Neste Oil Renewable Fuels Leading the Way Forward

4th International Conference on Biofuels Standards
Gaithersburg, MD
November 14, 2012

NESTE OIL

Safe Harbor Statement

The following information contains, or may be deemed to contain, “forward-looking statements”. These statements relate to future events or our future financial performance, including, but not limited to, strategic plans, potential growth, planned operational changes, expected capital expenditures, future cash sources and requirements, liquidity and cost savings that involve known and unknown risks, uncertainties and other factors that may cause Neste Oil Corporation’s or its businesses’ actual results, levels of activity, performance or achievements to be materially different from those expressed or implied by any forward-looking statements. In some cases, such forward-looking statements can be identified by terminology such as “may,” “will,” “could,” “would,” “should,” “expect,” “plan,” “anticipate,” “intend,” “believe,” “estimate,” “predict,” “potential,” or “continue,” or the negative of those terms or other comparable terminology. By their nature, forward-looking statements involve risks and uncertainties because they relate to events and depend on circumstances that may or may not occur in the future. Future results may vary from the results expressed in, or implied by, the following forward-looking statements, possibly to a material degree. All forward-looking statements made in this presentation based on information presently available to management and Neste Oil Corporation assumes no obligation to update any forward-looking statements. Nothing in this presentation constitutes investment advice and this presentation shall not constitute an offer to sell or the solicitation of an offer to buy any securities or otherwise to engage in any investment activity.

Agenda

1. The Company
2. Technology
3. Feedstock – Current Mix and Development
4. Renewable Aviation Fuel
5. The Role of Standards

The Preferred Partner for Cleaner Traffic Fuel Solutions

- **Neste Oil Corporation is a refining and marketing company concentrating on low-emission, high-quality traffic fuels.**
- **Neste Oil is the world leader in renewable diesel**
- **Neste Oil has invested billions of dollars in renewable diesel**

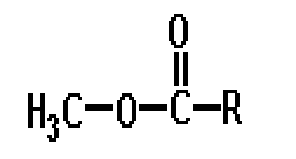
Refining capacity	**260,000 bpd (petroleum)**
	44,000 bpd (renewable)
Employees	**5,000 (approximate)**
Sales	**Euro 15.4 billion (2011)**

- **World headquarters in Helsinki, Finland**
- **US office in Houston, Texas**

Global Leader in Renewable Diesel

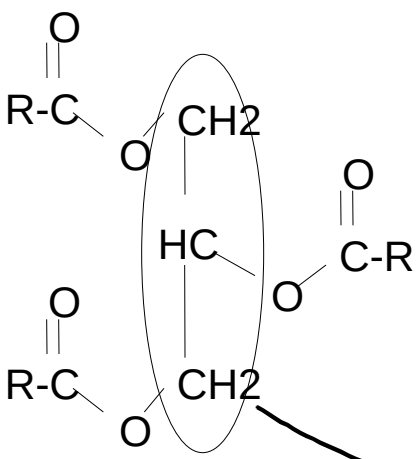
Location	Capacity	Investment	Completed
1. Finland #1	190 000 tons	€ 100 million	2007
2. Finland #2	190 000 tons	€ 100 million	2009
3. Singapore	800 000 tons	€ 550 million	2010
4. Rotterdam	800 000 tons	€ 670 million	2011

Alternative Fuel Options

In	Crude Oil	Natural gas Coal	Vegetable oils Animal fats	Vegetable oils Animal fats	Biomass
	Refining	Gasification Fischer-Tropsch	Esterification	Hydrotreating	Biological Chemical Thermal
Out	Gasoline Jet Diesel	Gasoline Jet Diesel	FAME = Biodiesel	HVO = Renewable Gasoline Jet Diesel	Renewable: Gasoline Jet Diesel
	C_nH_{2n+2} C_nH_{2n}	C_nH_{2n+2}		C_nH_{2n+2}	C_nH_{2n+2}
	Paraffins Aromatics Polyaromatics	**Paraffins**	Esters	**Paraffins**	**Paraffins**
	Commercial	Commercial	Commercial	Commercial by Neste Oil NExBTL technology	Development phase

NExBTL process chemistry
Hydro de-oxygenation (hydroprocessing)

Feedstock



Triglyceride, R = nC

Reactions & Products

H2

Catalyst

R'-CH2-CH3 + 2 H2O

R'-CH3 + CO2

R'-CH3 + CO

NExBTL Renewable Fuel

H2

Catalyst

CH3-CH2-CH3

Propane (fuel gas)

... NExBTL is a stable and pure hydrocarbon

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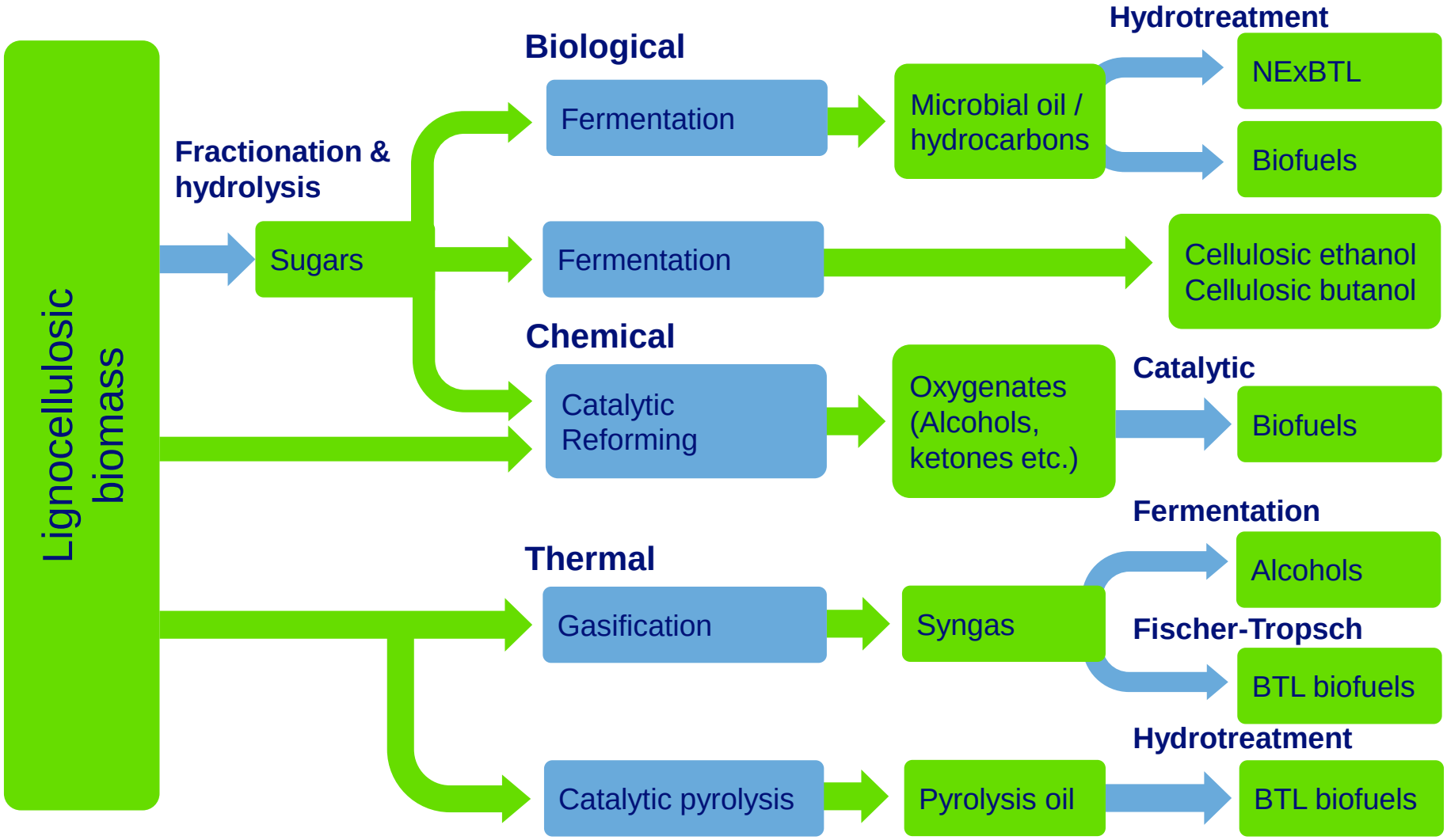
Routes to Advanced Liquid Biofuels



NExBTL Products

Flexible and sustainable feedstock:
a wide range of vegetable oils and animal fats

NExBTL renewable diesel

NExBTL renewable aviation fuel

Renewable gasoline

Renewable propane

Renewable Diesel Market Experiences

NESTE OIL

- Superior diesel blending component
- Being used in blends and as a neat fuel
  - "Green diesel" is our premium 10% diesel blend
  - Helsinki buses running 100% NExBTL
  - Select group running 100% NExBTL in LDV
- Completely fungible - no incremental costs
- No storage stability problems
- Excellent performance in cold climates
  - Temperatures in Alberta reached -40C
- Very high cetane number (80...100)
  - Less noise, easier starts
- Reduced exhaust emissions
- Meets specifications of ASTM D-975

Wide Variety of Feedstock

Palm oil, stearin, palm fatty acid distillate (PFAD)

Waste animal fat from the food industry

Waste fat from fish processing industry

Camelina oil

Jatropha oil

Soybean oil

Rapeseed oil

New Raw Materials and Process Alternatives

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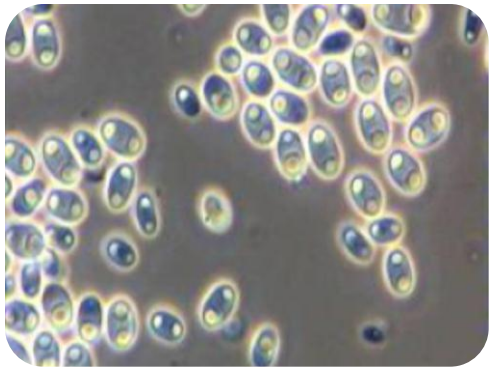
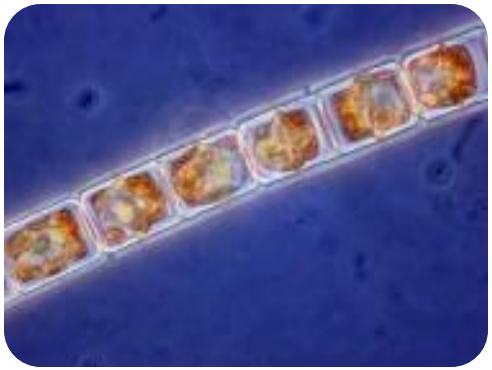
Potential Future Raw Materials



Microbial oil



Algae oil

Biowax from forest harvesting waste

- Cooperation with over 20 research institutions around the world.
- 80% of Neste Oil's R&D costs (~EUR 42 million in 2011) directed to researching renewable raw materials and the refining technologies.
- The first ever pilot plant in Europe to produce waste-based microbial oil recently opened at Neste Oil's Porvoo refinery in Finland.

Europe's First Pilot Plant For Waste and Residue-Based Microbial Oil

- Neste Oil is investing in a pilot plant in Finland to produce microbial oil from waste and residue streams
- Scale up to commercial production in 2015 at the earliest

BIOMASS
Agricultural or pulp and paper industry residues etc.

BIOREACTOR
Biomass is transformed into microbial oil

NExBTL PROCESS
Microbial oil is converted into fuel

PRODUCT
NExBTL
Renewable diesel / Aviation Fuel

NExBTL Renewable Aviation Fuel

- Offers airlines an easy way to cut their emissions
- Compatible with existing aircraft engines
- Performance demonstrated on over 1,000 Lufthansa flights
- Capable of being produced in commercial volumes
- Offers Neste Oil future growth opportunities

High Performance Level Proven by More Than a Thousand Flights!

