

Mongolia`s potential and challenges of biofuel production and usage

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2. Outline

- The term “ Biofuel „
- Current Status
 - Concepts of biodiesel
 - Current needs of biodiesel
 - Benefits and Environmental impact
 - Reducing global warming
- Biodiesel production and usage
 - Production capacity
 - Plan to supply municipal buses by biodiesel
- Development potential
- Policies
- The Way Forward



3. The term “ Biofuel “

- Biofuels refer to fuels in a solid (bio- char), liquid (ethanol & biodiesel) or gaseous state(biogas) produced predominantly from biomass resources.
- The most commonly understood liquid biofuels are ethanol and biodiesel, used as an alternative or replace petroleum products in the transport sectors



4. Current Status:

1. Bioethanol Producers:

- Orgil Oil, LLC- established in 2008
product- Eco 92; blending- 10% with A80

2. Biodiesel Producers:

- NBF(New Bio Fuels,LLC)- established in 2009
Produces - Biodiesel & Home Heating Oil
Blending - 5 -20 % with petrodiesel
- Tsever Tulsh (Clean Fuel,LLC) – established in 2011
Blending - 20% with petrodiesel



5. Concepts of biodiesel

- Biodiesel is a liquid fuel made from used vegetable oils and animal fats and is a cleaner burning replacement for petroleum - based diesel fuel .
- Biodiesel can be used as 5 - 20 % blend in most diesel equipment with no modifications.
- Biodiesel is a renewable and energy efficient .
- It can reduce global warming gas emissions.
- It can reduce tailpipe emissions, including air toxics.
- It is nontoxic, biodegradable, and suitable for sensitive environments.

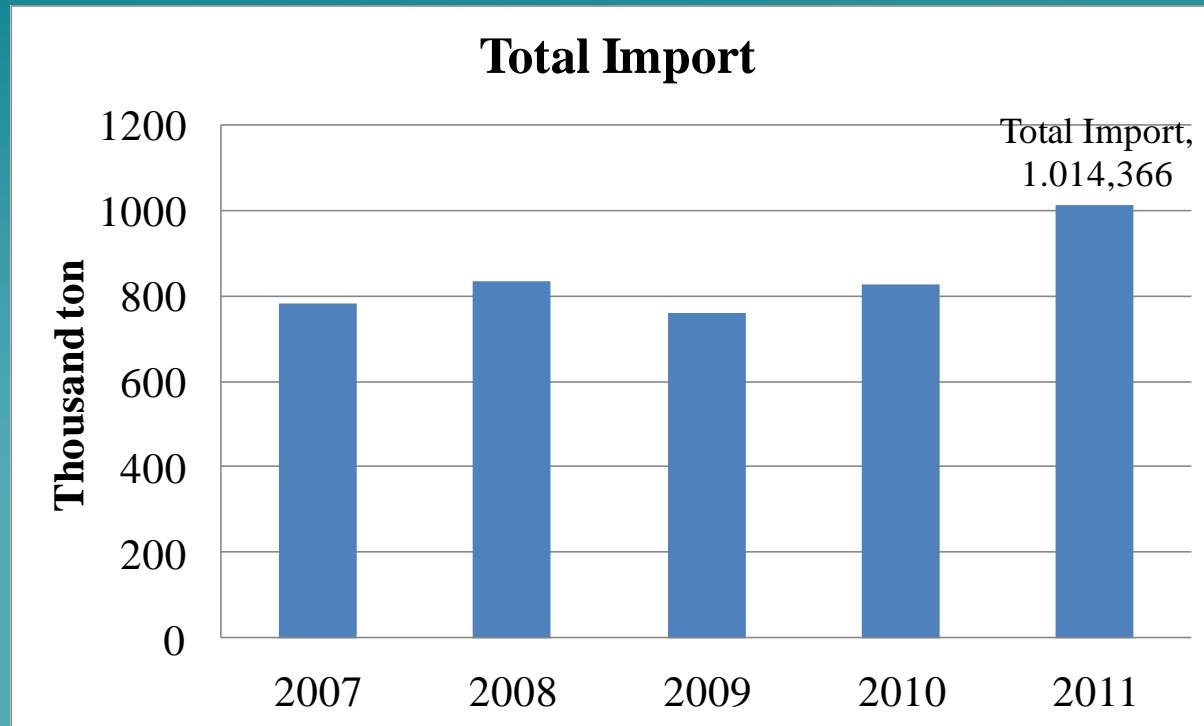


6. *Current needs of biodiesel*

- World wide deficiency in oil supply
 - Global oil supply 40-50 years
 - Russians oil supply 24 years
- Oil extraction is bound to decrease by 50% in 2020..
- Ecological crises, air pollution and global warming took off.
- Diesel engined automobiles in global market surged.
- Mongolian fuel consumption is 100% dependant on import.
- The booming mining industry in Mongolia is correlates to high diesel usage.



