

POME Treatment Co-benefits CDM, Malaysia
Summary of the Study

March, 2008
Pacific Consultants

1. Project Information

1-1 Background Information

Current feasibility study aims at the evaluation of feasibility and profitability of POME(Palm Oil Mill Effluent) treatment projects in Malaysia, which plan to install closed anaerobic biodigesters. Currently effluent discharged from palm oil mills, which has high concentration of organic contents, is dumped into open lagoons for anaerobic treatment. Under the current treatment system, POME is a large source of methane emission through open lagoons. The projects are expected to achieve co-benefits through the reduction of greenhouse gas emissions and the prevention of water pollution.

The project will reduce methane emissions that would have otherwise emitted from the existing open lagoon system in the absence of the project activity. The estimated GHG emissions reduction is about 50,000 t-CO₂/year.

This feasibility study aims at preparation of PDD and implementation of validation for at least two CDM projects.

1-2 Overview of Host Country (i.e. Malaysia)

Omitted due to space limitation.

1-3 CDM Policy and development status in Malaysia

Malaysia ratified the Kyoto Protocol on September 4, 2002. The country has designated Conservation and Environmental Management Division (CEMD) of the Ministry of Natural Resources and Environment (NRE) as Designated National Authority (DNA). Institutional systems for approving CDM projects have been already established. Malaysia is one of the advanced CDM countries and has twenty six CDM projects, which have been already registered by UNFCCC.

Malaysian DNA, Conservation and Environmental Management Division (CEMD) of the Ministry of Natural Resources and Environment (NRE), serves as a secretariat for evaluation of CDM projects. The National Steering Committee on Climate Change (NSCCC) agreed on the establishment of a two-tiered organisation for CDM implementation in Malaysia. The two-tiered institutional CDM set up comprises of The National Committee on CDM (NCCDM) and two Technical Committees (i.e. The Technical Committee on Energy and The Technical Committee on Forestry).

1-4 Current Status of Malaysian Palm Oil Industry

Omitted due to space limitation.

1-5 Contribution to Sustainable Development

The project activity brings the following benefits:

Social benefit:

Since the project activity treats POME efficiently due to its high removal rate of pollutants, the project activity would develop an environmental consciousness of POME treatment. Thus, this type of POME treatment project will be promoted.

Economic benefit:

The carbon credit expected from the project activity encourages the similar projects to install closed POME treatment facility in other palm oil mills, which amounts 300 in Malaysia. Thus it would lead to the development of the regional economies and improve their socio-economic conditions.

Environmental benefit:

The project activity removes organic carbon contents from POME efficiently by collecting and combusting methane enriched biogas. The wastewater to be discharged by the project activity is far below the environmental standard.

1-6 Implementation Structure of the Feasibility Study

(1) Japanese Project Participants: Japanese private company

- Japanese private company and Konzen Environment Sdn. Bhd have concluded on LOI, and are now negotiating ERPA contract.

(2) Malaysian Project Participants : Konzen Environment Sdn. Bhd.

- Location: Kuala Lumpur, Malaysia
- Konzen Environment Sdn. Bhd. is under Konzen Group which has headquarters in Singapore. It was established as an Asian subsidiary of GE Infrastructure in 1980s, then reorganized into existing structure as a water treatment engineering company.
- Konzen Environment Sdn. Bhd is promoting realization of CDM projects using self-developed high-efficiency wastewater treatment plant.
- Konzen Environment Sdn. Bhd. plans to implement CDM projects using a BOT scheme.



(3) Malaysian Project Hosting Company 1: Rinwood Pelita (Mukah) Plantation Sdn. Bhd.

- Name of Palm Oil Mill: Rinwood Palm Oil Mill
- Location: Sarawak State, Malaysia
- Rinwood Pelita (Mukah) Plantation Sdn. Bhd. is a middle-size company which was established in 1990s. The owner company is developing multi-sectoral businesses such as Hotel and Coal Mining.
- Rinwood Pelita (Mukah) Plantation Sdn. Bhd. is interested in implementing CDM projects which treat POME effectively in terms of Corporate Social Responsibility.



