Neste Oil - Global leader in renewable diesel

- Annual production capacity 2 million tons of NExBTL renewable diesel
- The highest quality diesel in the world
- Flexible and sustainable raw material base
- Reduces greenhouse gas and tailpipe emissions significantly
Flexible feedstock base: a wide range of vegetable oils and waste animal fats

- Renewable NExBTL diesel
- Renewable NExBTL aviation fuel
- Renewable Naphta
- Renewable Propane
Four ways of using hydrotreated vegetable oil (HVO, NExBTL) in road traffic

1. Low blend to fulfill quota, e.g. 5%
2. Upgrading of sub-spec fossil fuel
3. “Drop in and forget” - optimizing cost in fulfillment of quota e.g. 0%...30%
4. Highest quality blend stock for premium fuels (e.g. WWFC 4)
NExBTL renewable aviation fuel

• Offers airlines an easy way to cut their emissions
• Compatible with existing jet engines
• High energy content (MJ/kg), no aromatics, reduces CO2 and sulphur emissions
• Complies with ASTM D7566-11a specification
• In Brazil 50% blend use in aviation approved (Regulamento Técnico ANP no 01/2013)
NExBTL renewable aviation fuel business activities

- There is wide interest towards NExBTL among airlines and other airline industry globally
- It is already available at commercial scale
- In Brazil Neste Oil is a stakeholder in Sustainable Aviation Biofuels for Brazil project (SABB)
- Regulatory support needed for wider use
High performance level proven by more than thousand flights

- 1,187 flights
- 1,557 tons of Neste Oil renewable aviation fuel blend (50%) consumed
- 1,471 tons reduction in CO2 emissions
Perfect fuel for aviation

1. During the operation
   • Aircraft and engine performed excellently
   • 1% lower fuel consumption due to the higher energy content

2. Inspection after the program
   • Fuel system, combustion chamber and turbines in a perfect condition
   • Normal function and tightness of fuel bearing parts

3. Storage stability
   • Density steady at 783 kg/cbm
   • No microbial issues
Feedstock for NExBTL production
Range of renewable raw materials

- Waste animal fat from the food processing industry
- Waste fat from the fish processing industry
- Palm fatty acid distillate (PFAD) and stearin
- Technical corn oil
- Tall oil pitch
- Crude palm oil
- Camelina oil
- Jatropha oil
- Soybean oil
- Rapeseed oil
Expanding the feedstock base

- Waste animal fats, waste oils, residue and side streams
- Microbial oil
- Non-food vegetable oils
- Harvesting residue and biomass
- Algae oil
Microbial oil technology – conversion of wastes and residues to biofuel

RAW MATERIALS: Agricultural and industrial residues

RAW MATERIAL FRACTIONATION

OIL RICH MICROBES

MICROBIAL OIL

NExBTL RENEWABLE FUEL

RESIDUAL BIOMASS
Raw materials for microbial oil production

Sources of raw materials
- Agricultural residues, e.g. straw, bagasse
- Pulp and paper industry residues
- Sugars from cereals and sugar cane/beet

Versatility in using raw materials
- Hexose (C6)
- Pentose (C5)
- Other raw materials than sugars, e.g. glycerine
Raw materials for microbial oil production

- Europe’s first microbial oil pilot plant using wastes and residues
- €8 million investment, operational since 08/2012
- In pilot, microbial oil technology is developed and verified for scale-up

From lab scale to piloting
Summary

• High quality renewable diesel NExBTL is commercially available, even for aviation use

• NExBTL offers considerable advantages beyond fulfilling the biomandate

• Possible to use waste and residue based feedstock

• Microbial oil technology is approaching commercial stage and screening for potential partners is going on → opportunities for Brazil!