

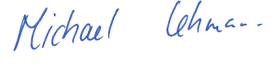




Validation opinion for post registration changes

Title of project activity:		
Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040		
CDM reference number:	DNV project No.:	
3464	PRJC-344687-2011-CCS-BRA	
Date:	Validation of the changes were conducted:	
26 October 2012	<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:	Work verified by:	Approved by:
Juliana Scalón 	Felipe Lacerda Antunes 	Michael Lehmann 

1 Overview of post registration changes

Type of post registration change		Is prior approval by CDM EB required? (refer to Appendix 1 of CDM Project Standard)
Temporary deviations from the registered monitoring plan and/or monitoring methodology (refer to section 2)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Corrections (refer to section 3)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Changes to the start date of the crediting period (refer to section 4) <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"/> Not applicable
Permanent changes from the registered monitoring plan or applied methodology (refer to section 5)	<input type="checkbox"/> Proposed revision only includes the request by the CDM EB <input type="checkbox"/> Proposed revision includes not only the request by the CDM EB but also additional revisions proposed by the PP/DOE <input checked="" type="checkbox"/> Proposed revision includes revisions proposed by the PP/DOE	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not applicable
Changes to the project design of a registered project activity (refer to section 6)	<input checked="" type="checkbox"/> Notification of changes from project activity as described in the registered PDD (i.e. changes do <u>not</u> raise any concerns with regard to i) additionality, ii) the scale of CDM project activity	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not applicable

	and/or iii) the applicability and application of baseline methodology <input type="checkbox"/> Request for approval of changes from project activity as described in the registered PDD	
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2 Temporary deviations from the registered monitoring plan and/or monitoring methodology

Not applicable

3 Corrections

Not applicable

4 Changes to the start date of the crediting period

Not applicable

5 Permanent changes from the registered monitoring plan or applied methodology

Not applicable

6 Changes to the project design of a registered project activity

6.1 Description of the changes as compared to the description in the registered PDD and description of the changes to the monitoring plan

In the registered PDD dated 25 November 2009 /12/, the output power of the project activity is stated to be 4.5 MW, planned to be invested in 2009. The designed capacity was an indicative energy generation with an installed capacity to be implemented through a first phase of 0.5 MW and a second phase of 4.0 MW.

However, the project has been implemented using the following equipment and according to the following schedule:

- On November 2010, three generators of 1.426 MW each were installed, totalling 4.278 MW of capacity, and thus within the installed capacity of 4.5 MW described in the registered PDD. The actual capacity was verified by DNV through the documentation presented to DNV for an earlier verification by another DOE under the VCS scheme of the project's emission reductions occurring prior to the start of the CDM crediting period /23/;
- On September 2011 one more generator set of 1.426 MW of installed capacity was implementing, resulting in a total installed capacity of 5.704 MW. This was verified by DNV based on the operation records provided to DNV during the verification of the emission reductions reported for the first monitoring period /6/ of the CDM crediting period. Since the landfill was closed on December 2007, the LFG production trend is to decrease, and therefore, there will not be enough LFG to run the four generators in the near future. Therefore, the fourth LFG generator installed is planned to be removed and sold again in January 2013, so that the total installed capacity will

be gain the original installed capacity of 4.278 MW with three LFG generators of 1.426 MW each.

Nonetheless, the project activity has currently an actual installed capacity of 5.704 MW as verified by DNV during the site visit. The revised PDD, version 3 dated 3 October 2012 /1/, correctly describes the actual installed capacity, the corrected electricity generation of electricity and the future plans for the overall installed capacity of the project.

6.2 Assessment of the changes to the project design

Assessment of when the changes occurred

The first three generators of 1.426 MW each (reaching 4.278 MW) were purchased at the end of 2009 by the time the LFG capturing and flaring system started operations /23/. The fourth LFG generator was purchased on 23 November 2010 /7/ and started operations on 21 September 2011 as verified from the project monitoring records /6/ provided to DNV during the verification process.

Assessment of the reasons for these changes taking place

The modification of the original installed capacity from 4.5 MW to 5.704 MW was due to an increase in the volume of LFG captured above the volumes predicted in the registered PDD. Therefore, the project participant has decided to make use of all the LFG to generate electricity instead of burning the excess in enclosed flares. In this sense, DNV has assessed the possible reasons for the changes and analysed the modifications made to the revised PDD /1/ regarding those reasons.

