Difficult Decisions Need . . .

A 2nd Opinion, Inc.

Clean Fuels and Regulatory Issues **Cal Hodge, President**

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Via Email to:

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Via Express Delivery to:

California Energy Commission
Docket Unit
Attn: Docket No. 06-AFP-1
1516 Ninth Street, Ms-4
Sacramento, California 95814-5512

Re: Docket No. 06-AFP-1

Subject: Neste Oil Comments concerning scope of "State Plan to Increase the Use of Alternative Transportation Fuels"

Thank you for the opportunity to comment on this important issue. Henrik Erämetsä, President of Neste Oil Holding (U.S.A.), Inc. has asked A 2nd Opinion, Inc. to prepare and file appropriate comments. Neste Oil's comments in this document reiterate the comments that Tom Fulks, of MightyComm presented on Neste's behalf at the May 12, 2006, California Energy Commission Workshop on the 2007 Integrated Energy Policy Report.

Neste's comments are focused on alternative diesel fuel. To make the comments easier to read and summarize, slides from Mr. Fulks presentation (with some minor edits) will be inserted in this document along with some clarifying remarks.

Let's start with suggestions for scoping goals.

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2007 IEPR – Suggested scoping goals

- Synchronize knowledge base of renewable fuels technology among CEC, CARB, Division of Weights & Measures (CA Dept. of Agriculture), legislators, their staff, committee staff and affected stakeholders such as NGOs and others.
- Establish definition of terms or "brand" identification for the various renewable fuels, i.e.
  - What is "biodiesel?"
  - What is "renewable diesel?"
  - What defines appropriate "feedstocks?"
  - Etc.
- Establish clear numerical goals and deadlines for the volume production of the various renewable fuels under development in the state now and unknowns in the future.

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It is important that we are all looking at the same knowledge base and that we have similar definitions. Outside the United States the term biodiesel includes all diesel fuel components derived from renewable resources. It covers direct use products like vegetable oils and animal fats, the esters made when vegetable oils and animal fats are reacted with alcohols and synthetic hydrocarbons that can be made from an even wider range of renewable sources. We suggest you consider adopting the world definition and then differentiating the various technologies as: Direct biodiesel, Ester biodiesel, Synthetic biodiesel and, because we do not know what technology may create, Unknown biodiesel. As for appropriate feedstocks, we suggest being flexible. Goals and deadlines are needed to force the alternatives to develop. But, they should be flexible enough to let the marketplace choose the alternative fuels rather than specifying particular types of fuels or molecules.

Neste is participating in this process because Neste has developed the NExBTL® Synthetic Biodiesel process that they believe is major step forward in diesel fuel technology. This bio to liquids (BTL) renewable synthetic diesel product has the properties and the emissions benefits of synthetic gas to liquids (GTL) diesel fuel and the greenhouse gas and reduced fossil fuel dependence benefits of Ester biodiesel. Neste believes that NExBTL® Synthetic Biodiesel can improve California air quality while reducing California's dependence on imported fossil fuels.

Background

Bio to Liquids (BTL) Diesel Fuels

They are 2nd generation renewable diesel fuels that combine the benefits of GTL-diesel and biodiesel

- Premium fuel properties like GTL
- Reduce exhaust emissions like GTL (or even lower)
- Fit existing infrastructure and engines
- CO_2 savings like ester based biodiesel (or even more)
- Renewable: reduces oil dependence

- Provides consistant quality from diverse feedstock
  - Waste animal fat
  - Soy, corn, canola, rape and other vegetable oils
  - Cellulosic wastes such as wood chips, etc.
- Provides a cleaner more energy efficient future
- California needs to include 2nd generation renewable fuels like NESTE's NExBTL® Synthetic Biodiesel in its energy plans.

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Now that we have told you why we are filing comments lets tell you a little about who Neste Oil is. Neste Oil is a leading independent Northern European refining company with focus on high quality petroleum products for cleaner traffic, committed to global growth of renewable fuels. It has a refining capacity of 270,000 bpd. It has 4300 employees and sales of 11 billion US$. Its US headquarters is in Houston and its Long Beach, CA sales office has been providing clean fuels and clean fuels components to California for over ten years. Neste has the technology and capability to extend its environmental commitment to California.

NESTE's Environmental commitment

- First oil company to require double-hulled ships (pre-Valdez)
- Pioneer in producing Ultra-Low-Sulfur diesel fuel and gasoline
- Among the first to deliver reformulated gasoline to the U.S., including reformulated gasoline to California
- Developed proprietory iso-octane technology
- First to convert MTBE plant to iso-octane, enabling California's shift to ethanol oxigenate a year early
- Currently building ultra-high quality renewable diesel production facility utilizing NExBTL technology
- Two other global energy companies followed and are committed to synthetic BTL diesel projects using this technology
- NESTE is ready and willing to assume a leadership role in bringing cleaner burning diesel technology to California

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Here are the highlights of Neste's NExBTL® Synthetic Biodiesel technology.

