

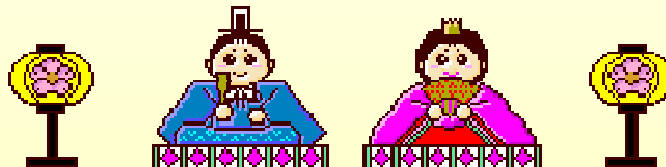
# Lessons Learned from Feasibility Study on Biogas Power Project in Thailand



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**TAKUMA**

3 March, 2005





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# 1) Company Profile



Takuma  
headquarters

# Company Outline

**TAKUMA**

(as of March 31,2002)

Corporate name: TAKUMA CO., LTD

Established : June 10 ,1938

Capitalization : ¥ 13 billion

President : Tsuneo Nishida

Headquarters : Amagasaki City, Hyogo

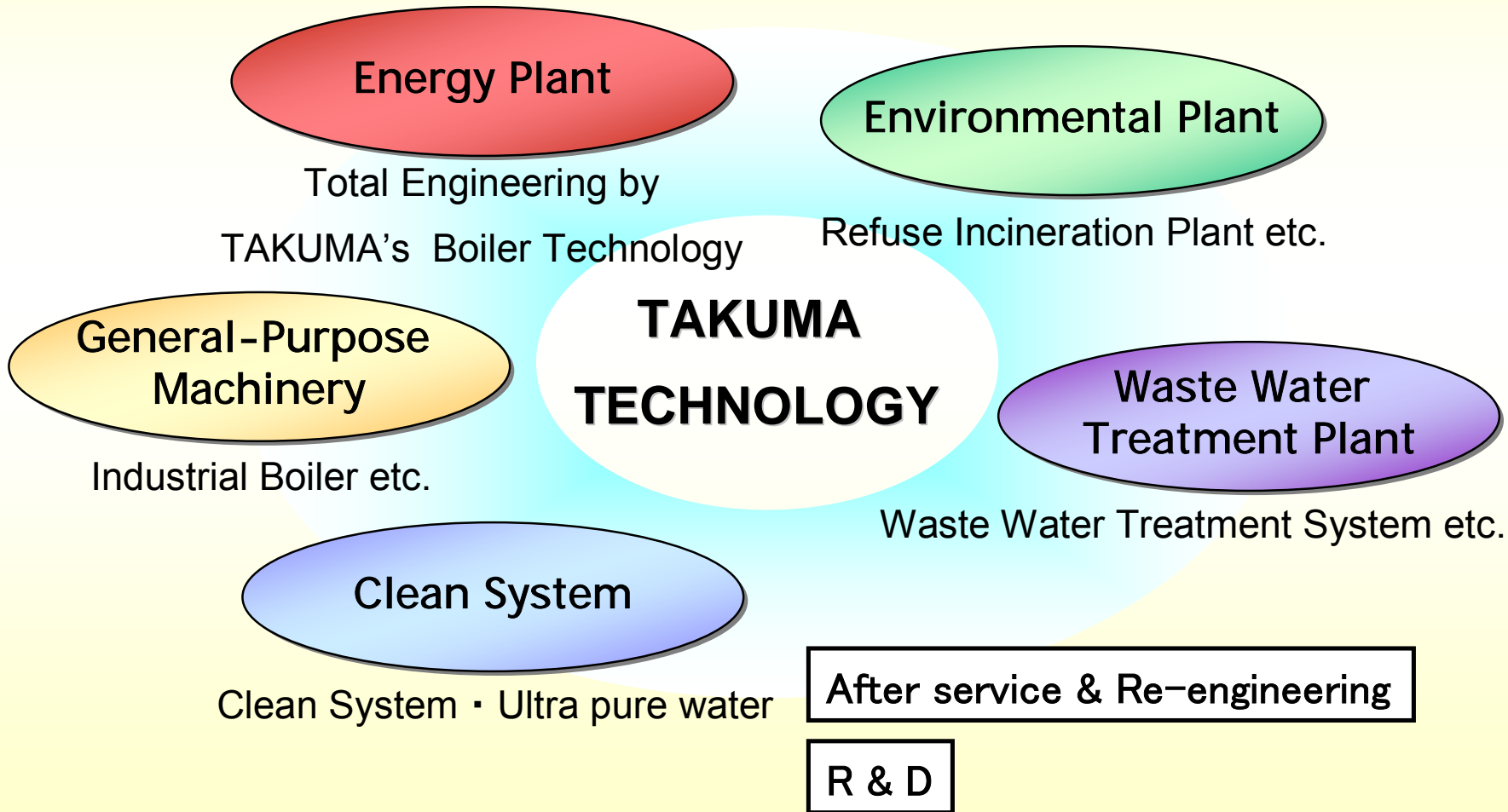
Branch : Tokyo, Nagoya, Kyushu, Hokkaido, Hokuriku,  
Hiroshima, Sendai, Yokohama, Okinawa, Kumamoto,  
Taipei(Taiwan), Bangkok (Thailand), Shanghai (China),  
Beijing (China)

Factory : Harima (Hyogo), Kyoto (Acquired ISO14001  
Certificate in 1999)

Employee : 822 (Acquired ISO9001 Certificate in 1997)



## TAKUMA is “Total Engineering Plant Manufacturer”.



# Energy Plant



A bagasse firing boiler in a sugar factory of Thailand (300t/h 2units).