Methane generated and captured by the project:

According to the project recorded data provided by the project participant which was verified by another DOE as part of the VCS verification for the period from 1 December 2010 to 30 September 2011 (10 months) /8/, the amount of methane captured was 10 477 tonnes of CH₄. Extrapolating the value for 12 months, the amount of methane actually captured would result in about 12 572 tonnes of CH₄. The *ex-ante* estimations of methane captured by the project (MD_{project,y}) in the registered PDD was 9 517 tonnes of CH₄ in 2011 /12/., i.e., 24.3% less than actual.

In the revised CER estimation spreadsheet /2/, the estimated amount of methane to be captured by the project activity (MD_{project,y}) from 4 June 2011 to 31 December 2011 (210 days) is 5 844 tonnes of CH₄. Extrapolating for the entire year of 2011, MD_{project,y} estimated in the revised PDD is 10 157 tonnes of CH₄, and thus 18.9% less than the actual volume /8/. The table below summarises the result of the comparison:

Table 1: Methane captured by the project activity

MD _{project,2011} Actual (tonnes CH ₄)	MD _{project,2011} Estimated in the registered PDD (tonnes CH ₄)	MD _{project,2011} Revised estimation (tonnes CH ₄)
12 572	9 517 (24.3% less than actual)	10 157 (18.9 % less than actual)

DNV has assessed all the calculations and the estimations of methane production and capture /2/. Nothing was modified in relation to the estimations made in the registered PDD with the exception of considering a better LFG collection system. The *ex-ante* estimations in the

registered PDD /12/ admitted 80% of efficiency in the LFG collection system. The revised PDD has changed the value to 85% (6.25% higher), considering the recommendations in a report by the Environmental State Agency of São Paulo /24/. Since the landfill was closed on December 2007, there are no significant operational barriers to implement an efficient LFG draining and capturing system, and to maintain a good leachate drainage system as well. Therefore, the use of 85% of collection efficiency is reasonable.

Therefore, the amount of methane captured by the project is resulting in higher values than the estimations. The possible reasons for that performance above the estimations can be:

- A LFG collection efficiency above 85%;
- Waste composition different from what was informed by the municipality to the project participant. This information is not under project participant control, and it is not possible to monitor anymore since the landfill is closed.

The methane estimations were correctly calculated according to the “tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site”, version 4 (according to the registered PDD). Since DNV could not identify any anomalies in the methane captured under the project and in the methane estimations, the resulted differences in Table 1 are acceptable. Moreover, as described below, actual electricity generation from LFG is lower than estimated.

Electricity production

DNV has analysed the electricity production estimated in the revised PDD /1/ and the registered PDD /12/. Besides the correction made in the installed capacity according to the actual generation sets installed on site, the revised CER estimation spreadsheet has modified the electricity production regarding three issues:

- Use of 8 100 hours of operation per year for each electricity generator, instead of 7 500 hours as stated in the registered PDD. The 7 500 hours do not reflect the current engines performance /8/. Therefore, in accordance with the actual observed operating hours in the year 2011, the engines are assumed to operate for about 8 100 hours;
- Use of an engine efficiency of 38.9% instead of 30% in the emission reduction estimations of the registered PDD. At the time of the validation, the LFG generator was only indicative, and 30% of efficiency was based on an average of a typical 1 MW motor. However, since the engines are already defined, the efficiency was modified according to the engine’s technical data sheet /5/;
- Modification of the self-consumption of electricity from 327.1 kWe to 200 kWe. This modification was made also reflecting the current electricity consumption, as can be verified in the electricity bills provided by the project participant /11/.

The table below demonstrates the electricity estimated in the registered PDD and the electricity productions in the revised PDD:

Table 2: Net electricity generation estimated in the registered and revised PDD.

