CLEAN DEVELOPMENT MECHANISM FEASIBILITY STUDY 2001
SPONSORED BY MINISTRY OF THE ENVIRONMENT JAPAN

RESEARCH FOR THE REDUCTION OF METHANE RELEASE FROM MALAYSIAN PALM OIL MILL LAGOON AND IT S COUNTERMEASURES

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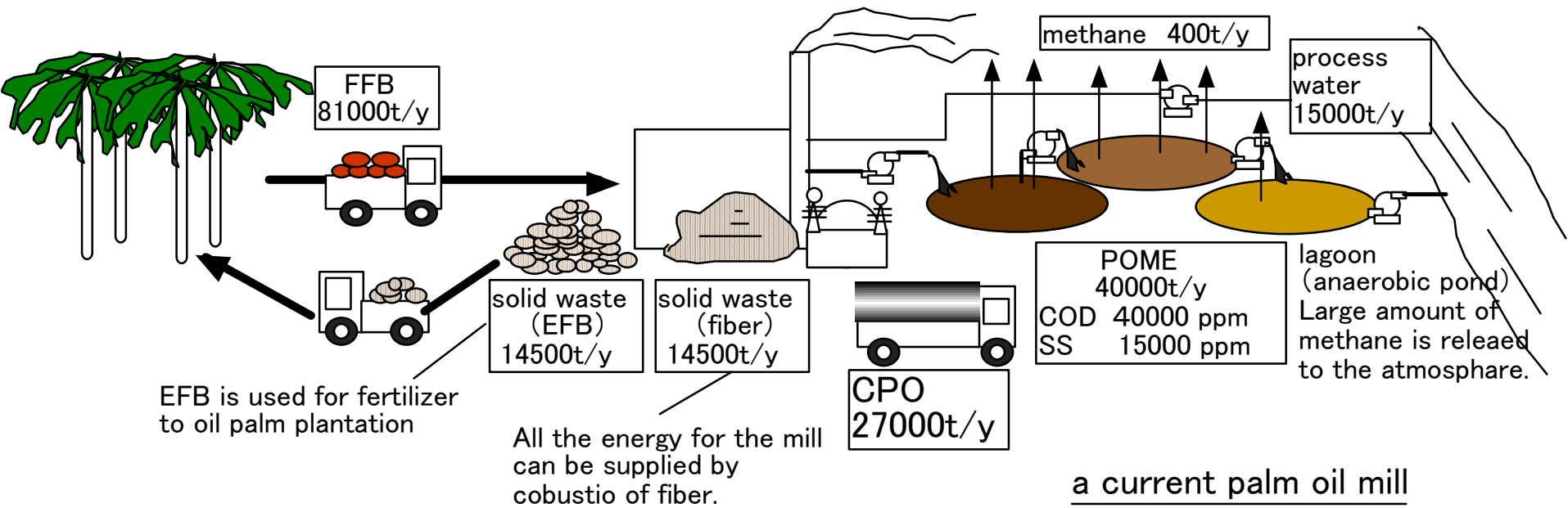
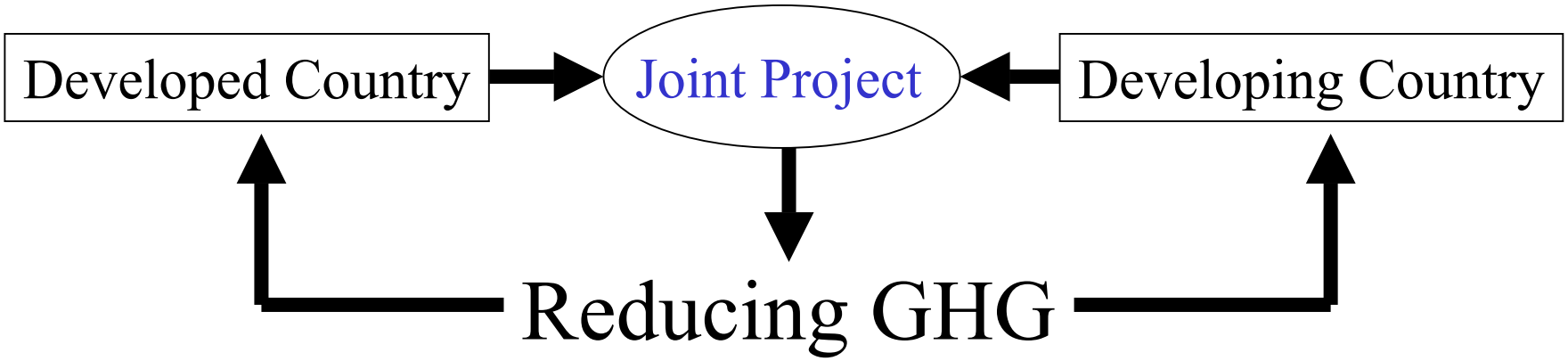


