

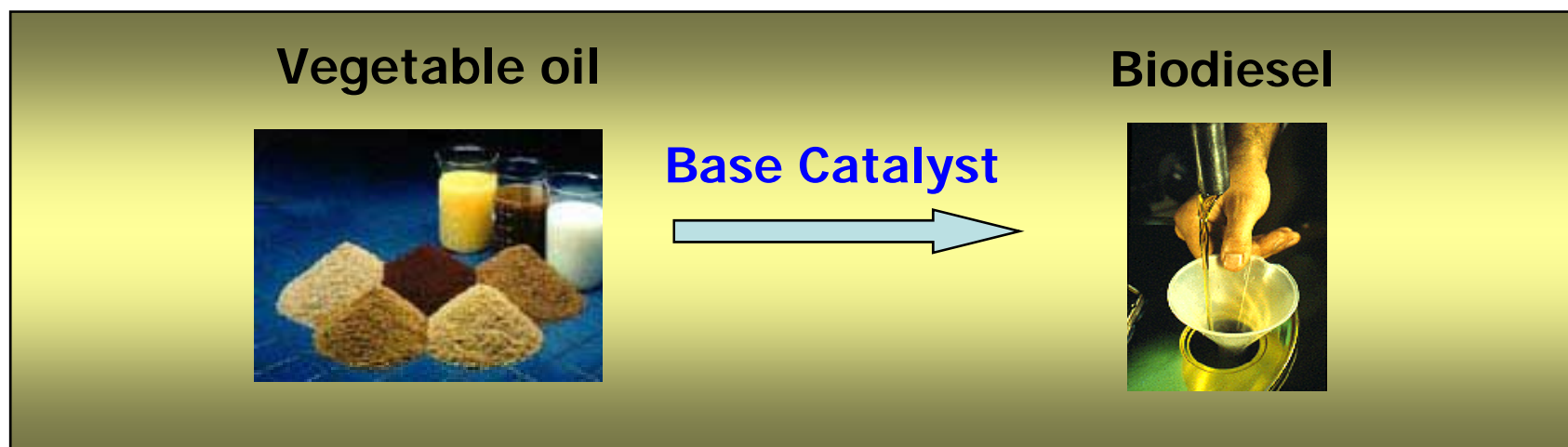
Utilization of Palm Wastes for Biodiesel

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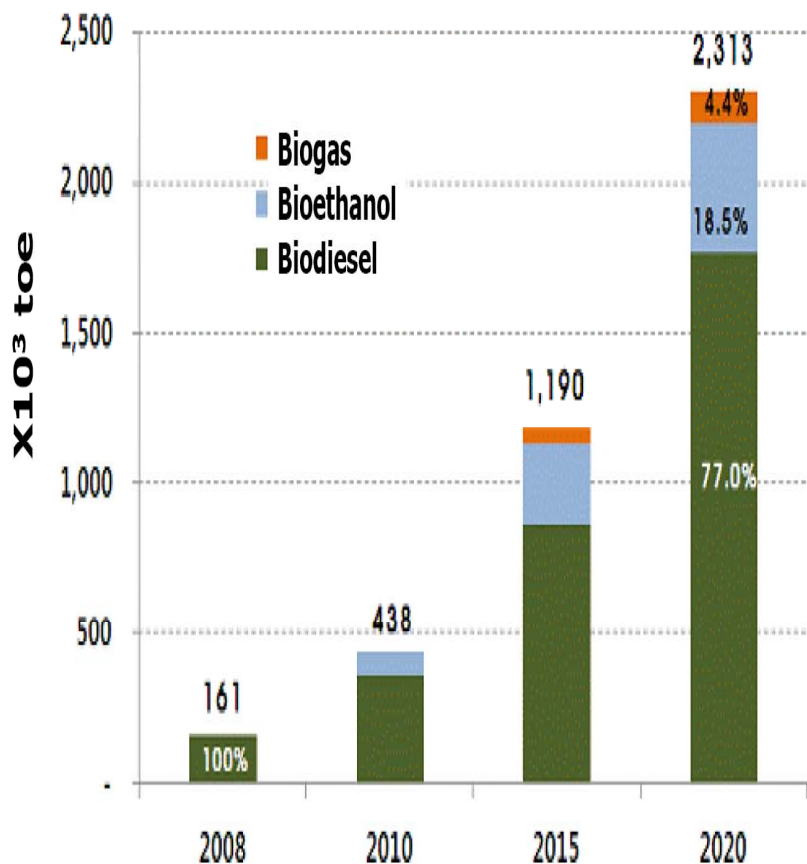
What is Biodiesel?