Year	Net electricity generated estimated in the registered PDD (MWh)	Net electricity generated estimated in the revised PDD (MWh)	Difference observed
2011 (full year)	27 510	36 128	+ 31.3%

2012	25 250	40 081	+ 58.7%
2013	20 983	32 900	+ 56.8%
2014	17 704	28 853	+ 63.0%
2015	15 127	25 019	+ 65.4%
2016	13 057	21 939	+ 68.0%
2017	11 360	19 414	+ 70.9%
2018	9 941	17 303	+ 74.1%
2019	5 823	15 507	+ 166.3%
2020	-	13 956	-
2021	-	2 932	-
Total	146 755	254 032	-
Average	16 306	23 094	+ 41.6%

DNV has checked all the calculations and found them to be correct /2/. DNV has also compared the revised estimation of the electricity generation against the actual generation reported for the year 2011 /8/ /9/. According to the information provided by the project participant, the electricity generated from 1 January 2011 to 31 December 2011 was 33 433 MWh, i.e., 8.05% less than estimated. The overestimation in the revised PDD is mostly due to the assumed 38.9% electrical efficiency of the engine used in the revised CER estimation spreadsheet /2/. According to the engine's technical data sheet /5/, 38.9% is the engine efficiency considering 75% of capacity load and 60% of methane content in the LFG. Considering that the methane content had an average of 53.09% during the monitored period of 4 June 2011 to 30 September 2011 /6/, it is possible to assume that the actual engine's electrical efficiencies are below the efficiency established in the manufacturer specifications and therefore, producing less energy than expected.

DNV has also compared the electricity used for internal consumption and verified that it had decreased from 327 kW /13/ to 200 kW /2/. Project participant had changed the internal consumption in the estimations to the lower values reached and observed during the performance period of 4 June 2011 to 30 September 2011 (in the electricity bills) /6/ in order to maximize the exported electricity to the grid for the purpose of calculating the best case scenario of revenues from electricity consumption. DNV considers this approach appropriate when analysing the financial returns of the project in the additionality assessment.

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

The first three generators of individual installed capacity of 1.426 MW were purchased at the end of 2009, when the LFG capturing and flaring system started operations (according to revised PDD schedule statements). By that time, the project was under the process of obtaining the letter of approval by the DNA of Brazil. As the DNA of Brazil requires a final validation report, the validation was thus already completed.

The project activity was submitted for registration on 8 April 2010 /10/. At the time of validation the indicative implementation schedule of 4.5 MW was still valid whereas the first phase of electricity installed capacity was 0.5 MW and the second phase would be the

installation of the remaining 4 MW. Therefore, at the time of validation and submission of the project for registration, the installed capacity foreseen in the PDD of 4.5 MW was not expected to be surpassed by the installed capacity of the first three generators of 1.426 MW that were purchased in the course of validation.

The fourth LFG generator of 1.426 MW was purchased on 23 November 2010 /7/ and started operations on 21 September 2011. Therefore, the installed capacity above the design foreseen in the PDD were likely not known to the project participant when the project was submitted for registration to the UNFCCC on 8 April 2010 /10/.

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

The increase in the electricity generation installed capacity from 4.5 MW to 5.704 MW does not impact the project's ability to produce and deliver the emission reductions as stated in the PDD.

However, it is important to notice that LFG generation and capture are very dynamic and is subject to variations that cannot be predicted by a theoretical method of estimations as used in the PDD. The landfill had been closed since 2007, which means that at any time, the project operator can expect a sudden decrease in the LFG production which may affect the overall capacity of the project to deliver the expected electricity and CERs estimated.

6.3 Assessment of the impact of the changes to the project design

Do the changes adversely affect the conclusions of the validation report of the registered PDD with regard to any of the following?

- ☐ Additionality
- ☐ Scale of CDM project activity
- ☐ Applicability and application of approved baseline methodology under which the project activity has been registered or the later version of the applied methodology
- ☐ The compliance of the monitoring plan with applied monitoring methodology (*refer as applicable to section 3 for the assessment of revisions to the monitoring resulting from the change of the project design*)
- ☐ The level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan (*refer as applicable to section 3 for the assessment of revisions to the monitoring resulting from the change of the project design*)
- ☒ The changes do not adversely impact i) the applicability and application of the applied methodology, ii) the additionality of the project activity and iii) the scale of the project activity

Assessment of impacts of the changes on additionality

The project activity additionality was originally demonstrated by applying an investment analysis. The proposed changes in the PDD do affect this analysis, since it represents a change in investment and in revenues. The project IRR has increased from -12.5% (which financially

would not be possible) to +0.15%, but it is still below the benchmark of 12.34% applied in the registered PDD. The assessment of the new IRR calculation is presented below:

Input parameters

DNV has validated all revised input values to the investment analysis based on appropriate evidence, as described below.

