



# EU-China CDM Facilitation Project Workshop on Verification

## Case Study 2: Biomass Energy Plant-Lumut

Beijing

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EU China CDM Facilitation Project



## ► Contents

- Description of project
- Final monitoring report of first monitoring period
- First periodic verification report including protocol
- Final monitoring report of second monitoring period
- Second periodic verification report including protocol
- Request for review
- Summary



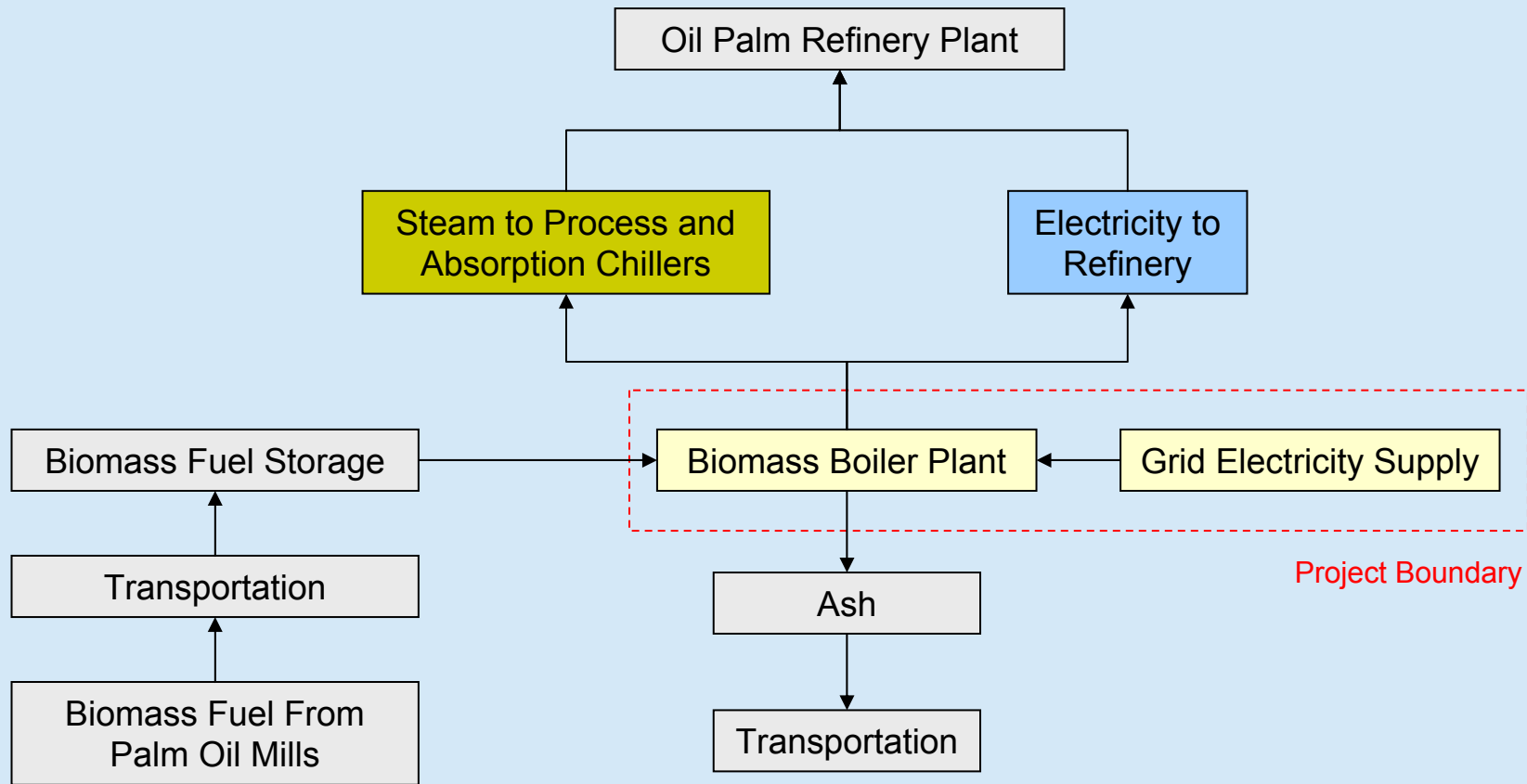
## ► Description of project

Title	Biomass Energy Plant-Lumut	
Project number	0249	
Sectoral scope	1	
Methodology	AMS-I.C. version 07	
Host Party	Malaysia	
Date of registration	24/02/2006	
DOE of validation	DNV	
DOE of verification	DNV	
Crediting period	01/02/2005 – 31/01/2012	
First monitoring period	01/02/2005 – 30/04/2006	
	Status: CERs Issued	20,700 t CO <sub>2</sub> e
Second monitoring Period	01/05/2006 – 30/04/2007	
	Status: Request for review <b>Status (05/03/2008): Corrections request</b>	-

# ► Description of project



# ► Project Boundary



**Stage 1** : Biomass boiler is installed and new absorption chillers is constructed and operating in good condition.

**Stage 2** : 2 MW steam turbine is under construction.



# ► Calculation of Emission Reduction

Year	STEP 1					STEP 2			STEP 3			STEP 4
	A	B	C*	D**	E = C x D	F	G***	H = F x G	I	J***	K = I x J	L = E + H - K
	Steam Demand t/h	Steam Production TJ/year	Baseline Fuel Consumption TJ/year	Emission Coefficient of Fuel Displaced tCO <sub>2eqv</sub> /TJ	Baseline Emissions tCO <sub>2eqv</sub> /year	Electricity Displaced by Project MWh	Emission coefficient for Grid tCO <sub>2eqv</sub> /MWh	Baseline Emissions tCO <sub>2eqv</sub> /year	Electricity Drawn From Grid MWh	Emission coefficient for Grid tCO <sub>2eqv</sub> /MWh	Project Emissions tCO <sub>2eqv</sub> /year	Total Baseline Emissions tCO <sub>2eqv</sub> /year