7 .Oil import statistics of Mongolia

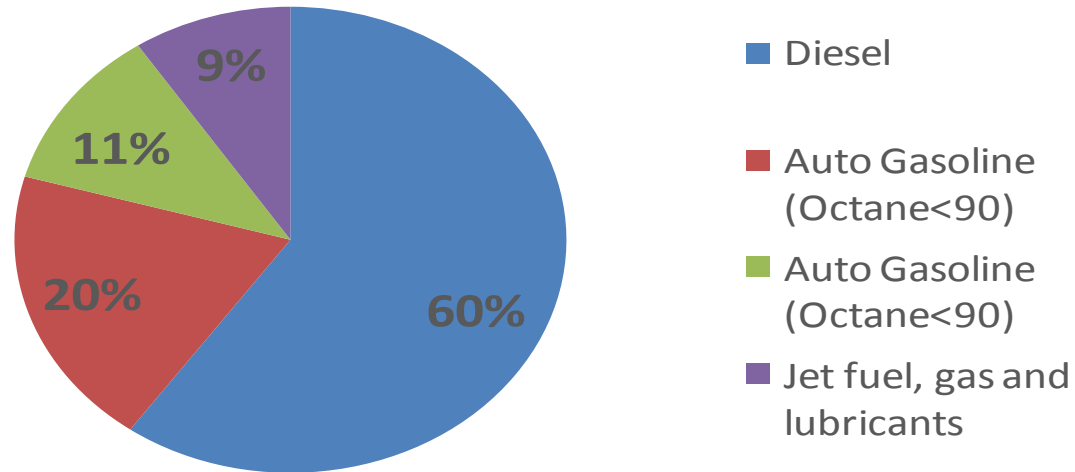


- The total oil import in 2011 has been 1,014,366 tons.
- By 2015 , the aggregate need is bound to reach 1.5 million tons.



8. Types of fuel import

Imported oil products by type, 2011



- In 2011 the 60% of total oil import was a diesel fuel (635,424.08 tons).
- In 2011, amount of total imported diesel fuel is 45% more than it was in 2009, 22.0% more than 2010.



9. *Benefits and Environmental Impact*

Reduction of GHG emissions and improvement of air quality:

- Fewer CO₂ emissions (more “ carbon neutral “)
- Fewer SO_x (Sulfur oxides) and PM (particle matter) emissions

Reduces Tailpipe Emissions - BD contains 11% oxygen by weight. The fuel oxygen allows the fuel to burn more completely, so fewer unburned fuel emissions result.

By providing heat-only boiler stoves with liquid fuel, the coal consumption can be phased out and air pollution mitigated.

- A 20% blend of biodiesel in home heating oil will reduce SO₂ by about 20%



10. Biodiesel emissions

Average Biodiesel Emissions compared to Conventional diesel, according to EPA

<i>Emission Type</i>	<i>B100</i>	<i>B20</i>
<u>Regulated</u>		
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter	-47%	-12%
<u>Non-Regulated</u>		
Sulfates	-100%	-20%
PAH(Polycyclic Aromatic Hydrocarbons)	-80%	-13%
nPAH(nitrated PAH's)	-90%	-50%
Ozone potential of speciated HC	-50%	-10%

Source: U.S.Environmental Protection Agency (EPA) under the Clean Air Act Section 211(b), A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions (EPA: Report www.epa.gov/otag/models/analysis/biodsl/p02001.pdf.)



