



VALIDATION REPORT

Regional landfill projects in Chile

REPORT No. 2007-0702

REVISION No. 02



VALIDATION REPORT

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CERTIFICATION AS

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Client: Bionersis S.A.	Client ref.: Frederic Pastre

Project Name: Regional landfill projects in Chile

Country: Chile

Methodology: ACM0001

Version: 05

GHG reducing Measure/Technology: landfill gas project activities (captured gas is flared)

ER estimate: 70 299 tCO_{2e}/yr

Size

☒ Large Scale

☐ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☒ Corrective Actions Requested

☒ Clarifications Requested

☒ Full Approval and submission for registration

☐ Rejected

In summary, it is DNV's opinion that the Regional landfill projects in Chile, as described in the PDD version 8 dated 17 January 2008, meet all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0001 version 05. DNV thus requests the registration of the project as a CDM project activity.

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Report title: Regional landfill projects in Chile		
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Key words:

Climate Change

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Validation

Clear Development Mechanism

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Abbreviations

CAR	Corrective action request
CER	Certified emission reduction
CDM	Clean Development Mechanism
CL	Clarification
CONAMA	Comisión Nacional del Medio Ambiente (Eng. National Environmental Commission)
DNA	Designated National Authority
DNV	Det Norske Veritas Certification AS
GHG	Greenhouse gas
LFG	Landfill gas
PDD	Project design document
MIES	Mission Interministérielle de l'Effet de Serre (Eng. Interministerial Mission of the Greenhouse Effect)
NGO	Non-governmental organisation
ODA	Official Development Assistance
PDD	Project Design Document
SEIA	Sistema de Evaluación de Impacto Ambiental (Eng. Environmental Impact Assessment System)
SEREMI	Secretaría Regional Ministerial de Salud (Eng. Regional Health Secretary)
STP	Standard temperature and pressure
UNFCCC	United Nations Framework Convention on Climate Change



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the Regional landfill projects in Chile. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Chile and the Annex I Party is France. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA from Chile confirms that the project assists in achieving sustainable development.

The project correctly applies ACM0001, “Consolidated baseline methodology for landfill gas project activities”, version 05.

By burning landfill gas instead of passively venting it, the project results in reductions of CH₄/CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 70 299 tCO_{2e} per year over the selected 10 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

Adequate training and monitoring procedures will be implemented.

In summary, it is DNV’s opinion that the Regional landfill projects in Chile, as described in the PDD version 8 dated 17 January 2008, 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. DNV thus requests the registration of the project as a CDM project activity.



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2 INTRODUCTION

Bionersis S.A. (“Bionersis France”, project developer) has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the Regional landfill projects in Chile (hereafter called “the project”). This report summarises the findings of the validation of the project, performed 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.

2.1 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).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD /1/ 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. The validation team has, based on the recommendations in the Validation and Verification Manual /2/ 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.



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3 METHODOLOGY

The validation consists of the following three phases:

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

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The table on the following page outlines the documentation reviewed during the validation.

Main changes between the version published for the 30 days stakeholder commenting period and the final version submitted for registration:

- a description of the electricity generation/consumption equipment has been added;
- the corresponding combustion emissions and their monitoring have been described;
- the monitoring of the flare efficiency has been adapted;
- the text on the monitoring plan has been reworked.

These changes have made it necessary to rewrite:

- Sects. B.6 and B.7;
- Ann. 4.

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The documentation:

- /1a/ Bionersis S.A., *Regional landfill projects in Chile*, Version 3, 2007/04/03 (“PDD_Regional_LFG_Chile-3.doc”, published for the 30 days stakeholder commenting period)
- /1b/ Bionersis S.A., *Regional landfill projects in Chile*, Version 8, 2008/01/17 (“PDD_Regional_LFG_Chile-8.doc”, final version)
- /2/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF), *Determination and Verification Manual*.
<http://www.vvmanual.info>
- /3a/ Letter from CONAMA to M.C. Ascui Barth dated 2008/04/10 (“LoA Host - Regional Landfill Projects in Chile.pdf”)
- /3b/ MIES, *AND-Agrément_MDP-2007-013*, 2007/10/23 (“LoA MIES_eng.pdf”)
- /4/ UNFCCC CDM-Executive Board, *Revision to the approved consolidated baseline methodology ACM0001*, “Consolidated baseline methodology for landfill gas project activities”, Version 05, 2006/12/22 (“ACM0001 version 05”)
- /5/ Inversiones 88, *Inspection Report - Chile* (Inspection Report 3 Sites INVERSIONES 88.doc)
- /6a/ Bionersis S.A., ER-Spreadsheets (“ER Larajilla.xls”, “ER Vinita Azul.xls”, “ER Lena Dura.xls”)
- /6b/ Bionersis S.A., EPA/Mex-Spreadsheets (“Lajarilla Mex.xls”, “Vinita Azul Mex.xls”, “Lena Dura Mex.xls”)
- /7a/ U.S. Environmental Protection Agency, *User’s Manual. Mexico Landfill Gas Model*, Version 1.0, 2003/11/14.
http://www.epa.gov/lmop/int/UsersManualMexico_LFG_modelV1_5.pdf
- /7b/ U.S. Environmental Protection Agency, Spreadsheet (Excel, 120 KB).
<http://www.epa.gov/lmop/int/LMOPMexicoModelv31.xls>
- /8/ Conestoga-Rovers & Associates, *Handbook for the Preparation of Landfill Gas to Energy Projects in Latin America and the Caribbean. The World Bank-ESMAP*, Ref. No. 019399 (6), January 2004
- /9a/ Letter from B. Courcelle to CONAMA dated 2005/11/01 (“SOLICITUD PRONUNCIAMIENTO A CONAMA.pdf”)
- /9b/ Letter from CONAMA to B. Courcelle dated 2005/12/23 (“carta 54000 conama.jpg”)
- /10/ Vergara Abogados, *Legal Report. Chilean Regulation regarding Biogas Management in Landfill Sites* (“Legal report BIONERSIS ingles 07.doc”).
- /11/ Bionersis S.A., IRR/NPV-spreadsheet (“Elec only_Financial summary.xls”)



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3.2 Follow-up Interviews with Project Stakeholders

Organizations interviewed are Comisión Nacional del Medio Ambiente (“CONAMA”, DNA of Chile) and Sistemas de biogases Bionersis Chile Ltda (“Bionersis Chile”, project proponent and project equipment operator).

The interviews:

	Date	Name	Organization	Topics
/B/	2007/05/23 09:00-14:00 Bionersis Santiago Office	Carolina Ascui Barth (Development Manager), Maritza Rojas C. (Technical Manager)	Bionersis Chile	project details regarding: - monitoring plan - measurement equipment - procedures
		Italo Volonte Gomez	lawyer, on behalf of Bionersis Chile	
/C/	2007/05/23 15:00-18:00 CONAMA Office	Alvaro Sapag Rajevec (Head of International Relationship Dpt.)	CONAMA	legislation/regulations regarding: - landfills, - environmental impact assessment - sustainable development - environmental/health authority/control
		Carolina Ascui Barth, Maritza Rojas C.	Bionersis Chile	

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV’s positive conclusion on the project design. In order to ensure transparency a validation protocol is customised for the project. 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 two tables. The different columns in these tables are described in the figure below. The completed validation protocol for the Regional landfill projects is enclosed in Appendix A to this report.

