

VALIDATION REPORT

Salvador da Bahia Landfill Gas Management Project in Brazil

REPORT NO. 2003-1598 REVISION NO. 04



NO 945 748 931 MVA

VALIDATION REPORT

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Summary:

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the Salvador da Bahia Landfill Gas Management Project in Brazil on the basis of UNFCCC 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. the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

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 Salvador da Bahia Landfill Gas Management Project, as described in the revised and resubmitted project design documentation of March 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the approved baseline and monitoring methodology AM0002. Hence, DNV requests the registration of the Salvador da Bahia Landfill Gas Management Project as CDM project activity.

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Abbreviations

AMC	Aterro Metropolitano do Centro
BATTRE	BATTRE Bahia Transferencia e Tratamento de Residuos S.A.
BLS	Baseline Study
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EB	CDM Executive Board
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill gas
MSW	Municipal Solid Waste
MVP	Monitoring and Verification Plan
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change
VEGA	VEGA Bahia Tratamento de Resíduos S.A.



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1 INTRODUCTION

BATTRE Bahia Transferencia e Tratamento de Residuos S.A. (BATTRE), until 2 December 2004 called VEGA Bahia Tratamento de Resíduos S.A. (VEGA), has commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the Salvador da Bahia Landfill Gas Management Project (hereafter called "the project") in Brazil.

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 consisted of the following personnel:

Mr Luis Filipe Aboim Tavares	DNV Brazil	Team leader, CDM auditor
Ms Mari Grooss Viddal	DNV Oslo	CDM auditor
Dr. Tsuyoshi Nakao	DNV Japan	Waste management sector expert
Mr Michael Lehmann	DNV Oslo	CDM auditor
Mr Einar Telnes	DNV Oslo	Internal verifier

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 the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions by the CDM Executive Board. The validation team has, based on the recommendations in the Validation and Verification Manual /13/, 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.



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1.3 The Salvador da Bahia Landfill Gas Management Project

The Salvador da Bahia landfill, known more correctly as Aterro Metropolitano do Centro (AMC), is located in a rural area, approximately 20 km north-east of downtown Salvador, State of Bahia, Brazil. The site is in the metropolitan area of Salvador that includes 10 municipalities and the neighbouring area is residential. Although the total project area is 2,500,000 m², the area reserved for waste disposal will be 600,000 m². The landfill has a total capacity of 18,000,000 m³ and receives approximately 850,000 tonnes/year of domestic waste. BATTRE, a wholly owned subsidiary of the SITA GROUP, operates the existing landfill.

The geographic system boundaries of the landfill includes the current plot of 72 hectares occupied by BATTRE, as well as a further 178 hectares to cover the landfill's expansion in subsequent phases outlined in the concession agreement between BATTRE and the Municipal Government of Salvador da Bahia. The concession has a validity for 20 years, starting from 1999. While the environmental license for the landfill specifies that there should be LFG capture, no specific collection efficiency is specified. BATTRE's original proposal to the Municipality, submitted to apply for the landfill concession, suggested a collection efficiency of 19% to 24% over the life of the landfill. The proposal later became a contractual document and formed the basis for which BATTRE received its license to operate the Salvador da Bahia landfill.

The proposed project will expand the coverage of the LFG capture system at the Salvador de Bahia Landfill by installing additional equipment for LFG collection and flaring with a capacity of 6,250 m³/h in 2000 and expanding to 46,250 m³/h in 2020). The project will herewith improve the original project collection efficiency of 19-24% to 80% and is, as a consequence, expected to reduce methane emissions.

Although electricity generation is not economically feasible at this stage, a gas engine with a capacity of 8 MW for electricity production may be installed in the future. Potential CO_2 emission reductions resulting from displacing fossil-fuel based electricity generation are currently not considered for crediting under CDM, although this may be considered for future crediting periods.

Simplified, the project can be described like this:

Without project" or baseline scenario:

Capture and flaring of only 19-24% of LFG (according to the concession agreement between BATTRE and the Municipal Government of Salvador da Bahia) produced by the Salvador Landfill with the remaining LFG emitted to atmosphere.

➤ "With project" scenario:

Improvement of the LFG collection system efficiency to 80% and flaring of all LFG collected.

The projected emission reductions are 13 958 155 tonnes of CO_2e (t CO_2e) over the projects operational lifetime of 16 years (average of 664 674 t CO_2e per year) and 4 911 649 t CO_2e during the first 7 years crediting period (average of 701 664 t CO_2e per year).



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2 METHODOLOGY

The validation of the project was started in November 2002 and was concluded in April 2005. The validation consisted of the following three phases:

- i) a desk review of the project design documents (November 2002 to April 2005)
- ii) follow-up interviews with project stakeholders (December 2002)
- iii) the resolution of outstanding issues and the issuance of the final validation report and opinion (January 2003 to April 2005).

2.1 Review of Documents

The Project Design Document (PDD) of the Salvador da Bahia Landfill Gas Management Project underwent several revisions. DNV performed a pre-validation by reviewing the draft PDD of October 2002. To address DNV's initial concerns, BATTRE resubmitted in April 2003 a revised draft PDD. This revised draft PDD was in April 2003 submitted to the CDM Executive Board for review of the proposed new baseline and monitoring methodologies employed by the project. To address changes to the baseline and monitoring methodologies requested by the CDM Executive Board, the PDD needed further revisions. Subsequently, a fourth version of the PDD /1/ was submitted to DNV in October 2003 for final review. This version was presented to the Brazilian DNA for approval. Eventually, the PDD was once more revised to reflect the new format of the CDM-PDD and changes to the list of project participants. The final validation findings presented in this report relate to the project as described in the PDD of March 2005 (version 5).

