CDM: Recommendation Form for Small Scale Methodologies (version 01) ***(To be used for presenting questions/proposals/amendments to the simplified methodologies for small-scale CDM project activity categories)***	
Date of SSC WG meeting:	30 January−02 February 2012, SSC WG 35
Title/Subject (give a small title or specify the subject of your submission, maximum 200 characters):	Revision of AMS-III.Y to estimate project emissions from enteric fermentation and manure when the separated solids are used as animal feeds
Indicative methodology to which your submission relates (refer the items of Appendix B of the Simplified Modalities and Procedures), if applicable.	AMS-III.Y "Methane avoidance through separation of solids from wastewater or manure treatment systems"
Name of the authors of the query:	Yunfu Luo Institution: Beijing Uniufa Energy Technology Co., Ltd thj@uniufa.com, shihaiting@uniufa.com, lyf@uniufa.com

Summary of the query:

Please use the space below to summarize the query related to SSC methodologies/categories SSC Modalities and Procedures provide recommendation/analysis of the SSC WG.

Original text from Stakeholder:

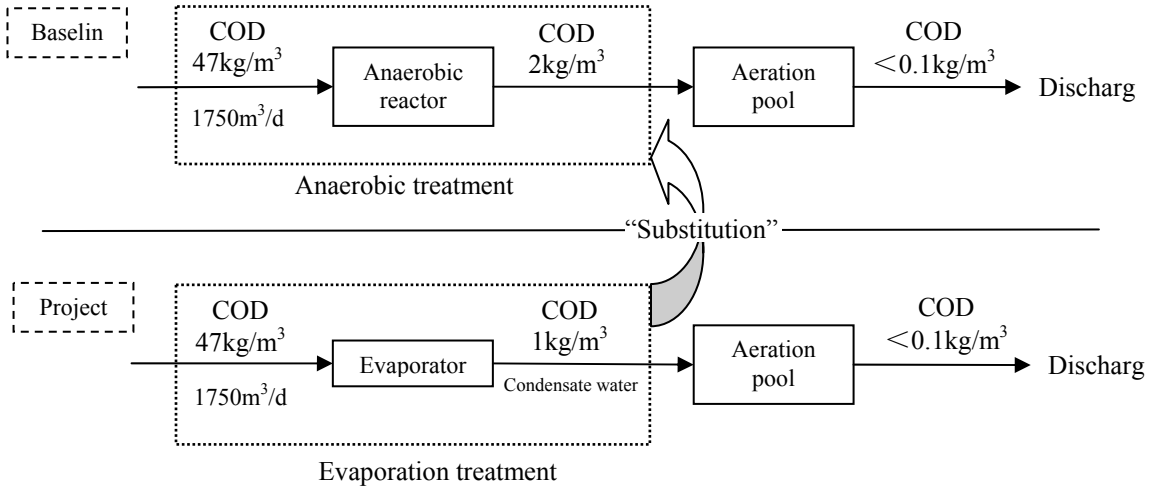
Request No.1 for Revision of Methodology

Introduction

A project of *Comprehensive Utilization Project of 100,000 tons DDGS of Jiaozuo Heyang Alcohol Co., Ltd.* is a wastewater treatment project which using evaporation technique to separate solids in wastewater.

In the baseline scenario, there is an anaerobic reactor for treating 1750m^3/d of wastewater (COD = 47kg/m^3), the COD of the wastewater leaving this anaerobic reactor was 2kg/m^3 and then transferred to an aeration pool for further treatment until it satisfied the discharging standard (COD＜0.1kg/m^3). The biogas produced in the anaerobic treatment process is emitted to atmosphere.

In the project scenario, an evaporator is installed as a solid separation system to treat the wastewater, the condensate water (liquid fraction) leaving the evaporator has the COD of 1kg/m^3 and it will be transferred to the existing aeration pool, the COD of the discharging wastewater is about the same as the baseline scenario
(COD＜0.1kg/m^3). The solids separated by the evaporator will be further treated to produce feed. The flow sheet of the baseline scenario and project scenario are shown as below:



Methodology Requirement

The Para 19 and 21 of the approved SSC methodology AMS-III.Y, Version 02 indicates that:

19. In case of wastewater treatment systems, the baseline emissions BE_y, shall be calculated based on the COD removal efficiency of the solids separation device, as follows:

$$BE_y = UF_b * Q_{y,ww} * (COD_{y,in} - COD_{y,out}) * B_{o,ww} * MCF_{ww,treatment} * GWP_{CH_4} / 1000 \quad (3)$$

Where:

$Q_{y,ww}$	*Volume of wastewater entering the solid separation device in year y (m^3)*
$COD_{y,in}$	*Chemical oxygen demand of the wastewater entering the solid separation device (kg/m^3)*
$COD_{y,out}$	*Chemical oxygen demand of the wastewater leaving the solid separation device (kg/m^3)*
UF_b	*Model correction factor to account for model uncertainties (0.89)*[1]
$MCF_{ww,treatment}$	*Methane correction factor for the baseline anaerobic wastewater treatment system*
$B_{o,ww}$	*Methane producing capacity of the wastewater (IPCC default value of 0.25 kg CH_4/kg COD or 0.6 kg CH_4/kg BOD)*

21. In case of thermal treatment technologies the above approach for baseline emissions shall be followed, however $COD_{y,out}$ shall be taken as zero.

