Progress on Biofuel and Biomass Utilization in Indonesia

By :
Wahono Sumaryono
Unggul Priyanto

Agency for the Assessment and Application of Technology (BPPT)

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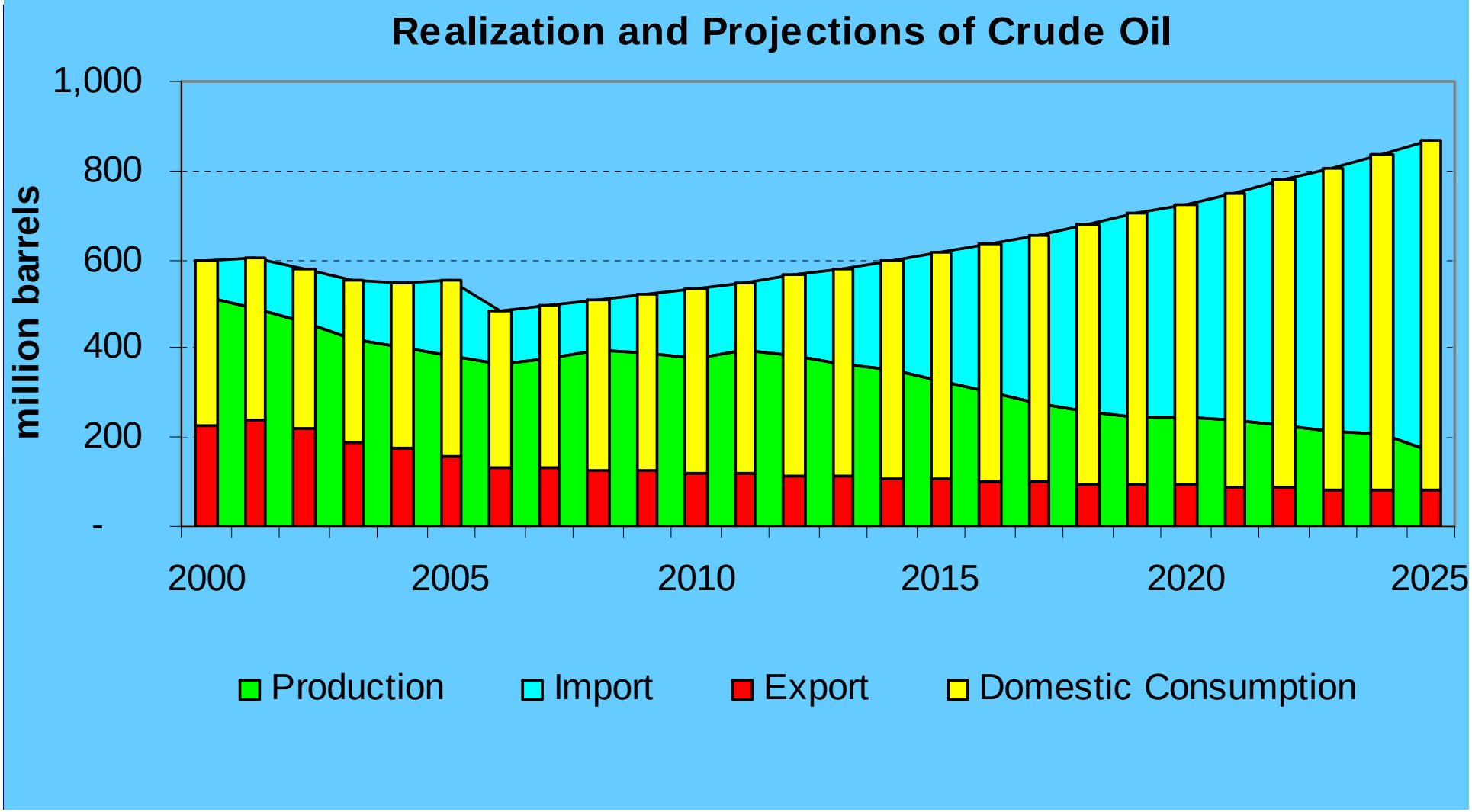
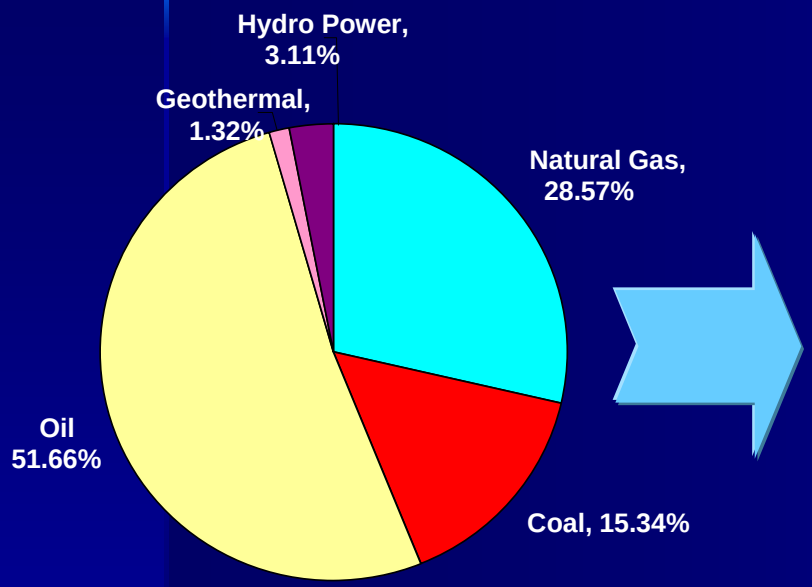
Projections of Crude Oil