Furthermore, the Salvador da Bahia Landfill Gas Management Project Baseline Study (BLS) /5/, the Salvador da Bahia Landfill Gas Project Monitoring and Verification Plan (MVP) /2/, the Salvador da Bahia Landfill Gas Project Baseline Study Workbook /3/ and the Salvador da Bahia Landfill Gas Project Monitoring and Verification Workbook /4/ were reviewed during the valdiation. Additional background documents /9/-/12/ related to the project design and the baseline were also consulted.

In order to ensure transparency, a validation protocol has been customised for the project, according to the Validation and Verification Manual /13/. The completed validation protocol for the Salvador da Bahia Landfill Gas Management is enclosed in Appendix A to this report. 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 validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The completed validation protocol for the Salvador da Bahia Landfill Gas Management Project is enclosed in Appendix A to this report.



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Validation Protocol Table 1: Mandatory Requirements					
Requirement	Reference	Conclusion	Cross reference		
<i>The requirements the project must meet.</i>	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		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 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



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2.2 Follow-up Interviews

On 20 December 2002 DNV performed interviews with Brazilian project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of BATTRE /14/ were interviewed. The main topics of the interviews were:

- Leachate treatment,
- Implementation of electricity generators,
- Plastic contribution in CH₄ production,
- ➢ ISO 14001 certification,
- LFG monitoring,
- > Pertinent legal requirements (Environmental Permissions, Waste Law project).

The results from the follow-up interviews are documented in the validation protocol in Appendix A to this report.

2.3 Resolution of Clarifications 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 objective of this phase of the validation was to resolve the *Corrective Action Request* and requests for *Clarification*. The two *Corrective Action Request* and the two requests for *Clarification* identified by DNV were resolved through communications between BATTRE and the validation team and BATTRE's subsequent revisions of the PDD. To guarantee the transparency of the validation process, the corrective action requests and clarifications raised by DNV and the responses given by BATTRE are described in Table 3 of the Validation Protocol in Appendix A to this report.



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3 VALIDATION FINDINGS

The findings from 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 PDD of March 2005.

3.1 Participation Requirements

The project participants are BATTRE Bahia Transferencia e Tratamento de Residuos S.A. of Brazil, Showa Shell Sekiyu K.K. of Japan and Shell Trading International Limited of the United Kingdom. The participating Parties - Brazil as host Party and Japan and the United Kingdom as Annex I Parties - meet all relevant participation requirements. The Designated National Authorities (DNA) of Brazil, Japan and the United Kingdom approved the project on 2 June 2004, 12 January 2005 and 20 April 2005 /6//7//8/, respectively, and confirmed the Parties' voluntary participation in the project.

3.2 **Project Design**

The project will expand the coverage of the LFG capture system and improve the original project collection efficiency of 19-24% specified in the concession to 80%. The project design represents good practise, and LFG capture with 80% efficiency represents leading edge technology for landfill management, reducing methane emissions and improving local air quality.

The geographical (the Salvador da Bahia landfill) and temporal boundaries (a renewable 7 yearscrediting period starting 1 January 2004) of the project are clearly defined.

Although electricity generation is not economically feasible at this stage, BATTRE is considering the possibility to utilise LFG to generate electricity in the future. However, as this is not a part of the current proposed CDM project, future utilisation of LFG for electricity production and potential emission reductions resulting from displacing grid electricity have not been validated by DNV.

It is stated that BATTRE will not receive any public funding for the development of this project.

The project is expected to improve air quality through reducing odour and VOC emissions. Support of Land and Protected Area Conservation (APA Joanes Ipiranga) will contribute to land savings. The validation has confirmed that the project is in line with sustainable development policies in Brazil. In its letter of approval of 2 June 2004 /6/, the DNA of Brazil confirms the project's contribution to the sustainable development of Brazil.

The validation has not revealed any information that indicated that project funding is a diversion of official development assistance (ODA) from sponsor countries.



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3.3 Baseline and Additionality of the Project

The baseline methodology employed by the project, i.e. AM0002 *Greenhouse Gas Emission Reductions through Landfill Gas Capture and Flaring where the Baseline is established by a Public Concession Contract*, was approved by the CDM Executive Board at its 10th meeting.

In line with the baseline methodology, the baseline is determined based on the requirements for LFG collection specified in the concession given to BATTRE by the municipality of Salvador da Bahia for operating the Salvador da Bahia landfill. This concession contract covers the contractual lifetime of the landfill and specifies the volume of LFG to be captured and flared, i.e. between 19-24% of total LFG.

The determination of the baseline is sustained by an analysis of the trends in the waste management practices in Brazil. There are currently no legislative incentives to improve landfill gas recovery in order to avoid CH₄ emissions and typical recovery of LFG in Brazil is minimal. Moreover, technical norms issued by the Brazilian Association of Technical Norms (ABNT) do not have any technical requirements for LFG management. A conservative estimate of 20% recovery of LFG for passive systems is considered to be best practice. A new waste management policy ("National Politic for Solid Waste") has been under discussion for many years, but at present no changes in national waste management legislations are anticipated.