# Supply Record of Biomass Firing Boilers

**TAKUMA**



## For Bagasse, Wood Waste, Palm waste, etc.

(As of 2000)

- Japan	168
- Indonesia	118
- Thailand	108
- Malaysia	36
- Philippine	17
- Korea	13
- Singapore	12
- Other countries	58

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- Total	530 Units
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# Waste Incineration Plants

**TAKUMA**



Customer :Kang-Shan, Taiwan

Completion : April,2001

Capacity : 1,350 t/d

(450t/24h × 3Lines)

Electric capacity:42,000kW

Steam condition : 40kg/cm<sup>2</sup>,400°C



Customer: Lut-Sao, Taiwan

Completion : December,2001

Capacity : 900 t/d

(450t/24h × 2Lines)

Electric capacity : 28,000kW

Steam condition : 40kg/cm<sup>2</sup>,400°C





## 2) Project Outline



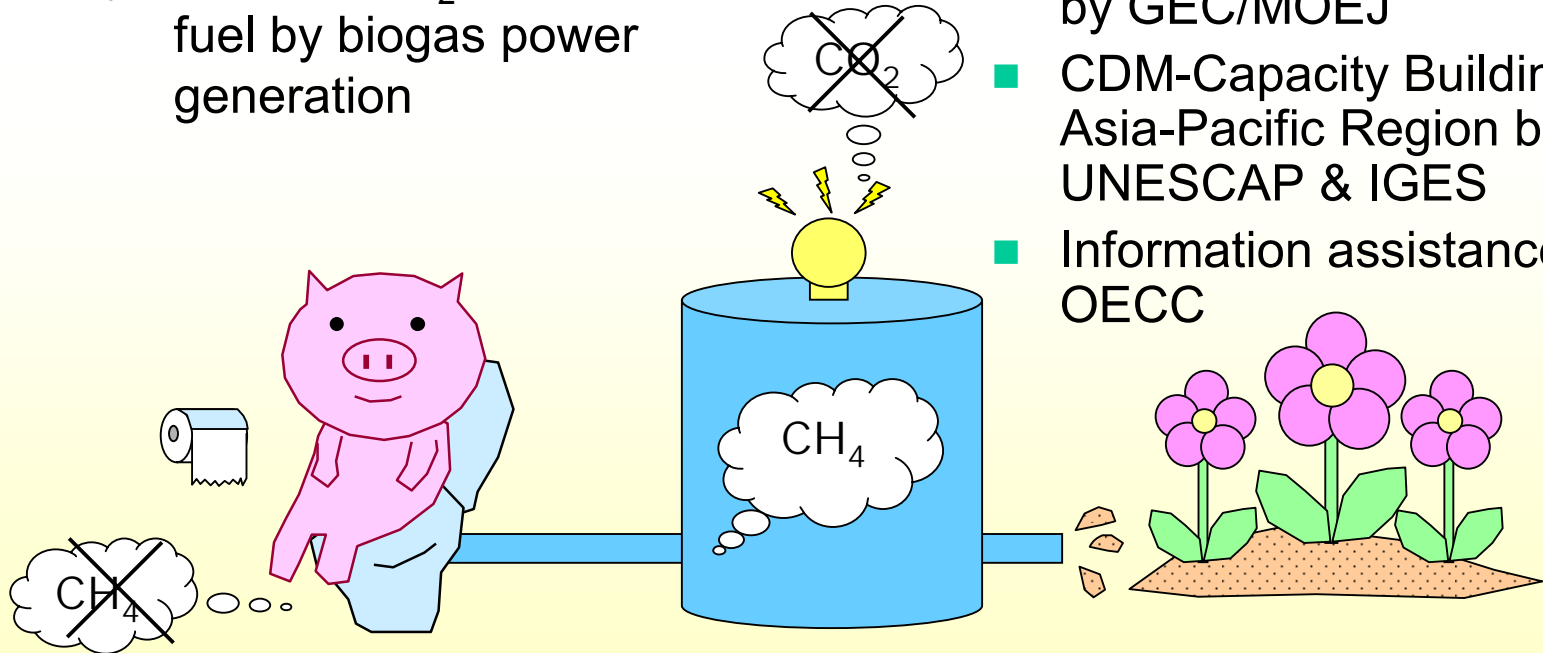
Pilot plant in Hiroshima for Swine manure treatment