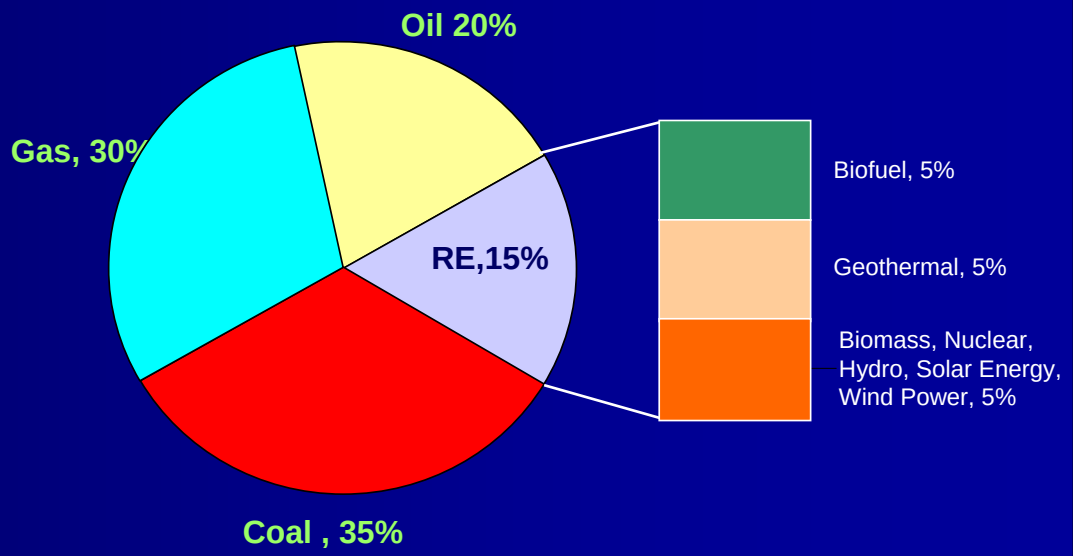
NATIONAL ENERGY POLICY
(PRESIDENTIAL DECREE NO. 5 YEAR 2006)

CURRENT ENERGY MIX (1 billion BOE)
National (Primary) Energy Mix



Energy Elasticity = 1,8

National Energy Mix 2025 (3 billion BOE)
(Presidential Decree No. 5/2006)



Energy Elasticity < 1

Indonesian Biodiesel Standard (SNI 04-7182-2006) [1]

No.	Parameter	Unit	Value	Method
1	Density (40 ° C)	kg/m3	850 – 890	ASTM D 1298
2	Viscosity (40 ° C)	mm^2/s (cSt)	2.3 – 6.0	ASTM D 445
3	Cetane Number		min. 51	ASTM D 613
4	Flash point (close cup)	° C	min. 100	ASTM D 93
5	Cloud point	° C	max. 18	ASTM D 2500
6	Copper Strip Corrosion (3 hr, 50 ° C)		max. no 3	ASTM D 130
7	Carbon residu - sample - 10 % dist. residue	%-mass	max 0.05 (max. 0.3)	ASTM D 4530
8	Water & Sediment	%-vol.	max. 0.05*	ASTM D 2709 or ASTM D 1796
9	Distillation temperature, 90 % recovered	° C	max. 360	ASTM D 1160

