



*Research Workshop on Sustainable Biofuel Development in Indonesia
Progress So Far and Future Applied Research Opportunities*

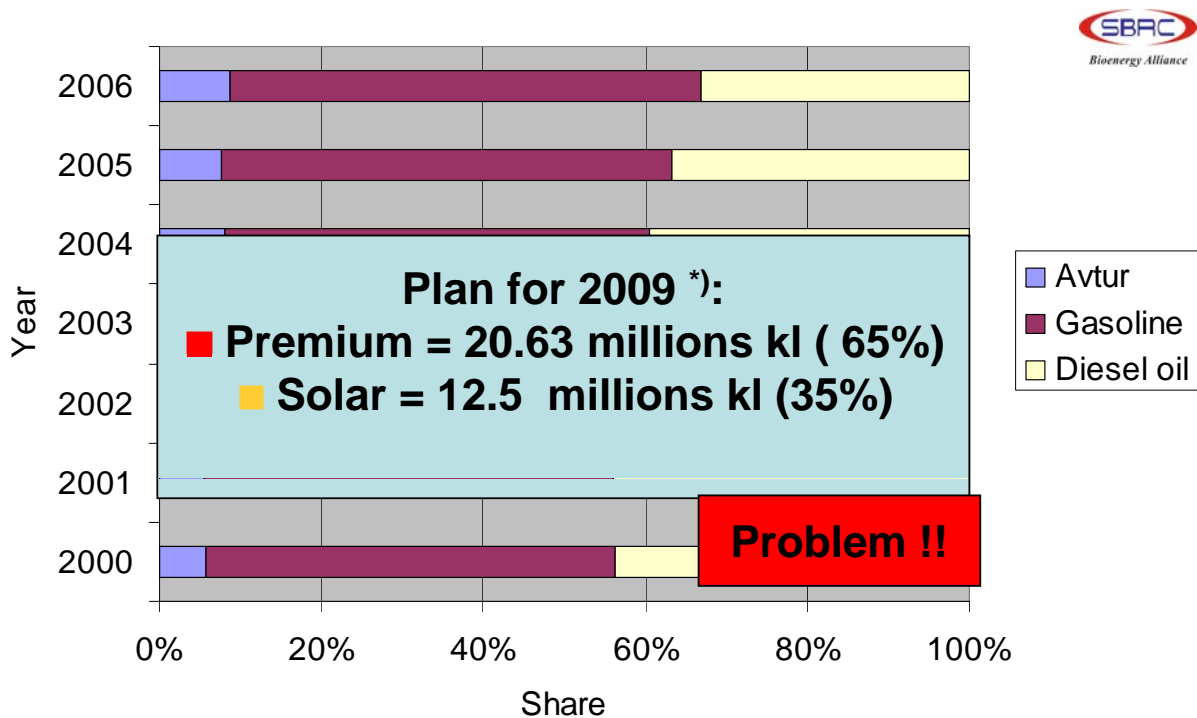
**UTILIZATION OF HYDROUS ETHANOL
PRODUCED BY SMALL & MEDIUM ETHANOL PRODUCERS
AS BIO-FUEL**

By : Roy Hendroko 
Bambang Purnomo

 YAYASAN BIOENERGI INDONESIA
(Indonesian Bioenergy Foundation)