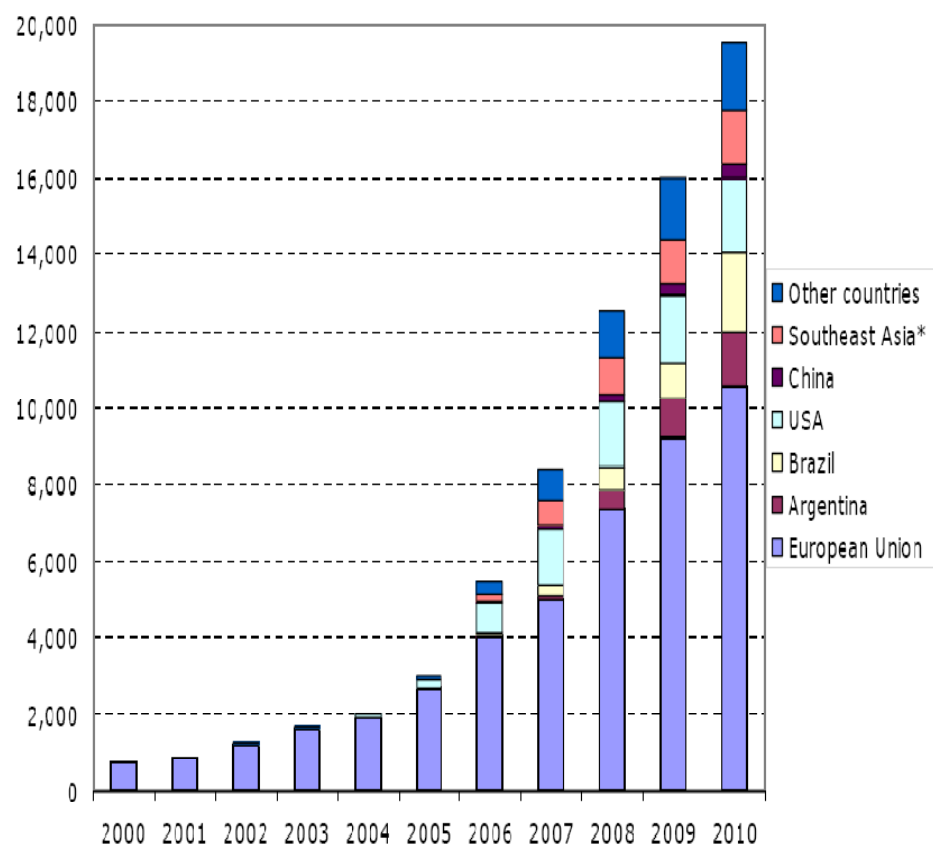
Biodiesel is the important green diesel fuel from all vegetable oils

