VALIDATION REPORT

"URBAM/ARAUNA – LANDFILL GAS PROJECT" (UALGP) IN BRAZIL

REPORT NO. 2007-0086

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DET NORSKE VERITAS

VALIDATION REPORT

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Client: Araúna Participações e Investimentos Ltda.	Client ref.: Maurício Maruca

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Summary:

Det Norske Veritas Certification AS (DNV) has performed a validation of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) project in Brazil on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board. This validation report summarizes the findings of the validation.

The validation consisted of the following three phases: i) a desk review of the project design documents, ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and the issuance of the final validation report and opinion.

In summary, it is DNV's opinion that the ""URBAM/ARAUNA – Landfill Gas Project" (UALGP)", as described in the project design document version 9 of 7 April 2007, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0001 (version 05). Hence, DNV requests the registration of the ""URBAM/ARAUNA – Landfill Gas Project" (UALGP)" project as a CDM project activity.

Report No.: 2007-0086	Subject Group: Environment
Report title: "URBAM/ARAUNA – Landfill Gas Project" (UALGP) in Brazil	
Work carried out by: Felipe Lacerda Antunes and Luis Filipe Aboim Tavares	
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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CETESB	State of São Paulo environmental agency
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
SMA	State Secretary of Environmental Impacts *(Secretaria de Estado de Meio Ambiente)*
UALGP	URBAM/ARAUNA Landfill Gas Project
UNFCCC	United Nations Framework Convention on Climate Change
URBAM	Urbanizadora Municipal S/A

1 INTRODUCTION

Araúna Participações e Investimentos Ltda. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) at São José dos Campos Municipality; São Paulo State, Brazil, (hereafter called "the project").

This report summarizes the preliminary findings of the validation of the project, performed on the basis of UNFCCC and host Party criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of the following personnel:

Mr. Felipe Lacerda Antunes	DNV Certification, Porto Alegre	Team leader, GHG auditor
Mr. Luis Filipe Tavares	DNV Certification, Rio de Janeiro	CDM validator, Sector Expert;
Mr. Einar Telnes	DNV Certification, Oslo	Technical reviewer

1.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, the monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0001 – "*Consolidated baseline methodology for landfill gas project activities*" (version 05) /16/. The validation team has, based on the recommendations in the Validation and Verification Manual /15/, employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design

1.3 Description of Proposed CDM Project

The aim of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) is to capture and burn greenhouse gases (GHG) caused by decomposition of waste at a landfill located in São José dos Campos, São Paulo State, Brazil. In the absence of this project, the GHG produced in the landfill would be vented into the atmosphere through a passive venting system, which do not have the efficiency to capture a significant amount of gas. The project starting date will be 01 July 2007.

The estimated amount of GHG emission reductions from the project is calculated to be 818 362 tonnes CO_2 equivalents (tCO_2e) during the first renewable 7-year crediting period (with the

potential of being renewed twice), resulting in estimated average annual emission reductions of 116 909 tCO_2e.

2 METHODOLOGY

The validation consists of the following three phases:

I a desk review of the project design documents;
II follow-up interviews with project stakeholders;
III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /15/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfillment of validation protocol criteria or where a risk to the fulfillment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) mistakes have been made with a direct influence on project results;
ii) validation protocol requirements have not been met; or
iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term Clarification may be used where additional information is needed to fully clarify an issue

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities			
Requirement	***Reference***	***Conclusion***	***Cross reference***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*	*Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.*

Validation Protocol Table 2: Requirement Checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a **Corrective Action Request (CAR)** due to non-compliance with the checklist question (See below).A request for **Clarification (CL)** is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action Requests and Requests for Clarification			
Draft report corrective action requests and requests for clarifications	***Ref. to Table 2***	***Summary of project participants' response***	***Final conclusion***
If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

2.1 Review of Documents

The initial PDD (version 1 of 15 December 2006) /1/ submitted by Araúna Participações e Investimentos Ltda. was reviewed. However, this PDD was based on the baseline and monitoring methodology ACM0001 version 4. Due to the approval of the version 5 of the methodology the PDD was revised on 8 March 2007 /2/. After the assessment of this new version of the PDD by DNV some further revised PDDs /3/ - /6/ were submitted by Araúna Participações e Investimentos Ltda. for validation, addressing the corrective actions requested by DNV. Finally, the last version of the PDD (version 9 of 7 April 2007) was assessed by DNV.

2.2 Follow-up Interviews

In March and April 2007 DNV performed interviews with Araúna Participações e Investimentos Ltda. /20/ to confirm selected information and to resolve issues identified in the document review. The main topics of the interview are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Araúna Participações e Investimentos Ltda.	➢ Management system ➢ Environmental licenses. ➢ Consultation of local stakeholders ➢ Current practise of passive venting and unsystematic burning of LFG

2.3 Resolution of Clarification and Corrective Action Requests

The objective of this phase of the validation is to resolve any outstanding issues which needed to be clarified for DNV's positive conclusion on the project design.

The initial validation of the project identified 7 (seven) c*orrective action requests* and 17 (seventeen) requests for c*larification*. The project participant's response to DNV's draft validation report findings and the PDD final version 9 of 7 April 2007 addressed the *corrective action requests* and requests for *clarification* to DNV's satisfaction.

To guarantee the transparency of the validation process, the concerns raised and the response provided by the project participants are documented in more detail in the validation protocol in Appendix A.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the revised PDD version 9 of 7 April 2007.

3.1 Participation Requirements

The project participants are Araúna Participações e Investimentos Ltda. and Urbanizadora Municipal S/A. The host Party Brazil meets all relevant participation requirements. No participating Annex I Party is yet identified.

Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the project assists in achieving sustainable development

The project is expected to bring improvement on sustainable development through reducing methane emissions, generating new activities in landfill dependencies, raising the knowledge regarding environmental care and improving work conditions. The contribution of the project to the sustainable development of Brazil needs to be confirmed by the DNA of Brazil.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

3.2 Project Design

The purpose of "URBAM/ARAUNA – Landfill Gas Project" (UALGP) is to capture and burn greenhouse gases caused by the decomposition of municipal solid waste. The project activity will reduce GHG emissions through the implementation of an active landfill gas capturing system. The technology to be used in the project activity is available in the Brazilian market, consisting basically of a vertical drains system interconnected to horizontal tubing, which is connected to suction and flaring equipment. The technology for the collected landfill gas (LFG) flaring includes: enclosed biogas flare; blower systems to force the landfill gas out of the landfill; an automated monitoring system; an automated system controlling flare adjustments, blowers speed and alarm system; an engine that runs on landfill gas acting as a secondary source of energy (generator); a gas filtering and drying system to avoid excessive liquids in the blower, in the generator and in the flare; horizontal pipes to collect the landfill gas; and vertical drains on the waste to extract the landfill gas. All energy used by the LFG collection system will be generated by the project. No emission reductions will be claimed from displacing energy from other sources.

A 7-year renewable crediting period is selected (with the potential of being renewed twice), starting on 01 July 2008. The expected operational lifetime of the project is 21 years.

3.3 Baseline Determination

The project applies the approved baseline methodology ACM0001 – "*Consolidated baseline methodology for landfill gas project activities*" version 05 /16/ and the "Tool to determine project emissions from flaring gases containing methane" /19/.This methodology is applicable to

project activities that reduce greenhouse gas emissions through landfill gas capture and destruction of the methane by flaring and/or generation of electricity. In the case of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP), the destruction of methane will be done through flaring. Energy will be produced for the project activity use only.

The common practice to dispose waste of large cities on Brazil is sanitary landfill. In small cities the common practice is open dumping. None of these scenarios have any structure to collect and flare LFG, only passively collected LFG is flared due to safety concerns. The selected baseline scenario is the partial atmospheric release of the landfill gas. As URBAM does not have any contractual and legal obligations to burn methane, the baseline emissions are calculated using an "Adjustment Factor". The "Adjustment Factor" is estimated to be 10% of total methane produced; this is a conservative assumption based on the results of flow measurements from the drains /11/. An "Adjustment Factor" of 10% allows for the destruction of LFG in the baseline scenario which would have occurred as a result of the continuation of the current practice of passive venting and unsystematic burning of LFG. A capturing system efficiency value of 60% is considered for the project.

GHG emissions by sources in the baseline were estimated using IPCC's guidelines and the first order decay model approach considering values of L_0 = 0.0986 Gg_{CH4}/Gg_{waste} and k (1/year) = 0.1.

3.4 Additionality

In accordance with ACM0001, the additionality of the project is demonstrated through the *Tool for the demonstration and assessment of additionality* /19/, which includes the following steps:

Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations: The possible baseline scenarios are: a) to implement the project of capture and flaring of LFG without CDM incentives, b) LFG would continue to be released to the atmosphere and only small amounts of LFG would be burned due to safety and odour reasons and c). to capture LFG and use it to produce electricity or for commercial purposes. There is no legislation in Brazil obliging landfills to flare the collected gas. All scenarios are thus in compliance with all applicable legal and regulatory requirements.

Step 2 - Investment analysis: As the CDM project activity does not generate any financial or economic benefit other than the CDM related income, and there is no intention to produce electricity commercially, a simple cost analysis is applied /8/. Considering the additional costs necessary for increasing the LFG capture capacity, without any additional revenues, the project is not a likely baseline scenario. Even if LFG was used to generate electricity for export to the grid, this would not significantly alleviate the economic and financial hurdles of the project.

Step 3 - Barrier analysis: Not selected (Step 2 is selected only)

Step 4 - Common practice analysis: DNV was able to confirm that possible future legislation that would require landfills to quantify and flare a certain amount of the gas produced is not likely to be implemented in near future when considering the waste disposition situation in Brazil. According to the 2000 National Research on Sanitation (Pesquisa Nacional de Saneameto Básico 2000), made by IBGE (Instituto Brasileiro de Geografia e Estatística - Statistics and Geographic Brazilian Institute), from a total estimated volume of garbage collected in Brazil, 47.1% of the collected garbage was dumped on sanitary landfills, 22.3% was dumped on "controlled" landfills and 30.5% was dumped on "Garbage dumping sites" without any control. A major

environmental problem related to domestic waste in Brazil is the lack of waste disposal areas for sanitary landfills. DNV was able to confirm that investments for installation of systems to capture and flare methane are not representing common practice in Brazil.

3.5 Monitoring Plan

The project correctly applies the approved monitoring methodology ACM0001 – "*Consolidated baseline methodology for landfill gas project activities*" version 05 /16/.

Details of the data to be collected, the frequency of data recording, its certainty, and format and storage location are described in the PDD (version 9 of 7 April 2007) /7/. The recording frequency of the data seems appropriate for the project. Algorithms and formulae used have also been clearly established. According to ACM0001 the following parameters are monitored:

- The amount of biogas generated (in cubic meters), where the total biogas ($LFG_{total,y)}$, must be constantly measured.

- Biogas temperature (T) and pressure (p) must be measured in order to determine methane density within the landfill gas.

- The Brazilian legislation applicable to this project activity in the national, state and municipal scope, in order to identify whether there has been any changes in the applicable requirements.

- Flare efficiency (FE), expressed based on the time the gas remains in the flares' flame. The flare efficiency is initially estimated as 90%, and will be monitored and calculated as defined by the "Tool to determine project emissions from flaring gases containing methane" /19/ during the project activity. The following data will be measured using a continuous gas analyzer, and the values will be averaged hourly or at a shorter time interval:

  - The volumetric fraction of each component present in biogas ($Vf_{i,h}$).

  - The volumetric fraction of O_2 in the exhaust gas of the flare ($t_{O2,h}$).

  - The concentration of methane in the exhaust gas of the flare in dry basis ($fv_{CH4,FG,h}$).

- Temperature of the exhaust gas of the flare (T_{flare}) will also be measured by a Type N thermocouple.