2005	10	173	209	77.37	16,143	0	0.63	0	3200	0.63	2016	14,127
2006	12	227	273	77.37	21,133	16,400	0.63	10,332	400	0.63	252	31,213
2007	15	283	341	77.37	26,416	16,400	0.63	10,332	400	0.63	252	36,496
2008	15	283	341	77.37	26,416	16,400	0.63	10,332	400	0.63	252	36,496
2009	15	283	341	77.37	26,416	16,400	0.63	10,332	400	0.63	252	36,496
2010	15	283	341	77.37	26,416	16,400	0.63	10,332	400	0.63	252	36,496
2011	15	283	341	77.37	26,416	16,400	0.63	10,332	400	0.63	252	36,496
											TOTAL	227,818

Emission Reduction = Baseline Emission of fuel displaced + Baseline Emission of electricity displaced - Project Emission

## ▶ Monitoring Methodology

Monitoring shall consist of:

Metering the thermal and electrical energy generated for co-generation projects. In the case of co-fired plants, the amount of fossil fuel input shall be monitored.

***AMS-I.C. version 07***



7



## ► Monitoring plan

Data to be monitored:

ID number <i>(Please use numbers to ease cross-referencing to table D.6)</i>	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Thermal Energy	Steam Supplied to the refinery	TJ	(m) and (c)	Monthly	100%	Electronic and paper	7 years	The metering is required in the steam purchase agreement between PGEO and ENCO energy.
2	Electrical Energy	Electricity Supplied to the refinery	kWh	(m)	Monthly	100%	Electronic and paper	7 years	Main meter and/or check meter. The metering is required in the electricity purchase agreement between PGEO and ENCO energy.
3	Electrical Energy	Electricity Consumed by the bio-energy plant	kWh	(m)	Monthly	100%	Electronic and paper	7 years	Meter provided by the electricity company TNB
4	Thermal Energy	Cooling capacity of absorption chiller	RTh	(m) and (c)	Monthly	100%	Electronic and paper	7 years	The absorption chiller electronic panel will display all necessary data to calculate the RTh. Data will be recorded in the PGEO refinery operation and maintenance log sheet.

