



Standardized Modular Package for the Production of Biodiesel

Lastingly regenerating raw materials

– an infinite energy source !

BioDiesel belongs to the renewable energies. Raw materials for BioDiesel are regenerating and in principle don't create environmental damages. Thus it offers the solution for two main problems in the traffic sector:

Best reasons for shifting to BioDiesel production and commercial application:

1. Worldwide limited energy resources
2. Global climatic change



The high demand for Diesel fuel in Europe and the rest of the world, combined with the increasing price for crude oil, carry the production of bio diesel in the foreground and makes it economically attractive for investors.

Lohrmann International provides a standardized technology for the efficient and safe production of BioDiesel.



Raw Materials

Production

Products

Clients

Advantages of Lohrmann BioDiesel Packages

- 
- + assembled in standard (mobile) 40' containers for remote sites
 - + no special requirements in infrastructure
 - + fast track installation and commissioning
 - + fuel production from local vegetable oil resources
 - + simple plant handling
 - + fully automatic esterification process
 - + easy adjustment for different feed material

Typical configuration of a Package BioDiesel Plant of Capacity 3.600 tons per year

Basic Components (Modules):

Oil Extraction (Module 1)



Bio Diesel Plant (Module 2)



Tank Farm (Module 3)



Capacity extensions are simple and easy by doubling or multiplying in parallel operation of identical or smaller units.

