

# Sustainable Supply Chain Management

April 2009

NESTE OIL

refining the future

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# Neste Oil in brief

Short description of main activities

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# Neste Oil's three Business Areas: Oil Products - Renewable Fuels - Oil Retail

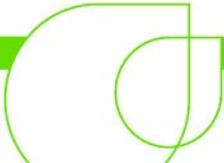
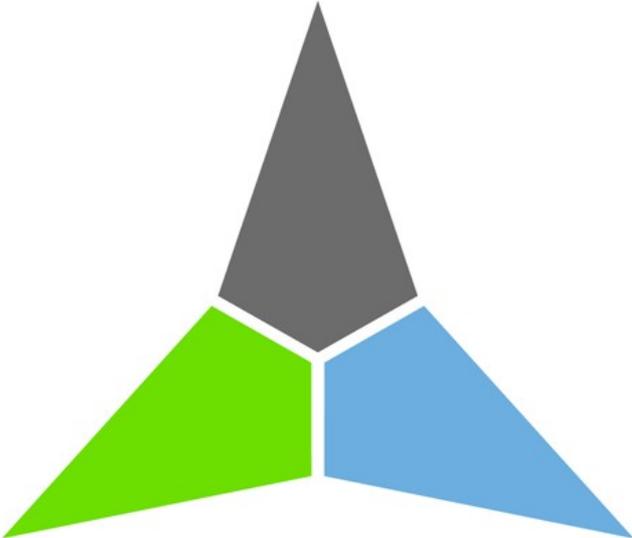


# Neste Oil's strategy

Supplying premium-quality products  
for cleaner traffic

Expanding the  
feedstock base

Leveraging refining  
expertise



# Neste Oil globally

Northern Europe is the focus of operations



# **NExBTL renewable diesel**

**World's cleanest diesel**

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# Product

NExBTL renewable diesel is the best fuel of its type available anywhere, and can be used in all diesel engines.



- NExBTL is the cleanest diesel available, and its technology is several years ahead of any competitors in the renewable fuels market
- Can be produced in large volumes on an industrial scale
- NExBTL renewable diesel significantly reduces both tailpipe and greenhouse gas emissions
- NExBTL renewable diesel can be used in all modern diesel engines, hence there is no need to replace existing vehicles
- Can be used as such or as a blending component in conventional diesel
- Performance and ease of use is equal to that of fossil diesel
- NExBTL renewable diesel is engine-friendly
  - ▶ High cetane number
  - ▶ A pure hydrocarbon



# People

Using NExBTL renewable diesel improves the quality of the air we breathe.

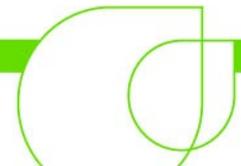


- The particulate, carbon monoxide, and nitrogen oxide emissions released by NExBTL renewable diesel are all lower than those of conventional diesel fuel
- Regulated emissions are significantly reduced:
  - ▶ NO<sub>x</sub> 10% lower
  - ▶ Particulates 28% lower
  - ▶ CO 28% lower
  - ▶ HC 50% lower