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Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities				
Requirement	Reference	Conclusion		
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>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.</i>		

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>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.</i>	<i>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.</i>	<i>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.</i>

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
<i>If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1: Validation protocol tables



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

- i) mistakes have been made with a direct influence on project results;
- ii) CDM and/or methodology specific 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.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

3.4 Internal Quality Control

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

3.5 Validation Team

The team:

Role/Qualification	Last Name	First Name	Country
Project Management / GHG Auditor	Starckx	Sven	Belgium
Desk Review / GHG Auditor	Van Evercooren	Jan	Belgium
Follow-up Interviews / GHG Auditor	Martinoli	Julio	Argentina
Sector Expertise / Sector Expert for Sectoral Scope 13	Tavares	Luis Filipe	Brazil
Technical Review / Technical Reviewer (applicant)	Brinks	Hendrik	Norway
Technical Review / Technical Reviewer (draft report)	Telnes	Einar	Norway
Technical Review / Technical Reviewer (final report)	Lehmann	Michael	Norway

The qualification of each individual validation team member is detailed in Appendix B to this report.



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4 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 and resubmitted project design documentation.

4.1 Participation Requirements

The project participants are Sistemas de biogases Bionersis Chile Ltda as the project proponent from the host Party Chile, and Bionersis S.A. representing the Annex I Party France. Both Parties meet the requirements to participate in the CDM. Endorsement of the project from the Chilean and French DNA has been obtained (Letters of Approval /3a/ and /3b/).

4.2 Project Design

The project activity is to build, operate and maintain landfill gas (LFG) collection and flaring equipment on three landfill sites in Chile:

- “Lajarilla landfill” in Viña del Mar (Chile Region V);
- “Viñita Azul landfill” in Copiapo (Region III);
- “Leña Dura landfill” in Punta Arenas (Region XII).

The equipment foreseen for each of the subprojects contains:

- the landfill cover, a composite or earth layer;
 - a LFG collection network comprising vertical only permeable pipes and gas wells, the latter with a typical density of 5 per hectare,
- and an extracting and flaring station consisting of:
- a degassing compressor, enclosed in a container, and
 - an enclosed (high temperature) flare.

The extracting and flaring station of the HOFGAS[®]-type will be supplied by Swiss Hofstetter Umwelttechnik AG. The equipment is considered as good technology.

The equipment on the Leña Dura landfill will use captive electricity. The landfill will be equipped with a generator running on diesel oil. The other landfills will use power grid electricity.

The starting date of the project activity is 2007/04/27, date on which the extracting and flaring stations of the three project landfills were ordered.

The operational lifetime of the project is estimated as 15 years. It is the equipment lifetime according to the manufacturer, and the period of significant LFG production of a closed landfill.

The crediting period selected is fixed on 10 years and starts on 2008/01/14. Expected date of first operation of the Lajarilla landfill equipment is 2008/01/01.

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4.3 Baseline Determination

The project applies methodology ACM0001 version 05, “Consolidated baseline methodology for landfill gas project activities” /4/. The methodology is justifiably applicable since:

1. The baseline scenario is the atmospheric release of the LFG. This is justified on the basis of recent field inspection of the passive venting and burning of the three project landfills (Inspection Report /5/);
2. The project activity is the flaring of the LFG.

According to ACM0001 version 05, the baseline is the atmospheric release of the gas. The baseline methodology also includes the option that some of the methane generated by the landfill may be captured and destructed to comply with regulations or contractual requirements, or to address safety and odour concerns. In Chile, there are guidelines for waste handling, but no detailed guidelines regarding LFG handling. Since no details for LFG capture and handling are mentioned in the guidelines, these are considered not in force. Hence, there are no regulations or contractual requirements, but it is nevertheless conservatively been estimated that a small portion of the LFG is destructed for safety reasons (see the Inspection Report already mentioned).

The system boundaries for every individual subproject:

	GHGs involved	Description (equipment: emission)
Baseline	CH ₄ , CO ₂	Landfill: atmospheric release
Project activity	CH ₄ , CO ₂	Flare: destruction emissions
	CO ₂	Captive (Leña Dura landfill) or power grid (other landfills) electricity generation: combustion emissions

4.4 Additionality

The additionality of the project has been demonstrated using the Additionality Tool (version 03, latest) as required by ACM0001 version 05.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulation

Five alternatives were identified:

1. Continuation of the current situation, i.e. a small portion of the LFG being destructed;
2. The captured LFG flared, this activity not undertaken as a CDM project;
3. The captured LFG utilized to produce electricity;
4. The captured LFG utilized to produce heat;
5. The captured LFG utilized to cogenerate electricity and heat.

The following of these alternatives are not credible or realistic:

- Alt. 3 supposes an investment with too low revenue. This is evidenced by the (financial) feasibility information provided (a project IRR/NPV-spreadsheet /11/);
- Alts. 4 to 5 suppose a local demand for the steam produced, but this is clearly not present at



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any of the three project landfills.

It is adequately shown that the only credible and realistic alternatives to the project activity are the continuation of the current situation (alt. 1) and the capturing of the LFG, not undertaken as a CDM project (alt. 2). Both alternatives are in compliance with the mandatory legislation and regulations. This was checked by DNV during the follow-up interviews: elaborated guidelines for waste handling exist in the host country, but these give no details on LFG destruction (/C/).

Step 2: Investment analysis

A simple cost analysis has been applied (Option I) for alt. 2 since the project activity can not generate revenue (the captured LFG is flared without utilizing its energy content). The project activity requires nevertheless an investment cost, and an incremental operation and maintenance cost. Alt. 2 is hence less attractive than the continuation of the current practice. The investment cost is described for the three subprojects separately, and comprises the cost of the landfill cover, the LFG collection network plus the degassing compressor, the flare, the civil works, the engineering plus the management, and the diesel generator of the Leña Dura landfill. The operation and maintenance cost is also described for the three subprojects separately, and comprises the fuel cost (Leña Dura landfill) or the electricity cost (other landfills), and the maintenance plus administration cost.

It can be concluded that the project is not financially attractive.

Step 3: Barrier analysis

This step has not been selected.

Step 4: Common practice analysis

Chile counts several landfills where LFG capture is under discussion. Most of these capture the LFG for safety reasons, and apply low technology and low recovery rate. This is evidenced in the PDD through a table from the March 2006 issue of the specialized magazine Ecoamérica. The landfills that apply high technology, comparable with the project, are all developed under the CDM.

Similar activities are thus observed, but the essential distinctions are reasonably explained. It can be concluded that high-tech LFG destruction is not common practice in the host country.

The project activity can thus be considered additional.

4.5 Monitoring

The PDD provides detailed documentation related to the collection and archiving of parameters in accordance with the monitoring methodology of ACM0001 version 05.

The documentation covers the GHG emissions within the system boundaries, i.e. the LFG atmospheric release and the flare emission (determination of the methane emission reduction), and the captive or power grid electricity generation (determination of the project combustion emissions). For the methane destructed by the project activity, the documentation refers correctly to the "Tool to determine project emissions from flaring gases containing methane" ("Flaring Tool"). For the combustion emissions due to the electricity consumption, it refers to:

- AMS-IA for the Leña Dura landfill, since captive electricity is used;
- AMS-ID for the other landfills, since power grid electricity is used and the capacity is within the small-scale threshold values.

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4.5.1 Parameters determined ex-ante

The methane destructed in the baseline is estimated with an "Adjustment Factor" (AF) as foreseen in ACM0001 version 05. This factor is determined on the basis of an estimated maximum of 3% of the LFG being destructed (see the Inspection Report already mentioned). However, a monitoring of the relevant regulations is foreseen in order to be able to adapt the AF value according to the methodology requirements.

For the three project landfills, the combustion emissions due to the electricity consumption are calculated with a fixed power grid displacement factor.