Module 1: Oil Press



Type: **Oecosys 4000**

Capacity: 750 – 1000 kg/h

L: 4800 mm

W: 1200 mm

H: 1700 mm

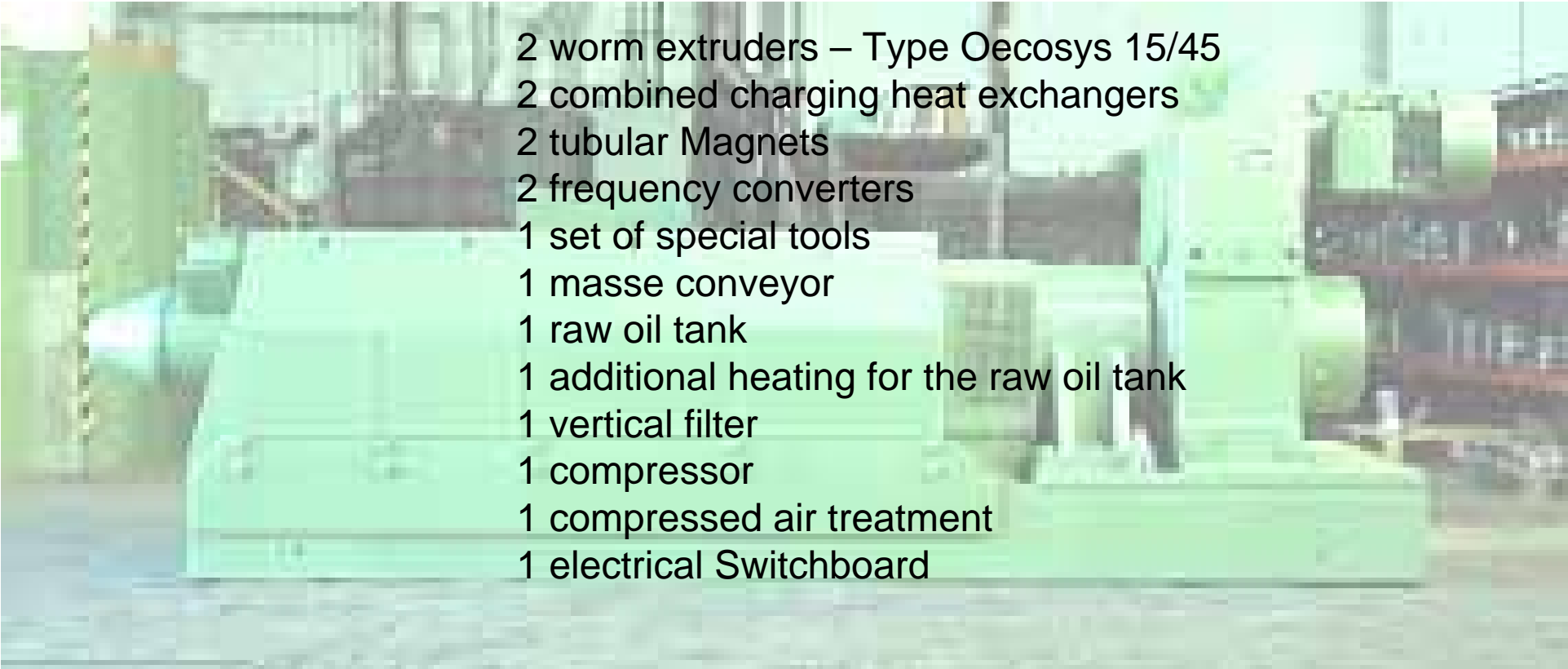
Net-Weight: 9200 kg

Installed electric: 45 kW

An important prerequisite for the esterification process is an excellent (or good) oil quality. To guarantee such quality, we recommend the use of the Lohrmann oil press. In case of low-grade oil extracted from other (existing) mills it might be necessary to add a processing module in order to treat and purify the oil according to the process requirements.

Module 1

Typical Scope of Supply:

- 
- 2 worm extruders – Type Oecosys 15/45
 - 2 combined charging heat exchangers
 - 2 tubular Magnets
 - 2 frequency converters
 - 1 set of special tools
 - 1 masse conveyor
 - 1 raw oil tank
 - 1 additional heating for the raw oil tank
 - 1 vertical filter
 - 1 compressor
 - 1 compressed air treatment
 - 1 electrical Switchboard

Module 2: Esterification Plant

The Modern Technology of Transesterification

The whole process runs in a single tank and is completed after six to eight hours, depending on the quality of the input material.

The plant technology is controlled automatically by means of a programmable logic control (PLC). The process is visualised on a touchscreen monitor.

The operator thus has the plant status in his sight at all times.

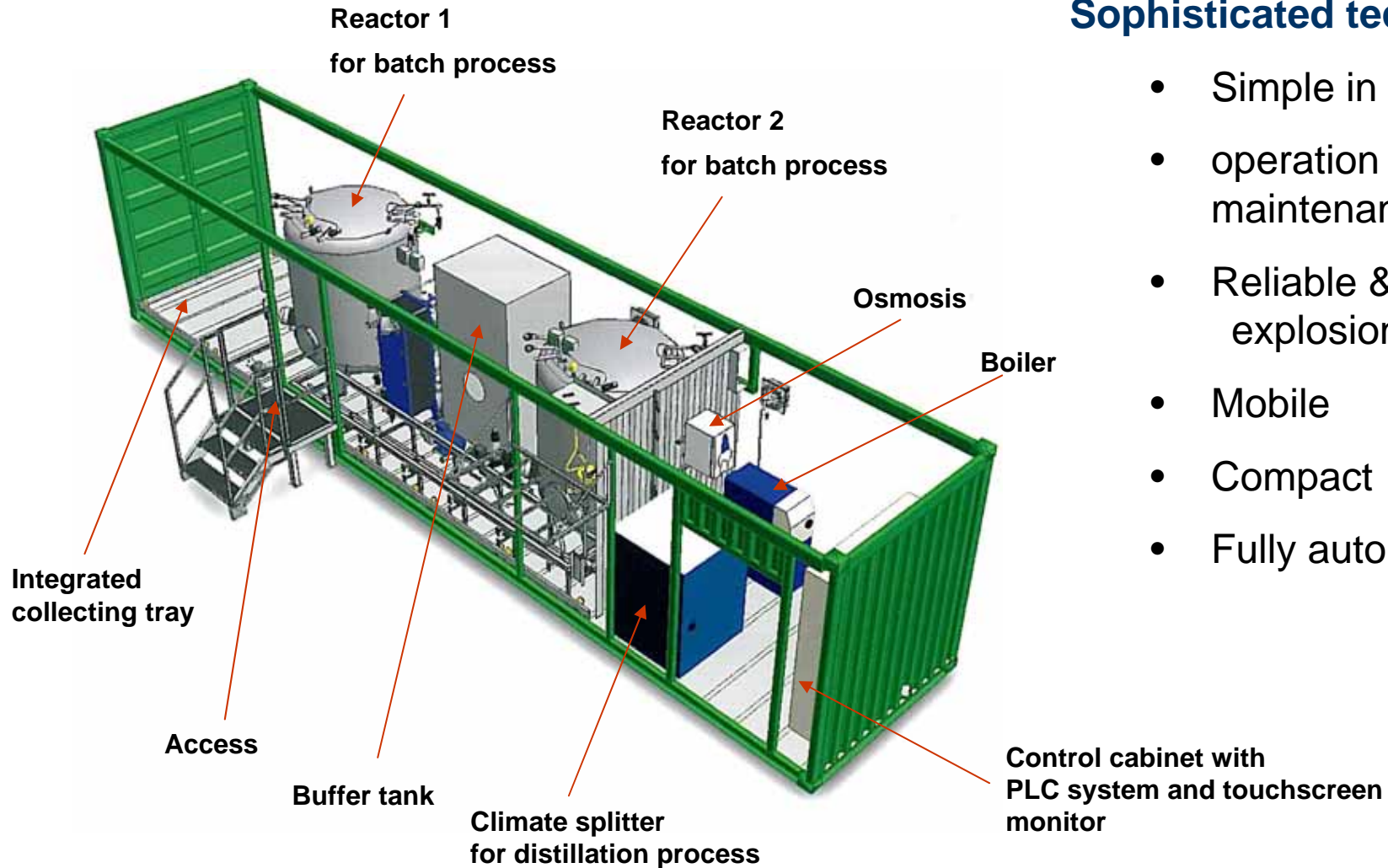
Continuous data recording ensures the process control and reproducible process parameters, consequently minimising the labour and monitoring work. The process can also be telemonitored by means of a data teletransmission system.





