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CDM Validation Report

Enterprise

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Service

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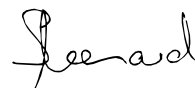
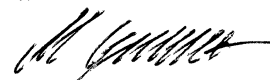


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1 Introduction

1.1 Objective

Green Gas Yotoco S.A. has retained SQS to validate The Colomba-Guabal Landfill Gas Project (hereafter called "the project").

The objective of the validation is an independent assessment by a Designated Operational Entity (DOE) of a proposed project activity against the defined set of criteria for registration under the Clean Development Mechanism (CDM). Validation is part of the CDM project cycle and will finally result in a conclusion by the DOE whether a project activity should be submitted for registration to the CDM Executive Board (CDM-EB). The ultimate decision on the registration of a proposed project activity rests with the CDM-EB.

1.2 Scope

The scope of the validation is an independent and objective review of the project design document (PDD), and the DOE uses a risk-based approach focusing on the identification of significant risks for project implementation and the generation of CERs against the criteria stated in

- The Kyoto Protocol, in particular § 12 and modalities and procedures for the CDM
- Decision 2/CMP1 and Decision 3/CMP.1 (Marrakech Accords)
- MODALITIES AND PROCEDURES FOR A CLEAN DEVELOPMENT MECHANISM
- CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL (ver. 01.2)
- Decisions and specific guidance by the EB published under <http://cdm.unfccc.int>
- ACM0001 Version 11
- Tool for the demonstration and assessment of additionality, version 5.2, EB 39
- Tool to calculate the emission factor for an electricity system, version 02.2.0 EB 61 Annex 12
- Guidelines on the Assessment of Investment Analysis, version 04, EB 61, Annex 13
- A comprehensive list of the normative references is given in the validation protocol

1.3 Project description

The objective of the project is to build, operate and maintain a landfill gas collection and flaring system on the Colomba-Guabal Landfill near Cali, in the municipality of Yotoco in Colombia. The landfill is an anaerobic managed landfill currently in operation.

The project involves the installation of a 2700 scfm (standard cubic feet per minute) capacity enclosed flare [47] and the eventual installation of approximately 11MW electricity generation capacity in case the quality and quantity of the LFG allows for such installation.

Project participants are:

- Green Gas Yotoco S.A.S. registered in Colombia and
- Green Gas International B.V. registered in The Netherlands

The project activity starting date is 25/06/2010, the date of the contract signing between Green Gas Yotoco and Interaseo (the landfill operator) for the development of the LFG CDM project [9, 34].

The project uses the renewable, 21 year period and its first 7-year crediting period will start on 01/02/2012 or registration date whichever is later.

1.4 Validation methodology

The SQS auditors apply standard auditing techniques to assess the correctness of the information provided by the project participants, including, where appropriate, but not limited to:

- (a) Document review, involving: review of data and information to verify the correctness, credibility and interpretation of presented information and cross checks between information provided in the PDD and information from sources other than that used, if available, and if necessary independent background investigations
- (b) Follow-up actions (on-site visit, telephone, email interviews), including: interviews with relevant stakeholders in the host country, personnel with knowledge of the project design and implementation and cross-check of information provided by interviewed personnel to ensure that no relevant information has been omitted from the validation
- (c) Reference to available information relating to projects or technologies similar to the proposed CDM project activity under validation
- (d) Review, based on the approved methodology being applied, of the appropriateness of formulae and correctness of calculations.

If, during the validation of a project activity, the auditor identifies issues that need to be further elaborated upon, researched or added to in order to confirm that the project activity meets the CDM requirements and can achieve credible emission reductions, the auditor shall ensure that these issues are correctly identified, discussed and concluded in the validation report.

The auditor shall raise a corrective action request (CAR) if one of the following occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

The DOE shall raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

The project participant shall respond to all requests with sufficient evidence.

The DOE shall resolve or “close out” CARs and CLs only if the project participants modify the project design, rectify the PDD or provide adequate additional explanations or evidence that satisfies the DOE’s concerns. If this is not done, the DOE shall not recommend the project activity for registration to the CDM Executive Board.

In order to ensure transparency, a validation protocol (CDM Validation Protocol) was customized for the project. The protocol shows, in a transparent manner, criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process in which the DOE will document how a particular requirement has been validated and the result of the validation;
- The validation protocol consists of several tables, as described below.

The completed validation protocol is enclosed in appendix F to this report.

CDM Validation Protocol 1 - 3: Requirements	
<i>Requirement</i>	The requirements the project must meet.
<i>Ref.</i>	Reference to the PDD or documents.
<i>MoV (Means of Validation)</i>	Explains how conformance with the requirements is investigated. DR = Document Review, I = Interview, N/A = Not Applicable
<i>Comment</i>	The section is used to elaborate and discuss the conformance to the requirement.
<i>Draft Concl. / Final Concl. (Draft and/or Final Conclusion)</i>	OK = Conform, CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

CDM Validation Protocol 4: Summary of Requests	
<i>No.</i>	The requests (CAR, CL, FAR) are numbered and listed in this section.
<i>Ref.</i>	Reference to the requirement number in Protocol 1 - 3 where the request is explained.
<i>DOE request</i>	The section is used to elaborate and discuss the request. The DOE may give reference to the PDD or documents.
<i>Project participant response</i>	The responses given by the project participants during the communications with the DOE is summarised in this section.
<i>DOE conclusion</i>	This section should summarise the DOE's responses and final conclusions. The conclusions should also be included in Protocol 1 - 3, under "Final Conclusion".
<i>Date</i>	Date when request was closed.

2 Validation Opinion

2.1 Summary of the validation conclusions

Based on

- PDD of The Colomba-Guabal Landfill Gas Project, Version 07, dated 29/04/2012
- Documents submitted and listed in appendix C of this report
- ACM0001 Version 11 "Consolidated baseline and monitoring methodology for landfill gas project activities"
- Tool for the demonstration and assessment of additionality, version 5.2, EB 39 Annex 10
- Tool to determine project emissions from flaring gases containing methane EB28 Annex 13;
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption - version 01, EB39 Annex 7;
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion - version 02, EB41 Annex 11;
- Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site - version 05.1.0 EB61 Annex 10;
- Tool to calculate the emission factor for an electricity system, version 02.2.0, EB 61 Annex 12
- Guidelines on the Assessment of Investment Analysis, version 04, EB 61, Annex 13
- Validation and Verification Manual Version 01.2, EB55
- On-site visit on 06-07/12/2010

It is SQS's opinion that the project "Colomba-Guabal Landfill Gas Project" described in PDD Version 07, dated 29/04/2012 with a renewable crediting period starting from 01/02/2012 to 31/01/2019, meets all relevant criteria of the listed references.

SQS confirms that the approved baseline and monitoring methodology ACM0001 Version 11 "Consolidated baseline and monitoring methodology for landfill gas project activities" is applicable for this project activity and is correctly applied, and that the criteria are discussed in an exhaustive manner in the PDD and supported by the submitted documents.

The selected methodology is applicable to the proposed CDM project activity and is correctly applied. Therefore, SQS requests the registration of given CDM project.

2.2 Summary of the validation methodology and process used and the validation criteria applied

The validation process was carried out using the methodology described in paragraph 1.4. The validation included a desk review of the PDD and its annexes and additional documents listed in the appendix C of this report, an on-site visit with an inspection of the project site on 07/12/2010 and interviews (see appendix B) subsequently

- 6 CLs were raised. All of them are closed.
- 11 CARs were raised. All of them are closed.
- 0 FAR was raised.

2.3 Description of project components or issues not covered by the validation process

All project components were covered by the validation process.

2.4 Statement on the validation of the expected emission reductions

SQS confirms that the calculation of the expected emission reduction of 2,120,809t CO_{2e} for the first 7 years crediting period is carried out in a transparent and conservative manner, so that the calculated emission reductions are most likely to be achieved, given that the underlying assumptions do not change. SQS confirms that the starting date of the first crediting period is planned for 01/02/2012 or registration date, whichever is later.

2.5 Statement whether the proposed CDM project activity meets the stated criteria

Based on the observations made during the validation process, SQS concludes that the proposed project is accurate, conservative, relevant, credible and reliable and meets the stated criteria.

3 Validation Findings

3.1 Approval

The Letter of Approval by the host country Colombia was issued with the date of 20/05/2011, Ref: 2000.2.42400, file number 181 [49].

The Letter of Approval (LoA) /from the DNA of Colombia confirms in accordance with VVM Version 01.2 paragraph 45:

- Colombia is a Party to the UNFCCC (point 1 of LoA issued)
- Colombia is a Party to the Kyoto Protocol (point 2 of LoA issued)
- The participation is voluntary (point 4 of LoA issued)
- The project contributes to sustainable development in Colombia (point 4 of LoA issued)
- The LoA refers exactly to the project title "The Colomba-Guabal Landfill Gas Project"

SQS confirms that the letters refer precisely to the proposed CDM project activity title in line with the title in the PDD "The Colomba-Guabal Landfill Gas Project". In addition, the LoA statements are clear and unambiguous with respect to all required content such as Kyoto Protocol ratification status and voluntary participation. The Colombian LoA also confirms that the proposed CDM project activity contributes to the sustainable development of Colombia.

The United Kingdom of Great Britain and Northern Ireland, as the second party involved, has issued the letter of approval dated on 07/06/2011 Ref GGIBV/01/2011[50] by its DNA, the Department of Energy & Climate Change.

The Letter of Approval (LoA) /from the DNA of the United Kingdom of Great Britain and Northern Ireland confirms in accordance with VVM Version 01.2 paragraph 45:

- the United Kingdom of Great Britain and Northern Ireland is a Party to the Kyoto Protocol (point 1 of LoA issued)
- The participation is voluntary (point 2 of LoA issued)
- The LoA refers exactly to the project title "The Colomba-Guabal Landfill Gas Project"

Both LoAs are considered as authentic without doubts and are unconditional. SQS received these letters from the project participant directly.

The SQS validation team was able to confirm the authenticity of the LoA issued by the DNA of Colombia by discussing the LoA issuance circumstances with the representatives of the Colombian DNA directly on 01/06/2011. The representative of the Colombian DNA also confirmed in writing that the content of the comment received during the Global Stakeholder consultation process was considered and evaluated in the course of the issuance of the LoA by the Colombian DNA [49] as the submitter of the comment directly approached the DNA with its claim.

SQS confirms that the approval of participation is valid for the proposed project participants – see [49] and [50]. SQS considers that the Letters of Approval are in accordance with paragraphs 45 – 48 of the VVM version 1.2 (EB 55, Annex 1).

The letters of approval do not contain additional specification of the project activity, such as the PDD version number.

3.2 Participation

The names of the two project participants “Green Gas Yotoco SAS” (Colombia) and “Green Gas International B.V.” (The Netherlands) are listed in the PDD in tabular form in section A.3. This information is consistent with the contact information details of the project participants as provided in Annex I of the latest version of the PDD. No entities other than those approved as project participants are included in these sections of the PDD.

The participation of “Green Gas Yotoco SAS” is approved by means of the Letter of Approval of the host party. The participation of “Green Gas International B.V.” is approved by means of the Letter of Approval of the United Kingdom of Great Britain and Northern Ireland. Therefore, in addition to the host Party an annex I Party has approved the project.

By reviewing the latest version of the completed Modalities of Communication Form (F-CDM-MOC) for the project activity signed by both project participants, the validation team was able to confirm that this form is correctly completed. The names, authorized signatories and contact details of the project participants indicated in the MoC are consistent with the ones in the PDD.

3.3 Project design document

The PDD is compliant with the latest template and guidance of the CDM EB available on the UNFCCC website.

The validation team can confirm that the PDD Version 07, dated 29/04/2012 is complying with the applicable CDM requirements, VVM V1.2 para 57. Each section of the PDD is based on the currently valid PDD template and is completed in accordance with the applicable guidance document.

3.4 Project description

The description of the project activity contained in the PDD is unambiguous, detailed and provides a good overview of the project. Its content was confirmed by means of an on-site visit and interviews on 06-07/12/2010.

The objective of the project activity is to build, operate and maintain a landfill gas collection and flaring system located at the landfill of Colomba-Guabal near the city of Cali, Colombia. This is an anaerobic managed landfill receiving up to 719,163 tons of waste per annum by 2018 according to the landfill's original EIA waste forecast of an annual increase of 2% [51]. The landfill is covered with clay and soil on areas which do not receive waste anymore. The equipment includes a gas collection network, a high temperature enclosed flare, monitoring and control systems and civil works. The installation of gas engines with a maximum capacity of approximately 11 MW is envisaged over the 21 years of project lifetime in case the LFG quality and quantities allows for running such electricity generation.

This project will capture and combust methane from a landfill used for disposal of municipal waste containing biodegradable organic matter, therefore, reducing the Global Warming impact of the emitted methane.

The feasibility of electricity generation alternative will be evaluated in further stages. In addition to climate change mitigation, the project will contribute to sustainable development by way of:

- Hiring and training of local contractors and employees
- Transfers of know-how, directly by training, or indirectly through the visibility of the project and its interest as a successful local environmental initiative
- Increased awareness to environmental issues within the existing training initiatives of the landfill operator

Main changes between the PDD (Version 01, dated 01/12/2010) published for the 30 days stakeholder commenting period and the final version (Version 07, dated 29/04/2012), submitted for registration, are

issues related to the eleven CARs and six CLs identified during validation (for details see appendix F: Summary of requests).

It must be noted that the operational starting - hence the beginning operational lifetime of the project as described in C.1.2 of the PDD - date was delayed due to the fact that the Colombian LoA was received after many months of waiting (for reasons see Section 3.10). Due to this waiting the initially planned operational starting in May 2011 was postponed and subsequently the crediting period starting, as indicated in C.2.1.1 of the PDD, had to be modified. This modification was also necessitated by the fact that Registration Requests submissions to the UNFCCC can only be conducted with a crediting period starting date that is after the uploading date. Therefore, the changes in the ER volumes between the first and the final version of the PDD are not related to the CLs and CARs; the ER changes only reflect the modifications of the project starting and end dates. Subsequently, similar timeline related ER changes occurred in the course of addressing the Completeness Check requests and updating the PDD to its Version 05, final version dated 16/12/2011. Further ER changes have not occurred in the final Version 07, dated 29/04/2012, and submitted after the Request for Review issues were incorporated.

The coordinates of the project activity as listed in the PDD were verified and deemed correct: 03°46'12" N and 76°25'05" W.

It is SQS's opinion that the project description is accurate and complete.

3.5 Baseline and monitoring methodology

3.5.1 General requirement

The project applies a large-scale methodology:

ACM0001, version 11 "Consolidated baseline and monitoring methodology for landfill gas project activities".

The project applies the following tools:

- Tool for the demonstration and assessment of additionality, version 05.2, EB 39 Annex 10
- Tool to determine project emissions from flaring gases containing methane, version 01, EB28 Annex 13
- Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site, 1.1., EB61 Annex 10
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01, EB39 Annex 7
- Tool to calculate the emission factor for an electricity system, version 02.2.0 EB 61 Annex 12

Colombia used in its official Grid Emission Factor (GEF) calculation an earlier version (1.1) of the "Tool to calculate the emission factor for an electricity system". The DNA has confirmed that the Resolution No. 180947 of June 2010 containing the grid emission factor value is correctly applied in the then available UNFCCC tool version. The DNA also confirmed that the grid emission factor value used in the PDD is the latest available one. The respective GEF Tool has been updated in the meantime and its present version 02.2.0 will be used for the new GEF calculations. SQS confirms that neither the off-grid option nor the amended identification of the sample groups of power plants for the build margin calculations will have any significant impact on the GEF. Off-grid electricity production is insignificant in Colombia whilst there are no power plants within the built margin built more than 10 years ago. Therefore, it is SQS's opinion that the continued use of the existing GEF based on version 1.1 of the Tool is appropriate.

3.5.2 *Applicability of the selected methodology to the project activity*

The project activity applies the approved baseline and monitoring methodology ACM0001 "Consolidated baseline and monitoring methodology for landfill gas project activities" Version 11. This is the most recent version of the methodology and is valid at the time of validation.

The methodology is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas. During the on-site visit it was confirmed that the current situation is a partial passive venting of the gas as required by national legislation. The proposed project activity is in line with criteria a) as the captured gas will be flared and/or with criteria b) if the captured gas is used to produce energy (electricity).

The applicability of the selected methodological tools is discussed below:

- Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site.
As identified on-site, the landfill is a solid waste disposal site (SWDS). It was also confirmed on-site that the project activities do not include hazardous waste since this type of waste is treated separately and spatially outside the cells considered by the project activities.
- Tool to determine project emissions from flaring gases containing methane
The residual gas stream to be flared contains no other combustible gases other than methane, carbon monoxide and hydrogen. It was verified on-site that the residual gas stream to be flared is obtained from decomposition of organic material from The Colomba-Guabal Landfill.
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption.

The project equipments will consume electricity. Electricity consuming equipments attributable to the project activity will be connected to the national grid from where the power required will be imported. Hence, SQS confirms that the project falls under scenario A "Electricity consumption from the grid". The project will not use an off-grid fossil-fuel fired generator as a backup. The project uses the official, obligatory Colombian grid factor (0.2849 tCO₂/MWh), as laid down in the Resolution of the Ministry of Mines and Energy No. 180947 of 04/06/2010. The DNA of Colombia confirmed that this resolution contains the latest applicable grid emission factor.

SQS confirms that the applicability criteria of the selected methodology and its methodological tools are met.

As a result of the implementation of the proposed CDM project activity, there are no emissions expected to contribute more than 1% of the overall expected average annual emissions reductions that are not addressed by the applied methodology.

As per the information detailed in this section 3.5, SQS confirms that the selected baseline and monitoring methodology is applicable to the project activity, the version is valid and it has been correctly applied by the Project Proponent. Based on the site visit carried out by the audit team, it can be confirmed that all possible GHG emission sources that could contribute more than 1% of the overall expected annual average emission reduction have been correctly identified. Therefore, in compliance with VVM v1.2 para 65 to 69.

3.5.3 *Project boundary*

The project boundary is defined in the PDD, chapter B.3. and is shown in figure B.3.1. "Project Boundary". Project boundary in version 01 of the PDD excluded the electricity grid. The grid shall be included within the project boundary as electricity use (in phase 1, flaring) and flaring and electricity production (in phase 2, generation) necessitates the grid and it's connected power plants to be included within the boundary. Therefore, CAR 3 was raised. Figure B.3.1 and the corresponding text were modified and resulted in clear differentiation between phase 1 (flaring only) and the potential phase 2 (electricity generation and flaring) and the items within the respective project boundary. Therefore, CAR 3 was closed.

The project activity is capture and flaring (phase 1) of and energy production (phase 2) from LFG gas. Hence, the project boundary includes the site of the project activity where the gas is captured and destroyed/utilised. The localization of the project site near Cali, as described in the PDD, was verified on-site. Since the electricity used for and produced by project activity is connected to the grid, the project boundary includes all power generation sources connected to the grid of Colombia to which the project activity is connected.

Within the project boundary, the following gases are included: Methane emissions from decomposition of waste at the landfill site and CO₂ emissions associated with electricity consumption and CO₂ emissions associated with electricity production within the grid. The identified boundary and the selected sources and gases are justified for the project activity. No emission sources that will be affected by the project activity and that are not addressed by the selected approved methodology were identified by SQS.

The physical project boundary was verified during the on-site visit on 07/12/2010. The detailed plans, the construction schedule and the coordinates of the project were consulted and verified. Therefore, the project boundary fully corresponds to the applied methodology.

3.5.4 Baseline identification

The stepwise approach established by the methodology ACM0001, version 11 for selecting the most plausible baseline scenario (following the latest version of "Tool for demonstration and assessment of additionality") has been correctly applied.

The baseline scenario is defined as continuation of the release of landfill gases to the atmosphere and the supply of electricity from the national grid (LFG2+P6).

The information presented in the PDD has been validated by an initial document review of all data. Further confirmation has been made based on the on-site visit and a review of information from similar projects and/or technologies. The sources referenced in the PDD have been quoted correctly.

The information was verified against the credible sources, such as the followings:

- Landfill Environmental Impact Assessment EIA [10,11,12]
- Environmental and waste permits such as Resolutions No. 0349, No. 377, No. 0659 & No. 612 [13,14,15,16,24,27,28,29]
- Regional Environment Authority (CVC) site specific permits such as CVC Resolution 0100 No. 0740 – 0531 dated 23/09/2010 [21,22]

Step 1: Identification of alternative scenarios

The project proponent describes the entire set of relevant waste legislation of Colombia in the PDD under Section B.5. Sub-step 1b and Section D.1. The National Legislation for Landfill construction and operation is mentioned in Title F of the "Technical Regulation of the Drinking Water Sector and Basic Sanitation" (Spanish: Reglamento Técnico para el Sector de Agua Potable y Saneamiento Básico, RAS 2000) from which the chapter F.4 Exploitation (Aprovechamiento in Spanish) and F.6 Landfills (Rellenos Sanitarios in Spanish) are the most relevant sections for Landfill Gas capture projects since they describe the collection and the passive venting of landfill gas, but no specific LFG control mechanisms are defined. The National legislation on landfill and MSW management in Colombia includes a venting obligation for newly built landfills in order to improve the physical stability of landfills and to reduce odours, but there is no mandatory regulation indicating that the vented LFG must be flared.

