

## NESTE OIL'S NExBTL DIESEL

NExBTL Renewable Diesel is a new generation biofuel developed by Neste Oil. It is the cleanest renewable diesel fuel available today. It offers significant reductions in both greenhouse gas emissions and pollution compared to fossil diesel fuel. The reductions are larger than with the traditional FAME (fatty acid methyl ester) biodiesel.

The precise reductions of greenhouse gases depend on the raw materials used in production, but are between 40% to 60% throughout the whole product lifecycle. Engine tests have proved that NExBTL reduces also tailpipe emissions significantly compared to fossil diesel fuel. Based on tests performed, emissions reductions such as the following can be attained:

- 10% less nitrogen oxides <sup>(1)</sup>
- 28% less small particle emissions <sup>(1)</sup>
- 50% less hydrocarbons <sup>(1)</sup>
- 28% less carbon monoxide <sup>(1)</sup>
- 40-45% less aldehydes <sup>(2)</sup>
- 40-45% less benzene <sup>(2)</sup>

<sup>(1)</sup> MAN, 5th Colloquium of Fuels, Esslingen

<sup>(2)</sup> SAE paper 2005 -01-3771

NExBTL can be used in any blend or unblended, because it is compatible with traditional fossil diesel. For the traditional biodiesel the maximum blend into fossil diesel is 5%. NExBTL is applicable to today's engine technologies and distribution systems and thus does not require modifications to the existing cars pool.

NExBTL technology can use a wide range of vegetable oil and animal fat feedstock without changes in the end product quality. It is the most feedstock flexible technology available. Sustainable feedstocks are the only solution for Neste Oil. From the greenhouse gas balance, availability and price perspectives, palm oil is currently the most competitive raw material. This view is supported by the tests of IFEU (Institute for Energy and Environmental Research Heidelberg, Germany). The results show that greenhouse gas and energy balances per ton of NExBTL diesel are better for palm oil cultivated on mineral soils than for rapeseed oil. Rapeseed oil is currently the most common raw material for the production of traditional biodiesel.

NExBTL contributes to improved engine performance and efficiency. With traditional biodiesel, engine cleanliness can be a problem. NExBTL actually improves engine cleanliness. Unlike with traditional biodiesel, there is no "use by" date in NExBTL. This means long life stability which allows for storage. Distribution can take place within existing oil refinery logistics. With NExBTL, there is no need to relax fuel quality specifications to achieve high bio content. Better fuels, such as NExBTL diesel, allow more efficient engines and lower fuel consumption.

Neste Oil carries out extensive research and development of non-food feedstocks. Neste Oil is investing in a significant research and development program to find an alternative long-term solution which could be e.g. wood-based raw materials.