4.5.2 Parameters monitored ex-post

The methane destructed by the project activity is monitored on the basis of the following measurements:

1. to determine the methane fed to the flare,
 - the LFG fed to the flare (FV), with a turbine flow meter; accuracy ($< 0.5\%$ of reading), maintenance interval (quarterly), and measurement interval (continuous) are deemed appropriate;
 - the LFG methane content (fv), with an IR-analyzer; accuracy (2% of reading), calibration interval (monthly), and measurement interval (continuous) are deemed appropriate;
 2. to determine the methane escaping the flare,
 - (preferentially) the flare methane mass ratio exhaust/supply, with the supply side methane analyzer mentioned above (LFG), and exhaust side methane and oxygen analyzers (exhaust gas); in accordance with the simplified approach in the Flaring Tool, the other supply side components than methane will be considered nitrogen; the exhaust side methane analyzer is a NDIR-analyzer; accuracy (0.5% of reading), calibration interval (monthly), and measurement interval (continuous) are deemed appropriate; the oxygen analyzer is an electrochemical cell; accuracy (0.25% of reading), calibration interval (monthly), and measurement interval (continuous) are deemed appropriate;
 - (as a back-up) the flare temperature, with a type N thermocouple; accuracy ($2.2\text{ }^{\circ}\text{C}$), calibration interval (yearly), and measurement interval (continuous) are deemed appropriate.
- The Flaring Tool indeed allows to fix the flare efficiency (η) with a default value (0, 50 or 90%, resp. depending on non-operation, operation outside or within the manufacturer's specifications).

The gas flow meter additionally measures the LFG temperature and pressure, and automatically converts the LFG volume to standard temperature and pressure (STP). This enables the use of the STP methane density of 0.7168 kg/Nm^3 to convert a methane volume to mass.

The combustion emissions due to captive or power grid electricity consumption is monitored on the basis of the electricity consumption: measurement of the electricity supply with an electromechanical induction meter, and check with the supplier's invoices; accuracy ($< 2\%$ of reading), calibration interval (5-yearly), and measurement interval (continuous) are deemed appropriate.

4.5.3 Management system and quality assurance

The overall project management is granted to the Chief Operating Officer (Bionersis Chile). He supervises the equipment, operation and maintenance of the three project landfills and the personnel involved.

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The Monitoring Director and the Maintenance Director are his direct reports (Santiago office). The Monitoring Director is responsible for the monitoring and data gathering, the organizing of training, and the planning of calibration and maintenance.

The Maintenance Director is responsible for the daily preventive and corrective maintenance on-site, and the execution of calibration and maintenance. The Field Technician is his direct report.

The Director of Carbon Finance (Bionersis France) is in charge of the computation and recording of the CERs (Paris office).

Procedures involved feature the following elements relevant for the monitoring:

- the on-site measurement equipment is directly connected to the Santiago office;
- the data are registered electronically, on-site as well as centrally (Santiago office);
- the data are checked weekly by the Monitoring Director;
- the data are reported monthly to the Director of Carbon Finance.

4.6 Estimate of GHG Emissions

The GHG estimate is documented in a complete and transparent way in the PDD (ex-post calculation in Sects. B.6.1 and B.6.2, ex-ante calculation in Sect. B.6.3) and in the EPA/Mex- and ER-Spreadsheets /6/ (ex-ante calculation).

In view of the project type (flaring) and the measurements foreseen (continuous, LFG flow and methane content, flare methane mass ratio exhaust/supply), the hourly methane emission reduction achieved by each of the subprojects can be described as follows:

- the methane fed to the flare, i.e. FV multiplied by f_v , minus the methane escaping the flare, i.e. $FV * f_v * (1 - \eta)$,

multiplied by:

- $(1 - AF)$, to account for the methane destructed in the baseline.

The combustion emissions come as a (negative) monthly correction term hereto:

- $EL * CEF_e$, EL being the electricity consumed.

The calculation of the methane amount escaping the flare is in line with the Flaring Tool. The overall calculation of the methane emission reduction is in line with ACM0001 version 05. The fixed value for AF of 4% is to be considered conservative as it is the most unfavorable figure according to the field inspection of the situation at the three project landfills (see the Inspection Report already mentioned).

For the Leña Dura landfill, the calculation of the combustion emissions due to the electricity generation makes use of a CEF_e of 0.8 tCO₂/MWh (in line with AMS-I.A). For the other landfills, the calculation makes use of a CEF_e of 1.3 tCO₂/MWh (in line with AMS-I.D, and a conservative estimate from the “Tool to calculate project emissions from electricity consumption” -“Electricity consumption Tool”-).

The ex-ante calculation was verified by DNV. The yearly emission reduction for each of the subprojects is estimated with the following forecasted parameters:

- the methane fed to the flare, using the yearly amount of methane plus a fixed recovery rate of 75%;
- the methane escaping the flare, using a fixed flare efficiency of 90%;
- the methane destructed in the baseline, using the AF of 4% fixed ex-ante;
- the yearly electricity consumed (an estimated 95.4 MWh per landfill).

Account is taken of the 2-days yearly shut down period for maintenance of the flare, and the



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continuous compliance with the manufacturer's requirement for proper flare operation (hence the 90% figure for the flare efficiency).

The amount of LFG is calculated with the LFG generation EPA/Mex-model /7/. This model's input data are the landfill's annual deposited amounts and the region's average precipitation class. The EPA/Mex-Spreadsheets checked by DNV, show the use of a fixed LFG methane content of 50%. The source of the deposited amounts is the Municipality involved and additionally for the Lajarilla landfill, the Pontifica Universidad de Valpareiso. The recovery rate of 75% is the optimal value according to the ESMAP-Handbook /8/. The value is justified seen the landfill cover properties and the high gas well density.

No uncertainties are considered apart from those inherent to the measurements made.

For the ex-ante calculation, no uncertainties were considered apart from those inherent to the EPA/Mex-model.

4.7 Environmental Impacts

For the environmental aspects of the project, the PDD refers to the EI-Analysis conducted for CONAMA by Bionersis Chile /9a/ (checked by DNV). The document involved reveals the following relevant aspects:

- the landscape is remodelled, and this is evaluated as positive;
- the human well-being is enhanced, since the equipment type is known to serve abatement of both the odor nuisance and the sanitary risk (positive);
- the air quality is enhanced thanks to less release of toxic components (positive);
- the compressor and the flare can cause noise nuisance (negative).

Furthermore, a safety issue is indicated, the control of the explosion risk (positive).

The Chile legislation and regulations (in particular law N° 19.300, Ley de Bases Generales del Medio Ambiente) require that landfills serving a population from 5 000 people onwards perform an EIA (and enter the SEIA, the Environmental Impact Assessment System). It was indicated in the Legislation Analysis conducted for Bionersis Chile by Vergara Abogados /10/ (checked by DNV), and confirmed during the follow-up interviews (/C/) that the SEIA entrance is not obligatory for landfills with a first operating permit dated earlier than 1997. The project landfills started earlier. Bionersis Chile nevertheless has presented its EI-Analysis to CONAMA, whereupon the environmental authority has replied that an EIA is not necessary in the case of a degassing project. DNV checked this in the CONAMA letter involved /9b/.

4.8 Comments by Local Stakeholders

The Chile legislation and regulations do not require direct consultation of the stakeholders unless the project is submitted to SEIA entrance. As this is not the case, DNV assessed Bionersis Chile's stakeholders' consultation against the rules of the CDM.

The following activities are to be considered sufficiently adequate consultation of stakeholders:

1. The presentation of the three subprojects to the regional representatives of the authorities involved, i.e. the SEREMI's (Regional Health Secretaries, for the Ministry of Health) and the Regional Conama's (Regional Environmental Commissions, for CONAMA);
2. The meetings with the general public in the municipalities of the three project landfills. The public was invited through the Municipality or its involved Department, using posters



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placarded in the Municipalities' townhall. As an example, DNV was sent the Viña del Mar poster (Lajarilla landfill).

