



PRELIMINARY VALIDATION REPORT

BRAZIL MARCA LANDFILL GAS TO ENERGY PROJECT

REPORT No.2004-0632

REVISION No. 01

DET NORSKE VERITAS



PRELIMINARY VALIDATION REPORT

Date of first issue: 2004-05-20	Project No.: 28624550 (07)
Approved by: Einar Telnes Technical Director	Organisational unit: DNV Certification, International Climate Change Services
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Summary:

DNV is currently performing a validation of the Brazil Marca Landfill Gas to Energy Project in Brazil, 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. UNFCCC criteria refer to the Kyoto Protocol criteria and the modalities and procedures for CDM project activities as agreed in the Marrakech Accords. This draft validation report summarizes the preliminary findings of the validation.

The validation consists 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, the Brazil Marca Landfill Gas to Energy Project meets all present and relevant UNFCCC criteria and correctly applies the approved baseline and monitoring methodologies ACM0003. However, the project has not yet been approved by the DNA of the participating Parties, and the DNA of Brazil has not yet confirmed the project's contribution to sustainable development.

Report No.: 2004-0632		Subject Group: Environment	
Report title: Brazil Marca Landfill Gas to Energy Project			
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Date of this revision: 2005-04-07	Rev. No.: 02	Number of pages: 15	

Indexing terms	
Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification
	Market Sector
	Process Industry
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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
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
UNFCCC	United Nations Framework Convention for Climate Change
GWP	Global Warming Potential



1 INTRODUCTION

Ecosecurities Brazil Ltd. and Marca Ltd. have commissioned Det Norske Veritas Certification Ltd. (DNV) to validate the Marca Landfill Gas to Energy Project, at Cariacica Municipality; Espírito Santo State, Brazil (hereafter called “the project”).

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

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 Ecosecurities. However, stated requests for clarifications and corrective actions may provide input for improvement of the project design.

The validation team consists of the following personnel:

Mr Luis Filipe Aboim Tavares	DNV Rio de Janeiro	Team leader, GHG auditor
Mrs Susanne Haefeli	DNV Oslo	GHG auditor
Mr Michael Lehmann	DNV Oslo	Internal verifier



1.3 GHG Project Description

The Marca Landfill Gas to Energy Project, located on Cariacica Municipality – Espírito Santo State, involves the capture of landfill gas emitted from solid municipal waste of the metropolitan area of Vitória, and municipalities of Cariacica, Serra and others. More landfill will be added to the Marca Landfill site until the planned closing of the site in 2017.

The project activity consists of the installation, operation and maintenance of a landfill gas capturing and flaring system. Additionally, one pilot generation set of 1 MW utilising landfill gas is being installed by 2004-2005, followed by the installation of additional gas engines & power generator sets of up to 11 MW.

Combustion and flaring combined are expected to reduce emissions of 4 859 503 tonnes of CO₂e over the next 21 years. No emission reductions arising from the displacement of more carbon intensive electricity will be claimed by the project.

2 METHODOLOGY

The validation consists 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.

This draft validation report summarises the findings after phase I and II of the validation, what were considered by Marca/ Ecosecurities on review the PDD. Almost all were considered solved except the recognise from Brazilian DNA.

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 is enclosed in Appendix A to this report



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



2.1 Review of Documents

The Project Design Document /1/ revision February, 2004 submitted by Ecosecurities was reviewed. After initial validation findings were identified and communicated to Ecosecurities, a new version /2/ was submitted including complementary information. Additional background documents related to the project design and the baseline i.e. the validation and verification manual /3/ and the approved baseline and monitoring methodology AM0003 /4/ were also consulted.

2.2 Follow-up Interviews

On March 19, 2004, DNV performed interviews with Marca Ltda at the landfill site in Cariacica Municipality, Espírito Santo State, to confirm and to resolve issues identified in the document review. Moreover, the Environmental Licences, conditionings and Environmental Impact Assessment were reviewed during the site visit in order to assure the accuracy of relevant information.