Specific to this project activity, the CVC, the regional Authority of Environmental and Operational Licenses in the Cauca Valley, issued the Environmental License based on the Environmental Impact Assessment ("EIA") and the Environmental Management Plan ("PMA") by means of the Resolution 0100 No. 0740 –

0377 from 09/08/2007 [14, 24]. The Environmental License stated that the landfill operator would be required to install a venting system by means of collection wells built from the bottom of the landfill and placed at 25 meters from each other with a burner attached to the top. This is so the LFG could be flared, as it is recommended per the EIA as odour mitigation activity. The original Environmental License does not specify any conditions for the passive flaring e.g. frequency, efficiency, type of burner, etc. The Environmental License for the Colomba-Guabal landfill has been modified 5 times as indicated under section D.1 of the PDD; out of the 5 modified Resolutions only 3 have some references to the landfill gas flaring.

On 18/12/2007 the Environmental License was amended by means of the Resolution 0100 No. 0740 – 0612 [16, 28], which states that the obligation for passive flaring of the landfill gas has been removed in order to more effectively mitigate the gas emissions and comply with countrywide regulations already in place. The resolution indicated that the most effective way to mitigate the issues with the biogas was the creation of a CDM project, a better and more efficient way to destroy the methane. With the amendment dated 18/12/2007, the regional environmental authority (CVC) allowed the landfill operator to seek better and more effective practices by which to mitigate the environmental impact of methane emissions. The CDM project described in the PDD and seeking registration was appointed as one of the alternatives to accomplish such objectives.

The modification referred to above stated that the resolution does not carry any consequences in the operation, compliance issues or contradictions with Colombian regulations. The responsible waste expert, David-Alejandro Arango of CVC's Environmental Permitting Unit, confirmed in person on 7 December 2010 and in writing [19] on 14 December 2010, that the flaring requirement was only an odour control mitigation issue. Also it should be noted that this modification took place only four (4) months after the original Environmental License was issued and six (6) months before the landfill operations began in 2008. Therefore, there is no flaring obligation in the baseline scenario – whatever version of the environmental licence it is based on – and a zero adjustment factor is appropriate. This means that even if the first licence would have remained in force no passive flaring would have occurred passive flaring would not have been enforced.

With respect to the other modifications and resolutions, the regional agency (CVC) left the conditions the same in order to continue to comply with national regulations, as per the Environmental Minister. In the Resolution 0100 No. 0740 – 349 [13, 27] from 19/06/2009, it stated that the gas generated in the landfill should be vented by means of venting wells but no gas flaring is required, as per the modified Environmental License. The final Resolution 0100 No. 0740 – 0531 [18, 22] from 23/09/2010 also confirms that no flaring is required, unless it is done by means of the implementation of a CDM project high-efficiency technology system, as is proposed by this project.

The above described LFG venting and flaring related obligations, as detailed in the CVC environmental licences, are summarised in the table below:

Resolution Number	Requirements for Flaring	Date
0100 No. 0740 – 0377	Venting system with burners attached but no flaring requirements specified	09/08/2007 (10 months prior to beginning landfill operations)
0100 No. 0740 – 0612	Venting system with burners reference removed, CDM project with potential active flaring mentioned	18/12/2007 (6 months prior to beginning landfill operations)
0100 No. 0740 – 0314	Not covering venting/flaring	11/06/2008 (during landfill operations)
0100 No. 0740 – 0659	Not covering venting/flaring	03/12/2008 (during landfill operations)
0100 No. 0740 – 0349	LFG venting is required but no gas flaring is required	19/06/2009 (during landfill operations)

0100 No. 0740 – 0531	No flaring is required, unless it is implemented by a CDM active flaring project	23/09/2010 (during landfill operations)
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SQS confirmed that no Colombian landfills, except for those registered for CDM have implemented active LFG flaring systems. SQS also confirmed that passive flaring systems (i.e. venting systems with a burner attached to the top of the venting pipe) are not operated in Colombia. The responsible CVC representative confirmed these license elements and historic developments on-site and also in written communication that was sent directly to SQS [19], in this communication it clearly states not passive flaring system is required. However, CL 3 was raised requesting further elaboration of the PDD regarding these aspects; the PDD was extended accordingly and CVC submitted the full set of licenses [13-29]. Therefore, CL 3 was closed. Neither the national, nor the regional legislation - including the permits of the MSW landfill - requires any flaring; this statement has been properly documented by the PP. The project participant correctly used an adjustment factor (AF) of zero to reflect that no flaring is taking place in the baseline.

Alternative scenarios discussed in the PDD are derived correctly according to ACM0001 Version 11 and the "Tool for demonstration and assessment of additionality". The first version of the PDD [1] also referred to the "Combined Tool" for additionality assessment, therefore, CAR 2 (a) was raised; PP has eliminated the "Combined Tool" related parts, hence, CAR 2 (a) was closed. SQS has validated the argumentation line against the reference documents to which the PDD refers.

In the first version of the PDD submitted for validation, only scenarios LFG1, LFG2 and P1 were discussed. SQS requested the project proponent to further discuss the other alternative scenarios (CAR 2 b) for energy generation (P4, P5). The Project proponent extended the B.4 section of the PDD and further elaborated the financial calculations for electricity generation. It was checked-on site that heat generation is not feasible due to the lack of heat off-takers in the vicinity of the landfill. The extended argumentation and the supporting calculations are deemed to be correct. Thus, (CAR 2 b) was closed.

The LFG2 scenario - continuation of the current situation of atmospheric release of landfill gas (phase 1)- and in case of the installation of power generators (phase 2), the P6 scenario - existing and/or new grid-connected power plants - are deemed to reasonably represent what would have occurred in the absence of the project activity.

SQS has determined that no reasonable alternative scenario has been excluded. Based on the validated assumptions used for project activity calculations SQS considers that the identified baseline scenario is reasonable.

With regard to criteria 87 of VVM, SQS confirms the following statements:

- All the assumptions and data used by the project participants are listed in the PDD, including their references and sources
- All documentation used is relevant for establishing the baseline scenario, and is correctly quoted and interpreted in the PDD
- Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable
- Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD
- The PDD also provides an accurate description of the baseline scenario which includes the continued use of fossil fuel power plants to supply electricity to the grid.

The procedure of SQS, including the steps taken to assess the baseline scenario of the project activity, for the validation of the most plausible baseline scenario is described below. Sections 3.6.2. – 3.6.5 describing the additionality of the project activity also describes the steps taken how SQS validated the baseline scenario.

Step 2: Investment Analysis

Option III, benchmark analysis has been appropriately selected as the Project in its phase 2 could generate financial or economic benefits other than CDM related income by means of electricity sales.

The project participant decided to use the IRR as the financial indicator [6b,7b,8] and compared it to a benchmark developed on the basis of prevailing Colombian lending rates [37] resulting in a 13.25% benchmark. The choice of the IRR as the applicable indicator is in line with the methodology, and the use of the benchmark is appropriate as one of the baselines includes power from the grid. The correctness of the approach is further supported by the clarification (AM_CLA_0125) to the EB41 guidance on investment analysis that a benchmark analysis should be used to analyse the baseline situation where no investment was made (e.g. import of grid electricity).

The PP considered an annual cost escalation of 5%; in the absence of a PPA and considering the historic development of electricity tariffs (1.8% per year over the last ten years [59]) of Colombia the electricity revenues were kept constant in the calculations SQS found this approach reasonable, however SQS has checked whether alternative, more conservative scenarios – such as using the historical growth of electricity prices – would have resulted in an above than benchmark IRR [58]. These values arising from various cost/revenue escalation scenarios should be evaluated together with the results of the sensitivity analysis presented below proving that significant changes are required in the key input factors to reach the benchmark. The costs escalation scenarios [58] presented in the PDD demonstrate that the benchmark is unlikely to be reached. It must be further noted that LFG projects has a high uncertainty in delivering the ex-ante estimated LFG volumes hence the forecasted electricity generation related revenues are inherently uncertain. The CERs realised by LFG projects are 45% of the volumes forecasted in the PDDs by the very same projects according to latest data by the UNEP-RISOE Center¹.

The analysis in the PDD concludes that Alternative P1, the project without CDM revenues, is unattractive for the project participant or any other entity. Further steps on how the investment analysis was checked diligently by the audit team can be found below.

As required by the Tool, a sensitivity analysis was conducted. The sensitivity calculation evaluated the changes in electricity price, OPEX and CAPEX changes. The sensitivity analysis revealed the following:

- Total investment costs: To reach 13.25% % of benchmark value, total investment costs would need to decrease by significantly more (-62%). This is unlikely in Colombia which experienced over the last years of high GDP growth. The most likely outcome is an increase in costs.
- O&M costs: To reach 13.25% % of benchmark value, total O&M costs would need to decrease by significantly more (-44%). This is unlikely in Colombia which experienced over the last years of high GDP growth. The most likely outcome is an increase in costs.
- Electricity tariff: To reach 13.25% of benchmark value, the power tariff would need to increase by significantly more (+26%). This is not likely as the Colombian Commission for the Regulation of energy and Efficiency (CREG2) has been implementing market regulation since 1 December 2006 that has resulted in price stability (e.g. CREG Resolutions 071,079,094 of 2006 and 027 of 2007). The Regulator facilitates the participation of generation sources below 20 MW, the so-called “minor plants”, in the development of the Colombian electricity sector. The Expansion Plan of the National Energy Planning Unit (UPME) (2010 – 2024) adopted by the Ministry of Mines and Energy (Resolution 182215; 22 November 2010) [60] identifies the most probable sources of expansion from power projects database based on the lowest expansion and operational costs. The development scenarios presented in the UPME document does not foresee tariff increases either. The most likely scenario is tariff stability; therefore the assumption of the Project Participant which considers zero electricity price escalation is realistic and valid.

¹ <http://cdmpipeline.org/cers.htm>

² http://www.creg.gov.co/html/i_portals/index_ingles.php

The sensitivity analysis clearly demonstrated that plausible and realistic energy price, OPEX and CAPEX changes will not result in situations where the project activity will have an IRR that is higher than the benchmark.

The Capital and O&M expenditures were represented separately; detailed calculations in excel format supported the documentation.

Input values for the benchmark analysis were based on project proponent's experience with building and operating landfill gas capture, flaring and energy generation projects. The input values were found reasonable by SQS. The investment analysis clearly demonstrated that the baseline scenario is less costly than the project activity.

The appropriateness of the costs and revenues has been checked by assessing the available design and cost estimations for each project elements as detailed in Section 3.6.3. It was deemed that the overall investments as well as the operational & maintenance costs are reasonable. After assessment of all referenced documents, the validation team of SQS concluded that the approach used by the PP with respect to the energy prices is adequate and the values used are correct and appropriate. Thus the tariff used is conservative in the CDM/additionality context and therefore accepted by the SQS validation team.

After the investment analysis, one is left with only one alternative LFG 1 combined with P6; this was selected as the baseline. In order to provide further support for the selection of the baseline scenario, the project participant conducted the last analytical step, the Common Practice Analysis, (step 4) of the Tool.

Step 3: Common Practice Analysis

The Common Practice Analysis adequately listed and analysed the Colombian landfill situation, based both, on publicly available government reports and own market intelligence. Moreover, a review of ongoing CDM activities in the municipal solid waste field was included, providing a full picture regarding prevailing practices and the way how CDM could be used to execute landfill gas collection and flaring/energy generation.

The DOE has cross checked the information and sources contained in the updated PDD on these matters.

All documentation used is relevant for establishing the baseline scenario and is correctly quoted and interpreted in the PDD.

The relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario. The identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity. SQS concludes that no reasonable baseline scenario was excluded.

3.5.5 Algorithms and/or formulae used to determine emission reductions

SQS has assessed the calculations of project emissions, baseline emissions, leakage, and emission reductions. Corresponding calculations were carried out based on calculation spreadsheets. The equation comparison has been made explicitly following all the formulae presented in the calculation files. Parameters, options selected and the mathematical functions used for the ex-ante estimation of the project's emission reductions are appropriate, correct, plausible and conservative as per the methodology and its applicable tools applied.

The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

ACM0001 version 11

SQS has validated the calculations, data and parameters used in the PDD and Attachment 1 to the PDD (excel spreadsheet)[5b] by using a checklist for Methodology ACM0001 version 11 (refer to Protocol 2 of this report). According to ACM0001 version 11, the measurement of WCH₄ has to be carried out using certified equipment. During the validation stage, the choice of technology supplier was finalised and a John Zink flare was ordered [47]. The gas analyzer will be provided by the flare provider as part of the gas flaring system. John Zink is certified according to ISO 9001 and ISO 14001. Its gas analyser, therefore, meets the requirements.

Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site

SQS has validated the calculations, data and parameters used in the PDD and Attachment 1 to the PDD (excel spreadsheet) [5b] by using a checklist for Methodology ACM0001 Version 11 (refer to Protocol 2 of this report).

The key input factors beyond the volume and waste composition (MCF, oxidation factor, recovery rate, climatic conditions relating to the decay rate) influencing the LFG generation, were investigated and their accuracy and conservativeness were checked with the following results:

- Waste volume: For the years 2008 and 2009 historical data from the landfill operator was obtained [44] directly by SQS. Since 2009 (last full set of data), an estimation for the following years was taken into consideration. The yearly increase of 2.107% is based on the independent Environmental Impact Assessment Study [10,11,12]. The document which granted the Environmental License to the Landfill is the Resolution 0100 No. 0740-0377 [14,24] from 2007, which in section 4.2 Technical Evaluation, Capacity for Final disposal states the following "The landfill El Colomba-Guabal has the approval for the disposal of domestic solid waste with a maximum capacity of 1,654 tons per day according to the Decree 838 from 2005 issued by the Ministry of Environment, Housing and Land".
- Waste composition: The Cali area has a high organic content (over 73% of food waste: only 11% inorganic) in its collected and deposited municipal waste. The waste composition data used by Green Gas corresponds to data obtained from EMSIRVA, the former publicly owned municipal waste management company, operating in Cali [42]. However, the organic content estimated by Green gas is lower than EMSIRVA's values.
- MCF: SQS has confirmed that the site is anaerobically managed by controlled placement of waste, cover material, mechanical compacting and levelling of the waste. The landfills are deeper than five meters and there are no structures introducing air to the waste layer. The landfill complies with all requirements for an anaerobic managed solid waste disposal site. Therefore, the MCF value of 1.0 is appropriately used.
- Oxidation factor: On-site verification has proven the choice of 0.1 oxidation factor associated with the cover materials for active, open areas (soil and clay).
- Recovery rate: The used recovery rate of 65-68% [5b;42] is deemed realistic on the basis of the landfill cover quality (40 cm clay – geomembrane – 30 cm clay). Moreover, the recovery rate is only used for ex-ante calculations, estimating the emission reductions.
- Climatic conditions influencing the decay rate (kj): chosen decay rate (kj) for each waste type is correctly identified in the PDD; the climatic conditions – tropical and wet were verified.

The results of the calculations show that the parameters and data used for the calculation to determine methane emissions avoided from disposal of waste at landfill sites are appropriate. It is confirmed that the assumptions for the ex-ante baseline methane emissions avoided from disposal of waste at a solid waste disposal site are plausible.

Tool to determine project emissions from flaring gases containing methane

SQS has validated the calculations, data and parameters used in the PDD and Attachment 1 to the PDD (excel spreadsheet)[5b] by using a checklist for the Tool to determine project emissions from flaring gases containing methane (refer to Protocol 2 of this report).

Regarding the ex-ante calculations, SQS concludes that the tool has correctly been applied and that the parameters and data used are reasonable. All assumptions and data used by the project participants are listed in the PDD, including their references and sources.

Tool to calculate baseline, project and/or leakage emissions from electricity consumption

SQS has validated the calculations, data and parameters used in the PDD and Attachment 1 to the PDD (excel spreadsheet [5b]) by using a checklist for the Tool to determine project emissions from flaring gases containing methane (refer to Protocol 2 of this report). SQS confirms that the tool has correctly been applied and that the data used are reasonable. The data used by the project participants are listed in the PDD, including their references and sources.

The DOE has cross checked the legislation and the data on the Colombian grid factor as required for CDM projects by a Resolution of the Ministry of Mines and Energy (180947 of 04/06/2010.)[38,39]. SQS obtained a confirmation from the DNA of Colombia that the PDD interpretation of the Resolution No. 180947 of 2010 is correct and that the grid emission factor value used is the latest available one.

The default value was chosen for TDL_y therefore 20% is used for the voltage level at which electricity is obtained from the grid at the project site. According to www.nationmaster.com (a database for statistics done by the Australian company Rapid Intelligence), the electric power transmission and distribution losses for Colombia (position 23 in the list) were calculated in 2004 with 19.32% grid losses (http://www.nationmaster.com/red/graph/ene_ele_pow_tra_and_dis_los_of_out-power-transmission-distribution-losses-output&b_map=1,). Therefore, the respective default value used by the Project Participants is conservative and in line with the respective tool.

Based on the applicable methodology (ACM0001 version 11) and its referred Tools described above the key formulae used to determine baseline emissions, project emissions and emission reductions are as follows:

Baseline emissions:

The baseline emission calculations assumes realistic and conservative input values from the perspective of the emission reduction calculations and financial calculations, the key assumptions are as follows:

- annual operating hours of the flares, including the blowers (7884 h/y - assuming a 10% maintenance and shutdowns)
- annual operating hours of the gensets (7500 h/y – based on general gas engine experience and Green Gas own estimation)
- genset efficiency of 41.3% based on the detailed data sheet “Gas engine technical data - Caterpillar G3520C” [55] and the publicly available information form Caterpillar (<http://www.cat.com/cda/files/220277/7/LEHE0009-03.pdf>)[56]
- blowers efficiency is 90% for various brands (based on HofGas, John Zink flare information)
- blower electricity consumption is 30-45Kwh depending on brand (based on HofGas, JohnZink flare information)

$$BE_y = (MD_{project,y} - MD_{BL,y}) * GWP_{CH4} + EL_{LFG,y} * CEF_{elec,BL,y} + ET_{LFG,y} * CEF_{ther,BL,y}$$

As the project activity is a landfill gas flaring and electricity generation project and the project activity does not include thermal energy generation therefore the baseline emissions are calculated with the following simplified formula:

$$BE_y = (MD_{project,y} - MD_{BL,y}) * GWP_{CH4} + EL_{LFG,y} * CEF_{elec,BL,y}$$

A, Ex post calculations (monitoring of ERs)

Where $MD_{project,y}$ (methane destroyed by the project activity) will be determined ex post by measuring the actual quantity of methane captured and destroyed once the project activity is operational.

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y} + MD_{PL,y}$$

As the proposed project activity does not include thermal energy generation or LFG fed into pipeline, $MD_{project,y}$ can be simplified through following equation:

$$MD_{project,y} = MD_{flared,y} + MD_{electricity,y}$$

The quantity of methane destroyed by flaring is calculated using the following equation:

$$MD_{flared,y} = (LFG_{flare,y} * w_{CH4,y} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4})$$

and

$$MD_{electricity,y} = LFG_{electricity,y} * w_{CH4,y} * D_{CH4}$$

B, Ex ante calculations (estimating and forecasting the baseline emissions)

The ex-ante estimation of the amount of methane which would have been destroyed/combusted during the year is calculated as follows:

$$MD_{project,y} = BE_{CH4, SWDS,y} / GWP_{CH4}$$

$MD_{project,y}$ and $BE_{CH4, SWDS,y}$ (methane generation from the landfill in the absence of the project activity at year y (tCO_{2e})) is, calculated as per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site” and using the FOD (first order decay) model.

For the amount of methane destroyed in the baseline scenario, the following equation is used:

$$MD_{BL,y} = MD_{project,y} * AF$$

AS described in Section 3.5.4 above AF was correctly defined as Zero hence $MD_{BL,y} = 0$

Additional required parameters – such as $CEF_{elec, BL, y}$ (grid emission factor) and AF (Adjustment Factor) are all defined and/or calculated according to the methodology and its applicable tools and as described in Section 3.5.

Project emissions:

The project emissions are equal to the project emissions from electricity consumption which will be calculated according to equation (1) of the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, justified by Scenario A: electricity consumption from the grid by the flares and the gensets:

$$PE_{EC,y} = (EC_{PJ,flare,y} + EC_{PJ,elec,y}) * EF_{grid,y} * (1+TDLy)$$

Leakage:

According to ACM0001 version 11 leakage is not considered.

Emission reductions:

All formulae and calculations are correct and therefore the calculation of the baseline emissions, the project emissions and the emission reductions are considered correct.

