

Energy. Future. Responsibility.

Challenges and Tools for Regional Planning

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NExBTL - Renewable Diesel

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ESCOBALT

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UUSIMAA REGIONAL COUNCIL
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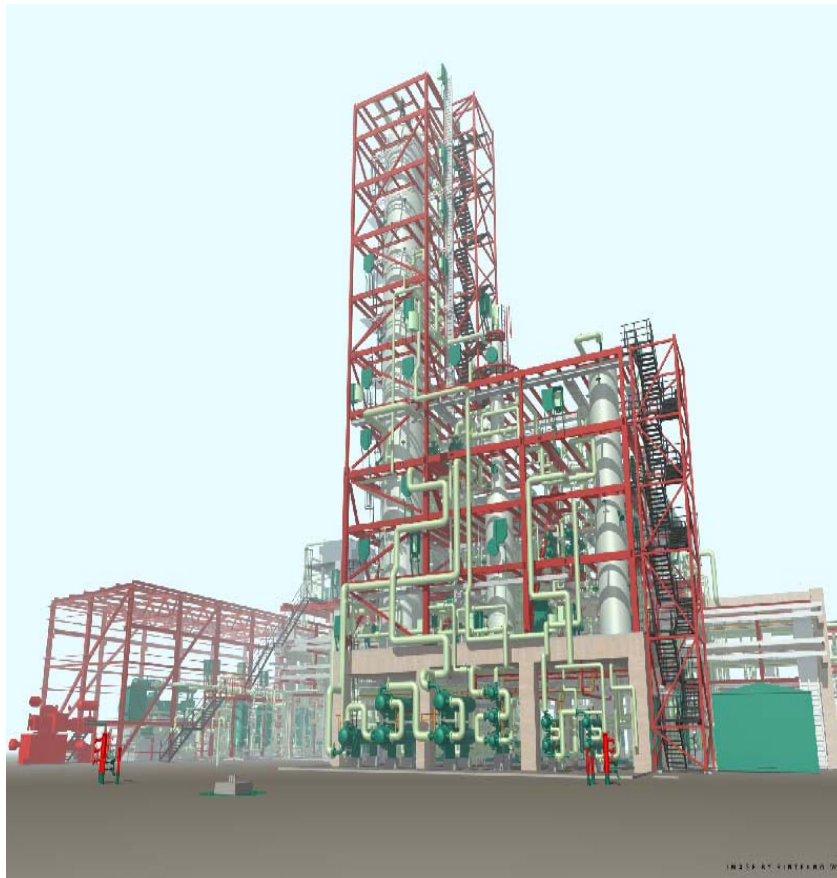
Global warming is here!



- Link between greenhouse gases and global warming undisputable
- Consumer behaviour drives towards increasing greenhouse gas emissions
 - bigger cars
 - more traveling
 - more consumption



The first in the world NExBTL renewable diesel production plant is ready



The first production unit in Porvoo will start production this summer

- based on Neste Oil's own technology
- capacity of 170 000 tons of renewable diesel per annum
- 100 million € investment

The second unit is under construction in Porvoo and will be commissioned late 2008



Ideal Biofuel - NExBTL

- | | |
|--|------------------------|
| • Has the same driveability as conventional fuels, including performance and convenience | YES |
| • Is compatible with current engines | YES |
| • Will help improve new engine and exhaust gas technologies | YES |
| • Cuts tailpipe and GHG emissions | YES |
| • Can be produced cost-effectively and in large scale | YES |
| • Can be produced from non-food feedstocks | YES
(in the future) |



NExBTL has superior product quality

Fuel Properties	RME	Sulphur-free Diesel fuel ¹⁾	NExBTL
Density at +15°C (kg/m ³)	≈ 885	≈ 835	775 ... 785
Cetane number	≈ 51	≈ 53	≈ 84 ... 99 ²⁾
Cloud point (°C)	≈ - 5	≈ - 5	≈ - 5 ... - 30
Heating value (lower) (MJ/kg)	≈ 38	≈ 43	≈ 44
Sulfur content (mg/kg)	< 10	< 10	≈ 0
Product stability	Unstable	Stable	Stable

- ### NExBTL characteristics
- No implications for existing car pool
 - No need to relax specifications to achieve high bio content
 - Distribution within existing oil refinery logistics
 - No need to compromise fuel quality