Therefore the project "*Comprehensive Utilization Project of 100,000 tons DDGS of Jiaozuo Heyang Alcohol Co., Ltd.*" have to use zero as the value of $COD_{y,out}$ as per the Para 21 of the methodology.

Proposed Revision

According to Para 21 of the approved SSC methodology AMS-III.Y, Version 02, the $COD_{y,out}$ in equation 3, Para 19 shall be taken as zero, this is due to the high efficiency of the thermal treatment technologies. However, the actual emissions in the absence of the project activity is smaller than the calculated baseline emissions through equation 3, Para 19 of the methodology AMS-III.Y. Consequently, the emission reduction is not real and it is not conservative when thermal treatment technology is applied in this methodology.

In case of thermal treatment technologies, it is possible that the project activity involves wastewater treatment system with higher efficiency than the treatment systems used in the baseline situation. Therefore the baseline emission is limited to the baseline situation in the absence of the project activity. In

[1] Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

this case, the historical records of the COD removal efficiency of the baseline plant are required.

Our submission is that, the change of wastewater treatment system will result in efficiency improvement compare to the baseline scenario. In such a case, current provisions of methodology consider the baseline emissions as the *ex post* calculated according to the wastewater treated in the project scenario is not accurate. In order to impart accuracy in achieving baseline emission, we are proposing the following changes in methodology for case of the application of thermal treatment technologies and other techniques with higher efficiency in wastewater treatment than the situation in the absence of the project activity.

New approach in order to determine the baseline emission in methodology AMS-III.Y:

In case of wastewater treatment systems, the baseline emissions BE_y, shall be calculated based on the lowest value of the following:

(i) The COD removal efficiency of the solids separation device, which is the amount of wastewater treated and COD removing by the solids separation device during the crediting period. This approach is the same as the approved SSC methodology AMS-III.Y, Version 02.

(ii) *Ex post* calculated baseline, which is determined using the COD removal efficiency of the baseline plant and the actual monitored volume of wastewater treated by the solids separation device. The flow of wastewater entering the solid separation device, the COD load of the wastewater entering the solid separation device and the COD removal efficiency in the absence of project activity is required.

Therefore an additional approach to calculate baseline emission is required for option (ii) above, as follows:

The baseline emissions BE_y are calculated based on the COD removal efficiency of the baseline plant, the volume of wastewater treated by the solids separation device and the COD of the wastewater entering the solid separation device, as follows:

$$BE_y = UF_b * Q_{y,ww} * COD_{y,in} * \eta_{COD,BL} * B_{o,ww} * MCF_{ww,treatment} * GWP_{CH_4} / 1000$$

Where:

$Q_{y,ww}$	Volume of wastewater entering the solid separation device in year *y* (m^3)
$COD_{y,in}$	Chemical oxygen demand of the wastewater entering the solid separation device (kg/m^3)
$\eta_{COD,BL,i}$	COD removal efficiency of the baseline treatment system, determined as per the paragraph 16 above, if multiple wastewater treatment systems were used in baseline scenario, a weighted value should be used.
UF_b	Model correction factor to account for model uncertainties (0.89)[2]
$MCF_{ww,treatment}$	Methane correction factor for the baseline anaerobic wastewater treatment system
$B_{o,ww}$	Methane producing capacity of the wastewater (IPCC default value of 0.25 kg CH_4/kg COD or 0.6 kg CH_4/kg BOD)

In the case of "*Comprehensive Utilization Project of 100,000 tons DDGS of Jiaozuo Heyang Alcohol Co., Ltd.*", the COD value of $2kg/m^3$ which is determined by the historical record of the COD removal efficiency in the absence of project activity (baseline plant) will be used.

Request No.2 for Revision of Methodology

Introduction

In the case of *Comprehensive Utilization Project of 100,000 tons DDGS of Jiaozuo Heyang Alcohol Co., Ltd.*, the separated solids are used as animal feeds. As per the approved SSC methodology AMS-III.Y, Version 02, any emissions from enteric fermentation and emissions from the manure, depending on the treatment system in those instances shall be considered as project emissions, additionally, project

[2] Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

emissions in this instance taking into account the methods of 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Proposed Revision

Chapter 10, volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories provides guidance on methods to estimate emissions of methane from Enteric Fermentation in livestock, and methane and nitrous oxide emissions from Manure Management. Our submission summarized the document above, proper modifications are made (*e.g.* combining calculation equations and indicating the most conservative values for the emission factors) to simplify the calculation method. The approach to calculate the emissions from enteric fermentation and emissions from the manure are shown as follows:

1. In case of the separated solids are used as animal feed, project activity emissions from enteric fermentation are calculated as follows:

$$PE_{y,solid,entric} = GWP_{CH_4} * \sum_{LT}(N_{y,LT,p} * EF_{LT,entericCH_4})/1000$$

Where:

GWP_{CH4}	Global Warming Potential of methane (value of 21)
LT	Index for livestock species / category
$N_{y,LT,p}$	The number of head of livestock species / category LT in year y (number)
$EF_{LT,entericCH_4}$	Methane emission factor of the enteric fermentation for the livestock species / category LT as per Table 10.10 in chapter 10, volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories if the country-specific data for tier 2 and tier 3 methods are not available (kg CH_4 $head^{-1}$ yr^{-1}).