All assumptions and data used by the project participants are listed in the PDD, including their references and sources. Thus, all values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. The baseline methodology has been applied correctly to calculate project emissions, baseline, emissions leakage and emission reductions. All estimates of the baseline emissions can be replicated, using the data and parameter values provided in the PDD. Hence, it is SQS's opinion that the methodology has correctly been applied to calculate project emissions, baseline emissions and emission reductions.

SQS confirms that there are no project activity related GHG emissions which will contribute more than 1% of the expected emission reductions per year and which are not addressed in the applied methodology.

All estimates of the baseline emissions are reasonable, correctly quoted and could be replicated using the data and parameter values provided in the PDD.

3.6 Additionality of project activity

As mandated by the methodology ACM0001 version 11, the project participants identified the baseline scenario and demonstrated additionality by using Version 05.2 of the "Tool for demonstration and assessment of additionality".

The PDD analyses the project additionality carrying out the steps established in the tool and performed "Investment Analysis" detailed below.

Regarding the application of the additionality tool, the following four steps were followed transparently;

- Step 1. Identification of alternative to the project activity
- Step 2. Investment Analysis
- Step 3. Barrier Analysis (not applicable for this project activity)
- Step 4. Common practice analysis

The Three steps of the tool mentioned (excluding barrier analysis) were followed correctly by the project participant. For this reason, it can be confirmed that the project has demonstrated additionality correctly and transparently.

3.6.1 *Prior consideration of the clean development mechanism*

In accordance with EB41 Annex 46, the UNFCCC was informed of the intention to seek CDM status for the proposed project activity on 08/09/2010 [33].

Evidence to assess prior consideration of the project and start date was assessed at the project site during the on-site visit. Documentation was confirmed as authentic as original company documents were supplied and crosschecked.

Start date of the project activity is 25/06/2010, the date of the contract between Green Gas Yotoco S.A.S. and Interaseo for the development of a CDM project at the Colomba-Guabal Landfill [9].

In compliance with the requirements of the Guidance on Prior Consideration of CDM Version 03, the validation team has assessed the above documented evidences presented by the PP by means of documentation review and on-site interview. On that basis, the validation team confirms that the documented evidence is authentic. SQS thus concluded that the project has sufficiently demonstrated its continuing and real actions taken in order to secure the project CDM status in parallel with its implementation.

3.6.2 Identification of alternatives/barriers

SQS considered and validated the following list of the alternatives:

Landfill Gas destruction

- LFG1: The project activity (i.e. capture of landfill gas and its flaring) undertaken without being registered as a CDM project activity
- LFG2: Atmospheric release of the landfill gas or partial capture of landfill gas and destruction to comply with regulations or contractual requirements, or to address safety and odour concerns.

Electricity generation

P1-The proposed project activity not undertaken as a CDM project activity (theoretically possible but not realistic – see section 3.6.3 for investment analysis proving an unacceptably low IRR).

P2- Existing or construction of a new on-site or off-site fossil fuel fired cogeneration plant; (not a realistic and credible alternative as there are no existing fossil fuel fired cogeneration plant at the project site).

P3- Existing or construction of a new on-site or off-site renewable based cogeneration plant; (not a realistic and credible alternative as there is no existing renewable based cogeneration plant at the project site).

P4- Existing or construction of a new on-site or off-site fossil fuel fired captive power plant (not a realistic and credible alternative as there are no existing fossil fuel fired captive power plant at the project site).

P5- Existing or construction of a new on-site or off-site renewable based captive power plant; (not a realistic and credible alternative as there is no existing renewable based captive power plant at the project site).

P6- Existing and/or new grid-connected power plants; credible and realistic alternative. See section 3.5.4.

Heat generation

Due to the lack of industrial heat off-take at the remote, rural location of the landfill, and due to the tropical climate of the host country no heat alternatives were taken into consideration.

The list of alternatives is considered complete in terms of describing the realistic and credible alternatives. The credible alternatives for the project are LFG 2 and P1 and P6. However, P1 is only theoretically possible but not realistic.

Baseline alternatives were identified accurately and completely as per the methodology, and the selection of the plausible baseline scenario was demonstrated, as detailed in section 3.5.4 of the validation report, in line with methodology and the “Tool for the demonstration and assessment of additionality” Version 05.2, EB 39. The underlying assumptions for alternative “P1: Power generated from landfill gas undertaken without being registered as CDM project activity” were cross-checked with the following:

- Electricity sale price (based on Law 142 from 1994 from the regional electricity company, EMCALI), electrical tariff valid for July 2010 and the general tariff structure for selling generated electricity to the grid (CREG, Comision de Regulacion de Energia y Gas/Colombian Regulatory Commission for Energy and Gas)

http://www.creg.gov.co/html/i_portals/index_ingles.php?p_origin=internal&p_name=content&p_id=MI-405&p_options=

- Formula used to calculate the amount of electricity generated including the list of input values used and their sources [5b]
- Electricity sales revenue generated and its comparison with the respective investment cost [6b,7b,8]

SQS found that the financial analysis of alternative P1 was carried out correctly, and that the alternative is economically not attractive for the project proponent.

3.6.3 *Investment analysis*

As prescribed by the additionality tool itself, the project developer has chosen project IRR to demonstrate the additionality of the project based on a benchmark analysis (Option III) as LFG 1 (phase1, flaring only without generating revenues) does not generate any revenues, therefore, alternative P1 (phase 2, revenues from electricity generation) requires the detailed benchmark investigation.

Choice of approach

The choice of approach is in line with the “Guidance on the Assessment of Investment Analysis” EB51, Annex 58, section 16, which states on page 4 *Investment comparison analysis and benchmark analysis*: “The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest”. The benchmark analysis for conducting the investment analysis is justifiable as the alternative to the project activity is the supply of electricity from a grid. The grid supply is not to be considered an investment. The correctness of the approach is also supported by the clarification AM_CLA_0125: “The Panel agrees that ‘Guidance on the Assessment of Investment Analysis’ (EB41 Annex 15) stipulates that if the alternative to the project activity is the supply of electricity from a grid, this is not to be considered an investment and a benchmark approach is considered appropriate.” This clarification implies that a benchmark analysis is appropriately used to analyse the baseline situation where no investment is made (e.g. import of grid electricity as in P6).

Benchmark identification

The selected benchmark, the IRR, looks at the total investment, including O&M costs. This approach appropriately results in an IRR that is a relevant standalone parameter for any investor to decide about the implementation of the alternative P1 that requires the investment (i.e. alternative P6 relies on grid provided electricity). The corresponding IRR is either below or above a particular benchmark that is used by the project proponent or any other investor.

The additionality tool stipulates that the benchmark/discount rates shall be derived from official approved benchmarks where such benchmarks are used for investment decisions. In addition, the ‘Guidance on the Assessment of Investment Analysis’ issued by EB 41 states that “In the cases of projects which could be developed by an entity other than the project participant, the benchmark should be based on publicly available data sources, which can be clearly validated by the DOE”, and “In cases where a benchmark approach is used, the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR”.

The project proponents have selected the longer term local commercial lending rate [37] as the benchmark. The longer term commercial lending rate in Colombia at the time of the starting date of the project was 13.25% [37].

Input parameters for IRR

The used input parameters for investments and O&M costs [6b,7b,and 8] were verified; expert judgment was used, and both, CAPEX and OPEX were found realistic and reasonable in the national and international

context. Therefore, SQS is able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project. The period of assessment taken is 21 years. This is in accordance with the guidance stating that "in general a minimum period of 10 years and a maximum of 20 year will be appropriate"; the project is taking a longer period which is more conservative. All input values are based on data available as of 25/06/2010, date of contract between PP and the landfill gas owner. The gas utilisation right has to be purchased from the landfill gas owner and defines the fee payable on the basis of the utilised LFG and the prevailing CER prices. However, tying the gas utilisation to the CER prices does not imply that this price is to be paid only in the instance where the project is registered for CDM. The gas right ("share of gas") has to be paid by the third party, the PP, implementing the LFG utilisation project. It is therefore appropriate that the project scenario "with CDM" and "without CDM" both contain the same price for the gas utilised. Furthermore, SQS has checked for plausibility purposes a scenario in which the landfill gas owner implements the project on its own assuming a hypothetical zero price of LFG. In case the LFG is obtained for free of charge the IRR, without the CDM revenues, is 8.2%, which is still below the benchmark of 13.25%. (see further explanation note below the following table).

The table below contains all input values used for the IRR calculation and their validation findings.

Assessment of financial parameters*							
Parameter	Value applied	Unit	Source of information	IRL number	DoE assessment		
					Correctness of value applied	Appropriateness of information source	Comment
Benchmark	13.25	%	Central Bank of Colombia, Report extract for 21-25 June, 2010 , http://www.banrep.gov.co/series-estadisticas/see_tas_inter5.htm	37	OK	OK	The longer term Colombian commercial lending rate is used as the benchmark. This is appropriate for the project. This rate corresponds to the EB 61 Annex 13 Group 1 rate of 12% for Colombian waste and energy projects.
Project investment costs	20,961,029	USD	1. Gas Treatment System Construction	7	OK	OK	All documents available - including purchase contracts for equipment (real costs)- have been reviewed and verified. The first flare (Hofstetter) planned for purchase was replaced by another manufacturer's flare (John Zink) which has installed over 700 plants worldwide several of them in CDM projects. By the time of completing the validation, the total costs (purchase, shipping, customs, etc.) of the purchased flare became known and the financial analysis has been updated accordingly. The second flare (Hofstetter) has not been purchased yet and all the information included in the PDD is based on a quotation from Hofstetter. A plausibility check was carried out for the investment costs and
			2. Flares and local works for installation of equipment	7,43,47			
			3. CHP Units (Caterpillar)	7,8			
			4. Civil works	7			
			5. Balance of plant (all other CAPEX)	7			

							only a decrease of more than 50% (of investment costs) would lead to an IRR above the benchmark. Hence, the project costs are considered appropriate and conservative.
Corporate tax	33	%	Deloitte "Taxation and Investment in Colombia 2011" http://www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Tax/Taxation%20and%20Investment%20Guides/2011/dttl_tax_guide_2011_Colombia.pdf	52	OK	OK	Since the project entity is Incorporated in Colombia, the corporate income tax rate of 33% is applicable
Depreciation	5 (building)	%	Deloitte "Taxation and Investment in Colombia 2011" http://www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Tax/Taxation%20and%20Investment%20Guides/2011/dttl_tax_guide_2011_Colombia.pdf	52	OK	OK	Standard rates are 5% for buildings and 10% for equipment and machinery. These are in line with the applicable tax system in Colombia. Important to note that buildings constitute a minor part of the investment.
	10 (equipment)	%		52			
Project operational costs	30	US\$/MWh produced	US EPA, Technology characterisation: Reciprocating engines, 2008 http://epa.gov/chp/documents/catalog_chptech_reciprocating_engines.pdf	53	OK	OK	Includes staff costs and other related operating costs such as spare parts, for both electricity and flaring. Detailed breakdown has been provided by PP [57]. The chosen value can be considered as conservative as normally the value to be applied for this small size of flaring & electricity generation with gas engines would be over 30. The cost represents 3.32 % of CAPEX. This cost is considered conservative.
Residual value	0	%	Deloitte "Taxation and Investment in Colombia 2011" http://www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Tax/Taxation%20and%20Investment%20Guides/2011/dttl_tax_guide_2011_Colombia.pdf	52			As per the applicable depreciation rate, machinery and equipment are fully depreciated after 10 years and buildings after 20 years buildings, a zero residual value has been applied. In light of the fact that buildings constitute only a small part of the CAPEX, this can be considered conservative.
Electricity cost	83	US\$/MWh	Electricity sale price (based on Law 142 from 1994 from the regional electricity company, EMCALI), electrical tariff valid for July 2010 and the general tariff structure for selling generated electricity to the grid (CREG, Comision de Regulacion de Energia y Gas/Colombian Regulatory Commission for Energy and Gas)	1	OK	OK	This cost assumption can be considered appropriate since it reflects the average cost of electricity at the time of decision-making.

			http://www.creg.gov.co/html/i_portals/index_ingles.php?p_origin=internal&p_name=content&p_id=MI-405&p_options=				
--	--	--	---	--	--	--	--

*The overall Financial Model and IRR calculation [7b] incorporates the cost of the LFG fully. Due to the contractual arrangements [9] PP pays for the LFG with generated CERs on an annual basis. The single upfront payment to the landfill gas owner is accounted in the Financial Model and IRR calculation [7b]. The CERs revenue share returned to the landfill gas owner is shown in the Financial Model [6b, 7b]. The gas utilisation right, as an exchange of a percentage of the issued CERs for each year during the project lifetime, is shown in the OPEX calculation and described by the term "share for gas". Each year this share of CERs is different as defined by contract between the PP and landfill gas owner shown in the worksheet "Gas Fee" of the Financial Model with CDM (6b).

The above table clearly demonstrates that the validated parameters are plausible, conservative and acceptable under the project situation.

IRR Calculations

The IRR calculation's excel sheet [6b,7b] was checked for all of its input values and calculation functions. SQS verified that calculations were conducted appropriately.

IRR Sensitivity analysis

The sensitivity analysis is a crucial part of the investment analysis as it guarantees that reasonable changes in the assumptions do not lead to fundamentally different conclusions related to the project. The verification of the sensitivity analysis does not only use hypothetical values for key input parameters, but for example, can incorporate the initially forecasted values, such as flare purchase price that has become factual during the validation. Based on these modelling results, SQS is on the opinion that the sensitivity analysis conducted by the project participant correctly applied the realistic ranges for key factors such as electricity price, OPEX and CAPEX and calculated their likely impacts on the IRR.

The sensitivity analysis was done for the project with variation of project's CAPEX, OPEX and the electricity tariff. For all the parameters varying +/- 20% (this is more conservative as in the tool it states only about +/- 10%), it could be confirmed that the benchmark is not reached. Hence, the project additionality is confirmed.

The PDD contains the values under which the OPEX and CAPEX would need to be reduced in order for the IRR to reach the benchmark. The same calculation has been given in reference to the increase in the electricity price in order for the IRR to reach to the benchmark. The PDD elaborates the possibility of these price changes occurring.

SQS confirms that both CAPEX and OPEX need to decrease by about 62% and 44% respectively in order to reach the IRR benchmark. This is not a realistic scenario. In case electricity prices increase by around 26% the IRR benchmark can be reached. However, in Colombia where cheap coal and hydropower is abundant this is not expected either based on the low-cost operation capacities contained in the mid-term governmental plan for energy sector development covering the 2010-2024 period [60].

The sensitivity analysis is conclusive: No realistic deviations from the key input prices resulted in an IRR that was above the benchmark.

The investment analysis, including the sensitivity analysis, demonstrated that the project cannot be economically feasible without the revenues associated with CDM.

The financial calculations have been reproduced by the validation team with the same result and are therefore considered correct.

3.6.4 Barrier analysis

The barrier analysis is not considered in the demonstration of additionality. This is compliant with the tool as the investment analysis concludes that the proposed CDM project activity is more costly than at least one alternative.

3.6.5 Common practice analysis

The geographical scope of the common practice analysis compasses the entirety of Colombia.

By cross checking the annually updated waste sector technical report (version 2009/2010), issued by the Superintendencia de Servicios Públicos (Supervision National Body of Public Services), including statistic and a sector overview, UNFCCC CDM project data and Colombian DNA published information with the PDD, SQS concludes that no similar activities are occurring in Colombia other than a few CDM activities that have been registered already or are in the process of development. There are no landfill gas capturing and utilization projects that are financed through any other sources than the selling of CERs.

Therefore, SQS confirms that the proposed CDM project activity is not common practice in Colombia.

3.7 Monitoring plan

SQS has validated the monitoring plan by using the checklist for Methodology ACM0001 version 11: Tool to determine project emissions from flaring gases containing methane, Tool to calculate the emission factor for an electricity system and Tool to calculate baseline, project and/or leakage emissions from electricity consumption (refer to Protocol 2 of this report). The monitoring plan described in the PDD was checked by desk-review and on-site.

During validation, SQS raised the following requests for corrective actions and clarifications regarding the monitoring plan:

CAR 4 - Revise the "Data and parameters that are available at validation" section and include all parameters required (e.g. solid waste composition and waste volume).

PP replied by stating that solid waste composition and waste volume data were already included in section B.6.2, no new parameters are included. Therefore, CAR 4 was closed.

CAR 5 - Include the "operation hours of the electricity generation" in the "Data and parameters monitored" section as already described in Annex 4.

PP has updated section B.7.1 accordingly. Therefore CAR 5 was closed.

CAR 6 - Correct the "collection efficiency" percentage values as they are not in line with the shown and correctly calculated values.

Annex 3 values were updated by PP showing the correct calculated values. Therefore, CAR 6 was closed.

CAR 10 - The monitoring plan indicates that the total amount of landfill gas captured is the sum of all flow meters installed at the flares and the gensets; clarify how the total amount of landfill gas captured (LFG_{total,y}) is continuously monitored.

PP has updated section B.7.1, B.7.2., Figure B.7.2 accordingly. Therefore CAR 10 was closed.

CL 4 - Please elaborate further on the difference between phase 1 and phase 2 with respect to monitoring with special attention to electricity use and generation. Consequently, please amend figure B.7.2.1. to reflect these differences between the flaring only and the flaring & electricity generation phases and amend table B.7.2.1. and annex 4 accordingly. The manufacturer specifications for the operation of the flare and the required data and procedures to monitor these specifications have not been documented.

PP has updated the monitoring sections (A.4.3., B.7.2.; Annex 4) to reflect the differences between monitoring the flaring and electricity generation. Manufacturers' specifications have been included Therefore, CL 4 was closed.

In order to be conservative for the ex-ante calculation, the default flare efficiency of 90% was applied. According to the monitoring plan, the combustion efficiency of the flare will be monitored continuously by the project operator.

The following parameters and data were excluded from monitoring:

From ACM0001 version 11:

$MG_{PR,y}$, because this is only needed in the case of ex-post determination of the adjustment factor (AF), which is not used here.

$LFG_{thermal}$ and ET_{LFG} , because there is no thermal energy generation.

$EF_{fuel,BL}$, $NCV_{fuel,BL}$, $\epsilon_{gen,BL}$, $\epsilon_{boiler/airheater}$ and "Operation of the boiler/air heater/heat generating equipment", because there is no thermal energy generation and electricity would not come from a captive power plant in the baseline.

LFG_{PL} , because no landfill gas is sent to a pipeline.

From the "Tool to determine project emissions from flaring gases containing methane": No exclusion.

From the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption":

$EF_{grid,CM}$, $TDL_{j,y}$, $FC_{n,i,t}$, $EG_{n,t}$, $HG_{n,t}$, $\eta_{boiler,y}$, $NCV_{i,t}$ and $EF_{CO2i,t}$, because electricity consumed is not sourced from an off-grid power plant and hence option B1 of the tool is not used. Parameter monitored: $EC_{PJ,y}$.

From the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site": z because according to ACM0001 version 11 page 7, no sampling is necessary to determine $p_{n,j,x}$.

The exclusions were cross checked with section B.6 of the PDD. The reasons given for exclusions are justified and in line with the methodology.

The high efficiency flares to be installed have an operational temperature range well above 500 °C therefore the conditions defined by the Tool to use the default 90% efficiency value are always guaranteed whenever the flare operates. Therefore in the absence of monitoring flare efficiency records, or in fact in case the flare efficiency monitoring devices are non-operational the required data on flare temperature and operational status of the flare are recorded. The PP has provided the detailed manufacturer specification for both flares (John Zink and Hofstetter) with respect to each monitored parameter. In addition the flare descriptions include the operational specifications.

PP has provided a detailed description/diagram of the location of the monitoring equipment within the gas collecting and flaring system. The flow meters associated with the flares and the gensets are located in a manner that allows the measuring of the total LFG as well as the volumes used by each and every combustion unit (flare and gensets). The PP has now specified the existence of 3 flow meters in order to measure and monitor in an independent continuous manner each of the following parameters: LFG_{total} , LFG_{flare} and $LFG_{electricity}$. The specific metering/measuring locations for each parameter are correct and are in line with the requirements of the methodology and its applicable tools.

The monitoring plan is compliant with the requirements of the methodology and is feasible within the project design of the proposed project activity. The validation team confirmed that the parameters identified to be monitored are complete and in accordance with the selected methodology.

Green Gas technical experts involved in the project activity dispose of vast experience in the field of landfill gas management. Therefore, it is SQS's unambiguous opinion that the project participant has the ability to implement the monitoring plan as required under CDM.

Management system and quality assurance

The project owner is reported to be responsible for management of monitoring and reporting of the project. The management team for monitoring of the project is identified in the PDD.

Detailed procedures have been developed in the PDD as follows:

- Data to be monitored;
- Operational and Management Structure for Monitoring plan;
- Monitoring of the net electricity supplied to the grid by the project;
- Monitoring of the installed capacity
- Quality assurance and quality control;
- Data management and training program; and
- Verification

The monitoring arrangements described in the monitoring plan of the PDD were assessed by the validation team by means of documentation review, interviews with representative from the project owner and on-site observation. On that basis, the effective implementation of the monitoring plan is considered feasible. The validation team considered that the project owner is capable to implement the monitoring plan.

