



VALIDATION REPORT

LANDFILL GAS TO ENERGY PROJECT AT LARA LANDFILL, MAUA, BRAZIL

REPORT No. 2004-1061

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DET NORSKE VERITAS



VALIDATION REPORT

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DET NORSKE VERITAS AS

DNV Certification

Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 945 748 931 MVA

Summary:

DNV has performed a validation of the “Landfill Gas to Energy Project at Lara Landfill, Maua, Brazil”, on the basis of UNFCCC and Brazilian criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol criteria and the modalities and procedures for CDM project activities as agreed in the Marrakech Accords.

The validation consisted of the following three phases: i) a desk review of the project design and the baseline and monitoring plan, 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 “Landfill Gas to Energy Project at Lara Landfill, Maua, Brazil”, as described in the project design document of July 2004, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0003. Hence, DNV will request the registration of the “Landfill Gas to Energy Project at Lara Landfill, Maua, Brazil” as CDM project activity. 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 a confirmation that the project assists in achieving sustainable development.

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Work carried out by: Luis Filipe Aboim Tavares, Kumaraswamy Chandrashekara			
Work verified by: Michael Lehmann			
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Appendix A Validation Protocol

***Abbreviations***

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EAF	Effectiveness Adjustment Factor
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MWh _e	Mega watt hour equivalent
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
tCO _{2e}	Tonne CO ₂ equivalent
UNFCCC	United Nations Framework Convention for Climate Change
GWP	Global Warming Potential



1 INTRODUCTION

Lara Co-Geração e Comércio de Energia Ltda. has commissioned Det Norske Veritas Certification Ltd. (DNV) to validate the “Landfill Gas to Energy Project at Lara Landfill, Maua, Brazil” (hereafter called “the project”).

This report summarises the 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 Luis Filipe Aboim Tavares, DNV Rio de Janeiro	Team leader, Waste management expert
Mr Kumaraswamy Chandrashekara, DNV Bangalore	GHG auditor
Mr Michael Lehmann, DNV Oslo	Technical reviewer

1.1 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 Kyoto Protocol criteria for the CDM, the CDM rules and modalities as agreed in the Marrakech Accords and relevant decisions by the CDM Executive Board. The validation team has, based on the recommendations in the Validation and Verification Manual /3/, and 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 provide input for improvement of the project design.

1.3 The Landfill Gas to Energy Project at Lara landfill, Maua, Brazil

The landfill gas to energy project, located in the Mauá Municipality, São Paulo State, involves the capture of landfill gas emitted from solid municipal waste of the metropolitan area of São Paulo, that has already been deposited at the Lara Landfill and that is to be added yet until the planned closing of the landfill site in 2014.

The project activity envisages an active gas collection system, improvements to the leachate drainage and landfill covering system and the installation of electricity generation and gas flaring plants, to be carried out in two phases:

- First phase (2004-2005): Installation and operation of a gas capturing and flaring system, with a pilot gas engine and generation of 1 MW power for project use.



- Second Phase (2005-2006): Power generation of upto 10 MW, by the installation of additional gas engines and power generator sets.

The power additional power generated will be fed to the local utility grid through a Power Purchase Agreement.

2 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design and the baseline and monitoring methodology
- 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 /3/. The validation protocol consists of three tables as described in Figure 1.

The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, 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 completed validation protocol for the “Landfill Gas to Energy Project at Lara Landfill, Maua, Brazil” is enclosed in Appendix A to this report

2.1 Review of Documents

The PDD /1/ (initial version of January 15, 2004, and the revised version of April 2004 and July 2004) submitted by Lara Co-Geração e Comércio de Energia Ltda was reviewed. Additional background documents /2/ related to the calculation of the emission reduction estimate and the financial analysis were also consulted. Other documents, such as the Environmental Licences, conditionings and Environmental Impact Assessment, were reviewed during the site visit in order to assure assessment of relevant information.



Validation Protocol Table 1: Mandatory Requirements			
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), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.	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). Clarification is used when the validation team has identified a need for further clarification.

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	Ref. to checklist question in table 2	Summary of project owner response	Validation 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 Client or other 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



2.2 Follow-up Interviews

On March 01, 2004, DNV performed interviews with Arquipélago Engenharia Ambiental and Lara Co-Geração e Comércio de Energia Ltda during a site visit to the Lara landfill in Mauá Municipality, São Paulo State, to confirm and to resolve issues identified in the document review.