Basic information of Rinwood Palm Oil, Rinwood Pelita (Mukah) Plantation Sdn. Bhd. is shown below;

Capacity	80 (MT-FFB/hour)
Operation Hour	20 (hour/day)
	288 (day/year)
POME flow rate	50 (m ³ /hour)

(4) Malaysian Project Hosting Company 2: Regional Harvest Sdn. Bhd.

- Name of Palm Oil Mill: Dumpas Palm Oil Mill
- Location: Sabah State, Malaysia
- Regional Harvest Sdn. Bhd. is a subsidiary company of Pembinaan Kekal Mewah Sdn. Bhd. which covers many industries. The main business is road construction, and others include housing development and hotel business. The company started Palm Oil Mill business in 2005.



Basic information of Dumpas Palm Oil Mill, Regional Harvest Sdn. Bhd. is shown below;

Capacity	60 (MT-FFB/hour)
Operation Hour	16-20 (hour/day)
	300 (day/year)
POME flowrate	40 (m ³ /hour)

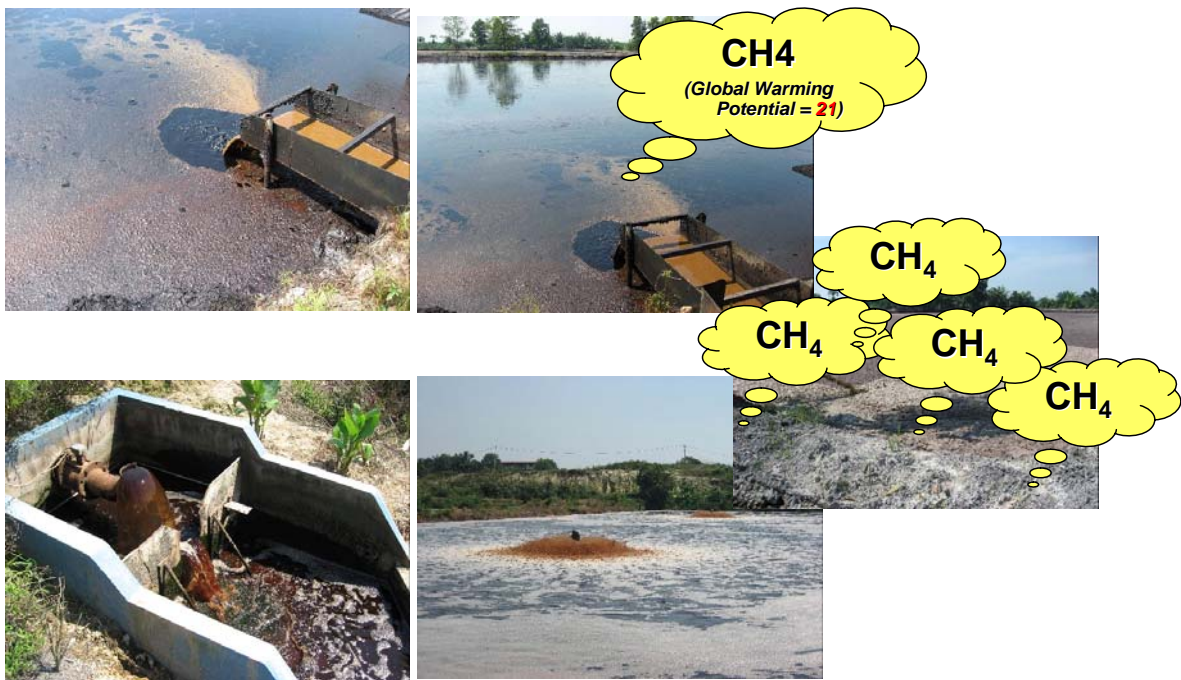
2. Project Description

2-1 Technical Description of the Project

(1) Current Practice

Under the current treatment system, POME is a large source of methane emission through open lagoons. For example, the open lagoon system of Rinwood Palm Oil Mill have the following treatment ponds.

