



RESPONSE TO THE REQUEST FOR REVIEW

From: Bureau Veritas Holding SAS

To: CDM Team

Attention: John Kilani; Secretary to the CDM Executive Board

Reference: REQUEST FOR REVIEW – 4293 – CARROLL's FOODS & LOGICARBON – GHG EMISSION REDUCTIONS FROM SWINE MANURE MANAGEMENT SYSTEM, DIAMANTINO, MT, BRAZIL

Dear CDM Team,

Regarding the above mentioned reference, Bureau Veritas Certification, BVC Holding SAS, had performed the Validation of the above mentioned Project.

Subsequently, five requests for review have been received from members of the Board. For each issue raised in the request for review, the project participants and DOE describes below the responses.

1. The DOE is requested to further explain how it has validated the input values to the investment analysis:

(a) as it is not clear whether the input values were available at the time of the investment decision in line with the EB51 Annex 58 paragraph 6, in particular:

(i) The O&M cost for the baseline scenario;

BRL 10,000.00 per month. It was based on company's experience. The validation team would like to point out that the Brazilian minimum wage at the time of investment decision was BRL 415.00 according to Law number 11,709 from 19/06/2008¹ which would allow the company to hire around 20 employees to work in the project's baseline activity. Another important consideration is that the referred input value would have to be BRL 53,909.00 per month (more than 5 times greater) to the project NPV reach BRL -3,500,000.00 using a breakeven analysis which would not be sufficient to change the project's additionality (the proposed project NPV is BRL -3.676.119.).

(ii) The installation cost for the digesters;

The validation team has assessed the appropriateness of the installation costs for the digesters by comparing the input value (BRL 2,059,516) with a supplier (Sansuy S/A) proposal /1/from 13/08/2008.

¹ Available at: http://www.portalbrasil.net/salariominimo_2008.htm. Accessed on 15/08/2009 and on 19/05/2011.



(iii) The installation cost for monitoring system;

The validation team has assessed the appropriateness of the installation costs for monitoring system by comparing the input value (BRL 286,837) with five supplier proposals /2/ /3/ /4/ /5/ and /6/ from 2008.

- Monitoring system installation cost comes from the sum of the electronic flow transmitter BRL 41,261 /2/ - proposal from 03/02/2008;
- Cost of on Site FEMS Installation + on Site AEMS Installation BRL 18,200 /3/ - proposal from 30/01/2008;
- Cost of AEMS Single Point USD 114,000 /4/ - proposal from 03/02/2008;
- Cost of the Custom Inconel Exhaust sampling device USD 6,500 /5/ - proposal from 05/02/2008;
- Cost of the Biogas Pro Software USD 5,000 /6/ - proposal from 30/01/2008.

The exchange rate used was 1.812 based on the 2008 exchange rate average.

Prices in BRL:

- Cost of AEMS Single Point BRL 206,541 /4/ - proposal from 03/02/2008;
- Cost of the Custom Inconel Exhaust sampling device BRL 11,776 /5/ - proposal from 05/02/2008;
- Cost of the Biogas Pro Software BRL 9,059 /6/ - proposal from 30/01/2008.

$$41,261 + 18,200 + 206,541 + 11,776 + 9,059 = 286,837$$

(iv) Generator and equipment cost;

The validation team has assessed the appropriateness of the installation costs for the digesters by comparing the input value (BRL 1,325,000) with a supplier (Stemac) proposal /7/ from 18/08/2008.

(v) The O&M cost for generator;

The PP has done a detailed analysis to estimate the O&M costs based on its own experience and supplier's information. It was considered O&M costs for the proposed AWMS (BRL 102,976 per year), the combustion system (BRL 19,878 per year), the monitoring system (BRL 14,342 per year) and the energy generation (BRL 1,044,592.26 per year) separated, resulting in a total O&M costs of BRL 1,181,787 per year which represents 10% of the total investment (Anaerobic Digesters: BRL 2,059,516 + Combustion system: BRL 397,550 + Monitoring system: BRL 286,837 + Bio gas power plant: BRL 7,008,483 + Proposed AWMS system installation costs: BRL 2,059,516 = BRL 11,811,903).