NExBTL® Synthetic Biodiesel,
A 2nd Generation Renewable Diesel

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Exceptionally high quality diesel fuel made from original or byproduct vegetable oils and/or animal fats

- **Renewable, pure hydrocarbon fuel**
- **Superior diesel blending component**
- **Fits into existing infrastructure - no incremental costs**
- **No storage stability problems**
- **Excellent performance in cold climates**
- **Very high cetane number (84 ... 99)**
- **Free of aromatics, sulfur, oxygen**
- **Reduces NOx, PM, HC & CO exhaust emissions**
- **Less fossil CO_2 than fossil diesel fuel**

It captures the benefits of both biodiesel and GTL diesel

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Here is a table comparing the properties of NExBTL® Synthetic Biodiesel to GTL diesel, Ester biodiesel (Fatty Acid Methyl Ester, FAME), and Sulfur free European diesel.

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Fuel Property comparison

	NExBTL®	GTL	FAME (RME)	Sulfur free Diesel fuel (summer)
Density at +15°C (kg/m^3)	775 ... 785	770 ... 785	≈ 885	≈ 835
Viscosity at +40°C (mm^2/s)	2.9 ... 3.5	3.2 ... 4.5	≈ 4.5	≈ 3.5
Cetane number	≈ 84 ... 99 *	≈ 73 ... 81	≈ 51	≈ 53**
Cloud point (°F)	≈ 23 ... - 22	≈ 32 ... - 13	≈ 23	≈ 23
Heating value (lower) (MJ/kg)	≈ 44	≈ 43	≈ 38	≈ 43
Heating value (MJ/l)	≈ 34	≈ 34	≈ 34	≈ 36
Polyaromatic content (wt-%)	0	0	0	≈ 4
Oxygen content (wt-%)	0	0	≈ 11	0
Sulfur content (mg/kg)	< 10 (< 1)	< 10	< 10	< 10
Carbon / hydrogen	≈ 5.6	≈ 5.6		≈ 6.0

*) Blending cetane number
**) ASTM specification > 40

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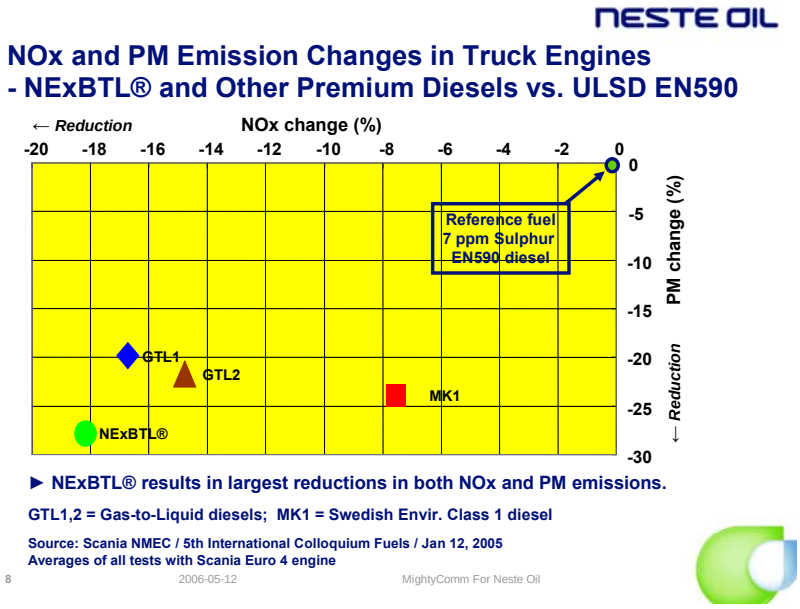
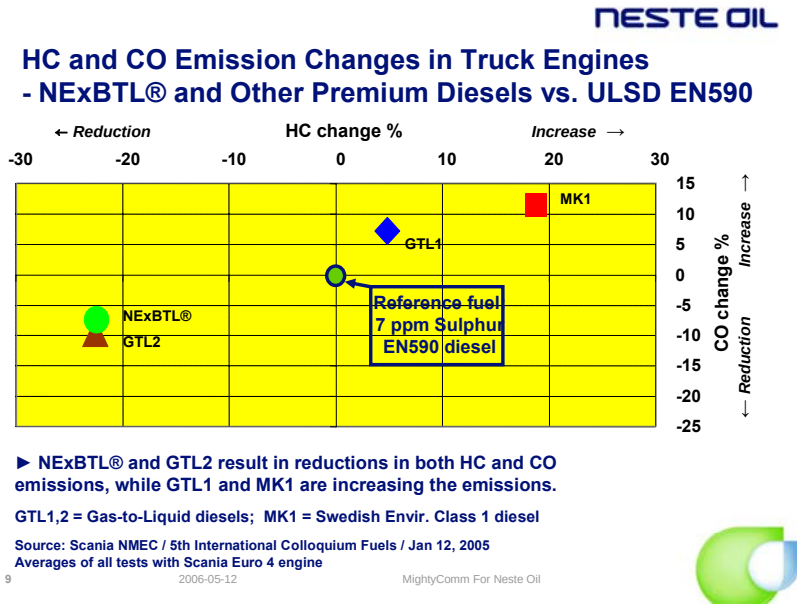
In Europe, any product less than 10 ppm sulfur is considered to be sulfur free. In the US the phrase Ultra Low Sulfur Diesel or ULSD is used. NExBTL® Synthetic Biodiesel product is typically a nano-sulfur product containing less than 1 ppm sulfur. It has the