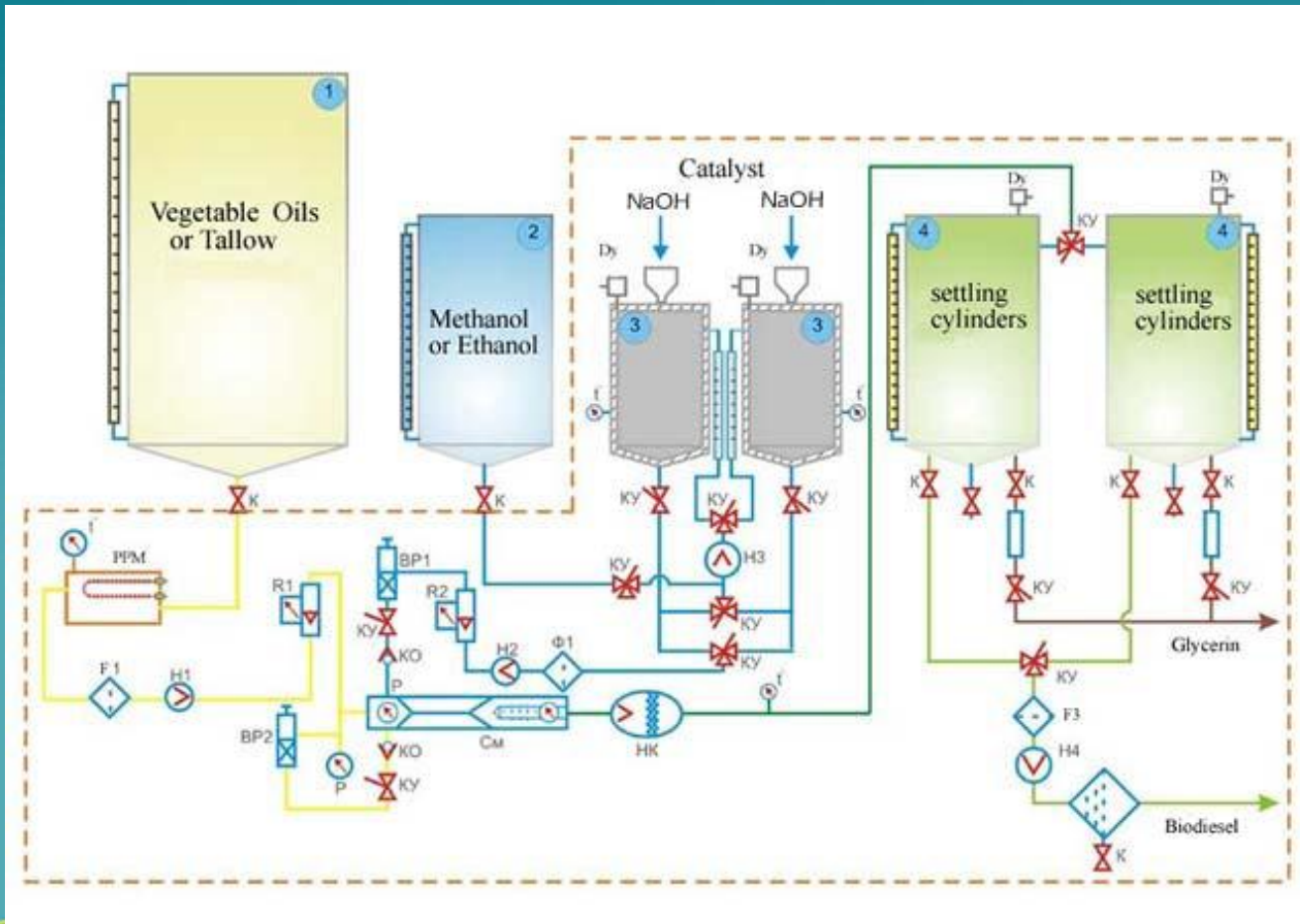
11.Reduces Life-Cycle Greenhouse Gas Emissions

When biodiesel displaces petroleum, it significantly reduces greenhouse gas (GHG) emissions.

- GHG emissions (carbon dioxide- CO₂, methane, and nitrogen oxide –NO_x) are reduced by 41%, if BD is produced from field that were already in production.
- Using B20 as a transport fuel reduces carbon dioxide emissions by 15%.



12. Biodiesel production scheme



13. Biodiesel plant of NBF,Co,Ltd -Ulaanbaatar,Mongolia







17. Glycerin settlement tank and filtration unit







БИОДИЗЕЛЬ ТҮЛШ

Ургамал ба амьтны гаралтай тосноос бэлдсэн экологийн
цэвэр бүтээгдэхүүн нь

- Дизель түлшний чанарыг сайжруулна.
- Ховдлуурийн 10 анги; тослож, техникийн анги, галтын хугацааг уртасгана.
- Автомашингаас ялгарах хорм хийг 30-40 хувиар бууруулна.
- Хүлэмжийн хийн ялгаруулалтыг багасгаж дэлхийн дулаарлыг саармагжуулах ач холбогдолтой бүтээгдэхүүн болно.