*Note : All data will be kept for 2 years after the crediting period.*

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- Request for review
- Summary

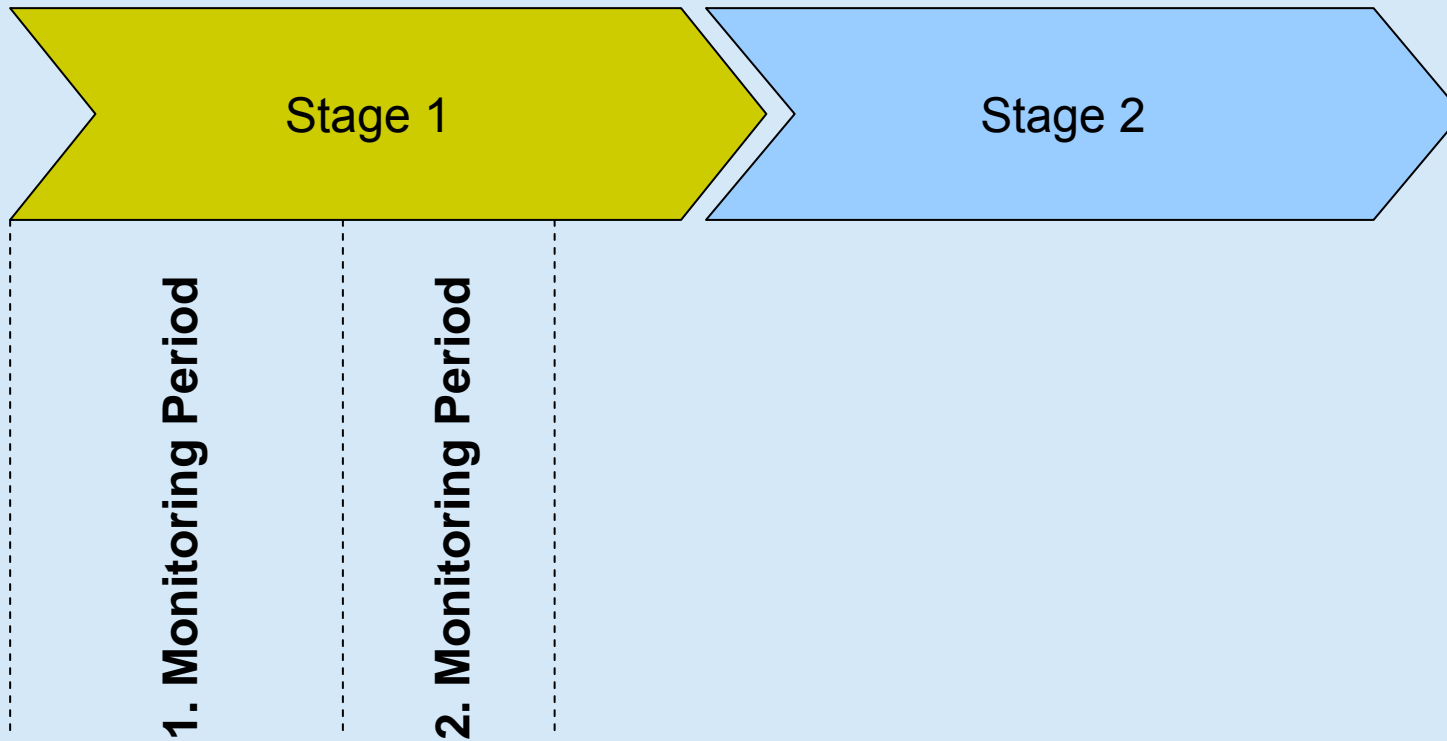


# ► Final monitoring report of first monitoring period

## Contents

- Introduction
  - Project Description
  - Project Location
  - Methodology Applied
- Status of the project
- Parameters Monitored
- Monitoring Period
- Obtained Parameters
- Emission Reduction
- Annexes

► Status of the project



## ► Status of the project

Stage	Component	Start of operation
1	Biomass Boiler	01/02/2005
	Absorption Chiller	14/01/2006
2	Steam Turbine	?

## ► Parameters monitored

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Thermal Energy	Steam Supplied to the refinery	TJ	(m) and (c)	Monthly	100%	Electronic and paper	7 years	The metering is required in the steam purchase agreement between PGEO and ENCO energy. Data obtained from invoices and a counter check can be done with SCADA system data.
2	Electrical Energy	Electricity Supplied to the refinery	kWh	(m)	Monthly	100%	Electronic and paper	7 years	Main meter and/or check meter. The metering is required in the electricity purchase agreement between PGEO and ENCO energy. Data obtained from invoices can be used to counter check. No data available for this verification period as the 2 <sup>nd</sup> stage of the project is not completed.

