in heavy-duty applications, and biomass-based diesel.

For purposes of this regulation, the producer or importer of pure biomass-based diesel that provides pure biomass-based diesel as a finished transportation fuel is treated as the diesel fuel producer or importer. Pure biomass-based diesel is subject to the same reporting requirements that apply to a diesel fuel producer or importer as specified in section 95423(c). The pure biomass-based diesel producer or importer must determine the carbon intensity of the pure biomass-based diesel by any of the methods specified in section 95425 for biomass-based diesel blendstocks, not for gasoline.

§95423 (c), Table 4. The term "R100" should be added to the header "Blended and Pure Fuels (i.e. E85, B20, B100, R100, E100)"

§95424 (a)(2) "B5, B20" should be replaced with biomass-based diesel blend so that §95424 (a)(2) reads as follows:

(2) LCFS…
For a provider of blended fuels such as E10, E85, biomass-based diesel blends, or …

§95424 (a), Table 7.
1) Diesel fuel appears to have been excluded from use in light/medium duty vehicles – it should be included.
2) California has very few light duty diesel vehicles at this time. Therefore, light duty vehicles fuelled with diesel fuel and biomass-based diesel blends are, for all practical purposes, alternative fuelled vehicles. Because new diesel engines are required to be as clean burning as gasoline engines and are inherently more efficient than gasoline engines, encouraging the use of light duty diesel engines can significantly reduce carbon emissions while not harming air quality. Therefore an entry for diesel fuel and biomass-based diesel blends should be added to the light/medium duty side of Table 7 with an EER of 1.3 (1/0.78).
3) The phrase "(incl. B5, B20, & other blends)" is neither necessary nor technology neutral therefore the phrase should be deleted.

§95425 (b)(1)(D) The term "R100" should be added to make the first paragraph read:

(D) *Alternative Fuels (CNG, LNG, LPG, Hydrogen, Electricity, Biomass-based Diesel Blend, Ethanol Blends, E100, R100 and B100)*

§95427.
A definition for "R100" should be included in order to enable the use of the term throughout the regulation.
The term "renewable biodiesel" should be corrected to read "renewable diesel".
References to the ASTM standards should reflect the recently approved 2008 versions.

"Alternative fuels" collectively refers to natural gas (CNG, LNG, biomethane), LPG, electricity, hydrogen, an ethanol blend, a biomass-based diesel blend, B100, R100, and E100.

"B100" means biodiesel.

"R100" means renewable diesel.

"E100," also known as "Denatured Fuel Ethanol," means nominally anhydrous ethyl alcohol meeting ASTM D4806-08 (*Standard Specification for Denatured Fuel Ethanol for Blending with Gasolines for Use as Automotive Spark-Ignition Engine Fuel*).

"Biomass-based diesel" means a biodiesel (mono-alkyl ester) or a renewable diesel that complies with ASTM D975-08a. This includes a renewable fuel derived from co-processing renewable biomass with a petroleum feedstock.
…
"Dedicated fuel vehicle" means a vehicle that uses a single external source of fuel for its operation. The fuel can be a pure fuel such as gasoline or a blended fuel such as E85 or diesel fuel containing biomass-based diesel. A dedicated fuel vehicle has one fueling port onboard the vehicle. Examples include BEV, E85 FFV, diesel running on diesel fuel containing biomass-based diesel, and grid independent hybrids such as a Prius.
…
§95427 CARB should add "land cleared in a sustainable manner" to the definition of renewable biomass. Including a provision for land cleared in a sustainable manner to be used to produce biofuel feedstocks encourages the use of sustainable practices. So the following addition should be made in the definition of Renewable Biomass:
"Renewable Biomass" means each of the following:
(i) …, and non-forested or land cleared in a sustainable manner.

CARB should allow for the inclusion of new renewable fuels other than ethanol, biodiesel esters, and renewable diesel in the LCFS. For example, a definition for "renewable gasoline" should be included. Renewable gasoline is analogous to renewable diesel – i.e. a hydrocarbon fuel derived from renewable sources, albeit with a smaller carbon chain length distribution than renewable diesel. Renewable gasoline is currently being produced as a by-product of renewable diesel production, and could be made "on-purpose" in the future. The same argument could be made for "renewable propane".

**Separate Compliance For Fuel Types**

§95421(a)(1)&(2). The separate LCFS compliance standards for gasoline and diesel fuel is of concern for two reasons.