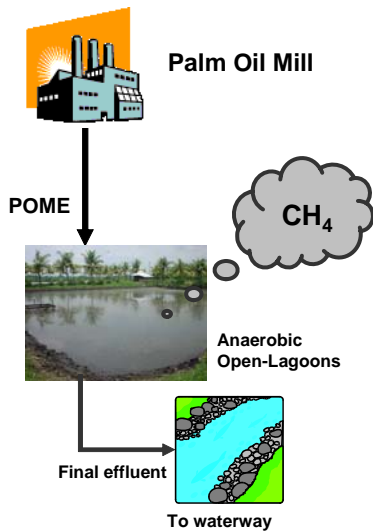
- i) 『One Cooling Pond (Depth 5m)』
- ii) 『Five Anaerobic Ponds (Depth 5m)』
- iii) 『One Facultative Pond (Depth 5.5m)』
- iv) 『Two Aerobic Ponds (Depth 3m)』
- v) 『One Polishing Pond (Depth 3m)』



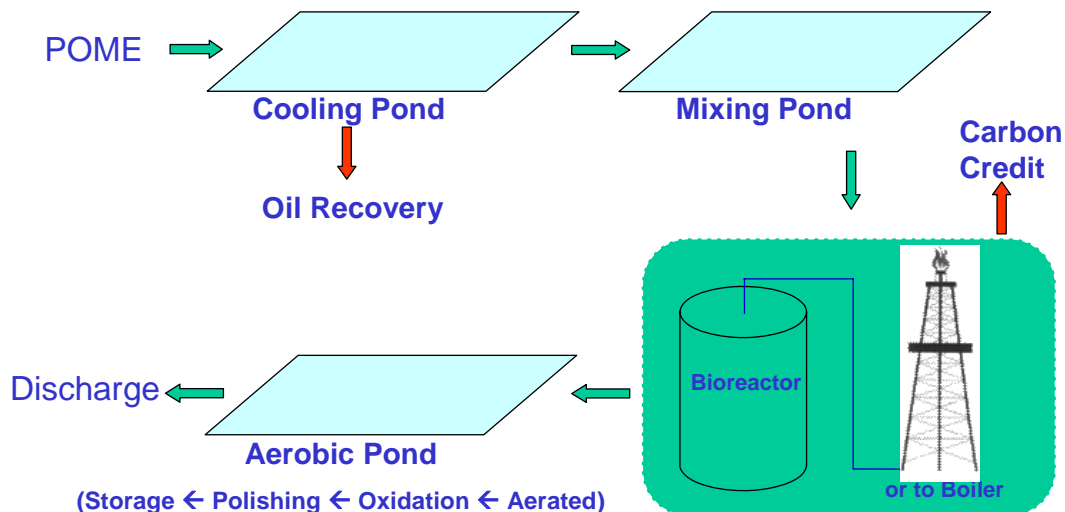
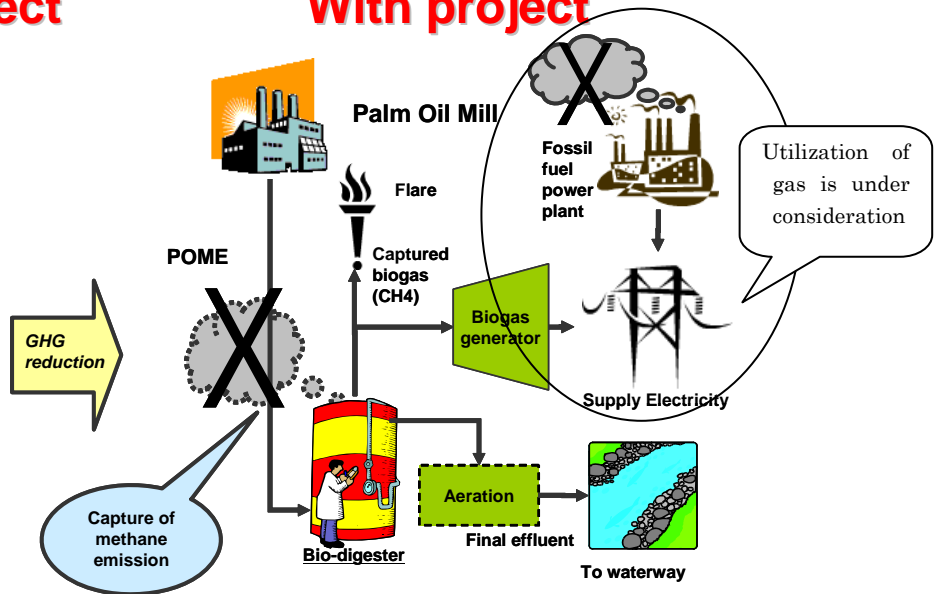
(2) Konzen Biodigester to be Introduced

The POME treatment projects plan to install closed anaerobic biodigesters. Currently effluent discharged from palm oil mills, which has high concentration of organic contents, is dumped into open lagoons for anaerobic treatment. Under the current treatment system, POME is a large source of methane emission through open lagoons. The project will reduce methane emissions that would have otherwise emitted from the existing open lagoon system in the absence of the project activity. The estimated GHG emissions reduction is about 50,000 t-CO₂/year.