a current palm oil mill

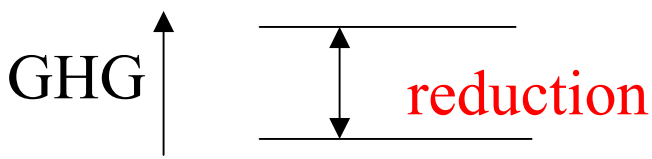
CDM



Boundary — Space
Time < 2012

Base Line → Measurable

Joint Project → No
Yes



methane

lagoon

POME

CPO: crude palm oil
11 million t/y
250 US$/t

POME: palm oil mill effluent
COD >40000ppm
25 million t/y

water

rinse

fertilizer

sterilization strip

digesting press

fiber:
6 million t/y
moisture content 40%
combustion 2700 kcal/kg

fruit

shell

seed

fiber + oil

kernel oil

FFB: fresh fruit bunch
60 million t/y

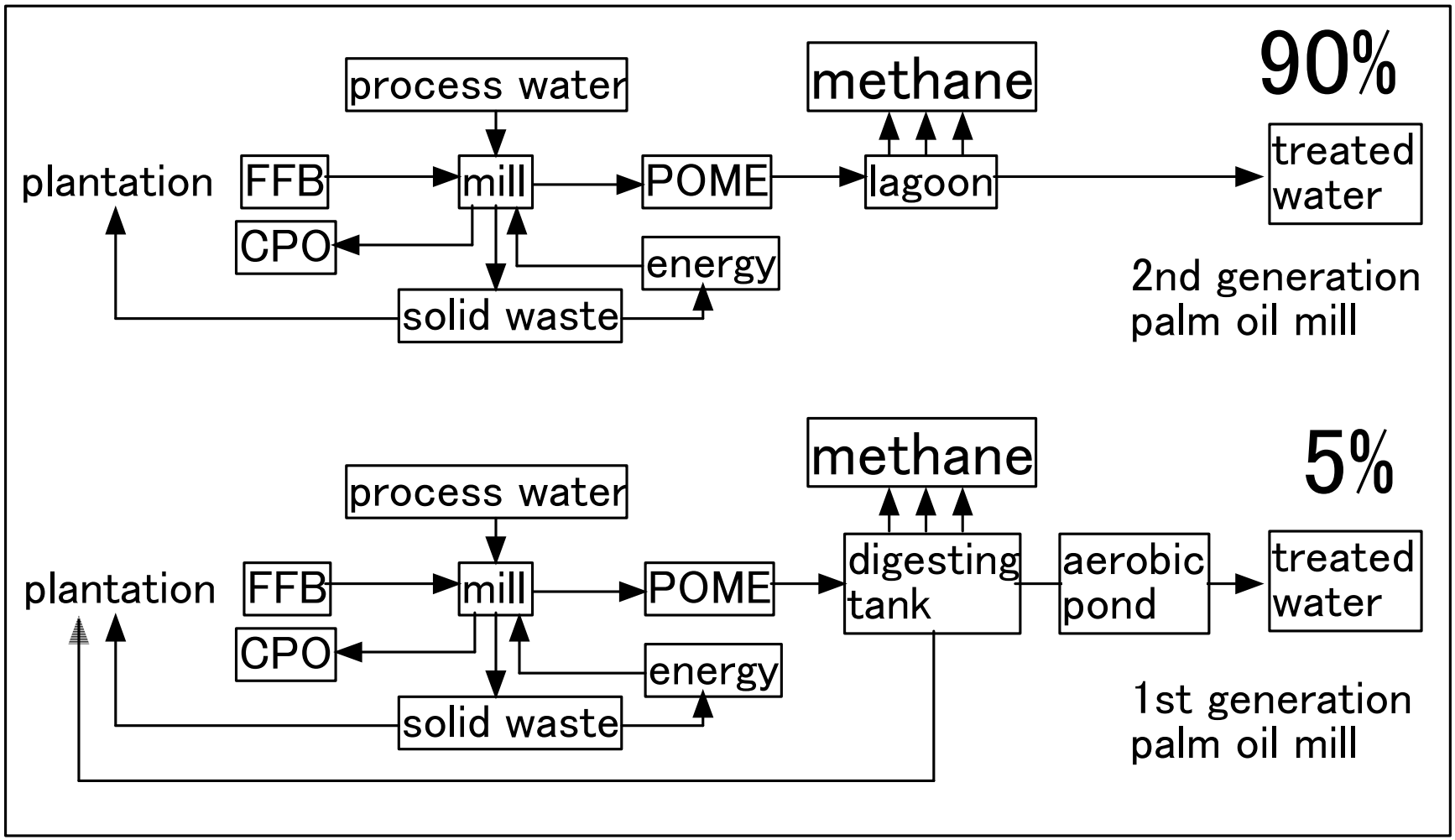
palm kernel
3 million t/y
180 US$/t