highest blending cetane number on the chart because it was developed to be a premium blending component in European diesel which is typically over 50 cetane while the cetane of US diesel is typically in the low 40's. It has the best cold weather (Cloud Point) properties because it was developed to work in the Finland's winter climate. Its volumetric energy content (Heating value (MJ/l) is similar to the other alternative diesel components. While we have not tabulated a measurement for stability or the ability to store the product for extended periods, it and GTL can be stored the longest without deteriorating.

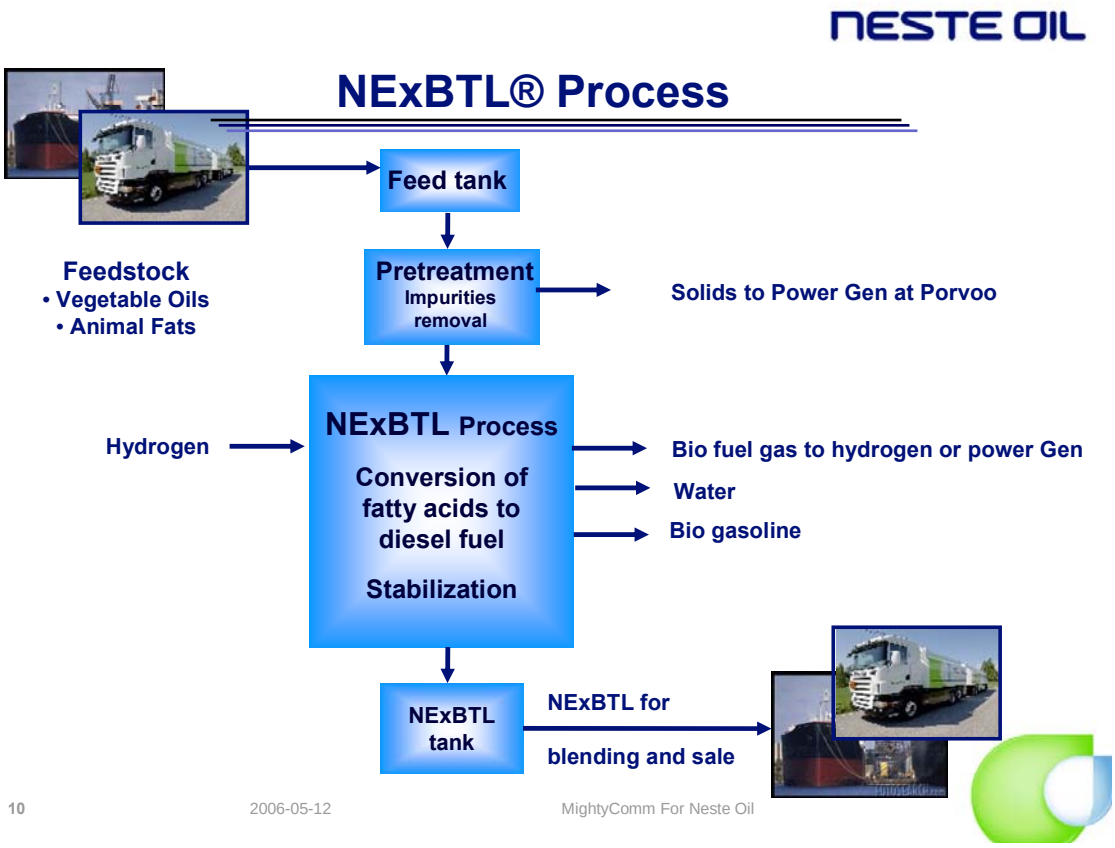
Historically, refiners have used paraffinic crude oils to make premium quality diesel fuel. NExBTL® and GTL product are both essentially all paraffins. As such they improve diesel engine performance and as shown in the following two charts apparently reduce





diesel engine emissions. These reductions in NOx, Particulate Matter, Hydrocarbon and Carbon Monoxide are relative to diesel fuel with the properties shown above and are another reason why the 2007 State Plan to Increase the Use of Alternative Transportation Fuels should include this technology.