Without project



With project



2-2 Project Boundary, Baseline Scenario and Additionality

(1) Project Boundary

According to the methodology, the project boundary is the physical, geographical site where the wastewater and sludge treatment takes place.

(2) Identification of Baseline Scenario and Additionality Demonstration

The Small-Scale Methodology Type III.H. "Methane Recovery in Wastewater Treatment" is applied.

The following barriers impede the project activity:

Financial barrier

The project activity generates no financial or economic benefits other than CDM related income. Therefore, the project activity is not financially feasible and would thus not occur without CDM.

Technological Barriers

The project activity employs Konzen's anaerobic bioreactor that is a state-of-the-art technology for treatment of organic or biological wastewater to treat wastewater with high COD level. In addition, the project activity would be actually one of the "first of its kind" in the palm oil industries in Malaysia.

2-3 Duration of the project activity / crediting period

Starting date of the first crediting period is 1st October 2008. Renewable crediting period.

Expected operational lifetime of the project activity is 25 years.

2-4 GHG Emission Reduction and Leakage

According to the Small-Scale Methodology Type III.H. "Methane Recovery in Wastewater Treatment", the emission reduction is calculated as follows:

(1) Formulae to calculate the project activity emissions

$$PE = PE_{\text{ww,treated}} + PE_{\text{fugitive}} + PE_{\text{dissolved}}$$

$PE_{\text{ww,treated}}$: Emissions through degradable organic carbon in treated wastewater in year "y"

PE_{fugitive} : Emissions through methane release in capture and flare systems in year "y".

$PE_{\text{dissolved}}$: Emissions through dissolved methane in treated wastewater in year "y"

$$PE_{\text{ww,treated}} = Q_{\text{ww}} * COD_{\text{ww,treated}} * Bo_{\text{,ww}} * MCF_{\text{ww,final}} * GWP_{\text{CH4}}$$

Q_{ww} : Volume of wastewater treated in the year "y" (m³)

$COD_{\text{ww,treated}}$: Chemical oxygen demand of the treated wastewater in the year "y" (t/m³)

$Bo_{\text{,ww}}$: Methane generation capacity of the treated wastewater (0.21 kg CH₄/kg COD)

$MCF_{\text{ww,final}}$: Methane correction factor based on type of treatment and discharge pathway of the wastewater (fraction) (Higher value: 0.1)

$$PE_{\text{fugitive}} = (1 - CFE_{\text{ww}}) * BE$$

* $MCF_{\text{ww,treatment}}$ (Higher value: 1.0) is used to calculate BE.

CFE_{ww} : Capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment

$$PE_{\text{dissolved}} = Q_{\text{ww}} * [CH_4]_{\text{ww,treated}} * GWP_{\text{CH4}}$$

$[CH_4]_{\text{ww,treated}}$: Dissolved methane content in the treated wastewater (t/m³)

(2) Formulae to calculate the baseline emissions

$$BE = Q_{\text{ww}} * COD_{\text{ww,untreated}} * Bo_{\text{,ww}} * MCF_{\text{ww,treatment}} * GWP_{\text{CH4}}$$

Q_{ww} : Volume of wastewater treated in the year "y" (m³)

$COD_{\text{ww,untreated}}$: Chemical oxygen demand of the treated wastewater in the year "y" (t/m³)

$Bo_{\text{,ww}}$: Methane generation capacity of the treated wastewater (0.21 kg CH₄/kg COD)

$MCF_{\text{ww,treatment}}$: Methane correction factor for the existing wastewater treatment system to which the sequential anaerobic treatment step is being introduced (Lower value: 0.8)

2-5 Monitoring Plan

Like Baseline Methodology, the Small-Scale Methodology Type III.H. "Methane Recovery in Wastewater

Treatment” is applied.