The main topics of the interviews were:

- Environment impacts & their control,
- Environment licenses conditioning compliance,
- Gas capture and power generation systems,
- Calibration requirements,
- Quality procedures.

2.3 Resolution of Clarification and Corrective Action Requests

Findings established during the validation can either be seen as a non-fulfilment of validation criteria or where a risk to the fulfilment 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) CDM or host Party 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.

The validation identified six requests for *Clarification*. To address these requests for *Clarification*, Lara Co-Geração e Comercio de Energia Ltda. submitted a revised PDD (version July 2004). The clarifications and additional information provided by Lara sufficiently addressed all concerns raised by DNV.

To guarantee the transparency of the validation process, the concerns raised and responses given are documented in more detail in Table 3 of the validation protocol in Appendix A.



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 validation findings relate to the project design as documented and described in the revised PDD of July 2004.

3.1 Participation Requirements

The only project participant is Lara Co-Geração e Comércio de Energia Ltda of Brazil. The participating Party is Brazil as the host Party. Brazil meets all relevant participation requirements.

3.2 Project Design

The objective of Lara Landfill Gas to Energy Project is to capture landfill gas emitted from the large quantities of degrading solid municipal waste of the metropolitan area of São Paulo and surrounding municipalities, which have already been deposited at the Lara landfill and which will be added yet until the planned closing of the landfill in 2014.

The project activity envisages an active gas collection system, improvements to the leachate drainage and landfill covering system and the installation of electricity generation and gas flaring plants, to be carried out in two phases:

- First phase (2004-2005): Installation and operation of a gas capturing and flaring system, with a pilot gas engine and generation of 1 MW power for project use.
- Second Phase (2005-2006): Power generation of up to 10 MW, by the installation of additional gas engines and power generator sets.

The project design engineering reflects good practice through the installation of a gas collecting system with connecting pipes, blowers and manifolds. Apart from the existing wells, additional wells will be drilled and connected to the gas collection system. Additionally, a flaring system and power generation system of about 1 MW will also be installed (to be completed in 2004-2005). The generated power is expected to meet the electricity demand of the entire landfill installation. In 2005-2006, the power generation capacity will be increased to 10 MW for supply to the local grid.

The project has the capacity to reduce emissions to the extent of 500 000 tons CH₄ (10,5 million tons CO₂e) over the 21 years expected operational lifetime of the project activity. According PDD version July 2004, the starting date of the project activity is January 01, 2005. A renewable crediting period of 7 years has been selected.

The project is expected to bring social (employment, health, and labor conditions), environmental (air quality) and economic benefits, thus contributing to sustainable development objectives of the Brazilian Government.

No public funding is involved, and the validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.



3.3 Baseline

The project applies the approved baseline methodology “Simplified Financial Analysis for Landfill Gas Capture Projects” (AM0003).

An analysis of a series of plausible baseline scenarios demonstrate that the continuation of the existing situation, i.e. the landfill owner will not take any particular action to prevent LFG emissions, apart from occasionally and manually igniting gas emanating from the small number of passive vents currently installed for reducing the risk of accidental fires, represents the most economic course of action and is thus a likely baseline scenario.

An Effectiveness Adjustment Factor (EAF) of 20% is selected to account for the estimated 5 to 10% of the total amount of landfill gas produced that is currently flared, i.e. by occasionally and manually igniting the vented gas at about 30 of the 60 venting pipes at the Lara landfill.

To demonstrate the additionality of the project, the baseline methodology includes an additionality test that considers a series of questions to justify why the project is not the likely scenario. It includes a justification of barriers and it is demonstrated that current landfill regulations and the economics of landfill gas utilisation only favour the baseline scenario. The financial analysis provided in the revised PDD sufficiently supports the claim that Lara would not initiate the project in absence of the CDM. It is demonstrated that CER revenues increase the IRR of the project and thus help to overcome an investment barrier.

3.4 Monitoring Plan

The project applies the approved monitoring methodology “Simplified Financial Analysis for Landfill Gas Capture Projects” (AM0003).

The methodology considers monitoring directly the emissions reductions through landfill gas measurements for flaring, and electric energy generated and applying the Generator Heat rate index to account total methane captured and destroyed.

Details of the data to be collected, the frequency of data recording, its certainty, and format and storage location are described. The recording frequency of the data seems appropriate for the project. Algorithms and formulae used have also been clearly established. All parameters including pressure and temperature have been included in the revised PDD.