The DOE confirms the compliance of the monitoring plan with the requirements of the methodology and that it is feasible to be implemented.

The net energy input to the grid will be measured by EMCALI, or the respective (electric) company responsible for the electricity off-take. EMCALI will also own the measurement equipment and is responsible for its calibration. PP may install a second meter for quality assurance purpose only. Readings and invoicing will be based on the EMCALI meter.

The annual monitoring reports and data quality check will be realized by PP.

It is the DOE's opinion that the project participant is able to implement and follow the monitoring plan.

3.8 Sustainable development

The LoA from Colombia [49] was issued during the validation process and it confirms explicitly that the proposed project meets the sustainable development criteria set by the host country for CDM projects. For confirmation to the contribution of the project to the sustainable development criteria of the host Party, also refer to section 3.1 of this report.

3.9 Local stakeholder consultation

The stakeholder meeting was held on 01/12/2010 by the landfill operator, Interaseo del Valle S.A. E.S.P and Green Gas after they had signed the contract to develop LFG flaring project.

SQS assessed the proofs of e-mails and letters sent to stakeholders and the announcement in a local newspaper [35,45, and 46].

In addition to Interaseo and Green gas personnel, 30 people attended the event [46]. The newspaper ads as well as a transcript of the questions and comments from stakeholders are included in the PDD. The attendance list is available. It is SQS's opinion that the process for invitation was adequate for CDM and that the stakeholders formally invited were identified in a fair and appropriate manner. The documents provide sufficient evidence for an unrestricted, open and detailed stakeholder consultation.

SQS is satisfied about the manner how the local stakeholder consultation was conducted.

3.10 Global stakeholder consultation

The PDD (Version 01 dated, 01/12/2010) was published from 03/12/2010 to 01/01/2011 on the UNFCCC website. One comment was received from EMAPA S.A. E.S.P. SQS followed up the submission with the correspondent and also liaised with the Colombian DNA on the matters raised. The Colombian DNA established direct contact with the comment submitter, and its LoA process included the evaluation of the claims put forward by EMAPA; this was confirmed by direct communication from the Colombian DNA to SQS [48]. Subsequently, the Colombian LoA was issued.

3.11 Environmental impacts

In accordance with national legislation, no environmental impact assessment (EIA) and no additional permitting (as compared to the original EIA for the landfill [10,11 and 12]) are required for the installation and operation of an LFG collection and flaring installation. This was re-confirmed by the representative of the regional authority - CVC. The content and the LFG implications of the existing Environmental Licence and its amendments [20-31] were discussed with the respective authority during the on-site visit and were followed up by written communication confirming CVC's exact position [19]. Therefore, it is SQS's unambiguous opinion that the project participants have dealt with environmental impacts as required by both national and by CDM rules and regulations.

3.12 Validation protocol

In order to ensure transparency and organize the corrective or additional information and measures, a validation protocol was established for the project. The protocol shows in transparent manner the criteria (requirements), the means of validation and the results from validating the identified criteria including any resulting CAR, FAR and CL.

4 List of Interviewees and Documents reviewed

The on-site audit and interviews were done according to the on-site visit program (see appendix A) which was communicated to the project owner in advance of the audit.

The following stakeholders were interviewed during the validation (see appendix B).

The following documents were assessed during the validation (see appendix C).

5 Validation Team and Reviewer

The following matrix shows the names and roles of the members of the validation team and the reviewer.

The reviewer is not a member of the validation team.

Certificates of competence for each validation team member are included in appendix D to this report.

Name	Role (1)	Country	Duties				
			Desk review	On-site audit	Resolution of CAR & CL	Report	Technical review
Zsolt Lengyel	LA	Switzerland	X	X	X	X	
Michael Gassner	TR	Switzerland					X
Christoph Leumann	TR	Switzerland					X

(1) LA = Lead auditor/assessor; TM = Team member; TE = Technical expert (if any); TR = Technical reviewer

6 Quality Control

Cross-checks and / or other plausibility checks undertaken during validation are mentioned in the report or in the protocol. The draft validation report, including the initial validation findings, underwent an internal review (by a member of the validation team) before being submitted to the project participants. The final validation report underwent a review for final approval carried out by a reviewer (not a member of the validation team) before requesting registration of the project activity. The reviewer is qualified in accordance with SQS's qualification scheme for CDM validation and verification.

7 Appendix A: On-Site Visit Program

Time from to	Subject	Function Department	Person(s) to contact
6/12/2010	Review of entire PDD and supporting documentation	Green Gas representatives	Miguel Delgado, Yajaira Chica and Paulo Bonanca
7/12/2010	Site inspection; Environmental licensing and project implementation	CVC and Interaseo del Valle	David Alejandro Arango Restrepo and Santiago Gonzalez

8 Appendix B: Interviews

Family Name	First Name	Organisation	Function	Issues
Arango Restrepo	David Alejandro	CVC (Environmental Authority)	Environmental Licence Unit	Environmental compliance and licensing, Env licences and their modification for the landfill/flaring
Gonzales	Santiago	Interaseo del Valle	Operations Director	General landfill operational issues, LFG capture technical implementation
Delgado	Miguel	Green Gas Yotoco	Managing Director	General project implementation, OPEX-CAPEX
Bonanca	Paulo	Green Gas Germany	Carbon Project Controller	Monitoring
Chica	Yajaira	Green Gas Yotoco	Project Engineer	Colombian legislation and general implementation issue

9 Appendix C: Documents reviewed

SQS Reference number	Reference/Content
1	PDD The Colomba-Guabal Landfill Gas Project version 01, 01/12/2010
2	PDD The Colomba-Guabal Landfill Gas Project version 02 30/12/2010
3	PDD The Colomba-Guabal Landfill Gas Project version 03 26/01/2011
4 a 4b 4c	PDD The Colomba-Guabal Landfill Gas Project version 04 27/07/2011 PDD The Colomba-Guabal Landfill Gas Project Version 05 16/12/2011 PDD The Colomba-Guabal Landfill Gas Project Version 07 29/04/2012
5a 5b	101201 ER Calculation El Guabal v1 and finalised: ER Calculation El Guabal v2(1) 101201 ER Calculation El Guabal v1 and finalised: ER Calculation El Guabal v3(2)
6a 6b 6c	101215 El Guabal_21Years_CDM(1) and finalised: El Guabal_21Years_CDM(1)_corrected El Guabal_21Years_CDM(1)_v4 El Guabal_21Years_CDM(1)_v5
7a 7b 7c	101215 El Guabal_21Years_withoutCDM(1) and finalised: El Guabal_21Years_withoutCDM(1)_corrected El Guabal_21Years_withoutCDM(1)_v4 El Guabal_21Years_withoutCDM(1)_v5
8	101102 DP OPEX Landfill_New_Cali
g	100715 Translation of Signed Contract MCW 12 - English
10	Landfill Environmental Impact Assessment/Study Chapter 1- EIA Capitulo 1_english
11	Landfill Environmental Impact Assessment/Study Chapter 2 EIA Capitulo 2_english
12	Landfill Environmental Impact Assessment/Study Chapter 3 Linea Base_english
13	Resolution 0349_english (see 27 for Spanish version)
14	Resolution 377_english (see 24 for Spanish version)
15	Resolution 0659_english (see 29 for Spanish version)
16	Resolution 0612_english (see 28 for Spanish version)
17	Reslimo -0100-0740-0314-jun -11-08-RellenoSanitarioColomba-ElGuabal- Yotoco-DARCentroSur SPANISH (see 16 for English version)
18	CVC Resolucion 0100 No 0740-0531-del 23 septiembre de 2010 SPANISH (see 22 for English version)
19	L- IN CVC flaring obligation clarification 2010 12 14 (containing the original copies of CVC issued resolutions)
20	0100 No 0740-0531-del 23 septiembre de 2010 sent on 2010 12 10 (obtained directly from CVC) (see 22 for English version)
21	CVC Resolucion 0100 No 0740 0531-del 23 septiembre de 2010 (obtained directly from CVC) (see 22 for English version)
22	Resolution 531_translated (see 18,20,21 for Spanish version)
23	L-IN CVC all resolutions re Colomba-Guabal landfill 2010 12 09 (CVC)
24	Resli-0100No.0740-0377-07-Colomba-ElGuabal-Yotoco (obtained directly from CVC) (see 14 for English version)
25	Reslimo-0100-0740-0314-jun-11-08-RellenoSanitarioColomba-ElGuabal-Yotoco-DARCentroSur (obtained directly fromCVC) (see 26 for English version)
26	Resolution 314_translated (see 17,25 for Spanish version)
27	Reslimo-0100-0740-0349-jun-19-09-RellenoSanitarioColomba-ElGuabal-Yotoco-DARCentroSur (obtained directly from CVC) (see 13 for English version)
28	Reslimo-0100-0740-0612-dic-18-07-RellenoSanitarioColomba-ElGuabal-Yotoco-DARCentroSur (obtained directly from CVC) spanish (see 16 for English version)
29	Resmoli-0100-0740-0659-dic-3-08-RellenoSanitarioColomba-ElGuabal-DARCentroSur (obtained directly from CVC) translated (see 15 for Spanish version)

30	res_0551_190309
31	res_0551_190309_anexo_II_A
32	CDM prior consideration DNA Colombia
33	Re CDM Prior Consideration for Colomba_Guabal Landfill (confirmation of receipt from UNFCCC)
34	Tendering results for LFG capture contractor -Acta de resultados proceso de seleccion
35	Local stakeholder consultation report (Acta presentacion a la comunidad_Guabal) 01/12/2010
36	Calculo del Factor de Emision_2008_3
37	Commercial lending rates (National Bank of Colombia)
38	Resolution 180947- Emission Factor Grid in Colombia_2010_Spanish CALCULATION METHOD
39	Resolution 180947- Emission Factor Grid in Colombia_2010_Spanish
40	Carta Interaseo No Quema del Gas_English
41	Letter from OPC - downtime of power plant
42	LFG model report Cali Greengas 11- 2- 09
43	Quotation VLP5590CO_R3 Ready 3000_5000 CDM @ 950 m asl (Hofstetter)
44	RESUMEN TONELADAS 2010_corrected
45	Local stakeholder consultation's announcement(Socializacion)
46	Local stakeholder consultation's participation (Traduccion Certificado Personeria por Socializacion) 01/12/2010
47	John Zink complete flare documentation (purchase contract, inspection results, commissioning planning)
48	Colombian DNA EMAPA public comment related email (07/07/2011)
49	LoA of Colombia dated 20/05/2011
50	LoA of the UK dated 07/07/2011
51	EIA Capitulo 2_english
52	Deloitte "Taxation and Investment in Colombia 2011" http://www.deloitte.com/assets/Dcom-Global/Local%20Assets/Documents/Tax/Taxation%20and%20Investment%20Guides/2011/dttl_tax_guide_2011_Colombia.pdf
53	US EPA, Technology characterisation: Reciprocating engines, 2008 http://epa.gov/chp/documents/catalog_chptech_reciprocating_engines.pdf
54	CREG, Comision de Regulacion de Energia y Gas/Colombian Regulatory Commission for Energy and Gas) http://www.creg.gov.co/html/i_portals/index_ingles.php?p_origin=internal&p_name=content&p_id=MI-405&p_options=
55	11 11 08 caterpillar 3520 spec sheet Cali0001.pdf "Gas engine technical data - Caterpillar G3520C"
56	CAT G3520C LEHE0009-03.pdf Gas engine generator set (http://www.cat.com/cda/files/220277/7/LEHE0009-03.pdf)
57	OM costs for simple model template (2).xls (O&M costs detailed breakdown as provided by PP)
58	Scenarios for various cost escalations: EI Guabal_21Years_withoutCDM_v5_scenario A EI Guabal_21Years_withoutCDM_v5_scenario B EI Guabal_21Years_withoutCDM_v5_scenario C EI Guabal_21Years_withoutCDM_v5_scenario D EI Guabal_21Years_withoutCDM_v5_scenario E
59	Costo Equivalente Real de Energia 2000_2010 (electricity prices in the 2000-2010 period)
60	The Expansion Plan of the National Energy Planning Unit (UPME) (2010 – 2024) adopted by the Ministry of Mines and Energy (Resolution 182215; 22 November 2010) available at: http://www.cno.org.co/webApp/pressflow/sites/default/files/documentos/noticias/6781_plan%20de%20expansi3n_2010_2024.pdf

9 Appendix D: Certificates of Competence

Name: Zsolt Lengyel

Scopes of expertise:

1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	X X X
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	X <input type="checkbox"/> X
3	Energy demand TA 3.1 Energy demand	X X
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
6	Construction TA 6.1: Construction	<input type="checkbox"/> <input type="checkbox"/>
7	Transport TA 7.1: Transport	<input type="checkbox"/> <input type="checkbox"/>
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	X <input type="checkbox"/> X
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	X <input type="checkbox"/> X
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	Solvents use TA 12.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	X X <input type="checkbox"/>
14	Afforestation and reforestation TA 14.1: Forestry	<input type="checkbox"/> <input type="checkbox"/>
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Name: Michael Gassner

Scopes of expertise:		
1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	X <input type="checkbox"/> X
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Energy demand TA 3.1 Energy demand	<input type="checkbox"/> <input type="checkbox"/>
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
6	Construction TA 6.1: Construction	<input type="checkbox"/> <input type="checkbox"/>
7	Transport TA 7.1: Transport	X X
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
12	Solvents use TA 12.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	X X X
14	Afforestation and reforestation TA 14.1: Forestry	X X
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	X X X

Name: Mr Christoph Leumann

Scopes of expertise:		
1	Energy industries (renewable/non-renewable sources) TA 1.1: Thermal energy generation from fossil fuels as well as thermal energy from solar TA 1.2: Energy generation from renewable energy sources	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	Energy distribution TA 2.1: Electricity distribution TA 2.2: Heat distribution	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Energy demand TA 3.1 Energy demand	<input type="checkbox"/> <input type="checkbox"/>
4	Manufacturing industries TA 4.1: Cement sector TA 4.2: Aluminium TA 4.3: Iron and steel TA 4.4: Refinery	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Chemical industry TA 5.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
6	Construction TA 6.1: Construction	<input type="checkbox"/> <input type="checkbox"/>
7	Transport TA 7.1: Transport	<input type="checkbox"/> <input type="checkbox"/>
8	Mining/mineral production TA 8.1: Mining and mineral processes, excluding those included in TA 8.2 below TA 8.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	Metal production TA 9.1: Metal production	<input type="checkbox"/> <input type="checkbox"/>
10	Fugitive emissions from fuels TA 10.1: Mining and mineral processes, excluding those included in TA 10.2 below TA 10.2: Oil and gas industry, coal mine methane recovery and use	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride TA 11.1: Chemical process industries TA 11.2: GHG capture and destruction	X <input type="checkbox"/> X
12	Solvents use TA 12.1: Chemical process industries	<input type="checkbox"/> <input type="checkbox"/>
13	Waste handling and disposal TA 13.1: Waste handling and disposal TA 13.2: Animal waste management	X X X
14	Afforestation and reforestation TA 14.1: Forestry	<input type="checkbox"/> <input type="checkbox"/>
15	Agriculture TA 15.1: Agriculture TA 15.2: Animal waste management	X X X

10 Appendix E: Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IEE	Initial Environmental Examination
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill Gas
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
SQS	Swiss Association for Quality and Management Systems
UNFCCC	United Nations Framework Convention on Climate Change

**Swiss Association for Quality and
Management Systems (SQS)**

B e r n s t r a s s e 1 0 3
P . O . B o x 6 8 6
C H - 3 0 5 2 Z o l l i k o f e n
T e l . + 4 1 3 1 9 1 0 3 5 3 5
F a x . + 4 1 3 1 9 1 0 3 5 4 5
h e a d o f f i c e @ s q s . c h
w w w . s q s . c h

Appendix F: CDM Validation Protocol

Enterprise

Business account:	321299
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Service

Audit/Assessment:	CDM Validation
Audit/Assessment beginning/end:	9 November 2010 –1 May 2012
Project name:	The Colomba-Guabal Landfill Gas Project
GBZ/Report-No.:	321299/P30649.33
UNFCCC Scope(s)/Technical area(s):	13
UNFCCC Methodology:	ACM0001 Version 11
UNFCCC Scale:	Large Scale Project
Team of auditors/assessors:	Mr Zsolt Lengyel

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Introduction

[VVM] 26: The purpose of validation is to ensure a thorough, independent assessment of proposed CDM project activities submitted for registration as a proposed CDM project activity against the applicable CDM requirements.

[VVM] 35: The DOE shall raise a corrective action request (CAR) if one of the following occurs:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- The CDM requirements have not been met;
- There is a risk that emission reductions cannot be monitored or calculated.

[VVM] 36: The DOE shall raise a clarification request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

[VVM] 37: The DOE shall raise a forward action request (FAR) during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Normative References/Documents

No.	Title	Version
[1]	CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL	1.2
[2]	GUIDELINES ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM	3
[3]	GUIDANCE ON THE ASSESSMENT OF INVESTMENT ANALYSIS	2.1
[4]	GLOSSARY OF CDM TERMS	6
[5]	MODALITIES AND PROCEDURES FOR A CLEAN DEVELOPMENT MECHANISM	unedited
[6]	Approved consolidated baseline and monitoring methodology ACM0001 "Consolidated baseline methodology for landfill gas project activities	11
[7]	Tool for the demonstration and assessment of additionality	5.2
[8]	Tool to determine project emissions from flaring gases containing methane	1
[9]	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site	5
[10]	Tool to calculate baseline, project and/or leakage emissions from electricity consumption	1
[11]	Tool to calculate the emission factor for an electricity system	02.2.0

Protocol 1: General CDM Requirements

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
1	Validation requirements based on paragraph 37 of the CDM modalities and procedures				
1.1	APPROVAL				
[1] 44	All Parties involved have approved the project activity.	49,5 0	DR	CAR1	OK
	Comment: CAR1: LoAs are not available. Please provide the host country and the Annex I LoA. LoAs of both countries were received and forwarded to SQS. Therefore, CAR 1 was closed.				
1.1.1 [1] 45	The DOE shall determine whether the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PDD has provided a written letter of approval. The DOE shall determine whether each letter confirms that: (a) The Party is a Party to the Kyoto Protocol; (b) Participation is voluntary; (c) In the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country; (d) It refers to the precise proposed CDM project activity title in the PDD being submitted for registration.	49,5 0	DR	OK	OK
	Comment: The LOAs are in accordance with CDM modalities and procedures. Neither of the LoAs contains reference to the version number of the PDD.				
1.1.2 [1] 46	The DOE shall determine whether the letter(s) of approval is unconditional with respect to (a) to (d) above.	49,5 0	DR	OK	OK
	Comment: The LoAs are unconditional.				
1.1.3 [1] 47	The DOE shall confirm that the letter(s) of approval was issued by the respective Party's designated national authority (DNA) and is valid for the proposed CDM project activity under validation. A list of DNAs is available on the UNFCCC CDM website.	48, 49,5 0	DR	OK	OK
	Comment: The DOE received the LoAs from the project participant; the Colombian DNA was confirmed by direct communication with the DNA.				
1.1.4 [1] 48	If the DOE doubts the authenticity of the letter of approval, the DOE shall verify with the DNA that the letter of approval is authentic.	48, 49,5 0	DR	OK	OK
	Comment: The authenticity of both LoAs is unambiguous.				
1.2	PARTICIPATION				
[1] 51	All project participants have been listed in a consistent manner in the project documentation. Also, their participation in the project activity was approved by a Party to the Kyoto Protocol.	4	DR	OK	OK
	Comment: Documentation, including the MoC Form, is consistent. PP's participation was approved by parties to the Kyoto Protocol.				
1.2.1 [1] 52	The DOE shall confirm that the project participants are listed in tabular form in section A.3 of the PDD and that this information is consistent with the contact details provided in annex 1 of the PDD. The DOE shall determine whether the participation of each project participant has been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation. The DOE shall confirm that no entities other than those approved as project participants are included in these sections of the PDD.	4	DR	OK	OK