"Эн Би Эф"ХХК

утас:95171085

Монголд үйлдвэрлэв.



Table 1. Select Properties of Typical No. 2 Diesel and Biodiesel Fuels

Fuel Property	Diesel	Biodiesel
Fuel Standard	ASTM D975	ASTM D6751
Higher Heating Value, Btu/gal	~137,640	~127,042
Lower Heating Value, Btu/gal	~129,050	~118,170
Kinematic Viscosity, @ 40°C (104°F)	1.3–4.1	4.0–6.0
Specific Gravity kg/l @ 15.5°C (60°F)	0.85	0.88
Density, lb/gal @ 15.5°C (60°F)	7.1	7.3
Carbon, wt %	87	77
Hydrogen, wt %	13	12
Oxygen, by dif. wt %	0	11
Sulfur, wt %	0.0015 max	0.0–0.0024
Boiling Point, °C (°F)	180–340 (356–644)	315–350 (599–662)
Flash Point, °C (°F)	60–80 (140–176)	100–170 (212–338)
Cloud Point, °C (°F)	-35 to 5 (-31 to 41)	-3 to 15 (26 to 59)
Pour Point, °C (°F)	-35 to -15 (-31 to 5)	-5 to 10 (23 to 50)
Cetane Number	40–55	48–65





БИОДИЗЕЛЬ
ТҮЛШ



ХАЛААЛТЫН
ШИНГЭН ТҮЛШ

22. *Liquid fuel fired stove* (8 -10 liters a fuel per day).



23. Liquid fuel fired stove.



24. House Heating with Liquid fuel fired boilers (180 м.квд)



25. Development Potential

- The biofuel policies will developed mainly to address
 - ✓ Foreign oil depending Concern (for security of oil supply)
 - ✓ Energy security Concern (for security of energy supply)
 - ✓ Environmental Concern (reducing air pollution and GHG emissions for climate change)
- Large Biomass Potential
 - Domestic production in 2013, will be 1,000 ton
 - Aim to expend to 10,000 ton by large-scale pilot projects
- Introduce of New Technologies for production of biodiesels
 - Pyrolysis of waste oil
 - Catalytic Cracking Oil



26. Catalytic cracking process

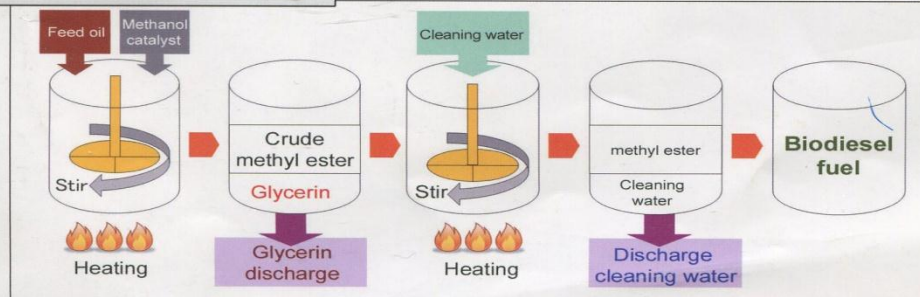
Comparison between the ordinary method and the new method

Method	Transesterification process	Catalytic cracking process
Components of cracked oil	Fatty Acid Methyl Ester	Hydrocarbon (equivalent to light oil)
Feed oil	Vegetable oil	Vegetable oil, animal oil, fat contained biomass
Catalyst	Alkaline catalyst (KOH, NaOH etc)	Newly developed catalyst
By-product	Glycerin (about 25% when using feed oil)	Not generated
Washing process	Necessary	Unnecessary
Pour point of cracked oil (from palm)	About 20°C	About -15°C (equivalent to diesel oil)