Complementary information provided in the revised PDD and the fact that the management systems have been certified to ISO 9001:2000 standards provide assurance that pertinent QA and QC procedures are in place.

In line with the approved methodology, towards the end of the first and second 7-years crediting period, the ABETRE, an expert shall be conducting a survey to determine the percentage of landfill gas flaring that companies are doing in their sites in the absence of carbon finance incentives. This percentage will be used to revise the EAF applied by the project in the following crediting period.

Monitoring and recording of sustainable development indicators have been established for environment and socio-economic indicators, in line with the compliance requirements of DNA resolution 1.



3.5 Calculation of GHG Emissions

The *ex-post* emission reduction are directly monitored and calculated, using two-step approach of the approved methodology: Methane combustion in electricity generators and Methane combustion in flares.

Emission reductions are estimated *ex-ante* based on the US EPA first order decay model. The assumptions used to estimate methane generation (i.e. methane generation constant of 0.1 per year and methane generation potential of 160 m³ per tonne waste) and the methane recovery (i.e. LFG recovery efficiency of 75%) are reasonable.

3.6 Leakage

The only potential source of leakage is from emissions resulting from generating electricity used to pump the landfill gas in the additional collection equipment. It is expected that there will be no leakage for the project, because sufficient electricity is generated from recovered landfills gas to operate the collection system.

3.7 Environmental Impacts

Brazilian law requires an EIA for new landfills. The project has an Environmental License to install and operate the landfill, and an EIA was conducted in 1991. For landfill gas recovery no license is necessary according to the Environment Agency letter. For energy generation below 10 MW a new environment operation license will need to be issued by the Environmental Agency and should be verified during verification of emission reductions. During the site visit, all existents licenses and conditionings were reviewed, including conditionings compliance (LF 14/00622/95 for 267.936 m² landfill) and found to be adequate.

The main environment impact from landfill is the leachate treatment, which is included in the project.

3.8 Comments by Local Stakeholders

The project meets the requirements of Resolution 1 of the Brazilian DNA to invite local stakeholders' comments, like Municipal Government, state and municipal agencies, Brazilian forum of NGOs, communities and office of the attorney general.

A summary of the comments received and how due account was taken of the comments received is included in the PDD. All organisations agreed with the project concept, and recognised the project's contribution to mitigate climate change.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

Det Norske Veritas Certification Ltd. (DNV) published the PDD (version of April 2004) on its website as and invited comments on the validation requirements from Parties, stakeholders and UNFCCC accredited NGOs during a 30 days period from 21 May 2004 to 20 June 2004. No comments were received during this period.



5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the “Landfill gas to energy project at Lara landfill, Maua, Brazil” (hereafter called “the project. The validation was performed on the basis of UNFCCC criteria for CDM project activities and relevant Brazilian criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The only project participant is Lara Co-Geração e Comércio de Energia Ltda of Brazil. The participating Party is Brazil as the host Party. Brazil meets all relevant participation requirements.

The project proposes collection and combustion or flaring of the landfill gas (LFG) captured at the Lara Landfill. The project results in the reduction of CH₄ emission, that is real, measurable and give long-term benefits and that are additional to what would have occurred in the absence of the project. Potential CO₂ emissions associated with the displacement of grid electricity when the project supplies electricity to the regional grid will not be claimed by the project.

The project is not expected to have considerable environmental impacts. Effluent treatment (leachate) is treated with aeration units and a biologic filter. For the implementation of a landfill gas collection system no further EIA/Environment Licence is necessary. However an Environmental Licence for landfill was required by Brazilian law and the Landfill has received an environmental licence by CETESB. For the generation unit, a new operation license will need to be issued by Environment Agency and should be checked during verification of emission reductions.

The project applies the baseline and monitoring methodology AM0003, i.e. “Simplified financial analysis for landfill gas capture projects”. The baseline methodology has been applied correctly 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 absence of the project activity.

By flaring or combustion of landfill gas (methane), the project results in the reduction of CH₄ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions. The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators.

Local stakeholders’ comments were invited according Brazilian DNA Resolution 1.

In summary, it is DNV’s opinion that the “Landfill gas to energy project at Lara landfill, Maua, Brazil”, as described in the project desing document of July 2004, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0003. Hence, DNV will requests the registration of the “Landfill gas to energy project at Lara landfill, Maua, Brazil” as CDM project activity.

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 a confirmation that the project assists in achieving sustainable development.