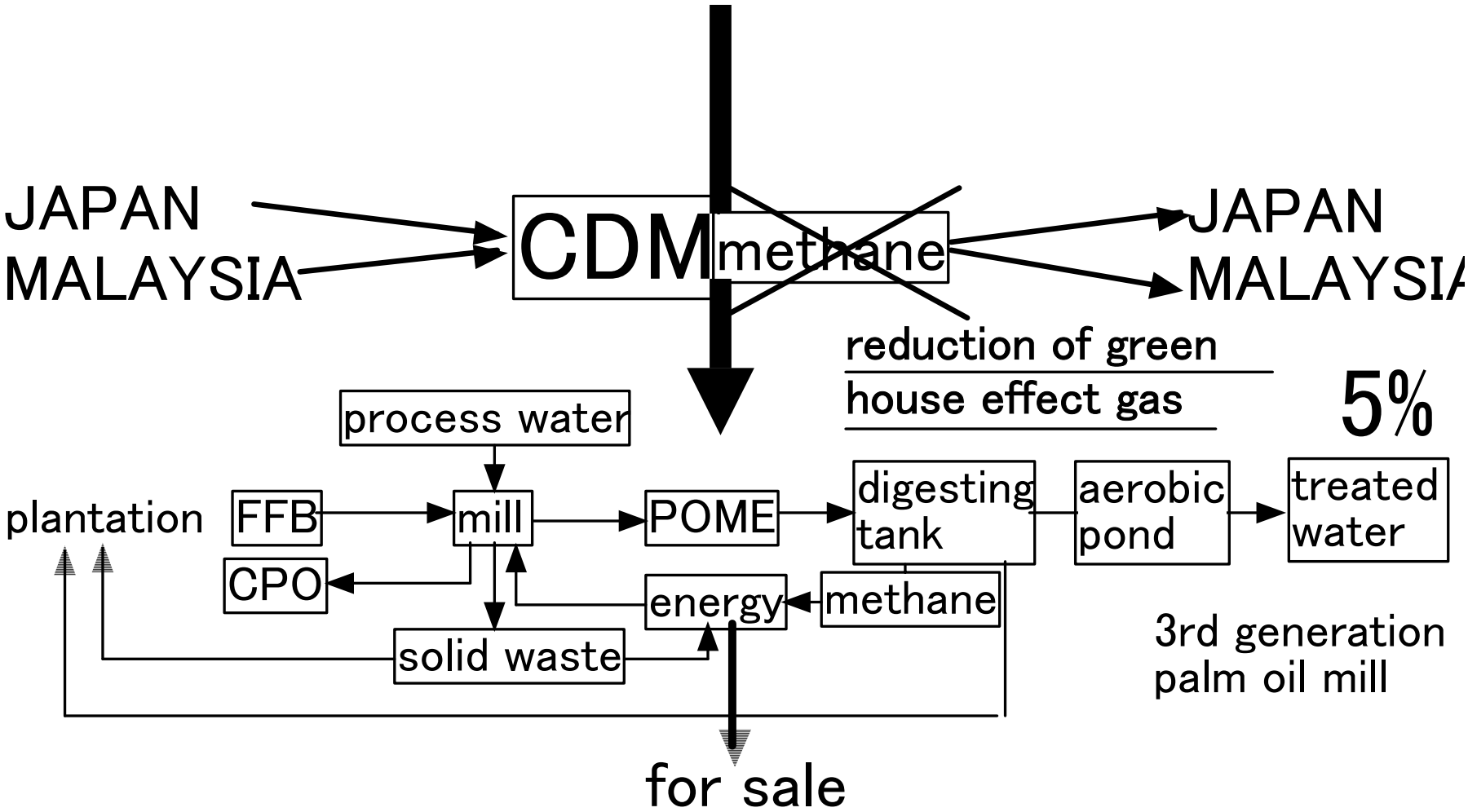
shell: 4 million t/y
moisture content 10%
combustion 4500kcal/kg

EFB: empty fruit bunch
14.4 million t/y
moisture content 60%
combustion 1400kcal/kg

PALM OIL INDUSTRY IN MALAYSIA

Palm oil industry in Malaysia




JAPAN
MALAYSIA
CDM
methane
JAPAN
MALAYSIA
reduction of green
house effect gas
5%
process water
plantation
FFB
mill
POME
digesting
tank
aerobic
pond
treated
water
CPO
energy
methane
solid waste
3rd generation
palm oil mill
for sale

Members of the research team

(Japan)

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Mr. B.G.Yeoh (SIRIM, Malaysia)