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	Comment: The PPs are listed appropriately in the PDD and they are the only entities that were approved by the respective DNAs.				
1.2.2 [1] 53	The DOE shall ensure that the approval of participation was issued from the relevant DNA and if in doubt shall verify with the DNA that the approval of participation is valid for the proposed CDM project participant.	49,5 0	DR	OK	OK
	Comment: The authenticity of both LoAs is unambiguous.				
1.3	PROJECT DESIGN DOCUMENT				
[1] 55	The PDD used as a basis for validation shall be prepared in accordance with the latest template and guidance from the CDM Executive Board available on the UNFCCC CDM website.	4	DR	OK	OK
	Comment: The PDD has used the latest template.				
1.3.1 [1] 56	The DOE shall determine whether the PDD is in accordance with the applicable CDM requirements for completing PDDs.	4	DR	OK	OK
	Comment: The PDD is in full compliance with relevant forms and guidance.				
1.4	PROJECT DESCRIPTION				
[1] 58	The PDD shall contain a clear description of the project activity that provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation.	4	DR	OK	OK
	Comment: Project activities (LFG collection, flaring and eventual energy generation if feasible) are clearly described.				
1.4.1 [1] 59	The DOE shall confirm that the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity.	4	DR	CL1 CL2	OK
	<p>CL1: The description of phase 2, electricity generation, in the project requires further details such as engine types, installation schedule and potential power purchase agreement. Moreover, the text contains conflicting statements about phase 2 (e.g. paragraph 1 of page 9). PDD was amended and, therefore, CL1 is closed.</p> <p>CL2: Relates the fact that that the landfill will have three zones (A,B,C). A schematic map shall be used that indicates all three zones and the planned location of the flare(s) with English text. PDD was amended and, therefore, CL2 is closed.</p> <p>The project description is accurate and complete.</p>				
1.4.2 [1] 60	For proposed CDM project activities in existing facilities or utilizing existing equipments, the DOE shall conduct a physical site inspection to confirm that the description in the PDD reflects the proposed CDM project activity for the following types of CDM project activities unless other means are specified in the methodology: (a) Large scale projects; (b) Non-bundled small scale projects with emission reductions exceeding 15,000 tonnes per year; (c) Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes per year; in such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.	4, 20- 29	DR	OK	OK
	Comment: An on-site visit confirmed that the description in the PDD reflects the proposed CDM project activity accurately. In addition, the environmental licences provided and amended for the existing landfill also prove that the PDD descriptions of the LFG capture and flaring/utilisation are correct.				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
1.4.3 [1] 61	For other individual proposed small scale CDM project activities with emission reductions not exceeding 15,000 tonnes per year, the DOE may conduct a physical site visit as appropriate.			N/A	N/A
	Comment:				
1.4.4 [1] 62	For all other proposed CDM project activities not referred to in paragraphs 59-61, the DOE shall undertake the validation by reviewing available designs and feasibility studies and may conduct comparison analysis to equivalent projects, as appropriate. The DOE may conduct physical site visit to assess the plan. For proposed CDM project activities for which the DOE does not undertake a physical site inspection, this shall be appropriately justified.			N/A	N/A
	Comment:				
1.4.5 [1] 63	If the proposed CDM project activity involves the alteration of an existing installation or process, the DOE shall ensure that the project description clearly states the differences resulting from the project activity compared to the pre-project situation.			N/A	N/A
	Comment:				
1.5	BASELINE AND MONITORING METHODOLOGY				
1.5.1	General requirement				
1.5.1.1 [1] 65	The DOE shall ensure that the baseline and monitoring methodologies selected by the project participants comply with the methodologies previously approved by the CDM Executive Board.	4	DR	OK	OK
	Comment: The baseline and monitoring methodology used in the project fully complies with CDM EB requirements.				
1.5.1.2 [1] 66	To ensure that the project activity meets this general requirement, the DOE shall determine whether: (a) The selected methodology is applicable to the project activity; (b) The PP has correctly applied the selected methodology.	4	DR	OK	OK
	Comment: The baseline and monitoring methodology used in the project fully complies with CDM EB requirements.				
1.5.1.3 [1] 67	The DOE shall ensure that the selected methodology applies to the project activity and has correctly been applied with respect to the following: (a) Project boundary; (b) Baseline identification; (c) Algorithms and/or formulae used to determine emission reductions; (d) Additionality; (e) Monitoring methodology.	4	DR	CAR2	OK
	Comment: CAR2 : The "Combined tool" for additionality and baseline setting is mentioned as being used for the project. The Methodology refers to the "Tool for the demonstration of and assessment of additionality" (version 05.2, EB 39, Annex 10) hence, the PDD has to be amended. PDD was amended and, therefore, CAR2 is closed. See 1.5.4 below.				
1.5.2	Applicability of the selected methodology to the project activity				
[1] 68	The DOE shall validate that the selected baseline and monitoring methodology previously approved by the CDM Executive Board is applicable to the project activity, including that the used version is valid.	4	DR	OK	OK
	Comment: The methodology is applicable and the version used is the latest one available.				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
[1] 69	The DOE shall apply specific guidance provided by the CDM Executive Board in respect to any approved methodology.	4	DR	OK	OK
	Comment: The applicability of the methodology is unambiguous.				
1.5.2.1 [1] 70	The DOE shall determine whether the methodology is correctly quoted and applied by comparing it with the actual text of the applicable version of the methodology available on the UNFCCC CDM website.	4	DR	OK	OK
	Comment: The methodology and its supporting tools are correctly quoted and applied.				
1.5.2.2 [1] 71	A selected approved methodology applies to the project activity if the applicability conditions of the methodology are met and the project activity is not expected to result in emissions other than those allowed by the methodology. The DOE shall determine whether the choice of methodology is justified, and the project participants have shown that the project activity meets each of the applicability conditions of the approved methodology or any tool or other methodology component referred to therein. This shall be done by validating the documentation referred to in the PDD and by verifying that its content is correctly quoted and interpreted in the PDD. If the DOE, based on local and sectoral knowledge, is aware that comparable information is available from sources other than the one used in the PDD, then the DOE shall cross check the PDD against the other sources to confirm that the project activity meets the applicability conditions of the methodology.	4	DR	OK	OK
	Comment: The proposed project activity is in line with criteria a) as the captured gas will be flared and/or with criteria b) if the captured gas is used to produce energy (electricity). Therefore, the validation opinion is unambiguous regarding the applicability of the selected methodology to the proposed CDM project activity.				
1.5.2.3 [1] 72	If the DOE cannot make a determination regarding the applicability of the selected methodology to the proposed CDM project activity, the DOE shall request clarification of the methodology in accordance with the guidance provided by the CDM Executive Board.			N/A	N/A
	Comment:				
1.5.2.4 [1] 73	If the DOE determines that the proposed CDM project activity does not comply with the applicability conditions of the methodology, the DOE may proceed by means of requesting revision to or deviation from the methodology in accordance with the guidance provided by the CDM Executive Board.			N/A	N/A
	Comment:				
1.5.2.5 [1] 74	If the DOE has requested clarification of revision to or deviation from a methodology, the DOE shall not submit a request for registration until the CDM Executive Board has approved the proposed deviation or revision.			N/A	N/A
	Comment:				
1.5.2.6 [1] 75	Under no circumstance shall the DOE consider the submission of a request for registration as a means of seeking clarification from the CDM Executive Board on the applicability of a methodology.			N/A	N/A
1.5.3	Project boundary				
[1] 78	The PDD shall correctly describe the project boundary, including the physical delineation of the proposed CDM project activity included within the project boundary for the purpose of calculating project and baseline emissions for the	4	DR	CAR3	OK

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	proposed CDM project activity.				
	<p>Comment:</p> <p>CAR3: Project boundary excludes the electricity grid and the leachate water treatment plant. These shall be included within the project boundary as electricity use (in phase 1, flaring) and electricity production (in phase 2, generation) necessitates that the grid and its connected power plants are included within the boundary. The physical location of the water treatment plant and its potential use of on-site generated electricity may require its inclusion within the project boundary. PDD was amended to include electricity; leachate treatment remains outside of the project boundary. CAR3 is closed.</p>				
1.5.3.1 [1] 79	<p>Based on documented evidence and corroborated by a site visit where required by paragraphs 59-62 above, the DOE shall determine whether the delineation in the PDD of the project boundary is correct and meets the requirements of the selected baseline methodology. The DOE also shall confirm that all sources and GHGs required by the methodology have been included within the project boundary. If the methodology allows project participants to choose whether a source or gas is to be included within the project boundary, the DOE shall determine whether the project participants have justified that choice. The DOE shall confirm that the justification provided is reasonable, based on assessment of supporting documented evidence provided by the project participants and corroborated by observations if required.</p>	4	DR	CAR3	OK
	<p>Comment:</p> <p>See 1.5.3. above.</p>				
1.5.4	Baseline identification				
[1] 81	<p>The PDD shall identify the baseline for the proposed CDM project activity, defined as the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the proposed CDM project activity.</p>	4	DR	CAR2	OK
	<p>Comment:</p> <p>CAR2(b): Elaborate further on P4 and P5 and their subsequent exclusion as realistic alternatives. PDD was amended and, therefore, CAR2 was closed. See 1.6.2 below.</p>				
[1] 82	<p>The DOE shall confirm that any procedure contained in the methodology to identify the most reasonable baseline scenario has correctly been applied. If the selected methodology requires use of tools (such as the "Tool for the demonstration and assessment of additionality" and the "Combined tool to identify the baseline scenario and demonstrate additionality") to establish the baseline scenario, the DOE shall consult the methodology on the application of these tools. In such cases, the guidance in the methodology shall supersede the tool. The DOE shall check each step in the procedure described in the PDD against the requirements of the methodology.</p>	4	DR	CAR2	OK
	<p>Comment:</p> <p>CAR2 : The "Combined tool" for additionality and baseline setting is mentioned as being used for the project. The Methodology refers to the "Tool for the demonstration of and assessment of additionality" (version 05.2, EB 39, Annex 10) hence, the PDD has to be amended. PDD was amended and, therefore, CAR2 is closed. See 1.5.1.3 above.</p>				
1.5.4.1 [1] 83	<p>If the methodology requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario, the DOE shall, based on financial expertise and local and sectoral knowledge, determine whether all scenarios that are considered by the project participants and are supplementary to those required by the methodology, are reasonable in the context of the proposed CDM project activity and that no reasonable alternative scenario was excluded.</p>			N/A	N/A
	<p>Comment:</p>				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
1.5.4.2 [1] 84	The DOE shall determine whether the baseline scenario identified is reasonable by validating the assumptions, calculations and rationales used as described in the PDD. It shall ensure that documents and sources referred to in the PDD are correctly quoted and interpreted. The DOE shall cross check the information provided in the PDD with other verifiable and credible sources, such as local expert opinion, if available.	4	DR	OK	OK
	Comment: Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable.				
1.5.4.3 [1] 85	The DOE shall determine whether all applicable CDM requirements have been taken into account in the identification of the baseline scenario for the proposed CDM project activity, including "relevant national and/or sectoral policies and circumstances." Drawing on its knowledge of the sector and/or advice from local experts, the DOE shall confirm that all relevant policies and circumstances have been identified and correctly considered in the PDD, in accordance with the guidance by the CDM Executive Board.	4	DR	OK	OK
	Comment: Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.				
1.5.4.4 [1] 86	The DOE shall determine whether the PDD provides a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity.	4	DR	OK	OK
	Comment: The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.				
1.5.5	Algorithms and/or formulae used to determine emission reductions				
	The steps taken and equations applied to calculate project emissions, baseline emissions, leakage and emission reductions shall comply with the requirements of the selected baseline and monitoring methodology.	4	DR	CL4 CAR4 CAR5 CAR6	OK
[1] 89	<p>Comment:</p> <p>CL4: The difference between phase 1 and phase 2 with respect to monitoring with special attention to electricity use and generation has to be elaborated further. Consequently, please amend figure B.7.2.1. to reflect these differences between the flaring only and the flaring & electricity generation phases and amend table B.7.2.1. and annex 4 accordingly. PDD was amended and, therefore, CL4 is closed.</p> <p>CAR4: "Data and parameters that are available at validation" section has to be revised and include all parameters required (e.g. solid waste composition and waste volume). As solid waste composition and waste volume data were already included in section B.6.2 and no new parameters were included, CAR4 is closed.</p> <p>CAR5: "Operation hours of the electricity generation" has to be included in the "Data and parameters monitored" section as already described in annex 4. PDD was amended and, therefore, CAR5 is closed.</p> <p>CAR6: The "collection efficiency" percentage values has to be corrected in the PDD as they are not in line with the shown, correctly calculated values. PDD was amended and, therefore, CAR6 is closed.</p>				
1.5.5.1 [1] 90	The DOE shall determine whether the equations and parameters in the PDD were correctly applied by comparing them to those in the selected approved methodology. If the methodology provides for selection between different options for equations or parameters, the DOE shall confirm that adequate justification was provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided) and that the correct	4	DR	OK	OK

MoV = Means of Validation, DR = Document Review, I = Interview, N/A = Not Applicable

CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	equations and parameters were used, in accordance with the methodology selected.				
	Comment: All assumptions and data used by the project participants are listed in the PDD, including their references and sources. All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD.				
1.5.5.2 [1] 91	The DOE shall verify the justification given in the PDD for the choice of data and parameters used in the equations. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, the DOE shall assess that all data sources and assumptions are appropriate and that calculations are correct, applicable to the proposed CDM project activity and will result in a conservative estimate of the emission reductions. If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, the DOE shall confirm that the estimates provided in the PDD for these data and parameters are reasonable.	4	DR	OK	OK
	Comment: All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology was applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.				
1.6	ADDITIONALITY OF A PROJECT ACTIVITY				
[1] 94	The PDD shall describe how a proposed CDM project activity is additional.	4	DR	OK	OK
	Comment: The PDD sufficiently describes the additionality of the project.				
1.6.1 [1] 95	The DOE shall assess and verify the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants to support the demonstration of additionality. This requires the DOE to critically assess the presented evidence, using local knowledge and sectoral and financial expertise.	4	DR	OK	OK
	Comment: The PDD contains reliable and credible information with respect to the waste management situation in Colombia in general and the project site in particular.				
1.6.2 [1] 96	The DOE shall consider tools and documents provided by the CDM Executive Board to demonstrate the additionality of proposed CDM project activities as well as specific complementary or alternative requirements included in approved CDM methodology.	4	DR	OK	OK
	Comment: The additionality tool is used and no alternative/additional requirements are applicable. See 1.5.1.3. and 1.5.4. above.				
1.6.1	Prior consideration of the clean development mechanism				
[1] 98	If the project activity start date is prior to the date of publication of the PDD for stakeholder comments, it shall be demonstrated that the CDM benefits were considered necessary in the decision to undertake the project as a proposed CDM project activity.	32,3 3	DR	OK	OK
	Comment: Prior consideration of CDM was communicated to both the UNFCCC Secretariat and the Colombian DNA in line with national and UNFCCC requirements. See 1.6.1.3. below.				
1.6.1.1 [1] 99	The DOE shall confirm that the start date of the project activity, reported in the PDD, is in accordance with the "Glossary of CDM terms". If the reported date is not in accordance with the glossary, the DOE shall raise a CAR to ensure that the start date is correctly reported in a revised PDD. In particular, for project	4,9, 34	DR	OK	OK

MoV = Means of Validation, DR = Document Review, I = Interview, N/A = Not Applicable

CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	activities that require construction, retrofit or other modifications, the date of commissioning cannot be considered the project activity start date.				
	Comment: The entire project history is documented and the contract is available to prove the project starting date.				
1.6.1.2 [1] 100	The DOE, in accordance with the guidance from the CDM Executive Board, shall determine whether it is a new project activity (a project activity with a start date on or after 2 August 2008) or an existing project activity (a project activity with a start date before 2 August 2008).	4	DR	OK	OK
	Comment: The project is a "new project activity" according to the EB guidance.				
1.6.1.3 [1] 101	For a new project activity, for which the PDD has not been published for global stakeholder consultation or a new methodology proposed to the CDM Executive Board before the project activity start date, the DOE shall ensure by means of confirmation from the UNFCCC secretariat that PPs had informed the host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. If such a notification has not been provided by the project participants within six months of the project activity start date, the DOE shall determine that the CDM was not seriously considered in the decision to implement the project activity.	4,32 ,33	DR	OK	OK
	Comment: Prior consideration of CDM was communicated to both the UNFCCC Secretariat and the Colombian DNA in line with national and UNFCCC requirements. See 1.6.1 above.				
1.6.1.4 [1] 102	For an existing project activity, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, the DOE shall assess the project participant's prior consideration of the CDM through document reviews and shall satisfy following requirements: (a) Evidence which must indicate that the awareness of the CDM prior to the project activity start date, and that the benefits of the CDM, were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a proposed CDM project activity. (b) Reliable evidence from project participants which must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat.			N/A	N/A
	Comment:				
1.6.1.5 [1] 103	If evidence to support the serious prior consideration of the CDM as indicated above is not available, the DOE shall determine that the CDM was not considered in the decision to implement the project activity.			N/A	N/A
	Comment:				
1.6.2	Identification of alternatives				
[1] 105	The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.	4	DR	CAR2	OK

MoV = Means of Validation, DR = Document Review, I = Interview, N/A = Not Applicable

CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	Comment: CAR2(b): elaborate further on P4 and P5 and their subsequent exclusion as realistic alternatives. PDD was amended and therefore CAR2 was closed. See 1.5.4 above.				
1.6.2.1 [1] 106	The DOE shall assess the list of alternatives given in the PDD and ensure that: (a) The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity; (b) The list contains all plausible alternatives that the DOE, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity; (c) The alternatives comply with all applicable and enforced legislation.	4	DR	CAR2	OK
	Comment: See 1.5.4. and 1.6.2 above.				
1.6.3	Investment analysis				
[1] 108	If the investment analysis has been used to demonstrate the additionality of the proposed CDM project activity, the PDD shall provide evidence that the proposed CDM project activity would not be: (a) The most economically or financially attractive alternative; or (b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).	4,6, 7,8,	DR	OK	OK
	Comment: Investment analysis has been used appropriately to demonstrate the additionality of the project.				
[1] 109	Project participants can show this through one of the following approaches, by demonstrating that: (a) The proposed CDM project activity would produce no financial or economic benefits other than CDM-related income. Document the costs associated with the proposed CDM project activity and the alternatives identified, and demonstrate that there is at least one alternative which is less costly than the proposed CDM project activity; (b) The proposed CDM project activity is less economically or financially attractive than at least one other credible and realistic alternative; (c) The financial returns of the proposed CDM project activity would be insufficient to justify the required investment.	4,6, 7,8,	DR	OK	OK
	Comment: The proposed CDM activity is less economically or financially attractive than at least one other credible and realistic alternative, and the financial returns of the proposed CDM project activity would be insufficient to justify the required investment.				
[1] 110	The DOE shall comply with the latest version of the "Guidance on the Assessment of Investment Analysis" as provided by the CDM Executive Board and with other relevant guidance, including the latest guidelines on plant load factors "guidelines for the reporting and validation of plant load factors".	4,6, 7,8,	DR	OK	OK
	Comment: The investment analysis is compliant with the respective EB guidance.				
1.6.3.1 [1] 111	To verify the accuracy of financial calculations carried out for any investment analysis, the DOE shall: (a) Conduct a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determine the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices; (b) Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices; (c) Review feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants; (d) Assess the correctness of computations carried out and documented by the project participants;	4,6, 7,8,	DR	CAR11	OK

