



Neste Renewable Diesel Distributed by Golden Gate Petroleum

Clean Fuel has never been this easy.

NESTE OIL

 **GOLDEN GATE
PETROLEUM**

» NEXGEN

Sustainable supply chain is a corner stone with our renewable raw materials



Broad range of renewable raw materials



Waste animal fat from the food processing industry



Waste fat from the fish processing industry



Vegetable oil residues (stearin, PFAD and spent bleaching earth oil)



Technical corn oil



Tall oil pitch



Soybean oil



Crude palm oil



Camelina oil



Jatropha oil



Rapeseed oil



Used cooking oil

Neste Oil is the world's only biofuel producer capable of refining renewable fuel from more than 10 different feedstocks

Benefits of NEXBTL Renewable Diesel

Drop-In fuel

- Can be used neat or blended
- No need for infrastructure changes: meets ASTM D975 and CARB diesel spec

Better for Climate

- Reduces GHG emissions by 40 - 90%

Lower tailpipe emissions

- Reduces NOx, particulate matter, and VOC emissions

Premium quality

- Can be used in passenger vehicles, heavy trucks, marine, aviation etc. to replace petroleum fuels
- Very high cetane number (80-100):
 - Less noise, easier starts;
- Very stable - can be stored over long periods of time with no deterioration in quality

Feedstock flexibility

- Wide range of feedstock in use and supply being increased

Neste Oil is a global leader in renewable hydrocarbon diesel

- Annual production capacity 2 million tons of NEXBTL renewable diesel
 - Aim to increase capacity to 2.3 Mt/a by 2015
- Production based on Neste Oil's proprietary NEXBTL technology

- Flexible and sustainable raw material base
 - Currently 12 different renewable raw materials
- Significant investments in development of future raw material base
 - 70% of total R&D costs (\$50 million in 2013)

NEXBTL renewable hydrocarbon diesel is fully compatible with petroleum diesel

	Biodiesel	Petroleum diesel	NEXBTL Renewable diesel	BTL
Raw material	Vegetable oils & waste animal fats	Crude oil (mineral oil)	Vegetable oils & waste animal fats (including high free fatty acids)	Biomass
Technology	Esterification	Traditional refining	Hydrotreating	Gasification & Fischer-Tropsch
End product	Ester	Hydrocarbon (gasoline, jet fuel, diesel)	Bio-based hydrocarbon (renewable diesel, jet fuel, bionaphta, biopropane)	Bio-based hydrocarbon (renewable gasoline, jet fuel, diesel)
Chemical composition	$\begin{array}{c} \text{O} \\ \\ \text{H}_3\text{C-O-C-R} \end{array}$	$\text{C}_n\text{H}_{2n+2} + \text{aromatics}$	$\text{C}_n\text{H}_{2n+2}$	$\text{C}_n\text{H}_{2n+2}$

FAME = Fatty Acid Methyl Ester, conventional biodiesel

RME = Rapeseed Methyl Ester, conventional biodiesel

HVO = Hydrotreated Vegetable Oil, advanced biofuel i.e. renewable fuel

BTL = Biomass to Liquid

Fuel property comparison

	Biodiesel	NEXBTL Renewable Diesel
Viscosity at +40° C (mm ² /s)	≈ 4.5	2.9 ... 3.5
Cetane number	≈ 51	≈ 84 ... 99 ^{*1}
Cloud point (° C)	≈ - 5	≈ - 5 ... - 25 ^{*3}
Heating value (lower) (MJ/kg)	≈ 38	≈ 44
Heating value (MJ/l)	≈ 33	≈ 34
Polyaromatic content (wt-%)	0	0
Oxygen content (wt-%)	≈ 11	0
Sulfur content (mg/kg)	< 10	< 10
Carbon / hydrogen		≈ 5.6

