VALIDATION REPORT

"TERRESTRE AMBIENTAL LANDFILL GAS PROJECT" IN BRAZIL

REPORT NO. 2006-1176

REVISION NO. **05**

DET NORSKE VERITAS

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 31-05-2006	Project No.: 45010021
Approved by: Michael Lehmann Technical Director	Organisational unit: DNV Certification, International Climate Change Services
Client: Terrestre Ambiental Ltda	Client ref.: Alex Schlosser

Summary:

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

The validation consisted of the following three phases: i) a desk review of the project design, 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.

This validation report summarizes the findings of the validation. The only changes made to this version of the validation report compared to the validation report rev. 04 dated 16 November 2006 referred to in the letter of approval of the DNA of Brazil are linked to version of ACM0001, the starting date and the status of issuance of the letter of approval by the DNA of Brazil.

In summary, it is DNV's opinion that the "Terrestre Ambiental Landfill Gas Project" as described in the revised PDD of 30 March 2007 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0001 (version 05). Hence, DNV will request the registration of the "Terrestre Ambiental Landfill Gas Project" as a CDM project activity.

Report No.: 2006-1176	Subject Group: Environment	
Report title: "Terrestre Ambiental Landfill Gas Project" in Brazil.		
Work carried out by: K.Venkata.Raman, Luis Filipe Tavares, Vicente San Valero		
Work verified by: Soumik Biswas and Michael Lehmann		
Date of this revision: 2007-04-02	Rev. No.: 05	Number of pages: 12

Indexing terms

Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification Market Sector Waste handling and disposal.

☒ No distribution without permission from the client or responsible organisational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

Table of Content *Page*

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CGR	Center for the Management of Residues (*Centro de Gerenciamento de Resíduos*)
CH_4	Methane
CL	Clarification request
CETESB	State of São Paulo Environmental Agency
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
DAIA	Departamento de Avaliação de Impacto Ambiental
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LFG	Land fill gas
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
SMA	State Secretary of Environment (Secretaria de Estado Meio Ambiente)
UNFCCC	United Nations Framework Convention on Climate Change
USEPA	United States Environment Protection Agency

1 INTRODUCTION

Terrestre Ambiental Ltda and Econergy Brasil Ltda have commissioned Det Norske Veritas Certification Ltd. (DNV) to perform a validation of the "Terrestre Ambiental Landfill Gas Project" in Brazil.

This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for CDM projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. This validation report summarizes the findings of the validation. The only changes made to this version of the validation report compared to the validation report rev. 04 dated 16 November 2006 referred to in the letter of approval of the DNA of Brazil are linked to version of ACM0001, the starting date and the status of issuance of the letter of approval by the DNA of Brazil.

The validation team consisted of the following personnel:

Mr Luis Filipe Tavares	DNV Rio de Janeiro	Waste sector expert
Mr Raphael de Souza	DNV Rio de Janeiro	GHG auditor
Mr Vicente San Valero	DNV Rio de Janeiro	Team Leader
Mr K.Venkata Raman	DNV Bangalore	GHG auditor
Mr Soumik Biswas	DNV Kolkata	Technical reviewer (Applicant)
Mr Michael Lehmann	DNV Oslo	Technical reviewer

1.1 Validation Objective

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

1.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0001 (version 05). The validation team has, based on the recommendations in the Validation and Verification Manual /11/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

1.3 "Terrestre Ambiental Landfill Gas Project"

The objective of the "Terrestre Ambiental Landfill Gas Project" is to capture and flare the landfill gas generated at the CGR Piaçaguera landfill in order to avoid emissions of methane to the atmosphere. The landfill is located in the city of Santos, São Paulo State, Brazil. The CGR Piaçaguera landfill has the capacity to receive 3 million tons of waste. The project is forecasted to start on 01 July 2007.

Terrestre Ambiental Ltda is a society between Terracom Construções Ltda and ESTRE (Empresa de Saneamento e Tratamento de Resíduos.

The current practice at the landfill is to collect and burn the gas only through a passive system, with no systematic and monitored flare. Methane is emitted naturally to the atmosphere through the existing wells, and part of the gas is burned due to safety and odour reasons.

The project involves the development of a collection pipeline network and a flaring system. The collection system will be built using the existing wells. The wells will be connected to a main pipeline to transport the landfill gas to the flare. A blower will be installed in order to increase the amount of landfill gas collected.

The estimated amount of GHG emission reductions from the project is calculated to be 703 430 tonnes CO_2 equivalents (tCO_2e) during the first renewable 7-year crediting period (with the potential of being renewed twice), resulting in estimated average annual emission reductions of 100 490 tCO_2e.

2 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents;

II follow-up interviews with project stakeholders;

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

In order to ensure transparency, a validation protocol was customised for the project, according to the Validation and Verification Manual /11/. The protocol shows in transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It 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 "Terrestre Ambiental Landfill Gas Project" is enclosed in Appendix A to this report.

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

i) mistakes have been made with a direct influence on project results;

ii) validation protocol requirements have not been met; or

iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

The term *clarification* (CL) may be used where additional information is needed to fully clarify an issue.

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

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

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

Figure 1 Validation protocol tables

2.1 Review of Documents

The PDD version 01 of 24 April 2006 /1/ and the subsequent revisions (version 02 of 07 June 2006, version 03 of 20 July 2006, version 04 of 20 September 2006 and the final version 05 of 30 March 2007 /5/) submitted by Terrestre Ambiental Ltda and Econergy Brasil Ltda were assessed by DNV. After that, the PDD version 6 dated 05 February 2007 applying the ACM0001 version 5 and PDD template version 3 was submitted, however the document mentions the wrong grid. A final version 7 of PDD dated 30 March 2007 was submitted, the changes between version 5 and 7 were related to the adjustment of flaring efficiency.

Also, additional background documents related to the project design and baseline were assessed during the validation.

2.2 Follow-up Interviews

On 11 April 2006, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Econergy Brasil were interviewed. The main topics of the interviews are summarised in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Econergy Eduardo Cardoso Filho - Virginia Gante	➢ Baseline emission calculations ➢ Project technology ➢ Project emission calculations ➢ Management structure and procedures ➢ Current practice of venting and flaring and AF factor.