In particular, the following representatives of the general public were invited:

- in Viña del Mar (Lajarilla landfill), the municipal unions, the neighbour associations,
- in Copiapo (Viñita Azul landfill), the municipal unions, the environmental organisations
- in Punta Arenas (Leña Dura landfill), the landfill site neighbours.

For the Leña Dura landfill, the subproject was additionally announced through articles appearing in the Municipality magazine "Punta Arenas" and through cable radio broadcasting by the Utilísima Satelital station.

PDD Sect. E.1 refers to the official documents issued by the SEREMI's -Resolutions- and the Regional Conama's -Approvals-. Bionersis Chile has provided these documents and DNV has checked that without any exception, the authorities' reaction was positive:

- the SEREMI's proclaim that the degassing is a further improvement of the landfills' operation;
- CONAMA confirms that the subprojects contribute to the sustainable development of Chile, and have voluntarily been presented to the DNA.

The main topics of the general public's comments are listed per subproject in PDD Sect. E.2. The comments appear to be positive. Bionersis Chile's due account taken mainly consisted of the on-the-spot answering of the questions raised.

4.9 Comments by Parties, Stakeholders and NGOs

The original version of the PDD 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 2007/04/14 to 2007/05/13.

No comments were received.



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APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion
About Parties		
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	The Annex I Party involved is France (sponsor Party).
The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	The non Annex I Party is Chile (host Party).
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. Letters of Approval from host Party and sponsor Party received.
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. Confirmation by host country included in LoA.
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 validation did not reveal any information indicating that the project can be seen as a diversion of ODA funding towards Chile.
Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK. Chile:

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Requirement	Reference	Conclusion
		Comisión Nacional del Medio Ambiente (CONAMA). France: Mission Interministérielle de l'Effet de Serre (MIES).
The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK. Chile ratified the Kyoto Protocol on 2002/08/26 and France on 2002/05/31.
The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK. France submitted its Initial Report on 2006/12/21.
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	OK. The Party is France: - has in place a national system for estimating GHG emissions - has in place a national registry.
About additionality		
Reduction in GHG emissions shall be additional to any that would occur in the 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. See Table 2, Sect. B.
About forecast emission reductions and environmental impacts		

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Requirement	Reference	Conclusion
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. See Table 2, Sect. B.
For large-scale projects only		
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. See Table 2, Sect. D.
About stakeholder involvement		
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. See Table 2, Sect. E.
Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK. The PDD was made publicly available on www.dnv.com/certification/climatechange and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 day period from 2007/04/14 to 2007/05/13. No comments were received.
Other		

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Requirement	Reference	Conclusion
The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK. Baseline and monitoring methodology is ACM0001.
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. See Table 2, Sect. B.
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. See Table 2, Sect. B.
The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK. PDD in conformance with EB CDM-PDD form “Version 03 - in effect as of: 28 July 2006”.
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. See Table 2, Sect. B.

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Table 2 Requirements Checklist

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <i>The project design is assessed.</i>					
Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR	Yes. In text and with a map of Chile: - "Lajarilla landfill" in Viña del Mar (Chile Region V) - "Viñita Azul landfill" in Copiapo (Region III) - "Leña Dura landfill" in Punta Arenas (Region XII).		OK
Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	Yes. Equipment for each landfill: - landfill cover - LFG collection network - degassing compressor - flare.		OK
Participation Requirements					

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i>					
Which Parties and project participants are participating in the project?	/1/	DR	Parties: - Annex I Party involved is France (sponsor Party) - non Annex I Party is Chile (host Party). Project participants: - Sistemas de biogases Bionersis Chile Ltda from Chile - Bionersis S.A. from France.		OK
Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/3a/ /3b/	DR	Yes. <i>CAR 1 about approvals/authorizations from host Party and sponsor Party, see Table 3.</i>	CAR-1	OK
Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority.	/1/	DR	Ratification of the Kyoto Protocol: Chile ratified the Kyoto Protocol on 2002/08/26 and France on 2002/05/31. Voluntary participation: - Chile, Working Plan on Climate Change in Strategic guidelines on climate change in		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Chile (appr. December 6, 1998 by CONAMA's Council of Ministers) consists of specific actions to be taken in order to pursue main objectives e.g. application of the CDM. - France, 2002 agreement between Government and industry on six GHG gases includes possible use of flexible mechanisms under the Kyoto Protocol. DNA: - Chile, Comisión Nacional del Medio Ambiente (CONAMA) - France, Mission Interministérielle de l'Effet de Serre.		
Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	No: project financed excl. by private capital raised from investment funds and/or banks, either locally or in the EU.		OK
Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Does the project design engineering reflect current good practices?	/1/	DR	Yes. Current good practices include: - landfill cover of composite or earth layer (improved gas recovery) - wells density of LFG collection network 5/ha (typical) - degassing compressor in container (reduced burglary risk, noise reduction) - enclosed flare (high temperature/efficiency, noise reduction). <i>CL 1 about:</i> - soil protection from leachate infiltration - installation of LFG collection network in old or new waste bodies, <i>see Table 3.</i>	CL1	OK
Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	Significantly better performance than commonly used technology. Document checked by JVEV: "Legislation Analysis", i.e. Vergara Abogados, Legal Report. Chilean Regulation regarding Biogas Management in Landfill Sites (Legal report BIONERSIS ingles 07.doc).		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Only newest landfills contemplate LFG extraction and destruction (first permit > 1997).		
Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Training, yes: - all Bionersis participants to the project (Chile and France) will be trained internally or externally at least once a year - the Field Technician will be qualified to carry out maintenance and control activities on-site. For procedure items, see “Project Management Planning”. Maintenance, yes: - measuring equipment will be calibrated as recommended by the manufacturers - the Field Technician will be in charge of basic maintenance (regulation/control of LFG collecting system, support of an aid telephone line and experts in charge of maintenance).		OK
Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
Has the host country confirmed that the project assists it in	/3a/	DR	Yes.	CAR-1	OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
achieving sustainable development?				Confirmation by host country included in LoA's.		
Will the project create other environmental or social benefits than GHG emission reductions?		/1/	DR	Yes. Environmental benefits, especially: - odor nuisance abatement - toxic VOC air pollutant emission abatement. See also Sect. "Environmental Impacts". Social benefits: - fire and explosion risk reduction - know-how/awareness enhancement - employment enhancement.		OK
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>						
Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>						
Does the project apply an approved methodology and the correct version thereof?		/1/	DR	Yes: ACM0001 version 05. Version 05's UNFCCC status is "active" and validity "valid from 22 Dec 06 to 05 Jul 07. Requests for registration can be submitted until 05 Mar		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
				08 23:59 GMT”.		
Are the applicability criteria in the baseline methodology all fulfilled?		/1/	DR	Yes. Baseline scenario is total atmospheric release of LFG and project activity is a) flaring (of possible a) to c) project activities foreseen).		OK
(question added by JVEV) Is the project boundary clearly defined and does it sufficiently cover sources and gases?		/1/	DR	Sources and gases covered: (baseline) - landfill atmospheric release (CH ₄) (project emissions) - project flare emission (CH ₄) - captive/power grid combustion emission due to electricity consumption of project equipment (CO ₂). <i>CL 2 about sources and gases not sufficiently covered, see Table 3.</i>	CL 2	OK
Baseline Scenario Determination <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>						
What is the baseline scenario?		/1/	DR	Atmospheric release of the LFG and methodology considers some LFG captured and destructed for safety. As no regulatory or		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			contractual requirements specify the quantity released, a factor AF is estimated (4%) on the basis of field inspection of the passive venting (and poss. burning). Evidence checked by JVEV: - "Inspection Report", i.e. Inversiones 88, Inspection Report - Chile (Inspection Report 3 Sites INVERSIONES 88.doc).		
What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	No other alternative scenarios are considered. Selected scenario prescribed in ACM0001.		OK
Has the baseline scenario been determined according to the methodology?	/1/	DR	Yes: see above.		OK
Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	No conservative assumptions are used. Remark: adjustment factor of 4% is conservative assumption for calculation, see Sect. "Calculation of GHG Emission Reductions - Baseline emissions".		OK
Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /C/	DR I	Yes: enforcement of announced new legislation on landfills not to be expected in the coming years. During follow-up interview it was confirmed		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			that new legislation's, - promulgation is expected end of 2007 - regulation term is uncertain.		
Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Baseline scenario compatible with available data. Evidence checked by JVEV: - Legislation Analysis - Inspection Report. Only newest landfills contemplate LFG extraction and destruction (Legislation Analysis), project landfills have only passive venting of LFG (Inspection Report, not referenced in Sect. B.4). <i>CL 3 about literature and sources not clearly referenced, see Table 3.</i>	CL 3	OK
Have the major risks to the baseline been identified?	/1/	DR	No. Major risk lies in announced new legislation on landfills.		OK
Additionality Determination <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>					
Is the project additionality assessed according to the methodology?	/1/	DR	Yes: latest version (03) of "Tool for the demonstration and assessment of	CL 4 CL 5	OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>additionality” (“Additionality Tool”) applied in accordance with ACM0001.</p> <p>Step 1, “Alternatives to the project activity” Alternatives defined:</p> <ol style="list-style-type: none"> 1. Continuation of current situation 2. Project activity without the CDM 3. Captured LFG to produce electricity 4. Captured LFG to produce heat 5. Captured LFG to cogenerate electricity/heat 6. Captured LFG to upgrade natural gas. <p><u>Only 1 and 2 realistic and credible, both in compliance with mandatory legislation and regulations.</u></p> <p><i>CL 4 about evidence for too low the revenue with alts. 3 to 6, see Table 3.</i></p> <p>Step 2, “Investment analysis” Simple cost analysis is applicable (Option I). Project activity:</p> <ul style="list-style-type: none"> - cannot generate revenue (captured LFG is flared without utilizing its energy content) - only requires investment cost and operation and maintenance cost. <p>Thus project is <u>not financially attractive</u>.</p>	CL-6	