6 REFERENCES

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

- /1/ Factor Consulting + Management AG, Arquipélago Engenharia Ambiental: *Landfill gas to energy project at Lara landfill, Maua, Brazil - Project Design Document*. Initial version of January 2004 and revised version of April 2004 and July 2004.
- /2/ Factor Consulting + Management AG, Arquipélago Engenharia Ambiental: *Spreadsheet documenting emission reduction and financial analysis*.

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

- /3/ International Emissions Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /3/ Approved baseline and monitoring methodology AM0003: *Simplified Financial Analysis for Landfill Gas Capture Projects* (Version 01, 12 January 2004).

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

- /a/ Ralf Lattouf - Arquipélago Engenharia Ambiental
- /b/ Yara Campos Almeida – Lara Central de Tratamento de Resíduos
- /c/ Wagner Damo – Lara Central de Tratamento de Resíduos

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APPENDIX A

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
2. The project shall assist non-Annex I Parties in achieving sustainable development and the project shall have obtained confirmation by the host country that the project assists in achieving sustainable development	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 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
4. The project shall have the written approval of voluntary participation from the designated national authorities 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 Brazil.
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

REQUIREMENT	Reference	CONCLUSION	Cross Reference / Comment
7. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Decision 17/CP.7	OK	No public funding involved.
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 country 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	NA	No participating Annex I Party is yet identified
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	NA	No participating Annex I Party is yet identified
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 Methodology Panel	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 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	CDM Modalities and Procedures §40	OK	The PDD was published on www.dnv.com/certification/ClimateChange , Parties, stakeholders and NGOs were on 21 May 2004

REQUIREMENT	Reference	CONCLUSION	Cross Reference / Comment
			invited through the UNFCCC CDM website to provide comments on the validation requirement during a period of 30 days until 20 June 2004. No comments were received.
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 was received before July 2004 and is according to version 01 of the CDM-PDD of 29 August 2002.

Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV ^a	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <i>The project design is assessed.</i>					
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/	DR	The project is located in Mauá Municipality, in the São Paulo State, Brazil		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The project system boundaries are limited to the geographic area of Lara Landfill site which includes landfill gas capture and flaring system, gas engines and power generator sets.		OK
A.2. Technology to be employed <i>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.</i>					
A.2.1. Does the project design engineering reflect current good practices?	/1/	DR	The project design engineering reflects good practice through the installation of active gas collection systems, landfill covering systems, power generation, gas flaring systems and improvements in leachate drainage.		OK
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	Yes, the common practice in Brazil is sanitary landfill without landfill gas treatment and this project involves transfer of state of the art landfill management system, largely unknown in		OK

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

CHECKLIST QUESTION	Ref.	MoV ^d	COMMENTS	Draft Concl.	Final Concl.
			Brazil.		
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, at least within the first seven year commitment period.		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 project documentation does not detail provisions for training.	CL1	OK
A.3. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/	DR	The project has necessary licences issued by the local and state authorities		OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	The project is in line with Resolution 1 of Interministerial Committee for Climate Change with respect stakeholders consultations.		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.		OK
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is likely to improve employment, health and labour conditions.		OK

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

CHECKLIST QUESTION	Ref.	MoV ^d	COMMENTS	Draft Concl.	Final Concl.
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Is the baseline methodology previously approved by the CDM Methodology Panel?	/1/	DR	The project applies the approved baseline methodology called “Simplified financial analysis for landfill gas capture projects” (AM0003).		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/	DR	Yes, the project fulfils the condition under which AM 0003 is applicable.		OK
B.2. Baseline Determination <i>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.</i>					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/	DR	The methodology is appropriately applied. The methodology uses 7 steps instead of 4 steps as defined in AM0003. The wording of these steps is based on NM0005 upon which AM0003 is based. All issues included in the 4 steps of AM0003 are sufficiently addressed in the 7 steps in the PDD.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	Yes and is in line with the already approved methodology. The default Effectiveness		OK

