SALVADOR DA BAHIA LANDFILL GAS PROJECT

ANNEX 3, 4 and 5 to PDD

Presentation of New methodology for baseline and Monitoring

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This documentation was elaborated based on the Baseline study, Monitoring and Verification Plan and Project Design Document, version 03 June 2003, elaborated by ICF Consulting.

The document took into account "*Recommendations*" and "*Details of the evaluation of the proposed new methodology*" made by Meth Panel and approved by CDM-EB at its ninth meeting, 6-7 of June 2003.

The document was also revised to take into account annex 3 to the EB ninth meeting report, "*further clarifications on methodological issues*", mainly in reference to its section A, item 3. "*(...) The annexes 3 and 4 to the CDM-PDD shall not contain information which is related to the application of the proposed new methodology to the project activity for illustrative purposes.(...)*" and item 5. "*(...) The CDM-PDD sections A-E are meant to provide information on the application of the methodology(ies) to the project activity.*"

Annex 3

NEW BASELINE METHODOLOGY

1. Title of the proposed methodology:

Contractual amount of landfill gas capture and flaring defined through public concession contract.

2. Description of the methodology:

2.1. General approach (Please check the appropriate option(s))

The proposed Baseline New Methodology is based on the following general approach:

48(b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;

Justification:

The proposed new methodology is based on contractual obligations defined by a concession contract passed between a public government agency and a private operator.

The contract, and other associated binding documentation, defines a technology to be used and it associated performance, and a price to be paid for the service provided.

As a consequence the concession contract is the "economically attractive course of action" for the landfill management.

2.2. Overall description (other characteristics of the approach):

The proposed methodology consider a situation where a sanitary landfill owned by a municipality, or other public government agency, is operated by a private company under a long term concession contract.

The methodology will be applicable if all the following conditions are satisfied:

- Landfill concession contract includes all responsibilities for landfill design, construction, operation, maintenance and monitoring ;
- Landfill management services are paid only through a fixed fee per ton of waste ;
- Landfill services invoicing is based exclusively on real waste entrance ;
- Concession contractual documents indicate a hypothetical annual quantity of waste entrance, over all contract duration ;
- Concession contractual documents clearly indicate an amount of landfill gas to be captured and flared, referenced to the hypothetical annual quantity of waste to be received, over all contract duration ;

The following conditions have to be checked additionally

- The landfill is operated with all required licences (environmental, ...) ;
- Energy production from landfill gas captured in addition to contractual amount will not happen without CDM project activity ;

The CDM project activity is to expand the gas collection system and destruction capacity over the contractual amount.

The difference between the actual destruction of methane and the contractual amount would be the resulting emission reduction from the project activity.

Why does that situation represent an economically attractive course of action?

***Landfill contract barriers to investment*:**

Call for tender for Landfill concession contracts generally define a maximum price, or a range of acceptable prices (minimum and maximum), associated with specific minimum technical requirement established by the public government agency.

By definition, the winning proposal attends the technical requirement (purpose of the contract, local environmental obligations,...), at the best price.

That fact defines the contractual amount of gas to be captured and flared as a valid technical reference for baseline, independently of the way it was calculated.
However it should be necessary, for project validation, to check if that amount of gas really represent a performance that is among the top 20% per cent of its category, to avoid public government agency temptation to transfer part of normal landfill cost to CDM mechanism.

Within the required conditions defined for the applicability of the proposed new methodology, the concessionaire is paid through a fixed fee per ton of waste entering the landfill.
That remuneration is supposed to cover all construction and operation cost.
As a consequence, it is not possible for the concessionaire to improve significantly landfill gas capture and destruction efficiency, as there is no additional revenue associated that would maintains the economical equilibrium of the contract.

We remember that required conditions for the applicability of the proposed new methodology necessarily includes the fact that energy production from landfill gas captured in addition to contractual amount will not happen without CDM project activity

For that reasons any investment or operational cost required to destroy more than the contractual amount is additional and will not happen without project activity.

3. Key parameters/assumptions (including emission factors and activity levels), and data sources considered and used:

Baseline is determined as the contractual amount of gas to be collected and burned.

Methane Emission Reduction (ER_{CH4}) from project activity will be calculated as the difference between real capture and destruction of methane in project scenario and contractual amount.

$ER_{CH4} = CH4_{captured\ in\ project\ scenario} - CH4_{captured\ in\ baseline\ scenario}$

With:

$CH4_{captured\ in\ project\ scenario}$:

Definition: amount of methane that will be really captured in project activity scenario
Unit: : Nm3
Data source: calculated by application of monitoring methodology

$CH4_{captured\ in\ baseline\ scenario}$:

Definition: contractual amount of methane that will be captured and flared.
Unit: : Nm3
Data source: concession contract. That data could be expressed directly in the contract, or obtained by :

$CH4_{captured\ in\ baseline\ scenario} = x\%\ time\ LFG_{captured\ in\ baseline\ scenario}$

With :

x% : volumetric percentage of methane within biogas, as indicated in concession contract.
$LFG_{captured\ in\ baseline\ scenario}$ is defined below.