2-6 Environmental Impacts and Other Indirect Impacts

The project activity basically involves the replacement of the existing open anaerobic lagoons for POME treatment by the installation of a closed anaerobic bioreactor. The biogas produced will be captured and combusted for the heat use. The project activity will contribute to the following positive environmental impacts:

- more efficient treatment, less land area required;
- reduced greenhouse gas emission;
- reduced odour problems to surrounding and within the mill;
- promoting the use of renewable energy. The recovered biogas will be utilized effectively.
- promoting better image on palm oil production technology

The negative environmental impact of this project is anticipated to be negligible. Potential negative impact is probably associated with the risk of explosion or leakage of methane collected. These could potentially create a safety risk and harm the surrounding environment. However, with proper design and operation, regular monitoring and maintenance of the system, this risk can be mitigated to almost none.

Under Malaysian Environmental Quality Order 1987, projects involving the upgrading of existing wastewater systems are not listed under the 19 prescribed activities and therefore it is not a formal requirement to carry out an Environmental Impact Assessment.

2-7 Stakeholders' comments

A local stakeholders consultation meeting was held at Kingwood Hotel and Resort, Mukah, to meet the local stakeholders and explain about the project and to receive their comments. Rinwood Pelita (Mukah) Palm Oil Mill advertised through a local newspaper, “The Borneo Post” on 26th January, 2008, giving a brief description of the purpose of the meeting and inviting the local residents to a meeting on 30th January, 2008 at 10.00 am at Kingwood Hotel and Resort, Mukah. Also personal invitations were extended to various relevant Government Department Heads and well-known NGOs including UNDP (United Nations Development Programme), SUHAKAM (Sarawak Branch) and Angkatan Zaman Mansang (AZAM) Sarawak.



The meeting commenced as per schedule at 10.00 am on 30th January, 2008 at Kingwood Hotel and Resort conference hall. After the Chairman of Rinwood Pelita (Mukah) Palm Oil Mill welcomed the local stakeholders, CDM consultants and Konzen explained to the stakeholders about the Kyoto Protocol, Article 12, what is GHG, Annex I countries and their commitment to reduce the GHG from the 1990 level, what CDM is all about and the working mechanism and how it is good for the environment, socially, economically and the country.

Listed below are the summary of the comments received from the stakeholders who attended the meeting.

No	Comments
1	What is meant by POME, COD, BOD as mentioned in importance of treated water quality?
2	Q1. What would be the negative impacts to the surrounding? Q2. As this is a stakeholder meeting, how well informed are the surrounding community on the intention of the project, especially to the community leaders who are not English educated?
3	On the proposed project, how is the monitoring and operation of the project going to be done? Will it be monitored by project developer or appointed representative?
4	For the waste generated from the project implementation, such as sludge, is it going to be use as landfilling or being transfer to a specific dumpsite?
5	Q1. What are the standard criteria or requirement as to qualify a project under CDM? Q2. What other industry or sector in which CDM program may be applicable?
6	Q1. Comparing the treatment system for food industry and POME, is it different in their treatment for their organic waste? Q2. What are the recovery system proposed for POME on the oil and grease content?
7	For the construction of new palm oil mill in future, is the open lagoon system will still be use? If not, does the new treatment system qualify under the CDM program?
8	What is the product from the implementation of the project which is of commercial value to the community?
9	The following was suggested: i) Proper information distribution to all involved stakeholders as in languages use in different community as to create public awareness ii) To get higher level of governmental department involvement in order to have better support on such project

3. Project Implementation

3-1 Project Implementation Structure

(1) Project Implementation Structure for Rinwood POME treatment CDM project

Malaysian Project Participants:

- Rinwood Pelita (Mukah) Plantation Sdn. Bhd.
- Konzen Environment Sdn. Bhd.

Japanese Project Participants:

- Japanese private company

* Pacific Consultants supports the elaboration of PDD and implementation of Validation.