***can be tested separately, sediment content max. 0.01 %-vol.**

Indonesian Biodiesel Standard (SNI 04-7182-2006) [2]

Continued ……

No.	Parameter	Unit	Value	Method
10	Sulphated Ash	%-mass	max. 0.02	ASTM D 874
11	Sulphur	ppm (mg/kg)	max. 100	ASTM D 5453 or ASTM D 1266
12	Phosphorous Content	ppm (mg/kg)	max. 10	AOCS Ca 12-55
13	Acid Number (N_A)	mg-KOH/g	max. 0.8	AOCS Cd 3-63 or ASTM D 664
14	Free Glycerin	%-mass	max. 0.02	AOCS Ca 14-56 or ASTM D 6584
15	Total Glycerin (G_{ttl})	%-mass	max. 0.24	AOCS Ca 14-56 or ASTM D 6584
16	Ester Content	%-mass	min. 96.5	Calculated*
17	Iodine Number	%-mass (g-I2/100 g)	max. 115	AOCS Cd 1-25
18	Halphen test		Negative	AOCS Cb 1-25

- Ester Content (%-mass) = $\frac{100(N_S - N_A - 4{,}57G_{ttl})}{N_S}$
- Ns = Saponification Number, mg KOH/g biodiesel, method AOCS Cd 3-25

Mandatory of biofuel utilization

According to Minister of Energy and Mineral Resources Regulation No. 32/2008

Biodiesel (B100)

Type of Sector	October 2008 until Desember 2008	January 2009	January 2010	January 2015**	January 2020**	January 2025**	Note
Household	-	-	-	-	-	-	
PSO Transportation	1% (existing)	1%	2.5%	5%	10%	20%	With respect to total demand
Non PSO Transportation	-	1%	3%	7%	10%	20%	
Industrial and Commercial	2.5%	2.5%	5%	10%	15%	20%	
Generating electricity	0.1%	0.25%	1%	10%	15%	20%	