Investment costs:

During the validation, the project participant had presented to the validator a quote of a typical 0.25 MW and 1 MW LFG generators from other projects implemented by Asja Brasil Serviços para o Meio Ambiente Ltda. in other countries. Therefore, the original cost composition was of two engines of 0.25 MW and four engines of 1 MW. In order to use the same values that were available at validation, the project participant had presented the revised investment costs suppressing the investment in the first phase of two engines of 0.25 MW each, adding in the second phase the costs of four engines of 1 MW each, and a third phase using a cost of one more 1 MW engine, totaling costs for a 5 MW of installed capacity plant /4/. Project participant has decided to present in the revised PDD the investment costs less than the total installed capacity of 5.704 MW, since one more engine of 1 MW cost included in the total investment would surpass the current installed capacity of 5.704 MW and therefore, would increase the investment costs of the project and decrease the resulting IRR. Hence, only considering 5 MW is conservative.

The total investment estimate was revised from EUR 4 581 015 to EUR 4 854 394 /3/. From this amount:

- There are EUR 305 000 less in 2009 for the “electric energy generation, transformation and distribution section” which corresponds to the costs of suppressing the two engines of 0.25 MW (EUR 140 000 each) and the costs for their installation, of EUR 25 000 /4/. DNV could confirm this value by comparing the difference in the values of the detailed costs estimations adjusted from the registered PDD;
- EUR 594 273 in 2011 corresponding to:
 - EUR 447 100 from the acquisition of the fifth engine and its installation costs /4/. This unit cost is the same of the one used in the validation;
 - EUR 3 984 of civil works for the installation of the generator /4/. This unit cost corresponds to the same values used in the validation for the other 4 engines;
 - EUR 94 560 and EUR 10 080 for the LFG collection and conveying sections /4/. This corresponds to the additional 30 wells excavation, installation and correspondent pipelines and manifolds to connect them to the LFG collection system in 2011. All the unit costs used are the same assessed in the validation. The project participant only added the quantity of wells.
- EUR 1 500 in 2011 for site management during the installation of the fifth engine /4/. This unit cost is the same used for the previous engines as estimated and validated in the registered PDD;
- EUR 750 in 2011 for on site assistance for the installation of the fifth engine /4/. This unit cost is also the same used for the installation of the other engines;
- EUR 8 000 in 2011 for transport cost of the fifth engine /4/. This unit cost is also the same used for the installation of the other engines;
- 5% of incidental expenses of the expenditures made in 2011, totaling EUR 28 299 /3/.

DNV confirms that the total investment value applied in the investment analysis is reasonable and corresponds to the available information at the time of the investment decision and at validation. For an increase of 26.7% in the installed capacity (from 4.5 MW to 5.704 MW), the investment increase was only 5.97%, since project participant used the costs for 1 MW engines totaling an investment of 5 MW of installed capacity.

O&M costs:

The operation and maintenance costs did not change, since it corresponds to a rate cost of EUR 25 per MWh generated and a fixed yearly amount of EUR 149 200 for the LFG collection and flaring system /3/.

Electricity generation:

The project is expected to generate an average of 23 094 MWh per year, according to the revised estimations /2/ considering 8 100 of engines working hours. This is extremely optimistic in terms of electricity generation in face of the previous 7 500 used for engine working hours in the registered PDD /12/ /13/. And in terms of additionality, is conservative, since it increases the project revenues and consequently the project IRR. Moreover, the electricity generated from 1 January 2011 to 31 December 2011 was 33 433 MWh, which was 8.05% less than estimated in the revised PDD for the same period. This reinforces the fact that the financial analysis is considering the scenario with the highest revenues from electricity generation possible in order to demonstrate the return on investment.

Electricity tariff:

The original electricity tariff available during validation was maintained /3/ /14/.

Taxes and depreciation:

DNV could also confirm that the taxes and depreciation applied in the original investment analysis were correctly updated based in the changes in the revenues and purchased equipment. Since the period of financial analysis and project lifetime are linked to the production of CERs, two years more were added at the end of the financial period, since the registration date has delayed two years from the first estimate in the validation. Originally, according to the registered PDD, the CERs production should have started on 1 September 2009. However, the registration occurred on 4 June 2011. Therefore, the project lifetime and financial analysis have been updated to 4 June 2009 – 3 June 2021.