The PDD (version 9 of 7 April 2007) /7/ identifies several monitoring routines. No specific procedures beyond the already established QA/QC procedures will be necessary. The established procedures reflect good monitoring and reporting practices.

3.6 Calculation of GHG Emissions

Emission reductions are directly monitored and calculated *ex-post*, using the approach indicated in ACM0001.

For the *ex-ante* estimation of emission reductions the expected LFG generation of the landfill is determined using the IPCC first order decay model. The calculation uses an Adjustment Factor of 10% and 60% landfill gas collection efficiency.

There are no sources of emission which might be attributed to the project activities outside its limits because the project does not export electricity. The project activity will produce all the energy needed for the project activity from landfill gas, and no emission reductions will be claimed for displacing/avoiding emissions from other sources as a conservative measure. In case of unintended emissions due to forced electricity use from the grid, the grid emission factor will be calculated *ex post* as required by ACM0002 /17/. In the first periodic verification of the project's emissions reductions, the energy consumption of the project, the energy generation and a possible energy consumption from the grid must be verified.

The only project emissions will result from the efficiency/availability of the flare given by the efficiency of the LFG capturing system.

Regarding the choice of flare efficiency factor in compliance with the "Tool to determine project emissions from flaring gases containing methane" /19/, this will be to continuously monitor the methane destruction efficiency of the enclosed flare (the flare efficiency) planned for this project. The calculation procedure in this tool determines the flow rate of methane before and after the destruction in the flare, taking into account the amount of air supplied to the combustion reaction and the exhaust gas composition (oxygen and methane). The flare efficiency is calculated for each hour of a year based either on measurements or default values plus operational parameters. Project emissions are determined by multiplying the methane flow rate in the residual gas with the flare efficiency for each hour of the year.

The estimated amount of GHG emission reductions from the project is calculated to be 818 362 tCO_2e during the selected first 7-year crediting period (with the potential of being renewed twice), resulting in estimated average annual emission reductions of 116 909 tCO_2e /9/.

3.7 Environmental Impacts

URBAM has all pertinent licenses for the landfill. These licenses were issued by CETESB /14/.

DNV observed that the project has not yet obtained a license for flaring landfill gas and a license should be applied for when the project is implemented. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the license will be obtained when the project is implemented. The first period verification of the project must confirm that this license was eventually obtained

3.8 Comments by Local Stakeholders

Local stakeholders were invited to comment on the project /10/ in accordance with the requirements of Resolution 1 of the Brazilian DNA. Comments by local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, environmental entities and the office of the attorney general, were invited.

No comments were received.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD version 3 of 8 March 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 10 March 2007 to 08 April 2007. No comments were received.

Prior to this, the PDD (version 1 of 15 December 2006) was made publicly available on DNV's climate change website and Parties, stakeholders and NGOs were, through the CDM website, invited to provide comments during a 30 days period from 27 December 2006 to 25 January 2007. No comments were received in this earlier call.

5 VALIDATION OPINION

Det Norske Veritas Certification AS has performed a validation of the ""URBAM/ARAUNA – Landfill Gas Project" (UALGP)" in Brazil. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The project participant is Araúna Participações e Investimentos Ltda. and Urbanizadora Municipal S/A. The host Party Brazil meets all relevant participation requirements. No participating Annex I Party is yet identified.

Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation that the project assists in achieving sustainable development

The aim of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP)" is to reduce greenhouse gas emissions through the capturing and burning of gases generated by the anaerobic decomposition of waste in the Urbanizadora Municipal S/A Landfill. All energy used in the system will be generated by the project. No emission reductions will be claimed from displacing energy from other sources.

The project applies the approved baseline methodology ACM0001 – "Consolidated baseline methodology for landfill gas project activities" version 05. The baseline methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.

The monitoring methodology has been correctly applied. The monitoring plan sufficiently specifies the monitoring requirements.

By the reducing methane emissions the project results in reductions of CO_2 emissions that give long-term benefits to the mitigation of climate change. Emission reductions are directly monitored and calculated ex-post, using the approach indicated in ACM0001 (version 05). These are estimated to be on average 116 909 tonnes of CO_{2e} per year over the crediting period.

Local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, environmental entities and the office of the attorney general were invited to comment on the project through conferences and notice boards. No comments were received.

In summary, it is DNV's opinion that the "URBAM/ARAUNA – Landfill Gas Project" (UALGP), as described in the revised and submitted project design document 9 of 7 April 2007 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0001 (version 05). Hence, DNV requests the registration of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) as a CDM project activity.

REFERENCES

Documents provided by the project proponent that relate directly to the project:

/1/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 1 of 15 December 2006.

/2/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 3 of 8 March 2007.

/3/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 4 of 30 March 2007.

/4/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 5 of 2 April 2007.

/5/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 6 of 3 April 2007.

/6/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 8 of 4 April 2007.

/7/ Araúna Participações e Investimentos Ltda.: Project Design Document for the "URBAM/ARAUNA – Landfill Gas Project" (UALGP) Version 9 of 7 April 2007.

/8/ Araúna Participações e Investimentos Ltda.: Simple Cost Analysis – Financial Sheet.

/9/ Araúna Participações e Investimentos Ltda.: Spreadsheets for the calculation of the UALGP Baseline.

/10/ Letters sent to local stakeholders.

/11/ Araúna Participações e Investimentos Ltda.: Measurement report of the burned biogas in the baseline. 02 April 2007.

/12/ URBAM: Public request for CDM proposal with the history of the landfill and the amount of waste received in each year. 14 June 2006.

/13/ Banco do Brasil: Evidence of Brazilian interests' rates (taxa SELIC). 27 March 2007

/14/ URBAM - Operation Licence # 3001706 issued by CETESB on 31 August 2005 which is valid until 31 August 2010.

Background documents related to the design and/or methodologies employed in the design or other reference documents:

/15/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/16/ CDM-EB: Approved Baseline and Monitoring Methodology ACM0001: "*Consolidated baseline methodology for landfill gas project activities*", version 05.