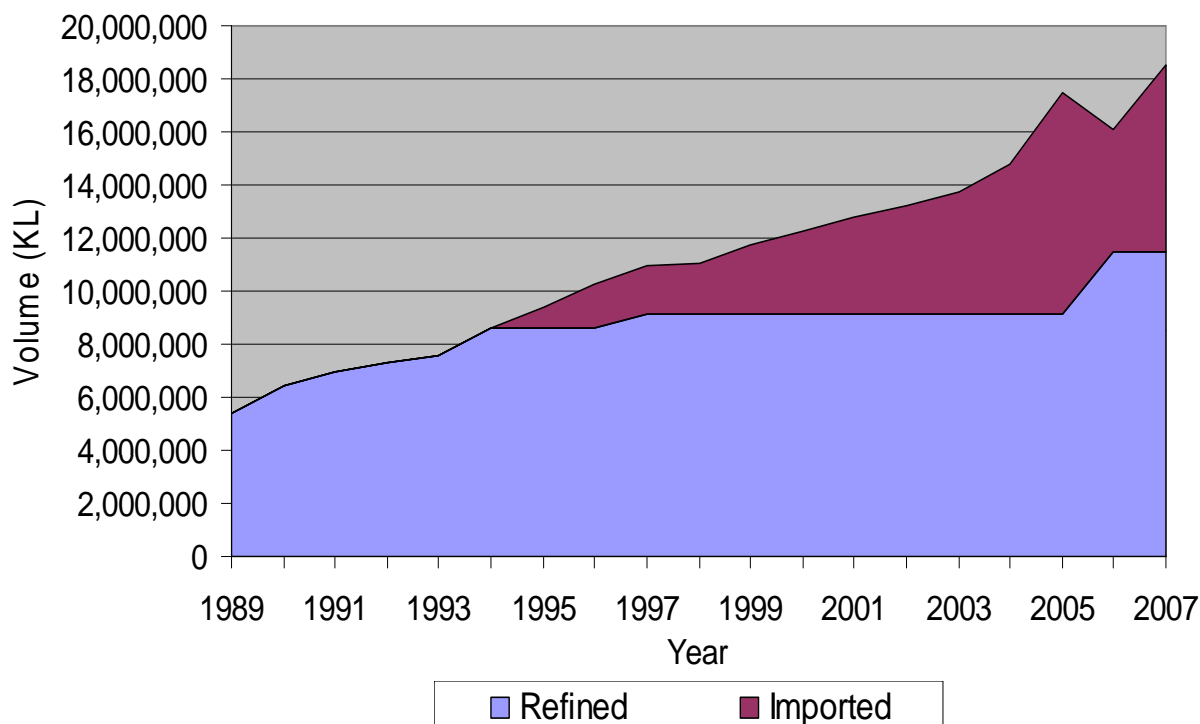


Sultan Hotel, Jakarta, 4-5 February 2009



**Premium Usage Compare to Diesel oil in
Transportation Sector at The Year 2000 - 2006**

*) Legowo E in Kompas 30th January 2009



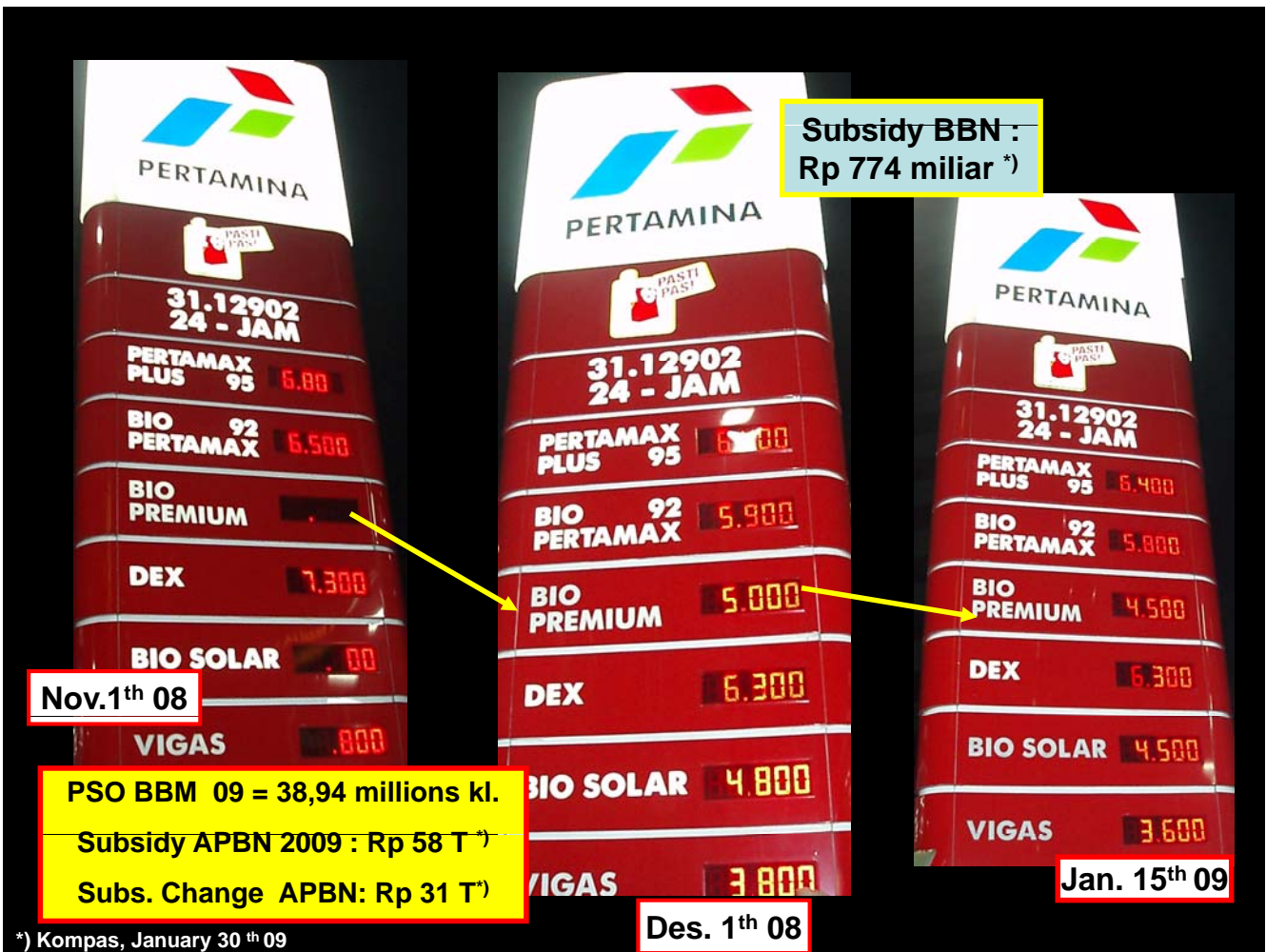
Premium Usage in Transportation Sector Year 1989-2007