Prof.Dr.Mohd. Ismail. Abdul Karim (University Putra Malaysia)

Dr.Azni Hj. Idris (University Putra Malaysia)

Biogas composition (measured)
methane 35% CO2 65% (digesting tanks)
methane 45% CO2 55% (facultative pond)

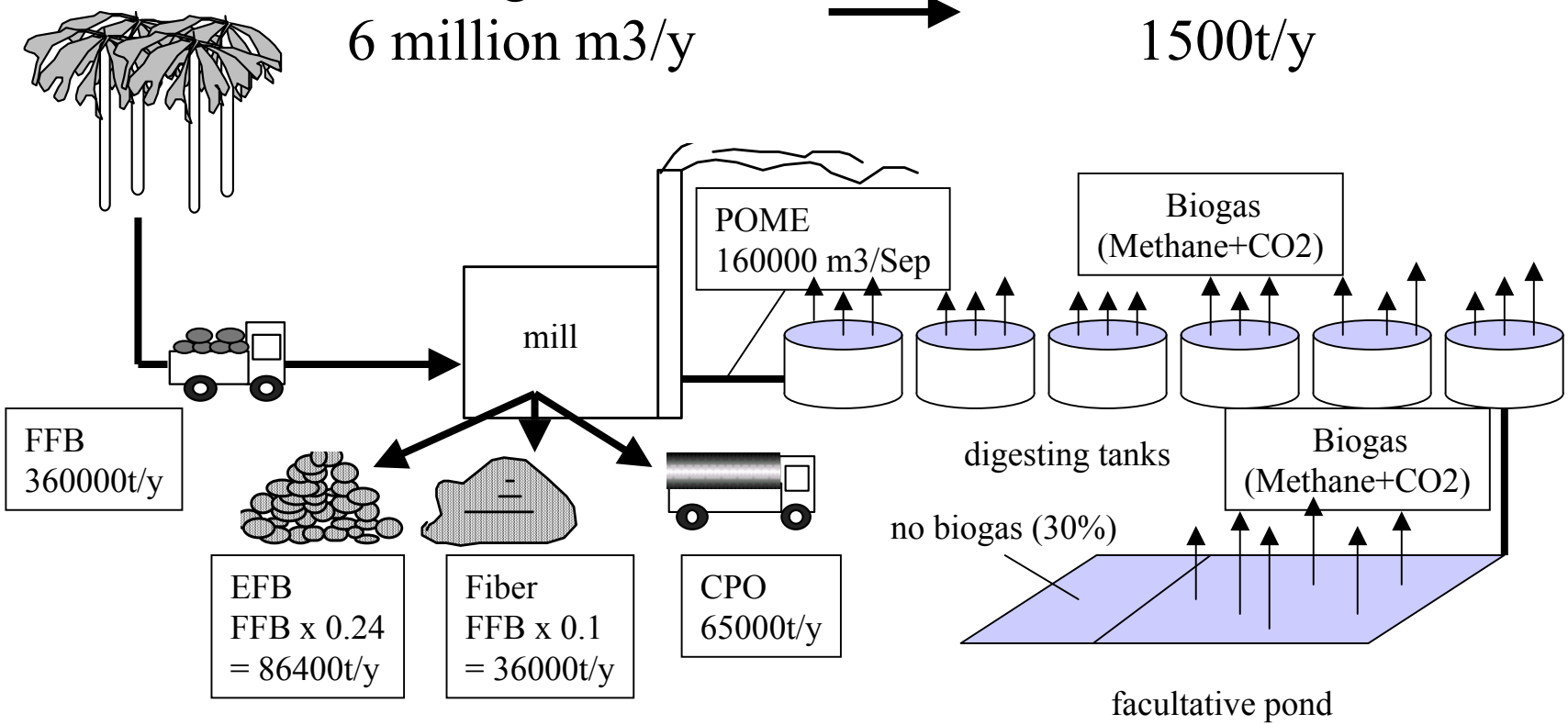
Biogas amount (measured)
4.9 L/min m2 → 7.06 m3/day m2 (digesting tanks)
0.7L/min m2 → 1.01 m3/day m2 (facultative pond)