/17/ CDM-EB: Approved Consolidated Baseline and Monitoring Methodology ACM0002 - "*Consolidated baseline methodology for grid-connected electricity generation from*

renewable sources", version 06.

/18/ CDM-EB: *Tool for the demonstration and assessment of additionality.* Version 03.

/19/ CDM-EB: *Tool to determine project emissions from flaring gases containing methane*. Version of 15 December 2006.

Persons interviewed during the validation, or persons who contributed with other information that are not included in the documents listed above:

/20/ André Leonel Leal – Araúna Participações e Investimentos Ltda.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion	Cross Reference / Comment
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3	Kyoto Protocol Art.12.2	OK	Table 2, Section E.4.1 No participating Annex I Party is yet identified.
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a		Table 2, Section A.3 Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written confirmation by the DNA of Brazil that the project assists in achieving sustainable development.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a		Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of the participating Parties.
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is	Decision 17/CP.7,	OK	The validation did not reveal any

Requirement	Reference	Conclusion	Cross Reference / Comment
used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	CDM Modalities and Procedures Appendix B, § 2		information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Brazil has ratified the Kyoto Protocol on 23 August 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	Not applicable	No participating Annex I Party
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	Not applicable	No participating Annex I Party
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	CDM Modalities and Procedures §37f	OK	Table 2, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall	CDM Modalities and	OK	The PDD was presented for public

Requirement	Reference	Conclusion	Cross Reference / Comment
have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	Procedures §40		comments in the period of 27 December 2006 to 25 January 2007 on climatechange.dnv.com and comments were invited via the UNFCCC CDM website. No comments were received until this date.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	PDD is in accordance with CDM-PDD (version 03 of 28 July 2006).