# Project Outline

## Project Activity

Biogas (methane) recovery from swine manure (pig waste)

- 1) Avoid methane emission from wastewater treatment
- 2) Reduce CO<sub>2</sub> from Fossil fuel by biogas power generation



## Project Site

Pig farm in Ratchaburi, Thailand

## Sponsor

- Feasibility Study funded by GEC/MOEJ
- CDM-Capacity Building in Asia-Pacific Region by UNESCAP & IGES
- Information assistance by OECC

# Project Site① Geography & Climate

Ratchaburi province -- Center Thailand 100 km southwest of Bangkok



## Climate of Ratchaburi

Average highest temperature 37°C

Average highest temperature 20°C

Annual rainfall 1,000~1,250mm

## Pig business in Ratchaburi

20% of domestic production (No.1 in 2003)



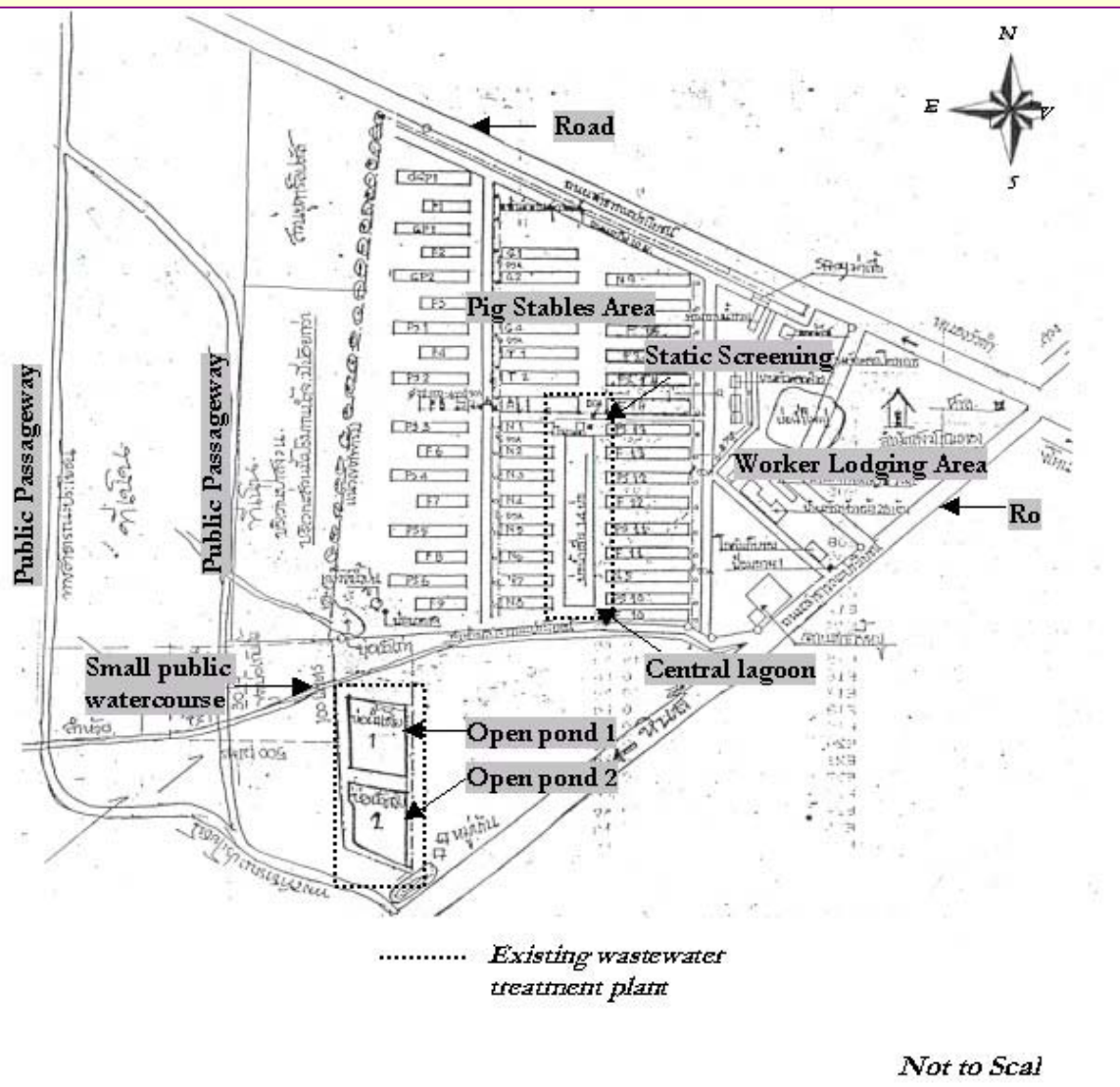
# Project Site② Site map



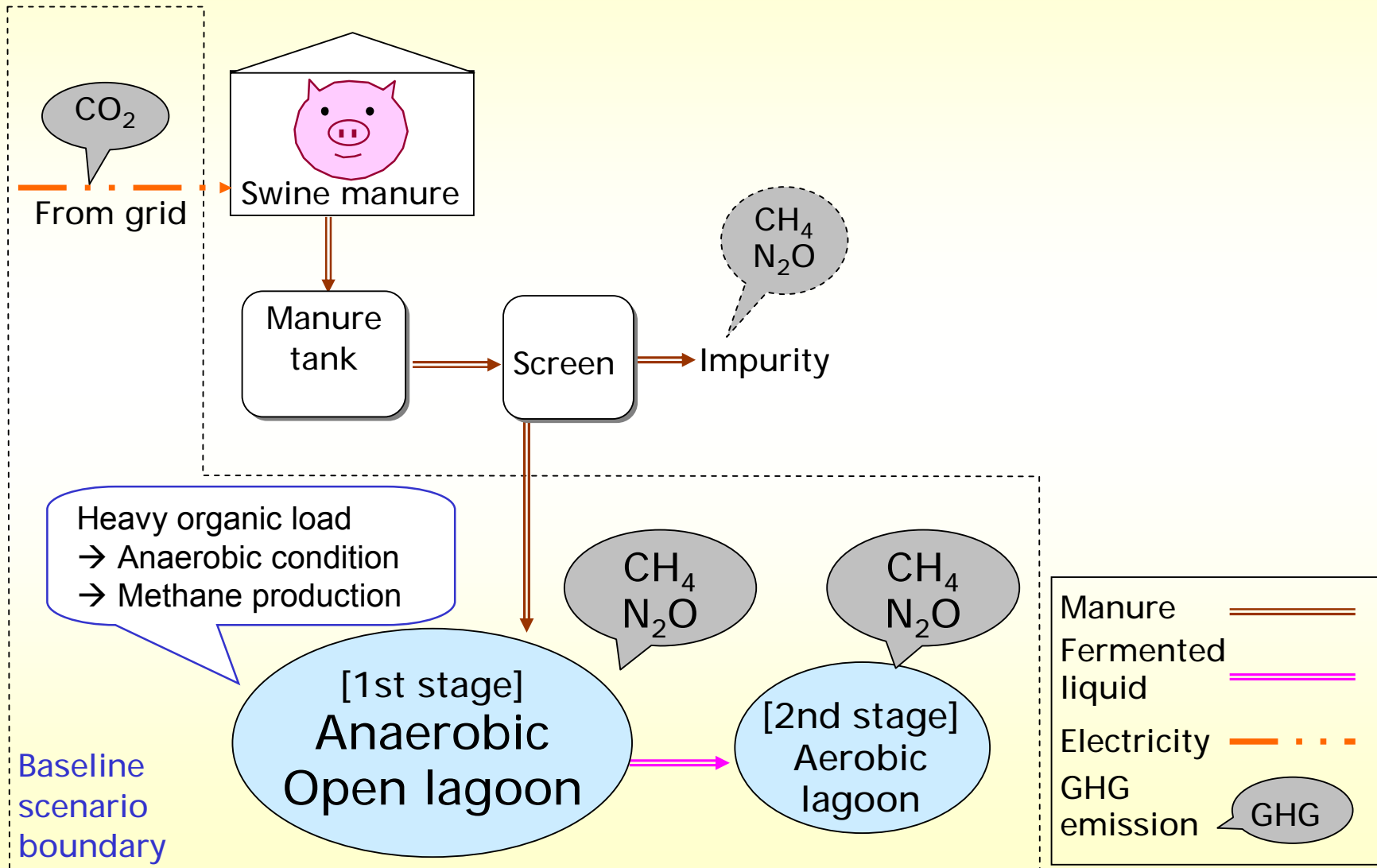
Project site:  
Kanchana Hybrid Farm

400,000m<sup>2</sup>  
46,200 pigs  
49 pig houses

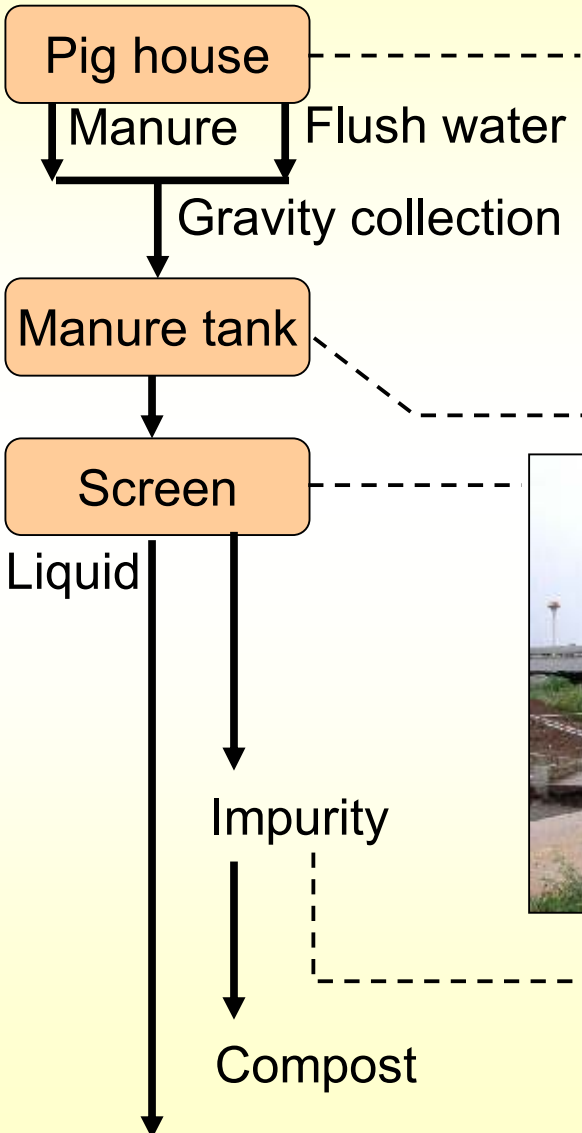
181 employees  
45km from the city



# Baseline – Current Anaerobic Open Lagoon **TAKUMA**



# Current Wastewater Treatment -1-



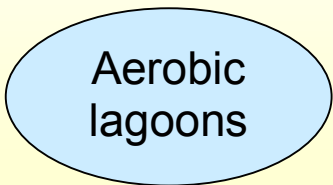
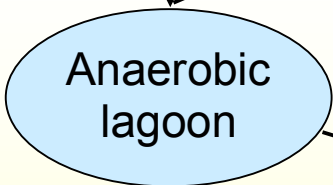
# Current Wastewater Treatment -2-