Biofuel Development in Indonesia

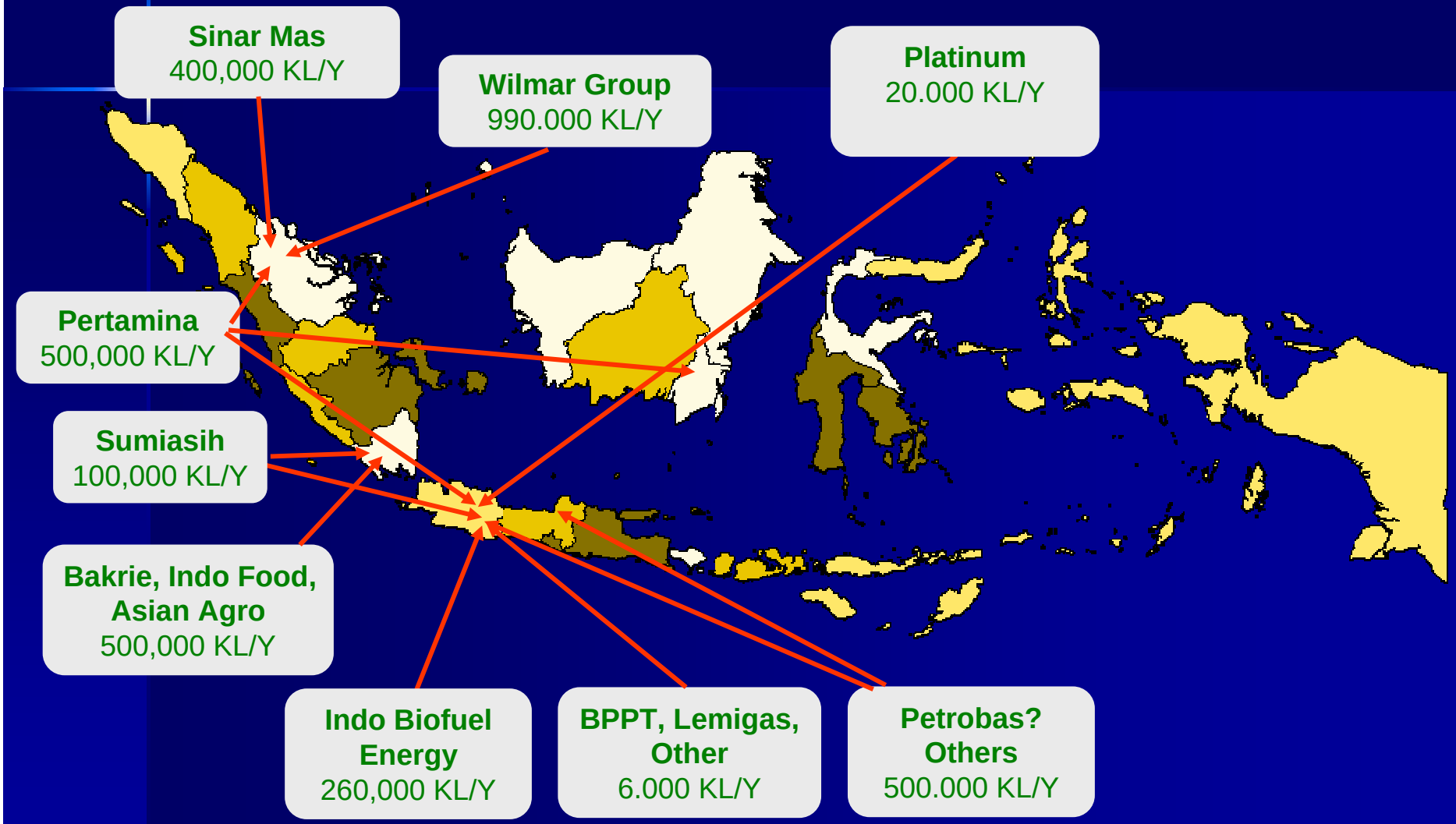
Mandatory of biofuel utilization according to Minister of Energy and Mineral Resources Regulation No. 32/2008

Bioethanol (E100)