Judging from Data from Felda Serting Hilir Palm Oil Mill

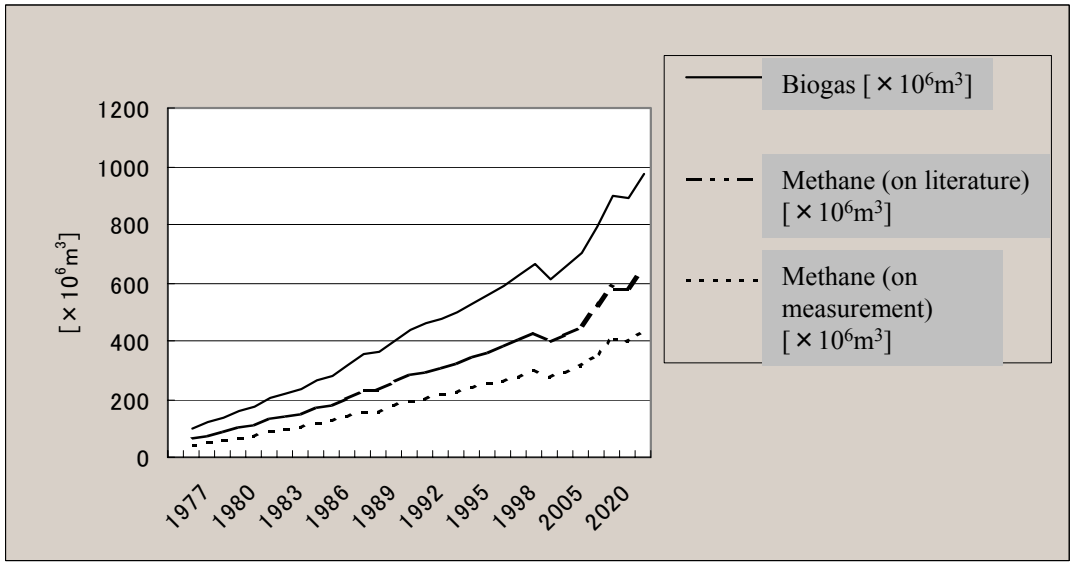
Total biogas from mill
6 million m3/y

→

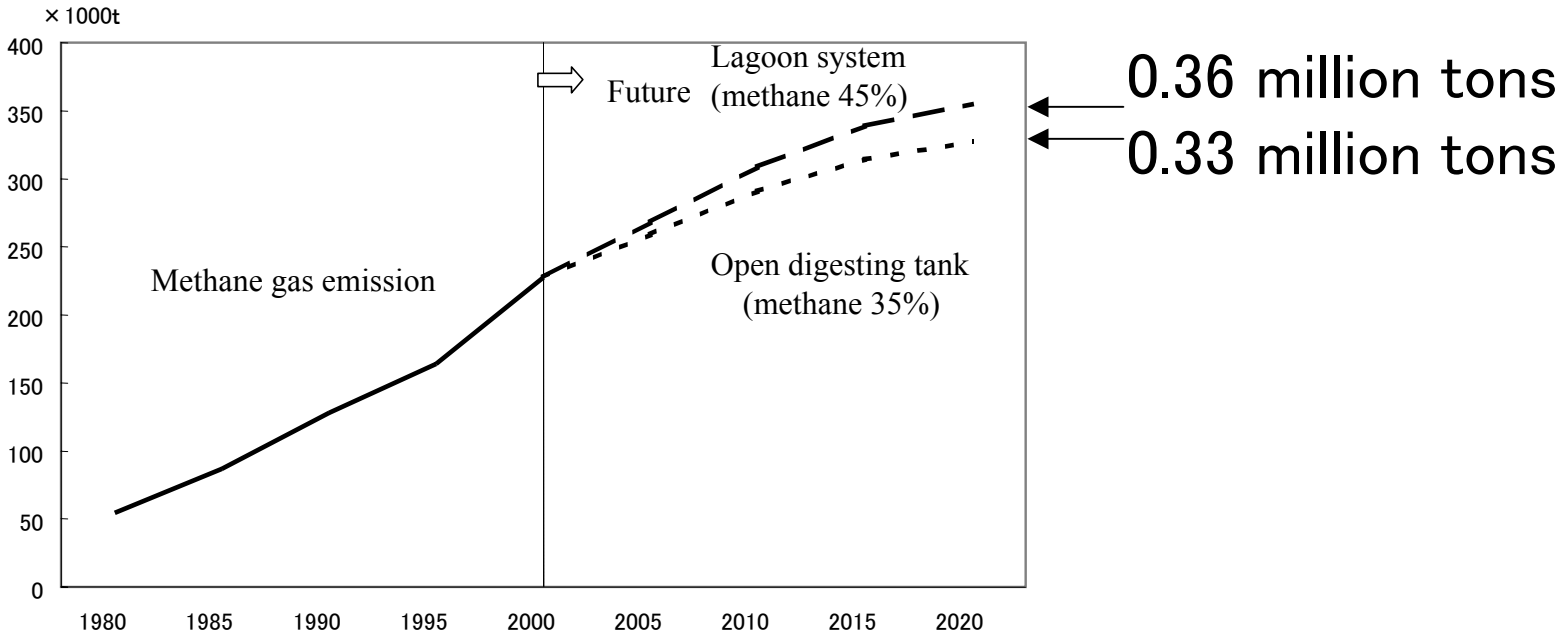
Total methane from mill
1500t/y



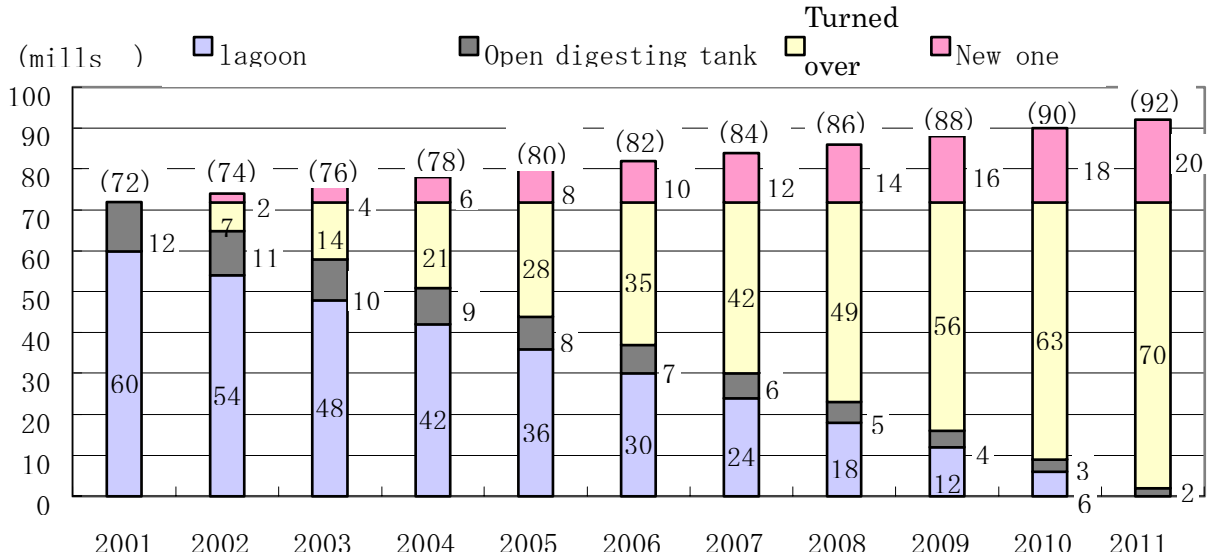
