Clerk of the Board

Air Resource Board

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Comments on: **Indirect Land Use Change**

Thank you for the opportunity to comment on the Indirect Land Use Change (ILUC) issue. By now your are tired of all the comments stating that ILUC methodology is not mature enough for use in regulations. The European Union's actions indicate they think it is not ready. Etc. Etc. I may repeat some of those comments. But I will focus on mitigation and/or minimization of ILUC impacts. The Boards acceptance of the principles I will put forth is of great importance to the biomass-based energy industry, California and indeed, due to the Board's leadership role in pioneering advances in environmental quality, the World.

Mitigation of ILUC impacts is consistent with long-standing precedent established in the California Environmental Quality Act (CEQA) that allows mitigation in some reasonable way.

Minimization of ILUC impact is what we all want. Biofuel producers who are already minimizing ILUC impact should be able to benefit from their good works by being granted lower ILUC factors under Method 2B. The ILUC section of the LCFS must include language that provides “direct crediting” for the specific characteristics of fuels with feedstock production methods that already are inherently low carbon emitters.

**Background**

A 2nd Opinion, Inc. (A2O) is submitting these comments on behalf of its client, Neste Oil. A2O's President Cal Hodge has over 40 years experience in the fuels industry. He learned to make unleaded gasoline before it was required by law. He helped formulate Amoco's first unleaded regular gasoline. He has been involved with California fuel regulations since the early 1990's. He is proud to have been part of the team of regulators, fuel providers and auto makers that have reduced automotive pollution by 99% since the first Earth Day. He is excited to be working on the next generation of fuels that will reduce man's carbon footprint while making vehicles emit even less pollutants. Now let me tell you about my client.

Neste Oil Corporation is a refining and marketing company concentrating on low-emission, high-quality traffic fuels. The company's strategy is based on growing both its oil refining and premium-quality renewable diesel businesses. Neste Oil's refineries are located in Porvoo and Naantali and have a combined crude oil refining capacity of approx. 260,000 barrels a day. The company had net sales of EUR 15 billion in 2008 and employs around 5,200 people. Neste Oil is listed on NASDAQ OMX Helsinki.

The Board's actions concerning the Low Carbon Fuel Standard (LCFS) and the ILUC issue are important to Neste because Neste's scientists have developed and commercialized a process to make renewable diesel fuel from the same biomass-based feedstocks as biodiesel (mono alkyl esters). Because it starts with the same biomass-based feedstocks it has about the same (actually slightly better due to differences in process efficiencies) full life cycle greenhouse gas (GHG) benefits as the esterification technology. But, by using hydrogen instead of an alcohol (typically methanol derived from fossil fuel) Neste's NExBTL process produces hydrocarbons that are suitable for use in all diesel engines at all concentrations. By controlling conversion conditions renewable diesel can be made with cold weather properties that are as good as or better than those of petroleum based diesel fuel from a wide range of vegetable oils and animal fats. Renewable diesel is fully compatible with petroleum based diesel fuel and can be used seamlessly throughout the existing blending, distribution and consumption infrastructure.

This is important to the Board because the fuel not only provides outstanding GHG benefits it also has an ultra high blending cetane and contains essentially no aromatics or sulfur. All three properties are key to making CARB Ultra Low Sulfur Diesel (CARB ULSD) and Texas Low Emissions Diesel (TxLED) burn more cleanly than their EPA ULSD counterpart. Neste's renewable diesel meets or exceeds the standards for all three ULSD's. When added to diesel fuel it lowers exhaust emissions, including NOx, which is a benefit California needs for ozone compliance.

After years of research and development, Neste , recognizing the environmental significance of the technology, started up the world first commercial scale (170,000 tonne/year(t/y), 57 million gallons per year(mmg/y)) in 2007 at their refinery in Porvoo, Finland. A second 170,000 t/y facility is scheduled to start up in 2009 in Porvoo. An 800,000 t/y plant is scheduled to be on line in Singapore in 2010 and another 800,000 t/y plant is due for startup in Rotterdam in 2011. It is A2O's opinion that Neste would like to announce a United States plant for startup in 2012.

**General comments**

As A2O participated in the LCFS regulatory process it became apparent that the methodology of calculating full life cycle energy and carbon balances, including direct land use changes is still evolving and that the methodology for calculating indirect land use changes is in its infancy. There will be changes in accepted methodology as we go forward and it is imperative that the Board create a very flexible regulation with frequent periodic reviews and economic protection for facilities that are in compliance with prevailing regulations when construction starts.