**1. Steam supplied to the refinery: Biomass Boiler**

**2. Electricity supplied to refinery: Steam Turbine**

## ► Parameters monitored

3	Electrical Energy	Electricity Consumed by the bio-energy plant	kWh	(m)	Monthly	100%	Electronic and paper	7 years	Meter provided by the electricity company TNB. Data from TNB meters.
4	Thermal Energy	Cooling capacity of absorption chiller	RTh	(m) and (c)	Monthly	100%	Electronic and paper	7 years	The absorption chiller electronic panel will display all necessary data to calculate the instantaneous RT. As this will only give an instantaneous value, steam totalizer data will be used to calculate RT for the whole crediting period using chiller efficiencies provided by the manufacturers. Data will be recorded in the PGEO refinery operation and maintenance log sheet.

**3. Electricity consumed by the bio-energy plant: Biomass Boiler**

**4. Cooling capacity of absorption chiller: Absorption chiller**

## ► Emission Reduction

<b>STEP 1</b>					
Period	A	B	C*	D**	E = C x D
	Total Steam Demand	Steam Production	Baseline Fuel Consumption	Emission Coefficient of Fuel Displaced	Baseline Emissions
	t/yr	TJ/year	TJ/year	tCO <sub>2eqv</sub> /TJ	tCO <sub>2eqv</sub> /year
1 Feb 2005- 31 Dec 2005	68,030	160.63	194	77.37	14,973
1 Jan 2006 - 30 April 2006	29,315	69.22	83	77.37	6,452

<b>STEP 2</b>			
Period	F	G***	H = F x G
	Electricity Displaced by Project	Emission coefficient for Grid	Baseline Emissions
	MWh	tCO <sub>2eqv</sub> /MWh	tCO <sub>2eqv</sub> / year
1 Feb 2005- 31 Dec 2005	-	0.63	-
1 Jan 2006 - 30 April 2006	797	0.63	502

Period	<b>STEP 3</b>			<b>STEP 4</b>
	I	J***	K = I x J	L = E + H - K
	Electricity Drawn From Grid	Emission coefficient for Grid	Project Emissions	Total Baseline Emissions
MWh	tCO <sub>2eqv</sub> /MWh	tCO <sub>2eqv</sub> / year	tCO <sub>2eqv</sub> / year	
1 Feb 2005- 31 Dec 2005	1,426.88	0.63	898.93	14,074
1 Jan 2006 - 30 April 2006	520.84	0.63	328.13	6,626
			Total	20,700

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- Description of project
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- Final monitoring report of second mentoring period
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► First periodic verification report including protocol

Findings during first periodic verification:

**0** CAR and **3** FARs:

A.2. Responsibilities	FAR 1
E.3. Internal verification	FAR 2
E.5. Data protection measures	FAR 3

## ► First periodic verification report including protocol

1	<u>INTRODUCTION</u>	3	VERIFICATION FINDINGS
1.1	Objective	3.1	Project implementation
1.2	Scope	3.2	Completeness of monitoring
1.3	Description of the project activity	3.3	Accuracy of emission reduction calculations
2	METHODOLOGY	3.4	Quality of evidence to determine emission reductions
2.1	Review of documentation	3.5	Management system and quality assurance
2.2	On-site audit	4	VERIFICATION STATEMENT
2.3	Assessment		REFERENCES
2.4	Reporting of findings	Appendix A	Periodic verification checklist

## ► Contents

- Description of project
- Final monitoring report of first monitoring period
- First periodic verification report including protocol
- **Final monitoring report of second monitoring period**
- Second periodic verification report including protocol
- Request for review
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## ► Final monitoring report of second monitoring period

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- Monitoring Period
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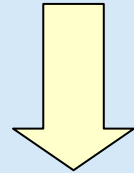
## ► Contents

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- First periodic verification report including protocol
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## ▶ Second periodic verification report including protocol

Findings during second periodic verification:

**0** CAR and **0** FAR



**3** FARs from the first verification  
has been already considered by PP.

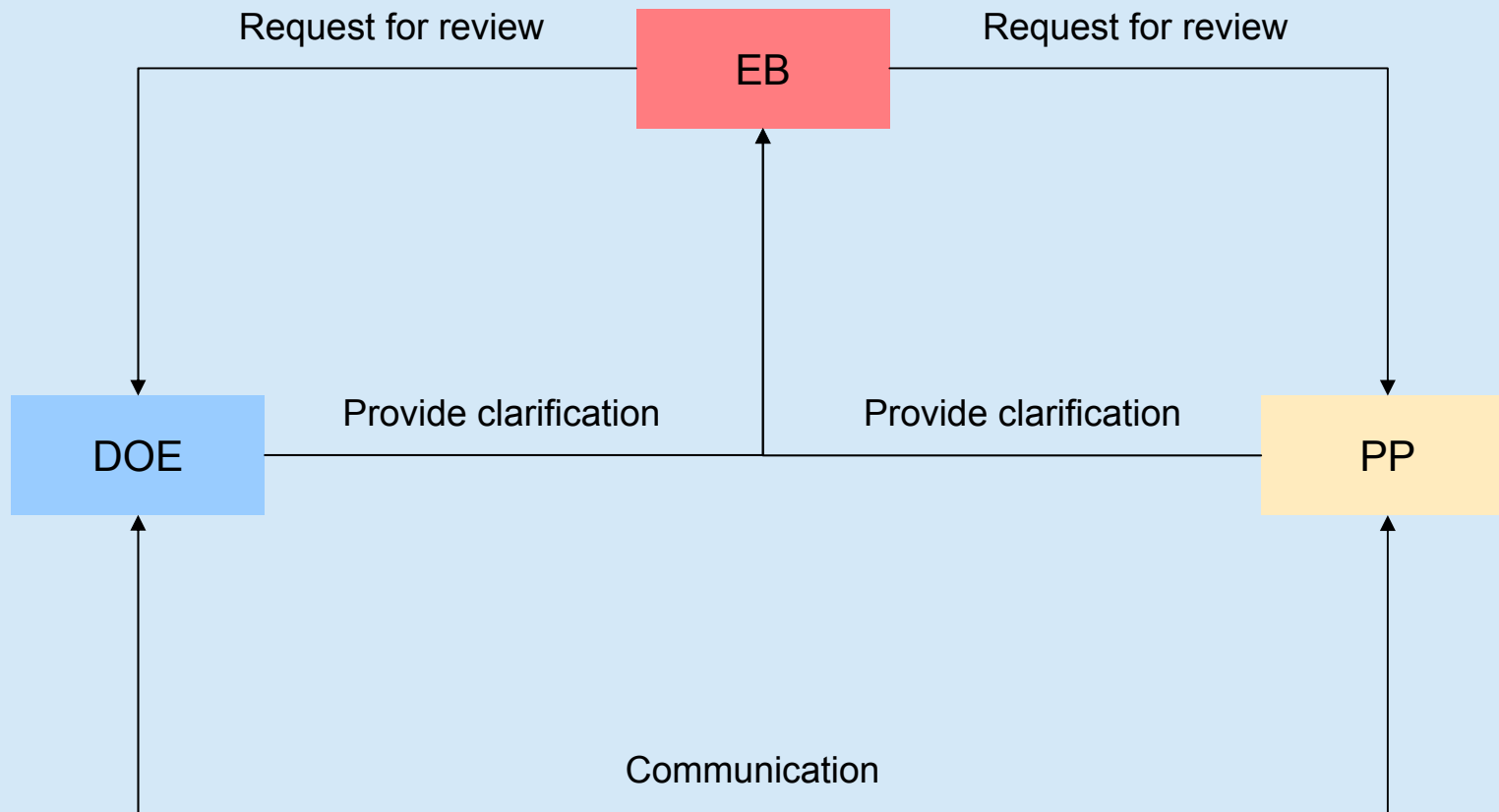
## ▶ Second periodic verification report including protocol

1	<u>INTRODUCTION</u>	3	VERIFICATION FINDINGS
1.1	Objective	3.1	Project implementation
1.2	Scope	3.2	Completeness of monitoring
1.3	Description of the project activity	3.3	Accuracy of emission reduction calculations
2	METHODOLOGY	3.4	Quality of evidence to determine emission reductions
2.1	Review of documentation	3.5	Management system and quality assurance
2.2	On-site audit	4	PROJECT SCORECARD
2.3	Assessment	5	VERIFICATION STATEMENT
2.4	Reporting of findings		REFERENCES
		Appendix A	Periodic verification checklist