As the referred project is considered an innovative project in Brazil it was difficult to find comparable projects within the country. So the validation team decided to compare this ratio O&M cost/ total investment with similar projects around the world. Table 1 shows some comparable projects:

Project	Inner-Mongolian Mengniu Aoya Biogas Power Project (1.36MW)
Number	3488
O&M/Total investment	13.0%
Registration date	2/04/2011

Project	Animal Manure Management System (AMMS) GHG Mitigation Project, Shandong Minhe Livestock Co. Ltd., Penglai, Shandong Province, P.R. of China
Number	1891
O&M/Total investment	12.1%
Registration date	27/04/2009

Project	Methane Recovery and Utilization CDM Project at Muyuan Swine Farm in Henan Province
Number	1301
O&M/Total investment	10.8%
Registration date	27/12/2007

Considering the comparable projects ratio the validation team concluded that the project estimate was conservative, suitable and appropriate at the time of investment decision.

(vi) Generator group cost;

The validation team has assessed the appropriateness of the installation costs for the digesters by comparing the input value (US\$ 1,828,670) with a supplier (Stemac) proposal /8/ from 24/09/2008.

(vii) Other equipment and installation costs;

The validation team has assessed the appropriateness of the installation costs for the digesters by comparing the input value (BRL 1,296,000) with a supplier (Stemac) proposal /8/ from 24/09/2008.

(viii) The methane production;

The daily methane availability was calculated based on the baseline methane emissions (67,501.33 tCO₂e/year), by simply dividing it by GWP_{CH₄} (21), by D_{CH₄} (0.00067 t/m³) and by 365 days/year, which results in 13,144 m³ of methane per day, or 547.67 m³/h).

(ix) The assumed electricity to methane ratio of 10.48 kWh/m³ of CH₄;

According to the US-EPA, visited on 26/08/2008, the methane heat value was 10.48 kWh/m³ of methane. It is important to notice that, the present address of US-EPA* is the one visited on 18/05/2011 and the new methane heat value found was 10.501 kWh/m³ of methane.

(x) 35% electricity output of the generator;

According to the biogas generator supplier Stemac's proposal of 24/09/2008, to provide 1,038 kW of electricity output, the equipment fuel consumption is 2,717 kW. Therefore, the efficiency rate of the equipment is 38.2 % (1,038 kW / 2,717 kW = 0.382). But to be more conservative, initially it has been utilized an efficiency of 35% to calculate the quantity of electricity to be generated. But, in this

case, to be more conservative we should have used the higher efficiency of 38.2%, as the additionality is based on the investment analysis.

[*http://www.epa.gov/cmop/resources/converter.html#one](http://www.epa.gov/cmop/resources/converter.html#one)

(b) As insufficient information was provided on how many projects have been compared nor the result of the comparison, in line with the VVM version 01.2 paragraph 111 (b), in particular:

(i) The electricity cost;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The project electricity cost was defined by calculating the average electricity cost of the period from October 2007 until September 2008. All the electricity invoices were provided /9/ and the validation team was able to verify the veracity and correctness of the calculation. As the cost was cross-checked with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(ii) The electricity consumption;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The electricity consumption was obtained by averaging the electricity consumption of the farm, cross-checked by electricity invoices /9/ during the period ranging from October 2007 until September 2008. As the evidences were available at the time of the investment decision and they represent what actually occurred they were considered the best approach to estimate the input value. As the cost was cross-checked with the electricity invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(iii) The electricity sales price;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The electricity sales prices were calculated by averaging the energy sales price provided by the Electric Power Commercialization Chamber² from January 2007 to December 2008 (Publicly available source). As the Electric Power Commercialization Chamber is the company responsible for the energy commercialization in Brazil the referred value was considered suitable and appropriated by the validation team.

(iv) The O&M cost for the baseline scenario;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

BRL 10,000.00 per month. It was based on company's experience. The validation team would like to point out that the Brazilian minimum wage at the time of investment decision was BRL 415.00

² Available at:

<http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=a39ca5c1de88a010VgnVCM100000aa01a8c0RCRD>.

