

TRANS BioDiesel Ltd.

**A New Game-Changing Technology
We Assist Companies Fuel The World**



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Rethinking The Future With

**Immobilized
Enzymes**



About TransBiodiesel's Technology

Today, biodiesel is made by a chemical process which is waste-intensive and requires expensive high quality oil (FFAs < 3%). The alternative is inexpensive "Enzymatic Process" which is the first commercial, patent-protected "Enzymatic Technology" for the production of > 99% biodiesel, complying with the ASTM and EN specs using any grade oil feedstock of FFAs in the range of 0-100%.



Crude & refined oil, UCO, PFAD, Brown Grease, Jatropha, Castor & Algal Oils are converted to biodiesel using Enzymes.



Enzyme

Production
Biodiesel From Waste Oil Biodiesel
Enzymatic process fuel TransBiodiesel
Biodiesel
TransBiodiesel Biodiesel



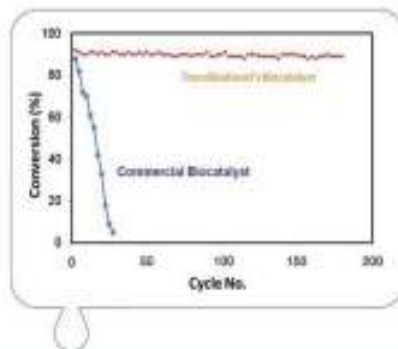


The GAME-CHANGING TECHNOLOGY

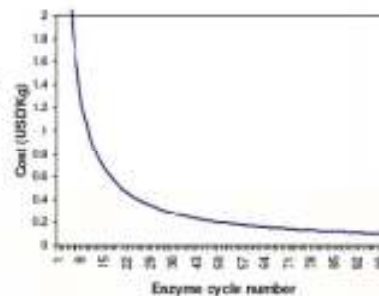
Enzymatic process is simple, safe, inexpensive, fully continuous, and competitive timewise with the conventional technology. One ton of biocatalyst can make > 3000 tons of biodiesel and the cost of the biocatalyst is in the range of US \$30 - 50 per ton of biodiesel depending on quality of feedstocks.

Cost Effective Enzyme Catalysts

- Modified Immobilized lipase
- No deactivation in methanol
- > 200 cycles, price competitive
- Enzymes can convert any oil
- Successful continuous units



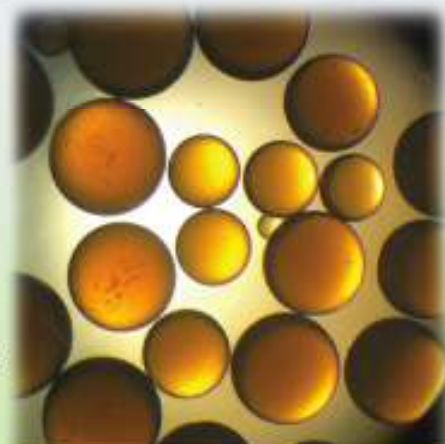
Enzyme cost effectiveness as a function of the number of enzymes' recycling



From US 20\$ in the first cycle to < 5 cents after 200 cycles.

TransBiodiesel's Immobilized Enzymes

The Enzyme is a modified-immobilized lipase which is resistant to methanol or ethanol. TransBiodiesel's biocatalysts have demonstrated over 300 cycles which translate into **< 5 cents** of enzyme cost per liter of biodiesel.



The Enzymes are immobilized on hard shell beads



The Enzyme Exhibits Environmental, Financial & Economic Benefits

Economic Sustainability

- Enzyme reusability
- Profitability
- Efficiency & productivity
- Ease of use
- Safe
- Higher glycerol quality



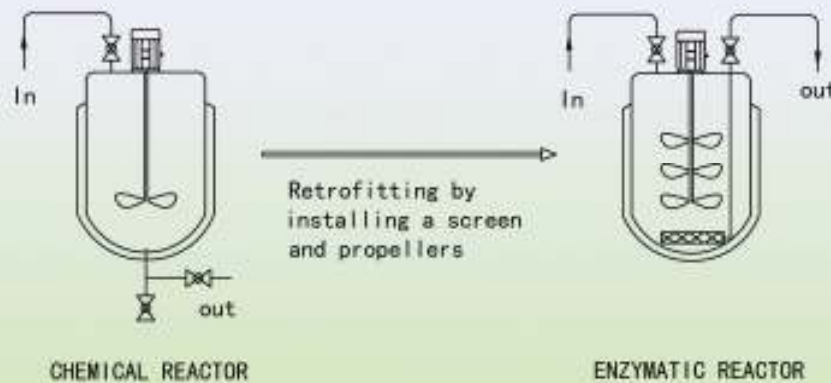
Financial

- 1 kg Enzyme > 3000kg Biodiesel
- 3-5 cents / kg Biodiesel
- \$150 / kg TranZyme A
(Only for commercial scale Biodiesel)

