International patent of innovative technology

Non Methyl Ester biodiesel refinery system

ECOPRO

made in Japan

NEW method

Fuel reformulation system for oil recycle

+ Fuel reformulation + Fuel blending + Water emulsification

ECOPRO method is a new approach, the new method of biodiesel refinery by microparticulation of oil particle, which does not require chemicals.

By microparticulation of oil particle, Fuel reformation and Fuel blending can be easily done, and also Water emulsification can be done.

ECOPRO can fuse different viscosity of feeds (plant oil, waste oil, diesel, heavy oil, etc.) by microparticulation of oil particle, and it can be held for a long period.

Environmentally -friendly

"Low cost"
"Easy operation" "No chemicals"
"High efficiency" "No water wash"

	ECOPRO	*Methyl esterification*
Chemical (Methanol)	No	Yes
Glycerin & Effluent treat	No	Yes
Quality stability	Stable	Variation
Production cost	1 / 100	1
Production efficiency	30 ~ 50	1
Others	Fuel reformulation Fuel blending Water emulsification	

ECOPRO specification

Capacity	500 litter per hour
Power consumption	7.5kw
Voltage	200V 3-phase
Size	W: 1,100 mm
	D: 700 mm (gauge incl.)
	H: 1,330 mm (legs incl.)

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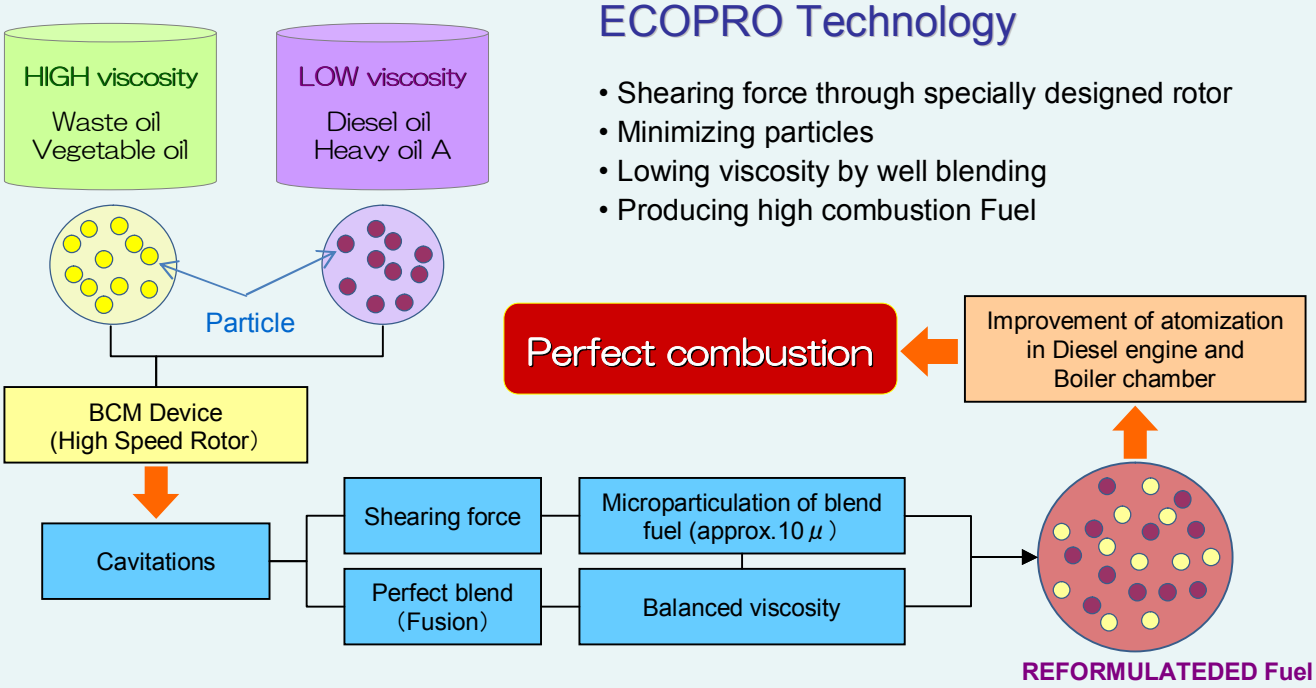
ECOPRO Technology

- Shearing force through specially designed rotor
- Minimizing particles
- Lowing viscosity by well blending
- Producing high combustion Fuel



Good fuel for …

Industrial steam boiler *Heater*
Co-generator *Tractor*
Engine generator *Fishing boat* *etc…*

Development history

- A collaboration for 25 years with Kobe University of Mercantile Marine (existing Kobe University)
- Association of American car engineer article announcement
- Japanese internal combustion machine organization learned society announcement