Screened liquid at the upstream of lagoon

Bubbles of methane on the surface

Liquid

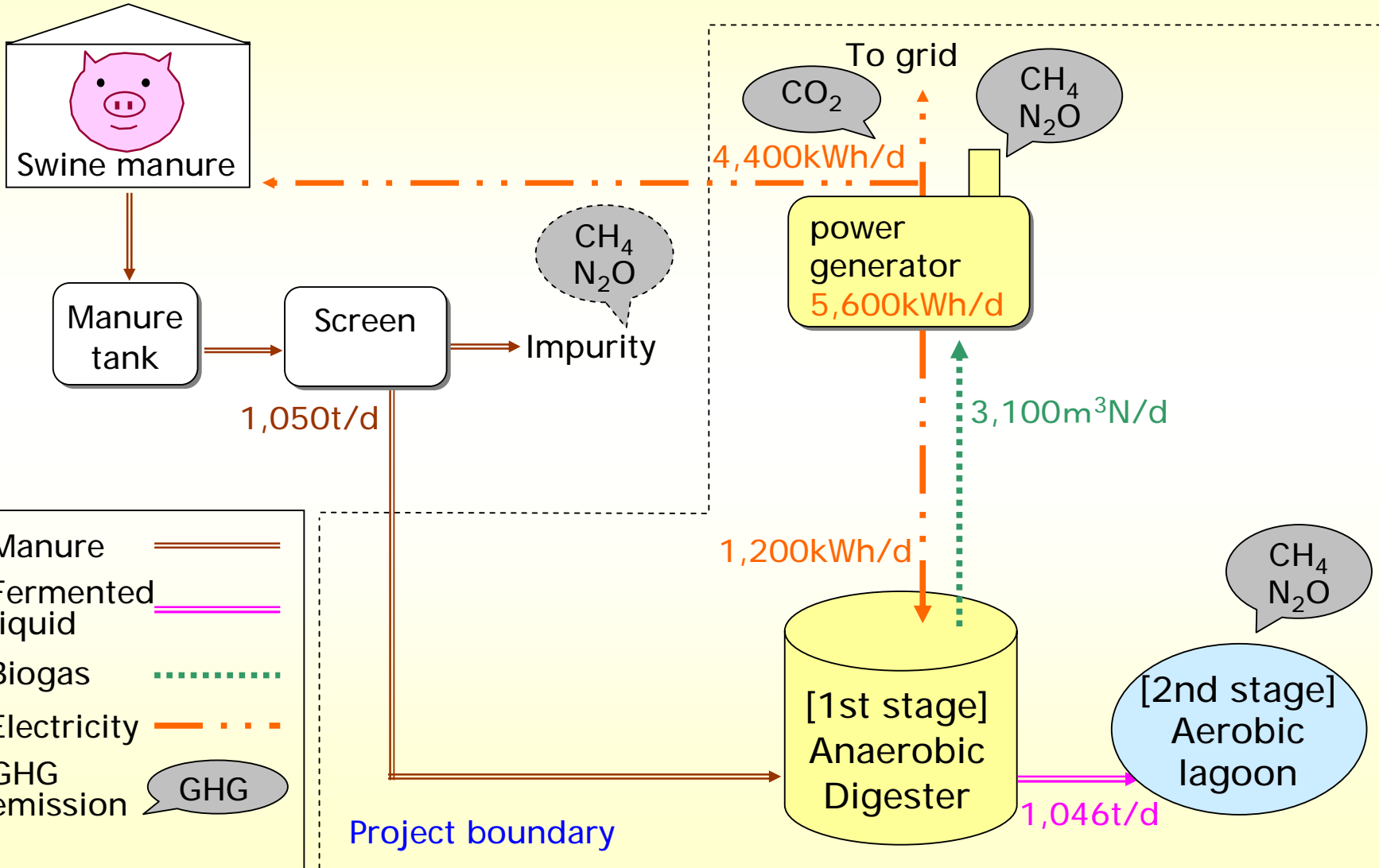


Effluent