Based upon the changes I have observed during the regulatory process an annual review is needed during the early years as both the Life Cycle Analysis (LCA) and ILUC calculation methodologies evolve and stabilize. Reviews in 2010, 2011, 2013, 2015 and 2018 are reasonable. Of course the reviews themselves can recommend the next review period.

As for duration of economic protection, biofuels production and conversion equipment have long economic lives. Fifteen years from project conception or ten years from conversion plant startup are reasonable.

**Pathway comments**

As we compared the preliminary estimates of the carbon intensities of fuels derived from soybeans we noticed that the co-product methodologies were inconsistent. Biodiesel received a fossil carbon credit for its co-product glycerin in the "*Detailed California-Modified GREET Pathway for Biodiesel (Esterified Soyoil) from Midwest Soybeans*" while renewable diesel did not receive a similar fossil credit for its co-product propane. This has been called to Staff's attention in another comment paper concerning the **"***Detailed California-GREET Pathway for Renewable Diesel from Midwest Soybeans*". This was the first draft of the renewable diesel pathway that we have seen. We are confident that staff will resolve the inconsistency. But, the resolution will require one or both of the pathways to evolve. This is an example of why the Board needs to build frequent reviews and the flexibility to change into the regulation. That flexibility also needs to include grandfathering compliant facilities like the European Union did when they adopted a timetable for implementing ILUC calculations in December 2008. Their report can be found at:

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+20081217+SIT+DOC+WORD+V0//EN&language=EN>

**ILUC comments**

The renewable diesel pathway was silent on ILUC. But the biodiesel pathway had a preliminary ILUC value for biodiesel of 42 gmCO2e/MJ. Because both biomass-based diesel fuels are produced from the same patch of land and crop, the impact on land use change should be the same for both fuels. Because of differences in fuel yields and properties, converting the same volume of soybeans to renewable diesel fuel produces 4% more energy than if biodiesel is produced. Because ILUC values are expressed in gmCO2e/MJ the higher energy yield per acre means the ILUC value for renewable diesel fuel should be 4% less than the value for biodiesel or 40 gmCO2e/MJ. The simple arithmetic of higher energy yield per acre causing a lower ILUC value suggests a mitigation strategy.

**Mitigation via crop yield improvement**

In the United States the average soy bean yield is about 40 bushels per acre and increasing at the rate of about 0.4 bushels per acre per year. The record yield was 139.4 in 2006 and 154.7 bushels per acre in 2007. (See Figure 1.)



The farmer that produced the record crops used the latest seed and crop management technology and had good soil. His yield is an example of what is possible. Now let us assume that the average soy bean farmer began to use advanced seed and land management technology. His soil probably will not let him produce at the record high levels but if he could get to 80 bushels per acre he will double the energy per acre yield, reduce the need to convert other land to crop land and reduce the effective ILUC values to 21 for biodiesel and 20 for renewable diesel. That sounds like something we want the LCFS to accomplish. We can make it happen if we build a mitigation feature into the system. Figure 2 illustrates how the ILUC value should decrease as soy bean yield increases.

**Minimization Recognition**



We should also reward credits for minimization of land use change impact to the early adopters, the environmental leaders who changed seed technology and/or land management practices to minimize both direct and indirect land use change impact because it was the right thing to do before the regulation was enacted. They should receive ILUC credits for the improvements they have made when they file a Method 2B pathway. Awarding those credits should be based upon the responses to three simple questions: 1. What was the yield? 2. What is the yield? 3. What did you do to increase the yield? Of course the regulation should also allow mitigation credits for continued advancements in sustainability of the pathway.

**Need way to estimate ILUC for new crops**

Because the ILUC calculation methodology is so new, preliminary ILUC values are available for only four crops: cellulose, corn and sugar cane for ethanol and soy for biodiesel. If the biofuels industry and California are to be ready to comply with the LCFS we need an accepted methodology to estimate ILUC values for alternative crops for which there is no GTAP data. A reasonable methodology would assume that if an acre produces more energy, it should have a lower ILUC value. Figure 3 illustrates how the ILUC values for various oil crops would compare to the preliminary value for biodiesel from soy. While these numbers are not precise, they would be 4% less for renewable diesel.