The main topics of the interviews were:

- Environmental impacts & their management;
- Presence of Environmental licenses;
- Cogeneration systems;
- Calibration requirements, and;
- 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 the 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 has identified three *Corrective Action Requests* and four requests for *Clarification*. In its response to these requests, the project participants 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 PRELIMINARY VALIDATION FINDINGS

The preliminary 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.

3.1 Project Design

The Brazil Marca Landfill Gas to Energy Project has as objective to capture landfill gas emitted from the large quantities of degrading solid municipal waste of metropolitan area of Vitória, Cariacica, Serra and surrounding municipalities, which have already been deposited at the Marca landfill and which are to be added yet until the planned closing of the landfill site in 2017.

The project activity consists of the installation, operation and maintenance of the landfill gas capturing and flaring system including a pilot gas engine / generation set of 1 MW, followed by the installation of additional gas engines & power generator sets of up to 11 MW after 2005.

The project design engineering reflects good practice through the installation of several wells and a collecting system for landfill gas exhausts and leachate drainage. The gas will be burned in an adequate flaring system, or used in a generator set with a capacity to co-generate around 1 MW_e during the first phase (2004-2005), expandable to co-generate 11 MW_e in a second phase (from 2005). The electricity will be used internally and fed into the grid.

The project has the capacity to reduce emissions of 1 193 499 tonnes of CO₂e over the first 7 years crediting period. The starting date of the project activity is 1 July 2004. A renewable crediting period of 7 years has been selected. The expected operational lifetime of the project is 21 years.

The project is expected to bring social (employment, health, and labor conditions), environmental (air quality) and economic benefits, including social activities programs like Ecological Brooms, Ecological Bricks and Nursery of Seedling Programs, thus contributing to the sustainable development objectives of the Brazilian Government.

The project has not yet obtained the written approval of voluntary participation from the participating Parties, including confirmation by Brazil that the project assists in achieving sustainable development.

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

3.2 Baseline

The project applies the approved baseline methodology “Simplified Financial Analysis for Landfill Gas Capture Projects” (AM0003) /4/.

The proposed baseline uses the Internal Rate of Return (IRR) calculation to assess conservatively the financial attractiveness of the project. A set of questions justifies the assumptions that the project is not the baseline and that the most economic course of action is the Business as Usual (BAU) scenario.



The baseline selection seems adequate and a possible change of the economic attractiveness of the project was discussed to evidence continual applicability of the baseline approach.

As required by in the baseline methodology, the amount of methane destroyed in the absence of the project is captured by the Effectiveness Adjustment Factor (EAF), which is 20% by default in the methodology. The project establishes 10% instead and justifies its choice by a discussion of the closing method used on cell 1, where marble industry residue was used. The method could be verified during the site visit. Moreover, there current no Brazilian legislation requiring the recovery of landfill gas and such legislation is not likely to be implemented in the near future. Hence, the justification seems reasonable. The EAF must be reviewed at renewal of the crediting period.

3.3 Monitoring Plan

The project applies the approved monitoring methodology “Simplified Financial Analysis for Landfill Gas Capture Projects” (AM0003) /4/.

The methodology considers directly monitoring the emission reductions through measurements of flared gas and the electricity generated (applying the Generator Heat rate index of 0,0357 GJ/m³CH₄).

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.

The Quality Control and Quality Assurance datasheet identifies several monitoring routines, including auditing, corrective actions and data review procedures. Finally, the site’s ISO 9001 certification is expected to for year end 2004.

In line with the approved methodology, the Effectiveness Adjustment Factor of 10% must be reviewed after each period.

Social and environmental benefits were mentioned; the number of jobs involved in Ecological Brooms, Ecological Bricks and Nursery of Seedling Programs could be foreseen as a sustainable indicator.

3.4 Calculation of GHG Emissions

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

The calculation assures conservativeness by using the EAF of 10% and a 75% effectiveness rate for the capture equipment capacity. The figures appear to be consistent and reliable. The EAF factor will be reviewed upon renewal of the crediting period as required by the monitoring methodology.