Anaerobic open lagoon followed by 2 aerobic lagoons.

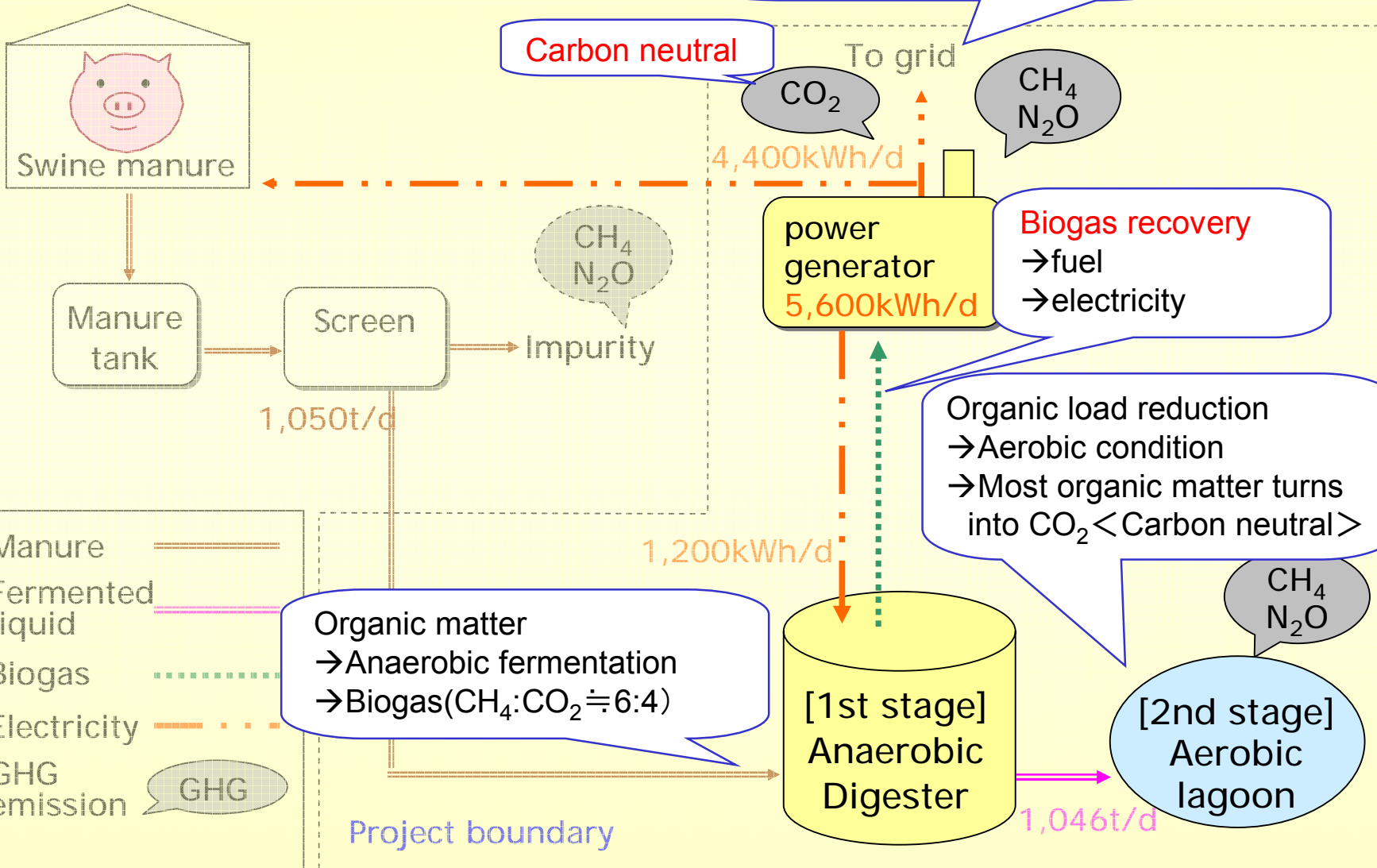


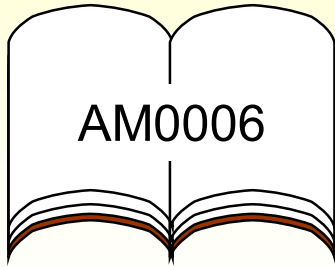
# Project Activity -Anaerobic Digester -