Also, since the fifth engine will be uninstalled at the beginning of 2013, it will not be entirely depreciated and therefore, the residue value was inserted as cash inflow (fair value of EUR 356 000 /3/) on 2013 (when the engine will be sold) of the financial analysis period.

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Calculation and conclusion

The IRR calculations for 10 years were provided in a spreadsheet. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project-IRR without CDM revenues is 0.15% /3/, which confirms that the project in the absence of CDM benefits and compared to the benchmark of 12.34% /12/ is still not financially attractive.

Sensitivity analysis

A sensitivity analysis has been performed by decreasing and increasing 5%-10% in the investments costs, operation and maintenance costs and electricity price. Reasonable variations of the electricity price, total investment costs and project operational and maintenance costs were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

Project participant had used the project IRR in order to compare the returns with the benchmark chosen. DNV was able to verify that the project IRR will be equal to the benchmark only if the above mentioned parameters change by values as mentioned below:

Electricity price	Investment costs	Operation and maintenance costs
+26.95%	-42.09%	-53.58%

Electricity: A positive variation of 26.95% in the price of electricity sold (energy price of EUR 53.00 per MWh /18/) would lead the IRR to reach the benchmark. The electricity price adopted is from the energy auction that happened in Brazil on renewable sources /18/. DNV has assessed the auction results from the second auction of renewable energy (held in 26 August 2010) and has verified that the energy tariff was EUR 64.76 per MWh /17/, 22% higher than the electricity price adopted. Moreover, observing the prices from more recent auctions, the 12th Auction on New Energy, held in 22 February 2011 had an average price of EUR 44.37 per MWh /19/, and the 13th Auction on New Energy held in 30 September 2011 had an average price of EUR 45.66 per MWh /20/. Hence, DNV can confirm that a variation of 26.95% in the price adopted for the project activity is unlikely to occur considering that a price increase is not expected for renewable energies in Brazil.

Investment costs: A decrease of 42.09% in the total project investments would lead to an IRR being equal to the benchmark. Likewise a decrease of 53.58% in the total project operation and maintenance costs would lead to equalling the benchmark. Such variations are not likely to happen considering the variation of the inflation index in Brazil. The General Market Price Index (IGP-M) is the market price index for products, construction, agriculture and services /21/, and the most commonly used for adjustments in contracted values. Considering the inflation from November 2010 (when the installation of the first engine occurred) to the present date (September 2012) based on the IGP-M index was 14.97% /22/. Hence, it is possible to confirm that the negative variation to reach the benchmark for the investment costs and operation and maintenance costs are not likely to occur.

The sensitive analysis above shows that unfavourable circumstances would be needed for the IRRs to reach the benchmark. In conclusion, it is DNV's opinion that the investment analysis and sensitivity assessment have shown that the proposed project is not financially attractive.

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

The project was registered as large scale and such modification does not present any impact on this matter.

Assessment of impacts of the changes on the applicability and application of baseline methodology

The modifications are of electricity generation installed capacity and therefore do not impact the applicability neither the application of the baseline methodology.

Assessment of impacts of the changes on the compliance of the monitoring plan with the applied monitoring methodology

The monitoring plan had not been changed. The increase in the installed capacity of electricity generation does not impact the monitoring plan already implemented, since the addition of an electricity generator is not a different component of the project monitoring plan already foreseen.

Assessment of impacts of the changes on level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan

Not applicable. The monitoring plan had not been modified.

7 Validation opinion

DNV checked and verified complementary data and related information used to explain the changes made in the project activity and the impact of such changes in the project's implementation, emission reductions, additionality, project's scale and applicability and application of baseline methodology.

The revised PDD /1/ and the calculations provided in the revised spreadsheets /2/ /3/ clearly and transparently identify the changes from the project activity as described in the registered project design document /12/. The changes made in the revised PDD are related to the installation of an additional 1.426 MW generation unit. The justification and assumptions made in the calculations are considered reasonable and acceptable.

The changes in the project design do not affect negatively the project activity operation however it affects the amount of emissions reductions expected by the project activity. The changes do neither impact adversely the additionality of the project nor the applicability/application of ACM0001, version 11 /16/.