2.3 Resolution of Clarification and Corrective Action Requests

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

The initial validation of the project identified 4 (four) *corrective action requests* and 7 (seven) requests for *clarification*. The project participant's response to DNV's draft validation report findings and the final version of the PDD of 30 March 2007 addressed the *corrective action requests* and requests for *clarification* to DNV's satisfaction.

To guarantee the transparency of the validation process, the concerns raised are summarised in chapter 3 below and documented in more detail in the validation protocol in Appendix A.

2.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review was performed by a qualified technical reviewer.

3 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the revised PDD of 30 March 2007.

3.1 Participation Requirements

The project participants are Terrestre Ambiental Ltda and Econergy Brasil Ltda of Brazil. The host Party Brazil meets all relevant participation requirements and has provided written approval of voluntary participation in the project. No participating Annex I Party is yet identified.

3.2 Project Design

The objective of the project is to capture and flare the landfill gas generated at the CGR Piaçaguera landfill site, owned by the project proponent and located in the city of Santos, São Paulo State, Brazil. The project activity thereby avoids emissions of methane to the atmosphere.

The current practice at the landfill is to collect and burn the gas only through a passive system, with no systematic and monitored flare. Methane is emitted to the atmosphere through the existing wells, and only part of the gas is burned due to safety and odour reasons.

The project involves the development of a collection pipeline network and a flaring system. The collection system will be built using the existing wells. The wells will be covered and connected to a main pipeline to transport the landfill gas to the flare. A blower will be installed in order to increase the amount of landfill gas collected.

A 7-year renewable crediting period is selected (with the potential of being renewed twice), starting on 01 July 2007. The starting date of the project activity is forecasted to be 01 July 2007 with an expected operational lifetime of 21 years.

The project is expected to bring improvement on sustainable development through reducing methane emissions and minimizing the risk of explosions at the site. The project involves the transfer of technology, which has a positive impact on employment and construction capacity skills.

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

3.3 Baseline Determination

The project applies the approved baseline methodology ACM0001 (version 05) – "*Consolidated baseline methodology for landfill gas project activities*" /12/. This methodology is applicable to project activities that reduce greenhouse gas emissions through landfill gas capture and destruction of the methane by flaring and/or generation of electricity. In the case of the ""Terrestre Ambiental Landfill Gas Project"", the destruction of methane will be done through flaring only.

The selected baseline scenario is the partial atmospheric release of the landfill gas. As the "Terrestre Ambiental Landfill Gas Project" does not have any contractual obligations to burn methane, the methane that would have been destructed in the baseline has been calculated using an "Adjustment Factor". The "Adjustment Factor" has been estimated to be 20% of the total methane destructed under the project activity. The "Adjustment Factor" of 20% allows for the destruction of LFG in the baseline scenario which would have occurred as a result of the continuation of the current practice of passive venting and unsystematic burning of LFG. Since the Brazilian landfill regulations do not mandate LFG collection and destruction and only a small amount of the methane generated is currently burned due to safety and odour reasons, an "Adjustment Factor" of 20% is deemed appropriate.

GHG emissions by sources in the baseline were estimated using IPCC's guidelines and the first order decay model approach considering values of L_0 = 70 m^3CH_4/tonwaste and k (1/year) = 0.1. These figures are deemed appropriate and conservative.

3.4 Additionality

In accordance with ACM0001, the additionality of the project is demonstrated through the "*Tool for the demonstration and assessment of additionality*" /14/, which includes the following steps:

Step 0 -Preliminary screening based on the starting date of the project activity: As the starting date of the crediting period (01 July 2007) is after the expected date of registration of the project, this step is not applicable.

Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations: The possible baseline scenarios are: a) LFG would continue to be released to the atmosphere and only small amounts of LFG would be burned due to safety and odour reasons and b) the implementation of capturing and flaring of LFG without CDM incentives. There is no legislation in Brazil obliging landfills to flare the collected gas. Both scenarios are thus in compliance with all applicable legal and regulatory requirements. Since the project activity does not have any other incentives from the capturing and flaring of the methane, the current scenario of continued release of methane to the atmosphere with partial flaring due to safety reasons has been selected as the baseline and this baseline scenario is further justified through the next steps of the additionality tool.

Step 2 - Investment analysis: As the CDM project activity does not generate any financial or economic benefit other than the CDM related income, the simple cost analysis scenario is applied. Considering the additional costs necessary for increasing the LFG capture capacity, without having any revenues, the project is not a likely baseline scenario.

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

Step 4 - Common practice analysis: DNV was able to confirm that possible future legislation that would require landfills to quantify and flare a certain amount of the gas produced is not likely to be implemented in near future, considering the waste disposition situation in Brazil. At present 53% of waste produced in Southeast of Brazil is disposed in dumps and only about 13% is destined to sanitary landfills. A major environmental problem related to domestic waste in Brazil is the lack of waste disposal to sanitary landfills. DNV was able to confirm that the investment to install systems to capture and flare methane is not common practice in Brazil.

Step 5 - Impact of CDM registration: As there is no income from the project, the sale of CERs will present the only revenue for the project and will significantly alleviate the economic and financial hurdles of the project.

Given the above, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions are thus additional.

3.5 Monitoring Plan

The project correctly applies the approved monitoring methodology ACM0001 (version 05) - "*Consolidated monitoring methodology for landfill gas projects activities*".

The following parameters will be monitored during the crediting period for calculation of the GHG emission reductions:

- Amount of landfill gas captured;
- Amount of landfill gas sent to the flare;
- Flare efficiency;
- Methane fraction in the landfill gas;
- Temperature and pressure of the landfill gas;
- Electricity requirement of the project;
- Grid emission factor – *ex-ante* determination for the entire crediting period;
- Regulatory requirement changes.

The regulatory requirements regarding landfills and the CO_2 emission factor of the grid will also be monitored for updating of the baseline at renewal of the crediting period.