Biodiesel Outlook

Korea

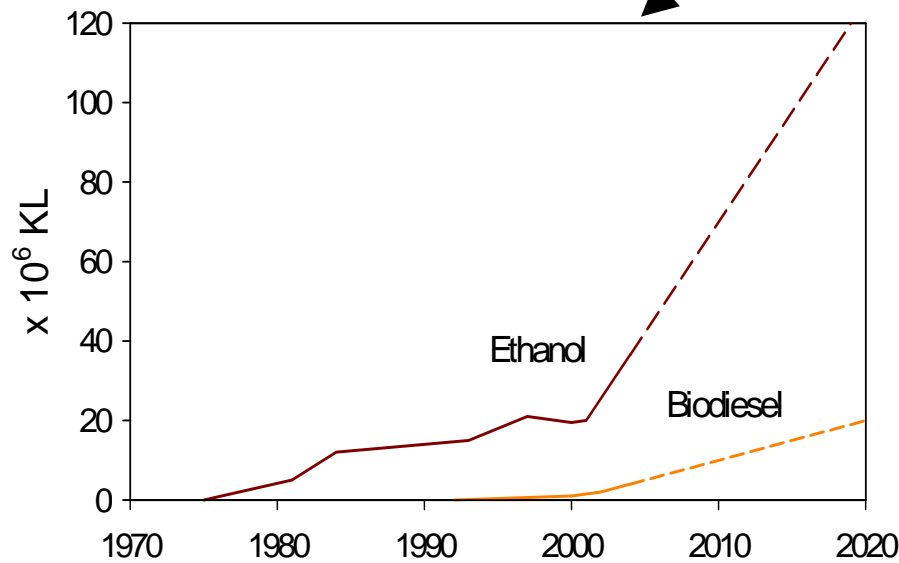


World

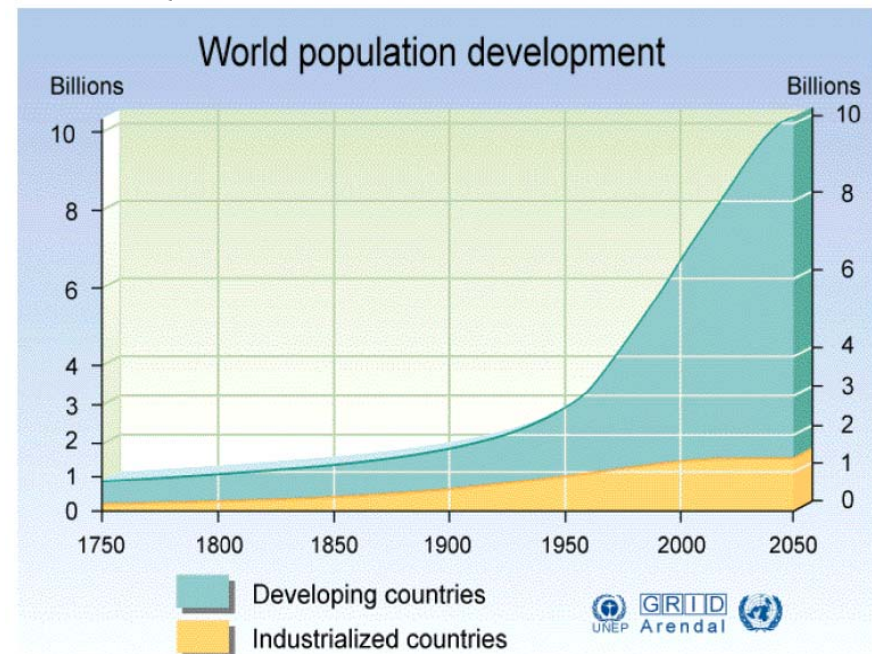


Edible Feedstocks for Biodiesel?

Edible Feedstocks
(Rapeseed, Soybean and Others)



Fuel



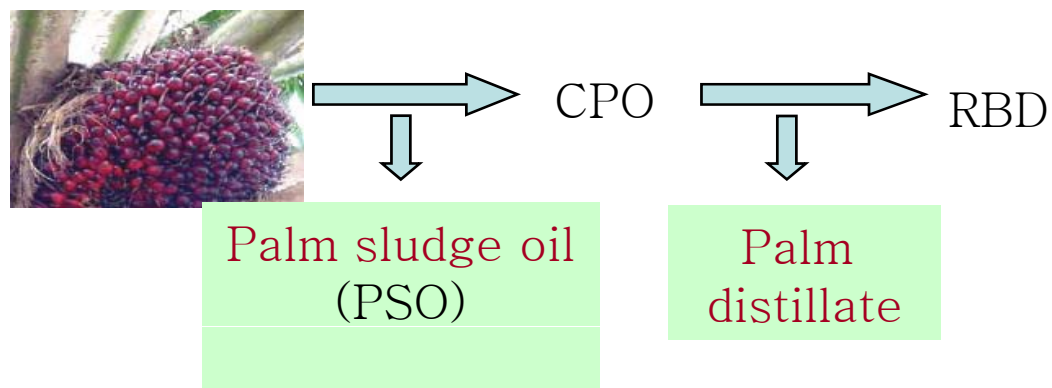
Food

Palm Oil Wastes

Plantation Farms

Abandoned Palm Fruits due to High Free Fatty Acids (FFA)