Sophisticated technology

- Simple in operation & maintenance
- Reliable & explosion proof
- Mobile
- Compact
- Fully automatic



Input – Output Balance Example for production of 1 to BioDiesel

vegetable oil

1020 kg
1121 Liter



methanol

163 kg
205 Liter



natrium methylat

15 kg

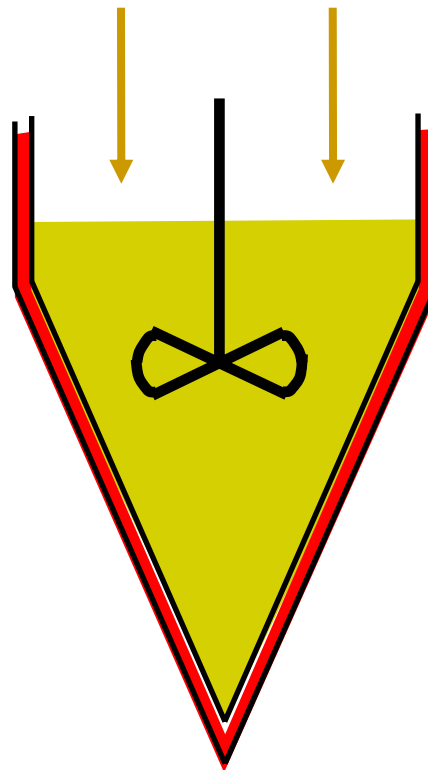


water

100 kg
100 Liter



appr. 75 kWh el. req.



biodiesel

1000 kg
1136 Liter



crude glycerol

130 kg
130 Liter



washing water

180 kg
180 Liter



Flexibility of the BioDiesel Plant Capacity

So far, it was only been possible to cover the costs for transesterification of vegetable oils and natural fats to produce BioDiesel by producing on a large industrial scale. Thanks to the intelligent design of the Lohrmann BioDiesel Packages, it has now become possible to eliminate cost-intensive parts without affecting from the quality of the produced fuel.

Therefore decentralised plant with a lower capacity of BioDiesel can for now be operated very profitably.

No specialised knowledge is necessary to operate these plants.

They run fully automatically under PLC control 24 hours a day.