Accessed on 15/05/2011.

according to Law number 11,709 from 19/06/2008³ which would allow the company to hire around 20 employees to work in the project's baseline activity. Another important consideration is that the referred input value would have to be BRL 53,909.00 per month (more than 5 times greater) to the project NPV reach BRL -3,500,000.00 using a breakeven analysis which would not be sufficient to change the project's additionality (the proposed project NPV is BRL -3.676.119.).

(v) The installation cost for the digesters;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The input value (BRL 2,059,516) was cross-checking with supplier's invoice (third-party available source) /1/. As the cost was cross-check with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(vi) The installation cost for monitoring system;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The input value (BRL 286,837) was cross-checking with five supplier's invoice (third-party available sources) /2/ /3/ /4/ /5/ and /6/. As the cost was cross-check with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(vii) Generator and equipment cost;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The input value (BRL 1,325,000) was cross-checking with supplier's invoice (third-party available source) /7/. As the cost was cross-check with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(viii) The O&M cost for generator;

The PP has done a detailed analysis to estimate the O&M costs. It was considered O&M costs for the proposed AWMS (BRL 102,976 per year), the combustion system (BRL 19,878 per year), the monitoring system (BRL 14,342 per year) and the energy generation (BRL 1,044,592.26 per year) resulting in a total O&M costs of BRL 1,181,787 per year which represents 10% of the total investment (Anaerobic Digesters: BRL 2,059,516 + Combustion system: BRL 397,550 + Monitoring system: BRL 286,837 + Bio gas power plant: BRL 7,008,483 + Proposed AWMS system installation costs: BRL 2,059,516 = BRL 11,811,903).

As the referred project is considered an innovative project in Brazil it was difficult to find comparable projects within the country. So the validation team decided to compare this ratio O&M cost/ total investment with similar projects around the world. Table 1 shows some comparable projects:

³ Available at: http://www.portalbrasil.net/salariominimo_2008.htm. Accessed on 15/08/2009 and on 19/05/2011.

Project	<u>Inner-Mongolian Mengniu Aoya Biogas Power Project (1.36MW)</u>
Number	3488
O&M/Total investment	13.0%
Registration date	2/04/2011

Project	<u>Animal Manure Management System (AMMS) GHG Mitigation Project, Shandong Minhe Livestock Co. Ltd., Penglai, Shandong Province, P.R. of China</u>
Number	1891
O&M/Total investment	12.1%
Registration date	27/04/2009

Project	<u>Methane Recovery and Utilization CDM Project at Muyuan Swine Farm in Henan Province</u>
Number	1301
O&M/Total investment	10.8%
Registration date	27/12/2007

Considering the comparable projects ratio the validation team concluded that the project estimate was conservative, suitable and appropriate at the time of investment decision.

(ix) Generator group cost;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The input value (US\$ 1,828,670) was cross-checking with supplier's invoice (third-party available source) /8/. As the cost was cross-check with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(x) Other equipment and installation costs;

VVM version 01.2 paragraph 111 (b): "Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices;"

The input value (BRL 1,296,000) was cross-checking with supplier's invoice (third-party available source) /8/. As the cost was cross-check with the invoices (third-party available source) the validation team has considered the input values suitable and appropriate. The sources used in the financial analysis assessment (input values cross checks) are credible and the values applied are consistent with the sources.

(c) As insufficient information was provided on how they have been validated in line with the VVM version 01.2 paragraph 111 (a) to (d), in particular:

(i) The methane production;

The daily methane availability was calculated based on the baseline methane emissions (67,501.33 tCO₂e/year), by simply dividing it by GWP_{CH₄} (21), by D_{CH₄} (0.00067 t/m³) and by 365 days/year, which results in 13,144 m³ of methane per day, or 547.67 m³/h).

According to paragraph 11 of VVM version 01.2:

The quantity of 67,501.3 tCO₂e/year has been confirmed by checking all the parameters and calculations presented in the PDD version 8.

The GWPCH₄ (21) and D_{CH₄} (0.00067 t/m³) have been Cross-checked against publicly available sources.