Based on the above, it is not reasonable to assume that BATTRE would improve the high LFG collection efficiency in the absence of the proposed CDM project activity. Since the project is expected to mitigate methane emissions by expanding and improving the LFG collection and flaring system, the project will hence result in emission reductions that are additional to what would have occurred in the absence of the proposed CDM project activity. This baseline will need to be revalidated after first crediting period to determine whether the project still is eligible for a second crediting period.

The baseline methodology AM0002 was specifically developed for this project. However, the Methodology Panel/EB introduced an additional requirement for applying the methodology, i.e. the methodology is applicable to landfill gas capture and flaring project activities where no generation of electricity using captured landfill gas occurs or is planned. However, although electricity generation is not economically feasible at this stage, BATTRE has always considered the possibility to generate electricity in the future. Nevertheless, BATTRE has opted not to claim any potential emission reductions from electricity offsets in the first crediting period. Moreover, it has been sufficiently demonstrated that even when considering revenues from potential electricity sales, the project is not a likely baseline scenario. If emission reductions are claimed from offsetting grid electricity in subsequent crediting period, the applicability of the baseline methodology must be revalidated.

3.4 Monitoring Plan

The provisions in the monitoring plan are consistent with the monitoring methodology AM0002. The choice of monitoring indicators is reasonable and the monitoring plan will, when correctly applied, provide for conservative calculations of emission reductions.

The amount of methane collected and flared in the project scenario will be determined by continuously monitoring the flow of LFG and the methane content of LFG. The flare temperature and working hours are monitored to ensure efficient flaring. The amount of methane



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collected and flared in the baseline scenario is specified in the concession contract. However, the amount of waste disposed at the landfill will be monitored to adjust the amounts specified in the concession contract with regard to actual amounts of waste disposed.

BATTRE's management system was ISO 14001 certified in December 2002. The management system necessary for consistent project operations, monitoring and reporting, i.e. responsibilities and procedures for monitoring of emission reductions, procedures for emergency preparedness, training, calibration, internal audits and corrective actions, are thus already in place.

3.5 Calculation of GHG Emissions

The GHG emission calculations are documented in a complete and transparent manner. The baseline emissions will be determined *ex-post* by monitoring the LFG collected and flared and consequently the methane emissions avoided by the project.

For the *ex-ante* estimation of emission reductions the expected LFG generation of the landfill is determined using the IPCC first order decay model. Assuming a collection efficiency of 80% in the project scenario compared to a collection efficiency of 19-24% in the baseline scenario, methane emissions in the project scenario are less than in the baseline scenario. The emission factor and assumptions used seem appropriate based on the IPCC Good Practise Guidance /11/ and Brazilian conditions.

 CO_2 emissions resulting from flaring of methane can be considered as carbon neutral in line with the IPCC Good Practise Guidance which states that "CO₂ emissions from landfill gas recovery combustion are of biogenetic nature and should not be included" /11/. Indirect emissions related to electricity use of LFG pumps are identified. However, as electricity will either be imported from a hydropower dominated electricity grid or will be produced on-site, if utilising LFG for electricity generation, these emissions are expected to be negligible.

The project is unlikely to result in significant leakage effects.

The assumptions for the *ex-ante* estimation of emission reductions are reasonable and, given that the project is implemented as planned, the project is likely to achieve the estimated emission reductions stated in the PDD.

3.6 Environmental Impacts

The project is not expected to have significant environmental impacts. Indeed, the project's positive effects, such the reduction of odour and the reduction of emissions of other gases are expected to compensate for any negative environmental impact the project may have.

An important issue is the handling of leachate. The site-visit verified that all leachate is sent to a nearby wastewater treatment station.

3.7 Comments by Local Stakeholders

Representatives of local NGOs, public authorities, local business and universities were consulted, and the project was presented in newspapers, through radio & TV broadcasting and on the Internet. In addition, meetings with local stakeholders were held. Due account has been taken of comments received.



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4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

According to the modalities for the validation of CDM projects, the validator shall make publicly available the project design document and receive, within 30 days, comments on the validation requirements from Parties, stakeholders and UNFCCC accredited non-governmental organisations (NGOs) and make them publicly available.

DNV has published the draft project design documents of October 2002 on the DNV Climate Change web site^{*} and stakeholders were through the Climate-L Info Mailing List invited to provide comments during a 30 days period from 29 November to 30 December 2002. One comment was received in this period. The comment (in unedited form) and an explanation on how DNV has taken due account of the comment received is given in Appendix B to this report.

After approval of the baseline and monitoring methodology of the project, the project documents of October 2003 were once more published on the DNV Climate Change web site and Parties, stakeholders and UNFCCC accredited NGOs were through the UNFCCC CDM web site invited to provide comments during a 30 days period from 12 December 2003 to 11 January 2004. No comments were received in this period.

^{*} http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=49



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5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the Salvador da Bahia Landfill Gas Management Project located in Salvador, State of Bahia, Brazil. The validation was performed on the basis of UNFCCC criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Marrakech Accords and the subsequent decisions by the CDM Executive Board.

The project participants are BATTRE Bahia Transferencia e Tratamento de Residuos S.A. of Brazil, Showa Shell Sekiyu K.K. of Japan and Shell Trading International Limited of the United Kingdom. The participating Parties Brazil, Japan and the United Kingdom meet all relevant participation requirements and the DNAs of Brazil, Japan and the United Kingdom approved the project and confirmed the Parties' voluntary participation in the project.