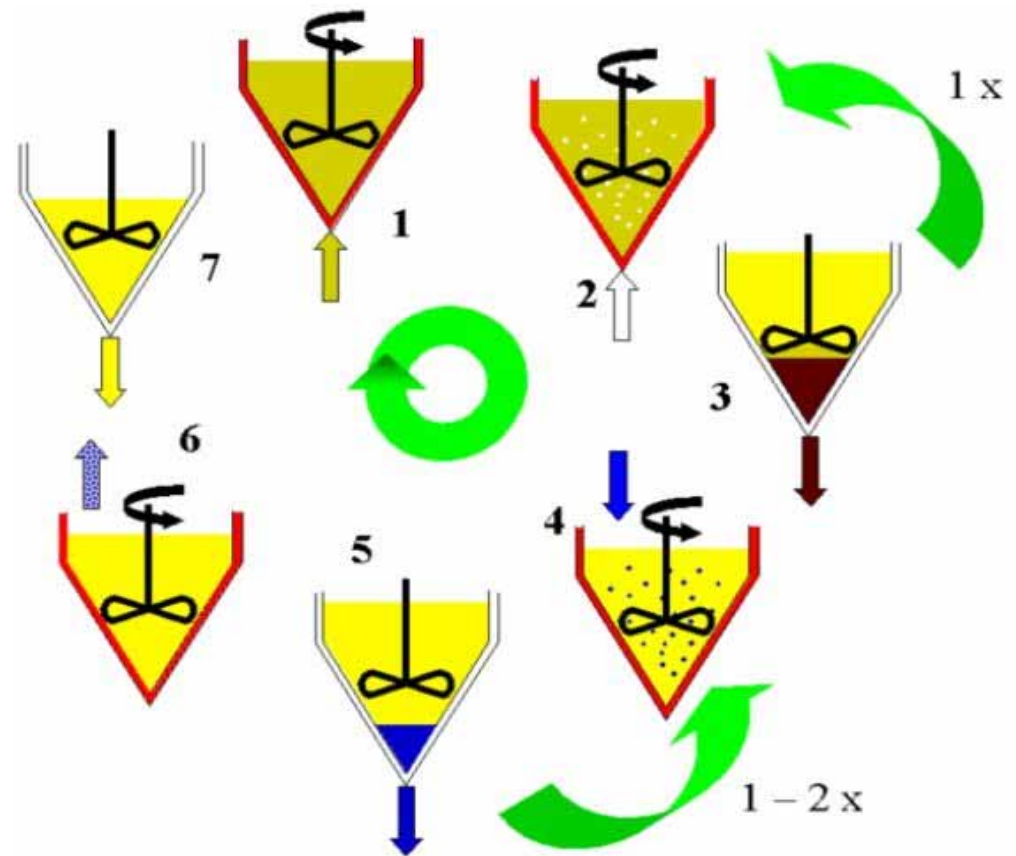
Two plant sizes with annual capacities of 1800 and 3600 t p.a. BioDiesel are available.

Capacity extensions are simple and easy by doubling or multiplying in parallel operation.