# Detail of Project Activity

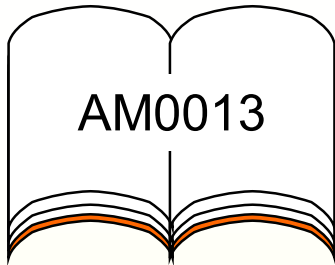




## Animal Waste Management System

Calculation of CH<sub>4</sub> and N<sub>2</sub>O emission by each treatment stage (anaerobic/ aerobic)

+



## Electricity

Calculation of weighed average emission factor based on EGAT Power Development Plan

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# New Methodology



# Emission Reduction



Emission reduction during the crediting period (10 years)

(t-CO<sub>2</sub>)

Source	GHG	Baseline	Project	Emission reduction
1st stage	CH <sub>4</sub>	271,480	0	271,480
	N <sub>2</sub> O	5,800	5,800	0
2nd stage	CH <sub>4</sub>	60	230	-170
	N <sub>2</sub> O	87,060	116,080	-29,020
Biogas electricity	CO <sub>2</sub>	8,699	0	8,699
TOTAL		373,099	122,110	250,989

25,000 t-CO<sub>2</sub>/y

### 3) Lessons Learned



Wat Pho (Temple of reclining Buddha)

## English barrier

- Common to all non-native speakers
- Difficult to understand PDD and methodology
- Conflicts with counterparts can be possible

## PDD structure

- Difficult to understand → Need translation
- CDM terms
- Difficult to describe in text → Flow diagram/ tables /pictures
- Writing varies by project participants → Have to check many PDDs  
→ Useful guidebooks available “CDM and JI in Charts”, “CDM Methodology guidebook”, “CDM/JI Hyojun Kyozaï (Japanese)”



Need to polish English ability

# PDD and NMB Requirements

## PDD Requirement is not clear

B.2. Description of how the methodology is applied in the context of the project activity:

Identification of Baseline scenario ?

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

Demonstration of Additionality

## NMB Requirement is clear

D.1. Explanation of how the methodology determines the baseline scenario (that is, indicate the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity)

Identification of Baseline scenario

D.3. Explanation of how, through the methodology, it can be demonstrated that a project activity is additional and therefore not the baseline scenario (section B3 of the CDM-PDD)

Demonstration of Additionality



Unclear guidance and Inconsistency between PDD and NMB cause confusion

# Data Availability

## Site specific data

-Not only wastewater analysis, but also detailed related information is necessary (ex. ISO certification?, how many pigs in one pig house?, what is the neighbor's livelihood?, etc.)

## Unexpected “nearby facility”

- The pig farm owner was constructing a H-UASB digester with a support of ENCON fund!
- NO ADDITIONALITY!!
- Could not justify in PDD...



Manure tank



- Close communication with the counterpart is inevitable
- Fund availability is a weak point of the project.  
(But how about in other countries? Fund, ESCO...)
- Pre-FS may be necessary

# Methodology Application

## AM0013 (Palm oil wastewater)


- 😊 Easy
- 😊 Digester used
- 😊 Electricity CO<sub>2</sub> counted
- 😞 No N<sub>2</sub>O counted
- 😞 Applicable to animal waste?

## AM0006, AM0016 (Swine waste)

- 😊 Applicable to swine waste
- 😊 Applicable to digester (covered open lagoon)
- 😊 N<sub>2</sub>O counted
- 😞 Difficult
- 😞 No electricity CO<sub>2</sub> counted

AM0006 (AWMS)  
+ AM0013 (Electricity)

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New Methodology

- 
- Project participants have to check all the relevant methodologies
  - Consolidation /modularization of methodologies by EB will be appreciated