The next chart is a summary of the NExBTL® process. The solids recovered in the feed pretreatment section will be used to generate renewable electricity when the 60 million gallon per year NExBTL® facility starts up in 2007 in Finland. The renewable fuel gas can be used to make renewable electricity, renewable LPG (propane) or renewable hydrogen. Also, there is a small renewable gasoline byproduct stream. That is why Neste recommends the plan be flexible enough to include renewable byproduct fuels as well as traditional diesel and gasoline components.



As we develop the plan we need to also be careful to not create needless specifications that prevent innovation.

Let's draw a parallel from the history of gasoline. Scientists knew what isooctane was before there were commercial processes to produce it. They used it the 1920's to set the octane scale for gasoline before developing commercial alkylation processes that made isoparaffin products rich in isooctane in the 1930's. These synthetic isoparaffins have since proven to be a key component in California's cleaner burning gasoline. Their properties enable the use of another renewable fuel, ethanol. Had someone created a specification that prevented increasing the isoparaffin content of gasoline by adding

synthetic or man made isoparaffins to gasoline, California's air quality and gasoline prices would be worse.

Continuing to draw a parallel from gasoline experience, we note that the addition of oxygenates like methyl tertiary butyl ether (MTBE) and ethanol caused the creation of specifications for those products and maximum blending limits. That course of action seems proper because oxygenates do not naturally occur in gasoline and because automotive fuel systems have evolved to use hydrocarbons. Based upon the gasoline experience and because it contains oxygenates that do not naturally occur in diesel fuel it is natural that separate specifications and blending limits have been established for Ester biodiesel.

On the other hand, because synthetic biodiesel components are simply increasing the concentration of paraffinic hydrocarbon components that are both naturally occurring and historically desirable for both performance improvement and emissions reduction, no restrictions should be put on their use in diesel fuel other than requiring the final blend to meet the ASTM D-975 and or state standards for diesel fuel. In fact if we are to accomplish the Governor's goal is to increase the use of renewable feedstocks in diesel fuel the feedstock suppliers should welcome Synthetic biodiesel because Ester biodiesel which historically has been subjected to concentration limits can be blended into diesel fuel containing synthetic biodiesel.

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Specifications considerations

- **NExBTL® synthetic biodiesel is a diesel component – It is like isooctane for diesel**
- **Only ASTM D-975 Diesel Fuel and/or CA specifications should limit its maximum concentration**
  - **Most diesel properties improve. Except**
  - **Like most ULSD products and GTL diesel lubricity additives are recommended.**
- **Because it is paraffins, its presence does not limit the use of ester-based biodiesel meeting ASTM D-6751 specifications.**
- **It increases the potential renewability of diesel.**
- **Standards for using renewable diesel fuel components need to avoid specifying types of molecules or prohibiting the use of second generation renewable diesel components.**

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To aid in the further growth and refinement of the renewable diesel industry, Neste suggests the 2007 IEPR development process:

1) identify potential plant sites and feedstock sources

2) identify regulatory, community and environmental barriers to production and potential remedies, and
3) determine the economic viability of various, using the global definition, biodiesel alternative fuel technologies in California.

Neste's NExBTL® Synthetic biodiesel technology reaffirms Neste's strong commitment to energy self sufficiency and environmental integrity. Two other companies have announced facilities using this technology in Europe. Neste seeks to further extend its own commitment toward cleaner fuels and reduced reliance on petroleum to the California market and California's drive toward reduced reliance on imported petroleum.

To add substance to Neste's commitment, Neste requests that the following people be added to the distribution lists for the workshops that will be necessary to prepare this plan:

Henrik Erametsa, President, Neste Oil Holding (U.S.A.), Inc.
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Tom Fulks, President, MightyComm
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Their goal will be to contribute some of the brainpower and sweat equity necessary to create an executable alternative fuels transportation plan.

On behalf of Neste Oil I thank you for the opportunity to contribute to this planning effort.

Cal Hodge, President
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