
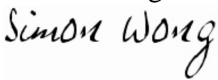
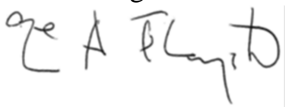




Validation opinion for post registration changes

Title of project activity:		
Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León		
CDM reference number:	DNV project No.:	
3378	PRJC-464060-2013-CCS-MEX	
Date:	Validation of the changes were conducted:	
19 September 2013	<input type="checkbox"/> Prior to the commencement of a verification of the project activity <input checked="" type="checkbox"/> When performing a verification of the project activity	
Work carried out by (name & signature):	Work verified by (name & signature):	Approved by (name & signature):
 Shruthi Poonacha	Simon Wong Yon-Sing 	Ole A. Flagstad 

Overview of post registration changes

Type of post registration change		Are the changes of a type specified in Appendix 1 of the CDM Project Standard? Note: In case of "No", prior approval by the EB is required
A: Temporary deviations from the registered monitoring plan and/or monitoring methodology (refer to section A)		<input type="checkbox"/> Yes <input type="checkbox"/> No
Applicable period for proposed deviations (inclusive):	From DD/MM/YYYY start date of the earliest included deviation to DD/MM/YYYY end date of the latest included deviation)	<input checked="" type="checkbox"/> No post registration change of this type
B: Corrections (refer to section B)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> No post registration change of this type
C: Changes to the start date of the crediting period (refer to section C) <i>Prior approval by the CDM EB is not required in case of (a) bringing forward the start date up to one year earlier or (b) postponing the start date by up to one year (by up to two years for project activities in LDCs).</i>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> No post registration change of this type
Proposed start date of the crediting period:	DD/MM/YYYY (changed from DD/MM/YYYY)	
D: Permanent changes from the registered monitoring plan or applied methodology		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

(refer to section D)	<input type="checkbox"/> No post registration change of this type
E a): Changes to the project design of a registered project activity (refer to section E)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No post registration change of this type
E b): Changes to the programme design of a registered PoA (refer to section E)	Note: All changes to the programme design of a registered PoA require prior approval by the EB. <input checked="" type="checkbox"/> No post registration change of this type
F. Changes specific to afforestation or reforestation project activities (refer to section F)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> No post registration change of this type

A. Temporary deviations from the registered monitoring plan and/or monitoring methodology

Not applicable

B. Corrections

Not applicable

C. Changes to the start date of the crediting period

Not applicable

D. Permanent changes from the registered monitoring plan or applied methodology

D.1 Description of the revision of the monitoring plan

The following changes have been identified from the PDD:

The monitoring system was found not in line with the description in the PDD. As per Table 5, Operational Management Structure for El Verde Project Monitoring of the PDD temperature (T) and pressure (P). The monitoring task describes that daily data on pressure and temperature would be recorded in a spreadsheet file which would be filed. Daily data on pressure and temperature is not required for the ER calculations in the actual operation structure as the project activity is using flow meters that measures within the flow temperature and pressure, expressing LFG volumes in normalized cubic meters (Nm³).

D.2 Assessment of the revision of the monitoring plan

The proposed revision of the monitoring plan ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions

Temperature:

No separate monitoring of temperature is necessary when using flow meters that directly measure temperature and pressure, expressing LFG volumes in normalized cubic meters.

Pressure:

No separate monitoring of pressure is necessary when using flow meters that directly measure temperature and pressure, expressing LFG volumes in normalized cubic meters.

There is no impact on the monitoring plan because no separate monitoring of temperature and pressure have been necessary because the project activity is using flow meters that directly monitors temperature and pressure and thereby calculating LFG volumes, expressing LFG volumes in normalized cubic meters (Nm³). This is in line with AM_CLA_23 (<http://cdm.unfccc.int/methodologies/PAmethodologies/clarifications/81628>).

The accuracy for temperature and pressure is given within the flow meter precision, which presents an accuracy class of ± 1 with two minutes intervals, which has been found valid for the operational ranges as per manufacturers specifications.

The proposed revision of the monitoring plan is in accordance with the approved monitoring methodology applicable to the project activity whilst ensuring the conservativeness of the emission reductions calculation

The revisions are in accordance to the monitoring methodology and DNV is able to confirm that the most conservative assumptions are applied in the emission reductions calculations.