The quality control and quality assurance datasheet for the project identifies several monitoring routines. As the project is not yet implemented, the responsibilities for project operation and monitoring and reporting have not yet been developed. However, by the time of the project implementation, a team and its responsibilities will be assigned. The management systems are to be assessed at the first periodic verification of the project's emission reductions

All the data will be archived for a period of two years after the crediting period.

3.6 Calculation of GHG Emissions

Emission reductions are directly monitored and calculated *ex-post*, using the approach indicated in ACM0001 (version 05). An adjustment factor of 20% for destruction of landfill gas in the baseline scenario will be applied during the first renewable 7-year crediting period.

For the *ex-ante* estimation of emission reductions the projected LFG generation from the landfill is determined using the IPCC first order decay model. A methane potential generation (L_0) of 70 m^3CH_4/ton waste, a decay constant k (1/year) of 0.1 and a collection efficiency of 65% were assumed.

For the calculation of project emissions due to the import of electricity used to pump the LFG, the Brazilian South-Southeast-Midwest interconnected grid CO_2 emission coefficient has been calculated and fixed *ex-ante* for the first 7-year crediting period and is calculated to be 0.2611 tCO_2e/MWh (weighted average of the build margin (BM) and operating margin (OM) emission coefficients). The calculation conform to the procedure given in ACM0002 (version 6) and the

calculations were based on electricity generation data provided by National Electricity System Operator (ONS) for the electricity generated in the South-Southeast-Midwest (S-SE-CO) grid in the years 2003-2005. Data for the years 2003-2005 are the most recent statistics available at the time of the PDD submission.

The project activity is projected to reduce 100 490 t CO_2e yearly. Considering the amount of uncertainty related to the methane generation and collection efficiency, which depends on the actual design and engineering of the project, this might be achievable if the project is implemented suitably. However, experiences with other landfills have shown that the methane generation and collection efficiency of the landfills projected by the first order decay model has an inherent uncertainty of almost 50% and hence the amount of CERs, which will be monitored *ex-post*, might vary from the projected amount.

3.7 Environmental Impacts

The CGR Piaçaguera landfill (Terrestre Ambiental Ltda) has been granted the Operating Licence # 18000614 on 21 June 2004, which is valid until 18 June 2009. This license was issued by the State of São Paulo environmental agency (CETESB).

The landfill gas capture and flaring project has not yet obtained a licence for flaring, and such a licence must be applied for. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the licence will be obtained when the project is implemented. At the first periodic verification of the project's emission reductions, it must be confirmed that this licence was eventually obtained.

3.8 Comments by Local Stakeholders

Local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, were invited to comment on the project, in accordance with the requirements of Resolution 1 of the Brazilian DNA. Copies of the letters sent to the local stakeholders were verified during the follow up interviews. One comment was received from the "*Fórum Brasileiro de ONGs*" and taken into account.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

DNV Certification published the PDD of 05 February 2007 on the DNV Climate Change web site (http://www.dnv.com/certification/ClimateChange) and Parties, stakeholders and NGOs are, through the UNFCCC CDM web site, invited to provide comments during the period from 03 March 2007 to 01 April 2007. No comments were received

Prior to this, the PDD the PDD of 24 April 2006 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 29 April 2006 to 28 May 2006. No comments were received.

5 VALIDATION OPINION

Det Norske Veritas Certification Ltd. (DNV) has performed a validation of the "Terrestre Ambiental Landfill Gas Project", located in the city of Santos, São Paulo State, Brazil. 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 participants are Terrestre Ambiental Ltda and Econergy Brasil Ltda of Brazil. The host Party Brazil meets all relevant participation requirements and has provided written approval of voluntary participation in the project. No participating Annex I Party is yet identified.

The project's objective is to capture and flare the landfill gas produced at the "Centro de Gerenciamento de Resíduos" - CGR Piaçaguera landfill, to avoid emissions of methane to the atmosphere. The technology to be employed will be the improvement of landfill gas collection and flaring, through the installation of an active recovery system composed of a collection and transportation pipeline network and a flaring system.

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

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

By burning the methane contained in landfill gas the project results in reductions of CH_4 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Emission reductions are directly monitored and calculated ex-post, using the approach indicated in ACM0001. The ex-ante estimation of emission reductions and the projected LFG generation from the landfill was determined using the IPCC first order decay model.

Local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, were invited to comment on the project, in accordance with the requirements of Resolution 1 of the Brazilian DNA. Copies of the letters sent to the local stakeholders were verified during the follow up interviews. One comment was received from the "Fórum Brasileiro de ONGs" and taken into account. Parties, stakeholders and NGOs were invited to comment on the validation requirements via the UNFCCC web-site. No comments were received.

In summary, it is DNV's opinion that the "Terrestre Ambiental Landfill Gas Project", as described in the revised and resubmitted project design document of 30 March 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0001 (version 05). Hence, DNV will request the registration of the "Terrestre Ambiental Landfill Gas Project" as a CDM project activity.

REFERENCES

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

/1/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 1 of 24 April 2006.

/2/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 2 of 07 June 2006.

/3/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 3 of 20 July 2006.

/4/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 4 of 20 September 2006.

/5/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 5 of 08 November 2006.

/6/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 6 of 05 February 2007.

/7/ Econergy Brasil Ltda: *Project Design Document for the "Terrestre Ambiental Landfill Gas Project"*, Version 7 of 30 March 2007.

/8/ *Spreadsheets for the calculation of the combined margin emission Coefficient* (BR SSECO 2003-2005-2006.08.28.xls).

/9/ Econergy Brasil Ltda: *Spreadsheets for the calculation of the emission reductions from the "Terrestre Ambiental Landfill Gas Project"*.

/10/ Comissão Interministerial de Mudança Global do Clima (DNA of Brazil): *Letter of Approval*. 25 January 2007

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

/11/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/12/ Approved Baseline and Monitoring Methodology ACM0001: "*Consolidated baseline and monitoring methodology for landfill gas project activities*", version 05.

/13/ CDM Executive Board: *Approved Baseline and Monitoring Methodology ACM0002: "Consolidated methodology for grid-connected electricity generation from renewable sources"*, version 6.

/14/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*. Version 02.