A model mill case study



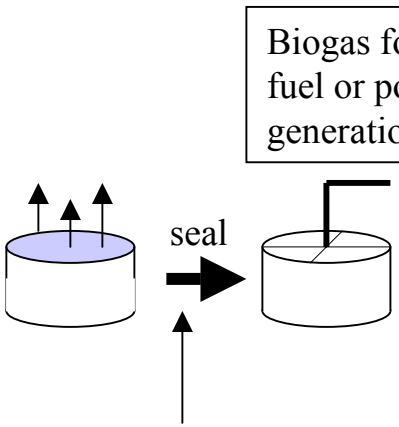
Comparison of methane emission between reported value and measured one



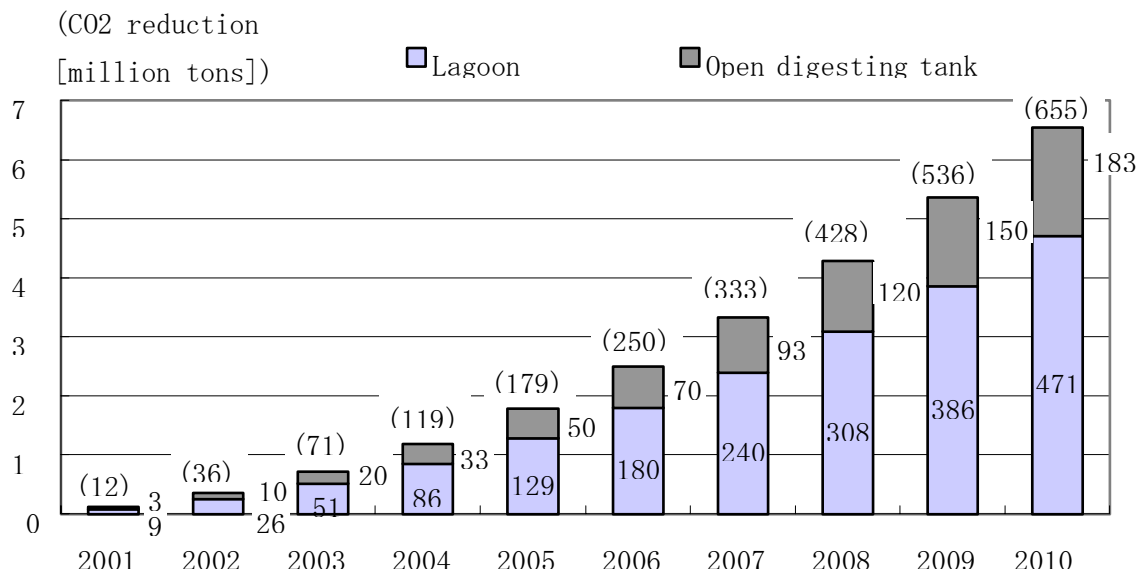
Methane emission from palm oil industry in Malaysia