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<i>CL 5 about more detail in investment/operation cost, see Table 3.</i> Step 3, “Barrier analysis”, skipped. Step 4, “Common practice analysis” Similar project activities: - many for safety reasons, with low technology and LFG volume insignificant, all without CERs revenue - few with high technology, all with CERs revenue. <u>Similar activities observed, but essential distinctions reasonably explained</u> , thus project activity additional. <i>CL 6 about confirmation by independent source of low technology/insignificant volume, see Table 3.</i>		
Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Transparency: yes. No conservative assumptions stated.		OK
Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes: legislation and regulations (step 1) and financial documentation (step 2).		OK
If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the	/1/	DR	N/A		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
incentive from the CDM was seriously considered in the decision to proceed with the project activity?					
Calculation of GHG Emission Reductions - Project emissions <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	CAR 2 about calculations not being completely in accordance with ACM0001, see Table 3.	CAR 2 CL 7	OK
			General calculation complete and transparent: - project flare emission (PE) - captive/power grid combustion emission (EL * CEF _e). (PE) Calculations in accordance with “Tool to determine project emissions from flaring gases containing methane” (“Flaring Tool”) as requested in ACM0001: - $PE = \sum(FV * f_v * (1-\eta)) * GWP$		

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>- flare η through CH₄ ratio exhaust/supply (remark: PDD version for 30 days stakeholder commenting period considered 3 possible η values according to flare temperature). (EL * CEF_e) Calculations in accordance with AMS-I.A (Leña Dura landfill) or AMS-I.D (other landfills): - EL * CEF_e = electricity * CEF(grid). Fixed variables: - (Leña Dura landfill) CEF(grid) of 0.8 tCO₂/MWh (AMS-I.A) - (other landfills) CEF(grid) of 1.3 tCO₂/MWh ("Tool to calculate project emissions from electricity consumption"- "Electricity consumption Tool"-).</p> <p>Ex-ante calculation complete and transparent. Worksheet "PE" in "ER-Spreadsheets": - ER Larajilla.xls - ER Vinita Azul.xls - ER Lena Dura.xls - Total ER - 3 sites.xls. Prognostic data additional to data for baseline</p>		

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			emissions: - η of 90% - flare maintenance 2 days/y (manufacturer's prescription) - EL of 95.4 MWh/yr. ER-Spreadsheets checked by JVEV. PE and EL * CEF correct. <i>CL 7 about transparency/documentation:</i> - mixing up of "methodological choices" and "ex-ante calculation" - formulas missing - no explanation of ex-ante estimate of 90% of flare efficiency - no explanation of ex-ante estimate of EL * CEF, <i>see Table 3.</i>		
Have conservative assumptions been used when calculating the project emissions?	/1/	DR	(General calculation) Conservatively high value: CEF(grid) for other landfills (Electricity consumption Tool).		OK
Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Not addressed: uncertainties depending on measurement equipment. See Sect. "Monitoring of Project Emissions".		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	<p>Calculations in accordance with ACM0001.</p> <p>General calculation complete and transparent, though (superfluous) text on reduction of volumes to standard conditions: $BE = \sum(FV * fv) * GWP$. And: $ER = (BE-PE) * (1-AF)$. Adjustment factor AF fixed, all other variables monitored. AF of 4% based on percentage of “generated” LFG in Inspection Report and estimated in accordance with ACM0001.</p> <p>Ex-ante calculation complete and transparent. Worksheet “ERY” in ER-Spreadsheets. Prognostic data for $\sum FV = R_r * LFGg * 363 * 24$: - LFGg estimated in “EPA/Mex-</p>	CL-8	OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>Spreadsheets”, i.e. Lajarilla Mex.xls Vinita Azul Mex.xls Lena Dura Mex.xls - recovery rate R_r of 75% (based on “World Bank-ESMAP Handbook”, i.e. Conestoga-Rovers & Associates, Handbook for the Preparation of Landfill Gas to Energy Projects in Latin America and the Caribbean. The World Bank-ESMAP, Ref. No. 019399 (6), January 2004) - 50% CH_4 (EPA/Mex-model). ER-Spreadsheets checked by JVEV (BE correct). EPA/Mex-Spreadsheets checked by JVEV (correct). <i>CL 8 about transparency/documentation:</i> - mixing up of “methodological choices” and “ex-ante calculation” - no inclusion of AF in Sect. B.6.2 (available at validation) - no documentation on EPA/Mex-model and input values used, see Table 3.</p>		

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	No conservative assumptions.		OK
Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Not addressed: uncertainties depending on measurement equipment. See Sect. "Monitoring of Baseline Emissions".		OK
Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	No leakage effects need to be accounted under ACM0001.		OK
Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	N/A		OK
Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	N/A		OK
Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation</i>					