Note *1: Blending cetane number

Note *2: ASTM specification > 40

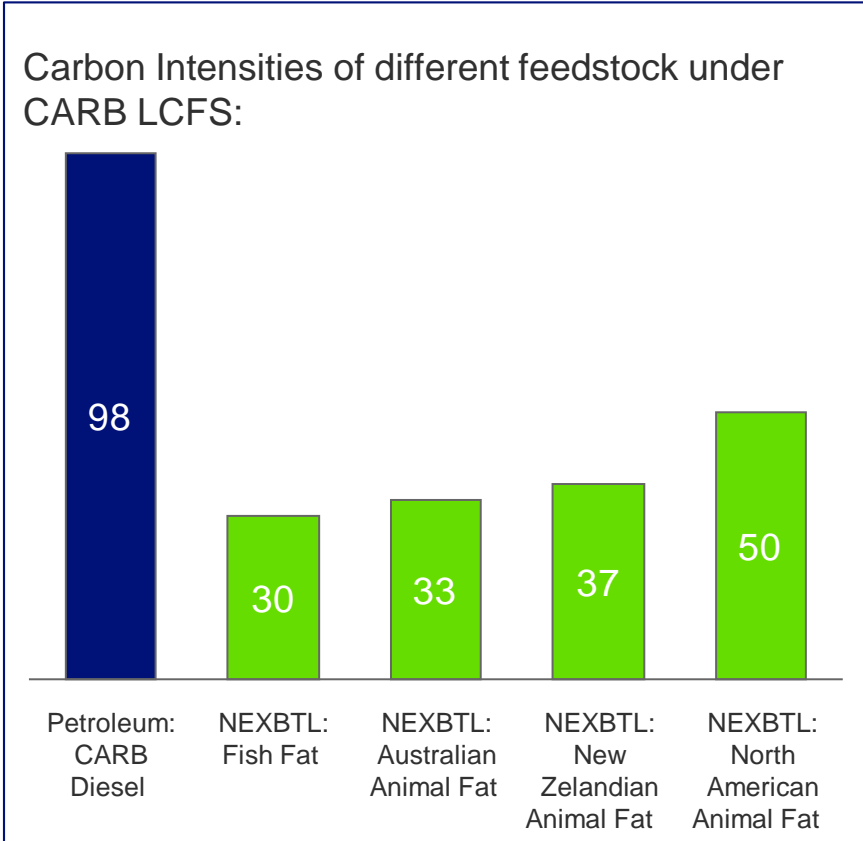
Note *3: Product can be engineered to specific cloud point within this range by adjusting process conditions

In California renewable feedstock provide ~70% CI reductions achieved with NEXBTL renewable diesel

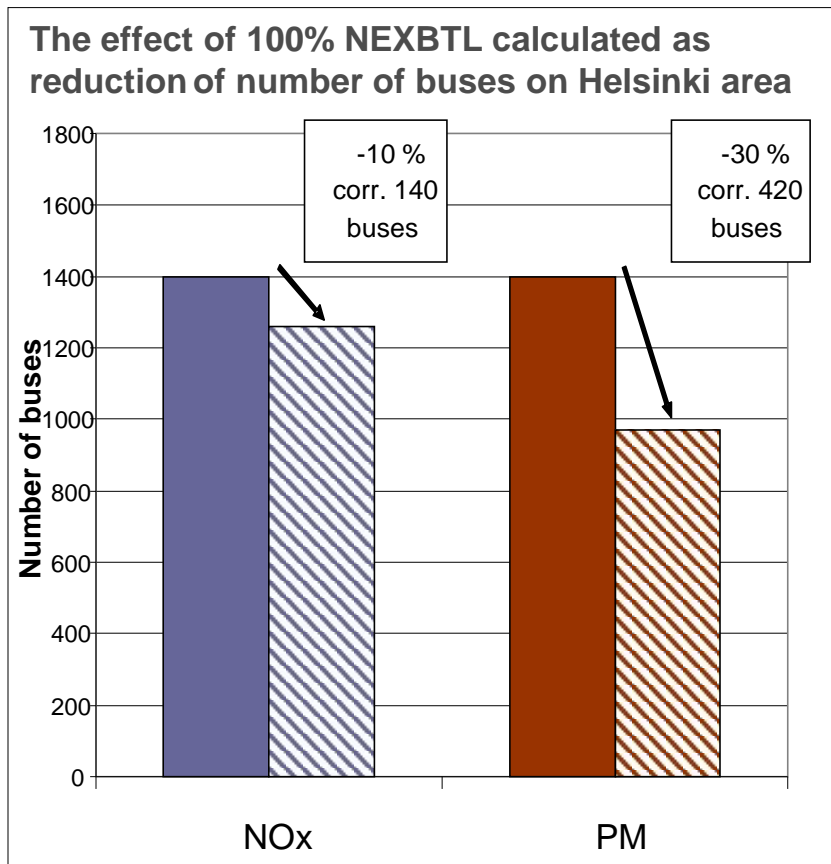
Currently Used Raw Materials in California