3.5 Leakage

According to the chosen methodology, the only potential source of leakage is from the emissions resulting from generating electricity used to pump the landfill gas inside the collection system. It



is expected that sufficient electricity is generated with the recovered landfill gas to operate the landfill gas capture equipment. Hence, no leakage is expected.

3.6 Environmental Impacts

The project has an Environmental License (LP GCA 002/2003 issued on 16 January 2002 by IEMA, valid for 1460 days) and an Environmental Impact Assessment (EIA/RIMA) to install and operate the landfill gas capture equipment. During the site visit, these documents were reviewed.

Leachate of the landfill is treated. However during the site visit an effluent with very high concentration of suspended matter could be observed, which is not in compliance with environmental legislation. The main cause for this was expected be the absence of aeration units and a biofilter. An aeration unit and a biofilter to reduce the concentration of suspended matter in the leachate was foreseen to be installed until mid 2004. However, the construction was not carried out as planned.

In March 2005, Marca and Ecosecurities informed DNV that a new Previews License (LP SL 247/2004 issued on 29 December 2004 valid for 1460 days) was issued by the Environment and Hydro Resources State Institute (IEMA) for the Cariacica Landfill. This license includes a condition requiring that the installation plants for an adequate leachate treatment system must be presented until 30 April 2005. According to the register of IEMA, this plan was sent to IEMA on 5 April 2005. The project is thus in compliance with environmental legislation. However, the actual implementation of the leachate treatment system must be verified during the first periodic verification of emission reductions.

3.7 Comments by Local Stakeholders

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

No comments were received during the consultation period.



4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

DNV Certification published the PDD of December 2004 on the DNV Climate Change web site^{*} and stakeholders were through the UNFCCC CDM web site invited to provide comments within a 30 days period from 24 May 2004 to 23 June 2004.

Three comment were received in this period. The comments (in unedited form) are given the below text boxes.

Comment by: Daniel B. Jones, Center for Climate Change Mitigation, Inc.

Inserted on: 2004-06-04

Subject: Landfill Gas Monitoring Methodology

Comment:

1. Monitoring should include continuous measurement of flame temperature in the flare. A proper temperature is a good indicator of proper flare operation and, hence, of methane destruction. Temperature measurement and recording is very easy and cheap. If the temperature is maintained within the flare manufacturer's recommended operating range, I do not believe semi-annual sampling of flare gas would be needed. In any case, a sample of gas sent to a laboratory for analysis provides only a "snapshot" of the flare performance. So it is of questionable value in any case.

If the flare temperature falls below the recommended range, the flow of gas to the flare should not be credited toward emission reductions, unless it is demonstrated that the lower temperature provides a documented partial destruction efficiency that would then be used to modify the calculation of emission reductions.

In practice, the temperature signal from the flare is often used to control the gas blower. If temperature falls below the normal operating range, the blower is turned off. This provision is not mentioned in the PDD. It would ensure that gas flow is measured to be zero when the flame is not on or is not as hot as it should be. Continuous recording of flare temperature would provide a backup method of ensuring that, even if gas continues to flow and to be measured, emission reductions are not inappropriately credited.

2. The use of "continuous" landfill gas composition measurements is inappropriate. "Continuous" measurement of methane concentration is extremely expensive. While metering systems can be installed to provide intermittent and frequent measurement, even this degree of measurement frequency is not needed. Landfill gas quality tends to change slowly, over the course of days. Normally, a daily measurement would be more than sufficient to provide adequate reliability. In rare instances, a sudden change such as a break in a pipe or "breakthrough" in the gas field that allows air to enter the collection wells, could result in a sudden change in methane concentration. Daily measurements would pick up this signal quickly enough to avoid serious miscalculation. For example if methane concentration were measured to be 50% at 10 AM yesterday and 30% at 10 AM today, applying a value of 40% for the 24 hour period from yesterday to today would not yield unacceptable errors. When a significant change is detected, prudent operators would begin

^{*} <http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=80>



taking more frequent measurements; e.g., hourly. They would do this as a normal course of business in seeking the cause of the sudden change and remedying it.

So, daily measurement of methane concentration should be acceptable with the proviso that more frequent measurements be taken if there are large sudden changes.