The project is likely to mitigate GHG emissions by expanding and improving the landfill gas capture system at the Salvador de Bahia Landfill, hereby improving the collection efficiency from 19-24% to 80%. The project results in the reduction of CH_4 emission that are real, measurable and give long-term benefits.

The project is likely to improve environmental and social conditions through job creation, improved air quality, improved safety and support of the Environmental Protection Area surrounding the landfill. The DNA of Brazil has confirmed that the project will contribute to sustainable development in Brazil.

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

The project correctly applies the approved baseline and monitoring methodology AM0002. The determination of the baseline, i.e. the amount of LFG captured and flared specified in the concession contract between BATTRE and the Municipality of Salvador, is well elaborated, transparent and sufficiently supported with facts. It is reasonable to assume that BATTRE would not improve the LFG collection efficiency in the absence of the proposed CDM project activity. Emission reductions attributable to the project are thus additional to what would have occurred in the absence of the project.

The provisions in the monitoring plan are consistent with the monitoring methodology AM0002. The choice of monitoring indicators is reasonable and the monitoring plan will, when correctly applied, provide for conservative calculations of emission reductions.

The GHG emission calculations are documented in a complete and transparent manner. If implemented as planned, the project is likely to achieve the emission reductions stated in the PDD.

In summary, it is DNV's opinion that the Salvador da Bahia Landfill Gas Management Project, as described in the revised and resubmitted project design documentation of March 2005, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the approved baseline and monitoring methodology AM0002. Hence, DNV requests the registration of the Salvador da Bahia Landfill Gas Management Project as CDM project activity.



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REFERENCES

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

- /1/ ICF Consulting: Clean Development Mechanism Project Design Document: Salvador da Bahia Landfill Gas Management Project. Version 4 of October 2003 and Version 5 of March 2005.
- /2/ ICF Consulting: Salvador da Bahia Landfill Gas Project: Monitoring and Verification Plan. Version 3 of October 2003.
- /3/ ICF Consulting: Salvador da Bahia Landfill Gas Project Baseline Workbook. Version 3 of October 2003.
- ICF Consulting: Salvador da Bahia Landfill Gas Project Monitoring and Verification Workbook. Version 3 of October 2003.
- /5/ ICF Consulting: Salvador da Bahia Landfill Gas Project: Baseline Study (BSL). Version 2 of February 2002.
- /6/ Comissão Interministerial de Mudança Global do Clima, Brazil Letter of Approval. 2 June 2004.
- /7/ The Liaison Committee for the Utilization of the Kyoto Mechanisms, Japan: *Letter of Approval*. 12 January 2005.
- /8/ Department for Environment, Food and Rural Affairs, United Kingdom: *Letter of Approval.* 20 April 2005.

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

- /9/ Approved baseline and monitoring methodology AM0002: *Greenhouse Gas Emission Reductions through Landfill Gas Capture and Flaring where the Baseline is established by a Public Concession Contract*. Version 01 of 26 September 2003.
- /10/ IPCC: Third Assessment Report http://www.unfccc.int/ipcc
- /11/ IPCC: Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories. <u>http://www.unfccc.int/ipcc</u>
- /12/ Energy Information Administration: *Country Analysis Brief An overview of the energy situation in this country, An Energy Overview of Brazil, and Brazil: Environmental Issues.* <u>http://www.eia.doe.gov/</u>. August 12, 2002.
- /13/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <u>http://www.vvmanual.info</u>



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

- /14/ BATTRE, 20. December 2002, Salvador Bahia Landfill:
 - Florent Mailly Technical Manager, CDM Project Coordinator
 - Artur Tanuri General Manager Landfill.
 - Ana Menezes Human Resources
 - Tadayuki Yoshimura Technical Director

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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	ОК	Table 2, Section E.4.1
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, Marrakesh Accords, CDM Modalities §40a	ОК	Table 2, Section A.3 In its letter of approval of 2 June 2004, the DNA of Brazil confirms the project's contribution to the sustainable development of Brazil /6/
3.	The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	ОК	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, Marrakesh Accords, CDM Modalities §40a	ОК	DNA of Brazil: Letter of Approval of 2 June 2004 /6/. DNA of Japan: Letter of Approval of 12 January 2005 /7/. DNV of UK: Letter of Approval of 20 April 2005 /8/
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	ОК	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, Marrakesh Accords, CDM Modalities §43	ОК	Table 2, Section B.2
7.	Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance	Marrakech Accords	ОК	BATTRE will not receive any public funding for this project.