(2) Project Implementation Structure for Dumpas POME treatment CDM project

Malaysian Project Participants:

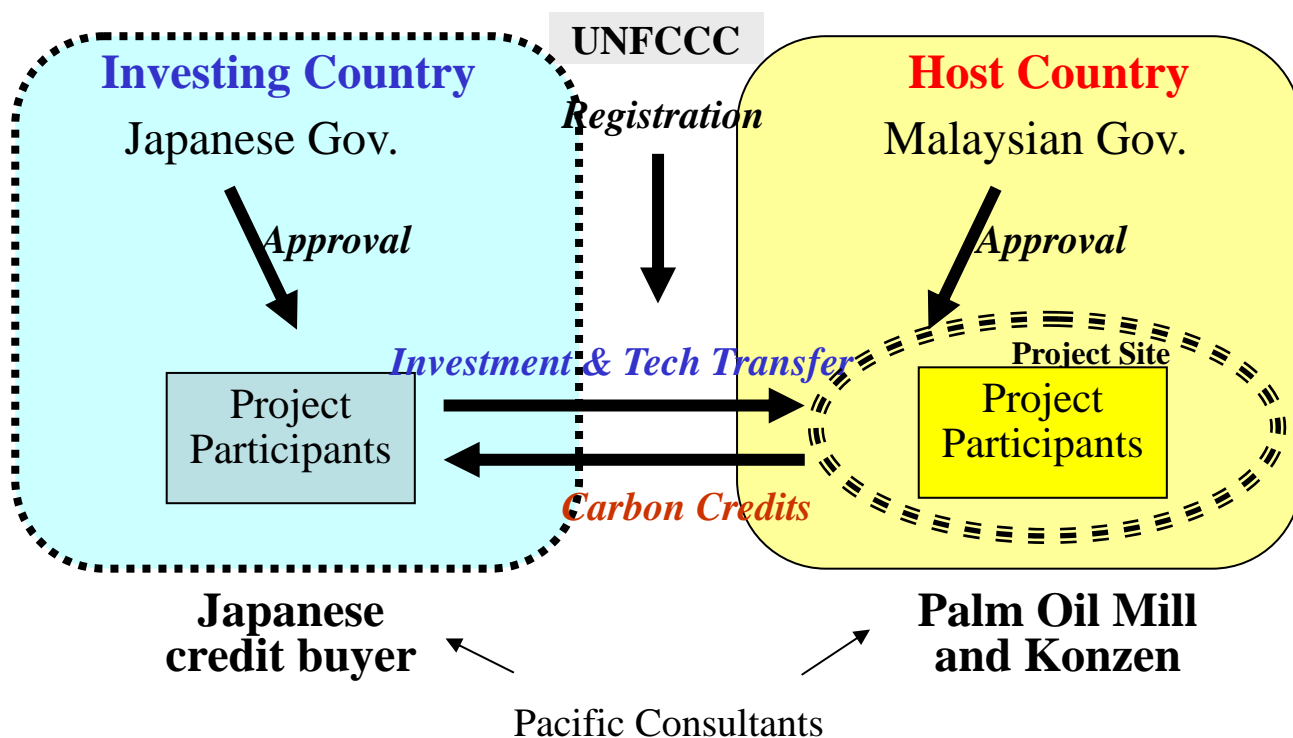
- Regional Harvest Sdn. Bhd.

- Konzen Environment Sdn. Bhd.

Japanese Project Participants:

- TBD

* Pacific Consultants supports the preparation of PDD and implementation of Validation.



3-2 Finance Plan for Project Implementation

The project is implemented as BOT by Konzen KONZEN Water Sdn. Bhd. The initial investment cost for this Project is about 144 million Yen. There is no income other than CER revenue.

It is estimated that approx. 50,000 tons of CERs are expected to be issued from 2010 until 2012. Assuming that CER price is approx. 1,600 Yen per t-CO₂, the project will receive approx. 80 million Yen per year for carbon credit sales.

3-3 Economic Analysis

Economic viability has been evaluated based on the above assumption. The Project IRR for this Project is 22 % as shown below. While the initial investment is 144 million Yen, the credit revenue is 320 million for four years. Therefore, if initial investment cost is procured, this project is highly feasible.

