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	Thomas Kleiserr	Thomas.Kleiser@tuev-sued.de			

Request for Review

Dear Sirs,

Please find below the response to the review formulated for the CDM project with the registration number 1737. In case you have any further inquiries please let us know how we can kindly assist you.

Yours sincerely,

Javier Castro
Head of Certification Body “Climate and Energy”
Carbon Management Service

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Response to the CDM Executive Board

Question 1

The DOE is requested to provide further details regarding how the methodological choices regarding project emissions have been validated, in particular the assumptions regarding fugitive emissions from the closed tanks and leaks in the system.

Response by PP

The Project Participant maintains that the expected fugitive emissions from the tanks and leaks in the system are zero. This assessment is supported by the following statement from IPCC 2006: *Where technical standards for biogas plants ensure that unintentional CH4 emissions are flared, CH4 emissions are likely to be close to zero*[1] (see page 4.4). The following arguments can further support/clarify this conclusion:

1) Possible methane formation in the palm oil mill from formation of the raw POME (Palm Oil Mill Effluent) to entry into the biogas digester (upstream methane formation) is outside the project boundary as the COD_{in} used for calculation of the methane formation potential is measured at the entry point to the digester. The upstream methane formation is expected to be unchanged (or reduced) compared to the baseline situation. The reduction compared to the baseline could emerge since the acidification pond is closed (see figure 3 p 6 in the PDD).
2) The gas pipeline and digester tank top will be made of stainless steel (SS304) and extensive leakage tests of the welding will performed as described on p 12 in the PDD. A leakage report will be prepared and will be available during the verification by DOE.
3) To further strengthen the confidence that there will not be any leakages the leakage test will be included in the monitoring plan and will be performed every year. If leaks are identified during the annual leak tests 5[2]% of the annual biogas production is deducted as project emissions in any case losses appear and these losses are less or equal 5%. In case the measured/monitored leakage would be higher than 5% then the actual value of the leakage will be deducted.

Response by DOE

The DOE accepts the logic and argumentation of the project participants as described in points 1 and 2 of the answer to the full extent. The issue was already discussed during the on-site visit and finally agreed in the later validation process.
Nevertheless, to consider unexpected situations where leakage could appear, already in the PDD submitted for registration ID No.: 17 – $E_{ch4,\ leaks}$ has been included to take into account leakage from the biogas system as project emissions.

[1] IPCC 2006: Volume 5, Chapter 4 p 4
[2] IPCC 2006: Volume 5, Chapter 4 p 4

Following the RfR the project participants decided to concretize this aspect and further work out this parameter and how to consider leakage in the project emissions.
The DOE agrees that it makes sense to specify the aspect – consideration of leakage emissions in the project and to further elaborate this aspect in the PDD to guarantee an always conservative approach and herewith to be on the safe side.
This has been suggested by the PP under point 3.
The DOE considers this suggestion as appropriate and the suggested assumption for project emissions as conservative considering the technological solution on-site.
By elaborating ID No 17 more detailed in the revised PDD and using an approach where 5% of the annual biogas production is deducted as project emissions in any case losses appear and these losses are less or equal 5 % and to deduct the actual value of the leakage in cases the measured/monitored leakage would be higher than 5 % question 1 is considered to be solved by the DOE. The approach is considered as conservative in any cases as leakages higher than 5 % appear to be impossible considering the technical solution applied on-site. But anyway the parameter will be measured and leakages will be considered if necessary. The measurement of leakage will be carried out following international standards. The procedure of leakage monitoring has to be assessed and correctness to be confirmed in the verification process.

The revised PDD will be submitted with this answer on the RfR.

Question 2

Further clarification regarding how the PDD complies with the baseline methodology with regard to the estimation of baseline emissions from diesel consumption is required, as the equation applied relates to displacement of heat.

Response by PP

There is a mistake in the description and the calculation of the baseline emissions of the diesel genset. (p 33 in the PDD)

The calculations have now been revised to follow the prescribed for baseline emissions from power production:

Displaced electricity CO_2 emissions are:
$E_{CO2\_power} = EL*CEF$ **(10)**

Where:

EL is the amount of electricity displaced by the electricity generated from the biogas collected from the anaerobic treatment facility. This is estimated as product of :(1) Average specific electricity consumption for the output of the facility, estimated using 3 years historical data; and (2) the annual production .

CEF is the carbon emission factor for the electricity displaced by the electricity generated from the biogas. If in the baseline situation only one source of power is used (onsite production or grid), then apply the corresponding carbon emission factor.

EL has been calculated based on the power production related to the total processed Fresh Fruit Bunches (FFB) in the palm oil mill for the years 2005-2007. This specific power consumption is calculated as 2.6 kWh per t FFB processed (see Annex 1).

The annual processing of FFB is expected to be 250,000 tFFB/year in 2009 and 260,000 t FFB/year for the following years.

The only power supply to the mill is from the onsite diesel genset. The CEF for the genset is determined using table I.D.1 in AMS I.D (version 13) where 0.8 kg CO2/kWh is the lowest emission factor for diesel generators.