In seven steps to tank-ready BioDiesel

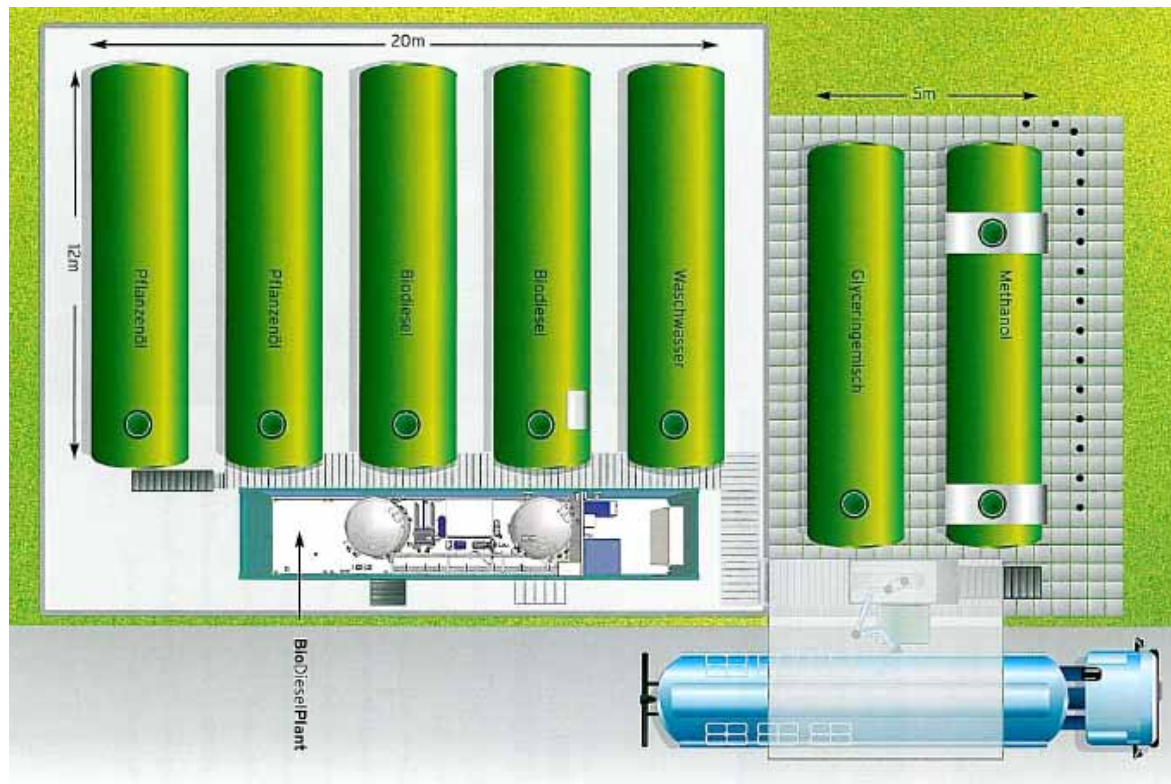
1. A defined mass of vegetable oil (triglyceride) or fat is drawn into the central stainless steel process tank where it is heated.
2. Methanol and a catalyst are added to the heated product. The transesterification process can then start.
3. The glycerine formed settles compactly at the bottom of the tank and will be drawn off.
4. The raw biodiesel is washed with water in order to remove impurities.
5. The water settles at the bottom of the tank within a short period and is drawn off.
6. The process tank is heated for distillation, completely removing the water and methanol that have not settled in the tank under a vacuum.
7. The finished biodiesel is drawn off and pumped into the storage tank. The cycle can start again from the beginning.





Module 3: Tank Farm

BioDiesel is readily biodegradable (water hazard class 1) which means that there are no special regulations in respect of transport and storage.