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>of climate change.</i>					
Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/	DR	Real and measurable: yes, in accordance with ACM0001. Long term CC mitigation: yes, expected operational lifetime approx. 15 years.		OK
Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Monitoring plan in accordance with ACM0001 though ACM0001 table "Data to be collected or used to monitor emissions from the project activity, and how this data will be archived" replaced by EB CDM-PDD form table "Data and parameters monitored".		OK
Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Additional info outside PDD: yes, data will be electronically archived during entire crediting period and kept for 2 years after crediting period/CERs issuance.		OK
Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
Does the monitoring plan provide for the collection and	/1/	DR	Yes:	CL9	OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?			- flare η , additional to data for baseline emissions - electricity consumption (for captive/power grid combustion emission monitoring). <i>CL 9 about project emissions monitoring not completely in accordance with ACM0001:</i> - electricity consumption not included in the monitoring plan - properties of involved measurement equipment missing, see Table 3.		
Are the choices of project GHG indicators reasonable and conservative?	/1/	DR	N/A, in accordance with ACM0001.		OK
Is the measurement <i>method</i> clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	Yes: - flare η determined, a. (preferentially) through measurement of CH ₄ concentration ratio exhaust/supply b. (back-up) through measurement of flare temperature. Both appropriate, in accordance with Flaring Tool - electricity measurement, cross-checked with invoices.		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR	Yes: - flare η , a. CH ₄ in exhaust, non-dispersive infrared (NDIR) analyzer O ₂ in exhaust, electrochemical cell CH ₄ in supply idem fv, see Sect. "Monitoring of Baseline Emissions" (rest of LFG considered N ₂) b. type N thermocouple. Both appropriate, in accordance with Flaring Tool - electricity, electromechanical induction meter (electricity supplier owned). Appropriate.		OK
Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	Yes: - flare η , a. CH ₄ in exhaust, 0.5% O ₂ in exhaust, 0.25% CH ₄ in supply idem fv, see Sect. "Monitoring of Baseline Emissions". Appropriate b. 2.2 °C. Appropriate - electricity, < 2%. Appropriate. No procedures for erroneous measurements in place. Procedures for review include		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			weekly review of data and necessary actions by Monitoring Director.		
Is the measurement <i>interval</i> identified and deemed appropriate?	/1/	DR	Yes: - flare η , continuous measurements. Appropriate, in accordance with Flaring Tool - electricity, continuous. Appropriate.		OK
Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	/1/	DR	Procedures briefly described with the following items also concerning the baseline emissions: - on-site logging (automatic, manual) of monitored data - data transmission to Santiago office - Santiago server data storage and back-up - data review and reporting to Paris office - Paris office emission reduction calculation.		OK
Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Procedures briefly described with the following items also concerning the baseline emissions: - calibration - malfunction. Calibration, additional info outside PDD: - flare η , a. calibration according to manufacturer's		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			recommendation b. 1/y (calibration or replacement) - electricity, 1/5yrs. Appropriate.		
Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/	DR	Procedures briefly described with the following items also concerning the baseline emissions: - daily review of data & project performance - no calculation for missing data.		OK
Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes. All necessary data measured: - FV - fv except: - AF, fixed - relevant regulations, referenced from external source. <i>CL 10 about relevant regulations not included in the monitoring plan, see Table 3.</i>	CL 10	OK
Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	N/A, in accordance with ACM0001.		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Is the measurement <i>method</i> clearly stated for each baseline indicator to be monitored and also deemed appropriate?		/1/	DR	Yes for measurements: - FV measured - fv measured. Appropriate, in accordance with ACM0001. Relevant regulations, unknown.		OK
Is the measurement <i>equipment</i> described and deemed appropriate?		/1/	DR	Additional info outside PDD: - FV, turbine flow meter with gas temperature/pressure measurement incorporated - fv, infrared (IR) analyzer. Appropriate, in accordance with ACM0001. Relevant regulations, N/A.		OK
Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?		/1/	DR	Additional info outside PDD: - FV, < 0.5% - fv, 2%. Appropriate. Relevant regulations, N/A. Procedures, see "Monitoring of Project Emissions".		OK
Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?		/1/	DR	Yes, continuous measurement. Appropriate, in accordance with ACM0001. Relevant regulations, 1/y.		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	/1/	DR	See “Monitoring of Project Emissions”.		OK
Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Procedures, see “Monitoring of Project Emissions”. Calibration: - FV, certificate from independent verification on site, quarterly maintenance - fv, monthly testing with calibration gas from certified provider.		OK
Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	See “Monitoring of Project Emissions”.		OK
Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	No leakage effects need to be accounted under ACM0001.		OK
Are the choices of project leakage indicators reasonable and conservative?	/1/	DR	N/A		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview				Draft Concl.	Final Concl.
Ref.	MoV*	COMMENTS			
Is the measurement <i>method</i> clearly stated for each leakage value to be monitored and deemed appropriate?	/1/	DR	N/A		OK
Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
Is the monitoring of sustainable development indicators / environmental impacts warranted by legislation in the host country?	/1/ /C/	DR I	N/A. During follow-up interview it was confirmed that host country legislation does not relate to said monitoring.		OK
Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	N/A. See above.		OK
Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	N/A. See above.		OK
Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Is the authority and responsibility of overall project management clearly described?	/1/	DR	Yes. Overall project management is granted to the Chief Operating Officer of Bionersis Chile (COO). Monitoring plus Maintenance Directors of Bionersis Chile report to COO.		OK
Are procedures identified for training of monitoring personnel?	/1/	DR	Procedure items indicated: - configuration of measurement equipment - review of measurement equipment - calibration requirements - maintenance requirements.		OK
Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	No procedures identified.		OK
Are procedures identified for review of reported results/data?	/1/	DR	Procedure items indicated: - weekly review of data & project performance - Monitoring Director will officially sign off on all documents with monitored data - Director of Carbon Finance will officially sign off CERs calculations.		OK
Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	No procedures identified.		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
C. Duration of the Project/Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>						
Are the project's starting date and operational lifetime clearly defined and evidenced?		/1/	DR	Starting date defined (originally 2008/01/01). Operational lifetime defined (approx. 15 years). <i>CL 11 about evidence for start and lifetime, see Table 3.</i>	CL 11	OK
Is the start of the crediting period clearly defined and reasonable?		/1/	DR	Crediting start: defined (originally 2008/01/01). Reasonable (expected date of first operation of Lajarilla landfill equipment).		OK
D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>						
Has an analysis of the environmental impacts of the project activity been sufficiently described?		/1/	DR	Yes. Relevant issues: - landscape (remodelled, positive) - human well-being (odor nuisance and sanitary risk abatement, pos.) - air (toxic component abatement, pos.) - noise (compressor, flare, neg.). Further, safety issue described (explosion		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			risk control, pos.). Document checked by JVEV: “EI-analysis”, i.e. Letter dated 2005/11/01 from B. Courcelle to CONAMA (SOLICITUD PRONUNCIAMIENTO CONAMA.pdf).		
Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /C/	DR I	No. Legislation Analysis mentions that entrance to the “Environmental Impact Assessment System” (SEIA, “Sistema de Evaluación de Impacto Ambiental”, acc. the “Environmental Law”, i.e. N° 19.300, Ley de Bases Generales del Medio Ambiente) is obligatory for landfills that serve a population from 5 000 people onwards, and with first permit > 1997. Project landfills all started earlier. Above year confirmed during follow-up interview. EI-analysis was nevertheless presented, whereupon CONAMA has replied that entrance to the SEIA is not necessary in the case of degassing projects. Document checked by JVEV: “SEIA-		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
				consideration”, i.e. Letter dated 2005/12/23 from CONAMA to B. Courcelle (carta 54000 conama.jpg).		
Will the project create any adverse environmental effects?	/1/	DR		Yes: compressor and flare noise production can cause noise nuisance.		OK
Are transboundary environmental impacts considered in the analysis?	/1/	DR		No transboundary impacts considered. Agreed by DNV since distance to border.		OK
Have identified environmental impacts been addressed in the project design?	/1/	DR		Yes, noise production addressed: - compressor in container - enclosed flare.		OK
Does the project comply with environmental legislation in the host country?	/1/ /C/	DR I		Yes. Legislation Analysis mentions that the “Minimum Conditions for the Handling of Landfills” (Resolution N° 2.444 of the Ministry of Health, acc. to the “Sanitary Law”, i.e. D.F.L. N° 725/1967, Código Sanitario) do not include requirements involving the LFG. During follow-up interview it was indicated that new legislation on landfills will not apply to existing landfills.		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>					
Have relevant stakeholders been consulted?	/1/	DR	Yes. All subprojects: - authorities involved, Regional Sanitary Authority Regional CONAMA - general public, Viña del Mar (Lajarilla landfill), municipal unions, neighbour groups Copiapo (Viñita Azul landfill), municipal unions, environmental organisations Punta Arenas (Leña Dura landfill), landfill site neighbours.		OK
Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Yes: - authorities involved, Regional Sanitary Authorities, project involved presented individually Regional CONAMA, project involved presented individually - general public, invited through the Municipality or its Department involved. For Leña Dura landfill additionally press articles	CL12	OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			in magazine “Punta Arenas” (Municipality publishing) and radio broadcasting by Utilísima Satelital (cable “Channel 72”). <i>CL 12 about formal means whereby general public has been invited, see Table 3.</i>		
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/ /C/	DR I	N/A. During follow-up interview it was confirmed that in the host country stakeholders’ consultation is needed only if landfill has entered the SEIA. Project landfills did not (see Sect. “Environmental Impacts”).		OK
Is a summary of the stakeholder comments received provided?	/1/	DR	Yes. Regional Sanitary Authorities, list/summary of official documents provided in Sect. E.1: - “Lajarilla-Resolution” i.e. Resolución N° 0823, Secretaría Regional Ministerial Valparaíso, 2006/06/06 (Resolucion 0893 SEREMI SALUD Lajarilla.jpg) - “Viñita Azul Resolution” i.e. Ord. BS3 / N° 1418, Secretaría Regional Ministerial Atacama, 2006/07/21 (Ord B53 N° 1418 SEREMI Salud Viñita Azul.pdf) - “Leña Dura Resolution” i.e. Ord. N° 258,		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Secretaría Regional Ministerial Magallanes y Antártica Chilena, 2006/03/06 (CHI XII LEÑA DURA APROB SALUD ORD_258.06.pdf). Documents checked by JVEV. Regional CONAMA, list/summary of official documents provided in Sect. E.1: - “Lajarilla-Approval” i.e. Carta N° 062572, CONAMA, 2006/09/08 (CHI V AND Aprobacion Lajarilla.pdf) - “Viñita Azul Approval” i.e. Carta N° 062569, CONAMA, 2006/09/08 (CHI III AND Aprobación Viñita Azul.pdf) - “Leña Dura Approval” i.e. Carta N° 062570, CONAMA, 2006/09/08 (CHI XII AND Aprobación Leñadura.pdf). Documents checked by JVEV. General public: summary in Sect. E.2. Information was checked by JUMART during follow-up interviews.		
Has due account been taken of any stakeholder comments received?	/1/	DR	N/A. No comments requiring due account taking. Questions raised answered by Bionersis.		OK