I would further argue that if the gas composition has been stable for several weeks it should be okay to go to weekly measurement of methane concentration. However, it may be appropriate in that case to require that if the methane concentration changes, the lower value (whether it is the reading immediately preceding the change or the reading immediately following the change) should be applied for the entire period between the two readings. This will provide a conservative estimate of emission reductions and allow the operator to sample gas at a frequency it determines to be most appropriate.

If the reference to "continuous" measurement is retained in PDD's, the project developer should be required to specify exactly what this term means. I find it hard to believe that they really intend to take multiple readings per second, which is what "continuous" temperature and flow meters do.

DNV's response:

The project correctly applies the approved monitoring methodology AM0003. Hence, no changes to the monitoring plan are required.

Comment by: Sudhir Sharma, Asian Institute of Technology

Inserted on: 2004-06-23

Subject: Application of methodology

Comment:

- (i) B2: the section should justify the applicability conditions mentioned in the AM003.
- (ii) AM003 provides four steps for identification of baseline scenario and additionality. Present PDD should use these four steps, as it purports to use AM003.
- (iii) The possible alternatives list is not exhaustive. One of the possibilities is processing of biodegradable waste prior to disposing MSW in landfill site. In absence of any reference to the policy document on MSW in Brazil it is difficult to see whether such an option is regulatory requirement or not. Also the requirement of regulation is summarily dismissed.
- (iv) IRR should be calculated using incremental investment. The PDD doesn't explain clearly whether there will be any investment for collecting and flaring gas in baseline for safety reasons. The PDD should explain the contractual conditions for the landfill operating organization. There is no transparency in this matter.
- (v) The PDD doesn't provide sufficient information on parameters of IRR estimation. Appendix 1 also has only limited information.
- (vi) The electricity tariff used for the IRR estimations is simply mentioned without adequate justification.



(vii) No reference is provided for source of information on Government bonds. It is also not adequately represented that this is the most conservative IRR. The type of bond and maturity period should be mentioned for referred Bond interest rates. Also an attempt should be made to report commercial interest rates for projects of similar nature, for example the commercial loan the project itself will avail to construct the facility.

(viii) In a number of country the governments provide subsidised interest rates for environmental projects, or capital subsidies. The project should mention what is the policy of Brazil in this regard.

DNV's response:

The project participants provided the below response to the comments made by Sudhir Sharma. In DNV's opinion, this response sufficiently addressed the comments made.

The response given by the project participants is given below:

(i) Approach 48 appears to be most appropriate to investment projects. The proposed project involves a significant investment in gas collection and power generation that must compete with other such investments. It is therefore appropriate to assume that the decision between alternative baseline scenarios is based on an investment calculus. This justifies an investment or financial analysis as an appropriate baseline methodology for this type of project situation.

(ii) Step 1 and 2: Possible and plausible baseline scenarios

Alternative 1: The landfill operator could continue the current business as usual practice of not collecting and flaring landfill gas from his waste operations. In this case, no power would be generated at the sites and the Brazilian power system would remain unaffected.

Alternative 2: The landfill operator would invest in some LFG collection and flaring but not in power generation. The Brazilian power system would remain unaffected.

Alternative 3: The landfill operator would invest in a landfill gas collection system of high effectiveness, as well as a high efficiency flaring system and in LFG power generation equipment (the proposed project activity). The operation would marginally reduce the generation of power for other grid-connected sources.

According to the National GHG Emissions Inventory conducted by CETESB in 1994, Brazil had over 6,000 waste deposition sites, receiving over 60,000 tonnes of waste per day (please note this study is currently being updated). According to the same study, 84% of Brazil's methane emissions came from the deposition of waste in uncontrolled rubbish dumps.

Currently, 76% of the total waste generated in Brazil is disposed in 'rubbish dumps' ("lixões") with no management, gas collection, or water treatment whatsoever. The remaining 24% of waste is disposed in 'controlled' landfills (as opposed to 'sanitary' landfills, as planned by the project), and subject to regulation by the environmental authorities.