	Requirement	Reference	Conclusion	Cross Reference / Comment
8.	Parties participating in the CDM shall designate a national authority for the CDM	Marrakech Accords, CDM Modalities §29	OK	The DNA of Brazil is the Comissão Interministerial de Mudança Global do Clima. The DNA of Japan is the Liaison Committee for the Utilization of the Kyoto Mechanisms- The DNA of the UK is the Department for Environment, Food and Rural Affairs.
9.	The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	Marrakech Accords, CDM Modalities §30	ОК	Brazil ratified the Kyoto Protocol on 23 August 2002. Japan accepted the Kyoto Protocol on 4 June 2002. The UK ratified the Kyoto Protocol on 31 May 2002.
10.	The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	ОК	Japan's assigned amount is 94% of the emissions in1990. The UK's assigned amount is 92% of the emissions in 1990.
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	ОК	Japan has in place a national registry and reported on 6 October 2004 its national GHG inventory for the years 1990-2002. The UK has in place a national registry and reported on 15 April 2004 its national GHG inventory for the years 1990-2002.
12.	Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	Marrakech Accords, CDM Modalities §37b	ОК	Table 2, Section G

Requirement	Reference	Conclusion	Cross Reference / Comment
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.	Marrakech Accords, CDM Modalities §37c	ОК	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	Marrakech Accords, CDM Modalities §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	Marrakech Accords, CDM Modalities §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	Marrakech Accords, CDM Modalities, §40	OK	The PDD was published on http://www.dnv.com/certification/cli matechange/Projects/ProjectDetail <u>s.asp?ProjectId=49</u> , and Parties, stakeholders and NGOs have been through the CDM website been invited to provide comments on the validation requirements during a period of 30 days from on 12 December 2003 to 11 January 2004.
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	Marrakech Accords, CDM Modalities, §45c,d	ОК	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	Marrakech Accords, CDM Modalities, §47	ОК	Table 2, Section B.2

Requirement	Reference	Conclusion	Cross Reference / Comment
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	Marrakech Accords, CDM Modalities, Appendix B, EB Decisions	ОК	

Table 2Requirements 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 Salvador da Bahia landfill, Brazil confines the project's spatial boundaries.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/	DR	The project's system boundaries are clearly defined. The components and facilities used to mitigate GHGs can be described as Capture and combustion/ flaring of Landfill Gas		ОК
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/ /14/	DR I	Yes, LFG capture with 80% efficiency and potential utilisation of LFG for electricity generation represents leading edge technology for landfill management and the project design represent good practise. However, the efficiency of effluent (leachate) treatment was not evident. The performance of		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			the sorting centre may be monitored in order to assure high content of organic matter in MSW.		
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	Vega is a subsidiary of SITA/SUEZ group which operates 206 landfills on Europe, most of these equipped with biogas capture and power generation. The waste disposal practices in Brazil are		ОК
			mainly sanitary landfills and open dumps.		
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/	DR	The methane landfill gas capture will not likely be substituted by other more efficient technologies.		ОК
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/ /14/	DR I	The necessary provisions are established in the MVP. The operator is certified to ISO 14001.		ОК
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/ /14/	DR I	BATTRE was ISO 14001 certified in December 2002. The management system related to responsibilities and procedures for training are therefore already in place.		ОК
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	/1/	DR	The project has obtained the necessary		ОК
and plans in the host country?	/14/	I	operating licence and is in line with relevant legislation.		
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/	DR	The project is expected to be in line with Brazil requirements for CDM projects. The project has been submitted for approval by the Brazilian DNA, but has yet to be approved.		ОК

Salvador da Bahia Landfill Gas Management Project, Brazil

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/	DR	The project is in line with sustainable development policies according to an IBAMA paper. The Brazilian DNA confirmed the project's contribution to sustainable development.		ОК
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /14/	DR I	In addition to improved air quality and benefits related to Protected Area (APA Joanes Ipiranga) conservation, the project will contribute with other benefits, i.e. job creation and support activities for ex-scavengers.		ОК
			Other emissions reductions, such as NMVOC and sulphite emission reductions, are identified but not considered in this project.		
			Labour conditions in BATTRE are above average. In the recent past, BATTRE has contributed to the local community by financing a capacity-building course for young scavengers from Salvador City and part of the construction of a sorting centre (operated by 80 ex-scavengers now organised as an independent co-operative). The project will employ people in Salvador, Bahia and support activities of ex- scavengers.		
			No adverse environmental or social effects are expected from the project.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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/ /9/	DR	The project applies baseline methodology AM0002: Greenhouse Gas Emission Reductions through Landfill Gas Capture and Flaring where the Baseline is established by a Public Concession Contract.		ОК
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/ /9/	DR	Baseline methodology AM0002 was specifically developed for this project. However, the Methodology Panel/Executive Board introduced an additional requirement for applying the methodology, i.e. the methodology is applicable to landfill gas capture and flaring project activities where no generation of electricity using captured landfill gas occurs or is planned. However, although electricity generation is not economically feasible at this stage, BATTRE is considering the possibility to generate electricity in the future. Nevertheless, BATTRE has opted not to claim any potential emission reductions from electricity offsets in the first		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			sufficiently demonstrated that even when considering revenues from potential electricity sales, the project is not a likely baseline scenario.		
			If emission reductions are claimed from offsetting grid electricity in subsequent crediting period, the applicability of the baseline methodology must be revalidated.		
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 project employs a business as usual baseline methodology for the avoidance of methane emission. The baseline is based on the concession from the municipality for landfill management. This agreement defines the amount of waste disposed and the efficiency of biogas capture and flaring (between 19-24%).		ОК
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/	DR	The limit of 80% as maximum of methane collection is seen as a conservative option.		OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/	DR	The baseline is defined according the specific agreement between BATTRE and the Municipality.		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/ /14/	DR I	The BATTRE and Municipality agreement established the biogas collected and combusted to be between 19-24%. This is		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			identified as the project baseline.		
			The current coverage area and collection efficiency of 19-24% could be increased for the baseline if a more strict legislation governing waste management practices comes into effect. The Government of Brazil has considered a change in its waste management policy. BATTRE's contractual obligation is an absolute number that is identified in the contract with the municipality. If new legislation for waste management comes into effect, this will likely result in a change to BATTRE's contract. As such, the selected baseline methodology takes into account possible changes in waste management policies, since the baseline methane emissions are determined based on Vega's contractual obligation to flare methane.		
			A new waste management policy (National Policy for Solid Waste) is under discussion, but no conclusions are foreseen the next years.		
B.2.5. Is the baseline determination compatible with the available data?	/1/	DR	Yes. The baseline scenario for the methane recovery is supported by available data.		ОК
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/	DR	Yes, the agreement establishes the baseline clearly. The business as usual scenario complies with existing good practices.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/ /14/	DR I	A financial analysis is included. It shows that the potential CER revenues significantly increase the project IRR. Comparing with IRR of other similar project of waste management and methane destruction in Brazil, CER should		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			be considered to assure a financially viable project.		
B.2.8. Have the major risks to the baseline been identified?	/1/	DR	Baseline risks are well elaborated. The main impact could be related to grid electricity, where the natural gas is influenced by the US dollar currency, and devaluation of Real could postpone the natural gas energy investments. Due to this uncertainty, emission reductions from displacement of natural gas-based electricity expansion were not considered for the first crediting period.		ОК
B.2.9. Is all literature and sources clearly referenced?	/1/	DR	The PDD is sustained by well elaborated references.		OK
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 of the project is 1 January 2004.		ОК
C.1.2. Is the crediting period 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 renewable crediting period of 7 years in selected starting 1 January 2004. Parties decided at CoP 9 that a CDM project activity starting between the date of adoption of decision 17/CP.7 and the date of the first registration of a clean development mechanism project activity, if submitted for registration before 31 December 2005, may use a crediting period starting prior to the date of its registration.		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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/ /9/	DR	The project applies monitoring methodology AM0002: Greenhouse Gas Emission Reductions through Landfill Gas Capture and Flaring where the Baseline is established by a Public Concession Contract.		ОК
D.1.2. Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/ /9/	DR	Monitoring methodology AM0002 was specifically developed for this project.		ОК
D.1.3. Does the monitoring methodology reflect good monitoring and reporting practices?	/1/ /9/	DR	The baseline methodology will, when correctly applied, enable conservative calculations of emission reductions.		OK
D.1.4. Is the discussion and selection of the monitoring methodology transparent?	/1/ /9/	DR	The MVP presents the monitoring and reporting of the main project components in a clear and transparent manner.		ОК