- Neste Oil is currently the world's only biofuel producer capable of refining high-quality renewable hydrocarbon diesel from more than ten different feedstocks on an industrial scale.
- In California NEXBTL renewable diesel is produced from:
 - Australian Animal Fat
 - New Zealandian Animal Fat
 - North American Animal Fat
 - South American Animal Fat
 - Fish Fat
- Produced in Neste Oil's Singapore plant and delivered with ocean going vessels

GHG Emission Reduction



Results of the bus trial in Finland



- Average emission reductions with 100% NEXBTL diesel
 - NOx-emissions: -10 %
 - PM-emissions: -30 %
 - CO-emissions: -35 %
 - THC-emissions: -40 %
 - PAH compounds: reduced significantly
- Standard service interval
- No changes in fuel logistics
- No operability issues with blend or 100 % NEXBTL
- Average daily low temp in 2009 was app. negative (-) 20 °C
- Winter grade NEXBTL had cloud point of negative (-) 25 °C
- There are approximately 1400 urban buses in the Helsinki area

NEXBTL renewable diesel for off-road vehicles



- NEXBTL renewable diesel can be used in the construction sites to replace petroleum diesel
- Decreases emissions significantly as well as results cleaner air for the workers
- Fully fungible
- No retrofitting of engines
- No additional infrastructure
- No storage stability problems



Several studies on-going in mining industry in Europe and North America



Results available in Q2 2015



NIOSH Study

- National Institute for Occupational Safety and Health (NIOSH), Office of Mining Safety and Health Research in US is currently conducting research on various viable control technologies and strategies suitable for reducing exposure of underground miners to particulate and gaseous emitted by diesel-powered vehicles
- Changing the fuel supply from petroleum diesel to neat or blended renewable fuels is considered by a number of underground mine operators to be a viable method for controlling diesel particulate matter (DPM) emissions
- The objective of this study is to characterize and quantify the effect of the Neste Oil's NEXBTL Renewable Diesel on aerosols and gases emitted by one light-duty and one medium-duty diesel engine typical of those used in underground mining vehicles

The True Cost of Petroleum Alternatives?

- Modifications to Fuel Systems – Alternate Tanks, Fuel Lines
- Infrastructure Costs – Existing Vs Building-
- New Equipment Purchase Vs Existing Maintenance Costs -
- Disposal/Recycling for “end of useful life” components –
- How will Vehicle Range and longevity be affected –
- Local Air Board Mitigation – CARB Example - Increased NOx emissions can lead to penalties costly mitigation

About Golden Gate Petroleum

- Golden Gate Petroleum is one of the largest petroleum and biofuel distributors in the Western United States. The company was founded in 1946 in San Francisco, CA. The company is currently headquartered in Martinez, CA.
- Golden Gate Petroleum has consistently been a leader in bringing new alternative fuels to the marketplace. Golden Gate started distributing biodiesel in 1996 and grew to be one of the largest biodiesel distributors in the United States.
- In early 2013, Golden Gate continued the tradition of bringing new alternative fuels to the market by beginning to distribute Renewable Diesel. Golden Gate was the first company globally to focus on the distribution of RD99 as a drop-in replacement fuel versus it being a blend stock into petroleum diesel.
- Since 2013, Golden Gate has delivered over 50 million gallons of RD99 to our customers with tremendous success.

How can Golden Gate Petroleum help?

Contact Golden Gate Petroleum to see what we can do today that will provide solid and functional alternatives to Petroleum based Fuels in a way that will be both environmentally and financially responsible.

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