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	(e) Assess the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur and the likelihood of these conditions.				
	<p>The parameters used in the financial analysis were validated by comparing official sources (e.g. IRR benchmark versus commercial lending rates) and expert judgement (e.g. CAPEX and OPEX of proposed project).</p> <p>CAR 11 was raised as:</p> <p>The PDD did not include the values of the identified parameters with which the project IRR exceed the benchmark and the possibility of this occurring.</p> <p>The PDD did not include the full justification of the appropriateness of the chosen cost escalation for all cost/revenue parameters.</p> <p>The PDD did not include project IRR with and without CER revenues.</p> <p>Therefore, investment analysis is hence not fully in line EB 48 Annex 60 paragraph 10 (a).</p> <p>PDD was amended accordingly; CAR 11 is closed.</p>				
1.6.3.2 [1] 112	<p>To confirm the suitability of any benchmark applied in the investment analysis, the DOE shall:</p> <p>(a) Determine whether the type of benchmark applied is suitable for the type of financial indicator presented;</p> <p>(b) Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity;</p> <p>(c) Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants involved, and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark.</p>	4,6, 7,8, 37	DR	OK	OK
	<p>Comment: The benchmark used in the PDD was compared to the prevailing commercial lending rate in Colombia.</p>				
1.6.3.3 [1] 113	<p>The CDM Executive Board clarified that in cases where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activities, DOEs are required to ensure that:</p> <p>(a) The FSR has been the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed;</p> <p>(b) The values used in the PDD and associated annexes are fully consistent with the FSR, and where inconsistencies occur, the DOE should validate the appropriateness of the values;</p> <p>(c) On the basis of its specific local and sectoral expertise, confirmation is provided, by cross-checking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision.</p>			N/A	N/A
	<p>Comment: FSR or similar studies are not required by Colombian authorities.</p>				
1.6.4	Barrier analysis				
[1] 115	<p>If barrier analysis was used to demonstrate the additionality of the proposed CDM project activity, the PDD shall demonstrate that the proposed CDM project activity faces barriers that:</p> <p>(a) Prevent the implementation of this type of proposed CDM project activity;</p> <p>(b) Do not prevent the implementation of at least one of the alternatives.</p>			N/A	N/A
	<p>Comment: According to the additionality tool barrier analysis is not required to be used.</p>				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
1.6.4.1 [1] 116	Issues that have a clear direct impact on the financial returns of the project activity cannot be considered barriers and shall be assessed by investment analysis. This does not refer to either: (a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance, or (b) Barriers related to the unavailability of sources of finance for the project activity.			N/A	N/A
	Comment:				
1.6.4.2 [1] 117	The DOE shall apply a two-step process to assessing the barrier analysis performed as follows: (a) <i>Determine whether the barriers are real.</i> The DOE shall assess the available evidence and/or undertake interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PDD exist. The DOE shall ensure that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics. If existence of a barrier is substantiated only by the opinions of the project participants, the DOE shall not consider this barrier to be adequately substantiated. If the DOE considers, on the basis of its sectoral or local expertise, that a barrier is not real or is not supported by sufficient evidence, it shall raise a CAR to have reference to this barrier removed from the project documentation; (b) <i>Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives.</i> Since not all barriers present an insurmountable hurdle to a project activity being implemented, the DOE shall apply its local and sectoral expertise to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of <i>at least one of the possible alternatives</i> , in particular the identified baseline scenario.			N/A	N/A
	Comment:				
1.6.5	Common practice analysis				
[1] 119	For proposed large-scale CDM project activities, unless the proposed project type is first-of-its kind, common practice analysis shall be carried out as a credibility check of the other available evidence used by the project participants to demonstrate additionality. This is a test to complement the investment analysis (Step 2 of the additionality tool) or barrier analysis (Step 3 of the additionality tool) to confirm that the project activity is not widely observed and commonly carried out in the region.	4	DR	OK	OK
	Comment: As a credibility check on the investment analysis results, a common practice analysis was conducted. Colombia only has CDM LFG projects and most of them are simple flaring projects.				
1.6.5.1 [1] 120	The DOE shall use its local and sectoral expertise to: (a) Assess whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type. For certain technologies, the relevant region for assessment will be local. For others, it may be transnational/global. If a region other than the entire host country is chosen, the DOE shall assess the explanation why this region is more appropriate; (b) Using official sources as well as local and industry expertise, determine to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, were undertaken in the defined region;	4	DR	OK	OK

MoV = Means of Validation, DR = Document Review, I = Interview, N/A = Not Applicable

CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	(c) If similar and operational projects, other than CDM project activities, are already "widely observed and commonly carried out" in the defined region, assess whether there are essential distinctions between the proposed CDM project activity and the other similar activities.				
	Comment: The proposed CDM project activity is not common practice. See 1.6.5 above.				
1.7	MONITORING PLAN				
[1] 122	The PDD shall include a monitoring plan. This monitoring plan shall be based on the approved monitoring methodology applied to the proposed CDM project activity.	4	DR	OK	OK
	Comment: The monitoring plan is based on the approved monitoring methodology.				
1.7.1 [1] 123	<p>The DOE shall apply a two-step process to assessing compliance with this requirement as follows:</p> <p>(a) <i>Compliance of the monitoring plan with the approved methodology.</i> The DOE shall:</p> <p>(i) By means of document review, identify the list of parameters required by the selected approved methodology;</p> <p>(ii) Confirm that the monitoring plan contains all necessary parameters, that they are clearly described and that the means of monitoring described in the plan complies with the requirements of the methodology;</p> <p>(b) <i>Implementation of the plan.</i> The DOE shall, by means of review of the documented procedures, interviews with relevant personnel, project plans and any physical inspection of the proposed CDM project activity site in accordance with paragraphs 59-62, assess whether:</p> <p>(i) The monitoring arrangements described in the monitoring plan are feasible within the project design;</p> <p>(ii) The means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified.</p>	4	DR	CL5	OK
	<p>The monitoring plan is in compliance with the requirements of the methodology.</p> <p>CL5: The exact roles and responsibilities of the entities depicted in figure B.7.2.1. (organisation chart) and in the respective text has to be further elaborated. Please indicate how project operator relates legally to the project participants.</p> <p>PDD was amended and, therefore, CL5 is closed.</p>				
1.8	SUSTAINABLE DEVELOPMENT				
[1] 125	CDM project activities shall assist Parties not included in Annex I to the Convention in achieving sustainable development.	4,10,11,12,20-29,49,	DR	OK	OK
	Comment: The environmental license modifications authorising the CDM project clearly indicates the sustainable development angle of the project; the host country LoA explicitly refers to the project benefits to sustainable development.				
1.8.1 [1] 126	The DOE shall determine whether the letter of approval by the DNA of the host Party confirms the contribution of the proposed CDM project activity to the sustainable development of the host Party.	49	DR	OK	OK

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	Comment: The host Party's DNA confirmed the contribution of the project to the sustainable development of the host Party.				
1.9	LOCAL STAKEHOLDER CONSULTATION				
	Local stakeholders shall be invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website.	35,4 5,46	DR	CL6	OK
[1] 128	Comment: CL6: The local stakeholder meeting related documentation as detailed in section E.1. including the description on how invitations were made (e.g. how you selected the invitees and how they were notified) has to be submitted. Please also correct the reference to "El Pais" to "Diario Occidente". The requested documentation was submitted and, therefore, CL6 is closed.				
1.9.1 [1] 129	The DOE shall, by means of document review and interviews with local stakeholders as appropriate, determine whether: (a) Comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity, have been invited; (b) The summary of the comments received as provided in the PDD is complete; (c) The project participants have taken due account of any comments received and have described this process in the PDD.	35,4 5,46	DR	OK	OK
	Comment: The local stakeholder consultation was appropriately and adequately conducted.				
1.10	ENVIRONMENTAL IMPACTS				
	Project participants shall submit documentation to the DOE on the analysis of the environmental impacts of the project activity in accordance with paragraph 37(c) of the CDM modalities and procedures.	10,1 1,12 , 20- 29	DR	CL3	OK
[1] 131	Comment: CL3: The Regional Environmental Authority (CVC) amended its original environmental license (Resolution 0100 No. 740-0377 on 09/08/2007) for the Landfill a few times. CVC confirmed on-site and in e-mail communication that it has legislative power to impose stricter requirements than required by the national legislation. Subsequently, the decision to authorise the Colomba-Guabal landfill to implement active flaring at the landfill site is in line with this legislative power. CVC's Resolution (0100 No 0740 – 0612, 18/12/2007) concludes that "the environmental impact on the greenhouse effect would be efficiently controlled through a CDM project than through the biogas burning environmental requirement". SQS understands that CVC's Resolution explicitly allows the landfill operator not to build a passive flaring system prior to the implementation of the CDM project. Please submit relevant materials (e.g. request for changing the resolutions) issued by Interaseao if possible. Please elaborate these details in the section describing MD _{BL,y} and its subsequent zero value The required documentation was obtained directly from CVC including their statement [23] related to the proposed CDM projects positive environmental impact. Therefore, CL3 was closed.				
1.10.1 [1] 132	The DOE shall confirm, by means of a document review and/or using local official sources and expertise, whether the project participants have undertaken an analysis of environmental impacts and, if required by the host Party, an environmental impact assessment.	10,1 1,12 , 20- 29	DR	OK	OK
	Comment: An environmental impact assessment was conducted for the landfill site in accordance with procedures as required by the host Party. The LFG project does not require an EIA, however it requires permitting. The responsible environmental authority has amended its environmental license for the landfill to allow for the project activities.				
2	Specific validation activities				
2.1	BACKGROUND				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
[1] 134	Project participants may contract a DOE to undertake certain specific validation activities. For such validation activities, the DOE shall apply the general means of validation and reporting requirements described above as well as those described below.				
2.2	PROJECT DESIGN OF SMALL-SCALE CLEAN DEVELOPMENT MECHANISM PROJECT ACTIVITIES				
[1] 135	The DOE shall determine whether a proposed small-scale CDM project activity meets the requirements of the simplified modalities and procedures for small-scale CDM project activities.			N/A	N/A
	Comment:				
2.2.1 [1] 136	During its validation of a small-scale project activity, the DOE shall confirm that: (a) The project activity qualifies within the thresholds of the three possible types of small-scale project activities. It may include more than one component; for example, a type III methane recovery component activity and a type I electricity component activity; (b) The project activity conforms to one of the approved small-scale categories and applies the relevant tool or methodology. The DOE shall confirm that the small-scale methodologies are applied in conjunction with the general guidelines to SSC CDM methodologies, which provides guidelines on equipment capacity, equipment performance/lifetime, baseline identification for type-II/III Greenfield project activities, sampling and other monitoring-related issues; (c) The project activity is not a debundled component of a large-scale project, in accordance with the rules defined in appendix C of the simplified modalities and procedures for small-scale CDM project activities; (d) Whether an assessment of the environmental impacts of the proposed CDM project activity is required by the host Party.			N/A	N/A
	Comment:				
2.3	AFFORESTATION OR REFORESTATION PROJECT ACTIVITIES UNDER THE CLEAN DEVELOPMENT MECHANISM				
2.3.1	General requirement				
[1] 138	The guidance provided in section 1 above also applies to the validation of A/R CDM project activities to the extent defined in modalities and procedures for afforestation or reforestation (A/R) CDM project activities and relevant guidance by the CDM Executive Board.			N/A	N/A
	Comment:				
2.3.1.1 [1] 139	In addition, the DOE shall confirm that specific requirements, as defined in the modalities and procedures for A/R CDM project activities, were followed, including: (a) Project boundary for A/R CDM project activities; (b) Selection of carbon pools; (c) Eligibility of land; (d) Approach proposed to address non permanence; (e) Timing of management activities, including harvesting cycles, and verifications; (f) Socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems.			N/A	N/A
	Comment:				
2.3.2	Project boundary for A/R CDM project activities				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
[1] 140	The PDD shall contain a description of the project boundary that geographically delineates the proposed afforestation or reforestation CDM project activity under the control of the project participants. The proposed A/R CDM project activity may contain more than one discrete area of land. Comment:			N/A	N/A
2.3.2.1 [1] 141	The DOE shall confirm whether the PDD contains a description of the CDM project boundary which encircles discrete areas of land planned for the proposed afforestation or reforestation CDM project activity under the control of the project participants. Comment:				
2.3.2.2 [1] 142	The DOE shall, through document review and/or interviews, validate that the project participants for all areas of land planned for A/R CDM project activity: (a) Have already established the control over afforestation or reforestation activities; or (b) The control over afforestation or reforestation is expected to be established in accordance to the guidance specified in the EB 44 report, annex 16. The control has to include at minimum the exclusive right, defined in a way acceptable under the legal system of the host country, to perform the A/R activity with the aim of achieving net anthropogenic GHG removals by sinks. If the total number of documents to be reviewed and persons/entities to be interviewed is not less than ten, then the DOE may apply a sampling approach. Comment:			N/A	N/A
2.3.3	Selection of carbon pools				
[1] 144	Proposed A/R CDM project activity may account for verifiable changes in the following carbon pools within the project boundary: above-ground biomass, below-ground biomass, litter, dead wood, and soil organic carbon. Comment:			N/A	N/A
2.3.3.1 [1] 145	The DOE shall determine whether the PDD selected the carbon pools to be considered in the proposed A/R CDM project activity in accordance with the requirements of the selected approved methodology. If the approved methodology allows for an option to exclude certain carbon pools, the DOE shall confirm that verifiable information was provided to justify the exclusion. For this, the DOE shall ensure that all documents referred to in the PDD are correctly quoted and interpreted. If relevant, the DOE shall cross check the information provided in the PDD with other available information from public sources or local experts. Comment:			N/A	N/A
2.3.4	Eligibility of land				
[1] 147	Project participants shall provide evidence that the land within the planned project boundary is eligible for a proposed A/R CDM project activity following the most recent version of the "Procedures to demonstrate the eligibility of land for A/R CDM project activities". Comment:			N/A	N/A
2.3.4.1 [1] 148	The DOE shall validate, based on review of information that reliably discriminates between forest and non-forest land according to the particular thresholds adopted by the host country (exemplary sources are listed in the			N/A	N/A

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	abovementioned procedures) and a site visit, that the area of land included within the project boundary is eligible for afforestation or reforestation activity.				
	Comment:				
2.3.5	Conservative choice and application of default data				
[1] 150	Project participants shall ensure that application of default data in estimation of the net anthropogenic GHG removals by sinks results in conservative, but not overly conservative, estimates. An acceptable method for satisfying the above-mentioned requirement is provided in the most recent version of the "Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sinks".			N/A	N/A
	Comment:				
2.3.5.1 [1] 151	The DOE shall review the PDD to ensure satisfactory application of "Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sinks" in order to prevent any overestimation of reductions in anthropogenic emissions according to the provisions of the modalities and procedures for afforestation and reforestation CDM project activities.			N/A	N/A
	Comment:				
2.3.6	Approach proposed to address non permanence				
[1] 153	Project participants shall specify the approach proposed to address non permanence in accordance with paragraph 38 of the modalities and procedures for afforestation or reforestation CDM project activities.			N/A	N/A
	Comment:				
2.3.6.1 [1] 154	The DOE shall review the PDD to ensure an approach to address that non permanence is selected according to the provisions of the modalities and procedures for afforestation or reforestation CDM project activities.			N/A	N/A
	Comment: The validation report shall describe the approach selected by the project participants to address non permanence.				
2.3.7	Timing of management activities, including harvesting cycles, and verifications				
[1] 156	Project participants shall plan management activities, including harvesting cycles, and verifications such that a systematic coincidence of verification and peaks in carbon stocks would be avoided.			N/A	N/A
	Comment:				
2.3.7.1 [1] 157	The DOE shall review the forest management plan and the monitoring plan for the proposed A/R CDM project activity to ensure that a systematic coincidence of verification and peaks in carbon stocks is avoided.			N/A	N/A
	Comment:				
2.3.8	Socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems				
[1] 159	Project participants shall submit to the DOE documentation on their analysis of the socioeconomic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed afforestation or reforestation project activity under the CDM.			N/A	N/A
	Comment:				

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
2.3.8.1 [1] 160	The DOE shall confirm, by means of a document review and/or using local official sources and expertise, whether the project participants have undertaken an analysis of the socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary.			N/A	N/A
	Comment:				
2.3.8.2 [1] 161	Should the above-mentioned analysis lead to conclusion that any negative impact that may be considered significant by the project participants or the host Party was detected, then the DOE shall, by means of document review, ascertain that a socio-economic impact assessment and/or an environmental impact assessment has been undertaken in accordance with relevant host Party regulations, and that the outcome of such impact assessment is summarized in the PDD. The DOE shall also ascertain that a description of the planned monitoring and remedial measures to address the negative impacts has been included in the PDD.			N/A	N/A
	Comment:				
2.4	PROJECT DESIGN OF SMALL-SCALE AFFORESTATION OR REFORESTATION PROJECT ACTIVITIES				
[1] 163	Small-scale afforestation or reforestation CDM project activities shall be validated using the requirements for afforestation or reforestation CDM project activities as described in section 2.3 above, while taking into account the simplified modalities and procedures for small-scale afforestation and reforestation CDM project activities.			N/A	N/A
	Comment:				
2.4.1 [1] 164	During its validation of a proposed small-scale A/R CDM project activity, the DOE shall determine whether: (a) The project activity complies with the thresholds for the small-scale A/R CDM project activities; (b) The project activity complies with one of the types of small-scale A/R project activities defined in appendix B of the annex to decision 6/CMP.1 and qualifies to apply one of the approved simplified baseline and monitoring methodology for small-scale afforestation and reforestation project activities; (c) The proposed CDM project activity is not a part of a debundled large-scale A/R project activity, in accordance with the rules defined in appendix C of the annex to decision 6/CMP.1; (d) The proposed CDM project activity was developed or implemented by low-income communities and individuals as confirmed by the host Party.			N/A	N/A
	Comment:				
2.5	PROGRAMME OF ACTIVITIES				
[1] 165	The CDM Executive Board has provided guidance and procedures for registering a programme of activities (PoA) as a single CDM project activity. In validating a PoA and any CDM programme activities (CPAs) proposed to be included in the PoA, the DOE shall, in general, apply the means of validation and reporting requirements described in this Manual. However, there are a number of requirements unique to PoAs for which additional instructions are provided below. The precise extent of validation required in each of these areas will need to be determined by the DOE, based on the type or PoA being validated.			N/A	N/A

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	Comment:				
2.5.1	Operational and management arrangements for the PoA				
[1] 166	The DOE shall assess the operational and management arrangements which have been established by the coordinating/managing entity in order to determine whether these arrangements are suitable for the PoA being validated. The arrangements shall be sufficient to ensure that the coordinating/managing entity will have control of all records and information related to the implementation of individual CPAs and will be in a position to ensure that each CPA is being operated in accordance with the specific requirements of the programme. Where the DOE considers the arrangements to be unsatisfactory or insufficient, a CAR shall be raised. A request for registration shall not be submitted until the CAR has been resolved to the satisfaction of the DOE.			N/A	N/A
	Comment:				
2.5.2	Eligibility criteria for CPAs				
[1] 167	The DOE shall assess the specified eligibility criteria in the POA-DD in order to determine whether or not these criteria are sufficient to ensure that all CPAs would comply with the CDM requirements applicable to the PoA. These requirements will include, inter alia, the means of demonstrating the additionality of the CPA and the applicability of the applied methodology. The eligibility criteria represent an essential element of ensuring the smooth functioning or programmatic CDM. Therefore, the DOE may raise CARs which ensure the ease of application of the eligibility criteria.			N/A	N/A
	Comment:				
2.5.3	Validation of CPAs				
[1] 168	The DOE shall assess any proposed CPA, which a coordinating/managing entity wishes to include in the PoA, to determine whether or not it complies with the eligibility criteria specified in the POA-DD. The means of validation to determine compliance with this requirement will be specific to the PoA. The DOE may consider a desk review of the documentation sufficient to determine compliance in certain instances. It may also consider follow-up interviews and/or site visits necessary for other types of PoA.			N/A	N/A
	Comment:				
2.6	RENEWAL OF CREDITING PERIOD				
[1] 169	When contracted to validate a proposed CDM project activity for a second or further crediting period, the DOE shall undertake a thorough reassessment of the validity of the original baseline or any updates thereto proposed by the project participants, and the corresponding estimation of emission reductions for the applicable crediting period, based on the latest version of the procedures for renewing the crediting period, the latest applicable version of approved methodology and the means of validation described in this Manual.			N/A	N/A
	Comment:				
2.7	CHANGES TO THE START DATE OF THE CREDITING PERIOD				
[1] 170	The CDM Executive Board has revised procedures for requesting post registration changes to the start date of the crediting period. The requirement for the Host Country to re-confirm that the delay in the start date of crediting period			N/A	N/A

MoV = Means of Validation, DR = Document Review, I = Interview, N/A = Not Applicable

CAR = Corrective Action Request, CL = Clarification Request, FAR = Forward Action Request

	Requirement	Ref.	MoV	Draft Concl.	Final Concl.
	will not affect project's contribution to sustainable development was removed, and that these revised procedures also contain provisions for project activities hosted in Least Developed Countries (LDCs). If project participants wish to delay the start date of the crediting period by more than one year but less than two years, and if project participants of projects hosted by a LDC wish to delay the start date of the crediting period by more than two year but less than four years, the DOE shall validate the baseline scenario in accordance with chapter V, section E, subsection 5(d) above.				
	Comment:				

Protocol 2-3: Methodological Requirements (incl. tools)

Tool to determine project emissions from flaring gases containing methane

The ACM0001 methodology requires the use of the "Tool to determine project emissions from flaring gases containing methane" to calculate the project emissions from flaring of the residual gas stream (PEflare in tCO₂e). PEflare can be calculated on an annual basis or for the required period of time using this tool.