2. The number of head of livestock species / category LT in year y is the annual population of a specific livestock species / category consuming the separated solids provided by the project activity as feed.

$$N_{y,LT,p} = \left(\frac{M_{ss,feed,y}}{DMI_{LT,\text{int}ake,y}} \right)$$

Where:

$M_{ss,feed,y}$	Amount of dry matter in the solids consumed by the livestock species / category LT in year y (kg)
$DMI_{LT,\text{int}ake,y}$	Dry matter intake by one animal of livestock species / category LT in year y (kg per year of feed consumed by livestock species / category LT), Country-specific data or the value obtains from 2006 IPCC Guidelines for National Greenhouse Gas Inventories can be used. If the country-specific data provides different DMI values for different mass values of the livestock type LT respectively, the typical animal mass (TAM, Table 10A-4 to 10A-9, chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories) of the livestock type LT can be used to determine the DMI values. In case of the country-specific data is not available, the DMI for the mature or growing cattle can be estimated through the default value of 2% of the bodyweight

3. In case of the separated solids are used as animal feed, project activity emissions from manure management of the livestock consuming the separated solids as feed are calculated as follows:

$$\text{PE}_{\text{y,solid,manure}} = \sum_{\text{LT}}[\text{N}_{\text{y,LT,p}} * (\text{GWP}_{\text{CH}_4} * \text{EF}_{\text{LT,manureCH4}} + \text{GWP}_{\text{N2O}} * \text{N}_{\text{ex,LT}} * \text{EF}_{\text{LT,manureN2O}} * \frac{44}{28})] * \frac{1}{1000}$$

Where:

GWP_{N2O}	Global Warming Potential of N_2O (value of 310)
$\text{EF}_{\text{LT,manureCH4}}$	Methane emission factor of the manure management for the livestock species / category LT, as per Table 10.14, 10.15 and 10.16 in chapter 10, volume 4, 2006

	IPCC Guidelines for National Greenhouse Gas Inventories if the country-specific data for tier 2 and tier 3 methods are not available (kg CH_4 $head^{-1}$ yr^{-1}).
$EF_{LT,manureN2O}$	Emission factor for direct N_2O emissions from manure management system as per Table 10.21 in chapter 10, volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories. A weighted value should be used if multiple manure management systems are involved. In case of hard to monitor and / or definite the type of the manure management system, a conservative value of 0.1 kg N_2O-N/kg Nitrogen excreted can be used which is the maximum value in the reference table (kg N_2O-N/kg N).
$N_{ex,LT}$	Annual average nitrogen excretion per head of species/category LT in year y (kg N $head^{-1}$ yr^{-1})
$\frac{44}{28}$	Conversion of $(N_2O\text{-}N)_{(mm)}$ emissions to $N_2O_{(mm)}$ emissions

In order to simplify the calculation, for the N_2O emission calculation, the direct N_2O emission from manure management systems is considered only. The indirect N_2O emission from manure management systems is excluded as the N losses and the atmospheric deposition of nitrogen on soils and water surface is negligible. However, the calculation of indirect N_2O emission from manure management systems can be added if it is necessary, and using the most conservative default values to simplify the calculation.

4. In case of no country-specific data is available, the value of $N_{ex,LT}$ can be estimated as per the IPCC default value of nitrogen excretion rate in Table 10.19 and the default value of the average animal mass in Table 10A-4 to 10A-9, chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

$$N_{ex,LT} = N_{rate,LT} * \frac{TAM}{1000} * 365$$

$N_{rate,LT}$	Default N excretion rate of livestock species/category LT in year y, kg N (1000kg animal mass)$^{-1}$ day^{-1}, as per Table 10.19 in chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
TAM	Typical animal mass for livestock species/category LT , as per Table 10A4 to 10A-9 in chapter 10, Volume 4, 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Recommendation by the SSC WG:

Please use the space below to provide amendments/change (in your expert view, if necessary).

Please refer to paragraph 23 of the meeting report of the SSC WG 35 <http://cdm.unfccc.int/Panels/ssc_wg>.

Answer to authors of query by the SSC WG:

Please use the space below to provide answer to the authors of the above query.

The small-scale working group of the CDM Executive Board would like to thank the author for the submission.

The SSC WG agreed to recommend a revision of AMS-III.Y, as contained in annex 13 of the meeting report of the SSC WG 35.

Signed by the Chair, Ms. Fatou Gaye
Date: 02/02/2012

Signed by the Vice-Chair, Mr. Peer Stiansen
Date: 02/02/2012

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