Environmental

- Green technology
- Waste → Energy
- Less wastewater treatment
- Handles micro algal oil

Retrofitting: Never been easier

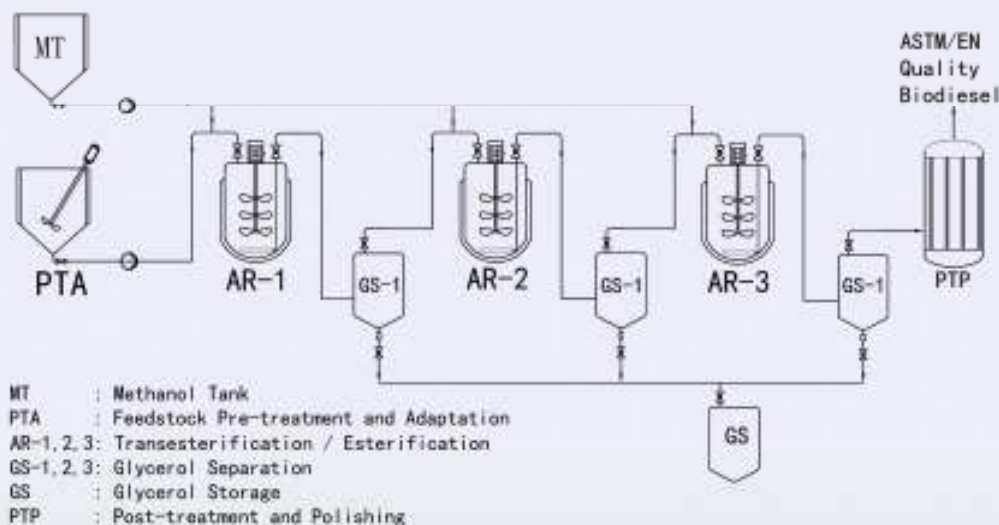


Two words: **Propellers** and **Screen**, are the main changes to the conventional reactor to be converted to Enzymatic reactor. The cost of retrofitting is < 3% of plant cost.

The Enzymatic Process

TransBiodiesel's cutting edge technology produces high quality biodiesel from vegetable oils (i.e., soybean, palm, rapeseed, olive, corn, etc.), jatropha oil, algal oil, as well as crude corn oil from bioethanol plants, PFAD (Palm Fatty Acid Distillate), soapstocks, used cooking oil, brown grease, animal fat with any level of FFAs (0-100%). The process is operated at low temperatures and with minimal methanol requirement, and with tolerance to presence of water.

TransBiodiesel's Enzymatic Process



Glycerol Quality From Chemical vs. Enzymatic Process

Chemical process



Enzymatic process



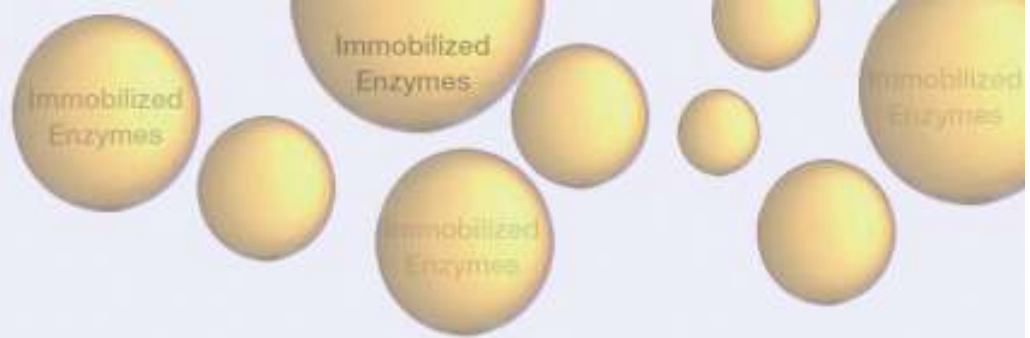


This is a "Triple Green Process" offering:

- Cutting down **energy costs** with Green Enzymatic process
- Biodiesel producers can use any **inexpensive feedstocks** (no drying is needed)
- Aqueous methanol can be used (less expensive than dry methanol)

Feedstock	% FFA
Crude plant oil	1-3
Rapeseed oil	1.5 2.0
Brown grease	90-100
PFAD	90
UCO	3-90
Algal oil	0.7-10
Tallow	3-10
Lard	2
Jatropha	5-9
Acidulated Soapstock	40
Tall oil FFAs	90
Stearic acid	100

- All kinds of oil feedstocks can be used such as Brown Grease (FFAs > 90%), PFAD (FFAs > 90%), Acid Oil (FFAs 30- 60%), UCO (FFAs 3-50%), soybean, palm, rapeseed, olive, jatropha and algal oils, animal fat with any level of FFAs (0-100%)
- The reaction temperature shouldn't exceed 37°C in the production process
- The oil used as is with no need for dehydration, degumming or refining
- The solid enzyme is mixed with the oil and methanol mixture in CSTR for 2-3h residence time to obtain FAME's higher than 96% using multiple feedstocks
- The glycerol/water (lower phase) in the separation tank is fully and quickly separated, **salt-free, soap-free and transparent**



Features, Advantages & Benefits

Features	Advantages	Benefits
Plant	Plant flexible - Expanding feedstock selection	Multi functional plant, working with cheaper feedstocks
No Soap & No caustic	No salts formed as in the case of the chemical process	No chemicals, smoother process & no clogging of soaps
Any Quality of Oil	Allow use of Oil with up to 100% FFAs	All types of FFAs are used to make Biodiesel, No loss of Feedstock
Uses crude gummy feed-stock	Produces > 97% of Biodiesel with gums and water	Savings in degumming step by removing most of the impurities later in the process
Continuous and batch processes	Simple, scalable & more efficient	Reduced CapEx and OpEx
Low energy	Less than tenth of the energy consumed in the chemical process	Maximizes the Biodiesel formation with low energy and without the use of chemicals
Retrofitting of an existing plant	Multi functional plant easily retrofitted with a screen to confine the enzyme	Flexibility to expand to new cheaper oil and reduction in installation costs
Glycerol	Much cleaner glycerol than in the chemical process	The quality of the glycerol is high, it is an added-value product
Methanol	Cheaper Aqueous Methanol or Ethanol can be used with the same rate of conversion	The use of wet methanol reduces OpEx



TransBiodiesel's Pilot Plants Worldwide

The company has several plants worldwide based on its enzymatically-catalyzed biodiesel production process such as:

Israel - Biodiesel Free Ltd., operates a new plant producing 15000 liters of biodiesel per day using brown grease and soapstocks.

USA - Partnering with a **Texas Biotech**, the company has started the first plant to produce 700 L/h of high quality biodiesel.

Singapore - A pilot plant is operating in collaboration with an Indonesian company with an initial annual production target of 10,000 L/day of biodiesel.

Korea - A large plant is operating in collaboration with a Korean company with an initial annual production of 30,000 Tons of biodiesel per year.

Holland - TCE Gofour. First compact process producing 1,000 L/d of biodiesel.

Japan - Koyo Transport Co, Ltd. of Hiroshima, Japan has launched a pilot plant producing 5000 liters/day of biodiesel.

China - A Chinese company, has started the first pilot plant of its kind producing 100 Liters/hour of high quality biodiesel from UCO.

Awards:

TransBiodiesel received the Start-up Company of the Year Award for 2010 from the Israel Ministry of Industry and Trade.

Dr. Sobhi Basheer CEO of TBD has been selected by the European Commission for Enterprise and Industry as one of 37 international champions for the years 2012-13 for best ideas.

TransBiodiesel is among the winners of The Artemis Project™ competition for excellence as a leading company in one of the greatest high-growth industries of the 21st Century.