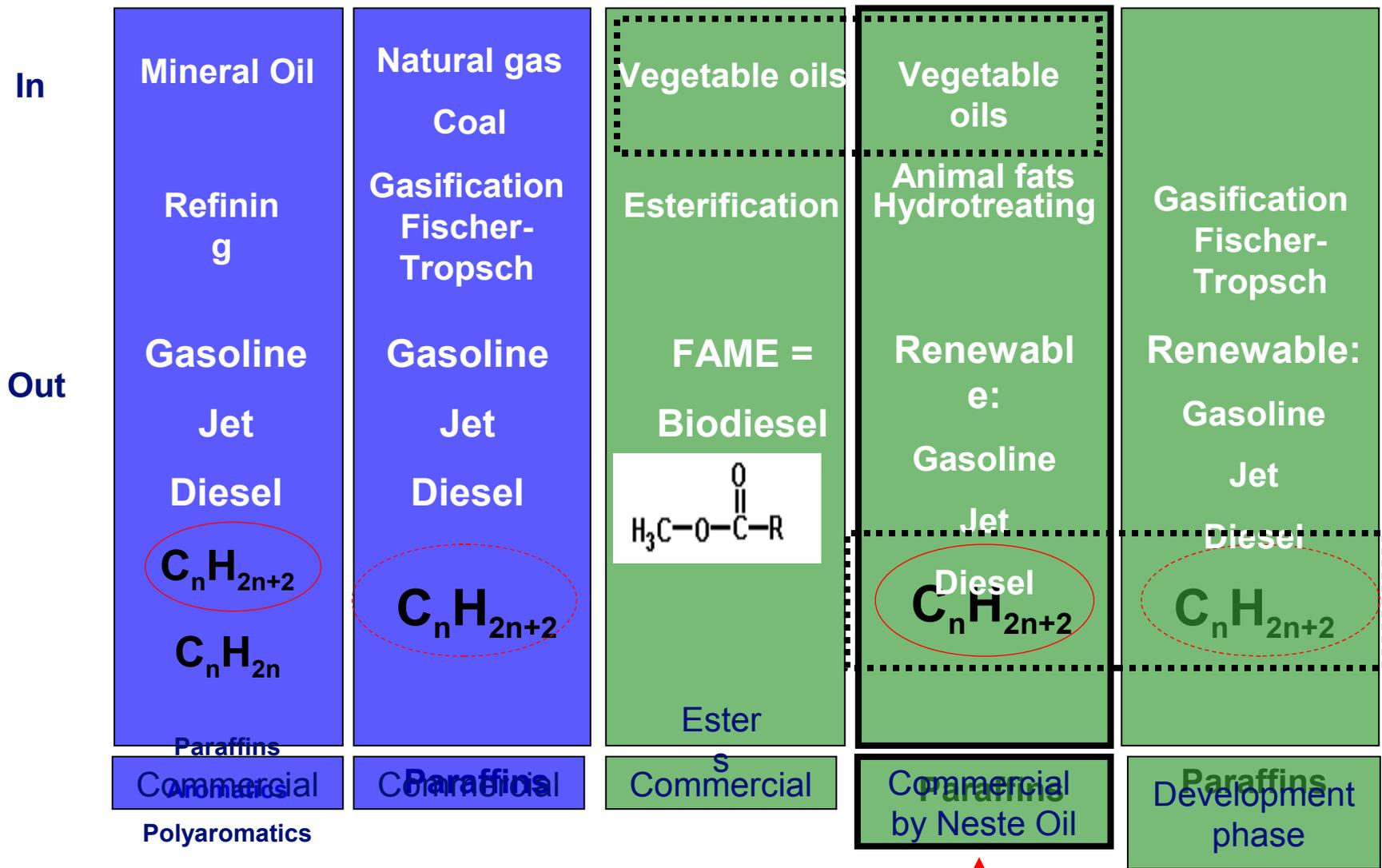
Source: Scania, MAN, VTT



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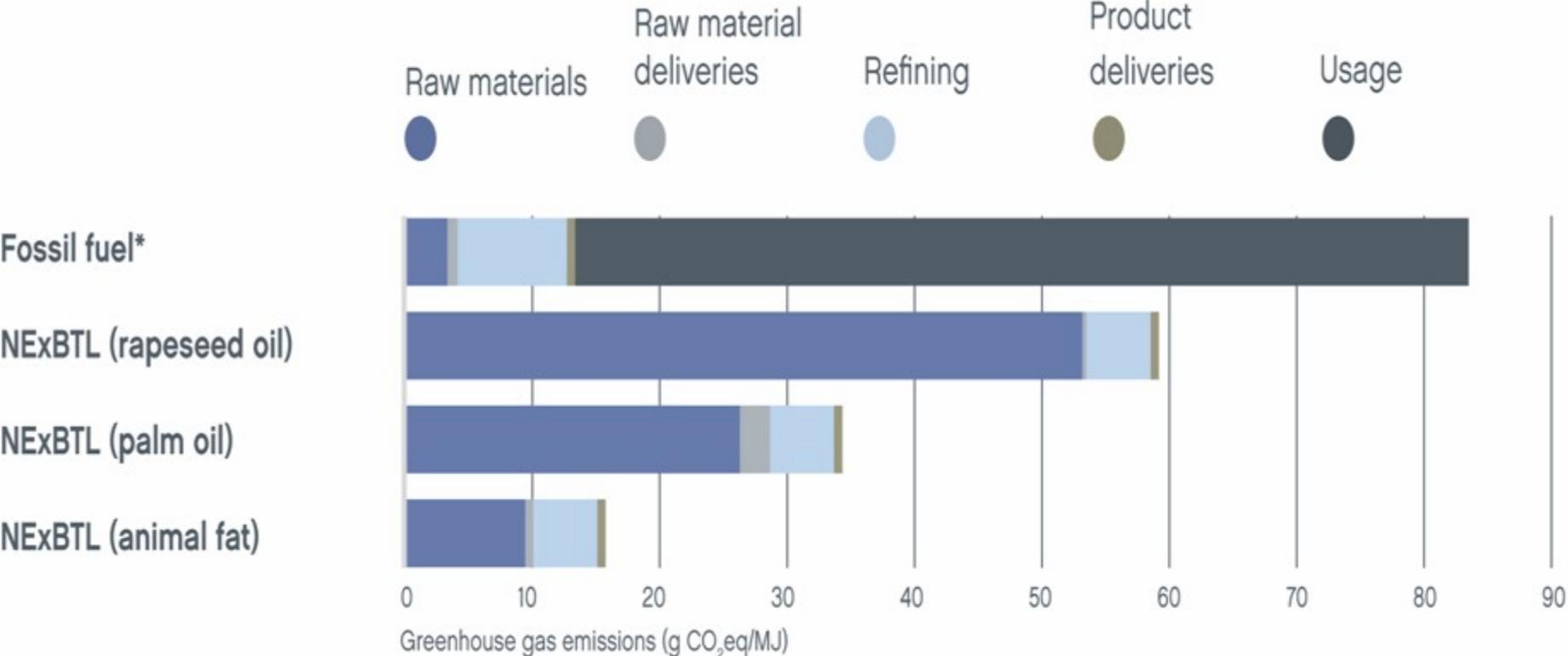


# NExBTL is a hydrocarbon renewable diesel



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# We measure GHG emissions over the Life Cycle on all our feedstocks



Source:Nikander

# Tracing the Origin of Sustainable Palm Oil

## SEEDLINGS

The seedlings are grown in a nursery adjacent to the plantation

## HARVEST

Oil palm trees bear fruit for approximately 30 years. At harvest the fruit bunches are cut down and transported to the extraction plant adjacent to the plantation. The separation of Neste Oil's fruit ensures traceability.