CHECKLIST TOPIC / QUESTION	Ref.	MoV	Draft Concl	Final Concl								
G. Tool to determine project emissions from flaring gases containing methane												
G.1. Justification of the choice of the tool and why it is applicable to the project activity												
G.1.1. Is the applied tool considered the most appropriate one?	4	DR	OK	OK								
Comments:	The flares are high efficiency, enclosed flares to which the tool (annex 13) is applicable.											
Integrate the required amount of sub-checklists on the applicability criteria as given by the applied methodology and comment on at least every line answered with “No”												
G.1.2. Criterion 1: Is the residual gas stream (RG) containing methane?	4	DR	OK	OK								
<table><tr><td>Applicability checklist</td><td>Yes / No</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Y</td></tr><tr><td>Compliance provable?</td><td>Y</td></tr><tr><td>Compliance verified?</td><td>Y</td></tr></table>					Applicability checklist	Yes / No	Criterion discussed in the PDD?	Y	Compliance provable?	Y	Compliance verified?	Y
Applicability checklist	Yes / No											
Criterion discussed in the PDD?	Y											
Compliance provable?	Y											
Compliance verified?	Y											
Comments:	The main combustible component of Landfill Gas is methane.											
G.1.3. Criterion 2: Is the residual gas stream (RG) to be flared containing no other combustible gases than methane, carbon monoxide and hydrogen?	4	DR	OK	OK								
<table><tr><td>Applicability checklist</td><td>Yes / No</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Y</td></tr><tr><td>Compliance provable?</td><td>Y</td></tr><tr><td>Compliance verified?</td><td>Y</td></tr></table>					Applicability checklist	Yes / No	Criterion discussed in the PDD?	Y	Compliance provable?	Y	Compliance verified?	Y
Applicability checklist	Yes / No											
Criterion discussed in the PDD?	Y											
Compliance provable?	Y											
Compliance verified?	Y											
Comments:	The residual gas stream – landfill gas – normally, does not contain any other combustible gases than carbon monoxide and hydrogen as listed in the “Tool to determine project emissions from flaring gases containing methane”. The simplified approach was used for the ex-ante/ex-post estimation of future Emission Reductions only. For the ex-post calculation CH4, the O2 and CO2 will be continuously measured and monitored.											
G.1.4. Criterion 3: Is the residual gas stream (RG) to be flared obtained from decomposition of organic material (through landfills, bio-digesters or anaerobic lagoons, among others) or from gases vented in coal mines (coal mine methane and coal bed methane)?	4	DR	OK	OK								
<table><tr><td>Applicability checklist</td><td>Yes / No</td></tr><tr><td>Criterion discussed in the PDD?</td><td>Y</td></tr><tr><td>Compliance provable?</td><td>Y</td></tr><tr><td>Compliance verified?</td><td>Y</td></tr></table>					Applicability checklist	Yes / No	Criterion discussed in the PDD?	Y	Compliance provable?	Y	Compliance verified?	Y
Applicability checklist	Yes / No											
Criterion discussed in the PDD?	Y											
Compliance provable?	Y											
Compliance verified?	Y											
Comments:	RG is obtained from decomposition of organic material in landfill.											

CHECKLIST TOPIC / QUESTION	Ref.	MoV	Draft Concl	Final Concl										
G.2. Description of the parameters included in the tool														
Integrate the required amount of sub-checklists for parameters as given by the tool applied and comment on at least every line answered with “No”														
G.2.1. Parameter: $PE_{flare,y}$ Project emissions from flaring of the residual gas stream in year y Unit: tCO_{2e} Type: result <table><tr><td>Boundary checklist</td><td>Yes / No</td></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y	4	DR	OK	OK
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments:														
G.2.2. Parameter: $\eta_{flare,h}$ Flare efficiency in hour h based on measurements or default values Unit: - Type: default/result <table><tr><td>Boundary checklist</td><td>Yes / No</td></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y	4	DR	OK	OK
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments:	Flare efficiency will be measured; if not, a default value will be used.													
G.2.3. Parameter: $f_{vi,h}$ Volumetric fraction of component i in the residual gas in the hour h where i = CH4, CO, CO2, O2, H2, N2 Unit: -Type: monitored <table><tr><td>Boundary checklist</td><td>Yes / No</td></tr><tr><td>Parameter discussed in the PDD?</td><td>NA</td></tr><tr><td>Inclusion / exclusion justified?</td><td>NA</td></tr><tr><td>Explanation / Justification sufficient?</td><td>NA</td></tr><tr><td>Consistency with monitoring plan?</td><td>NA</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	NA	Inclusion / exclusion justified?	NA	Explanation / Justification sufficient?	NA	Consistency with monitoring plan?	NA	4	DR	NA	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	NA													
Inclusion / exclusion justified?	NA													
Explanation / Justification sufficient?	NA													
Consistency with monitoring plan?	NA													
Comments:	Project Participants will use the simplified approach and will only measure the methane content of the residual gas and consider the remaining part as N2. The simplified approach was used for the ex-ante/ex-post estimation of future Emission Reductions only. For the ex-post calculation besides CH4, the O2 and CO2 will be continuously measured and monitored.													

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl	Final Concl										
<p>G.2.4. Parameter: $FV_{RG,h}$</p> <p>Volumetric flow rate of the residual gas in dry basis at normal (NTP) conditions 2 in the hour h</p> <p>Unit: m^3/h</p> <p>Type: monitored</p> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>		Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y	4	DR	OK	OK
Boundary checklist	Yes / No														
Parameter discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	Y														
Consistency with monitoring plan?	Y														
Comments:	Equivalent to LFGflare if temperature of the residual gas is below 60°C. Temperature of residual gas is monitored to provide evidence that the temperature of the residual gas is below 60°C.														
<p>G.2.5. Parameter: $t_{O_2,h}$</p> <p>Volumetric fraction of O_2 in the exhaust gas of the flare in the hour h (only in case the flare efficiency is continuously monitored)</p> <p>Unit: -</p> <p>Type: monitored</p> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>		Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y	4	DR	OK	OK
Boundary checklist	Yes / No														
Parameter discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	Y														
Consistency with monitoring plan?	Y														
Comments:	The values are measured continuously. The proportion of the data to be monitored is 100%.														
<p>G.2.6. Parameter to be monitored: $fv_{CH_4,FG,h}$</p> <p>Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h (only in the case the flare efficiency is continuously monitored)</p> <p>Unit: mg/m^3</p> <p>Type: required</p> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>		Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y	4	DR	OK	OK
Boundary checklist	Yes / No														
Parameter discussed in the PDD?	Y														
Inclusion / exclusion justified?	Y														
Explanation / Justification sufficient?	Y														
Consistency with monitoring plan?	Y														
Comments:															
<p>G.2.7. Parameter to be monitored: T_{flare}</p>		4	DR	OK	OK										

CHECKLIST TOPIC / QUESTION	Ref.	MoV	Draft Concl	Final Concl										
Temperature in the exhaust gas of the enclosed flare Unit: °C Type: required <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y				
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments:														
G.2.8. Parameter to be monitored: - Any other parameters required to monitor proper operation of the flare according to the manufacturer's specification (only in the case of use of a default value for the flare efficiency) Unit: - Type: required <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td></td></tr><tr><td>Inclusion / exclusion justified?</td><td></td></tr><tr><td>Explanation / Justification sufficient?</td><td></td></tr><tr><td>Consistency with monitoring plan?</td><td></td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?		Inclusion / exclusion justified?		Explanation / Justification sufficient?		Consistency with monitoring plan?			4	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?														
Inclusion / exclusion justified?														
Explanation / Justification sufficient?														
Consistency with monitoring plan?														
Comments:	Flare efficiency will be monitored continuously.													
G.2.9. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD?	4	DR	OK	OK										
Comments:														
G.3. Description of how the baseline methodology procedure is identified and description of the identified baseline procedure														
G.3.1. Are the project emissions from flaring of the residual gas stream calculated based on the flare efficiency and the mass flow rate of methane?	4	DR	OK	OK										
Comments:														
G.3.2. Does the determination of flare efficiency take into account the actual efficiency of combustion in the flare and the time that the flare is operating?	4	DR	OK	OK										
Comments:	See G.2.2.													
G.3.3. Does the calculation of combustion efficiency take into account the methane content in the exhaust gas of the flare, the air used in the combustion process, and the methane content in the residual gas?	4	DR	OK	OK										
Comments:	See G.2.2.													
G.3.4. Is the stated type of flare (open, enclosed) traceable due to the definitions mentioned in the tool?	4	DR	OK	OK										

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl	Final Concl
Comments:	Verified on-site				
G.3.5. In case of open flare: Is there a device foreseen to demonstrate the flare is operational and are the default values (50% , 0%) in the calculation adapted?			DR	N/A	
Comments:					
G.3.6. Have applicable regulatory or legal requirements been identified?		4	DR	OK	OK
Comments:					

Tool to calculate the emission factor for an electricity system

The ACM0001 methodology requires the use of the “Tool to calculate the emission factor for an electricity system” to determine the CO₂ emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the “operating margin” (OM) and “build margin” (BM) as well as the “combined margin” (CM).

CHECKLIST TOPIC / QUESTION	Ref.	MoV*	Draft Concl	Final Concl								
H. Tool to calculate the emission factor for an electricity system												
H.1. Justification of the choice of the tool and why it is applicable to the project activity												
H.1.1. Is the applied tool considered the most appropriate one?	4	DR	OK	OK								
Comments:												
H.1.2. Criterion 1: Is the tool used for the purpose of calculating baseline emissions where a project activity supplies electricity to a grid? <table border="1"> <thead> <tr> <th>Applicability checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Criterion discussed in the PDD?</td> <td></td> </tr> <tr> <td>Compliance provable?</td> <td></td> </tr> <tr> <td>Compliance verified?</td> <td></td> </tr> </tbody> </table>	Applicability checklist	Yes / No	Criterion discussed in the PDD?		Compliance provable?		Compliance verified?			DR	N/A	
Applicability checklist	Yes / No											
Criterion discussed in the PDD?												
Compliance provable?												
Compliance verified?												
Comments:												
H.1.3. Criterion 2: Is the tool used for the purpose of calculating baseline emissions for a project activity that results in savings of electricity that would have been provided by the grid? <table border="1"> <thead> <tr> <th>Applicability checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Criterion discussed in the PDD?</td> <td></td> </tr> <tr> <td>Compliance provable?</td> <td></td> </tr> <tr> <td>Compliance verified?</td> <td></td> </tr> </tbody> </table>	Applicability checklist	Yes / No	Criterion discussed in the PDD?		Compliance provable?		Compliance verified?			DR	N/A	
Applicability checklist	Yes / No											
Criterion discussed in the PDD?												
Compliance provable?												
Compliance verified?												
Comments:												
H.1.4. Criterion 3: Is the tool used for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary? <table border="1"> <thead> <tr> <th>Applicability checklist</th> <th>Yes / No</th> </tr> </thead> <tbody> <tr> <td>Criterion discussed in the PDD?</td> <td>Y</td> </tr> <tr> <td>Compliance provable?</td> <td>Y</td> </tr> <tr> <td>Compliance verified?</td> <td>Y</td> </tr> </tbody> </table>	Applicability checklist	Yes / No	Criterion discussed in the PDD?	Y	Compliance provable?	Y	Compliance verified?	Y	4	DR	OK	OK
Applicability checklist	Yes / No											
Criterion discussed in the PDD?	Y											
Compliance provable?	Y											
Compliance verified?	Y											
Comments: Colombian official EF _{grid,y} is used as defined by article 4 of resolution n°180947 of June 2010 (Ministry of Mining and Energy); the factor published is valid until another resolution is published.												
H.2. Description of the parameters included in the tool												
Integrate the required amount of sub-checklists for parameters as given by the tool applied and comment on at least every line answered with “No”												

CHECKLIST TOPIC / QUESTION	Ref.	MoV*	Draft Concl	Final Concl										
<div>H.2.1. Parameter: $EF_{grid,CM,y}$ Combined margin CO2 emission factor for grid connected power generation in year y Unit: tCO2/MWh Type: calculated</div> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td></td></tr><tr><td>Inclusion / exclusion justified?</td><td></td></tr><tr><td>Explanation / Justification sufficient?</td><td></td></tr><tr><td>Consistency with monitoring plan?</td><td></td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?		Inclusion / exclusion justified?		Explanation / Justification sufficient?		Consistency with monitoring plan?			DR	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?														
Inclusion / exclusion justified?														
Explanation / Justification sufficient?														
Consistency with monitoring plan?														
<div>Comments: See H.1.4.</div>														
<div>H.2.2. Parameter: $EF_{grid,BM,y}$ Build margin CO2 emission factor for grid connected power generation in year y Unit: tCO2/MWh Type: calculated</div> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td></td></tr><tr><td>Inclusion / exclusion justified?</td><td></td></tr><tr><td>Explanation / Justification sufficient?</td><td></td></tr><tr><td>Consistency with monitoring plan?</td><td></td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?		Inclusion / exclusion justified?		Explanation / Justification sufficient?		Consistency with monitoring plan?			DR	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?														
Inclusion / exclusion justified?														
Explanation / Justification sufficient?														
Consistency with monitoring plan?														
<div>Comments: See H.1.4.</div>														
<div>H.2.3. Parameter: $EF_{grid,OM,y}$ Operating margin CO2 emission factor for grid connected power generation in year y Unit: tCO2/MWh Type: calculated</div> <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td></td></tr><tr><td>Inclusion / exclusion justified?</td><td></td></tr><tr><td>Explanation / Justification sufficient?</td><td></td></tr><tr><td>Consistency with monitoring plan?</td><td></td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?		Inclusion / exclusion justified?		Explanation / Justification sufficient?		Consistency with monitoring plan?			DR	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?														
Inclusion / exclusion justified?														
Explanation / Justification sufficient?														
Consistency with monitoring plan?														
<div>Comments: See H.1.4.</div>														
<div>H.2.4. Parameter: $FC_{i,m,y}$, $FC_{i,y}$, $FC_{i,j,y}$, $FC_{i,k,y}$, $FC_{i,n,y}$ and $FC_{i,n,h}$ Amount of fossil fuel type i consumed by power plant / unit m, j, k or n (or in the project electricity system in case of $FC_{i,y}$) in year y or hour h Unit: mass or volume unit</div>		DR	N/A											

CHECKLIST TOPIC / QUESTION	Ref.	MoV*	Draft Concl	Final Concl										
Type: official publication <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y				
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments: See H1.4.														
H.2.6. Parameter: $EF_{CO_2,i,y}$ CO2 emission factor of fossil fuel type i in year y Unit: tCO2/GJ Type: <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y		DR	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments: See H.1.4.														
H.2.7. Parameter: $EG_{m,y}$, EG_y , $EG_{j,y}$, $EG_{k,y}$ and $EG_{n,h}$ Net electricity generated and delivered to the grid by power plant / unit m, j, k or n (or in the project electricity system in case of EG_y) in year y or hour h Unit: MWh Type: monitored <table><tr><th>Boundary checklist</th><th>Yes / No</th></tr><tr><td>Parameter discussed in the PDD?</td><td>Y</td></tr><tr><td>Inclusion / exclusion justified?</td><td>Y</td></tr><tr><td>Explanation / Justification sufficient?</td><td>Y</td></tr><tr><td>Consistency with monitoring plan?</td><td>Y</td></tr></table>	Boundary checklist	Yes / No	Parameter discussed in the PDD?	Y	Inclusion / exclusion justified?	Y	Explanation / Justification sufficient?	Y	Consistency with monitoring plan?	Y		DR	N/A	
Boundary checklist	Yes / No													
Parameter discussed in the PDD?	Y													
Inclusion / exclusion justified?	Y													
Explanation / Justification sufficient?	Y													
Consistency with monitoring plan?	Y													
Comments:														
H.2.8. Parameter (only for dispatch data OM): $EG_{PJ,h}$ Electricity displaced by the project activity in hour h of year y Unit: MWh Type: Monitored		DR	N/A											

CHECKLIST TOPIC / QUESTION		Ref.	MoV*	Draft Concl	Final Concl
Boundary checklist	Yes / No				
Parameter discussed in the PDD?					
Inclusion / exclusion justified?					
Explanation / Justification sufficient?					
Consistency with monitoring plan?					
Comments:					
H.2.9. Parameter: (only for dispatch data OM) $\eta_{m,y}$			DR	N/A	
Average net energy conversion efficiency of power unit m in year y					
Unit: -					
Type:					
Boundary checklist	Yes / No				
Parameter discussed in the PDD?					
Inclusion / exclusion justified?					
Explanation / Justification sufficient?					
Consistency with monitoring plan?					
Comments:					
H.2.10. Do the spatial and technological boundaries as verified on-site comply with the discussion provided by / indication included to the PDD?		4	DR	OK	OK
Comments:					
H.3. Description of how the baseline methodology procedure is identified and description of the identified baseline procedure					
H.3.1. Is every selection of options offered by the tool correctly justified and is this justification in line with the situation verified on-site?			DR	N/A	
Comments:					
H.3.2. Are the formulae required for the determination of the Operating Margin correctly presented, enabling a complete identification of parameter to be used and / or monitored?			DR	N/A	
Comments:					
H.3.3. Is the method to calculate the Operating Margin (Simple OM, Simple Adjusted OM, Dispatch data OM, or Average OM), the most appropriated one?			DR	N/A	
Comments:					
H.3.4. Are the formulae required for the determination of the Build Margin correctly presented, enabling a complete identification of parameter to be used and / or monitored?			DR	N/A	
Comments:					
H.3.5. Is the set of power units (the set of five power units that have been built most recently, or the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently), comprising the larger annual generation?			DR	N/A	

CHECKLIST TOPIC / QUESTION		Ref.	MoV*	Draft Concl	Final Concl
Comments:	See H.1.4.				
H.3.6. Are the formulae required for the determination of the Combined Margin correctly presented, enabling a complete identification of parameter to be used and / or monitored?			DR	N/A	
Comments:	See H.1.4.				
H.3.7. Are the values used for w_{OM} and w_{BM} correctly applied?			DR	N/A	
Comments:	See H.1.4.				
H.3.8. Is the calculation of the operating margin and build margin emission factors documented electronically in a spreadsheet attached to the CDM-PDD. This should include all data used to calculate the emission factors			DR	N/A	
Comments:	See H.1.4.				
H.3.9. Are the default efficiency factors for power plants used according to annex I of the tool?			DR	N/A	
Comments:					

Tool to calculate baseline, project and/or leakage emissions from electricity consumption

The ACM0001 methodology requires the use of the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”. This tool provides procedures to estimate the baseline, project and/or leakage emissions associated with the consumption of electricity.

CHECKLIST TOPIC / QUESTION	Ref.	MoV	Draft Concl	Final Concl																		
I. Emissions reductions																						
Integrate questions concerning methodological choices and selection of options, if necessary																						
I.1.1. Explanation of methodological choices																						
I.1.1.1. Is it explained how the procedures provided in the tool are applied by the proposed project activity?	4	DR	OK	OK																		
Comments:	See H.1.4.																					
I.1.1.2. Is every selection of options offered by the tool correctly justified and is this justification in line with the situation verified on-site?	4	DR	OK	OK																		
Comments:																						
I.1.1.3. Are the formulae required for the determination of project or leakage emissions by electricity consumption correctly presented, enabling a complete identification of parameter to be used and / or situation verified on-site?	4	DR	OK	OK																		
Comments:																						
I.1.2. Data and parameters that are available at validation																						
I.1.2.1. Is the list of parameters presented in chapter B.6.2 considered to be complete with regard to the requirements of the applied tool?		DR	OK	OK																		
Comments:	Ex-ante only the Colombian EFgrid y is available.																					
I.1.2.2. Parameter Title: PPi Rated capacity of power plant i		DR	N/A																			
<table><tr><th>Data Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>.</td></tr><tr><td>Data unit correctly expressed?</td><td>.</td></tr><tr><td>Appropriate description of parameter?</td><td>.</td></tr><tr><td>Source clearly referenced?</td><td>.</td></tr><tr><td>Correct value provided?</td><td>.</td></tr><tr><td>Has this value been verified?</td><td>.</td></tr><tr><td>Choice of data correctly justified?</td><td>.</td></tr><tr><td>Measurement method correctly described?</td><td>.</td></tr></table>	Data Checklist	Yes / No	Title in line with methodology?	.	Data unit correctly expressed?	.	Appropriate description of parameter?	.	Source clearly referenced?	.	Correct value provided?	.	Has this value been verified?	.	Choice of data correctly justified?	.	Measurement method correctly described?	.				
Data Checklist	Yes / No																					
Title in line with methodology?	.																					
Data unit correctly expressed?	.																					
Appropriate description of parameter?	.																					
Source clearly referenced?	.																					
Correct value provided?	.																					
Has this value been verified?	.																					
Choice of data correctly justified?	.																					
Measurement method correctly described?	.																					
Comments:																						
I.1.3. Ex-ante calculation of emission by electricity consumption																						
I.1.3.1. Is the projection based on the same procedures as used for future monitoring?	4	DR	OK	OK																		
Comments:																						
I.1.3.2. Are the GHG calculations documented in a complete and transparent manner?	4	DR	OK	OK																		
Comments:																						
I.1.3.3. Is the data provided in this section consistent with data as presented in other chapters of the PDD?	4	DR	OK	OK																		