From Oil Refining



Characteristics of Palm Oil Wastes

Waste fats	FFA content, %	Potential amount, ton/yr
Waste Palm oil	> 10	1.5 x 10 ⁶
Palm sludge oil	30~70	
Palm distillate	> 90	

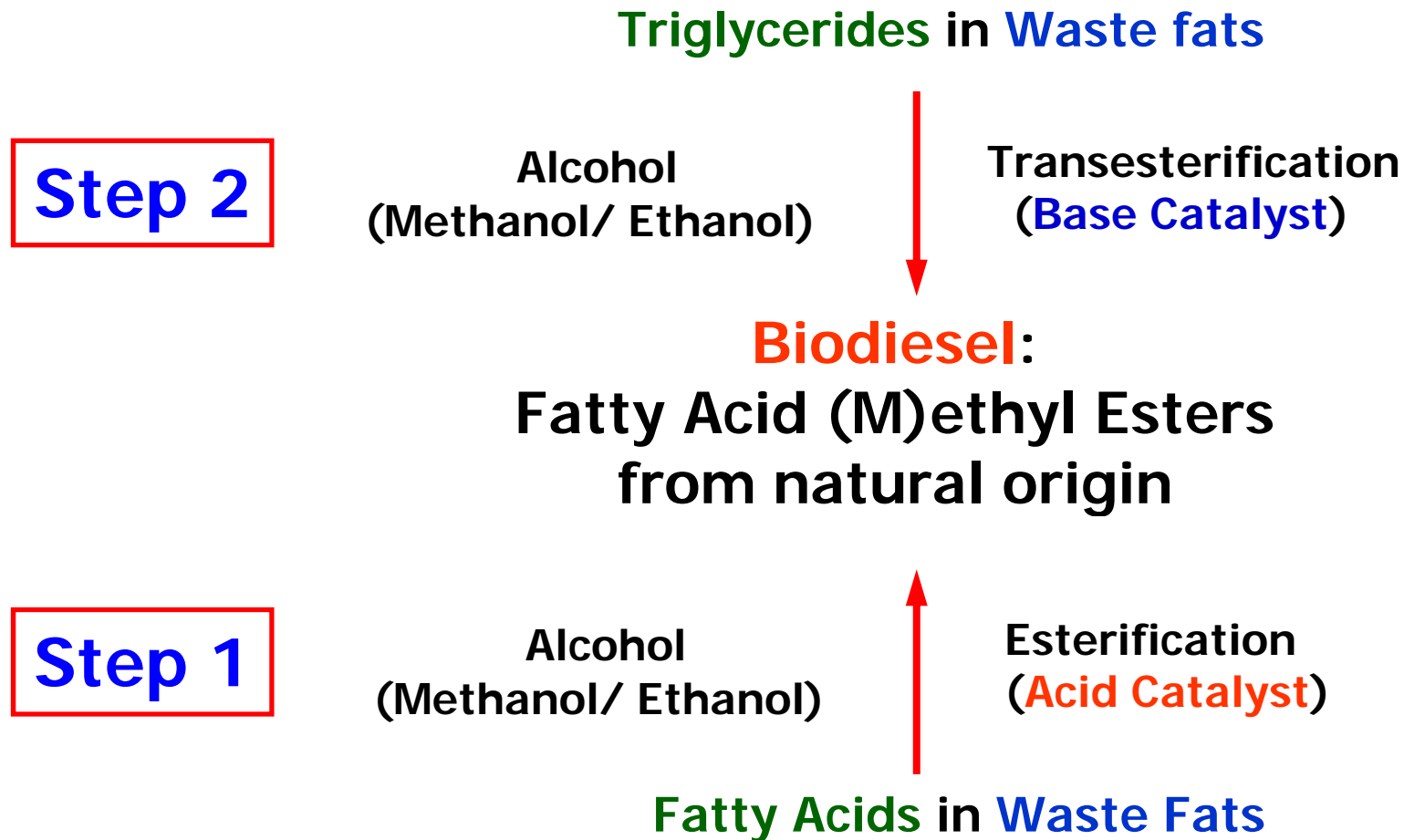
Commercial Biodiesel Catalysts

	Base catalyst	Acid catalyst
Feedstock	Refined oil	Waste fats (high free fatty acid)
Reaction condition	< 100°C < 5 atm	200-300°C 50-80 atm
Reaction Time	< 0.5hr	> 4hr
Catalysts	NaOCH ₃ , KOH, NaOH	H ₂ SO ₄