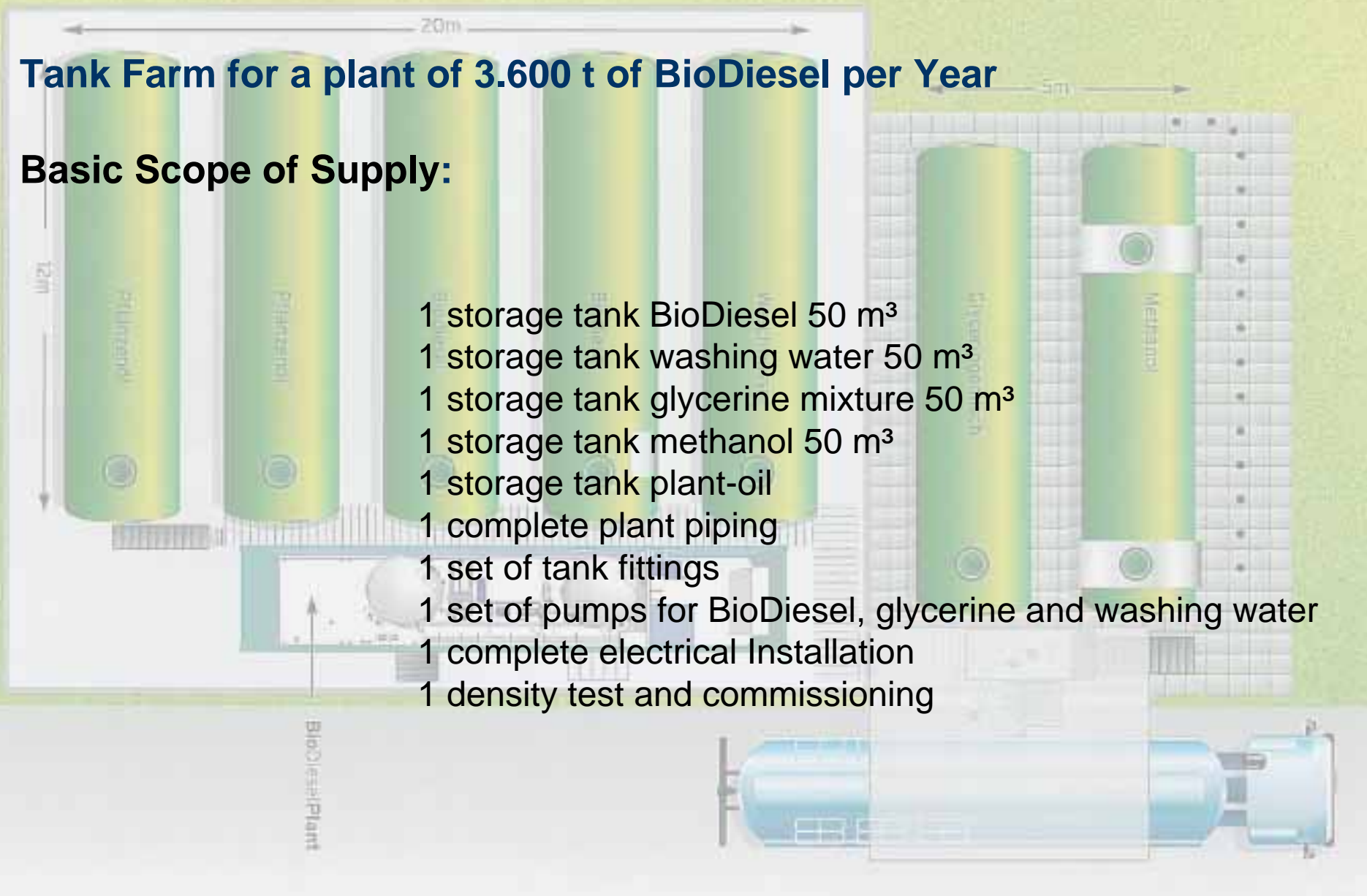




Tank Farm for a plant of 3.600 t of BioDiesel per Year

Basic Scope of Supply:

- 1 storage tank BioDiesel 50 m³
- 1 storage tank washing water 50 m³
- 1 storage tank glycerine mixture 50 m³
- 1 storage tank methanol 50 m³
- 1 storage tank plant-oil
- 1 complete plant piping
- 1 set of tank fittings
- 1 set of pumps for BioDiesel, glycerine and washing water
- 1 complete electrical Installation
- 1 density test and commissioning



Most important: Sustainable Process Quality

BioDiesel is environmental friendly. Its production calls for utmost care (explosives) and quality restrictions for troublefree commercial use.