The findings of previous verification reports, if any, have been taken into account

The monitoring parameters LFG_{total}, LFG_{flare,y}, LFG_{electricity,y} monitoring interval and the delay in the installation of 2.4 MW power generators were considered as per FAR 2 from the previous Verification report for the CDM project activity Landfill Gas Recovery and Flaring Project in the El Verde Landfill, León for the monitoring period 27 October 2010 to 30 June 2011, Report No.01 997 9105066415, rev 04. TÜV Rheinland, they are included in section E as they are considered as a change in the programme design.

E. Changes to the project or programme design of a registered project activity or PoA

E.1 Description of the changes as compared to the description in the registered PDD and description of the changes to the monitoring plan

a) The project participant has decided to permanently cease the use of the leachate evaporator on the EL Verde Landfill effectively from 1 November 2011 due to unexpected technical difficulties and failure to operate in a proper manner.

Therefore, considering that this change is being implemented in the current monitoring period the audit team has assessed whether the proposed change addressed by the PP requires prior approval by the CDM-EB through assessment based on the following conditions:

- i. The applicability and application of the applied methodology under which the project activity has been registered;
- ii. The additionality of the project activity;
- iii. The scale of the project activity.

The following changes were also identified during this monitoring period:

- b) According to the registered PDD, on section B.6.3 Ex-ante calculation emission reductions considers: “Blower electricity consumption: Based on manufacturer’s information, it is assumed that a blower will use 25 HP or about 18 kW to pump 1,869 m³/h of LFG (@ 50% methane). However, during the site visit two blowers were identified as 75 HP each.
- c) For parameters LFG_{total}, LFG_{flare,y}, LFG_{electricity,y}, as per registered PDD is stated in page 7 that according to the SCS Engineers study, a capacity of 2.4 MW power generators would be purchased in order to start operations in January 2012. Power generation equipment has not been installed during this monitoring period.

E.2 Assessment of the changes to the project design (*applicable to project activities only*)

Assessment of when the changes occurred

- a) The change was effective from 1 November 2011 as per the letter issued by Promotora Ambiental S.A.B de C.V. dated 30 January 2012, communicating the formal decision to permanently cease the use of the leachate evaporator on the El Verde Landfill. As per the *logbook 9_Reporte semanal VL_29.08.2011_a_04.09.2011*, this was the last operational week of the leachate evaporator, no other record of the leachate evaporator system was found during the monitoring period in the logbooks from this date on.
- b) The equipments commissioning is stated as 11 to 14 January 2010, which is prior to the start of crediting period of the project (27 October 2010).
- c) The installation of of 2.4 MW power generators was expected to happen in January 2012, this has been postponed in order to upgrade the LFG system in order to extract sufficient gas to achieve the amount of generation (MW) expected..

Assessment of the reasons for these changes taking place

- a) During the operation of the equipment, it has been found that the equipment was initially designed to utilise the cleaner and dryer fuel type, i.e. LPG with higher net calorific value than LFG (LPG 44.8 TJ/Gg versus LFG 25.4 TJ/Gg, Table 1.2 Volume 2: Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories), hence by using the LFG in the equipment the calorific requirements of the leachate evaporator could not be met. PASA installed a pre-treatment heat-exchanger to reduce the humidity and to increase the net calorific value of biogas but could not find a solution to clean the LFG without creating a

level of corrosion that made impracticable the normal operation of the leachate evaporator and its components (valves and regulators).

As stated in page 95 of the registered CDM-PDD, the baseline scenario practice of leachate management in the landfill at the time of validation was the recirculation of the leachate in the upper platform. The leachate was collected in pools, where some leachate evaporated naturally while the remainder was re-circulated by spraying on top of the landfill. This practice was carried out using a tank truck with a capacity of 10,000 litres, which pumped the leachate from leachate wells and pools and then transported and emptied the leachate on the landfill. Thus, as stated in section A.2 of the registered PDD, in the baseline scenario leachate would not be evaporated using any fuel.

The leachate evaporator EvapoDry Model ED 500 was commissioned on 27/02/2010 as can be evidenced on the document “Comissionning Certificate_Leachate Evaporator System_Leon” and was expected to treat 1.89 m³/h of leachate using the necessary LFG from the landfill. However, during the operation of the equipment, it has been found that the equipment was initially designed for clean and dry LPG with higher net calorific value than LFG hence the calorific requirements of the leachate could not be met. PASA installed a pre-treatment heat-exchanger to reduce the humidity and to increase the net calorific value of biogas but could not find a solution to clean the LFG without creating a level of corrosion that made impracticable the normal operation of the leachate evaporator and its components (valves and regulators). Although the project has been initially implemented in accordance with the description of the registered CDM-PDD, due to the operational difficulties with the leachate evaporator during the 1st and 2nd Monitoring periods, from July 2011 onwards the PP started to investigate two technologies to effectively mitigate the harmful effect of leachate on the El Verde Landfill. These technologies consist of:

Leachate Treatment Plant: A waste water/leachate treatment system that consists of several physical and chemical processes to ensure the leachate is still treated according to national regulations.

Phytoremediation: Treatment based on the use of a specific plant species that absorbs leachate, thus mitigating its production.

Once these two technologies have been properly evaluated from the technical and economical point of view, they have replaced the utilization of the leachate evaporator effectively from 1 November 2011 and are successfully mitigating the harmful effect of the leachate as could be verified by the DOE during the site visit. The combination of the two technologies largely improve the baseline scenario practice of leachate management in the landfill at the time of the verification and therefore, due to unceasing technical difficulties and failure to operate properly the leachate evaporator with LFG, the project participant decided to permanently cease the use of the leachate evaporator within the project activity from 1 November 2011.

b) The value for actual installed electricity consumption (two blowers of 75 HP each) is higher than the figure indicated in the PDD (two blowers of 25 HP each). This is due to the fact that at the time of validation, the equipment (blower) was sized based on the preliminary studies but not an in-depth sizing study was available at that time.

The following clarification has been added in the footnote in section B.1 of the MR:

“The PDD assumed the installation of two blowers with 25 HP each whereas finally two blowers with 75 HP each were installed. The monitored value of on-site consumption of electricity provided by the grid attributable to the project activity ($EC_{PJ,y}$) considering the two blowers of 75 HP each is used for the calculation of the project emissions from electricity consumption by the project activity ($PE_{EC,y}$)”.

c) The power generation equipment has been postponed. The power generation equipment is expected to be installed by 2014. DNV has confirmed that the monitoring period considers the actual electricity consumption provided by the grid, and this is considered as the most conservative approach.

Assessment of whether the changes would have been known to the project participants prior to registration of the project activity

a) The project participant decided to include the evaporator as per the technology provider recommendation. No feasibility study was presented to support this decision.

The evaporator system “Evapo-Dry Waste water Evaporator/sludge Dehydrator” is described by the manufacturer (Ecologix Environmental Systems) as designed to evaporate waste water and dehydrate the precipitated solids. It is described also as a low temperature evaporation systems designed to efficiently evaporate wastewater from landfill leachate recovery systems using a low BTU landfill gas as a fuel. This low temperature system evaporates solutions at approximately 180°F-186°F (80°C-85°C)

(http://old.ecologixsystems.com/pdfs/evapodry_howthework.pdf).

The operation and maintenance manual provided by the project participant do not include specifications on the characteristics of the gas to be used as power source.

It was identified an inconsistency between the specifications and description provided to the project participant and the description available in the web site by the manufacturer, which indicates that the equipment was originally not designed for landfill leachate but for waste water and sludge treatment using liquefied petroleum gas (LPG) as power source.

As no feasibility study was developed to support the decision, there was no possibility to known about this change before its installation.

b) The equipments commissioning is stated as 11 to 14 January 2010, which is prior to the registration date of the project (27 October 2010). The equipment installation was held during the validation process, however this correction wasn't included in the registered PDD. No comment regarding this change was identified in the previous verification report.

c) The project participant included the date of January 2012 as reference to conduct the investment analysis contained in the PDD which states the: “Installation of a LFG-fuelled power generator is being considered”. The project participant has control on this and they have decided to postpone the installation of the power generation primary due to economic reasons.

Assessment of how the changes may impact the overall operation/ability of the project activity to deliver emission reductions as stated in the PDD

- a) Operation of the project is not compromised by the ceased of the leachate evaporator as the landfill gas not used for the leachate will be directly send to the flare and to the LFG fuelled power generator once it is installed.
- b) No operational impact has been identified from this change. The installation of the two 75 HP blowers made possible the delivery of LFG to the flare.
- c) Operation of the project is not compromised by the postponed installation of the power generator as the collected LFG is flared.