/15/ CDM Executive Board: *"Methodological Tool to determine project emissions from flaring gases containing methane"*. Version 01.

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

/16/ Eduardo Cardoso Filho - Econergy

/17/ Virginia Gante - Econergy

- o0o -

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirement 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	N/A	No participating Annex I Party has been identified yet.
2. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK	Table 2, Section A.3
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC	Kyoto Protocol Art.12.2.	OK	Table 2, Section E.4.1
4. The project shall have the written approval of voluntary participation from the designated national authority of each party involved	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK	DNA of Brazil: Letter of Approval. 25 January 2007
5. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change	Kyoto Protocol Art. 12.5b	OK	Table 2, Section E
6. Reduction in GHG emissions shall be additional to any that would occur in absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK	Table 2, Section B.2
7. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK	The project activity does not involve any funding from an Annex-I country.
8. Parties participating in the CDM shall designate a national authority for the CDM	CDM Modalities and Procedures §29	OK	The Brazilian designated national authority for the CDM is the Comissão

Requirement	Reference	Conclusion	Cross Reference / Comment
			Interministerial de Mudança Global do Clima.
9. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol	CDM Modalities §30/31a	OK	Brazil has ratified the Kyoto Protocol on 23 August 2002.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded	CDM Modalities and Procedures §31b	N/A	No participating Annex I Party is yet identified.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7	CDM Modalities and Procedures §31b	N/A	No participating Annex I Party is yet identified.
12. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received	CDM Modalities and Procedures §37b	OK	Table 2, Section G
13. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK	Table 2, Section F
14. Baseline and monitoring methodology shall be previously approved by the CDM Executive Board	CDM Modalities and Procedures §37e	OK	Table 2, Section B.1.1 and D.1.1
15. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP	CDM Modalities and Procedures §37f	OK	Table 2, Section D
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available	CDM Modalities and Procedures §40	OK	The PDD of 24 April 2006 was made publicly available on DNV's climate change website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 29 April 2006 to 28

Requirement	Reference	Conclusion	Cross Reference / Comment
			May 2006. No comments were received.
17. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances	CDM Modalities and Procedures §45c,d	OK	Table 2, Section B.2
18. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure	CDM Modalities and Procedures §47	OK	Table 2, Section B.2
19. The project design document shall be in conformance with the UNFCCC CDM-PDD format	CDM Modalities and Procedures Appendix B, EB Decision	OK	The project design document conforms to the UNFCCC-CDM-PDD format.

Table 2 Requirements Checklist

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial (geographical) boundaries clearly defined?	/1/ /5/	DR	The project is located at the CGR Piaçaguera landfill located in the city of Santos, São Paulo State, Brazil.		OK
A.1.2. Are the project's system (components and facilities used to mitigate GHGs) boundaries clearly defined?	/1/ /5/	DR/I	The project engineering consultants and details have not been finalised. However, it is indicated that the project proponent will install wellheads at the existing concrete wells. The wellheads will be connected to a manifold. All the individual manifolds will be connected to the main transmission pipeline going to the flare system through a blower and a dewatering system. The system for the removal of leachate and its treatment prior to discharge will be as per the regulations specified in the operating licence.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
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/ /5/	DR	The landfill gas collection system and transmission pipelines are all standard equipment available in Brazil. The flare system technology and flare equipment will be imported. It can be concluded that the project design engineering reflects current good practice.		OK
A.2.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /5/	DR	The project uses standard technology available. The flare system which is the most critical part of the system is imported.		OK
A.2.3. Is the project technology likely to be substituted by other or more efficient technologies within the project period?	/1/ /5/	DR	No, the project technology is not likely to be substituted by other or more efficient technologies at least within the first 7-year crediting period.		OK
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period?	/1/ /5/	DR	Yes, the project will require extensive initial training in the operation and maintenance of the flaring systems, in order to work as presumed during the project period.		OK
A.2.5. Does the project make provisions for meeting training and maintenance needs?	/1/ /5/	DR/I	It was verified during the site visit that the training needs will be specified and provided for at the time of the start of the project activity.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
A.3. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.3.1. Is the project in line with relevant legislation and plans in the host country?	/1/ /5/	DR/I	The host country Brazil has no legislation regarding the collection and flaring of landfill gas. The CGR Piaçaguera landfill (Terrestre Ambiental Ltda) has been granted the Operating Licence # 18000614 on 21 June 2004, which is valid until 18 June 2009. This license was issued by the State of São Paulo environmental agency (CETESB). The landfill gas capture and flaring project has not yet obtained a licence for flaring, and such a licence must be applied for. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the licence will be obtained when the project is implemented. At the first periodic verification of the project's emission reductions, it must be confirmed that this licence was eventually obtained. The licences for the CGR Piaçaguera landfill are to be evidenced during the site visit.	~~CAR 1~~	OK
A.3.2. Is the project in line with host-country specific CDM requirements?	/1/ /5/	DR	The project is in line with host country specific requirements.		OK
A.3.3. Is the project in line with sustainable development policies of the host country?	/1/ /5/	DR	The project is in line with current sustainable development priorities in Brazil. The DNA of Brazil confirmed that the project assists in achieving sustainable		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			development..		
A.3.4. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /5/	DR	The project activity will create additional employments.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Is the baseline methodology previously approved by the CDM Executive Board?	/1/ /5/ /12/	DR	The project applies the approved baseline methodology ACM0001 - "Consolidated baseline and monitoring methodology for landfill gas *project activities"* which is previously approved by the CDM Executive Board.		OK
B.1.2. Is the baseline methodology the one deemed most applicable for this project and is the appropriateness justified?	/1/ /5/	DR	The baseline methodology is applicable to the project activity as the project envisages the capture and flaring of the landfill gas and the baseline scenario is the partial or total release of the landfill gas to the atmosphere.		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2. Baseline Determination *The choice of baseline will be validated with focus on whether the baseline is a likely scenario, whether the project itself is not a likely baseline scenario, and whether the baseline is complete and transparent.*					
B.2.1. Is the application of the methodology and the discussion and determination of the chosen baseline transparent?	/1/ /5/	DR	The application of the methodology is correct and the baseline determination is transparent. The baseline is that in the absence of the project activity the landfill gas would be released to the atmosphere, except of a small quantity which is captured and burnt to address safety and odour concerns.		OK
B.2.2. Has the baseline been determined using conservative assumptions where possible?	/1/ /5/	DR/I	As the landfill does not have any contractual obligations to burn methane, the baseline emissions are calculated based on the "Adjustment Factor", estimated as 20% of total methane destroyed at the baseline. A collection efficiency value of 80% was considered. As the project does not have any contractual obligations to burn methane, this value is a conservative approach. The "Adjustment Factor" was estimated to be 20% of total methane produced. The justification for the selection of 20% for the adjustment factor is to be presented. The consideration of a collection efficiency of 80 % is to be justified for the project activity.	~~CL 1~~ ~~CL 6~~	OK
B.2.3. Has the baseline been established on a project-specific basis?	/1/ /5/	DR	Yes.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /5/	DR/I	The National Waste Management Policy is under discussions and there is enough evidence to conclude that it will result only in requirements for LFG collection but no requirements for LFG destruction of more than 20 %.		OK
B.2.5. Is the baseline determination compatible with the available data?	/1/ /5/	DR	Yes		OK
B.2.6. Does the selected baseline represent the most likely scenario among other possible and/or discussed scenarios?	/1/ /5/	DR	Yes, the selected baseline represents the most likely scenario. The common practice in Brazil is to dispose waste in open dumps. None of these landfills have any structure to collect and flare the methane generated. In some case passive venting and flaring is done only due to safety reasons. Controlled landfills with gas collection and minimum flaring comprise of only 16 % (as per PNSB 2000 data). Most of the landfills which are equipped with active collection and flaring system have been developed as CDM projects.		OK
B.2.7. Is it demonstrated/justified that the project activity itself is not a likely baseline scenario?	/1/ /5/ /12/ /14/	DR/I	In accordance with ACM0001, the additionality of the project is demonstrated through the "*Tool for the demonstration and assessment of additionality*" /14/, which includes the following steps: *Step 0 -Preliminary screening based on the starting date of the project activity:* As the starting date of the crediting period (01 July 2007) is after the expected date of	~~CL 2~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			registration of the project, this step is not applicable. *Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations:* The possible baseline scenarios are: a) LFG would continue to be released to the atmosphere and only small amounts of LFG would be burned due to safety and odour reasons and b) the implementation of capturing and flaring of LFG without CDM incentives. There is no legislation in Brazil obliging landfills to flare the collected gas. Both scenarios are thus in compliance with all applicable legal and regulatory requirements. Since the project activity does not have any other incentives from the capturing and flaring of the methane, the current scenario of continued release of methane to the atmosphere with partial flaring due to safety reasons has been selected as the baseline and this baseline scenario is further justified through the next steps of the additionality tool. Step 2 - Investment analysis: As the CDM project activity does not generate any financial or economic benefit other than the CDM related income, the simple cost analysis scenario is applied. Considering the additional costs necessary for increasing the LFG capture capacity, without having any revenues, the project is not a likely baseline scenario.		