	2007	2008	2009	2010	2011	2012	2013
Income							
CER revenue				80	80	80	80
Expenditure							
Initial Cost		144					
O&M Cost			7	7	7	7	7
Total		-144	-7	73	73	73	73

IRR (7 years) = 22%

3-4 Prospects and Future Tasks for Project Implementation

(1) Current Situation of Palm Oil-related CDM projects in Malaysia

- There are growing awareness among palm oil mill owners, especially major companies, for CDM projects because Malaysian Palm Oil Industry has high potential for POME treatment CDM and Biomass utilization CDM projects. However, most of local companies are carefully observing developments and cautious about whether there are any successfully-practices CDM projects and how much carbon credits would be.
- The company called AgCert, which have many experiences of manure treatment CDM projects in South America, is rapidly promoting their CDM businesses in Malaysian Palm Oil Industry. The technology adopted by AgCert is a simple technology which recovers and flares the biogas by covering the open lagoon. The lower initial cost is great advantage for AgCert technology. Furthermore, the AgCert is actively making an attractive proposal to Palm Oil Millers in Peninsula and Sarawak State. AgCert suggests shortening the time until contract condition and purchasing carbon credits with higher price than market price. AgCert is said to have concluded LOIs with forty companies.
- The plant company called Simon Mooss, which dewateres POME and produces compost, is promoting development of CDM projects with DANIDA's support. Well-established companies including Golden Hope and Felda have started similar type of CDM projects and are now applying for Malaysian DNA's approval.
- Considering the effort of the Ministry of Energy, Water and Communication to promote the utilization of renewable energy, the National Committee on the CDM have decided that the utilization of the gas is just at least 10% with a condition that there is a plan from project proponent to expand further the usage for at least 50% by certain years. The National Committee on the CDM considers that with this requirement, the committee will prevent some of the project proponent from just maximizing their profit and from not consider the prospect of utilizing the biogas for any other purpose.

(2) Prospects and Future Tasks for Rinwood POME treatment CDM project

- Rinwood Pelita (Mukah) Plantation Sdn. Bhd. and Konzen Environment Sdn. Bhd have already agreed on Investment Agreement. Rinwood is highly motivated towards project realization. Rinwood is also concerned with Corporate Social Responsibility and strongly hopes to proceed with the CDM project. There are not particular technical concerns for implementing the project. As for CDM process, validation has begun in February 2008 and application for approval for both Japanese and Malaysian Governments is expected to be taken place in March 2008. The construction of the project i.e. installation of biodigesters are expected to start in April 2008.

(3) Prospects and Future Tasks for Regional Harvest POME treatment CDM project

- Regional Harvest Sdn. Bhd. and Konzen Environment Sdn. Bhd have already agreed on LOI and a draft PDD has been prepared by this Feasibility Study. Future tasks are to implement a Stakeholders Meeting, complete the PDD and start Validation Process as early as possible.

(4) Other Aspects

- With regard to contract on Rinwood POME Treatment CDM Project, a Japanese private company and Konzen Environment Sdn. Bhd have concluded on LOI, and are now negotiating ERPA contract. However, many buyers including Asia Carbon Fund based in Singapore are approaching Konzen

Environment Sdn. Bhd. with attractive conditions for purchasing carbon credits. These buyers are proposing higher carbon credits price and offering immediate conclusion of contracts. Therefore, they would be serious competitors for Japanese Government and Japanese private companies.

4. Validation

4-1 Communication with DNV

After completion of PDD for Rinwood POME treatment CDM project, validation has been undertaken by Det Norske Veritas (DNV), headquartered in Oslo, Norway. The PDD was posted on the UNFCCC and DNV website for public comments from February 15, 2008 until March 15, 2008. Then, the site visit was conducted early March.

4-2 Summary of Validation

At the site visit, which was conducted on March 4 and 5, DNV interviewed Rinwood Pelita (Mukah) Plantation Sdn. Bhd., Konzen Environment Sdn. Bhd., and Pacific Consultants in order to check the description of the PDD. DNV has requested project proponents to provide evidence documents where necessary. DNV also interviewed local community leaders and local environmental officials.

5. References

5-1 Site photos for Rinwood Palm Oil Mill

Omitted due to space limitation.

5-2 Site photos for Dumpas Palm Oil Mill

Omitted due to space limitation.

5-3 Photos and a list of attendants for Stakeholders Meeting for Rinwood POME treatment CDM project

Omitted due to space limitation.