E.3 Assessment of the impact of the changes to the project design (*applicable to project activities only*)

In the case of a project activity, do the changes adversely impact any of the following?

- ☐ The applicability and application of the applied methodology under which the project activity has been registered
- ☐ The additionality of the project activity
- ☐ The scale of the project activity
- ☒ None of the above

Assessment of impacts of the changes on the applicability and application of the applied methodology under which the project activity has been registered

The large scale baseline and monitoring methodology ACM0001 (version 10) does not include in its applicability conditions any restriction or capacity for the how the leachate is treated or the progression of the implementation in the LFG engine where the project activity is implemented. All applicability conditions of ACM0001 (version 10) are still being met..

- b) There is no impact on the applicability and application of the applied methodology under which the project activity has been registered.
- c) There is no impact on the applicability and application of the applied methodology under which the project activity has been registered.

Assessment of impacts of the changes on the additionality of the project activity

a) As stated in page 20 of the registered CDM-PDD and as demonstrated in Annex 5 of the same document, the leachate evaporation component of the project activity represented a significant investment for the project proponent (i.e. 339 057 USD) as well as higher operation costs than the leachate recirculation in the baseline scenario. The cost of leachate recirculation was demonstrated to be 1.85 USD/m³, while the cost of leachate evaporation was 4.55 USD/m³ in the registered CDM-PDD.

Nevertheless in page 20 of the registered CDM-PDD “as a conservative assumption, the costs incurred in the leachate evaporator are not considered in the investment analysis.”

Since the leachate evaporator was included in the original investment analysis at the time of validation, however this cost (i.e. 85,500 USD leachate equipment) its considered

insignificant as compared to the total overall cost of investment (6.9% of the total cost, 1,230,213 USD). It's removal does not negatively impact the additionality of the project.

b) There is no impact on the additionality of the project activity due to this change.

c) There is no impact on the additionality of the project activity due to this change as the purchase of the generators is postponed, not cancelled.

Assessment of impacts of the changes on the scale of the project activity

DNV has reviewed the files ER Spreadsheet_Leon_LFG, ER Spreadsheet_Leon_LFG_Revised, Difference ERs Initial and Revised PDD and it can be confirmed that the scale of the project remains as it was at the time of the validation.

The large scale baseline and monitoring methodology ACM0001 (version 10) does not include any restriction or capacity for the how the leachate is treated or the progression of the implementation in the LFG engine where the project activity is implemented. Thus, there is no requirement (threshold or capacity) in terms of scale and size for the landfill or for the project activity which could adversely affect the classification of the project as a large scale CDM project activity applying the baseline and monitoring methodology ACM0001 (version 10).

b) There is no impact on the scale of the project due this change.

c) There is no impact on the scale of the project due this change.

E.4 Assessment of the change to a PoA (*applicable to PoAs only*)

Not applicable

Changes specific to afforestation or reforestation project activities

Not applicable

Validation opinion

DNV's verification activity for the project revealed inconsistencies between the actual design of the project and the design of the registered PDD. Considering the assessment presented above, DNV was able to confirm that the discontinuation of the leachate evaporator, the installation of two 75 HP blowers and the postponed purchase of the LFG power generator would not impact the additionality of project activity negatively, would not change the scale of CDM project activity, and would not change the applicability of ACM0001 (version 10).

Since the quantity of landfill gas fed to the flare increased due to the ceased of the leachate evaporator along with the project emissions from flaring of the residual gas stream and were updated in the revised PDD, the annual estimated emission reductions have been updated to reflect to the actual project implementation and operation.

The occurred permanent changes to the project design and the revised monitoring plan correctly reflect the application of the approved CDM guidance regarding post-registration changes in the project design and monitoring plan as per the applicable provisions of the Clean Development Mechanism Project Standard.

All assessed post-registration changes comply with the applicable requirements as established in the Clean Development Mechanism Project Standard and the revised version of the PDD (version 13) addresses such changes in a correct and transparent manner.

In addition, it is DNV's opinion that the proposed revision of the monitoring plan i) ensures that the level of accuracy or completeness in the monitoring and verification process is not reduced as a result of the revisions and ii) is in accordance with the approved monitoring methodology applicable to the project activity whilst ensuring the conservativeness of the emission reductions. The changes on the monitoring plan are according to ACM0001 version 10.

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