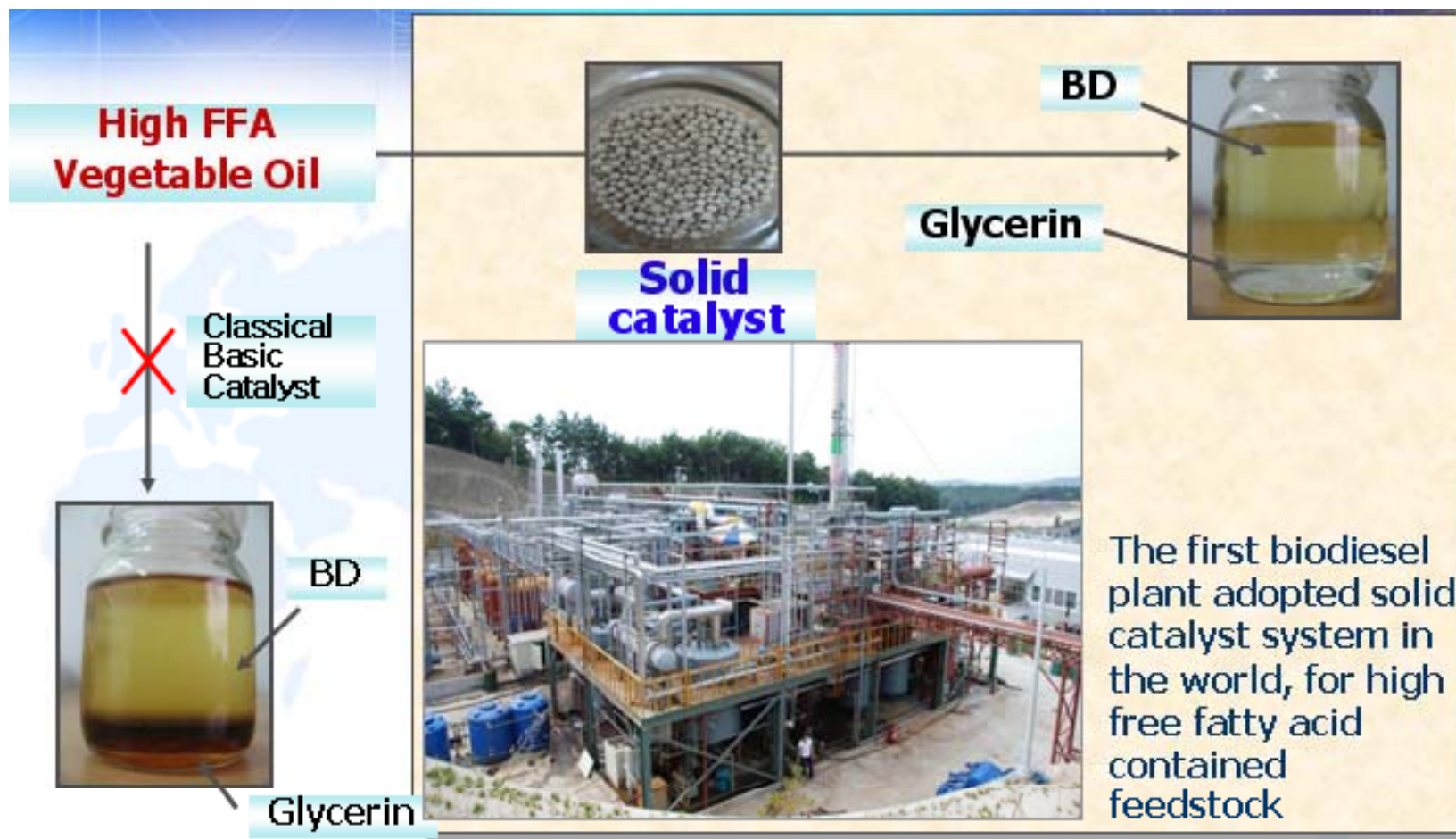
R&D Issues on biodiesel from palm oil wastes