Powered by TRANS BiDIESEL Ltd.'s Enzymes



AWARD NOMINATION

GoFour

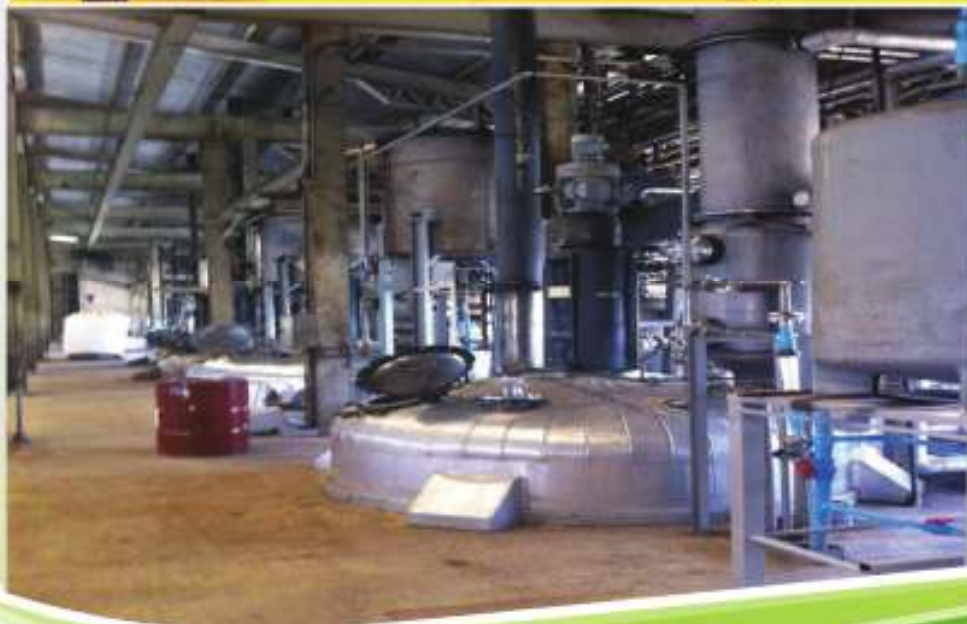
TRANS BiDIESEL Ltd.
POWERED BY TRANSBIODIESEL'S ENZYMES

TECHNOLOGY CENTRE EUROPE GOFOUR
BIO-ENERGY CONTAINER

greenPower
www.gofour.com


The advertisement features a green and yellow color scheme. It shows a green bio-energy container in a rural landscape with a tractor and a barn. A chicken is also visible in the foreground. The text highlights the company's award nomination and the use of enzymes in their technology.


POWERED BY
TRANSBIODIESEL'S
ENZYMES



CASE STUDY


50,000 Tons/year


 Cost of Plant : US \$7Million

 Cost of Biodiesel = 50,000 Tons x \$1300/Ton biodiesel = \$ 65 Million

 Cost (Average) of one Ton UCO = \$700 /Ton

 Cost of 50,000 Tons UCO = \$35 Million

 Production cost of 1-Ton of Biodiesel = \$170/Ton

 Feedstock + production cost + Enzyme => \$35Million + (50,000 x 170\$) + (16.66 Tons enzyme x \$150,000) = \$46 Million

Gross Revenue => \$65 - \$46 = \$19 Million

Team of Success - Experienced People You Can Trust



Dr. Sobhi Basheer

Dr. Sobhi Basheer, Founder & CEO

Dr. Basheer is a leading expert in enzyme technology with over 25 years of enzymatic technology experience. Dr. Basheer is the founder of Zeituna Ltd. and Enzymotec Ltd. listed in the Nasdaq stock exchange (ENZY, U.S.: Nasdaq) for enzymatically making lipids-based nutraceuticals and cosmeceuticals. He was a member of the Scientific Committee for the Technology Incubators at the Ministry of Trade and Industry, Israel. Dr. Basheer was granted many awards for his role in bringing enzymatic ideas to real commercialization.



Dr. Ahmed Tafesh

Dr. Ahmed Tafesh, VP New Business Development

An entrepreneur with a comprehensive and profound knowledge of organic chemistry. Former Head of International Marketing at Pal-indent Fine Chemicals - a subsidiary of ICL, Israel. Former Head of Homogeneous Catalysis in Hoechst AG, Frankfurt. Former Director of R&D at Varcod, Israel and Director of New Product Development (performance chemical division) at Lonza Group, New Jersey, USA. Dr. Tafesh has over than 33 patents registered under his name in diverse areas of chemistry.