Hence, it is DNV's opinion that the changes to the project activity do not raise any concerns with regard to i) additionality, ii) scale of the CDM project activity and/or iii) applicability and application of baseline methodology.

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

- /1/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Revised Project Design Document for the “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040” – Version 3 of 3 October 2012.*
- /2/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Revised CER estimation spreadsheet.* Dated 3 October 2012.
- /3/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Financial analysis spreadsheet.* Version 5 of 5 July 2012.
- /4/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Detailed investment costs updated for a 5 MW installed capacity.* Version 3 of 5 July 2012.
- /5/ GE Jenbacher: *technical specifications of 1.426 MW LFG energy generator.*
- /6/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Monitoring records - Monthly report of the project operation from 4 June 2011 to 30 September 2011 .*
- /7/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Purchase invoice for the acquisition of the fourth LFG generator.* Dated 23 November 2010.
- /8/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Operation records as per the monitoring plan from 1 December 2010 to 30 September 2011.*
- /9/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Actual operational records for the electricity exported by the project “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040” from 1 January 2011 to 31 December 2011.*
- /10/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *email from UNFCCC secretariat confirming the submission of the project “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040”for registration.* Dated 8 April 2010.
- /11/ Asja Brasil Serviços para o Meio Ambiente Ltda.: *Electricity bills from June 2011 to 30 September 2011*

Documentation used by DNV to validate / cross-check the information provided by the project participants

- /12/ CDM Executive Board: *Registered Project Design Document for the “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040” – Version 2a of 25 November 2009.*
- /13/ CDM Executive Board: *CER estimation spreadsheet for the registered project “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040”*
- /14/ CDM Executive Board: *Financial analysis for the registered project “Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040”*
- /15/ CDM Executive Board: *Registered Project “Exploitation of the biogas from Controlled*

- Landfill in Solid Waste Management Central – CTRS / BR.040. Available at:
<http://cdm.unfccc.int/Projects/DB/SGS-UKL1267696608.78/view>
- /16/ CDM Executive Board: “*Consolidated baseline and monitoring methodology for landfill gas project activities*”, ACM0001, version 11
- /17/ Chamber of Electricity Commercialization- *Second Auction on Renewable Energy in Brazil* – 26 August 2010.
<http://web.archive.org/web/20101224125621/http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=ef4f39fd29b39210VgnVCM1000005e01010aRCRD>
- /18/ Chamber of Electricity Commercialization- *First Auction on Renewable Energy in Brazil* – 18 June 2007.
<http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=3cb3f87495bd1110VgnVCM1000005e01010aRCRD>
- /19/ Chamber of Electricity Commercialization- *12th Auction on New Energy in Brazil* – 22 February 2011.
<http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=38820a6c2930f210VgnVCM1000005e01010aRCRD>
- /20/ Chamber of Electricity Commercialization- *13th Auction on New Energy in Brazil* – 30 September 2011.
<http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=b02951aa0e383310VgnVCM1000005e01010aRCRD>
- /21/ Getúlio Vargas Foundation: Market General Price Index description:
<http://portalibre.fgv.br/main.jsp?lumPageId=402880811D8E34B9011D984D6E3C34A9&lumII=8A7C82332BE9B9B8012BF98EFFCD5313>
- /22/ Central Bank of Brasil: Market General Price Index calculation for a period of time (see option “calculadora do cidadão”. Insert dates and inflation will be calculated for the desired period).
<https://www3.bcb.gov.br/CALCIDADA0/publico/exibirFormCorrecaoValores.do?met hod=exibirFormCorrecaoValores>
- /23/ Verified Carbon Standard: pre-CDM verification information of the project Exploitation of the biogas from Controlled Landfill in Solid Waste Management Central – CTRS / BR.040 from 29 October 2009 to 28 November 2010.
<https://vcsregistry2.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=659>
- /24/ Environmental State Agency of São Paulo (Cetesb): “*Reducing the uncertainty of methane recovered (R) in greenhouse gas inventories from waste sector and of adjustment factor (AF) in landfill gas projects under the clean development mechanism*”. Dated 2010.
http://homologa.ambiente.sp.gov.br/biogas/docs/artigos_dissertacoes/magalhaes_alves_santofilho_costa_kelson.pdf