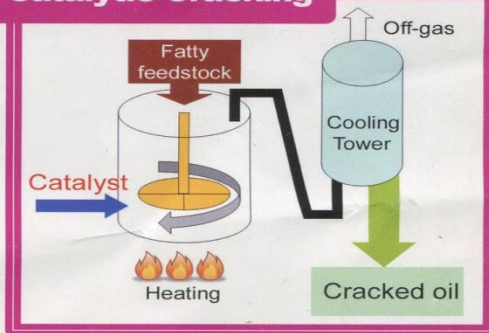
Oli-Converting Process

Low running cost due to simple oil-converting process

Transesterification



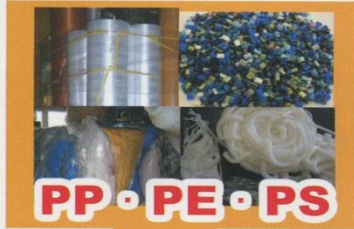
Catalytic Cracking



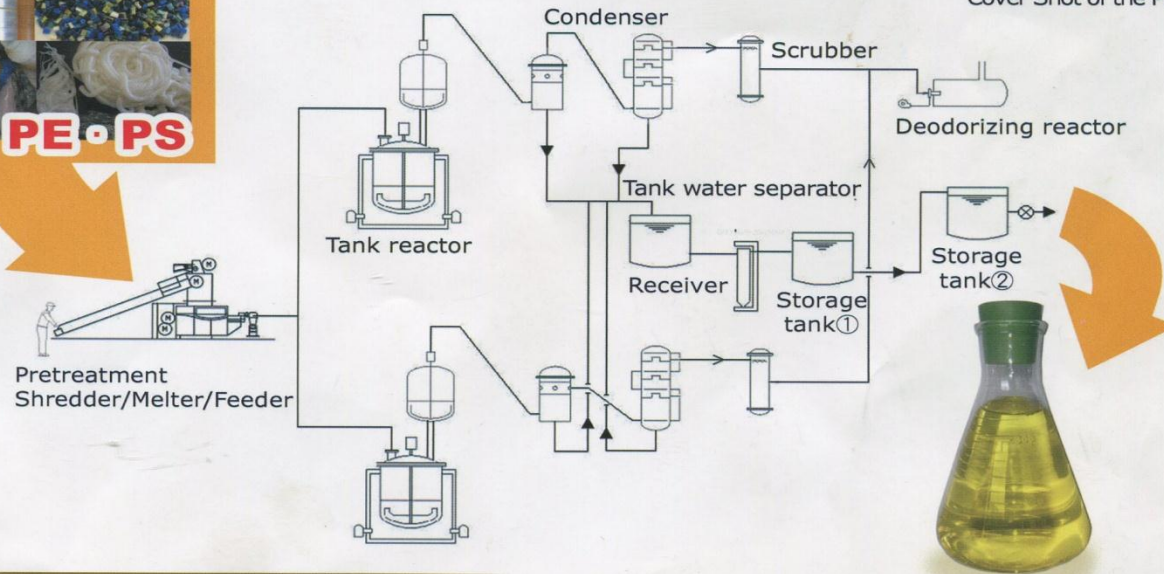
27. Flowchart of the oil converting plant

FLOWCHART OF THE OIL-CONVERTING PLANT

suitable raw materials



Cover Shot of the Plant



PHOTOS OF EACH COMPONENT



Pretreatment



Tank reactor



Condenser



Receiver



Tank water separator



Storage tank

Cracked oil



28. Plastic converting Plant (Moami-Kiko, Japan)



29. Production capacity (2014-2017)

<i>Products</i>	<i>Per day / ton /</i>	<i>Year /ton /</i>
B100	5-6	1100-1300
B20	25-30	5500-6500
B5	100	18,000
Total amount	25-100	5500-18000

PS: B100 will used to make final product of B20 and B5.



30. Plan to supply municipal buses

	Summer (B20)	Winter (B5)
Production Capacity	25 – 30 ton	18,000 ton
Number of Buses	200	600
Fuels - needed	14 ton	42 ton
Ability to supply	30 %	100 %



31.Policies

Government Incentives:

- Tax Mechanisms (Reduction in specific and value added tax)
- Blending Mandates (3-5% blending by City Law)
- The National Biofuel Program and Biofuel Act are needed
- Financial assistance (Preferential Government Purchasing)
- Environmental & Product Standarts
- Certification Systems



32. The Way Forward

- Expand collaboration with other countries on adopting new production technology:
 - Pyrolysis and Catalytic Cracking Oil System (\$ 2 million)
- Production capacity to be increased 3 to 5 times the current amount, usage of biodiesels for garbage collection trucks and municipal buses in UB will be reached 30-40% and consequently reducing air pollution by 40-50%.
- Reduction of GHG emissions will be reached about 25,000 tons per year by 2015.



*Thank you for your
attention!*

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