MANDATORY for BIOETANOL UTILIZATION (MINIMUM PERCENTAGE)

SECTOR	October 2008 till December 2008	January 2009	January 2010	January 2015**	January 2020**	January 2025**	REMARK
Household	-	-	-	-	-	-	Not determined yet
PSO Transportation	3 % (existing)	1 %	3 %	5 %	10 %	15 %	* Based on Total Needs
Non PSO Transportation	5 % (existing)	5 %	7 %	10 %	12 %	15 %	* Based on Total Needs
Industry and Commercial	-	5 %	7 %	10 %	12 %	15 %	* Based on Total Needs
Power Plant	-	-	-	-	-	-	Not determined yet

** Specification is adjusted in line with global specification and domestic interests



Problem of Bioethanol Development in Indonesia



BIOETHANOL PRODUCTION CAPACITY & LOCATION

No.	COMPANY	LOCATION	2008		2009	
			CAPACITY (KL)	Domestic (KL)	CAPACITY (KL)	Domestic (KL)
1	Anugrah Kurnia Abadi PT./ B2TP	Lampung	2.500	2.500	2.500	2.500
2	Medco Group	Lampung	60.000		60.000	
3	Molindo Raya Industrial	Lawang & Lampung	12.000	12.000	50.000	50.000
4	Sugar Group	Lampung	70.000		100.000	
	Jumlah			14.500		52.500



Existing Ethanol Plant

<u>Company name</u>	<u>Prod capacity</u>	<u>Plant location</u>
Molindo Raya	50 000 KI/Y	East Java
PTPN XI	7 000 KI/Y	East Java
Aneka Kimia Raya*	17 000 KI/Y	East Java
Indo Acidatama	45 000 KI/Y	Central Java
Madu Baru	7 000 KI/Y	Yogyakarta
Palimanan	7 000 KI/Y	West Java
Japura Sarana	6 000 KI/Y	West Java
Indo Lampung Dist	50 000 KI/Y	Lampung
Permata Sakti	5 000 KI/Y	North Sumatra
Molasindo	3 600 KI/Y	North Sumatra
Basis Indah	5 000 KI/Y	South Sulawesi