(1) EN590/2005
 (2) Blending cetane number



Significant reduction in tailpipe emissions

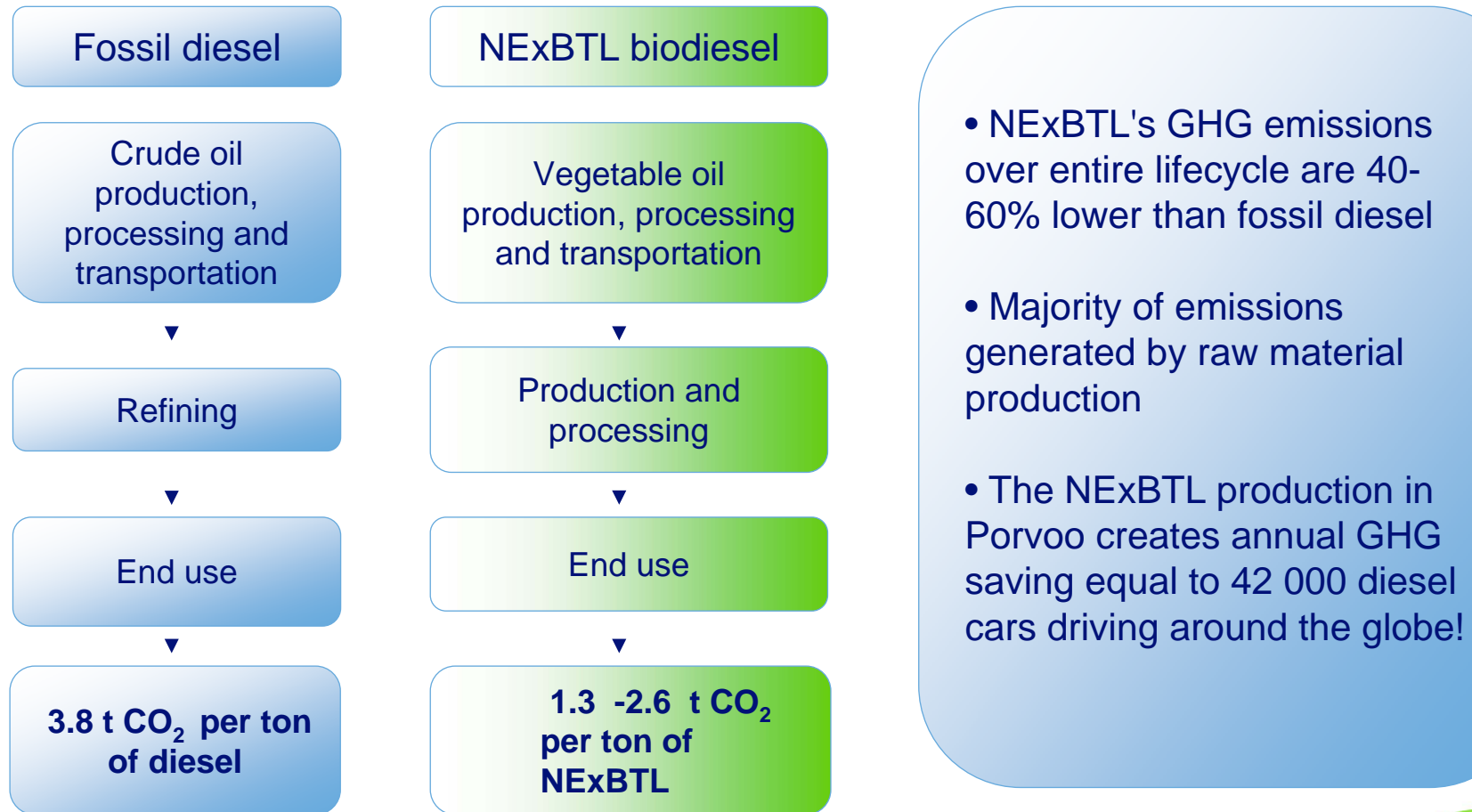
- Engine tests have proved that NExBTL renewable diesel reduces tailpipe emissions significantly compared to fossil diesel fuel:

- ✓ 18% less nitrogen oxides
- ✓ 27% less small particle emissions
- ✓ 20% less hydrocarbons
- ✓ 10% less carbon monoxide
- ✓ 30-40% less formaldehydes
- ✓ 40% less benzene

Source: Scania, MAN, VTT



40-60 % reduction in GHG emissions

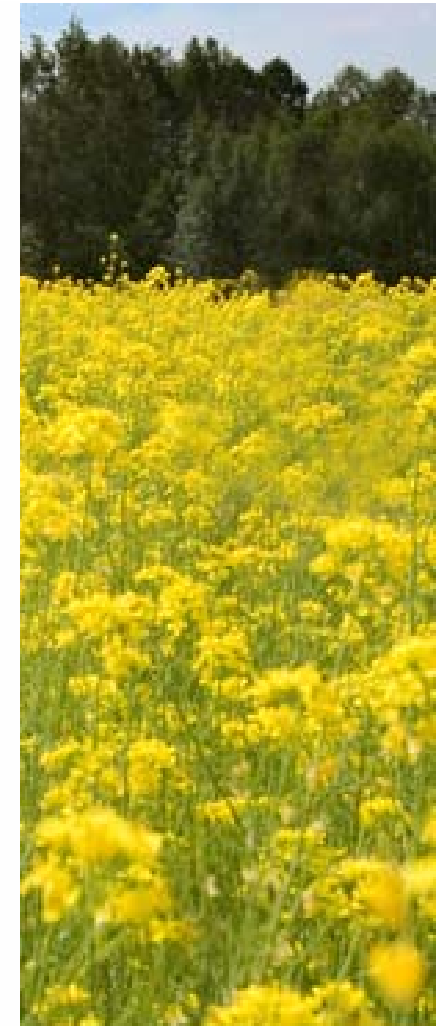


Source: Concawe/Eucar WTW 2004, IFEU



Next Steps - Get out from the food chain!

- **Food should not be used as fuel, but**
 - that is all we have currently
 - all feedstock should have equal treatment
- **Long-term solutions include**
 - use of non-edible vegetable oils (Jatropha, Castor etc.)
 - new feedstock as algae and bacteria
 - 3rd generation solutions (wood gasification FT etc.)
- **Extensive R&D needed**



Neste Oil and Stora Enso co-operation - biofuel production in connection to P&P mill

- Developing 3rd generation technology to gasify wood biomass into biodiesel
- Forest residues to be used as raw material
- Pilot unit to be build in Varkaus, Finland in 2008
 - in connection to Stora Enso's P&P mill
 - 14 million € investment
- End product is biodiesel wax that will be refined into renewable diesel in Porvoo
- Commercial production unit will be build when technical challenges are solved



Thank You!



The leading provider of cleaner traffic fuels

www.nesteoil.com