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## ▶ Request for review



## ► 1. Request for review by EB

*1. The steam consumption of the chiller was calculated as the difference between closing and opening readings of the meter. However in June-July 2006 the monthly opening reading does not correspond to the closing reading of the previous month. Clarification is required on how DOE has verified the accuracy of this parameter.*

Baseline Emission Data 2006					
Month	Process Steam Consumption		Absorption Chiller Steam Totalizer (kg/tonnes)		Consumption tonnes
	tonnes	TJ	Opening	Closing	
May-06	8,738.83	20.63	241,289	1,646,908	1,405.619
Jun-06	8,404.27	19.84	646,908	2,074,152	1,427.244
13-Jul-06**	as below	as below	74,152	430,051	355.899
Jul-06	5,621.23	13.27	43,005.1	43,514.0	508.9
Aug-06	10,183.70	24.05	43,514.0	45,147.5	1,633.5
Sep-06	9,182.40	21.68	45,147.5	46,684.2	1,536.7
Oct-06	9,214.67	21.76	46,684.2	48,017.5	1,333.3
Nov-06	8,767.87	20.70	48,017.5	49,657.0	1,639.5
Dec-06	5,314.13	12.55	49,657.0	50,526.1	869.1
Total	65,427.10	154.48			10,709.7

## ▶ PP's response

- Due to high flow rate in kg, the steam flow meter was recalibrated on 13th July 2006 to record in 5 digits in tonnes with one decimal point.
- The data recording was done in such a manner that, once a full revolution is completed an additional 7th digit will be added in the excel spreadsheet to mark the complete of one revolution.
- The relevant log sheets and the excel spreadsheets have been verified during the verification site visit by DOE.

## ▶ PP's response

### From 01/05/2006-13/7/2006 (Reading in kg)

Month	Opening kg	Closing kg	Consumption tonnes
May	241,289	1,646,908	1,405.619
Jun	646,908	2,074,152	1,427.244
01-13/07/06	74,152	430,051	355.899
<b>TOTAL</b>			<b>3,188.8</b>

→ 6 digits in kilograms

### From 13/07/2006-31/12/2006 (Reading in tonnes)

Month	Opening tonnes	Closing tonnes	Consumption tonnes
13*-31/07/06	43,005.1	43,514.0	508.9
Aug	43,514.0	45,147.5	1,633.5
Sep	45,147.5	46,684.2	1,536.7
Oct	46,684.2	48,017.5	1,333.3
Nov	48,017.5	49,657.0	1,639.5
Dec	49,657.0	50,526.1	869.1
<b>TOTAL</b>			<b>7,521.0</b>

→ 5 digits in tonnes with 1 decimal point

\* totaliser meter was calibrated to display the steam flow in tonnes

## ▶ DOE's response

- The installed steam flow meter was only capable of recording in 6 digits.
- The meter readings recorded in the log sheets were cross-checked with the spreadsheet submitted and were found to be in order.
- The flow meter was calibrated on 13 July 2006 which was evidenced with the calibration certificate submitted to DNV.

## ▶ 2. Request for review by EB

*2. The PDD stated that 15 t/h of steam will be generated for palm oil refinery process consumption and 3 t/h will be used to provide cooling through a new absorption chiller system. However, the relative steam supply to the chiller during this monitoring period is below the relative steam supply to the refinery. Further clarification is needed.*

## ▶ PP's response

- Relatively the average steam demand for the refinery is also lower than the projected demand in the PDD of 15 t/hr.
- The relative ratio between process steam and absorption chiller steam is approximately 6.0.
- Demand for process steam and absorption chiller steam is very much depending on the palm oil crop season, scheduled plant shutdown periods and efficiency of the heat exchangers.

## ▶ DOE's response

- Absorption chiller steam demand was 2.5t/hour, and rounded to 3t/hour.
- The actual steam supply to the process and absorption chiller is dependent on the load of the plant which fluctuates between low and high season.

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- Summary



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Further Information about Case Study 2:

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1137667309.06/view>



35