Current Brazilian legislation does not require that landfills collect and dispose of landfill gases. So far, only two landfills in Brazil, Salvador and Tremembé, located in State of Bahia and State of São Paulo respectively have been designed to collect and utilize (or even flare) the full amount of gas generated. Both landfills were financially supported by the sale of Carbon Credits.



In the few cases where gases are collected, this is done for safety reasons (to avoid explosions), and it is often the case that the amounts effectively collected are very low, due to high levels of leachate (which is often not drained or treated, as well) blocking the drainage pipes.

The implementation of environmental protection legislation in Brazil has a relatively long lead-time, and the Ministry of the Environment has no immediate plans to introduce legislation requiring the collection and flaring of landfill gas from landfill sites. Historically in Brazil there also tends to be a gulf between stated regulations and practice with regards to the implementation of environmental protection legislation.

Given the regulatory situation in Brazil and the location and conditions of the landfill, the realization of alternative 2 is not required and would also not be an economically attractive course of action for the landfill owner and/or operator. It is therefore not considered a plausible alternative.

This reduces the list of plausible alternatives to Alternative 1 (i.e. BAU) and Alternative 3 (the proposed project).

Steps 3, 4 and 5: Financial analysis and selection of baseline scenario

Given that the main potential financial returns derived from the collection of gas is the sale of electricity, the feasibility of this project is, thus, dependent on factors related to energy sector and to the decentralization of electricity generation in Brazil. It is necessary to conduct a financial analysis to determine whether the project is an economically attractive course of action.

Energy sector and electricity market: Hydro electricity accounts for an average of 81,42 per cent of national electricity production in Brazil. This high proportion in Brazil's electricity generation technology matrix was a consequence of a policy addressed at increasing Brazilian energy independence, as the country had few oil reserves and very poor coal reserves, but rich hydrology resources. In the mid 1980's, Brazil's power sector went through a serious financial crisis, leading to the interruption of construction of many power plants - mostly hydro. In 1993 decentralization of the power sector started which added to delays in implementing planned projects.

The current Brazilian 10-year expansion plan 2004/2012 reduces the importance of hydro in the short-term, but emphasizes its role again at the end of the period. However it is unclear how the large-scale investments will be financed, particularly in view of the trend towards decentralization of the sector. During 2001 power shortages occurred, caused by a scarcity of hydrological resources. It is unclear how this will affect the National Expansion Plan data. However, in the past couple of years there has been a push towards the introduction of thermal power to avoid future blackouts, and therefore a greater reliance on fossil fuels.

Historically, tariff levels have been relatively low due to a centralized pricing structure fixed by the government. While tariff increases may be expected in locations where there is a large growth in demand for electricity, such as Espirito Santo, the ability to capture such tariffs are still uncertain due to the risks of a still incipient free electricity market in Brazil.

In parallel to the risks related to the sale of electricity, the exact amounts of landfill gas and the performance of the plants also concerns landfill operators. Given that currently there isn't a single landfill site in Brazil generating electricity, this is seen as 'unproven' technology by local investors.



Financial analysis conducted for the Project using assumptions that are conservative from an investment decision point of view. The results obtained show that the Internal Rate of Return of the project without carbon finance is negative and even with the best possible conditions the MARCA project is still not an economically attractive course of action.

The only remaining plausible baseline scenario is Alternative 1, i.e. the continuation of the status quo (BAU) without any LFG treatment.

(iii) There is no regulatory requirements for MSW in Brazil. Of course there are many alternatives but vis a vis the current economic conditions of the City of Cariacica, Espirito Santo State, Brazil, the alternatives listed above are the only possible

(iv) Brazilian current legislation does not requires any collection of the gas collected through the project. No investment for collecting and flaring gas in baseline for safety reasons has been provided. Therefore the incremental investment is the investment considered.

(v) Further details on the IRR analysis were provided and validated by DNV:

(vi) Historically, tariff levels have been relatively low due to a centralized pricing structure fixed by the government. While tariff increases may be expected in locations where there is a large growth in demand for electricity, such as Espirito Santo, the ability to capture such tariffs are still uncertain due to the risks of a still incipient free electricity market in Brazil. Therefore, the obtention of a suitable PPA depends on several pre conditions which varies from time to time. A R\$ 120,00 tariff over the 21 year period was assumed as the most likely on the circumstances.