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			Adjustment Factor (EAF) of 20% is selected to account for the estimated 5 to 10% of the total amount of landfill gas produced that is currently flared, i.e. by occasionally and manually igniting the vented gas at about 30 of the 60 venting pipes at the Lara landfill.		
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	Yes, a project specific analysis of plausible baseline scenarios is carried out and a project specific IRR is determined.		OK
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	Yes, the baseline takes into account Brazilian electricity sector policies and includes review of environment legislation, and financial considerations.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Yes, according calculation of IRR and related details available on complementary datasheet..		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	Yes, the continuation of the existing situation, i.e. the landfill owner will not take any particular action to prevent LFG emissions, apart from occasionally and manually igniting gas emanating from the small number of passive vents currently installed for reducing the risk of accidental fires, is a likely baseline scenario.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario (e.g. through (a) a flow-chart or series of questions that lead to a narrowing of potential baseline options, (b) a qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely, (c) a qualitative or quantitative	/1/	DR	Yes, the PDD on section B.3 includes a series of questions that justify why the project is not a likely baseline scenario, including an IRR analysis for the project that demonstrates that the project is not financially attractive.		OK

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assessment of one or more barriers facing the proposed project activity or (d) an indication that the project type is not common practice in the proposed area of implementation, and not required by a Party's legislation/regulations)?					
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	Yes, Electric Energy Policy for small producers, poses an investment risk. The Effectiveness Adjustment Factor will be revised at the end of every baseline crediting period (e.g. for the first time after 7 years), by estimating the amount of GHG flaring taking place as part of common industry practices at that point in the future.		OK
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	Yes		OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and reasonable?	/1/	DR	Yes, according to the PDD version July 2004 the start of construction of the first phase is August 2004 and July 2005 for the second phase. The expected operation lifetime 21 years.		OK
C.1.2. Is the assumed crediting time clearly defined and reasonable (renewable crediting period of max. two x 7 years or fixed crediting period of max. 10 years)?	/1/	DR	A 7 years crediting period starting 2005-01-01 has been chosen with the potential for renewal twice.		OK

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D. Monitoring Plan <i>The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).</i>					
D.1. Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
D.1.1. Is the monitoring methodology previously approved by the CDM Methodology Panel?	/1/	DR	The project applies the monitoring methodology called “Simplified financial analysis for landfill gas capture projects” (AM0003).		OK
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/	DR	Yes,		OK
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/	DR	<p>The monitoring considers the measurements on electric energy production, gas flow rates and methane fraction in LFG. However the pressure and temperature components have not been addressed. Also no comments about electric energy used on exhaust of LFG defined on AM003.</p> <p>In accordance with AM0003, the monitoring plan also considers a review of the Effectiveness Adjustment Factor at renewal of the crediting period.</p>	CL2	OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/	DR	Yes		OK

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D.2. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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	Not applicable, because emission reductions are directly calculated.		OK
D.3. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
D.3.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	The electricity consumption for pumping gas and leachate will be monitored in accordance with AM0003. No significant leakages are envisaged from the project		OK
D.4. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
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	Yes, the project does foresee the assessment of Effectiveness Adjustment Factor and LFG recovery and flaring becoming an attractive course of action.		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 the specified baseline indicators?	/1/	DR	Yes		OK

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D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Although the PDD indicates several social and environmental initiatives, no indicators have been identified.	CL3	OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/	DR	As in D.5.1		OK
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/	DR	As in D.5.1		OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	As in D.5.1		OK
D.6. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/	DR	Yes, Lara Co-Geração e Comercio de Energia Ltda.		OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/	DR	Yes, Lara Co-Geração e Comercio de Energia Ltda		OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/	DR	No procedures for training of monitoring personnel are described, but the project only requires limited monitoring, which is part of normal operations.		OK
D.6.4. Are procedures identified for emergency	/1/	DR	No GHG emission relevant emergency situations		OK

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preparedness for cases where emergencies can cause unintended emissions?			are expected to occur.		
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/	DR	Yes, as indicated in the QC/QA procedures.		OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/	DR	Yes, as indicated in the QC/QA procedures.		OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/	DR	Yes, indicated in the QC/QA procedures.		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	Yes, as indicated in the monitoring plan.		OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/	DR	Yes		OK
D.6.10. Are procedures identified for review of reported results/data?	/1/	DR	It is not clear how reported data/results will be reviewed.	CL4	OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/	DR	Complementary information provided in the revised PDD and the fact that the management systems have been certified to ISO 9001:2000 standard provide assurance that pertinent procedures are in place.		OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/	DR	Complementary information provided in the revised PDD and the fact that the management systems have been certified to ISO 9001:2000 standard provide assurance that pertinent procedures are in place.		OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future	/1/	DR	Complementary information provided in the revised PDD and the fact that the		OK