## TRANSPORT

Neste Oil's palm oil is loaded into ships, sealed and shipped to Europe.



## PLANTATION

Plantations are set up according to RSPO's sustainable development criteria

## CULTIVATION

12-month old trees are planted. Proper care guarantees well-being and long life of the palms.

## OIL PRESSING

The palm fruit is freed from the bunches and mashed. Oil is extracted by mechanical pressing and stored in tanks which are sealed until transportation. The rest of the bunch is recycled

## REFINERY

At the NEXBTL plant at Neste Oil's refinery in Finland, palm oil is used as one of the raw materials for NEXBTL renewable diesel.

# Renewable fuels

- **The NExBTL diesel produced from renewable raw materials**
  - is based on Neste Oil's in-house research and development
  - the world's cleanest diesel
- **The first NExBTL plant at the Porvoo refinery was completed in 2007**
  - production of 170,000 tons a year
- **Large investment projects are underway**

<b>Location</b>	<b>Production</b>	<b>Investment</b>	<b>Est. completion</b>
Porvoo (#2)	170,000 t/yr	> 100 M euros	2009
Singapore	800,000 t/yr	550 M euros	2010
Rotterdam	800,000 t/yr	670 M euros	2011

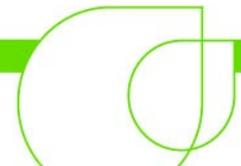
# Sustainable Supply Chain Management

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# Supply Chain of NExBTL

- New product
- New evolving technology
- New supply chain
  
- Sustainability has been taken into account already in R&D phase (energy efficiency, water conservation, materials efficiency)
- A lot of potential to improve the supply chain further in the future
  
- Comparison new processes and supply chains to old traditional chains and processes can be misleading because the new processes are still under construction.



# Direct and Indirect Effects of Supply Chain

- Direct Effects: Emissions directly attributable to the production of a product (including land use change for biofuels)
- Indirect Effects: An unwanted second (or third) order effect occurring outside the system boundary (could be positive or negative)

New Fuels Alliance “A Discussion of Indirect Effects In General Terms”, 2008

# Indirect Land Use Change – Several Drivers

- Variables of indirect effects are synergistic and dynamic  
e.g. tropical deforestation is best explained by multiple factors and drivers acting synergistically rather than by single-factor causation.

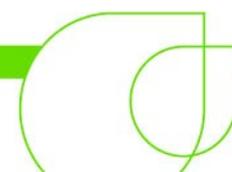
Why to use a different system boundary for biofuels than other products?

ILUC may be difficult to add as a part of carbon footprint assessment conducted at local level (inconsistent system boundaries).



# Direct Land Use Change

- LUC can be added as a part of carbon footprint assessment conducted at local level
- System boundaries of assessment are logical
- Origin of raw material is possible to determine at certain accuracy
- It is possible to get data for the estimation of impacts



# Including indirect effects in a single supply chain calculation

- Does it lead the development to the right direction?
- Does it motivate various economic operators of supply chain to improve their systems?

# California Environmental Protection Agency Calculation (February 28, 2009)

- Total Well-to-Wheel GHG emissions for Biodiesel (Esterified Soy Oil) are **26,9 gCO<sub>2</sub>e/MJ**
- Land use change analysis by staff for soy based fuels is estimated to be **42,0 gCO<sub>2</sub>e/MJ** (preliminary estimate using GTAP analysis)

# Economic operator's sphere of influence

- No legal authority, no existence of a legal mandate granting the organization the ability to enforce certain behaviours on others.
- The sphere of influence of Economic operator will usually include parts of the supply chain. It may also include the formal and informal associations in which it participates, as well as peer organizations or competitors.
- Economic Operator cannot be held responsible for the impacts of every party over which it may have some influence.

Guidance on Social Responsibility  
ISO/CD 26000 (2008)

# Economic Operator's methods of exercising influence

- Setting contractual provisions or incentives
- Sharing knowledge and information
- Conducting joint projects to improve systems
- Undertaking responsible lobbying and using media relations
- Promoting good practices
- Forming partnerships with sector associations, organizations and others



# Future Research

- Research of global scale indirect effects is needed.
- The interpretation and comparison of results from various LCA-studies should be made carefully.
- Life-cycle assessment is valuable tool to characterize supply chain and identify things to be improved.
- Land use change is not related only to biofuels, it may be too narrow focus to this phenomenon.