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl	Final Concl																						
Comments:																											
I.1.4. Summary of the ex-ante estimation of emissions by electricity consumption																											
I.1.4.1. Is the data provided in this section in consistency with data as presented in other chapters of the PDD?		4	DR	OK	OK																						
Comments:																											
I.2. Application of the monitoring methodology and description of the monitoring plan																											
I.2.1. Data and parameters monitored																											
I.2.1.2. Parameter Title: EC _{PJ,y} Onsite consumption of electricity provided by the grid and/or captive power plant(s) and attributable to the project activity during the year y		4	DR	OK	OK																						
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr><tr><td>Appropriate description of parameter?</td><td>Y</td></tr><tr><td>Source clearly referenced?</td><td>Y</td></tr><tr><td>Measurement method correctly described?</td><td>Y</td></tr><tr><td>Correct reference to standards?</td><td>Y</td></tr><tr><td>Indication of accuracy provided?</td><td>Y</td></tr><tr><td>Monitoring Frequency compliant?</td><td>Y</td></tr><tr><td>QA/QC procedures described?</td><td>Y</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Y</td></tr></table>		Monitoring Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y	Appropriate description of parameter?	Y	Source clearly referenced?	Y	Measurement method correctly described?	Y	Correct reference to standards?	Y	Indication of accuracy provided?	Y	Monitoring Frequency compliant?	Y	QA/QC procedures described?	Y	QA/QC procedures appropriate?	Y				
Monitoring Checklist	Yes / No																										
Title in line with methodology?	Y																										
Data unit correctly expressed?	Y																										
Appropriate description of parameter?	Y																										
Source clearly referenced?	Y																										
Measurement method correctly described?	Y																										
Correct reference to standards?	Y																										
Indication of accuracy provided?	Y																										
Monitoring Frequency compliant?	Y																										
QA/QC procedures described?	Y																										
QA/QC procedures appropriate?	Y																										
Comments:		The consumption of electricity attributable to the project activity is monitored as required by the methodology and is described in the monitoring plan.																									
I.2.1.3. Parameter Title: EF _{grid,y} Emission factor for the grid in year y		4	DR	OK	OK																						
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr><tr><td>Appropriate description of parameter?</td><td>Y</td></tr><tr><td>Source clearly referenced?</td><td>Y</td></tr><tr><td>Measurement method correctly described?</td><td>Y</td></tr><tr><td>Correct reference to standards?</td><td>Y</td></tr><tr><td>Indication of accuracy provided?</td><td>Y</td></tr><tr><td>Monitoring Frequency compliant?</td><td>Y</td></tr><tr><td>QA/QC procedures described?</td><td>Y</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Y</td></tr></table>		Monitoring Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y	Appropriate description of parameter?	Y	Source clearly referenced?	Y	Measurement method correctly described?	Y	Correct reference to standards?	Y	Indication of accuracy provided?	Y	Monitoring Frequency compliant?	Y	QA/QC procedures described?	Y	QA/QC procedures appropriate?	Y				
Monitoring Checklist	Yes / No																										
Title in line with methodology?	Y																										
Data unit correctly expressed?	Y																										
Appropriate description of parameter?	Y																										
Source clearly referenced?	Y																										
Measurement method correctly described?	Y																										
Correct reference to standards?	Y																										
Indication of accuracy provided?	Y																										
Monitoring Frequency compliant?	Y																										
QA/QC procedures described?	Y																										
QA/QC procedures appropriate?	Y																										
Comments:		Colombian official EF _{grid} is used ; its applicability and value confirmed according to article 4 of resolution n°180947 of June 2010 (Ministry of Mining and Energy) ;the factor published is valid until another resolution is published																									

CHECKLIST TOPIC / QUESTION	Ref.	MoV	Draft Concl	Final Concl																						
I.2.1.4. Parameter Title: TD _{Ly} Average technical transmission and distribution losses	4	DR	OK	OK																						
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td>Y</td></tr><tr><td>Data unit correctly expressed?</td><td>Y</td></tr><tr><td>Appropriate description of parameter?</td><td>Y</td></tr><tr><td>Source clearly referenced?</td><td>Y</td></tr><tr><td>Measurement method correctly described?</td><td>Y</td></tr><tr><td>Correct reference to standards?</td><td>Y</td></tr><tr><td>Indication of accuracy provided?</td><td>Y</td></tr><tr><td>Monitoring Frequency compliant?</td><td>Y</td></tr><tr><td>QA/QC procedures described?</td><td>Y</td></tr><tr><td>QA/QC procedures appropriate?</td><td>Y</td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?	Y	Data unit correctly expressed?	Y	Appropriate description of parameter?	Y	Source clearly referenced?	Y	Measurement method correctly described?	Y	Correct reference to standards?	Y	Indication of accuracy provided?	Y	Monitoring Frequency compliant?	Y	QA/QC procedures described?	Y	QA/QC procedures appropriate?	Y				
Monitoring Checklist	Yes / No																									
Title in line with methodology?	Y																									
Data unit correctly expressed?	Y																									
Appropriate description of parameter?	Y																									
Source clearly referenced?	Y																									
Measurement method correctly described?	Y																									
Correct reference to standards?	Y																									
Indication of accuracy provided?	Y																									
Monitoring Frequency compliant?	Y																									
QA/QC procedures described?	Y																									
QA/QC procedures appropriate?	Y																									
Comments: Only 2004 data is available (19.32%). Therefore, the default value of 20% is used.																										
I.2.1.5. Parameter Title: FC _{k,i,y} Quantity of fossil fuel type i fired in the captive power plant k in year y		DR	N/A																							
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr><tr><td>Correct reference to standards?</td><td></td></tr><tr><td>Indication of accuracy provided?</td><td></td></tr><tr><td>Monitoring Frequency compliant?</td><td></td></tr><tr><td>QA/QC procedures described?</td><td></td></tr><tr><td>QA/QC procedures appropriate?</td><td></td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?		Data unit correctly expressed?		Appropriate description of parameter?		Source clearly referenced?		Measurement method correctly described?		Correct reference to standards?		Indication of accuracy provided?		Monitoring Frequency compliant?		QA/QC procedures described?		QA/QC procedures appropriate?					
Monitoring Checklist	Yes / No																									
Title in line with methodology?																										
Data unit correctly expressed?																										
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Correct reference to standards?																										
Indication of accuracy provided?																										
Monitoring Frequency compliant?																										
QA/QC procedures described?																										
QA/QC procedures appropriate?																										
Comments:																										
I.2.1.6. Parameter Title: EG _{k,y} total net amount of electricity produced by captive power plant k		DR	N/A																							
<table><tr><th>Monitoring Checklist</th><th>Yes / No</th></tr><tr><td>Title in line with methodology?</td><td></td></tr><tr><td>Data unit correctly expressed?</td><td></td></tr><tr><td>Appropriate description of parameter?</td><td></td></tr><tr><td>Source clearly referenced?</td><td></td></tr><tr><td>Measurement method correctly described?</td><td></td></tr><tr><td>Correct reference to standards?</td><td></td></tr><tr><td>Indication of accuracy provided?</td><td></td></tr></table>	Monitoring Checklist	Yes / No	Title in line with methodology?		Data unit correctly expressed?		Appropriate description of parameter?		Source clearly referenced?		Measurement method correctly described?		Correct reference to standards?		Indication of accuracy provided?											
Monitoring Checklist	Yes / No																									
Title in line with methodology?																										
Data unit correctly expressed?																										
Appropriate description of parameter?																										
Source clearly referenced?																										
Measurement method correctly described?																										
Correct reference to standards?																										
Indication of accuracy provided?																										

CHECKLIST TOPIC / QUESTION		Ref.	MoV	Draft Concl	Final Concl
Monitoring Frequency compliant?					
QA/QC procedures described?					
QA/QC procedures appropriate?					
Comments:					
I.2.1.7. Parameter Title: HG _{k,y} quantity of heat co-generated in captive power plant k in year y			DR	N/A	
Monitoring Checklist	Yes / No				
Title in line with methodology?					
Data unit correctly expressed?					
Appropriate description of parameter?					
Source clearly referenced?					
Measurement method correctly described?					
Correct reference to standards?					
Indication of accuracy provided?					
Monitoring Frequency compliant?					
QA/QC procedures described?					
QA/QC procedures appropriate?					
Comments: No co-generation					
I.2.1.8. Parameter Title: NCV _i Net calorific value of fuel type i			DR	N/A	
Monitoring Checklist	Yes / No				
Title in line with methodology?					
Data unit correctly expressed?					
Appropriate description of parameter?					
Source clearly referenced?					
Measurement method correctly described?					
Correct reference to standards?					
Indication of accuracy provided?					
Monitoring Frequency compliant?					
QA/QC procedures described?					
QA/QC procedures appropriate?					
Comments:					
I.2.1.9. Parameter Title: EF _{CO_{2,i}} CO ₂ emission factor of fuel type i			DR	N/A	
Monitoring Checklist	Yes / No				
Title in line with methodology?					
Data unit correctly expressed?					
Appropriate description of					

CHECKLIST TOPIC / QUESTION			Ref.	MoV	Draft Concl	Final Concl
parameter?						
Source clearly referenced?						
Measurement method correctly described?						
Correct reference to standards?						
Indication of accuracy provided?						
Monitoring Frequency compliant?						
QA/QC procedures described?						
QA/QC procedures appropriate?						
Comments:						
Annex 4: Monitoring information						
If additional background information on monitoring is provided: Is this information consistent with data presented in other sections of the PDD?			4	DR	OK	OK
Comments:			There is additional background information on monitoring provided in Annex 4.			
Is the information provided verifiable? Has sufficient evidence been provided to the validation team?			4	DR	OK	OK
Comments:						
Do the additional information and / or documented procedures substantiate / support statements given in other sections of the PDD?			4	DR	OK	OK
Comments:						

Protocol 4: Summary of Requests

No.:	CL 1	Reference: A.2; A.4.3, excel sheet "El Guabal_21Years_withCDM"
Validator request:	The description of the phase 2, electricity generation, in the project requires further details such as engine types, installation schedule and potential power purchase agreement. Moreover, the text contains conflicting statements about phase 2 (e.g. paragraph 1 of page 9) Please elaborate on the electricity generation and make sure that the text is consistent. The total, actual costs of the John Zink flare (1 st installed flare) is not included in the excel calculation.	
Project participant response:	PDD was updated accordingly in section A.4.3	
Validator conclusion:	Electricity generation phase has been elaborated and actual total costs of 1 st (John Zink) flare incorporated into the calculations. Therefore, CL 1 is closed.	Date: 29/04/2012

No.:	CL 2	Reference: A.4.3
Validator request:	It is clear from the description and was validated on-site that the Landfill will have three zones (A,B,C). Please use a schematic map that indicates all three zones and the planned location of the flare(s) with English text.	
Project participant response:	Figure A.4.3.1: Map of the Landfill (including zones A, B and C) has been updated according to the request	
Validator conclusion:	The map has been updated therefore CL 2 is closed.	Date: 28/07/2011

No.:	CL 3	Reference: B.6.; D.1.
Validator request:	The Regional Environmental Authority (CVC) amended its original environmental license (Resolution 0100 No. 740-0377 on 09/08/2007) for the Landfill a few times. CVC confirmed on-site and in e-mail communication that it has legislative power to impose stricter requirements than required by the national legislation. Subsequently, the decision to authorise the Colomba-Guabal landfill to implement active flaring at the landfill site is in line with this legislative power. CVC's Resolution (0100 No 0740 – 0612, 18/12/2007) concludes that "the environmental impact on the greenhouse effect would be efficiently controlled through a CDM project than through the biogas burning environmental requirement". SQS understands that CVC's Resolution explicitly allows the landfill operator not to build a passive flaring system prior to the implementation of the CDM project. Please submit relevant materials (e.g. request for changing the resolutions) issued by Interaseao if possible. Please elaborate these details in the section describing MD _{BL,y} and its subsequent zero value.	
Project participant response:	CVC submitted all the documentation about the Environmental Licence to SQS. Section B.6 has been amended to reflect CVC resolutions affecting MD _{BL,y}	
Validator conclusion:	The CVC submitted documentation sufficiently clarifies	Date: 28/07/2011

the history and present status of the environmental licensing. Therefore, CL 3 is closed.

No.:	CL 4	Reference: A.4.3., B.7.2.; Annex 4
Validator request:	Please elaborate further on the difference between phase 1 and phase 2 with respect to monitoring with special attention to electricity use and generation. Consequently, please amend figure B.7.2.1. to reflect these differences between the flaring only and the flaring & electricity generation phases and amend table B.7.2.1. and annex 4 accordingly. The manufacturer specifications for the operation of the flare and the required data and procedures to monitor these specifications have not been documented.	
Project participant response:	Section B.7.2.1 has been amended to reflect the two phases of the project, see figure B.7.2.1 and B 7.2.2.	
Validator conclusion:	Monitoring section has been updated to reflect the differences between monitoring the flaring and electricity generation. Manufacturers' specifications have been included Therefore, CL 4 is closed.	Date: 29/04/2012

No.:	CL 5	Reference: B.7.2
Validator request:	Please further elaborate the exact roles and responsibilities of the entities depicted in figure B.7.2.1. (organisation chart) and in the respective text. Please indicate how project operator relates legally to the project participants.	
Project participant response:	Organization chart figure B.7.2.3 has been amended to clarify project operation and CDM management rules.	
Validator conclusion:	Organisation chart has been updated. Therefore, CL 5 is closed.	Date:28/07/2011

No.:	CL 6	Reference: E.1.
Validator request:	Please submit the local stakeholder meeting related documentation as detailed in section E.1. including the a description on how invitations were made (e.g. how you selected the invitees and how they were notified). Please also correct the reference to "El Pais" to "Diario Occidente".	
Project participant response:	PDD section E.1 has been modified accordantly.	
Validator conclusion:	Full documentation has been received. Therefore, CL 6 is closed.	Date:28/07/2011

No.:	CAR 1	Reference:	A.3.
Validator request:	LoAs are not available. Please provide the host country and the annex I LoA.		
Project participant response:	LoAs of both countries have been received and forwarded to SQS.		
Validator conclusion:	LoAs have been received. Therefore, CAR 1 closed.	Date:28/07/2011	

No.:	CAR 2	Reference:	B.1.; B.4.; B.5.
Validator request:	<p>The "Combined tool" for additionality and baseline setting is mentioned as being used for the project. The Methodology refers to the "Tool for the demonstration of and assessment of additionality" (version 05.2, EB 39, Annex 10). Therefore:</p> <ol style="list-style-type: none"> Please eliminate the reference to the "Combined tool" and its subsequent use in section B.4. and B.5. Please further elaborate on P4 and P5 <u>and</u> their subsequent exclusion as realistic alternatives. Please submit the background information on the investment calculations, including your financial model as they were not delivered together with the supporting materials sent with the PDD. Please elaborate on Option III of Investment analysis and include the choice of and justification for the benchmark used. Consequently, delete table B.5.3. and replace it with sensitivity analysis for the benchmark values for the LFG 1 + P6 option. The sensitivity analyses must contain at least the LFG volume, electricity price and CAPEX & OPEX. Update the B.5.4. table and ensure that all Colombian CDM LFG projects (e.g. Doña Juana landfill in Bogota) are included and their status is up to date. Please move the starting date and the prior consideration of CDM (as listed in table B.5.2) sections to the end of section B.5. 		
Project participant response:	B.1, B.4 and B.5 have been amended accordingly		
Validator conclusion:	Points a-f have all been addressed in the PDD. Therefore, CAR 2 is closed.	Date:28/07/2011	

No.:	CAR 3	Reference:	B.3.
Validator request:	Project boundary excludes the electricity grid and the leachate water treatment plant. These shall be included within the project boundary as electricity use (in phase 1, flaring) and electricity production (in phase 2, generation) necessitates that the grid and its connected power plants are included within the boundary. The physical location of the water treatment plant and its potential use of on-site generated electricity may require its inclusion within the project boundary.		
Project participant response:	Figure B.3.1 has been updated to include electricity grid, leachate water treatment remains outside the project boundary		
Validator conclusion:	Electricity grid is included in project boundary and leachate treatment remains outside. Therefore, CAR 3 is closed.	Date:28/07/2011	

No.:	CAR 4	Reference:	B.6.2.
Validator request:	Please revise the "Data and parameters that are available at validation" section and include all parameters required (e.g. solid waste composition and waste volume).		
Project participant response:	Section B.6.2. has been updated accordingly. Solid waste composition and waste volume data are already included in section B.6.2, no new parameters are included.		
Validator conclusion:	No changes were made; the requested parameters were already included in the PDD. CAR 4 is closed.	Date:28/07/2011	

No.:	CAR 5	Reference:	B.7.1.
Validator request:	Please include the "operation hours of the electricity generation" in the "Data and parameters monitored" section as already described in annex 4.		
Project participant response:	Section B.7.1 has been updated accordingly.		
Validator conclusion:	Electricity generation hours as parameter is included in the PPD. Therefore, CAR 5 is closed.	Date:28/07/2011	

No.:	CAR 6	Reference:	Annex 3.
Validator request:	Please correct the "collection efficiency" percentage values as they are not in line with the shown correctly calculated values.		
Project participant response:	Annex 3 values has been updated, showing the correct calculated values		
Validator conclusion:	Mistakenly copied values have been corrected. Therefore, CAR 6 is closed.	Date:28/07/2011	

No.:	CAR 7	Reference:	B.7.1
Validator request:	The monitoring parameter "TDLy" is not included in the monitoring plan section B.7.1		
Comment	This CAR was opened in response to Scope 1 of the UNFCCC request of 08/12/2011		
Project participant response:	The requested information has been added to the revised PDD, TDL is moved to Section B.7.1 of the PDD describing Monitored Parameters.		
Validator conclusion:	PDD updated to include TDLy in Section B.7.1 listing monitored parameters hence CAR 7 is closed.	Date: 18/01/2012	

No.:	CAR 8	Reference:	B.7.1
Validator request:	Zero checks shall be conducted for gas analyzers while this is not included in the monitoring plan in line with the applicable Tool.		

Comment	This CAR was opened in response to Scope 2 of the UNFCCC request of 08/12/2011		
Project participant response:	The requested information has been added to the revised PDD.		
Validator conclusion:	PDD updated to include the zero checks hence CAR 8 is closed.	Date:	18/01/2012

No.:	CAR 9	Reference:	B.7.1,
Validator request:	PDD states that one flow meter is installed for each flare but does not state if the other parameters used to calculate flare efficiency will also be monitored separated.		
Comment	This CAR was opened in response to Scope 2 of the UNFCCC request of 08/12/2011		
Project participant response:	The requested information has been added to the revised PDD.		
Validator conclusion:	PDD updated and explicitly states that each parameter is monitored separately at each flare hence CAR9 is closed.	Date:	18/01/2012

No.:	CAR 10	Reference:	B.7.1, B.7.2., Figure B.7.2
Validator request:	<p>It is not clear whether a separated flow meter will be used to monitor the landfill gas recovered since the project has flares and engines involved. The diagram in Figure B.7.2.2 "Monitoring plan for phase 2" shows that LFGflare is installed before the landfill gas is separated for gensets and flares while page 57 of the PDD states that LFGtotal is the flow meter installed at the flares measuring LFGflare,y and flow meter installed at the gensets measuring LFGelectricity,y.</p> <p>The monitoring plan indicates that the total amount of landfill gas captured is the sum of all flow meters installed at the flares and the gensets; clarify how the total amount of landfill gas captured (LFGtotal,y) is continuously monitored.</p>		
Comment	This CAR was opened in response to Scope 3 of the UNFCCC request of 08/12/2011		
Project participant response:	<p>The requested information has been added to the revised PDD in Section B.7.2. including the corrected Figure B.7.2 showing that LFGflare flow meter(s) are installed after the landfill gas flow is separated between gensets and flares, and that LFGtotal will be measured continuously before the collected gas is diverted towards the flare and the gensets. Section B.7.1 has also been updated to explicitly state that all required parameters are measured at each flare and gensets respectively.</p>		
Validator conclusion:	PDD updated and explicitly states that all required parameters are measured at each flare and gensets respectively and Figure B.7.2 is corrected to reflect that the total amount of landfill gas captured (LFGtotal,y) is continuously monitored. hence CAR 10 is closed.	Date:	29/04/2012

No.:	CAR 11	Reference:	B.5
Validator request:	The PDD does not include the values of the identified parameters with which the project IRR exceed the benchmark and the possibility of this occurring.		

	<p>The PDD does not include the full justification of the appropriateness of the chosen cost escalation for all cost/revenue parameters.</p> <p>The PDD does not include project IRR with and without CER revenues.</p> <p>Therefore, investment analysis is hence not fully in line EB 48 Annex 60 paragraph 10 (a).</p>	
Project participant response:	<p>The PDD version 7 has been updated and explicitly states the values under which the OPEX and CAPEX would need to be reduced in order for the IRR to reach the benchmark. The same explanation has been given in reference to the increase in the electricity price in order for the IRR to reach to the benchmark.</p> <p>The PDD, section B.5, includes a detailed explanation for having selected cost escalation but no electricity price escalation over the years of project lifetime. At the moment no PPA has been signed, therefore assuming a constant increase in the electricity generation selling price is not realistic. The Historical prices of Colombia for the last 10 years (2000 – 2010) have shown an enormous variation in the prices for electricity; therefore assuming a constant yearly escalation without having a PPA in place is not appropriate.</p> <p>A table with the IRR from the project with CER and without CERs revenues has been added to the PDD.</p>	
Validator conclusion:	The PDD has been amended and required details have been added. Therefore, CAR 11 is closed.	Date: 29/04/2012

No.:	FAR 1	Reference:
Validator request:	n/a	
Project participant response:		
Validator conclusion:		Date: