Biodiesel, sustainable energy
Solarix:
- Since 2005
- Focus on biodiesel, vegetable oil and sustainable energy;
- Expert knowledge on oleo chemistry and agriculture, integrated projects
Transesterification

\[ R-C\text{O}-C\text{H}_2\text{O} + \text{CH}_3\text{O}^- \rightarrow R-C\text{O}-\text{CH}_3 + \text{CH}_3\text{O}^- \]

Ausscheidung als schwere Phase
Fatty Acid Composition

For example:

- Butyric acid 4:0
- Capron acid 6:0
- Capryl acid 8:0
- Caprine acid 10:0
- Laurine acid 12:0
- Myristine acid 14:0
- Palmitine acid 16:0
Figure 4-2. GHG-emissions of selected FAME compared to diesel.

**BIOScopies:**
Biodiesel Improvement On Standards, Coordination of Producers and Ethanol Studies

EC project TREN/D2/44-LOT 3/S07.54848

The European BIOScopies project is carried out by Ecofys for the European Commission's Directorate-General Energy and Transport, in cooperation with AGQM, EBB, NEN, University of Graz, Atrax, ITERG, Abengoa, SSOG, ASG, ADM, Ecotraffic, BAFF, LACCO, UNGDA, LBB, O2Diesel, and VTT.
Particulate matter (soot)

(http://www.epa.gov/OMS/models/analysis/biodsl/p02001.pdf)

Figure ES-A
Average emission impacts of biodiesel for heavy-duty highway engines
Kenya Eco Energy

production of animal feed
vegetable oil for energy, biodiesel and food
(reforestation)
Tanzania

Sustainer
Production of Sustainable Energy, Fuel and Food
by Solarix
An alternative for CO2 storage in empty gasfields

The solution by AF&F:

CO2 conversion to biomass using fotobiorectors

AF&F = joint venture between:

bioSoil

tendris

Solarix
Project Hallum Friesland

- 4 experimental fotobioreactors of 25 m³

Growth based on:

- Constant circumstances (temp, pH, light, nutrients)
- LED assimilation lights and daylight
- CO₂ from fumegases biogas engine
- Nutrients from digestate biogas installation
- Continuous harvesting
Future perspective:

Combined waste to energy (bio refinery?):

- Biodiesel (from waste and by products);
- Glycerol (from byproduct to fuel additive);
- Biogas;
- Bio-ethanol;
- BTL (Pyrolyse, bio catalysis etc.)
- “Green” electricity
- Algae

Advantage: Synergy in logistics, byproducts and energy (heat efficiency)
Biodiesel Amsterdam
Multi Feedstock Biodiesel production

VERGISTING
- Capacity: 343,000 ton per year
- Waste products from the process waste and of others
- Delivery in bulk via and by rail
- Delivery of electricity and heat

WATERZUIVERING
- Capacity: 343,000 ton per year
- Waste products from the process waste and of others
- Delivery in bulk via and by rail
- Delivery of electricity and heat

VESTEMELRIJ & FOODRECYCLING
- Involvement with over 60 tractor drawn vehicles
- Delivery in embalming and bulk
- Delivery of electricity and heat
- Delivery of electricity and heat

[Diagram of the biodiesel production facility with various sections labeled and details on the processes and capacities mentioned above.]
Biodiesel Amsterdam

FEEDSTOCKS:
1. Used Cooking Oils
2. Animal fats
3. Fatty Acid Distillates (FAD)

FACTS:
- Operating days/year: 330
- Operating hours/day: 24
- Annual operating hours: 7,920
- CAPACITY/HOUR: 12,626 MT
- CAPACITY/DAY: 303 MT
- Guaranteed Minimum Biodiesel OUTPUT/YEAR: 100,000 MT
THE PROCESS:

UCO → FAD → ANIMAL FAT → PRE-TREATMENT → ESTERIFICATION → TRANS ESTERIFICATION → PHASE SEPARATION → FAME PURIFICATION → FAME DISTILLATION

GLYCEROL → FERTILIZER (Potassiumphosphate) → BIOGAS → STEAM GENERATION

METHANOL RECOVERY → BIO HEATING OIL
QUALITY:

• Dedicated ‘bom-proof’ fat pre-treatment systems;
• FAME- distillation columns;
• In-line quality measurement system;
• Quality Management System; intermediate /day tanks, qualified lab on-site, etc;
• Incorporated CIP-systems;
• EN 14214!
CAPACITY:

• Controlled and secured feedstock supply;
• Fully automated system;
• Oversized “critical devices”;
• Full flexibility of operation;
• Critical devices are redundant and have possibility to run parallel.
UNIQUE IN SEVERAL WAYS:

- High quality FAME (14214) only produced from secondary feedstocks;
- Waste products are converted into high value end products like Bio Heating Oil and Fertilizer;
- All fatty acids and fatty acid compounds are converted into Biodiesel (yield optimization);
- No “Food for Fuel” sensitivity;
- Located in harbor with ‘direct’ access to open sea;
- First in Europe;
- BDA FAME counts double in Dutch blending requirements.
Used Cooking Oils (U.C.O.)
Secondary Oils/Fats
RECALL Expired Food
G.F.T. Fruit-, vegetable- & garden waste
F.A.D. Fatty Acid Distillates
SWILL Organic food waste

INPUT:

GREENMILLS

OUTPUT:

Biodiesel
Green Energy

NO WASTE!
Greenmills Amsterdam: energy from waste

Rotie (UCO, swill, biodiesel)
Orgaworld (glycerol, biogas, bioethanol)
Thank you

www.solarix.eu