Note : * = currently not in operation



2nd Problem

Availability of Molasses to Biofuel Feedstock **1%**

Type of BBM	BBM Usage 2009 (kiloliter)	Feedstock Availability	Ethanol Usage 1% (kiloliter)	% Usage of molasses availability
Bio Premium	194,444 ^{*)}	** ⁾ 800.000 ton molasses	1,9444 kl equal 780 t ^{***)} molasses	98

Note:

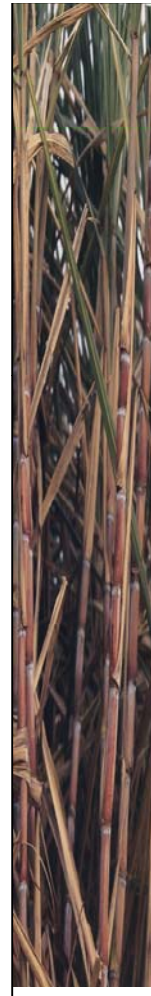
^{*)} Kompas January 30th 2009

^{***)} molasses conversion 1:4, calculated $1,9444 \times 4 = 7,777.760 \text{ l} \sim 780 \text{ ton}$

**** molasses production in Indonesia $\pm 1,4$ millions ton/year, 600 ton used to ethanol industry, 600 ton used to MSG & feed industry, and 200 ton export**

**How Premium non PSO ??
Bio Pertamina –E5**

How about industry & commercial ??



How to solve the ethanol problem?



**"Dog Wood"
Robert Warren**



Use Hydrous Ethanol

Especially from SMEP



PT PANCA JAYA RAHARJA
CICURUG, West Java, Nov. 2008



PT B
C

PT BIO PRIMA ENERGI
KEBUMEN-Central Java product



Evaporator & Destilator



Bioethanol from Domestic Waste

PT AGRO MAKMUR
KARANGANYAR
Central Java



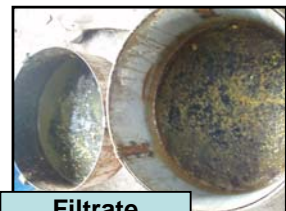
Crushing Machine



Pulp Waste



Squeizing Waste



Filtrate Liquid Waste



Fermentation



Molasses Feedstock



Product



Destilator



Bekonang Village
SUKOHARJO
Central Java



Evaporator



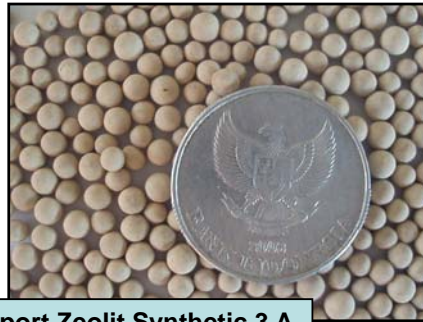
Ethanol 70%



Ethanol 95%



CaO & FGE



Import Zeolit Synthetic 3 A

ZEOLIT
For Dehydration



Natural Zeolit

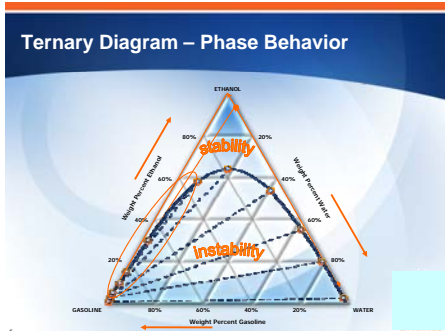
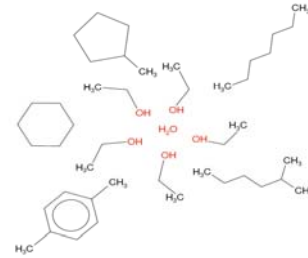


Import Zeolit Synthetic 3 A & BPPT



Zeolit & FGE

Ron Kotrba 2008 : hydrous ethanol (HE) can be mixed with gasoline perfectly in the particular composition. In this region, the mixture will be homogeneous, bright and clear, and no sign of two layers.



Troels Johansen and Jesper Schramm have released a publication of Low-Temperature Miscibility of Ethanol-Gasoline-Water Blends in Flex Fuel Applications in 2009.