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			Step 3 - Barrier analysis: Not selected (Step 2 is selected only) *Step 4 - Common practice analysis:* DNV was able to confirm that possible future legislation that would require landfills to quantify and flare a certain amount of the gas produced is not likely to be implemented in near future, considering the waste disposition situation in Brazil. At present 53% of waste produced in Southeast of Brazil is disposed in dumps and only about 13% is destined to sanitary landfills. A major environmental problem related to domestic waste in Brazil is the lack of waste disposal to sanitary landfills. DNV was able to confirm that the investment to install systems to capture and flare methane is not common practice in Brazil. *Step 5 - Impact of CDM registration:* As there is no income from the project, the sale of CERs will present the only revenue for the project and will significantly alleviate the economic and financial hurdles of the project. Given the above, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions are thus additional. The source of the data is to be verified as the total of the pie chart adds up to more than 100.		
B.2.8. Have the major risks to the baseline been identified?	/1/ /5/	DR/I	The risk to the baseline would be the introduction of laws/regulations requiring the	~~CL 3~~	OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			capturing and flaring of landfill gases. This has been identified and will be tracked as per the methodology. Another risk to the baseline is the premature closure of the landfill due to unavailability of sufficient quantities of waste. The project proponent is requested to confirm that the amount of waste used in the calculations will be available for the landfill during the project lifetime..		
B.2.9. Is all literature and sources clearly referenced?	/1/ /5/	DR	Yes.		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/ /5/	DR/I	The project is foreseen to start on 01 July 2007 and the project's expected operational lifetime is 21 years and deemed reasonable.		OK
C.1.2. Is the assumed crediting time clearly defined (renewable crediting period of seven years with two possible renewals or fixed crediting period of 10 years with no renewal)?	/1/ /5/	DR/I	A renewable 7-year crediting period (with the potential of being renewed twice) is selected, with a forecasted starting date of 01 July 2007.		OK

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 ((Blue text contains requirements to be assessed for optional review of monitoring methodology prior to submission and approval by CDM EB).*					
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/ /5/	DR	The project applies the approved baseline methodology ACM0001 (version 05) – "*Consolidated monitoring methodology for landfill gas project activities*".		OK
D.1.2.Is the monitoring methodology applicable for this project and is the appropriateness justified?	/1/ /5/	DR	The monitoring methodology is applicable for the project as the project is a landfill gas capture and flaring project. In line with the methodology the following parameters will be monitored. - Quantity of LFG captured- measured - LFG flared - measured - Methane fraction in LFG being flared- analyser - Flare efficiency - Temperature of LFG – measured - Pressure of LFG – measured - Electricity consumption – measured - Hours of blower operation		OK

