Neste Oil Corporation & NExBTL Renewable Diesel

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President, A 2nd Opinion, Inc.
On behalf of Neste Oil

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Sacramento, CA
February 14, 2006
Neste Oil

Neste Oil, a leading independent Northern European refining company, is focused on high quality petroleum products for cleaner traffic and committed to global growth of renewables.

Refining capacity 270,000 bpd = 14 Mt/a
Employees 4,300
Sales USD 11 billion/a

US HQ in Houston, Texas
California Facilities:
Sales Office in Long Beach, CA and
Isooctane production in Edmonton, Canada
Neste Oil's Global Presence

Singapore Ibn Zahr Beringen London Edmonton Houston Sines Toronto Dubai Long Beach

Severe Technology Oil Retail

Oil Refining Components Oil Retail Shipping Refinery, plant, or other facility Office

St Petersburg Moscow
Leadership Commitment to the Environment

- First oil company to require double bottom ships
- Forerunner in reducing sulfur in diesel and gasoline
- All exported fuels are Ultra Low Sulfur
- Among the first to deliver reformulated gasoline to the United States, including reformulated gasoline to California
- Developed proprietary technology to produce iso-octane
- First to convert MTBE plant to iso-octane, enabling California’s shift from MTBE a year early
- Started construction on a ultra high quality renewable diesel production unit utilizing NExBTL technology
Neste ahead of EU & US Gasoline Sulfur Limits

![Graph showing the comparison of sulfur max. (mg/kg) between EU, Neste Oil, US Per unit, and US Avg, with Neste Oil leading the way.]
Neste ahead of EU & US Diesel Sulphur Limits
Investing in Renewable Diesel at Porvoo

- New NExBTL plant under construction at the Porvoo refinery
- Capacity: 170,000 t/a (~3750 bpd, 60 million gpy)
- Due for start-up in summer 2007
- Investment valued at approx. €100 million
- Based on Neste Oil’s proprietary process know-how
- Renewable raw materials: vegetable oils and animal fats
- Tests show product has excellent properties and low emissions
- Designed to meet growing European demand for biofuels
- EU approves NExBTL renewable diesel as certified EU diesel fuel
- NExBTL technology can help America too
NExBTL, A 2nd Generation Renewable Diesel

Exceptionally high quality diesel fuel made from on purpose 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 exhaust emissions
- Less fossil CO$_2$ than fossil diesel fuel
# Fuel Property comparison

<table>
<thead>
<tr>
<th>Property</th>
<th>NExBTL</th>
<th>GTL</th>
<th>FAME (RME)</th>
<th>Sulfur free Diesel fuel (summer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density at +15°C (kg/m³)</td>
<td>775 ... 785</td>
<td>770 ... 785</td>
<td>≈ 885</td>
<td>≈ 835</td>
</tr>
<tr>
<td>Viscosity at +40°C (mm²/s)</td>
<td>2.9 ... 3.5</td>
<td>3.2 ... 4.5</td>
<td>≈ 4.5</td>
<td>≈ 3.5</td>
</tr>
<tr>
<td>Cetane number</td>
<td>≈ 84 ... 99 *</td>
<td>≈ 73 ... 81</td>
<td>≈ 51</td>
<td>≈ 53**</td>
</tr>
<tr>
<td>Cloud point (°C)</td>
<td>≈ - 5 ... - 30</td>
<td>≈ 0 ... - 25</td>
<td>≈ - 5</td>
<td>≈ - 5</td>
</tr>
<tr>
<td>Heating value (lower) (MJ/kg)</td>
<td>≈ 44</td>
<td>≈ 43</td>
<td>≈ 38</td>
<td>≈ 43</td>
</tr>
<tr>
<td>Heating value (MJ/l)</td>
<td>≈ 34</td>
<td>≈ 34</td>
<td>≈ 34</td>
<td>≈ 36</td>
</tr>
<tr>
<td>Polyaromatic content (wt-%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>≈ 4</td>
</tr>
<tr>
<td>Oxygen content (wt-%)</td>
<td>0</td>
<td>0</td>
<td>≈ 11</td>
<td>0</td>
</tr>
<tr>
<td>Sulfur content (mg/kg)</td>
<td>&lt; 10 (&lt; 1)</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Carbon / hydrogen</td>
<td>≈ 5.6</td>
<td>≈ 5.6</td>
<td></td>
<td>≈ 6.0</td>
</tr>
</tbody>
</table>