(vii) Just for reference, an extremely conservative fund of a first line bank in Brazil, based upon interbanks certificate deposits yields 23,5% per annum.

(viii) There is not such policy in Brazil

Comment by: Luis R. Mejia, Simapro, S. A

Inserted on: 2004-06-23

Subject: Monitoring Methodology

Comment:

The project's activity has been very well documented for the Monitoring Methodology. The three basic elements of sustainable development have been contemplated: social aspect, economical aspect and the environmental aspect. The technical description is very appropriate for the monitoring. The technical details of the landfill's design have been presented very properly, so that the potential environmental impacts of the landfill operation can be diminished.

For the leachate, a system treatment has been proposed by lagoon. It is also necessary the monitoring of the ground waters and surface waters.

Because of the characteristics of the collected LFG, and the emissions that haven't been released to the atmosphere, these can be directly monitored.

DNV's response:

The monitoring of ground waters and surface waters is included as a requirement on the Environment License.





5 PRELIMINARY VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has validated the Brazil Marca Landfill Gas to Energy Project at Cariacica, Espírito Santo State, Brazil (hereafter called “the project”), proposed by Marca and Econergy for registration under the CDM. 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 project proposes to collect and combust or flare landfill gas (LFG) captured at Marca Landfill. The use of electricity generated from landfill gas reduces CO₂ emissions associated with the use of grid electricity. However, emission reductions from displacing electricity from the regional grid will not be claimed by the project.

The project is not expected to have considerable environmental impacts. An Environmental Impact Study as required by Brazilian law has been carried out and the project has received an environmental licence for Capture and Treatment of Landfill Gas by IEMA (Instituto Estadual de Meio Ambiente). However, leachate is not yet treated adequately and IEMA required that a plan for installing the necessary aeration units and biologic filter is presented within April 2005. According to the register of IEMA, such a plan was sent to IEMA on 5 April 2005. The project is thus in compliance with environmental legislation. However, the actual implementation of the leachate treatment system must be verified during the first periodic verification of emission reductions.

*By promoting renewable energy and implementing several social programs, the project is in line with current sustainable development priorities of Brazil. **Nevertheless, the Brazilian DNA has not yet formally approved the project, including a confirmation that the project assists Brazil in achieving sustainable development.***

The project applies the approved 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 the absence of the project activity. The project applies an Effectiveness Adjustment Factor (EAF) of 10% instead of the methodologies default value of 20%. The provided justification with regard to the current closing conditions of the landfill sufficiently justifies the selected EAF.

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 stakeholder comments were invited according to the Brazilian DNA Resolution 1, however no one was received. International stakeholders comments were invited through DNV website and some ones were received and answered without necessity of documentation change.



In summary, the Brazil Marca Landfill Gas to Energy Project meets all present and relevant UNFCCC criteria and correctly applies the approved baseline and monitoring methodologies ACM0003. However, the project has not yet been approved by the DNA of the participating Parties, and the DNA of Brazil has not yet confirmed the project's contribution to sustainable development.



6 REFERENCES

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

- /1/ PDD MARCA Gas to Energy Project, version February, 2004.
- /2/ PDD MARCA Gas to Energy Project, version March, 2004.

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

- /3/ DNV Certification et al.: *Validation and Verification Manual*.
<http://www.vvmanual.info>
- /4/ Approved Baseline methodology AM 0003
Simplified Financial Analysis for Landfill Gas Capture Projects
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_529250970

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

- /a/ Sergio Almenara Ribeiro – Manager Marca Construtora e Serviços.
- /b/ Pablo Fernandes – Ecosecurities Brasil Ltda,
- /c/ Mirela Chiapani Souto –Project Manager Marca Construtora e Serviços
- /d/ Breno Castilioni Marchiori - Staff Marca Construtora e Serviços – [Effluent manager](#)

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