1,187
flights

1,557 tons
of Neste Oil renewable aviation fuel blend (50%) consumed

1,471 tons
reduction in CO_2 emissions

Perfect Fuel For Aviation

1. During the operation

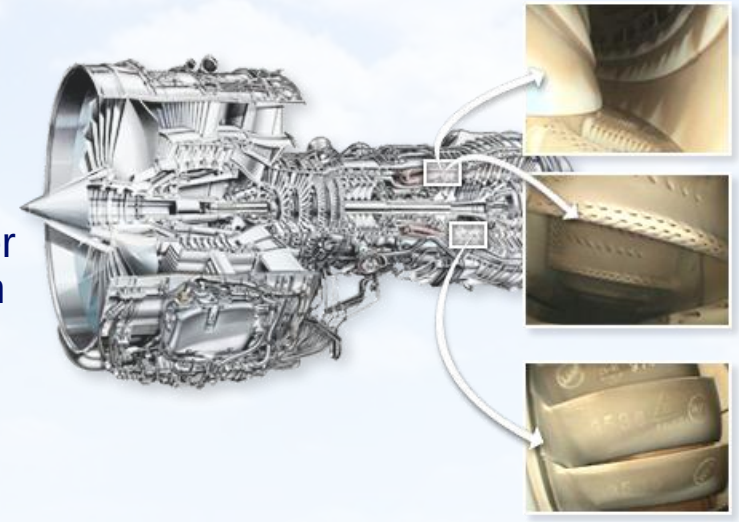
- ✓ Aircraft and engine performed excellently
- ✓ 1% lower fuel consumption due to the higher energy content

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



Source of the picture: Lufthansa

Standards

JIG Joint Inspection Group

Product Specifications

Bulletin No. 45 **May 2011**

Issue 25 –5th May 2011
Supersedes Issue 24 – October 2008

AVIATION FUEL QUALITY REQUIREMENTS FOR JOINTLY OPERATED SYSTEMS (AFQRJOS)

This document has the agreement of: BP, Chevron, ENI, ExxonMobil, Kuwait Petroleum, Shell, Statoil, and Total. It defines the fuel quality requirements for supply into Jointly Operated Fuelling Systems.

The Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS) for Jet A-1 embodies the most stringent requirements of the following two specifications:

(a) British Ministry of Defence Standard DEF STAN 91-91/Issue 7 18 February, 2011 for Turbine Fuel, Kerosene Type, Jet A-1, NATO Code F-35, Joint Service Designation: AVTUR.

(b) ASTM Standard Specification D 1655-10 for Aviation Turbine Fuels "Jet A-1".

Jet fuel that meets the AFQRJOS is usually referred to as "Jet A-1 to Check List", or "Check List Jet A-1" and, by definition, generally, meets the requirements of both of the above specifications.

The main table requirements in IATA Guidance Material for Aviation Turbine Fuels Specifications (GM) are no longer part of the Check List because Part I of the IATA GM is now a guide to specifications rather than a specification itself. However, the water and dirt limits for fuel at the point of delivery into aircraft, which are embodied in Part III of the IATA GM, remain part of Check List.

The Aviation Fuel Quality Requirements for Jointly Operated Systems for Jet A-1 are defined in the following table, which should be read in conjunction with the Notes on pages 3 to 6 of this document. The Notes highlight some of the main issues concerning the specification parameters.

In principle, conformance to AFQRJOS requires conformance to the detail of both specifications listed above, not just the following table.

See Note 22 for guidance on statements declaring conformance to these specifications.

Also, it should be specifically noted that DEF STAN 91-91/7 requires traceability of product to point of manufacture and requirements applicable to fuels containing synthetic components. See Annex J and D of DEFSTAN 91-91/7 for more information.