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
			- CO_2 emission intensity of grid. - Regulatory requirements		
D.1.3.Does the monitoring methodology reflect good monitoring and reporting practices?	/1/ /5/	DR/I	The monitoring methodology reflects good monitoring practices. The following need to be corrected in table D.2.2.1 in line with the monitoring methodology: - Flare efficiency - the comments have got reversed 1) should be continuous measurement of the operation time of flare and (2) periodic measurement of methane in flared gas. - CO2 intensity of grid electricity is the estimation "at *the validation and yearly after registration".* - However, since the project adopts the selected emission factor *ex-ante,* the project proponent is requested to modify this. The table still says that the CO2 emission factor, which is fixed *ex-ante,* will be measured yearly. The project proponent is requested to modify the table.	~~CAR 2~~	OK
D.1.4.Is the discussion and selection of the monitoring methodology transparent?	/1/ /5/	DR	The discussion and selection of the monitoring methodology is as per the approved methodology and transparent.		OK

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/ /5/ /13/	DR/I	Yes, in line with the methodology, the monitoring plan provides for the collection and archiving of all necessary data. The consideration of a collection efficiency of 80 % is to be justified for the project activity. The grid emission factor has been estimated at 0.2636 considering generation data for the years 2002 -2004 in the South-Southeast-Midwest grid. The factor is estimated as per the guidelines of the ACM0002. The Operating margin was calculated using the simple adjusted OM, with the vintage data of 2002 to 2004 from the Brazilian Electricity System Manager (ONS). The build margin BM has been calculated using the 20% of the total generation of the year 2004 as the generation of the 5 most recent plants is less than the 20%. It is to be clarified if the electricity grid emission factor of 0.2636 t CO2e/MWh is to be calculated *ex-ante* or will be calculated every year. With the availability of the data for the year 2005, the grid emission factor is to be updated.	~~CL 4~~ ~~CL 6~~ ~~CAR 4~~	OK
D.2.2. Are the choices of project GHG indicators reasonable?	/1/ /5/	DR	The choice of project GHG indicator CO_2 is reasonable.		OK

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

Checklist Question	Ref.	MoV*	Comments	Draft Concl	Final Concl
D.2.3.Will it be possible to monitor / measure the specified project GHG indicators?	/1/ /5/	DR	Yes.		OK
D.2.4.Will the indicators give opportunity for real measurements of project emissions?	/1/ /5/	DR	Yes.		OK
D.2.5.Will the indicators enable comparison of project data and performance over time?	/1/ /5/	DR	Yes.		OK
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/ /5/ /12/	DR	No potential emission sources of leakage are to be considered as per ACM0001.		OK
D.4. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
D.4.1.Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/ /5/	DR	The baseline emissions of GHG have been estimated *ex-ante* following the IPCC guidelines and the first order decay model.		OK
D.4.2.Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	/1/ /5/	DR	The choice of CH_4 as the baseline indicator is reasonable.		OK
D.4.3.Will it be possible to monitor / measure the specified baseline indicators?	/1/ /5/	DR	Yes.		OK
D.4.4.Will the indicators give opportunity for real measurements of baseline emissions?	/1/ /5/	DR	Yes.		OK

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

D.5. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is checked that choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
D.5.1. Does the monitoring plan provide the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/ /5/ /12/	DR/I	Neither ACM0001 nor Resolution 1 of the Brazilian DNA requires the monitoring of social or environmental indicators.	~~CL 5~~	OK
D.6. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
D.6.1. Is the authority and responsibility of project management clearly described?	/1/ /5/	DR/I	The PDD mentions a team to be assigned to monitor emission reductions. Procedures in section D.6 are to be evidenced.	~~CL 5~~	OK
D.6.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification.	~~CL 5~~	OK
D.6.3. Are procedures identified for training of monitoring personnel?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.5. Are procedures identified for calibration of monitoring equipment?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.6. Are procedures identified for maintenance of monitoring equipment and installations?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.7. Are procedures identified for monitoring, measurements and reporting?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK

D.6.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.9. Are procedures identified for dealing with possible monitoring data adjustments and uncertainties?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.10. Are procedures identified for review of reported results/data?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.11. Are procedures identified for internal audits of GHG project compliance with operational requirements where applicable?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.12. Are procedures identified for project performance reviews before data is submitted for verification, internally or externally?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
D.6.13. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/ /5/	DR/I	This is not mentioned in the PDD and needs clarification	~~CL 5~~	OK
E. Calculation of GHG Emissions by Source *It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.*					
E.1. Project GHG Emissions *The validation of ex-ante estimated project GHG emissions focuses on transparency and completeness of calculations.*					
E.1.1. Are all aspects related to direct and indirect GHG emissions captured in the project design?	/1/ /5/	DR	Yes, all aspects related to direct GHG emissions have been captured in the project design. The direct project emissions result		OK

			from the electricity consumption of the blower. There are no indirect emissions from the project.		
E.1.2. Are the GHG calculations documented in a complete and transparent manner?	/1/ /5/	DR	The calculations are documented in a transparent manner.		OK
E.1.3. Have conservative assumptions been used to calculate project GHG emissions?	/1/ /5/	DR/I	Yes, conservative assumptions have been used to estimate the project GHG emissions. With the availability of the data for the year 2005, the grid emission factor is to be updated.	~~CAR 4~~	OK
E.1.4. Are uncertainties in the GHG emissions estimates properly addressed in the documentation?	/1/ /5/	DR/I	Yes.	~~CAR 4~~	OK
E.1.5. Have all relevant greenhouse gases and source categories listed in Kyoto Protocol Annex A been evaluated?	/1/ /5/	DR	Yes.		OK
E.2. Leakage *It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed and estimated ex-ante.*					
E.2.1. Are potential leakage effects beyond the chosen project boundaries properly identified?	/1/ /5/ /12/	DR	No potential emission sources of leakage are to be considered as per ACM0001.		OK