Of course once an ILUC value has been determined for a crop, it should be able to be further mitigated by increasing the crop per acre yield by using advanced seed and crop management practices.

**Other ILUC mitigation observations**

At the March 27, 2009 LCFS Workshop, Dr. John Sheehan of the Institute on the Environment at the University of Minnesota made the presentation "Biofuels and land-use change A simpler approach to the problem". His presentation is based upon work he has done with Nathanael Green at NRDC to develop a simple, commonsense systems dynamics model to assess the carbon debt of biofuels when indirect land use change is included. While he is late to the party, (This is another example of how fast this methodology is evolving.) his observations and conclusions are pertinent to the Board's decisions concerning how to deal with the ILUC issue.

1. Some of the early publishers on ILUC assumed constant crop yields which tends to overstate carbon debt. If one assumes historical trends of increasing yields the carbon debt is much less.
2. "Permanent loss of farmland due to human-induced degradation is estimated to be 5-6 million ha per year."
3. "Addressing sustainable land management changes the picture"
4. "Land abandonment due to unsustainable farming is a (the?) critical problem"
5. We need to "Focus on incentivizing fuel providers who offer low land-use impact feedstocks or who couple their fuel production to strategies that lead to better land management globally and restoration of degraded lands"

Here are three thoughts the Board should consider:

1. The methodology of accounting for ILUC is evolving rapidly. Flexibility and review is essential.
2. What better way to incentivize fuel providers than to better manage land and restore degraded lands than to create mitigation procedures in the LCFS regulations?
3. Some people are already doing what is right. We need to reward, not penalize, biofuel providers that committed to responsible and sustainable production practices early.

**Environmental leadership should not be penalized for leading**

Neste Oil is fully committed to only using biofuel feedstocks that have been produced responsibly. It has a set of tough sustainability principles in place covering its procurement of bio-based raw materials. Thanks to the development of a system that enables it to trace the origin of all the biofuel feedstocks that it uses, it knows exactly where and how they have been produced. Neste Oil has committed itself to only using sustainable biofuel feedstocks.

Neste Oil is actively supporting work in the areas of legislation and certification designed to prevent the irresponsible production of biofuels. The company has committed itself to an alliance calling for a ban on the felling of rainforest. It was the first oil company to play an active role in an organization dedicated to protecting rainforest.

"Our approach is very much to only use raw materials that are produced in line with the principles of sustainable development. We oppose the destruction of rainforest and anything that undermines human rights or natural biodiversity," said President & CEO Matti Lievonen, speaking at Neste Oil's Annual General Meeting in Helsinki on March 4, 2009.

"Neste Oil is working with over 20 research communities in Europe, America, Africa, Asia, and Australia to develop and introduce new raw materials. We increased our R&D budget last year by a third, to €37 million, and are devoting the bulk of our research efforts today to researching and identifying new types of renewable raw materials."

If regulators want to encourage companies to take such leadership roles, regulators must be careful when setting baseline performance goals or default values so as not to damage the innovators. When a company assumes a leadership role in doing what is right, it needs to be judged against its peers not itself.

**Feasibility**

One more comment. Large ILUC values threaten the feasibility of the LCFS. Without the ILUC debit it takes a 14% blend of soy-based biodiesel to satisfy the 2020 LCFS. Currently most diesel engine manufacturers are comfortable with a 5% blend. Some have accepted a 20% blend. But few are comfortable with the 36% blend that is needed in 2020 if the preliminary estimate of 42 gmCO2e/MJ ILUC impact survives the regulatory process.

For renewable diesel blends, recipes are not a problem because renewable diesel is acceptable at all blend levels. However, even though the feasible blend ratios are expected to be smaller than for biodiesel after staff resolves the inconsistencies we have found in the pathways and adjusts the preliminary ILUC impact to 40 gmCO2e/MJ, the global volume requirements may be hard to supply if other jurisdictions adopt similar low carbon fuel requirements.

**Regulatory Certainty**

Regulatory uncertainty will worsen the potential supply problem. Therefore, it is essential that the LCFS regulations assure capital recovery for projects that are compliant when concieved. Fifteen years from project conception or ten years from conversion plant startup are reasonable.

If you have questions you may contact Cal Hodge at [A2ndOpinionInc@aol.com](mailto:A2ndOpinionInc@aol.com) and/or Riitta Lempiainen at [Riitta.Lempiainen@nesteoil.com](mailto:Riitta.Lempiainen@nesteoil.com) .