Salvador da Bahia Landfill Gas Management Project, Brazil

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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/ /2/ /14/	DR I	CO ₂ emissions from flaring landfill gas are of biogenetic nature and must hence not be accounted for. The monitoring methodology directly measures methane emissions avoided by the project.		ОК
D.2.2. Are the choices of project GHG indicators reasonable?	/1/ /2/	DR	The monitoring of MSW disposal, methane collected and flared are reasonable. The provisions in the monitoring plan are consistent with the project boundaries in the baseline study. The boundaries of the MVP are the Salvador da Bahia Landfill, Bahia.		ОК
D.2.3. Will it be possible to monitor / measure the specified project GHG indicators?	/1/ /2/	DR	Yes, it will be possible to monitor/ measure the specified indicators according to the methodology described in the MVP.		ОК
D.2.4. Will the indicators give opportunity for real measurements of achieved emission reductions?	/1/ /2/	DR	The indicators will provide for monitoring captured and flared methane emissions, that would otherwise be released to the atmosphere.		ОК
D.2.5. Will the indicators enable comparison of project data and performance over time?	/1/ /2/	DR	Yes, the proposed indicators enable to compare project data and performance over time.		OK

Salvador da Bahia Landfill Gas Management Project, Brazil

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/ /2/	DR	The monitoring methodology requires the monitoring of electricity consumption of additional collection equipment to determine the emissions resulting from generating the electricity used to pump LFG. However, as electricity will either be imported from a hydropower dominated electricity grid or will be produced on-site, if utilising LFG for electricity generation, these emissions are expected to be negligible. Electricity consumption will thus not be monitored.		ОК
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/ /2/	DR	The amount of waste disposed at the landfill will be monitored and used to adjust the amount of methane that needs to be collected and flared in accordance with the concession (baseline scenario).		ОК
D.4.2. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/ /2/	DR	Yes		ОК
D.4.3. Will it be possible to monitor the specified baseline indicators?	/1/ /2/	DR	Monitoring of amounts of waste disposed at the landfill is standard operating practise.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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 for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/ /2/	DR	Yes		OK
D.5.2. Is the choice of indicators for sustainability development (social, environmental, economic) reasonable?	/1/ /2/	DR	The selected indicators for monitoring job creation, land and protected area conservation, odour, air pollutants and leachate are reasonable.		ОК
D.5.3. Will it be possible to monitor the specified sustainable development indicators?	/1/ /2/	DR	Yes		OK
D.5.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/ /2/	DR	Yes, The project is consistent with criteria that are mentioned in a discussion paper dated April 2002 on performance metrics for sustainable development for CDM projects in Brazil published by the Ministério do Meio Ambiente ("Critérios de Elegibilidade e Indicadores de Sustentabilidade para Avaliação de Projetos que Contribuam para a Mitigação das Mudanças Climáticas e para a Promoção do Desenvolvimento Sustentável.").		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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/ /2/ /14/	DR	Yes, the project will be implemented by BATTRE.		ОК
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/ /2/ /14/	DR	The ISO 14001 certificate from December 2002 sustains this.		ОК
D.6.3. Are procedures identified for training of monitoring personnel?	/1/ /2/ /14/	DR	Yes, through the ISO 14001 certified environmental management system (EMS).		ОК
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /2/ /14/	DR	Yes, through the ISO 14001 certified EMS.		ОК
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/ /2/ /14/	DR	Yes, through the ISO 14001 certified EMS.		ОК
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/ /2/	DR	Yes, through the ISO 14001 certified EMS.		ОК
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/14/ /1/ /2/ /14/	DR	Yes, through the ISO 14001 certified EMS.		OK

Checklist Question		MoV*	Comments	Draft Concl	Final Concl
D.6.8. Are procedures identified for day-to-day records bandling (including what records to		DR	Storage of records and back-up systems are defined in the MVP and spreadsheet		ОК
keep, storage area of records and how to process performance documentation)	/14/	I			
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and		DR	Yes, through the ISO 14001 certified EMS.		ОК
uncertainties?	/14/	I			
D.6.10. Are procedures identified for review of reported results/data?	/1/ /2/	DR	Yes, through the ISO 14001 certified EMS.		OK
	/14/	I			
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational	/1/ /2/	DR	Yes, through the ISO 14001 certified EMS.		OK
requirements where applicable?	/14/	I			
D.6.12. Are procedures identified for project performance reviews before data is		DR	Yes, through the ISO 14001 certified EMS.		ОК
submitted for verification, internally or externally?	/14/	I			
D.6.13. Are procedures identified for corrective actions in order to provide for more	/1/ /2/	DR	Yes, through the ISO 14001 certified EMS.		ОК
accurate future monitoring and reporting?	/14/	I			

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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.Predicted Project GHG Emissions The validation of predicted 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	CO_2 emissions resulting from flaring of methane can be considered as carbon neutral as long as the carbon derives from biomass. However, CO_2 emissions from flaring of CH_4 that derives from fossil carbon, such as from plastic, should be taken into account in the calculations.	CAR 1	ОК
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.					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/	DR	Emissions resulting from generating the electricity used to pump LFG in additional collection equipment are identified. However, as electricity will either be imported from a hydropower dominated electricity grid or will be		ОК

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			produced on-site, if utilising LFG for electricity generation, these emissions are expected to be negligible.		
E.3.Baseline Emissions The validation of predicted 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 T p fl e	The baseline emissions will be determined <i>expost</i> by monitoring the LFG collected and flared and consequently the methane emissions avoided by the project.	CL-1	ОК
			It needs to be clarified whether the yearly volume of biogas referred to as the baseline will be updated based on actual amounts of waste and waste composition.		
			For the <i>ex-ante</i> estimation the expected LFG generation of the landfill is determined.		
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?		DR	Yes		ОК
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/ /6/	DR	The GHG calculations are documented in a complete and transparent manner (spreadsheet).	CAR 2	OK
			The selected GWP for methane was considered to be 23 as established by IPCC TAR. However, this must be revised to GWP=21 as formally approved by UNFCCC.		
			The ER related to potential fuel displacement as a result of electricity generation is not		

Checklist Question		MoV*	Comments	Draft Concl	Final Concl
			considered.		
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/ /7/	DR	LFG generation is determined using the IPCC first order decay model. A methane potential L_o of 180 m ³ (0,12ton) /ton MSW, a decay rate of 0,12, a methane concentration of landfill gas of 50% and a collection efficiency of project of 80% is selected for estimating <i>ex-ante</i> emissions. A clarification is requested on how the coefficients L_0 and k were estimated and whether the assumptions made provide for a conservative calculation of emission reductions.	CL-2	ОК
E.3.5. Are uncertainties in the GHG emission estimates properly addressed in the documentation?	/1/	DR	The baseline is the BATTRE and Municipality agreement. The main uncertainties are related to the projection of waste disposal at landfill and methane amount. This will be measured according to the MVP. The factors used for estimating total LFG generation will need to be revises based on actual waste composition data (i.e. 59,8 % Organic, 6,1% paper, 6,9% board) and other measurements, although no significant organic content changes is foreseen.		ОК
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, both the baseline and the project emissions are determined based on the amount of methane collected and combusted.		ОК

Salvador da Bahia Landfill Gas Management Project, Brazil

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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	The project will avoid methane emissions that are real, measurable and additional to any that would occur in absence of the project. The anticipated emission reductions are 13 958 155 tCO ₂ e over the projects operational lifetime of16 years (664 674 tCO ₂ e per year) and 4 911 649 tCO ₂ e during the first 7 years crediting period (701 664 tCO ₂ e per year).		ОК
<i>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.					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /14/	DR I	The project is not expected to have significant environmental impacts. Indeed, the projects positive effects, such the reduction of odour and the reduction of emissions of other gases are expected to compensate for any negative environmental impact the project may have.		ОК
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	No EIA is required.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
F.1.3. Will the project create any adverse environmental effects?	/1/ /14/	 DR An important issue is the handling of lead The site-visit verified that all leachate is so the CETREL Wastewater Treatment S from Camaçari Petrochemical Pole, in ord treat and properly control the disposal. 			ОК
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	No consideration of transboundary environmental impacts is necessary.		ОК
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	The project is not expected to have significant environmental impacts.		ОК
F.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	The project has obtained the necessary operation concession.		ОК
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	Representatives of local NGOs, public authorities, local business and universities were consulted.		ОК
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	The project was presented in newspapers and radio & TV broadcasting and on the Internet. In addition, meetings with local stakeholders were held.		ОК
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	Not applicable.		NA