Contractual amount is established based on call for tender technical requirement or/and economical consideration, i.e. maximum bearable cost that gas capture and destruction can represent within the total cost for Landfill.
Activity level is defined in the contract by the hypothetical quantity of waste that will be annually disposed at the landfill.
As the concessionaire is paid based on a fee per ton of waste really entering the site, amount of gas flared in baseline needs to be adjusted to real activity level. Amount of gas in baseline will be then calculated on an annual basis, proportionally to the real waste entrance, through the following equation:

$$LFG_{captured\ in\ baseline\ scenario} = LFG_{captured\ in\ concession\ contract} \times (WASTE_{really\ disposed} / WASTE_{disposed\ in\ contract\ scenario})$$

With:

$LFG_{captured\ in\ baseline\ scenario}$:

> ***Definition***: amount of landfill gas in baseline scenario that will be really used for Emission Reduction calculation
> ***Unit***: : Nm3 of Landfill gas at x % of CH4 (x% as indicated in concession contract)
> ***Data source***: calculated

$LFG_{captured\ in\ concession\ contract}$:

> ***Definition***: amount of landfill gas that is indicated in the concession contract in reference with the hypothetical level of activity
> ***Unit***: Nm3 of Landfill gas at x % of CH4 (x% as indicated in concession contract)
> ***Data source***: Concession contract

$WASTE_{really\ disposed}$:

> ***Definition***: amount of waste really received at the landfill
> ***Unit***: metric tonnes
> ***Data source***: Weight bridge of the landfill

$WASTE_{disposed\ in\ contract\ scenario}$:

> ***Definition***: hypothetical stream of waste projected to be received during contract duration
> ***Unit***: metric tonnes
> ***Data source***: Concession contract

That information will be registered through the following table:

Year	A : Annual tonnage of waste considered in Concession Contract : *[tones]*	B : Actual tonnage of Waste really Disposed *[tones]*	C : Annual amount of landfill gas considered in Concession Contract : *[Nm3 @ x % CH4]*	D : Annual amount of landfill gas to consider in baseline : D = CxB/A : *[Nm3 @ x % CH4]*
Year 1				
Year 2				
…				

To be able to use the methodology, the concession contract needs to identify directly the amount of methane that will be captured, or the percentage of methane considered in the landfill gas that will be captured.

Real amount of methane captured and flared will be directly and continuously monitored as indicated in monitoring methodology.

Remembering :

$CH4_{captured\ in\ project\ scenario}$:

Definition: amount of methane that will be really captured in project activity scenario

Unit: : Nm3

Data source: calculated by application of monitoring methodology. It will be obtained by :

$CH4_{captured\ in\ project\ scenario} = x\%_{measured}$ time $LFG_{captured\ in\ project\ scenario}$

In fact, in real condition of gas capture, the percentage of methane within the landfill gas may vary more than 20% during a same day, due to gas capture network conditions. As a consequence, amount of methane captured will be an integration over time of volume of landfill gas captured at different percentage of methane. Calculation details are given in monitoring methodology.

4. Definition of the project boundary related to the baseline methodology:

Gas management on a sanitary landfill can be considered as a closed system.

Methane is the only anthropogenic GHG involved.

Two other potential sources of emissions that might offset any reductions achieved were also considered.

First, potential CO2 emissions generated from CH4 produced by plastics decomposition. For several reasons, this was considered as immaterial. The Revised IPCC Guidelines for National GHG Inventories (1996) do not consider CH4 production from plastic wastes. The level of plastics waste is generally lower than 20% in developing country Municipal Solid Waste, and importantly the contribution to CH4 from plastics is only 5m3 CH4/tonne of MSW compared to the emissions of approximately 180m3 CH4/tonne of MSW, and its decomposition kinetic is much more slower.

The second potential source considered was the potential for emissions resulting from electricity being used to pump methane gas in the additional collection equipment.
The relevancy of emission due to that additional electricity consumption will have to be discussed in project design document, as it depends of the origin of the electricity used.

5. Assessment of uncertainties:

Uncertainties in a landfill gas management project baseline come from the fact that gas production in landfill varies along the time, as well as gas capture efficiency.

Amount of landfill gas to be captured in baseline can also be affected by regulatory changes.