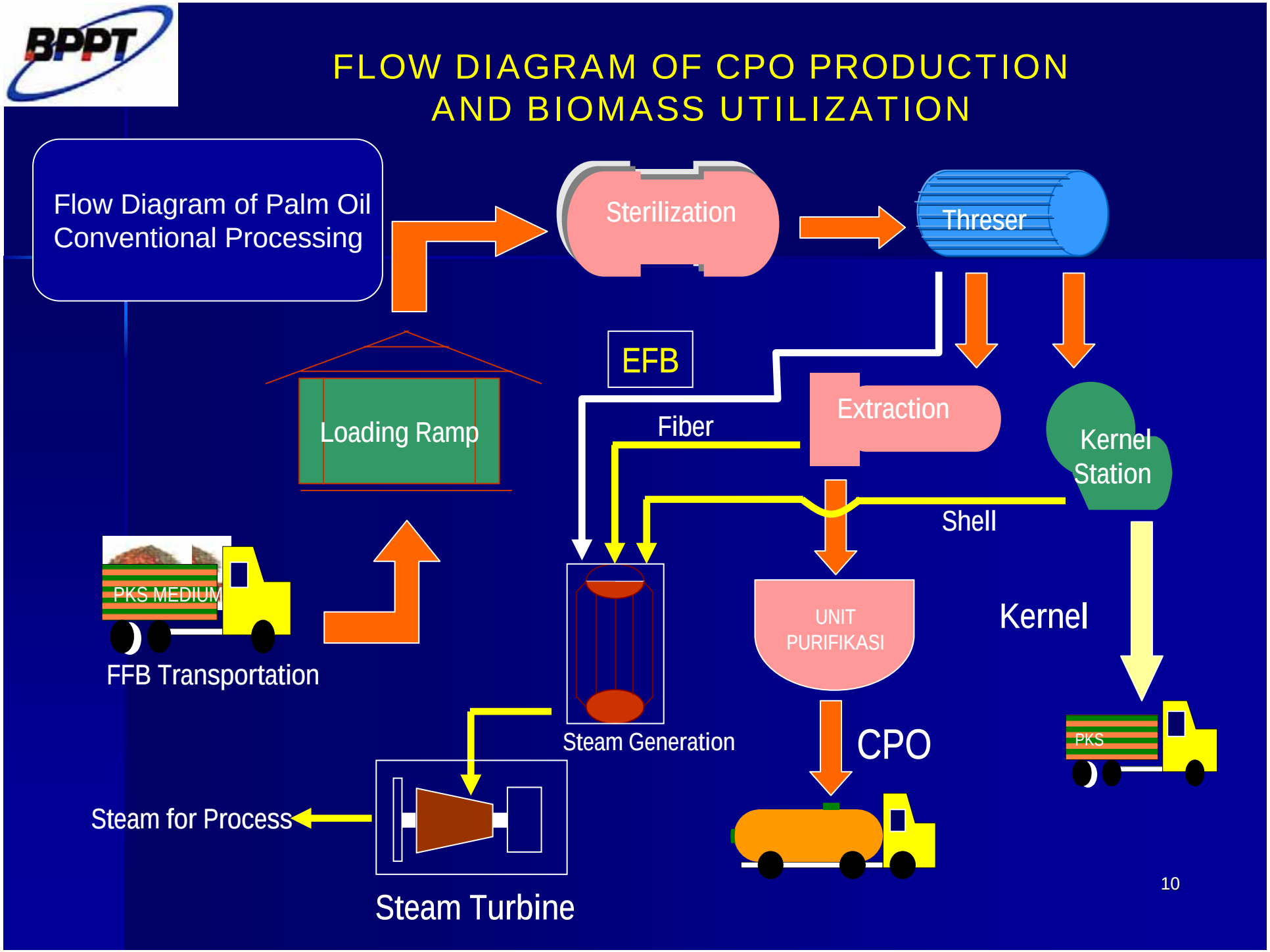
Type of Sector	October 2008 until December 2008	January 2009	January 2010	January 2015**	January 2020**	January 2025**	Details
Household	-	-	-	-	-	-	
PSO Transportation	3% (existing)	1%	3%	5%	10%	15%	With respect to total demand
Non PSO Transportation	5% (existing)	5%	7%	10%	12%	15%	
Industrial and Commercial	-	5%	7%	10%	12%	15%	
Generating electricity	-	-	-	-	-	-	

Progress on Biodiesel Development

(Current & projected installed capacity up to 2010 approx 3 mio KL/Y)
Mainly Using CPO as Feedstock



FLOW DIAGRAM OF CPO PRODUCTION AND BIOMASS UTILIZATION



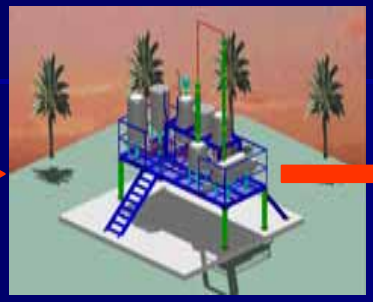
PALM COMPLEX MODEL

(Integrated approach for sustainable development)

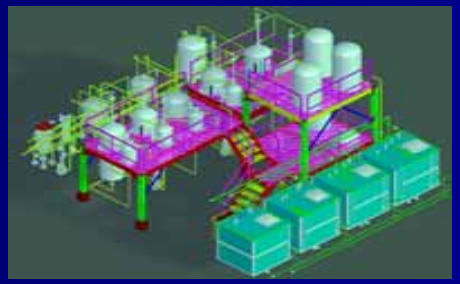
Development of BioDiesel Plant at BPPT

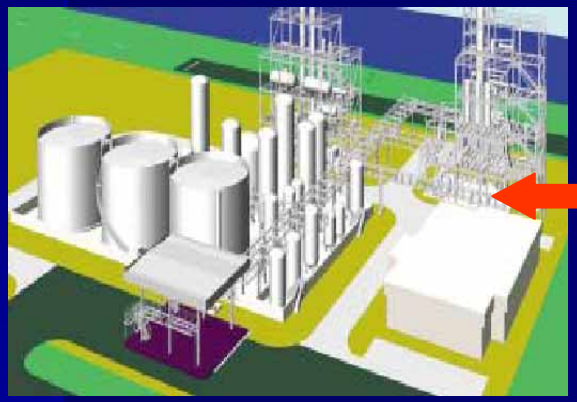
Development of prototype plant for Biodiesel are carried out step by strep at BPPT