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The "URBAM/ARAUNA – Landfill Gas Project" (UALGP) is located in São José dos Campos, São Paulo State, Brazil. The physical and geographical boundaries of the project are not clearly identified in the PDD.	~~CL 2~~	OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	See A.1.1	~~CL 2~~	OK
A.2. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR	The project design engineering reflects good practice through the use of technology available in the Brazilian market, consisting basically of a vertical drains system interconnected to horizontal tubing which is connected to the suction and flaring		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			equipment.		
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	The common practice in Brazil is sanitary landfill without landfill gas treatment or only safety flaring.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	The project is unlikely to be substituted by other more efficient technologies.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/	DR	The project will require minimal additional training for project operation and maintenance.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	The UALGP team will guarantee the provision of human and material resources predicted in the service planning and necessary for the accomplishment of the activities, so that all the professionals involved will receive adequate training about the implementation of the Monitoring and Project Plan.		OK
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	Environmental Licenses for landfill was issued by State of São Paulo environmental agency (CETESB).		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	The project follows the Resolution 1 of the Interministerial Committee for Climate Change.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	The project is in line with current sustainable development priorities in Brazil.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Prior to the submission of this validation report to the CDM Executive Board, DNV will have to receive the written confirmation by the DNA of Brazil that the project assists in achieving sustainable development.		
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is expected to bring improvement on sustainable development through reducing methane emissions, generating new activities in landfill dependencies, raising the knowledge regarding environmental care and improving work conditions.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved baseline methodology ACM0001 - "Consolidated baseline methodology for landfill gas project activities"		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR	The project fulfils the conditions under which ACM0001 / Version 04 is applicable considering only the capture and flaring of LFG.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	The application of the methodology is correct and the baseline determination is transparent		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	As "URBAM/ARAUNA – Landfill Gas Project" (UALGP) does not have any contractual obligations to burn methane, the baseline emissions is calculated based on the "Adjustment Factor", estimated as 10% of total methane produced at the baseline that is flared due to odor and security concerns. Also, a conservative collection efficiency value of 60% was considered It was observed that the Adjustment Factor in the baseline emissions calculation is not conservative. It should be evidenced that 10% of the gas would be flared without the implementation of CDM project. An adjustment factor like 20% (used in most Brazilian projects) is more conservative than this approach. No evidence was provided regarding the stated flare efficiency of 98%. DNV request evidence that this value is conservative, considering that the default value is 90%.	~~CAR 1~~ ~~CAR 2~~	OK
B.2.3. Has the baseline been established on a project-	/1/	DR	The baseline has been specifically designed		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
specific basis?			for this project.		
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	The National Waste Management Policy is under discussions and there is enough evidence to conclude that it will result only in requirements for LFG collection but no requirements for LFG destruction of more than 20% of the LFG produced.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	GHG emissions by sources in the baseline were estimated using IPCC's guidelines and the first order decay model approach considering values of L_0 = 0.0986 Gg_{CH4}/Gg_{waste} and k (1/year) = 0.1. It was observed that the Adjustment Factor in the baseline emissions calculation is not conservative. It should be evidenced that 10% of the gas would be flared without the implementation of CDM project. An adjustment factor like 20% (used in most Brazilian projects) is more conservative than this approach. The line "value applied" presented in tables B.6.2 and B.7.1 should inform the quantitative value of data used for expected emission reductions calculations. The parameters Global Warning Potential for methane (GWPCH4) and Capture System Efficiency (CE) should be presented in table B.6.2, as long as the parameters described in the "Tool to determine project emissions from flaring gases containing methane". Parameter values from IPCC 2006	~~CAR 1~~ ~~CL 4~~ ~~CL 5~~ ~~CL 17~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			guidelines are required to be used.		
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	The common practice to dispose waste of large cities on Brazil is sanitary landfill. On small cities the practice is open dumping. All of these scenarios don't have any structure to collect and flare, only flare the natural emission due to safety conditions.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/	DR	In accordance with ACM0001, the additionality of the project is demonstrated through the *Tool for the demonstration and assessment of additionality* /19/, which includes the following steps: *Step 0 -Preliminary screening based on the starting date of the project activity:* As the starting date of the CDM project activity is mentioned on PDD/C.1.1 is 01 July 2008 this step is not applicable. *Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations:* The possible baseline scenarios are: a) to implement the project of capture and flaring of LFG without CDM incentives, b) LFG would continue to be released to the atmosphere and only small amounts of LFG would be burned due to safety and odour reasons and c). to capture LFG and use it to produce electricity or for commercial purposes. There is no legislation in Brazil obliging landfills to flare the collected gas. All scenarios are thus in compliance with all applicable legal and regulatory requirements.	~~CL 3~~ ~~CL 15~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Step 2 - Investment analysis: As the CDM project activity does not generate any financial or economic benefit other than the CDM related income, and there is no intention to produce electricity commercially, the simple cost analysis scenario is applied. Considering the additional costs necessary for increasing the LFG capture capacity, without having any revenues, the project is not a likely baseline scenario. Even if LFG was utilised to generate electricity, this would not significantly alleviate the economic and financial hurdles of the project. *Step 3 - Barrier analysis:* Not selected (Step 2 is selected only) *Step 4 - Common practice analysis:* DNV was able to confirm that possible future legislation that would require landfills to quantify and flare a certain amount of the gas produced is not likely to be implemented in near future when considering the waste disposition situation in Brazil. According to the 2000 National Research on Sanitation (Pesquisa Nacional de Saneameto Básico 2000), made by IBGE (Instituto Brasileiro de Geografia e Estatística - Statistics and Geographic Brazilian Institute), from a total estimated volume of garbage collected in Brazil, 47.1% of the collected garbage was dumped on sanitary landfills, 22.3% was		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			dumped on "controlled" landfills and 30.5% was dumped on "Garbage dumping sites" without any control. A major environmental problem related to domestic waste in Brazil is the lack of waste disposal to sanitary landfills. DNV was able to confirm that the investment to install systems to capture and flare methane is not common practice in Brazil. Even though step 3 of tool for the demonstration and assessment of additionality was not selected, it should be referenced. DNV requests evidence about the Brazilian interests stated in the PDD as about 13,25% per year.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	The project considers the EAF of 10% and collection efficiency of 60%. It was observed that the Adjustment Factor in the baseline emissions calculation is not conservative. It should be evidenced that 10% of the gas would be flared without the implementation of CDM project. An adjustment factor like 20% (used in most Brazilian projects) is more conservative than this approach.	~~CAR 1~~	OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	DNV requests a spreadsheet presenting the grid emission factor calculations. It should present a 3 years historical of electricity dispatch to the grid of all power plants ordered by installation date (month by month). The fuel source should be	~~CAR 7~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			informed also.		
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR	The starting date will be 01 July 2007. The expected operational lifetime is 21 years. DNV requests evidence of the beginning of URBAM Landfill operation, as well as information about the capacity of the landfill, and the cities that send their waste to the landfill.	~~CL 14~~	OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/	DR	A 7-year crediting period was defined, starting in 01 July 2008.		OK
D. Monitoring Plan *The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed*					
D.1. Monitoring Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
D.1.1. Is the monitoring methodology previously approved by the CDM Executive Board?	/1/	DR	The project applies the approved baseline methodology ACM0001 - "*Consolidated baseline methodology for landfill gas project activities*"		OK
D.1.2. Is the monitoring methodology applicable for	/1/	DR	Yes		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
this project and is the appropriateness justified?					
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	The monitoring plan for emissions reductions occurring within the project boundary is based on measuring the LFG collected and flare, adjusted to STP conditions. The recording frequency of the data seems appropriate for the project.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes		OK
D.2. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.2.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	The monitoring plan provides a detailed description of how to measure and adjust the volume of LFG collected and flared and reduced with electricity consumed by project. The algorithms used follows well recognized formulas.		OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/	DR	The monitoring plan indicates continuous monitoring of flare efficiency. In order to determine the flare efficiency and the LFG pressure, the local atmospheric pressure should be measured. No QA/QC procedures were established for monitoring the following data: temperature, pressure, electricity imported, emission factor of the electricity and regulatory requirements related to the project. The monitoring plan does not include the	~~CAR 4~~ ~~CAR 5~~ ~~CAR 6~~ ~~CL 4~~ ~~CL 7~~ ~~CL 9~~ ~~CL 10~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			monitoring of the operation of the energy plant, required by ACM 0001. The monitoring plan – annex 4 and section B.7.1 – describes the methodology form monitoring a landfill gas project activity. This plan should be more specific about how it will be the monitoring plan of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP). The line "value applied" presented in tables B.6.2 and B.7.1 should inform the quantitative value of data used for expected emission reductions calculations. Please indicate the ID number of each data and parameters presented in section B.7 The data "CO_2 emission intensity of the electricity" ($CEF_{electricity,y}$) is presented twice: in sections B.6.2 and B.7.1. Some data variables have to be archived for a period of 2 years from the end of the crediting period (21 years) and the PDD doesn't make any reference to that.		