E.3. Baseline Emissions *The validation of ex-ante estimated baseline GHG emissions focuses on transparency and completeness of calculations.*					
E.3.1. Have the most relevant and likely operational characteristics and baseline indicators been chosen as reference for baseline emissions?	/1/ /5/	DR/I	The baseline GHG emissions have been estimated *ex-ante* following the IPCC guidelines and the first order decay model. In line with the guidelines, the following constants were assumed. - k – decay constant – 0.15 (1/year) - L_o- methane generation potential – 0.07 m3 methane/ Kg waste - F - fraction of methane in landfill gas - Collection efficiency – 80 %. The values of k and Lo have been taken from the United States Environmental Protection Agency (US EPA) and are deemed reasonable. The consideration of a collection efficiency of 80 % is to be justified for the project activity. The baseline emissions calculation sheet is to be checked as the figures in the spreadsheet and the PDD do not match.	~~CL 6~~ ~~CAR 3~~	OK
E.3.2. Are the baseline boundaries clearly defined and do they sufficiently cover sources and sinks for baseline emissions?	/1/ /5/	DR	Yes.		OK
E.3.3. Are the GHG calculations documented in a complete and transparent manner?	/1/ /5/	DR	Yes, the GHG calculations are documented in a transparent manner.		OK
E.3.4. Have conservative assumptions been used when calculating baseline emissions?	/1/ /5/	DR	Yes.		OK
E.3.5. Are uncertainties in the GHG emission estimates	/1/	DR	Yes.		OK

properly addressed in the documentation?	/5/				
E.3.6. Have the project baseline(s) and the project emissions been determined using the same appropriate methodology and conservative assumptions?	/1/ /5/	DR	Yes.		OK
E.4. Emission Reductions *Validation of ex-ante estimated emission reductions*.					
E.4.1. Will the project result in fewer GHG emissions than the baseline scenario?	/1/ /5/	DR/I	The estimated amount of GHG emission reductions from the project is expected to be 703 430 tCO_2e during the first renewable 7-year crediting period, resulting in estimated average annual emission reductions of 100 490 tCO_2e.		OK
F. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
F.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /5/	DR/I	The CGR Piaçaguera landfill (Terrestre Ambiental Ltda) has been granted the Operating Licence # 18000614 on 21 June 2004, which is valid until 18 June 2009. This license was issued by the State of São Paulo environmental agency (CETESB). The landfill gas capture and flaring project has not yet obtained a licence for flaring, and such a licence must be applied for. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the licence will be obtained when the project is implemented. At the first periodic verification of the project's emission	~~CL 7~~	OK

			reductions, it must be confirmed that this licence was eventually obtained. Status of the EIA, the environmental impacts identified and how the leachate will be treated is to be clarified and included in the PDD.		
F.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /5/	DR/I	Same as F.1.1	~~CL 7~~	OK
F.1.3. Will the project create any adverse environmental effects?	/1/ /5/	DR	Since the project is for the capture and flaring of landfill gas, there will be no adverse environmental effects on the atmosphere. However, the leachate from the landfill is to be treated according to the specifications of the Brazilian laws and regulations before discharge.		OK
F.1.4. Are transboundary environmental impacts considered in the analysis?	/1/ /5/	DR	Since the project is only a LFG capture and flaring project, no transboundary environmental impacts are foreseen.		OK
F.1.5. Have identified environmental impacts been addressed in the project design?	/1/ /5/	DR/I	See F.1.1.	~~CL 7~~	OK
F.1.6. Does the project comply with environmental legislation in the host country?	/1/ /5/	DR/I	See F.1.1.	~~CL 7~~	OK
G. Stakeholder Comments *The validator should ensure that a stakeholder comments have been invited and that due account has been taken of any comments received.*					
G.1.1. Have relevant stakeholders been consulted?	/1/ /5/	DR/I	Local stakeholders, such as the Municipal Government, the state and municipal agencies, the Brazilian forum of NGOs, neighbouring communities and the office of the attorney general, were invited to		OK

			comment on the project, in accordance with the requirements of Resolution 1 of the Brazilian DNA. Copies of the letters sent to the local stakeholders were verified during the follow up interviews. One comment was received from the "*Fórum Brasileiro de ONGs*" and taken into account.		
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/ /5/	DR/I	Yes.		OK
G.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/ /5/	DR/I	See G.1.1.		OK
G.1.4. Is a summary of the stakeholder comments received provided?	/1/ /5/	DR/I	See G.1.1.		OK
G.1.5. Has due account been taken of any stakeholder comments received?	/1/ /5/	DR/I	See G.1.1.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CAR 1 The licences for the CGR Piaçaguera landfill are to be evidenced during the site visit.	A.3.1	The CGR Piaçaguera's operation license nº 18000614 issued on 21/06/04 was added to the PDD version 2.	The CGR Piaçaguera landfill (Terrestre Ambiental Ltda) has been granted the Operating Licence # 18000614 on 21 June 2004, which is valid until 18 June 2009. This license was issued by the State of São Paulo environmental agency (CETESB). The landfill gas capture and flaring project has not yet obtained a licence for flaring, and such a licence must be applied for. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the licence will be obtained when the project is implemented. At the first periodic verification of the project's emission reductions, it must be confirmed that this licence was eventually obtained. This CAR is therefore closed.
CAR 2 The following need to be corrected in table D.2.2.1 in line with the monitoring methodology: - Flare efficiency - the comments have got reversed 1) should be continuous measurement of the operation time of flare and (2) periodic measurement of methane in flared gas.	D.1.3	The section D.2.2.1 of the PDD was updated according to the ACM0001 version 4. The emission factor is calculated based on *ex-ante* data, which means that it will only be revised at the renewal of the crediting period.	The table in D.2.2.1 has been modified regarding the flare efficiency monitoring. However, the table still says that the CO_2 emission factor, which is fixed *ex-ante*, will be measured yearly. The project proponent is requested to modify the table. (cont…)