A simulation for CDM in palm oil industry in this 10 years



CDM



Estimated amount of CO2 reduction in this CDM during 10 years

Investment for CDM in palm oil industry from Japan and Malaysia

	Number of new mills	Cost/mill	Total cost
Malaysia			5.8 million US$
Open digesting tank	20	0.29 million US$	5.8 million US$
Japan			61.5 million US$
Open digesting tank	60	0.48 million US$	28.8 million US$
Sealing	30	0.19 million US$	5.7 million US$
Generator	90	0.3 million US$	27 million US$
Total number	90		67.3 million US$

Investment from Japan per mill = 61.5/90 = 0.68 million US$

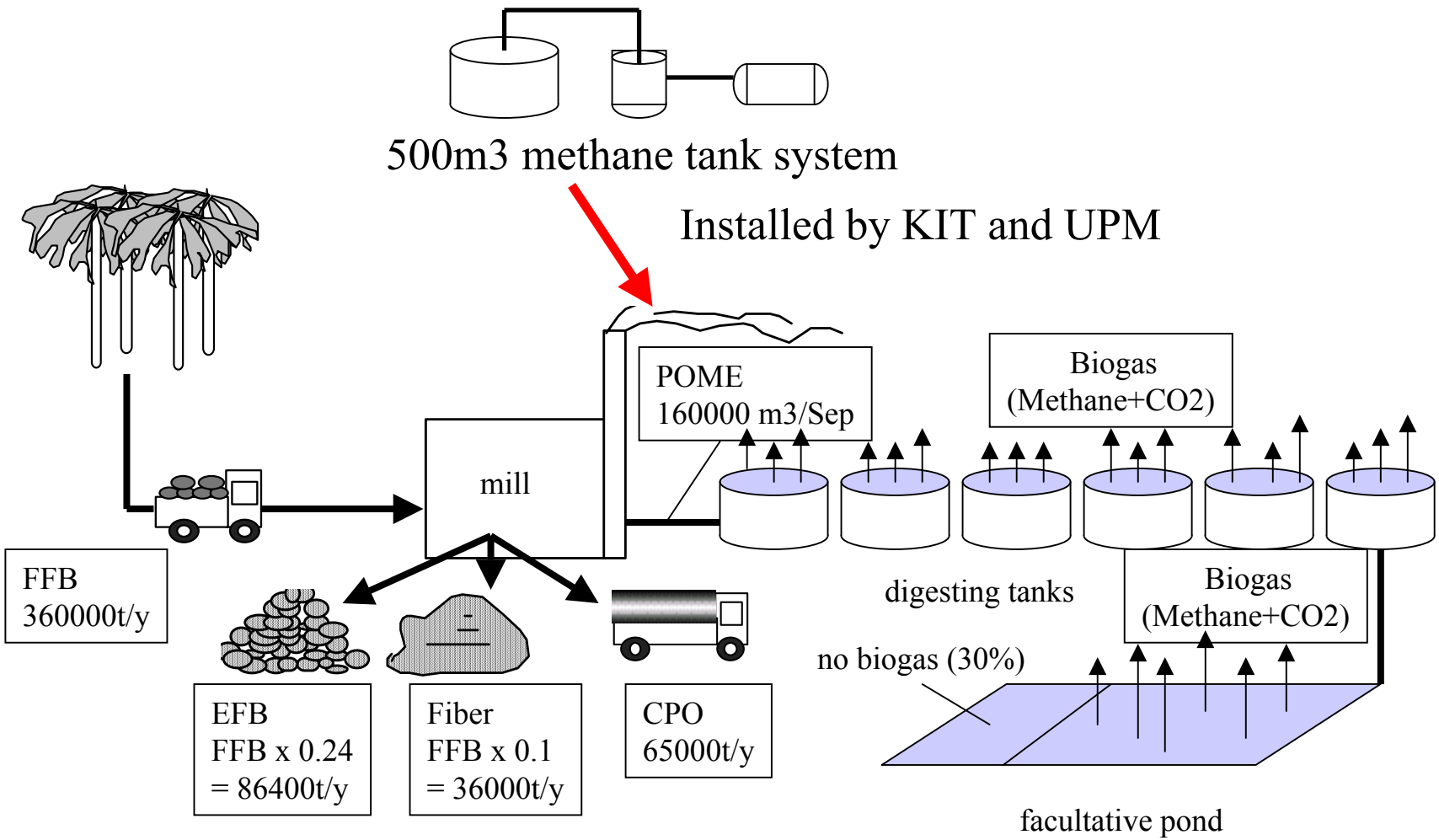
CO2 reduction per mill →

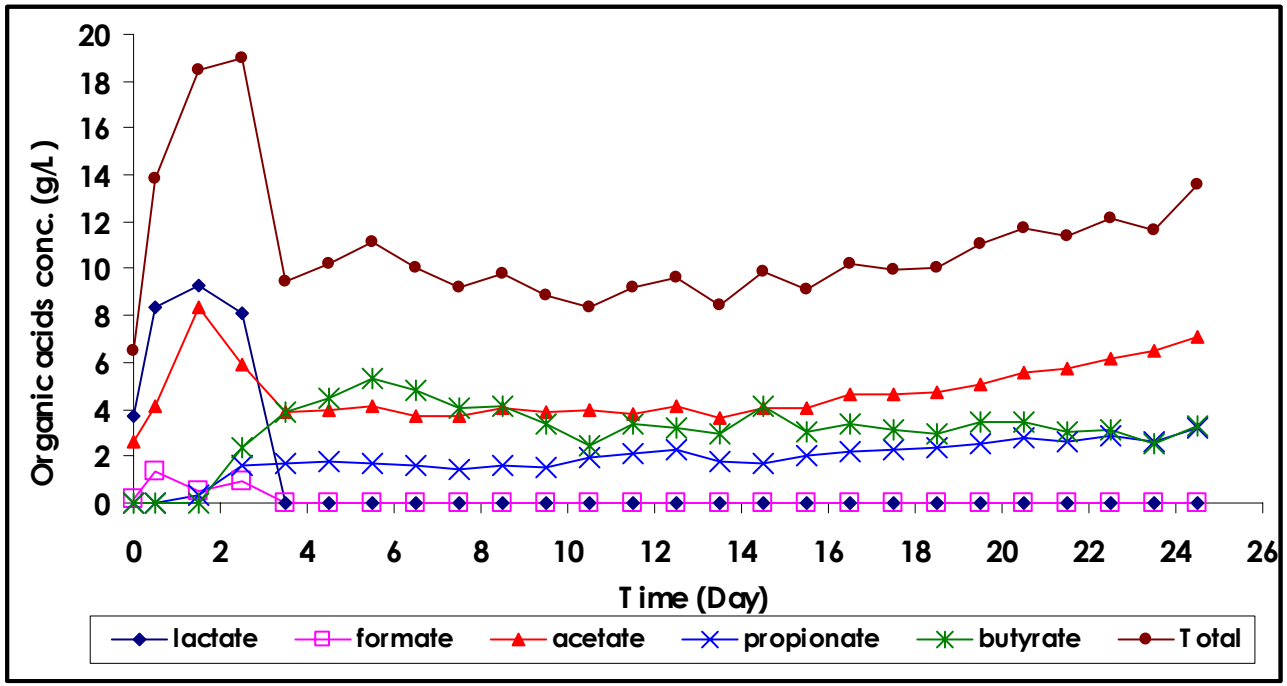
14,280 t/y ×10y = 142,800 t
(Lagoon)
11,107 t/y ×10y = 111,070 t
(Open digesting tank)

0.68 million US$/142,800t
0.68 million US$/111,070t

= 4.8 – 6.1 US$/t-CO2

Joint Project between KIT & UPM with FELDA





Organic acids production from POME using a 50L bioreactor

POME

Anaerobic Treatment

Purified organic acid

Summary

1 Methane content released from the anaerobic pond system (lagoons) in a palm oil mill was 45% and that from the open digesting tank was 35%.

2 Based on this data, 0.36 million ton methane per release from lagoons and 0.33 million ton from open digesting tanks were estimated at 2020 in Malaysia.

3 Adopting the scenario as using open digesting tank system as business as usual, in the case of investing installment cost for power generation from methane, it would be profitable when the price of carbon credit more than 6US$/t-CO2.

4 Our organizing steering committee including the member from the Malaysian government, industry, and university suggested that our CDM project match Malaysian policy encouraging power generation from biomass, if the sustainable development of palm oil industry could be promoted.

Acknowledgement

This project was planned based on the long collaborating works between Prof. Yoshihito Shirai, Kyushu Institute of Technology, Japan and Dr Mohamed Ali Hassan, University Putra Malaysia. The field works were cooperatively carried out by the staffs of each university in a FELDA's palm oil mill.

This project was supported by the Global Environmental Center, Osaka Japan and sponsored by Ministry of the Environment Japan.

Future Subjects

1. Consensus for the baseline of this project
2. Risk hedge for the CDM business
3. Business plan by a model business
4. Further FS with biomass power generation by solid wastes
5. Partnership between Japan and Malaysia
6. Funding
7. Scheduling
8. Malaysian policy and innovation