(1) With the proposed ILUC values, it will be very difficult if not impossible to comply with the gasoline requirements

Table A illustrates the fuel blend required to meet the 2020 carbon reduction goal. The calculated blend concentrations required to meet the 2020 standard are based upon the carbon intensities listed in the draft regulation and the simple blending equation:

Blend% * $CI_{Alt\ Fuel}$ + (1 - Blend%) * $CI_{Base}$ = $CI_{LCFS\ Compliance}$. Which simplifies to:

Blend% = ( $CI_{LCFS\ Compliance}$ - $CI_{Base}$)/( $CI_{Alt\ Fuel}$ - $CI_{Base}$)

Table A shows that with the ILUC values indicated in the draft it is impossible to meet the proposed 2020 gasoline standard with commercially available ethanol, given the existing vehicle fleet (designed to use E10) and the existing fuel distribution infrastructure. That means that the current fleet must be replaced with an E85-capable fleet and that an E85 distribution infrastructure must be built. The only proven commercial ethanol source that can help to meet the carbon reduction goal (imported ethanol derived from sugarcane), also requires more than a 10% blend, and so requires a new vehicle fleet and changes to the fuel distribution infrastructure.

The diesel standard can be met using advanced biomass-based diesel made from waste fat and commercially available renewable diesel. The use of conventional biodiesel ester in the required concentration (38%) would require the approval of engine manufacturers and the appropriate infrastructure would have to be developed. Renewable diesel is a fully fungible paraffinic fuel and so there is no need for additional distribution infrastructure or the specific approval of engine manufacturers as long as the finished diesel product meets ASTM standards.

## Table A: Feasibility Check Calculation With Proposed ILUC Values

| | | | Blend % Required to Meet 2020 goal | | Commercial Availability |
|---|---|---|---|---|---|
| | Gasoline[1] | Diesel[1] | Gasoline | Diesel | |
| Base, gCO2e/MJ | 96.8 | 95.8 | | | |
| 2020, gCO2e/MJ | 86.5 | 86.2 | | | |
| Average Corn Ethanol | 103.2 | | -161% | | Yes |
| Low Carbon Intensity Ethanol | 90 | | 151% | | Unknown |
| RFS-compliant Low Carbon Ethanol | 77.3 | | 53% | | No |
| Cellulosic Ethanol | 38 | | 18% | | No |
| Advanced Renewable Ethanol | 20 | | 13% | | No |
| Sugarcane Ethanol | 53.7 | | 24% | | Yes |
| Conventional Biomass-based diesel | | 70.3 | | 38% | Yes |
| Advanced Biomass-based diesel | | 20 | | 13% | Yes |

[1] Source: Table 3, Descriptions and Carbon Intensities of Fuels Included in Compliance Scenarios

Table B illustrates the fuel blend required to meet the 2020 carbon reduction goal with the ILUC value set to zero. Table B shows that the gasoline fleet will continue to require more E85 capable vehicles and an E85 distribution infrastructure. The carbon intensities of the biomass-based diesel fuels make it likely that the diesel standard will be surpassed. To make conventional biodiesel (mono alkyl esters) into a feasible solution the distribution infrastructure would have to be developed and the engine manufacturers would have to increase the approved content from 5 to 20%. As stated above, renewable diesel would need neither additional distribution infrastructure investment nor specific approval of engine manufacturers as long as the finished diesel product meets ASTM standards.

## Table B: Feasibility Check Calculation Without ILUC Values

| | | | Blend % Required to Meet 2020 Goal | | Commercial Availability |
|---|---|---|---|---|---|
| | Gasoline[1] | Diesel[1] | Gasoline | Diesel | |
| Base, gCO2e/MJ | 96.8 | 95.8 | | | |
| 2020, gCO2e/MJ | 86.5 | 86.2 | | | |
| Average Corn Ethanol | 68.2 | | 36% | | Yes |
| Low Carbon Intensity Ethanol | 55 | | 25% | | Unknown |
| RFS-compliant Low Carbon Ethanol | 42.3 | | 19% | | No |
| Cellulosic Ethanol | 20 | | 13% | | No |
| Advanced Renewable Ethanol | 20 | | 13% | | No |
| Sugarcane Ethanol | 18.7 | | 13% | | Yes |
| Conventional Biomass-based diesel | | 35.3 | | 16% | Yes |
| Advanced Biomass-based diesel | | 20 | | 13% | Yes |
| [1] Source: Table 3, Descriptions and Carbon Intensities of Fuels Included in Compliance Scenarios | | | | | |

Given the difficulty of meeting the gasoline standard, we support the proposal to allow credit trading between fuel types.
CARB should also create credits that encourage diesel substitution in the light duty fleet.
Furthermore, CARB should re-examine the ILUC default values (see ILUC discussion below).

2) Given the inherent efficiencies of diesel engines separate compliance eliminates an opportunity to reduce $CO_2$ emissions.

Having separate gasoline and diesel standards causes California to miss the opportunity to lower carbon emissions in the light duty vehicle sector. California has very few light duty diesel vehicles at this time. Therefore, light duty vehicles fuelled with diesel fuel and biomass-based diesel blends are, for all practical purposes, alternative fuelled vehicles. Because new diesel engines are required to be as clean burning as gasoline engines and are inherently more efficient than gasoline engines encouraging the use of light duty diesel engines can significantly reduce carbon emissions while not harming air quality.