(ii) The assumed electricity to methane ratio of 10.48 kWh/m³ of CH₄;

According to the US-EPA, visited on 26/08/2008, the methane heat value was 10.48 kWh/m³ of methane. It is important to notice that, the present address of US-EPA* is the one visited on 18/05/2011 and the new methane heat value found is 10.501 kWh/m³ of methane.

The heat values of 10.48 kWh/m³ of methane and of 10.501 kWh/m³ of methane have been checked by visiting US-EPA site.

(iii) 35% electricity output of the generator.

According to the biogas generator supplier Stemac's proposal of 24/09/2008, to provide 1,038 kW of electricity output, the equipment fuel consumption is 2,717 kW. Therefore, the efficiency rate of equipment is 38.2 % (1,038 kW / 2,717 kW = 0.382). But to be more conservative, initially it was utilized an efficiency of 35% to calculate the quantity of electricity to be generated. But, in this case, to be more conservative we should have used the higher efficiency of 38.2%, as the additionality is based on the investment analysis.

The source for the information of the efficiency of 38.2 % utilized in the PDD version 8 and in the Validation Report revision 02.4, has been the biogas generator supplier Stemac's proposal of 24/09/2008. The efficiency range from 35% to 38.2% of the generator had also been informed, by telephone, by Stemac. Due to wrongly conservative reasons, the lower efficiency of 35% had been used in the previous versions of PDD version 7 and Validation Report revision 02.4.

In addition of all efforts that have been done to assess the additionality of the project, the validation team also presents the calculation of the breakeven point analysis to estimate what would be the deviation in each input value to the NPV of the project reach the baseline's NPV. As you can see in the table below the project is by far additional. Another important aspect that the validation team wants to highlight is that the sensitivity analysis was performed by subjecting the most important input values to a +20% and -20% variation instead of the regular range of +10% and -10%.

	Original Value	Breakeven Point	% of Deviation
Avg electricity cost	290	590	103%
Avg electricity consumption	2,655	5,609	-311%
Avg electricity price (sales)	116	178	53%
Baseline O&M costs	10,000	56,621	466%
AWMS Installation costs	2,059,516	63,034	-97%
Combustion System Installation costs	397,550	- 4,245,794	-1168%
Monitoring System Installation costs	286,837	- 4,356,507	-1619%
Generators & equipment costs	1,325,000	- 1,167,769	-188%
Generator groups costs	1,828,000	- 39,757,616	-2275%
Other equipment & installation costs	1,296,000	- 4,025,464	-411%
Power Capacity	2,076	4,219	103%

In BVC's opinion, the investment analysis has been done correctly and demonstrates that the project activity is unlikely to be financially/economically attractive.

- /1/ Sansuy proposal from 13/08/2008.
- /2/ Magnetrol proposal from 03/02/2008.
- /3/ LandTec proposal from 30/01/2008.
- /4/ LandTec proposal from 02/01/2008.
- /5/ LandTec proposal from 05/01/2008.
- /6/ LandTec proposal from 30/01/2008.
- /7/ Stemac proposal from 18/08/2008.
- /8/ Stemac proposal from 24/09/2008.
- /9/ Electricity invoices from October 2007 until September 2008.

2. The DOE is requested to further explain how it has validated the baseline scenario in line with VVM version 01.2 paragraph 33 (a) and paragraph 84. In doing so, the DOE should provide its independent opinion regarding the alternative scenarios to the project activity.

In the Validation Report, page 34, the explanation requested it is not necessary because, all the required information has been given according to paragraphs 87 and 88 of VVM version 01.2, which include all the requirements made in paragraph 33 (a) and 84 of VVM version 01.2. The DOE has provided its independent opinion regarding the alternative scenarios of the project activity, as described below:

Based on the above assessment, the DOE hereby confirms that:

- (a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;
 - (b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;
 - (c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;
 - (d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;
 - (e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.
- The main sources used to cross check against the PDD were the Methodology ACM0010, version 05, the Tool for the demonstration and assessment of additionality, version 05.2, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Chapter 10, Table 10.18), the Bibliographic References, the UNFCCC site, other CDM projects and the site visit.