1978	Starting R & D of Heavy oil reformulation system
1981	Starting Collaborative R & D with Kobe University (incl. Proof tests)
1984	Presenting a paper at University with test data
1985	Presenting a paper at The Japan Society of Naval Architects and Ocean Engineers
1998	Starting R & D specialized on Biodiesel application Developed and sold "Waste cooking oil reformulation system"
2000	Business alliance contracts with companies including Yanmar Co., Ltd.
2001	Presenting a paper at The Society of Automotive Engineers (***SAE***) in USA
2002	New model plant for "Kandenko Co., Ltd.", "East Japan Railway Co.", "Hitachi Ltd.", "Kitashiba Electric Co., Ltd." and 5 public facilities. Starting export by project bases (Thailand, Indonesia, India)
	Sold over 500 systems as "Heavy oil reformation system" and "Biodiesel refinery system" to Japan / ASEAN market
2005	Completing proof tests specialized on Biodiesel application Collaborative R & D with Kobe University specializing on Jatropha oil Quality proof on 100% Jatropha biodiesel on Diesel engine
2008	Presenting a paper at The Japan Institute of Marine Engineering Succeeded on a proof test of 100% Jatropha biodiesel with Fisherman association on Diesel fishing boat (The first in Japan)

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Low cost as "1 litter for 1 cent"

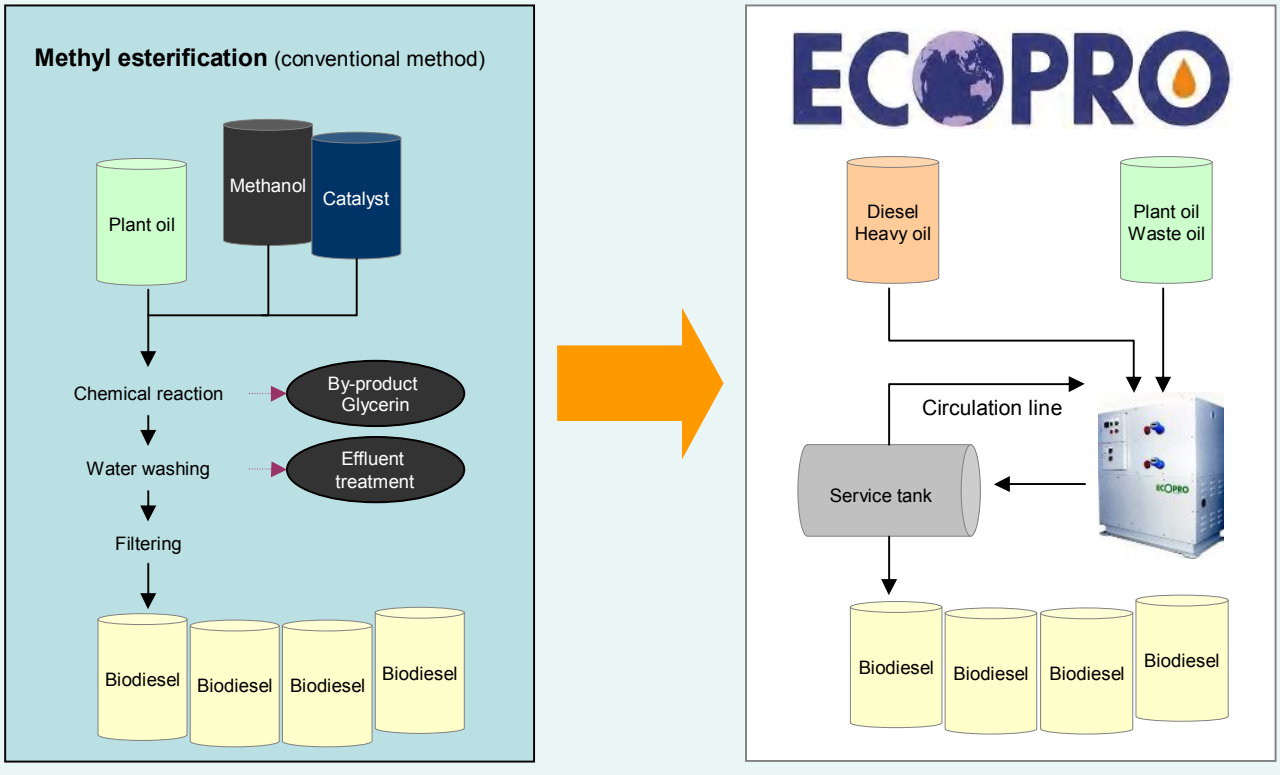
	ECOPRO	Methyl esterification
Production capacity	500 litter per hour	10~15 litter per hour
Production efficiency	30~50 times more	1
Chemicals	n/a	¥ 39.0 per litter (*1)
Electricity	¥ 0.3 per litter (*2)	¥ 0.17 per litter
Water	n/a	¥ 0.39 per litter
Boiler fuel	n/a	¥ 3.5 per litter
Per litter cost	¥ 0.3	¥ 43.0

(*2) 7.5kw x 20 (kwh) / 500L / hour = 0.3 per litter

(*1)

Methanol	¥ 26 / L	Chemical solution	¥ 1.0 / L
Catalyst	¥ 4.0 / L	Dehydrator	¥ 8.0 / L

Image of biodiesel refinery



Export sales agent

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c/o Eco Globe 21 project