CARB should ensure that diesel technology efficiencies are introduced to light duty vehicles as well as heavy duty vehicles.

**Compliance Schedule**

§95421(a)(2). To assist CARB in evaluating the proposed compliance schedule, Neste Oil provides the following information on its current NExBTL renewable diesel capacity projection:
2007 - 170,000 tonnes per year (58 million gallons per year) on stream at Porvoo I, Finland;
2009 - 170,000 tonnes per year (additional) to start up at Porvoo II, Finland;
2010 - 800,000 tonnes (271 million gallons per year) per year to start up in Singapore;
2011 - 800,000 tonnes (271 million gallons per year) per year to start up in Rotterdam;
This will bring Neste Oil's worldwide NExBTL capacity to approximately 658 million gpy by 2011.

Neste Oil continues to explore production opportunities in the United States, with California being a very attractive option. Typical lead time required for engineering, permitting, construction and start up is approximately two years (may be longer in California due to the extensive permitting time)

**Energy Densities for Biomass-based Diesel**

§95424 (a)(1) Table 6. The energy densities of pure biomass-based diesel fuels vary. For example, renewable diesel is more energy dense than biodiesel ester. Therefore, Table 6 should be expanded to include additional biomass-based diesel entries or the methodology needs to allow the use of actual energy densities. As an example, in the federal Renewable Fuel Standard, "biodiesel ester" is assigned an equivalency value of 1.5 (relative to ethanol which is 1); and "non-ester renewable diesel" is assigned an equivalency value of 1.7.

**Carbon Intensity Values – Indirect Land Use Change**

Several points warrant comment on this important issue.

§95425(c)(2)(A)&(B). The "10-10" Substantiality requirements are of concern as they may discourage innovation. Innovative improvements frequently come in small increments with small increments in the 1 to 2 % range occurring more frequently than large improvements in the 10% range. The small improvements are worth making in that they represent real reductions in worldwide carbon emissions. CARB should eliminate the requirement for quantum improvements of 10% or higher before consideration and credit is given, and give due consideration to all claims of incremental improvements. CARB could consider charging an application fee (to offset actual administrative costs) for companies that wish to present their own innovations for review.

§95425(b)(1)(B) & Table 3 from Supporting Documentation. As stated previously, with the proposed ILUC values, it will be very difficult if not impossible to comply with the gasoline requirements; and very difficult for conventional biodiesel ester to be used to comply with the diesel goal. For this reason alone, the ILUC default values in the GTAP ILUC model should be re-examined.

In addition, the models taking into account indirect land use change are not at a level that they may be used as a regulatory tool. There is still a void in moving from the current theoretical macro-level discussion of ILUC to the practical micro-level, actual fuel pathway data needed to calculate a LCA. Attempts to quantify GHG emissions from indirect land use change contain subjective assumptions and considerably uncertainty. Several attempts to include land use aspect in LCAs exist, but there is no commonly agreed methodology or systematic approach.

At this time, there is no science to justify the use of a mandatory ILUC factor. Notable experts like Michael Wang and Ed Gallagher have expressed such views (M Wang, 3.14.2008 Letter to Science magazine; "The Gallagher Review of the Indirect Effects of Biofuels Production", July 2008, Ed Gallagher, Chair - The Renewable Fuels Agency.) While scientific assessment of land use change issues is urgently needed in order to design policies that prevent unintended consequences from biofuel production, conclusions regarding the GHG emissions effects of biofuels based on speculative, limited land use change modelling may misguide biofuel policy development (Michael Wang, 14.3.2008, Letter to Science). For example, while the GTAP ILUC model has a land elasticity factor that captures theoretical yield changes, further yield

improvements at a micro-level are ignored. There should be some mechanism so that when better land management increases yields, the better managed land should not have to carry the burden of indirect land use change default value. The mechanism could be as simple as being able to earn an ILUC credit to offset the default ILUC debit when using one's own pathway so that directly applicable ILUC values can be reflected.

Many other jurisdictions around the world (e.g. the EU's Renewable Energy Directive) are facing the same issue, and none have yet imposed a mandatory ILUC factor into required LCA modelling. Similarly, CARB should not mandate an ILUC factor, especially if companies have verifiable LCA data for their own renewable fuel pathway.

Companies should be allowed to use their own fuel pathways if these are available and verifiable – including using the use of directly applicable ILUC values. We understand and appreciate the need to reduce the regulatory administrative burden – and CARB is reluctant to accept individual fuel pathways for review because of this burden. CARB should consider charging an application fee (to offset the actual administrative costs) for companies that wish to present their own pathway submissions for review and certification.

Thanks you again for the opportunity to submit these comments for consideration. Please contact the undersigned if further clarification is required.

For information, Neste Oil's sustainability principles are attached to these comments

Respectfully Submitted,

Neste Oil

Neville Fernandes