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
G.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Only technical comments were received by one stakeholder.		ОК
G.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	The project was modified to address the comments received.		OK

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project owner response	Final validation conclusion
CAR 1: CO₂ emissions from flaring of CH₄ that could derive from fossil carbon, such as from plastic, should be taken into account in the calculations.	E.1.1	The "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories" do not consider CH ₄ production from plastic waste. Plastic in landfill condition have a very low degradation rate (half degradation life between 15 and 30 years) and very low CH ₄ production potential (below 5 m ³ of CH ₄ per ton of waste). In the document called "Greenhouse Gas Emission from management of selected Material in Municipal Solid Waste" is indicated that, in the USA, total CH4 emissions from plastics in LFG is lower than 1,1%. In the particular case of Salvador, plastic represent around 17% of total waste with a potential of 5 m ³ of CH ₄ per ton of waste. As the global potential of Salvador MSW is approximately 180 m ³ of CH ₄ per ton of waste, the plastic contribution is lower than 0,5%. Furthermore, as the degradation halftime is at least twice higher than other components, contribution of CH ₄ from plastic in Salvador landfill CH ₄ production is lower than 0,25%. This range of contribution is much lower than the continuous gas analyser accuracy that will be used for ERs monitoring.	OK. The validation team acknowledges that CH₄ generation from the degradation of plastic is insignificant. Furthermore, DNV acknowledges that the IPCC Guidelines state that "CO₂ emissions from landfill gas recovery combustion are of biogenetic nature and should not be included" (Good Practise Guidance and Uncertainty Management in National Greenhouse Gas Inventories, p. 5.9). The corrective action request is thus withdrawn.
		Therefore, and as suggested by IPCC guidelines, it	

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	Final validation conclusion
		is not necessary to consider CO_2 emission from CH_4 produced by plastic decomposition in the GHG balance of the project.	
		Moreover there is no combustion condition detected in the landfill, firstly because humidity condition naturally prevents that problem, secondly because a recent gas analyse taken from Salvador Landfill biogas has shown 0% of CO content. CO is an indicator in case of fire inside the landfill.	
CAR 2: The methane emissions calculation has used GWP of 23 in accordance with TAR, This value is not yet approved by CoP. The project should therefore use GWP = 21 until another value is formally approved.	E.3.3	As Kyoto Protocol targets are based on SAR (Second Assessment Report) from IPCC and as that SAR considered a GWP of 21 for CH ₄ , Vega decided to use the 21 factor for ERs calculation. Project documents were revised.	OK. The validation team accepts the revised documentation. DNV's corrective action request is sufficiently addressed.
CL 1: Although the baseline was based on contractual obligations, it needs to be clarified whether yearly volume of biogas referred to as the baseline will be updated based on actual amounts of waste and waste composition.	E.3.1	The annual volume of methane captured in the baseline will be corrected to adjust for differences in the tonnes of actual waste entering the landfill and the MVP was adjusted accordingly.	The validation team accepts the revised documentation. DNV's clarification request is sufficiently addressed.

Draft report clarifications and corrective action requests by validation team	Ref. to Table 2	Summary of project owner response	Final validation conclusion
CL 2: A clarification is requested on how the coefficients L_0 and k are estimated and whether the assumptions made provide for a conservative calculation of emission reductions.	E.3.2	A thorough response on how the emission reductions are calculated has been provided to the validation team in the revised PDD.	The emission factor and assumptions used seem appropriate based on the IPCC Good Practise Guidance and Brazilian conditions. DNV's clarification request is sufficiently addressed.

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APPENDIX

B

COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

Comment by: Vinay Deodhar, Individual

Inserted On: 2002-12-23 Subject: VEGA Salvador da Bahia Landfill Gas Project Comment:

1) The PDD, Baseline document and M&V document of the VEGA Salvador da Bahia Landfill Gas Project mention that these should be read in conjunction with two spreadsheets, Salvador da Bahia Landfill Gas Project Baseline Workbook and Monitoring and Verification Workbook. However these workbooks are not found on the weblinks on your website. Please clarify and provide these documents, as otherwise comments cannot be offered.

2) Are any fossil fuels used to operate the biogas flare? If yes, what are the GHG emissions from these and are they accounted for in the baseline/additionality analysis?

3)The note mentions methane capture rate in contract as 19% - 24%. What is it a percentage of?

More comments after completion of the reading and receiving the Worksheets as mentioned in Point no. 1.

Vinay M. Deodhar

DNV Response

1) The Marrakech Accords only require that the validator makes publicly available the Project Design Document (PDD) of a project seeking registration as CDM project. However, supporting document, such as a Baseline Study (BLS) and a Monitoring & Verification Plan (MVP), may be made publicly available if desired by the project proponent. BATTRE has given DNV the permission to publish the BLS and MVP, but BATTRE does not wish to publish the Salvador da Bahia Landfill Gas Project Baseline Workbook and Monitoring and Verification Workbook.

2) The project is not likely to use fossil fuels.

3) This is a percentage of total methane generated from the landfill.

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