

Biodiesel Transesterification Plants in India: Overview



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Regional Forum on Bioenergy Sector Development: Challenges, Opportunities,
and the Way Forward

23-25 January 2008, Bangkok, Thailand, UNITED NATIONS ECONOMIC AND
SOCIAL COMMISSION FOR ASIA AND THE PACIFIC, ASIAN AND PACIFIC
CENTRE FOR AGRICULTURAL ENGINEERING, AND MACHINERY (APCAEM)

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Introduction

- ◆ Increasing Energy Demand and Economic Growth
 - Energy Elasticity of Demand
 - 6th in Energy Demand amongst the countries of the world
- ◆ Inadequate Supply of Energy
 - Supply of coal is at 515 MT whereas demand is at 620 MT (according to working group on coal and lignite)
- ◆ Demand Supply Gap
- ◆ Oil Imports. Environmental Emissions
 - 70% of consumption is met through imports
- ◆ Need for alternative fuels
 - Biodiesel

Technology Need for Biodiesel Production

- ◆ Extraction and Transesterification Technology
- ◆ Technology for conversion of triglycerides in extracted oil to biodiesel (which is an alkyl ester)
 - In the presence of catalyst like Sodium Hydroxide, Potassium Hydroxide and acids like sulphuric acid

International Front Runners

- ◆ Ballestra, Italy
- ◆ BDT Biodiesel Technologies, Austria
- ◆ Biodiesel Industries, U.S.
- ◆ Biodiesel International, U.S
- ◆ Biosource Fuels, LLC, U.S.
- ◆ BIOX Corporation, Canada
- ◆ Crown Iron Works Company, U.S.

Contd.....

- ◆ Energea Biodiesel Technology, Austria
- ◆ Imperial Western Products, Inc., U.S.
- ◆ Lurgi PSI, Inc.U.S.
- ◆ Pacific Biodiesel, Inc.Hawaii.
- ◆ Superior Process Technologies, U.S.

Characteristics of the front runners

- ◆ Continuous Plant, Capable of processing wide range of feedstocks, byproduct recovery
- ◆ Could process oil with higher free fatty acid content
- ◆ Large Capacity and meeting ASTM, DIN standards

Indian Scenario

Technology Providers

- ◆ Energea, Lurgi, Novamont, Comprimo, Vogel and Noot etc..
- ◆ IICT Hyderabad, IIP Dehradun, Punjab University, IITs, CSMCRI, Tamilnadu University, Oil India Limited etc.

INDIAN PLAYERS

Institutes	Capacity	Type of Operation
IIT Delhi, Delhi College of Engineering	5,10,50, 100 litres per day	Batch
NOVOD Board	60 litre per day	Batch
CBDA	1 KL per day	Batch
Department of Bio-energy, Tamil Nadu Agricultural University	250 litres per day	Batch
Central Salt and Marine Research Institute (CSMCRI)	250 litres per day	Batch
Central Salt and Marine Research Institute (CSMCRI)	1000 litres per day	Batch
Southern Railways	1 ton per day	Batch
Oil India	24 MT per day	Batch
IIP – Dehradun, IOCL, IISC	300 MT per day, 30 MT per day, 5 MT per day	Batch

Technology Characteristics

- ◆ Base Catalyzed
- ◆ Acid Catalyzed
- ◆ Non Alkaline
- ◆ Can deal with FFA (Free Fatty Acid) levels of 1% - 6%
- ◆ Temperature is in the scale of 60 – 70 degree Celsius
- ◆ Pressure is higher than normal atmospheric pressure

Technology Characteristics

Type - I

- ◆ Oil Pretreatment to transesterification and conversion to crude glycerin and biodiesel
- ◆ Crude Glycerin and Biodiesel then refined
- ◆ Methanol is recovered and reused

Type – II

- ◆ Esterification and Transesterification followed by methanol recovery
- ◆ Phase Separation separating biodiesel and glycerine
- ◆ Glycerine Refining giving rise to glycerine

Technology Characteristics

Type – III

- ◆ Optional removal of FFA
- ◆ Solvent Addition
- ◆ Transesterification
- ◆ Glycerine and Biodiesel purification and separation
- ◆ Solvent Separation

Challenges

- ◆ Technology development to treat any undissolved pellets of KOH left in alcohol
- ◆ Technology development which would allow separation of glycerol and reduction of formation of soap
- ◆ Commercial, Viable UpScaling of production of biodiesel treating the average high content of FFA (>2%) in Indian Feedstocks for Biodiesel production like Jatropha Oil, Pongamia Oil, Mahua, Pilu, Sal, Nahor, Kokam, Kamala, Rubber Seed through a continuous process of transesterification

Continued

- ◆ Complete removal of alcohol, catalyst, water, soaps, glycerine, unreacted and partially reacted triglycerides and free fatty acids
- ◆ Technology development for processing large variety of raw and refined vegetable oils with low effluent generation and adaptable to large range of production capacities
- ◆ Heterogeneous Trans-esterification Process
- ◆ Development of additives for Bio-diesel-Diesel blends

Way Ahead



- ◆ Development of Solid Acid Catalysis technique of transesterification
- ◆ Development of Lipase – Catalyzed (Enzyme Catalyzed) process
- ◆ Continuous deglycerolization
- ◆ Non Ionic Base Catalyzed Process

THANK YOU



BIO ENERGY FOR CLEANER TOMORROW