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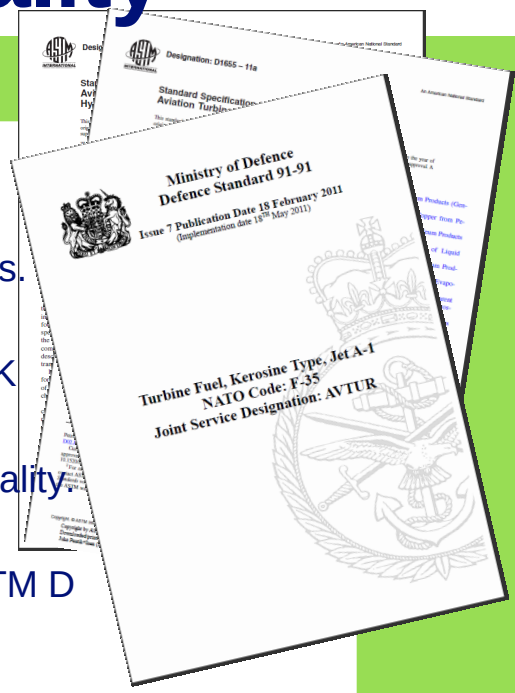
The Role of Standards in Renewable Aviation Fuel – Fuel Quality



Standards defining the quality of jet fuel are in the key role in fuel production:

- **ASTM D1655 – 12**: Standard for Jet A, Jet A1 from conventional sources. Annex A1 references **ASTM D7566** for synthetic components
- **ASTM D7566 - 11a:** Standard for synthetic components' quality (FT-SPK Annex 1 and HEFA Annex 2)
- **Defence Standard 91-91 Issue 7**: Military standard for petroleum jet quality. Includes a reference to ASTM D7566 for synthetic components.
- **JIG Issue 26 - 4th May 2012**: includes the strictest requirements of ASTM D 1655 and DEF Stan 91-91.

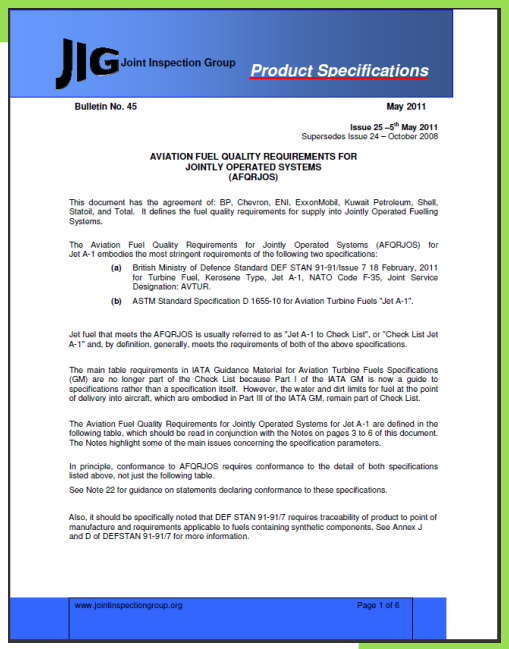
- **The most challenging requirements for synthetic components:**
  - low density, flash point, freezing point, and distillation temperatures
  - Very strict metal levels requiring complicated, expensive and time consuming analyses

The Role of Standards in Renewable Aviation Fuel – Fuel Handling

Handling instructions for jet fuel are included in:

- JIG 1 (Into-plane)
- JIG 2 (Airport Depots and Hydrants), and
- JIG 3 (Supply and Distribution) instructions.

- The same instructions are valid for jet fuels containing synthetic components.
- Supplements to the above instructions will be included in 2012 JIG Bulletin No.57.



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Neste Oil's Renewable Fuels - Solutions for Energy and Climate Challenges

Premium quality, drop-in renewable fuels commercially available

Significant reduction in greenhouse gas and exhaust gas emissions

Securing of energy supply and reducing the dependency on fossil fuels

Kiitos!
Thank You!

Neville Fernandes

General Manager, USA

Neste Oil Corporation

neville.fernandes@nesteoil.com

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