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
- CO_2 intensity of grid electricity is the estimation "*at the validation and yearly after registration*". However, since the project adopts the selected emission factor *ex-ante*, the project proponent is requested to modify this.			
CAR 2 (…cont) The table still says that the CO_2 emission factor, which is fixed *ex-ante*, will be measured yearly. The project proponent is requested to modify the table.	D.1.3	Table D.2.2.1 was corrected on PDD version 3.	OK. The monitoring frequency has been corrected to '*At the validation and at renewal of a crediting period*'. This CAR is therefore closed.
CAR 3 The baseline emissions calculation sheet is to be checked as the figures in the spreadsheet and the PDD do not match.	E.3.1	The PDD was updated according to the spreadsheet version 2 for emission reduction calculation, considering the crediting period from 01/04/2007 to 31/03/2014.	OK. The revised worksheets have been checked and found to be in order. This CAR is therefore closed.
CAR 4 With the availability of the data for the year 2005, the grid emission factor is to be updated.	D.2.1 E.1.3 E.1.4	The PDD v4 was updated using the most recent statistics from ONS and ANEEL.	The PDD has been revised as requested. The CAR is closed.
CL 1 The "Adjustment Factor" was estimated to be 20% of total methane produced. The justification for the selection of 20% for the adjustment factor is to be presented.	B.2.2	According to AM0003 version 3, the methane content of landfill gas captured can vary by more than 20% during a single day due to gas capture network conditions (dilution with air at wellheads, leakage on pipes, etc.). In Brazil there is no rule that obliges the landfill to burn the methane. In the baseline landfill burns a small part of the methane only for security reason and a conservative factor of 20% was adopted.	OK. Since the Brazilian landfill regulations do not mandate LFG collection and destruction and only a small amount of the methane generated is currently burned due to safety and odour reasons, an "Adjustment Factor" of 20% is deemed appropriate. This CL is therefore closed.

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
CL 2 The source of the data is to be verified as the total of the pie chart adds up to more than 100.	B.2.7	The pie chart was updated and the source was presented for verification.	OK. The data for the pie chart has been verified according to the latest official statistics on urban solid waste and it's has been corrected in the PDD. This CL is therefore closed.
CL 3 Another risk to the baseline is the premature closure of the landfill due to unavailability of sufficient quantities of waste. The project proponent is requested to confirm that the amount of waste used in the calculations will be available for the landfill during the project lifetime.	B.2.8	Terrestre Ambiental can assure that the amount of waste will be available once CGR Piaçaguera is the only landfill in the Baixada Santista Region that has an Operational Licence from CETESB. The construction of a new landfill might take a long time, once most of the Baixada Santista Region is located close to "Parque Estadual da Serra do Mar" (an area protected by the Environmental Secretariat of São Paulo, where no constructions can be made) and, though, the Licensing process might more bureaucratic and take a long time.	OK. Since Piaçaguera is the only landfill in the region, it can be concluded that the landfill will receive the projected quantities of waste. This CL is therefore closed.
CL 4 It is to be clarified if the electricity grid emission factor of 0.2636 t CO2e/MWh is to be calculated *ex-ante* or will be calculated every year.	D.2.1	The choice of the adjustment factor was clarified in CL 1. The emission factor is calculated *ex-ante* as mentioned in CAR 3.	OK. The emission factor is calculated *ex-ante*. This CL is therefore closed.
CL 5 Procedures in section D.6 are to be evidenced.	D.6.1	The Project Management Planning will be defined with the start of the project activity.	OK. Since the project is yet to be implemented, this is acceptable. However, the project management planning manual is to be verified at the first periodic verification of the project's

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
			emission reductions. This CL is therefore closed.
CL 6 The consideration of a collection efficiency of 80 % is to be justified for the project activity.	B.2.2 D.2.1 E.3.1	A document from USEPA presents a conservative value of collection efficiency of 75%. However, the PDD v2 has been corrected to reflect 65% collection efficiency. The source was sent to the validation team.	The source document is the US EPA document on developing landfills, dated September 1996 and indicating a value of 75 to 85% collection efficiency. However, a conservative value of 65% was selected. Considering the amount of uncertainty related to the methane generation and collection efficiency, which depends on the actual design and engineering of the project, this might be achievable if the project is implemented suitably. However, experiences with other landfills have shown that the methane generation and collection efficiency of the landfills projected by the first order decay model has an inherent uncertainty of almost 50% and hence the amount of CERs, which will be monitored *ex-post*, might vary from the projected amount. This CL is therefore closed.
CL 7 Status of the EIA, the environmental impacts identified and how the leachate will be treated is to be clarified and included in the PDD.	F.1.1	All the rules to the treatment of the landfill's leachate are specified in the operation license nº 18000614. The Environmental Impact Study for the landfill is already concluded and was considered for the emission of the operational license by the environmental agency.	OK. The leachate treatment is specified in the license. The CGR Piaçaguera landfill (Terrestre Ambiental Ltda) has been granted the Operating Licence # 18000614 on 21 June 2004, which is valid until 18 June 2009. This license was issued by the State of São Paulo environmental

Draft report corrective action requests and requests for clarifications	Ref. to Table 2	Summary of project participants' response	Final conclusion
			agency (CETESB). The landfill gas capture and flaring project has not yet obtained a licence for flaring, and such a licence must be applied for. Given that the flaring of landfill gas has little adverse environmental impacts, it is likely that the licence will be obtained when the project is implemented. At the first periodic verification of the project's emission reductions, it must be confirmed that this licence was eventually obtained. This CL is therefore closed.

- o0o -

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Michael Lehmann

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Raphael de Souza Tavares

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Soumik Biswas

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

K.Venkata Raman

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Vicente San Valero

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Luis Filipe Tavares

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

GHG Auditor:	Yes		
CDM Validator:	Yes	***JI Validator:***	No
CDM Verifier:	Yes	***JI Verifier:***	No
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 9 & 13		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	No	*AM0021*	No
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	No	*AM0023*	No
ACM003, ACM0005, AM0033, AM0040	No	*AM0024*	No
ACM0004	No	*AM0027*	No
ACM0006, AM0007, AM0015, AM0036, AM0042	No	*AM0028, AM0034*	No
ACM0007	No	*AM0030*	No
ACM0008	No	*AM0031*	No
ACM0009, AM0008, AMS-III.B	No	*AM0032*	No
AM0006, AM0016, AMS-III.D	No	*AM0035*	No
AM0009, AM0037	No	*AM0038*	No
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	No	*AM0041*	No
AM0014	No	*AM0034*	No
AM0017	No	*AMS-II.A-F*	No
AM0018	No	*AMS-III.A*	No
AM0020	No	*AMS-III.E, AMS-III.F*	No

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

Michael Lehmann
Technical Director