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/	DR	Yes		OK
D.2.4. Will the indicators give opportunity for real measurements of project emissions?	/1/	DR	Yes		OK
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/	DR	Yes		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.3. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	No potential emission sources of leakage were established by "URBAM/ARAUNA – Landfill Gas Project" (UALGP), The ex-ante calculations of emission reductions presented in PDD doesn't make any reference to the leakage.	~~CL 6~~	OK
D.3.2. Are the choices of leakage indicators reasonable?	/1/	DR	See D.3.1		OK
D.3.3. Will it be possible to monitor / measure the specified leakage indicators?	/1/	DR	See D.3.1		OK
D.3.4. Will the indicators give opportunity for real measurements of leakage effects?	/1/	DR	See D.3.1		OK
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	See D.2.1		OK
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/	DR	Yes		OK
D.4.3. Will it be possible to monitor / measure the specified baseline indicators?	/1/	DR	Yes		OK
D.4.4. Will the indicators give opportunity for real	/1/	DR	Yes		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
measurements of baseline emissions?					
D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	ACM0001 and the Brazilian DNA do not require the monitoring of neither social nor the environmental indicators.		OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/	DR	See D.5.1		OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/	DR	See D.5.1		OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	See D.5.1		OK
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	The responsible for project management and monitoring system are not yet defined, as well as the process planning, the maintenance plan, quality documents and all others procedures of the monitoring plan.	~~CL 12~~	OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	See D.6.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	The UALGP team will guarantee the provision of human and material resources predicted in the service planning and necessary for the accomplishment of the activities, so that all the professionals involved will receive adequate training about the implementation of the Monitoring and Project Plan.		OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	No emergency procedures in case of unintended emissions of LFG were evidenced	~~CL 11~~	OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	See D.6.1		OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	See D.6.1		OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	See D.6.1		OK
D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	See D.6.1 Some data variables have to be archived for a period of 2 years from the end of the crediting period (21 years) and the PDD doesn't make any reference to that.	~~CL 10~~	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	See D.6.1		OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	See D.6.1		OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	See D.6.1		OK
D.6.12. Are procedures identified for project	/1/	DR	See D.6.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
performance reviews before data is submitted for verification, internally or externally?					
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	See D.6.1		OK
E. Calculation of GHG Emissions by Source *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.*					
E.1. Project GHG Emissions *The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	The project consider emissions due electricity consumed to pump the LFG as established by ACM0001.		OK
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/	DR	There are no sources of emission which might be attributed to the project activities outside its limits because the project does not export electricity. The only emissions will result from the efficiency/availability of the flare, the efficiency of the LFG capturing system and from the energy consumed to operate compressors, burners, lighting the operating site and monitoring equipment.	~~CAR 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			For calculation of project emissions due to the import of electricity used to pump the LFG, the amount of electricity consumed and Emission Factor (EF) of SSECO Brazilian grid with value of a combined margin emission coefficient of 0.2636 tCO_2e/MWh (weighted average of the build and operating margin). The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to methodology ACM 002, version 6, for ex ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission. Regarding the flare efficiency the choice, in compliance with "Tool to determine project emissions from flaring gases containing methane", is to continuous monitor the methane destruction efficiency of the enclosed flare (the flare efficiency) planned for this project. The calculation procedure in this tool determines the flow rate of methane before and after the destruction in the flare, taking into account the amount of air supplied to the combustion reaction and the exhaust gas composition (oxygen and methane). The flare efficiency is calculated for each hour of a year based either on measurements or default values plus operational parameters. Project emissions		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			are determined by multiplying the methane flow rate in the residual gas with the flare efficiency for each hour of the year.		
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/	DR	See E.1.3		OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	Yes		OK
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	No potential emission sources of leakage were established by "URBAM/ARAUNA – Landfill Gas Project" (UALGP) The ex-ante calculations of emission reductions presented in PDD doesn't make any reference to the leakage.	~~CL 6~~	OK
E.2.2. Have these leakage effects been properly accounted for in calculations?	/1/	DR	See E.2.1		OK
E.2.3. Does the methodology for calculating leakage comply with existing good practice?	/1/	DR	See E.2.1		OK
E.2.4. Are the calculations documented in a complete and transparent manner?	/1/	DR	See E.2.1		OK
E.2.5. Have conservative assumptions been used when calculating leakage?	/1/	DR	See E.2.1		OK
E.2.6. Are uncertainties in the leakage estimates	/1/	DR	See E.2.1		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
properly addressed?					
E.3. Baseline Emissions *The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	For the ex-ante estimation of emission reductions the expected LFG generation of the landfill is determined using the IPCC first order decay model. The calculation ensures conservativeness by using an Adjustment Factor of 10% and 60 % landfill gas collection efficiency. It was observed that the Adjustment Factor in the baseline emissions calculation is not conservative. It should be evidenced that 10% of the gas would be flared without the implementation of CDM project. An adjustment factor like 20% (used in most Brazilian projects) is more conservative than this approach. No evidence was provided regarding the stated flare efficiency of 98%. DNV request evidence that this value is conservative, considering that the default value is 90%.	~~CAR 1~~ ~~CAR 2~~	OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/	DR	See E.3.1		
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	See E.3.1 DNV requests a spreadsheet presenting the grid emission factor calculations. It should present a 3 years historical of	~~CAR 7~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			electricity dispatch to the grid of all power plants ordered by installation date (month by month). The fuel source should be informed also.		
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	See E.3.1		OK
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	See E.3.1		OK
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/	DR	Yes		OK
E.4. Emission Reductions *Validation of ex-ante estimated emission reductions*.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	The project is expected to reduce CO2 emissions to the extent of 818 362 tCO2e (116 909 tCO2e / year average) over the 7-year crediting period.		OK
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/		URBAM has all pertinent licenses for the landfill. These licenses were issued by CETESB. We observed that the project has not yet obtained a license for flaring landfill gas and that such a license must be applied for		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			when the project is implemented. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the license will be obtained when the project is implemented. The first period verification of the project must confirm that this license was obtained		
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	See F.1.1		OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	See F.1.1		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	See F.1.1		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	See F.1.1		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	See F.1.1		OK
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	Local stakeholders were invited to comment on the project in accordance with the requirements of Resolution 1 of the Brazilian DNA. Comments by local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, environmental entities and the office of the	~~CL 13~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			attorney general, were invited. The name of the stakeholders invited to comment the project should be in English.		
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	See G.1.1		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	See G.1.1		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	See G.1.1		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	See G.1.1		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 1 It was observed that the Adjustment Factor in the baseline emissions calculation is not conservative. It should be evidenced that 10% of the gas would be flared without the implementation of CDM project. An adjustment factor like 20% (used in most Brazilian projects) is more conservative than this approach.	B.2.2 B.2.5 B.2.8 E.3.1	The flow on burning drains has been measured and estimated that would be burned about 2,63% of the expected landfill gas on 2008 descending to about 2,27% on 2014. So, it is reasonable to assume that a very low volume of gas will be flared, and a 10% EF is considered to be conservative. Documentation with measurements will be sent to DNV.	The documentation presented states that, in measurements taken from March 28th to March 31st, the nine drains burned an average of 92.21 m^3/h of biogas, which corresponds to 2.63% of the landfill gas. Based on this, a 10% EF may be considered reasonable. Therefore this CAR is closed.
CAR 2 No evidence was provided regarding the stated flare efficiency of 98%. DNV request evidence that this value is conservative, considering that the default value is 90%.	B.2.2 E.3.1	The 98% is an ex-ante estimation based on the manufacturers specification. Since this is not relevant for the actual emission reduction of the project on the PDD will be considered 90% efficiency only for ex-ante estimation. The value was corrected.	Section B.6.4 states that project activity emissions include 2% of inefficiency of the enclosed flare. This value should be updated. Therefore this CAR remains opened. Inefficiency of the enclosed flare was corrected in PDD, version 5. Therefore this CAR is closed.
CAR 3 The data used for emission factor calculation were obtained from the period 2002 – 2004. However, according to methodology ACM 002, version 6, for ex ante emission factors calculation it must be used the full generation-weighted average of the most recent 3 years for which data are available at the time of PDD submission.	E.1.3	The project participants decided that the only energy source will be a generator that runs on landfill gas. And in case of unwanted emissions due to forced electricity use from the grid the grid emission factor will be calculated *ex post* as required by ACM0002.	Project emissions due to electricity imported from the grid are no longer considered. In the first periodic verification of the project's emissions reductions, DNV must check the energy consumption of the project, the energy generation and how a possible energy consumption from the grid was taken into account. Therefore this CAR is closed.

* MoV = Means of Verification, DR= Document Review, I= Interview

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 4 In order to determine the flare efficiency and the LFG pressure, the local atmospheric pressure should be measured.	D.2.2	There is no reference on the methodology to measure atmospheric pressure.	The methodology ACM0001 and the "Tool to determine project emissions from flaring gases containing methane" do not require the measurement of atmospheric pressure. Therefore this CAR is closed.
CAR 5 No QA/QC procedures were established for monitoring the following data: temperature, pressure, electricity imported, emission factor of the electricity and regulatory requirements related to the project. The monitoring plan does not include the monitoring of the operation of the energy plant, required by ACM 0001.	D.2.2	Corrected. There is no power plant on the URBAN/ARAUNA Landfill Gás Project	The PDD, version 4, presents QA/QC procedures for all applicable data. Therefore this CAR is closed.
CAR 6 The monitoring plan – annex 4 and section B.7.1 – describes the methodology form monitoring a landfill gas project activity. This plan should be more specific about how it will be the monitoring plan of the "URBAM/ARAUNA – Landfill Gas Project" (UALGP).	D.2.2	Corrected. Corrected.	The description of measurements methods and procedures to be applied, and the QA/QC procedures to be applied for the data related to the "Tool to determine project emissions from flaring gases containing methane" still are too generic. Therefore this CAR remains opened. Measurements methods and procedures were adjusted. Therefore this CAR is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 7 DNV requests a spreadsheet presenting the grid emission factor calculations. It should present a 3 years historical of electricity dispatch to the grid of all power plants ordered by installation date (month by month). The fuel source should be informed also.	B.2.9 E.3.3	The project participants decided that the only energy source will be a generator that runs on landfill gas. And in case of unwanted emissions due to forced electricity use from the grid the grid emission factor will be calculated ex post as required by ACM0002.	Grid emission factor calculations will be done ex post just in case of unintended emissions due to forced utilization of grid electricity. In the first periodic verification of the project's emissions reductions, DNV must check the energy consumption of the project, the energy generation and how a possible energy consumption from the grid was taken into account. Therefore this CAR is closed.
CL 1 The tables A.4.4 and B.6.4 are not according to the template of CDM project design document CDM- PDD.		Corrected	The PDD version 4 presents the tables according to the template of CDM-PDD. Therefore this CL is closed.
CL 2 The physical and geographical boundaries of the project are not clearly identified in the PDD.	A.1.1 A.1.2	Corrected	The physical and geographical boundaries are clearly stated in the PDD, version 5. Therefore this CL is closed.
CL 3 Even though step 3 of tool for the demonstration and assessment of additionality was not selected, it should be referenced.	B.2.7	Corrected	Step 3 is referenced in the version 4 of the PDD. Therefore this CL is closed.
CL 4 The line "value applied" presented in tables B.6.2 and B.7.1 should inform the quantitative value of data used for expected emission reductions calculations.	B.2.5 D.2.2	Corrected	The source of data used for data $CEF_{electricity,y}$ is not clearly stated in section B.6.2. The source of data used and value applied for data EL_{imp} does not seem appropriate in section B.7.1. Therefore this CL remains opened.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
		Tables B.6.2 and B.7.1 were corrected.	All data are clearly described in the PDD, version 5. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 5 The parameters Global Warning Potential for methane (GWP_{CH4}) and Capture System Efficiency (CE) should be presented in table B.6.2, as long as the parameters described in the "Tool to determine project emissions from flaring gases containing methane".	B.2.5	Agreed on the GWP CH4 however there are no other parameters that influences the emission reduction of the project. The Capture Efficiency (CE) is an ex-ante parameter. The project will actually measure the landfill gas that will be destroyed.	All appropriate parameters are defined in section B.6.2 of the PDD, version 4. Therefore this CL is closed.
CL 6 The ex-ante calculations of emission reductions presented in PDD doesn't make any reference to the leakage.	D.3.1 E.2.1	Corrected – It was indicated that ACM0001 do not consider leakage.	It is clear stated in the PDD that ACM0001 do not consider leakage. Therefore this CL is closed.
CL 7 The data "CO_2 emission intensity of the electricity" ($CEF_{electricity,y}$) is presented twice: in sections B.6.2 and B.7.1.	D.2.2	Corrected – Is defined on PDD that ex-ante calculation will be considered, so CEF on B.7.1 item was erased	$CEF_{electricity,y}$ will be defined ex-ante, so it was removed from section B.7.1. Therefore this CL is closed.
CL 8 Please explain what represents the variable $MSW_F(x)$ in FOD equation.		Corrected	The variables of FOD equation are clearly described in the PDD, version 4. Therefore this CL is closed.
CL 9 Please indicate the ID number of each data and parameters presented in section B.7.	D.2.2	Corrected – Though the parameter from the "Tool to determine project emissions from flaring gases containing methane." do not have ID number.	The ID number of each data and parameter established by ACM 0001 is clearly stated. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 10 Some data variables have to be archived for a period of 2 years from the end of the crediting period (21 years) and the PDD doesn't make any reference to that.	D.2.2 D.6.8	Corrected	The time defined for archiving the variables is reasonable. Therefore this CL is closed.
CL 11 No emergency procedures in case of unintended emissions of LFG were evidenced.	D.6.4	There are no unintended emissions since only the landfill gas that will be burned will be monitored.	The response presented seems appropriate. Therefore this CL is closed.
CL 12 The responsible for project management and monitoring system are not yet defined, as well as the process planning, the maintenance plan, quality documents and all others procedures of the monitoring plan.	D.6.1	Corrected	Although some actions will be implemented only after the project starts, like the maintenance plan, the monitoring plan presented in the PDD, version 4, seems appropriate. Therefore this CL is closed.
CL 13 The name of the stakeholders invited to comment the project should be in English.	G.1.1	Corrected	The name of the stakeholder is presented in English. Therefore this CL is closed.
CL 14 DNV requests evidence of the beginning of URBAM Landfill operation, as well as information about the capacity of the landfill, and the cities that send their waste to the landfill.	C.1.1	Ok the public request for proposal will be sent to DNV.	The public request for CDM proposal was received. This document presents the information required. Therefore this CL is closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 15 DNV requests evidence about the Brazilian interests stated in the PDD as about 13,25% per year.	B.2.7	Annex - Banco Central	Evidence of Brazilian interests' rates was provided. Therefore this CL is closed.
CL 16 The variables Pn and Ru presented in the page 15 of the PDD are not correctly described.		Corrected	The description of the variables was corrected. Therefore this CL is closed.
CL 17 Parameter values from IPCC 2006 guidelines are required to be used.	B.2.5	Corrected Is not mandated that, for ex-ante calculation IPCC 2006 is used. Quote ACM0001: "Project proponents should provide an ex ante estimate of emissions reductions, by projecting the future GHG emissions of the landfill. In doing so, verifiable methods should be used." The baseline ex ante will not influence the actual emission reduction of the project. Yet, the 2006 IPCC explain that the 2000 IPCC FOD is conservative comparing to the 2006 IPCC method on the item 3A1.6.2 (volume 5 chapter 3), and the parameters k, F, MCF were 2006 IPCC based.	The IPCC 1996 and IPCC 2000 guidelines are still referenced in the PDD. Therefore this CL remains opened. The ex ante estimate of reductions were based in the 2000 IPCC FOD, more conservative than 2006 IPCC. Therefore this CL is closed.

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APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Einar Telnes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	Yes
CDM Verifier:	Yes	***JI Verifier:***	Yes
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1,2,3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	*AM0021*	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	*AM0023*	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	*AM0024*	Yes
ACM0004	Yes	*AM0027*	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	*AM0028, AM0034*	Yes
ACM0007	Yes	*AM0030*	Yes
ACM0008	Yes	*AM0031*	Yes
ACM0009, AM0008, AMS-III.B	Yes	*AM0032*	Yes
AM0006, AM0016, AMS-III.D	Yes	*AM0035*	Yes
AM0009, AM0037	Yes	*AM0038*	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	*AM0041*	Yes
AM0014	Yes	*AM0034*	Yes
AM0017	Yes	*AMS-II.A-F*	Yes
AM0018	Yes	*AMS-III.A*	Yes
AM0020	Yes	*AMS-III.E, AMS-III.F*	Yes

CERTIFICATE OF COMPETENCE

Felipe Lacerda Antunes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	No	***JI Validator:***	No
CDM Verifier:	No	***JI Verifier:***	No
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	No	*AM0021*	No
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	No	*AM0023*	No
ACM003, ACM0005, AM0033, AM0040	No	*AM0024*	No
ACM0004	No	*AM0027*	No
ACM0006, AM0007, AM0015, AM0036, AM0042	No	*AM0028, AM0034*	No
ACM0007	No	*AM0030*	No
ACM0008	No	*AM0031*	No
ACM0009, AM0008, AMS-III.B	No	*AM0032*	No
AM0006, AM0016, AMS-III.D	No	*AM0035*	No
AM0009, AM0037	No	*AM0038*	No
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	No	*AM0041*	No
AM0014	No	*AM0034*	No
AM0017	No	*AMS-II.A-F*	No
AM0018	No	*AMS-III.A*	No
AM0020	No	*AMS-III.E, AMS-III.F*	No

CERTIFICATE OF COMPETENCE

Luis Filipe Tavares

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	No
CDM Verifier:	Yes	***JI Verifier:***	No
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 13		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	No	*AM0021*	No
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	No	*AM0023*	No
ACM003, ACM0005, AM0033, AM0040	No	*AM0024*	No
ACM0004	No	*AM0027*	No
ACM0006, AM0007, AM0015, AM0036, AM0042	No	*AM0028, AM0034*	No
ACM0007	No	*AM0030*	No
ACM0008	No	*AM0031*	No
ACM0009, AM0008, AMS-III.B	No	*AM0032*	No
AM0006, AM0016, AMS-III.D	No	*AM0035*	No
AM0009, AM0037	No	*AM0038*	No
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	No	*AM0041*	No
AM0014	No	*AM0034*	No
AM0017	No	*AMS-II.A-F*	No
AM0018	No	*AMS-III.A*	No
AM0020	No	*AMS-III.E, AMS-III.F*	No

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director