VALIDATION REPORT

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 No involved Parties have provided a valid and complete letter of approval nor have authorized all private/public project participants. Letters of approval and authorizations should be provided in order to have the project registered. Confirmation of the host country should be provided that the project assists in achieving its sustainable development.	A (Participation Requirements, Contribution to Sustainable Development)	LoA incl. authorization of Bionersis Chile from host Party has been provided: Carta D.E. N° 081136, Ref. Proyecto “Proyectos de Vertederos Regionales en Chile” (version 03). LoA incl. authorization of Bionersis France from sponsor Party has been provided: AND-Agrément_MDP-2007-013.	Letters of approval and authorizations provided. OK, CAR closed.
CAR 2 Project emissions calculation not completely in accordance with ACM0001: captive/power grid combustion emission term (EL * CEF _e) is omitted. Term should be included in Sect. B.6.1 (general calculation) and Sect. B.6.2 as well as ER-Spreadsheets (ex-ante calculation).	B (Calculation of GHG Emission Reductions - Project emissions)	Replacement text provided with inclusion of omitted terms (B6-B7 v6.doc). Replacement ER-spreadsheets provided with inclusion of omitted formulas/input values (ER Lajarilla.xls, ER Vinita Azul.xls, ER Lena Dura.xls, Total ER - 3 sites v2.xls).	Captive/power grid combustion emission term (EL * CEF _e) is correctly implemented in project emissions calculation. Replacement text and ER-spreadsheets have been checked by JVEV and can be considered sufficient evidence that project emissions calculation is completely in accordance with ACM0001. OK, CAR closed.
CL 1	A (Technology)	Additional information provided with	Additional information provided is

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>It is not sufficiently clear whether the project design engineering reflects current good practices e.g.:</p> <ul style="list-style-type: none"> - does the project cover soil protection from leachate infiltration - will the LFG collection network be installed in old or new waste bodies (except for the Lajarilla landfill, closed)? 	to be employed)	<p>text (Leachate-Cover.doc) and photographs (leachate issues.doc).</p> <p>On soil protection from leachate infiltration: not covered by the project since rocky bottom (Lajarilla landfill and Viñita Azul landfill) or mid 2006 installed leachate pond (Leña Dura landfill).</p> <p>On LFG collection in old or new waste bodies: the LFG collection network will be installed in old waste body (Lajarilla landfill, closed in 2003, and Viñita Azul landfill, closed in 2007), resp. old and new waste body (Leña Dura landfill, to be closed in 2010).</p>	<p>sufficient for conclusion that project reflects current good practices.</p> <p>OK, CL closed.</p>
<p>CL 2</p> <p>Three elements that prevent the clear definition of sources and gases in the project boundary:</p> <ul style="list-style-type: none"> - the explanation of the exclusion of the LFG CO₂ from the baseline calculation is erroneous - the LFG CH₄ in the project emissions calculation is not included 	B (Baseline Methodology)	<p>Correct information provided in replacement of Sect. B.3 table.</p> <p>On LFG CO₂ in the baseline: idem as in the project activity.</p> <p>On the LFG CH₄ in the project activity: included (not destructed since flare efficiency < 100%).</p> <p>On the power grid/generator CO₂ in the project activity: not negligible</p>	<p>Replacement table sufficiently elaborates the sources and gases in the project boundary.</p> <p>OK, CL closed.</p>

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>- the exclusion of the power grid CO₂ from the project emissions calculation in the PDD text is not in accordance with ACM0001.</p> <p>Elements cited should be properly elaborated in Sect. B.3 and in accordance with ACM0001.</p>		(included in project emissions).	
<p>CL 3</p> <p>The Inspection Report should be referenced in Sect. B.4 since it is a key source.</p>	B (Baseline Scenario Determination)	<p>New version of Inspection Report provided (with appendix): Inversiones 88, Inspection Report - Chile (Inspection Report 3 Sites.doc). Reference involved adapted in Sect. B.4.</p>	<p>Inspection Report adequately referenced.</p> <p>OK, CL closed.</p>
<p>CL 4</p> <p>Concerns step 1 of additionality assessment (alternatives): alts. 3 to 6 suppose an investment with too low the revenue to be credible or realistic, but actual figures of cost vs. revenue to demonstrate this are missing.</p>	B (Additionality Determination)	<p>Additional information provided with (project)IRR/NPV-spreadsheet (Alternative 3-Elec only.xls) for alt. 3. Key items include:</p> <ul style="list-style-type: none"> - benchmark IRR of 10% - project-IRR of 0.1% - with 20% higher electricity price, 5.1% - with 20% lower investment or O&M cost, 1.1% or 3.2%. <p>Alts. 4 to 5 are not credible or realistic</p>	<p>Additional information (revenue, market) provided is sufficient for conclusion that alts. 3 to 6 can be considered not credible or realistic and need not to be included in the further additionality test..</p> <p>OK, CL closed.</p>

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		due to their revenue, but because there is no local demand for their production (steam, upgraded LFG). Alt. 6 (upgraded LFG) is to be crossed out of the PDD.	