*) Blending cetane number
**) ASTM specification > 40
NExBTL production unit

Production start 2007 in Porvoo

NExBTL-Process
Conversion of fatty acids to diesel fuel

Stabilization

Pretreatment
Impurities removal

Feed tank

Bio Oil

Component tank

Diesel tank

Mineral oil diesel

Diesel + Biodiesel Blends

Bio fuel gas

Water

Bio gasoline

NExBTL component sales

Hydrogen

Bio Oil

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NExBTL component sales

Hydrogen
NOx and PM Emissions in Truck Engines

Source: Scania NMEC / 5th International Colloquium Fuels / Jan 12, 2005
Averages of all tests with Scania Euro 4 engine

Reference fuel
Sulphur free EN590 diesel
HC and CO Emissions in Truck Engines

Source: Scania NMEC / 5th International Colloquium Fuels / Jan 12, 2005
Averages of all tests with Scania Euro 4 engine
Exhaust emissions of NExBTL in truck engines

<table>
<thead>
<tr>
<th></th>
<th>MAN ESC</th>
<th>Scania ESC</th>
<th>Scania ETC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Particulates</strong></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td><strong>NOx</strong></td>
<td><img src="image" alt="Graph" /></td>
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**ESC** = European steady state cycle  
**ETC** = European transient cycle
NExBTL reduces Mutagenicity

- Adding NExBTL to Swedish MK1 almost as effective as oxidation catalyst
- Could benefit older technology vehicles

![Bar graph showing TA98-S9 strain comparison between Without CAT and OX CAT with MK1-E, MK1-5, and MK1-15 categories.]
CO$_2$equiv. Emissions / kgoe fuel

**Fossil diesel**
- Crude oil -production
- Transport
- Refining - diesel
- End use - diesel 3.2 kg CO$_2$/kg

$\sum$ 3.8 kg CO$_2$/kgoe fuel

**NExBTL diesel**
- Rape seed oil 1.3
- Palm oil 0.32
- Soybean oil 0.54
- Animal fat 0.28

Transport 0.005
Transport 0.18
Transport 0.09
Transport 0.033

NExBTL Process 0.22-0.57

End use 0 kg CO$_2$/kg

$\sum$ 0.5 - 1.5 kg CO$_2$/kgoe fuel

**Biodiesel**
- Rapeseed oil
- Transport
- Transesterification
- End use 0 kg CO$_2$/kg

$\sum$ 1.6 - 2.3 kg CO$_2$/kgoe fuel

Source: Concawe/Eucar WTW 2004

Source: Concawe, Shell, WTW

kgoe = kilogram oil equivalent (NExBTL 44, RME 38 MJ/kg)
Economics

• Competitive with other renewable diesel technologies
  – Feedstock flexibility,
  – Product yields,
  – Product quality (cetane, nano-sulfur (<1ppm), stability, cloud, etc.)
  – Full compatibility with distribution and consumption infrastructure
  – Offset investment costs

• All it needs are:
  – Its feedstock receive the same subsidies as its competitor’s feedstock
  – Specifications that allow its use
Specifications considerations

• NExBTL is a diesel component – It is like isoctane for diesel
• Its maximum concentration is diesel should be limited by ASTM D-975 Diesel Fuel specifications.
  – Most properties improve. Except
  – Like most ULSD products lubricity additives are recommended.
• Because it is paraffins, its presence does not limit the use of biodiesel meeting ASTM D-6751 specifications.
• It increases the potential renewability of diesel.
• As regulators consider the use of renewable diesel fuel components they need to avoid specifications that accidentally prohibit the use of innovative second generation renewable diesel components.
CONCLUSIONS

NExBTL is a 2nd generation Renewable Diesel That Combines the benefits of GTL-diesel and Biodiesel

– Premium fuel properties like GTL
– Reduces exhaust emissions like GTL (or even lower)
– Fits existing infrastructure and engines
– CO\textsubscript{2} savings like Biodiesel (or even more)
– Renewable-reduces oil dependence

• Offers feedstock diversity
  – Waste animal fat
  – Soy, corn, canola, rape and other vegetable oils

• Provides a cleaner more energy efficient future
• California needs to keep the door open to 2\textsuperscript{nd} generation renewable fuels like NExBTL
NExBTL reaffirms Neste's strong environmental commitment.

Neste seeks quality partnerships in ensuring Renewable Diesel's role in the Renewable Fuels Market.