Lab Scale biodiesel production (400 L)



Engineering design and fabrication of Biodiesel pilot plant , capacity 1.5 ton /day(Modularised, skid mounted and movable)





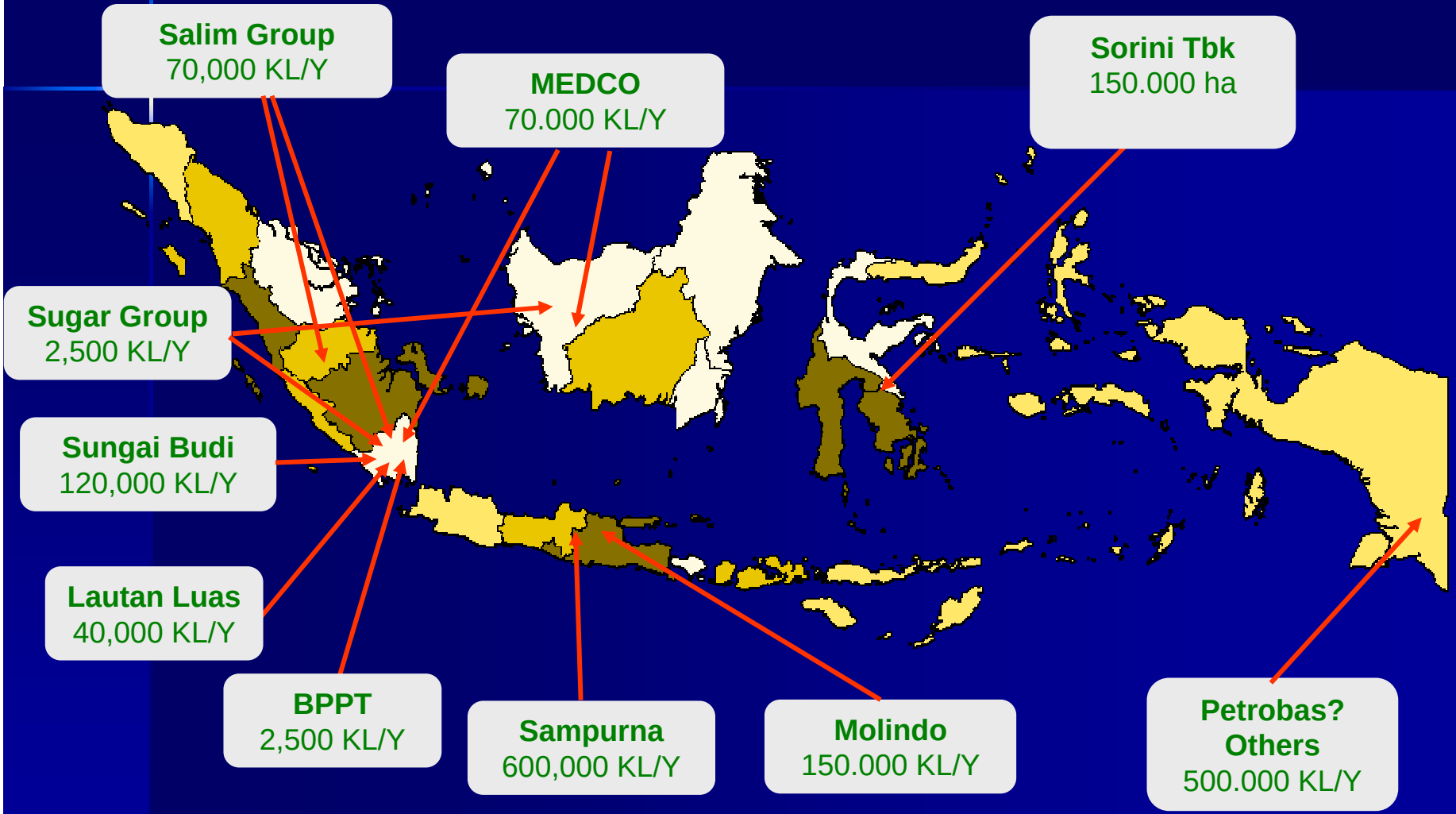
Basic Design and Engineering Biodiesel Plant Cap. 100 ton/ day