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monitoring and reporting?			revised PDD and the fact that the management systems have been certified to ISO 9001:2000 standard provide assurance that pertinent procedures are in place.		
E. Calculation of GHG Emissions by Source <i>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.</i>					
E.1. Predicted Project GHG Emissions <i>The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.</i>					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/	DR	As emission reductions are directly calculated, the only source of project emissions identified within the boundary is the fugitive methane emissions from the landfill. However, these will not be accounted for as they are equal in the project and baseline scenario.		OK
E.1.2. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/	DR	Only methane has been considered in accordance with AM0003.		OK
E.2. Leakage <i>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.</i>					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	There is no leakage expected from this project. The gas engine / generator set with a capacity of		OK

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			1 MWel is expected to cover the entire electricity demand of the landfill installations.		
E.3.Baseline Emissions <i>The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.</i>					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/	DR	Not applicable, because emission reduction are directly calculated		OK
E.3.2. Are the GHG calculations documented in a complete and transparent manner?	/1/	DR	Yes		OK
E.3.3. Have conservative assumptions been used when calculating baseline emissions?	/1/	DR	Yes, it was assumed that the gas collection system will collect 75% of the total amount of gas produced by the landfill.		OK
E.3.4. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	Emission estimates are by nature uncertain, but actual emission reductions will be directly monitored.		OK
E.4.Emission Reductions Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/	DR	Yes. The project is expected to abate, during first crediting period, emissions to the extent of 4,5 million tCO _{2e} , and 10,5 million tCO _{2e} over the 21 years.		OK

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F. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Yes		OK
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	Yes, an EIA was presented for Environment Licence issue, however it is not presented or mentioned nor respective conditionings.	CL5	OK
F.1.3. Will the project create any adverse environmental effects?	/1/	DR	The main impact of landfill is leachate and a treatment station has been included in the project design. No significant environmental impacts are expected to be created.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Not foreseen		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes		OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	As in F.1.2		OK
G. Stakeholder Comments <i>The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.</i>					
G.1.1. Have relevant stakeholders been consulted?	/1/	DR	Yes, the stakeholder consultation process covered the municipal governments, city councils, environmental agencies of the state and municipality, NGO's, community associations and the state attorney for public interest.		OK

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G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Yes. Through workshops and by involving the media.		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	As in G.1.1		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	The PDD indicates receipt of suggestions with respect to social programmes.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	Status of the alternatives to the social programmes suggested, as indicated in the PDD is not clear.	CL6	OK

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Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project owner response	Validation team conclusion
CL 1. The project documentation does not detail provisions for training	A.2.5	Revised PDD section A.4.3, now includes training to be provided during both the phases of the project.	OK. Complementary information on revised PDD and ISO 9001:00 certification assure provision for training
CL 2. The monitoring plan includes the main figures of emissions on electric generation and LFG flaring except for pressure, mentioned by AM0003.	D.1.3	Revised PDD Section D3, Table ID 1, now includes monitoring for temperature, pressure and electricity for gas & leachate pumping.	OK. Section D.3 of the revised PDD (Version sent on 22/04/2004) adequately provides the requested clarification on complementary monitoring.
CL 3. Although the PDD mentioned several social and environmental initiatives, no indicators were observed	D.5.1	Revised PDD now includes socio economic and environment indicators for the project.	OK. Appendix 2 of the revised PDD (Version July 2004) provides the requested clarification on Sustainable Development Monitoring according Resolution 1 of DNA (CIMGC).
CL 4. Procedures for results review and corrective action were not considered.	D.6.10	Revised PDD, now includes requirements for semi annual review, verification of data and audits	OK. Complementary information on revised PDD and ISO 9001:00 certificate assure that pertinent procedures are in place.
CL 5. EIA was presented for Environment Licence issue, however it is not presented or mentioned nor respective conditionings	F.1.2	Sections F in the PDD have been revised to address this.	OK. Environment Licences and related compliance requirements were verified during the site visit and considered adequate. As informed on revised PDD, the Environment Licence to electric generator unit will be available at the end of 2004, so it should be verified on verification.

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project owner response	Validation team conclusion
CL.6 Status of the alternatives to the social programmes suggested, on account of the stakeholder comments received, as indicated in the PDD is not clear.	G.1.5	Sections G2 and G3 in the PDD have been revised to address this.	OK. Section G2 and G3 of the revised PDD (Version sent on 22/04/2004) provides the requested clarification on Stakeholders comments. The response by the Municipality to takeover the sewage water collection system was adequately considered.

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