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 5 Concerns step 2 of additionality assessment (investment): more detail is required for, - the investment cost (the difference between the Leña Dura diesel generator and connection to the power grid should be clear) - the operation cost (the fuel cost and the electricity cost should be separated from the global cost).	B (Additionality Determination)	Detailed information provided in replacement of Sect. B.5 table (see also provided SimpleCostsAnalysis.xls): - Leña Dura diesel generator added to investment cost - Leña Dura landfill diesel oil consumption and other landfills electricity consumption incl. maintenance cost added to operation cost.	Replacement table sufficiently elaborates the project investment/operation cost. OK, CL closed.
CL 6 Concerns step 4 of additionality assessment (common practice): low technology/insignificant volume and passive LFG capture on most Chile landfills should be confirmed by independent source.	B (Additionality Determination)	Independent source would be the specialized magazine Ecoamérica. A table out of a recent issue (March 2006) is included in the PDD. Article title is “Primer Cadastro de Sites de Disposicion Final, Gestion y Tratamiento de Residuos Solidos”).	Source referred to can be considered as unbiased. This goes also for the text part on passive LFG capture in the Legislation Analysis (Legal report BIONERSIS ingles 07.doc). OK, CL closed.
CL 7 The transparency of the project emissions calculation is not sufficient. The “methodological choices” in Sect. B.6 should not be mixed up with the “ex-ante calculation”.	B (Calculation of GHG Emission Reductions - Project emissions)	Replacement text provided (B6-B7 v6.doc): - “methodological choices” (Sect. B.6.1) clearly separated from “ex-ante calculation” (Sect. B.6.3) - all formulas from said “Tool”	Replacement text transparently describes the project emissions calculation both in “methodological choices” and “ex-ante calculation”. OK, CL closed.

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>The (adapted) formula 15 of the Flaring Tool should be included in the text.</p> <p>The flare efficiency value of 90% used in the ex-ante calculation should be included in the text.</p> <p>The value of < 0.3% of ER of the term EL * CEF announced in Sect. B.3 should be included in the text (ex-ante calculation).</p>		<p>included in the text (Sect. B.6.1)</p> <ul style="list-style-type: none"> - 90% flare efficiency explained as an ex-ante estimate (Sect. B.6.3) - < 0.3% of ER for EL * CEF replaced by fully elaborated text package including the ex-ante estimate. 	
<p>CL 8</p> <p>The transparency of the baseline emissions calculation is not sufficient. The “methodological choices” in Sect. B.6 should not be mixed up with the “ex-ante calculation”.</p> <p>The adjustment factor AF should be included in Sect. B.6.2 since it is to be considered as ”data or parameters that are available at validation”.</p> <p>The application of the EPA/Mex-model for the ex-ante calculation should be documented:</p> <ul style="list-style-type: none"> - a reference to the model should be given - several key inputs should be included 	<p>B (Calculation of GHG Emission Reductions – Baseline emissions)</p>	<p>1. Replacement text provided (B6-B7 v6.doc):</p> <ul style="list-style-type: none"> - “methodological choices” (Sect. B.6.1) clearly separated from “ex-ante calculation” (Sect. B.6.3) - AF included in Sect. B.6.2 - EPA/Mex model documented. Model documentation includes, <ul style="list-style-type: none"> a. reference, b. reference of source of waste amount/type c. 75% recovery justified with landfill cover properties and high gas well density. <p>For landfill closing year and yearly waste amount is referred to the</p>	<p>Replacement text transparently describes the baseline emissions calculation both in “methodological choices” and “ex-ante calculation”.</p> <p>OK, CL closed.</p>

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>(landfill capacity, closing year, yearly waste amount from opening year on, waste type)</p> <ul style="list-style-type: none"> - a reference to the source of the waste amount/type should be given - a justification should be given for the 75% figure for the recovery rate (the World Bank-ESMAP Handbook considers 50% conservative and readily achievable, assuming that waste type and modeling exercise are based on reasonable data and assumptions). 		<p>EPA/Mex-Spreadsheets (updated versions provided).</p> <p>2. Spreadsheet extracts with closing year and yearly waste amount eventually included in the PDD.</p>	
<p>CL 9</p> <p>Project emissions monitoring not completely in accordance with ACM0001: electricity consumption not included in the monitoring plan (for captive/power grid combustion emission monitoring).</p> <p>Consumption should be included in Sect. B.7 and Ann. 4, along with measurement equipment properties (measurement principle, accuracy, measurement interval, calibration interval).</p>	<p>B (Monitoring of Project Emissions)</p>	<p>Replacement text (B6-B7 v6.doc) and replacement annex (Annex4 v2.doc) provided with inclusion of:</p> <ul style="list-style-type: none"> - omitted monitoring (electricity consumption) - additional monitoring (flare η through CH₄ ratio exhaust/supply). <p>For measurement equipment properties, see Table 2.</p>	<p>Replacement text/annex sufficiently describes the monitoring of electricity consumption.</p> <p>OK, CL closed.</p>

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 10 Baseline emissions monitoring not completely in accordance with ACM0001: relevant regulations not included in the monitoring plan. Regulations should be included in Sect. B.7 and Ann. 4, along with monitoring method.	B (Monitoring of Baseline Emissions)	Replacement text (B6-B7 v6.doc) and replacement annex (Annex4 v2.doc) provided with inclusion of monitoring of relevant regulations. Follow-up of environmental laws & regulations in Chile through a review with contracted lawyers (Vergara Abogados) every 6 months: - www.vergaraabogados.cl - specialists in Chile regarding environmental issues.	Replacement text/annex sufficiently describes the monitoring of relevant regulations. JVEV checked website mentioned: - list of publications by senior partner Javier Vergara - firm seems to be distinguished within best four Chilean law firms in environmental law, and its senior partner as leading expert (in “Which Lawyer 2006/2007”). OK, CL closed.
CL 11 The starting date of the project activity (originally 2008/01/01) should be explained. The estimated length of the expected operational lifetime (approx. 15 years) should be explained.	C (Duration of the Project/Crediting Period)	Newly defined starting date (2007/04/27) is date of purchase of equipment. 15 years is equipment lifetime according to manufacturer, and period of significant LFG production of a closed landfill.	Starting date and operational lifetime sufficiently explained. OK, CL closed.
CL 12 The general public was invited through the Municipality or its Department involved, but it should be described by what formal means.	E (Stakeholder Comments)	The general public was invited through posters placarded in the Municipalities’ townhall. Example of poster provided comes from Viña del Mar (Lajarilla landfill) i.e. “Invitación.doc”.	Formal invitation of the general public adequately illustrated. OK, CL closed.

VALIDATION REPORT

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Sven Starckx

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Jan Van Evercooren

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	Sectoral scope 9		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Julio Martinoli

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

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-CDMJ1-i1)

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	Yes	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	Sectoral scope 9 & 13		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Hendrik Brinks

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3 & 12		
Technical Reviewer for (group of) methodologies:			
ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS- III.I	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes		

Høvik, 18 July 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Einar Telnes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3 6 & 10		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0030	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0031	Yes
ACM0004	Yes	AM0032	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0035	Yes
ACM0007	Yes	AM0038	Yes
ACM0008	Yes	AM0041	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0034	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0043	
AM0009, AM0037	Yes	AM0046	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	AM0047	
AM0014	Yes	AMS-II.A-F, AM0044	Yes
AM0017	Yes	AMS-III.A	Yes
AM0018	Yes	AMS-III.E, AMS-III.F	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0030	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0031	Yes
ACM0004, ACM0012	Yes	AM0032	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0035	Yes
ACM0007	Yes	AM0038	Yes
ACM0008	Yes	AM0041	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0034	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0043	
AM0009, AM0037	Yes	AM0046	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	AM0047	
AM0014	Yes	AMS-II.A-F, AM0044	Yes
AM0017	Yes	AMS-III.A	Yes
AM0018	Yes	AMS-III.E, AMS-III.F	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

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