EPC Pilot Plant Biodiesel Cap. 3 ton/day , for field trial in Desa Mandiri

EPC Pilot Plant Biodiesel capacity 8 ton/ day

Progress on Bioethanol Development

(Current & projected installed capacity up to 2010 approx 2 mio KL/Y)
Mainly Using Molasses and Cassava as Feedstock



BIOETHANOL PRODUCTION FROM CASSAVA IN PILOT PLANT (8 KL/DAY)

Cassava (50 Ton/d)

Crushing

Cooking

Saccharification

Seed preparation

Seeding

Fermentation

Instrument Control

Distillation

Waste treatment by Methane fermentaion (methane gas for boiler fuel, contribute 20 % of energy consumption)

Dehydration (molecular sieving)

Bioethanol (99.5%) (8 KL/day)

Biofuel Development in Indonesia

- **Progress on small-scale production and distribution**

Small Scale Jatropha Curcas processor for PPO/Biodiesel (up to June 2008) :

- **4 units of Biodiesel processor 300 ton/year**
- **300 units of expeller/extractor 100 kg/hour**
- **62 units purificator 250 l/hour**

Pertamina (National Oil Company) Biofuel Station :

- **Bio-Solar (1%) : 232 units, Bio-Pertamax (5%): 46 units, Bio-Premium (3%) : 1 unit.**

National Electric Company (PLN) Biofuel Power Plant → Installed Capacity 96MW (50% PPO/ Biodiesel)

Bio-kerosene Utilization in household

Blending PPO 10 %, Kerosene 90 %

Conventional Stove (Kompor Sumbu)

Blending PPO 75 %, Kerosene 25 %

Pressurized Stove

Hybrid Power Plant (Pilot Scale) at Rote Ndao-East Nusa Tenggara
(Solar-Win-Diesel)

Power Plan using hybrid of PV-Wind-Diesel Genset

PV-Panel, total cap 35 KWh, combined with wind turbin @ 10 kW

Generator 135 kW using Diesel+ Biodiesel (up to 50%)

Diesel & Biodiesel storage

Accumulator (DC)

Control unit for hybrid system (converter DC=AC)

Research and Development :
Green Diesel and Green Gasoline

PALM/JATROPHA OIL

Feed	
Vegetable Oil, wt-%	100
Hydrogen, wt-%	1.5-3.8
Products	
LPG, vol %	8-8.6
Naphtha, vol-%	1-16
Diesel, vol-%	84-99
Cetane Number	> 75
Sulfur, ppm	< 1

CATALYST

PRODUCT
GREEN DIESEL

Research and Development :

Agricultural Waste → **2nd Generation Technology** → **Bioethanol**

- ~ Empty Fruit Bunch
- ~ Rice Husk
- ~ Straw
- ~ Stalk of Maize/Corn
- ~ Stalk of Sweet Sorghum
- ~ etc.

} **Bioethanol**

Promoting Public Awareness
(by Roadshow)

Utilization B10 for BPPT's employee transportation

Road Test Jawa – Sumatera 2002, B30, 5000 Km, in cooperation with PT. Toyota Astra Motor

Road Test Jawa – Bali 20.000 km, B30,
Sept. – Des. 2004, in cooperation with PT. Pantja Motor

Concluding Remarks

1. When first generation biofuels production is preferred, where feedstocks used are also competing with food and feed lines, there should be accompanied with intensification of agricultural production and diversification of food crops.
2. Establishing "Palm Complex Model" this also applied for rice, sugarcane, and sweet sorghum is necessary, to achieve most efficient utilization of nearly whole parts of plant. This will be one of great solution for the security of feedstocks.
3. The fact that the demand of food, feed and fuel are steadily increasing, especially in the developing countries, non-food feedstocks (biomass) are preferable. This is in line with second generation biofuels production.
4. Establishing optimized Hybrid Power Plant utilizing local potentials including biofuels, biomass and other renewable source of energy would be a significant approach for energy efficiency.
5. Promoting public awareness in utilizing renewable energy would be significant contribution for energy efficiency in particular, and sustainable development in general.


Thank You