3. The DOE is requested to further explain how it has validated the ex-ante parameters in line with the VVM version 01.2 paragraph 91, in particular F_{gas} for aerobic lagoon with natural aeration and F_{gas} for aerobic lagoon with forced aeration.

Due to the lack of specific value for aerobic lagoons with natural aeration, as a conservative approach, the default value of F_{gas} = 20% for indirect N₂O emissions from effluent had been used (Table 11.3, chapter 11, volume 4, IPCC 2006 Guidelines). For aerobic lagoons with forced aeration, as stated in the registered CDM PDD “Ramirana Emission Reduction Project of Agrícola Super Limitada”, version 4, “for the activated sludge system, indirect N₂O emissions are considered to be negligible, due to fast rate of the reactions that occur in this process. The level of dissolved oxygen and the quantity of organic matter in the aeration lagoon guarantee these reactions occur in the system”. Therefore, F_{gas} had also been considered zero.

But, based on paragraph 91 of VVM version 01.2:

The DOE shall verify the justification given in PDD for the choice of data and parameters used in the equations. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, the DOE shall assess that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, the DOE shall assess that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions,

The PP decided to use a more conservative approach for both, the F_{gas} for aerobic lagoons with natural aeration and for aerobic lagoons with forced aeration, considering for them F_{gas} = 40%, which is the default value of F_{gas} for anaerobic lagoons (table 10.22, chapter 10, volume 4 of IPCC 2006 Guidelines for National Greenhouse Gas Inventories). This approach will result in a lower quantity of emission reductions for the project activity because, although the nitrous emissions of the baseline are increased, the nitrous emissions of the project have a higher increase, resulting in a lower quantity of emission reductions for the project activity. Please, refer to the registered



project n° 1891 – Animal Manure Management System (AMMS) GHG Mitigation Project, Shandong Minhe Livestock Co. Ltd., Penglai, Shandong Province, P.R. of China – Accepted on 27 Feb 2011, where the same approach has been taken.

4. The PP is requested to include parameter FAer (fraction of volatile solids directed to aerobic treatment) in the monitor plan as per page 31 of ACM0010 v.5.

As per page 31 of ACM0010, version 5, the parameter FAer has been included in the monitoring plan of the PDD version 8.

5. The DOE is requested to explain how monitoring parameter LFAD (fraction of methane leakage from anaerobic digester) has been validated in line with the VVM version 01.2 paragraph 123 as no information was provided on how the parameter will be determined.

Due to the difficulties to measure the biogas leaks during monitoring and taking in consideration the paragraph 123 of the VVM version 01.2, in the PDD version 8 it has been adopted the recommended IPCC default value of LFAD = 0.15, validated by the DOE in the Validation Report revision 02.4.

The methodology ACM00110, version 05, recommends for LFAD the IPCC default value of 0.15 or less if documented evidence can be provided (to be checked by DOE).

It is PPs understanding that this is a too conservative (high) value, considering that other approved consolidated baseline methodology – ACM0014 – establishes for the same parameter (leaks from the digester) a default value of 0.05 and that the features of the proposed project for Mabella Diamantino I, such as:

- The chosen biodigester technology and materials (EPDM), after fully assembled, offer complete sealing between the cover and the liner, avoiding physical leakage.
- Due to the corrective and preventive maintenance plans, any event that prevents the biogas from being captured and/or burnt shall be solved in less than 24 hours.
- The biodigester technology applied in the proposed project activity is basically the addition of a biogas capturing structure (EPDM cover), with no heating, therefore it should not significantly improve the methane conversion capacity of the existing AWMS (well managed open anaerobic lagoons).
- Furthermore, when fully installed, the project will have complete redundancy, resulting in a capacity to burn the double of the expected volume of biogas to be produced by the digesters. So, the inability to combust methane by the project activity will be extremely rare.

Confident that the above comments will support you to adequately address the raised issues, the DOE remains available at any time for additional clarification.

Yours faithfully, for Bureau Veritas Certification, BVC Holding SAS.

Ricardo Fontenele
Local Product Manager

Antonio Daraya
GHG Team Leader Verifier

Oldemar Eichelt
GHG Technical Specialist