- How handle the **high free fatty acids** in palm oil waste?
- **Waste generation** including **low grade glycerine** with **homogeneous catalyst**

General Scheme for Biodiesel Production from Waste Fats

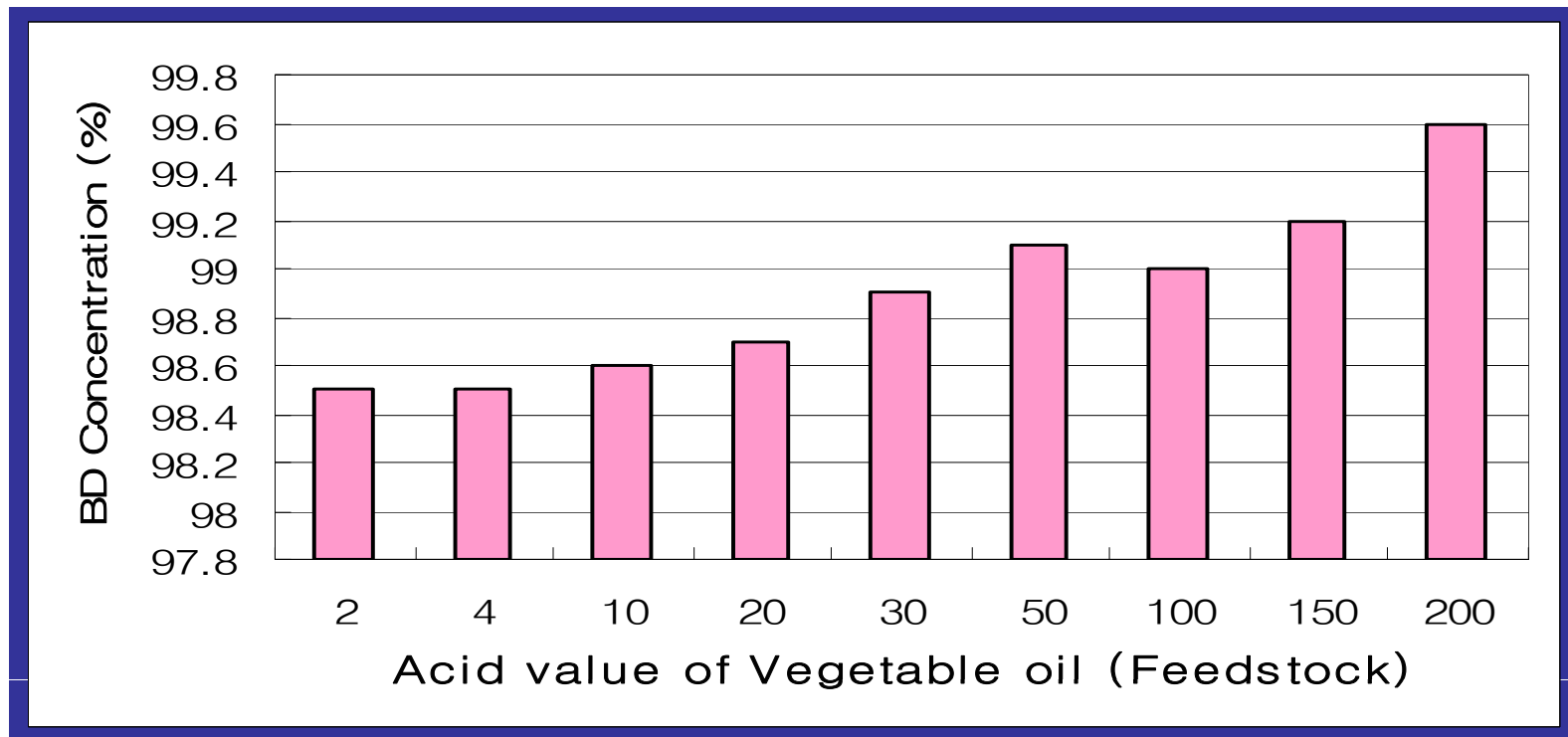


MFS Technology by Solid Catalyst



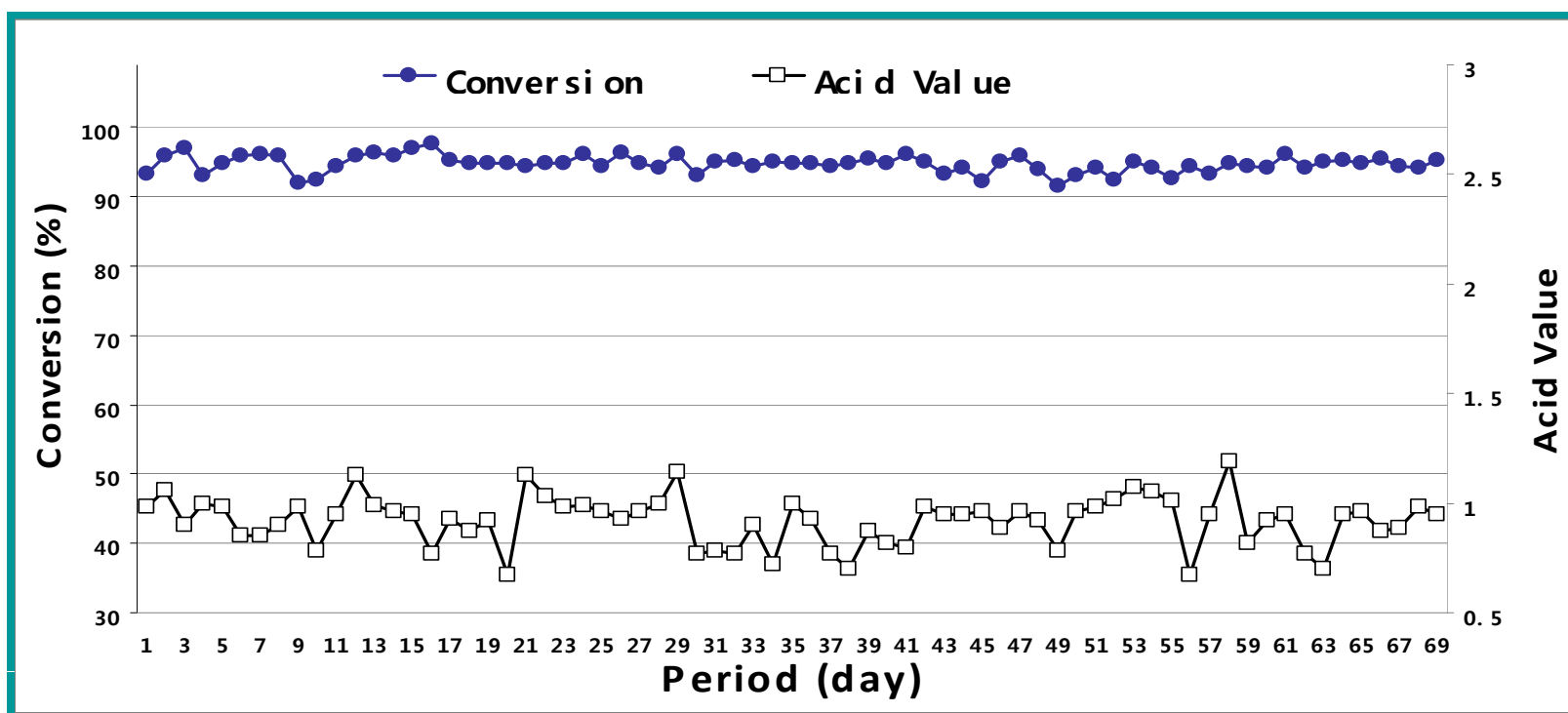
Performance of the Process (Biodiesel purity)

- High conversion is achieved in the process in all range of fatty acid content in CPO even 100 % of fatty acid
- Final biodiesel concentration in product is expected over 98 %



Durability of Catalyst

- Catalytic activity is maintained for a long period with high yield
- Conversion of 1st step reaction is reached about 95 %, while acid value is got around 1 (Initial AV ; 4 – 15)



Summary

- Like the palm cellulosic wastes for ethanol, **utilization of palm oil wastes** may be another important component for **Palm Refinery**
- An **innovative biodiesel process** for palm oil wastes needs to be developed
- The process **employing solid catalyst** is a promising option

Thank you!