These assumptions lead to the following revised calculation of baseline emissions from power production:

Baseline Scenario - CO_2 emissions from fossil fuel use for on site heat generation ($E_{CO2\_power\_BL}$)

Year	Annual FFB throughput (t)	Power consumption (kWh/tFFB)	Calculated annual power consumption (kWh)	Emission factor of the diesel, EF (tCO_2e/kWh)	**CO_2 emissions from fossil fuel use for back up ($E_{CO2\_power\_BL}$)**
2008 (5 months)	95,833	2.60	249,167	0.0008	**199**
2009	250,000	2.60	650,000	0.0008	**520**
2010	260,000	2.60	676,000	0.0008	**541**
2011	260,000	2.60	676,000	0.0008	**541**
2012	260,000	2.60	676,000	0.0008	**541**
2013	260,000	2.60	676,000	0.0008	**541**
2014	260,000	2.60	676,000	0.0008	**541**
2015	260,000	2.60	676,000	0.0008	**541**
2016	260,000	2.60	676,000	0.0008	**541**
2017	260,000	2.60	676,000	0.0008	**541**
2018 (7 months)	151667	2.60	394,333	0.0008	**315**

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Response by DOE

The DOE confirms that there was a mistake description and the calculation of the baseline emissions of the diesel genset (p 33 in the PDD) with a small (small overestimation) influence in the calculated overall emission reductions.
The PP in their answer have corrected the mistake and incorporated the corrections in the revised PDD as well as in the adjusted calculation sheets for the emission reductions. The relevant documents will be submitted to UNFCCC with this answer to the RfR. The corrections have been assessed as correctly carried out by the DOE. The approach is deemed to be fine for calculating baseline emissions from diesel consumption. The information concerning the electricity production from gensets for the last years at the mill has been delivered as requested (see annex 1 to this document).
With the corrections made question 2 is considered to be clarified and finally solved.

Question 3

No reference was provided for the statement in Table 1 – issue 2 (p 9 in PDD) regarding the emission factor of 0.21 kgCH4/kg COD.

Response by PP

Please find attached a paper from Yacob et al (2005)[3]. The study concerns methane formation in-situ in POME ponds in a palm oil mill and is thus highly relevant for the current project. Based on data for a year with daily COD measurements and continuous methane measurement they get the following relation between COD removed and methane production: "*methane emission from anaerobic ponds A and B were 0.223 and 0.247 kg of methane per kilogram of COD removed*". These numbers are 6% and 18% higher than the default value used – and the default value used can thus be regarded as conservative.

The responses have been included in an updated version of the PDD. The updated version of the PDD is attached with track changes for easy reference.

We sincerely hope that the Board accepts our above explanations.

Response by DOE

The information given in the paper (mainly the information at page 8 – top of the left column) as well as the following argumentation of the PP (see above) has been assessed by the DOE. The explanation is deemed to be fine with the submitted technical paper. The DOE considers this paper as sufficient evidence that the value for the emission factor given with 0.21 kg CH4/kg COD is justified and conservative and the question is clarified with this answer. The referred documentation will be uploaded with the answer on the RfR.

[3] Shahrakbah Yacob et al (2005) Baseline study of methane emission from anaerobic ponds of palm oil mill effluent treatment. Science of the Total Environment p 8

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Additional Attachments to this response to the RfR:

a. Revised PDD with track changes (.doc file and pdf file)
b. Revised calculation of emission reductions -.xls sheet: _ER Cal-AM22_final4.xls
c. .xls sheet: _FFB-power.xls
d. Baseline study of methane emission from anaerobic ponds (Shahrakbah Yacob et al (2005) - .pdf file
e. Extract from IPCC 2006 (chapter 4: Biological Treatment of Solid Waste) - .pdf file
f. KLPOWER.pdf (Kim Loongs answer directly to UNFCCC and incorporated in the Joint Response_DOE_PP)

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Annex 1: Calculation of specific power consumption per ton FFB processed

Year	Month	FFB (t)	Power produced	kWh/FFB	
2005	Jan	6,342.13	25790	4.07	
	Feb	6,367.74	25413	3.99	
	Mar	7,584.08	19713	2.60	
	Apr	9,629.76	19401	2.01	
	May	10,548.65	25258	2.39	
	Jun	10,311.35	21761	2.11	
	Jul	10,295.11	19890	1.93	
	Aug	12,220.88	24265	1.99	
	Sep	12,634.27	26223	2.08	
	Oct	14,783.93	20605	1.39	
	Nov	14,328.65	29282	2.04	
	Dec	11,683.07	35,741	3.06	2.47
2006	Jan	8,603.13	45282	5.26	
	Feb	10,531.29	38876	3.69	
	Mar	13,046.46	30850	2.36	
	Apr	16,130.03	42802	2.65	
	May	14,162.72	35187	2.48	
	June	14,536.64	41478	2.85	
	July	13,573.58	48477	3.57	
	Aug	14,021.68	52121	3.72	
	Sep	16,355.83	42534	2.60	
	Oct	18,680.68	49645	2.66	
	Nov	21,650.57	43506	2.01	
	Dec	17,273.65	53,703	3.11	3.08
2007	Jan	17,768.47	60096	3.38	
	Feb	12,506.80	40556	3.24	
	Mar	13943.33	44137	3.17	
	Apr	13888.56	55708	4.01	
	May	17923.79	28129	1.57	
	June	18587.28	38961	2.10	
	July	21561.55	37088	1.72	
	Aug	22162.34	38451	1.73	
	Sep	24871.01	74463	2.99	
	Oct	26198.14	23339	0.89	
	Nov	27615.1	35386	1.28	
	Dec	27793.61	23204	0.83	2.24
					Average kWh/tFBB
					2.60