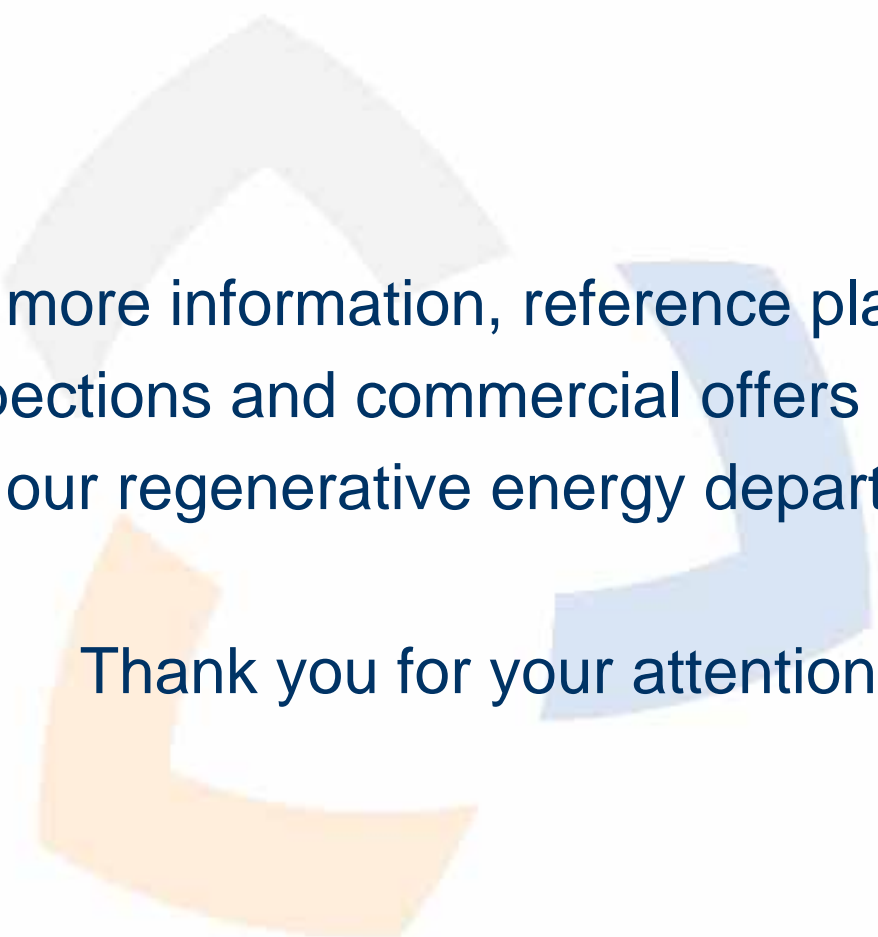

BioDiesel from the Lohrmann Biodiesel Plant meets today's relevant German and European standards DIN 51606 and EN 14214. If a Diesel engine is operated with BioDiesel, the pollutant emissions of carbon dioxide (CO₂) are reduced by up to 80%, of carbon monoxide (CO) by up to 10%, of hydrocarbons (HC) by up to 35% and of soot particles by up to 50% !

By contrast with fossil Diesel, BioDiesel contains only traces of sulphur (sulphur particles are partly responsible for acid rain).



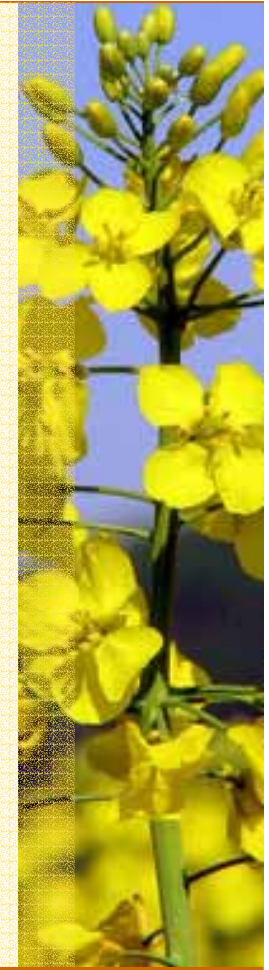
Typical Test Results versus the European Norm for BioDiesel

Test parameters	Test result	Limit value of EN 14214	
Free Glycerol	0,005 Mass-%	max. 0,02 Gew.-%	- 75 %
Monoglyceride	0,09 Mass-%	max. 0,8 Gew.-%	- 88 %
Diglyceride	0,12 Mass-%	max. 0,2 Gew.-%	- 40 %
Triglyceride	0,08 Mass-%	max. 0,2 Gew.-%	- 60 %
Total glycerol	0,05 Mass-%	max. 0,25 Gew.-%	- 80 %
Alkaline metals (Na + K)	2 mg/kg	max. 5 mg/kg	- 60 %
Flash point	165 °C	more 101 °C	+ 63 %
Water content	140 mg/kg	max. 500 mg/kg	- 26 %
Acid value	0,28 mg KOH/g	max. 0,5 mg KOH/g	- 44 %
Viscosity at 40 °C	4,49 mm ² /s	3,5 – 5 mm ² /s	
Sulphur content	3 mg/kg	max. 10 mg/kg	- 70 %



For more information, reference plant inspections and commercial offers please call our regenerative energy department.

Thank you for your attention !



Lohrmann International GmbH
Sonnenberger Strasse 16
65193 Wiesbaden, Germany

Tel. +49 611 701888
Fax +49 611 701895

www.lohrmann.com
info@lohrmann.com