# Electricity

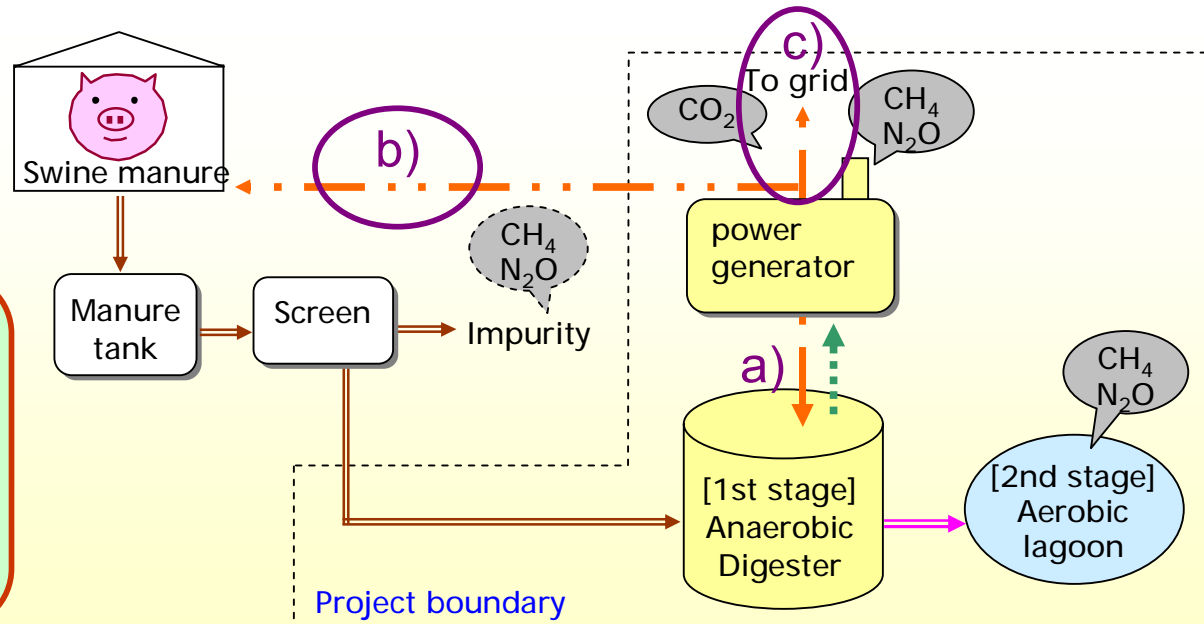
## Power generation in the Project activity

= Power consumption in the baseline scenario

- a) Digester electricity is additional use → Not count (Not seen in AM0013)
- b) Pig farm electricity → same amount in the baseline
- c) Electricity for grid export → **include in baseline emission**

Baseline emission  
= b) + c)

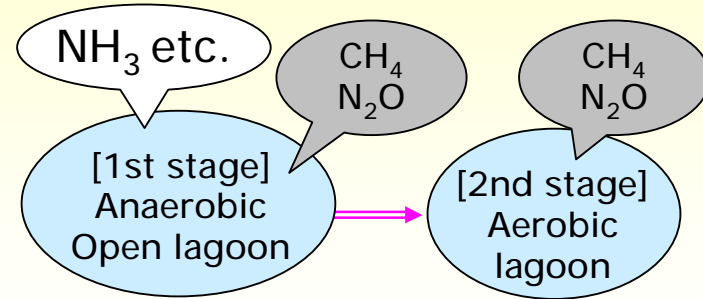
 **Difficult work to define baseline electricity emission from the project activity**



# N<sub>2</sub>O Increase !

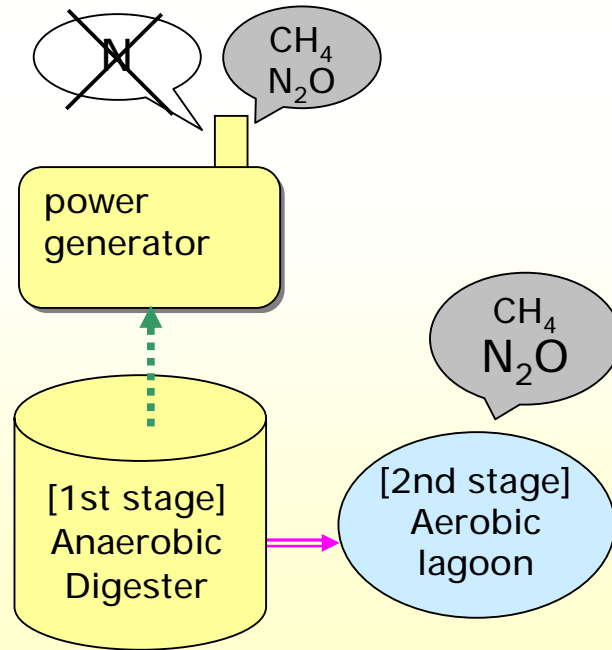
## Baseline : Open lagoon


- 1<sup>st</sup> stage: Not closed system → 25% Nitrogen reduced
- Need to examine credibility of default degradation value (25%)



## Project : Closed digester

- 1<sup>st</sup> stage: tightly closed system → 0 % Nitrogen reduced
- 2<sup>nd</sup> stage: more N<sub>2</sub>O than the baseline emitted



 - Weak point of the methodology  
- Traditional wastewater treatment technology has been focusing on CH<sub>4</sub> utilization, not N<sub>2</sub>O.

# Issues Ahead



Financial analysis

Finalization of PDD

Project implementation not discussed

Communication with Thai DNA

Thank you very much!



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