Anhydrous ethanol in biofuel **can be replaced by hydrous ethanol (HE)**. Therefore, the production cost and all the problems related to anhydrous ethanol production, transportation, storage handling, etc can be eliminated. **Moreover, ethanol from the small and medium scale ethanol producers (SMEP) can be used for biofuel.**



July 7th, 2008: introduction of hE15 to market in Europe





Objective

- Does the hydrous ethanol that is produced by SMEP can be perfectly blended in the Premium with the compositions of 5%, 10%, 15% and 20%?
- How long the mixture will stay stable?
- Will the hydrous ethanol increase the millage of vehicle compared to the pure Premium and Bio Premium ?
- What are the effects of hydrous ethanol to the engine compared to pure Premium and Bio Premium from Pertamina SPBU ?



Advantages

- SMEP can support the biofuel program, especially in the rural area. Therefore, the target pro-job, pro-poor and pro-growth can be achieved.
- The Energy Self Supporting Village (DME) can be achieved, because bioethanol can be produced by local raw materials.
- The bioethanol mandatory can be fulfilled.
- Less investment cost for bioethanol plants.
- Shorter chain of ethanol production for biofuel cheaper production cost and save more energy.
- The loses of ethanol in the dehydration can be eliminated
- Saving fossil fuel proportionally with the hydrous ethanol.
- Increasing the engine performance, millage and thermodynamic efficiency.
- Pro-planet because bioethanol is oxygenating agents.
- Can be proposed for CDM project.



I. Test Method (laboratories)

- Premium from 3 different fuel stations (SPBU) is collected.
- Hydrous ethanol (96% etOH – 4% water) is collected from different plants and different feedstock.
- The ethanol and gasoline are analyzed by Sucofindo.
- Hydrous ethanol is blended in gasoline with 5%, 10% , 15% and 20%v, each percentage has 2 samples.
- The samples are tested according to ASTM D 4176: “bright and clear”
- The stability of the mixtures is observed once a week in three months
- The result from d,e, and f will be compare with Biopremium (from Pertamina SPBU).



II. Test method (practical)

- 4 motorbikes with 4 strokes engine and automatic transmission are used in this experiment, with with fuels :
 - 100% Premium
 - 100% Bio Premium (from Pertamina SPBU)
 - 10% HE and 90% Premium
 - 15% HE and 85% Premium
- Before the test, those motorbikes should be checked by a technical expert.
- Those motorbikes will conduct a Dynotest (in the beginning and the end of the research) in order to measure the power, torque and emission by using different fuel;
 - Premium
 - Bio Premium
 - Hydrous ethanol 5% + gasoline 95%
 - Hydrous ethanol 10 % + gasoline 90%
 - Hydrous ethanol 15% + gasoline 85%
 - Hydrous ethanol 20% + gasoline 80%



Test method (practical) continue

- Those motorbikes were operated in the normal and equivalent working condition (in the city).
- For every 50 km, the motorbikes are refueled and the volume of refueled fuel and travelling distance are recorded.
- In two times per month, those motorbikes will be operated at the same distance together, ± 80 km (Jakarta – Bogor – Jakarta).
- For every 1,000 km, the engine and fuel systems will be observed by the expert.
- This testing will be done in 6 months (10,000 km)



GOAL



- To support the government's bio-fuel mandatory program
- To create new market for SMEP
- To stimulate the development of SMEP
- To support the self sufficient energy village (DME) development, pro- job, pro- poor and pro-growth
- To reduce fossil fuel's CO₂ emission (global warming issue)
- To make bio-fuel as CDM project



Nodan mamomamo

Teşekkür ederim

Danke schön Obrigado

Спасибо *Thank You*

धन्यवाद

Merci

Kiitos جزاكم الله خيراً Gum xia

Gracias

Ang kêun

Sha sha

Tawdi **Terima kasih**

謝謝

Añachaykin

Efcharisto

Maulanenga

Danyavad

Dekoju

Hvala Ookini

Xie xie

どうもありがとう。

Ngiyabonga

Spasibo

Grazie

Arigato

Giittus

Shukran

Eso

Dhannvaad

Gum xia

Wiyarrparlunpaju-yungu

Köszönöm

Qujanaq

מֵרִסִּי mersi

MAY GOD BLESS US



YAYASAN BIOENERGI INDONESIA
(Indonesian Bioenergy Foundation)



sinarmas