As a result, uncertainties were divided into 3 groups :

I - Uncertainties linked to estimating gas capture efficiency :

1. Impossibility to have a direct measurement of total gas emission on landfill cover

How uncertainties will be addressed :

1. The proposed baseline methodology defines directly the volume of Emission Reduction that would occur in the baseline scenario (contractual amount). The associated monitoring methodology will directly measure the volume of Emission Reduction in the project scenario, as the data are easily accessible. The methodology avoids having to estimating emissions at landfill covers, which would not provide an accurate or real assessment since it is technically infeasible to have a measurement of total emissions at the point of landfill cover..
   The proposed approach, in case of landfill gas management project, is the most reliable and is consistent with the general approach : *"Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment"*. As a matter of fact, investment and operational cost for gas management are directly dependent of the quantity of gas that will be captured and flared.

II - Uncertainties factors linked to gas production :

1. Quantity of waste to be really disposed at Landfill
2. Methane generation potential of waste (variation in waste composition)
3. Kinetic condition for waste degradation

How uncertainties will be addressed :

1. *Quantity of waste to be really disposed at Landfill*

   Volume of methane to be capture and flared in contract are linked to a hypothetical waste entrance.
   Real waste entrance will be measured at landfill entry. (Landfill invoicing based on a price per ton of waste disposed).
   Volume of methane to be captured in baseline will then be proportionally adjust to real waste entry.

2. *Methane generation potential of waste (variation in waste composition), and*
3. *Kinetic condition for waste degradation*

   As the proposed baseline methodology is based on a contractual amount of gas to be captured and flared, and as that amount is fixed due to the economical and legal frame defined by the

concession contract, the baseline is therefore not affected by waste composition (methane generation potential) or kinetic condition for waste degradation.
In the same manner, landfill gas destroyed in project activity will be directly measured, and will then be determined independently of that 2 factors.
Uncertainties on methane potential and kinetic conditions will then not affect Emission Reduction calculation.

However it will be necessary to verify if the performance of the baseline is compatible with the local good practices (among the top 20 per cent of its category) to avoid public government agency temptation to transfer part of normal landfill cost to CDM mechanism.
That point will have to be discussed to check the conservatism of the baseline and will be based on that 2 factors. (see section 8)

III - Uncertainties factors linked to regulatory changes :
Technical obligation of the contract are consistent with regulation at the moment of the contract signature.
As concession contracts are generally long term contracts (more than 10 years), it can appear new technical obligation regarding landfill gas management that could impact the baseline.
That point will have to be check by the DOE acting as verifier and will have to be also considered when the project activity is submitted for renewal for the second crediting period.

6. Description of how the baseline methodology addresses the calculation of baseline emissions and the determination of project additionality:

Baseline emission is determined as a consequence of the concession contract for landfill management.

The contractual volume of gas is calculated to respect technical requirements and the economical and legal framework defined by the concession contract.

Exist unlimited manners to reach that contractual amount, combining economical aspects, regulatory standards and contract technical requirements.

That context will have to be clearly exposed in the Project Design Document.

Project additionally will be determine by the difference of performance between gas capture in project scenario (to be measured) and baseline scenario (contractual amount).

We remember that the proposed methodology is applicable when energy production – or other valorisation form – from landfill gas captured in addition to contractual amount will not happen without CDM project activity ;

This condition determines the project additionality.

7. Description of how the baseline methodology addresses any potential leakage of the project activity:

The only potential leakage identified is due to the additional electricity that will have to be used for gas pumping.
The Project Design Document will have to indicated the origin of this energy and the potential GHG emission associated.

8. Criteria used in developing the proposed baseline methodology, including an explanation of how the baseline methodology was developed in a transparent and conservative manner:

Baseline methodology was developed using the existing legal context of Salvador de Bahia, Brasil, landfill concession contract (transparency aspect), and pretending not to be affected by uncertainties due to LFG production estimation (conservative aspect).

Concession contract is a public document, result of a public administrative process regulated by local juridical framework.

However, it is probable that in a majority of developing countries, no landfill gas management technical standard is clearly defined by the regulation.

For that reasons, the Project Design Documents, along with clearly identifying the way the contractual amount was calculated (see section 6), will have to demonstrate that this contractual amount represent, at least, a performance which is among the top 20% landfill gas management system of that region.

That demonstration would be able to be done :

- comparing proposed baseline system with landfill gas management system used in a group of existing representative sanitary landfills serving as reference, or
- using the First Order Decay model for Landfill gas generation estimation (see IPCC guideline, 1996) to calculate the possible range of variation of gas capture efficiency in function of the possible range of variation of the model 2 parameters : Lo : methane potential of waste and k : degradation kinetic (reference value of Lo and k are indicated in the IPCC guidelines in function of waste composition and landfill conditions). The result will have to be discussed and compared with the local sector situation.

Nota : that methodology does not consider eventual emission reduction from electricity displacement. If electricity generation is associated with gas capture, project participant will have to use, in addition, another specific approved methodology, as indicated in section 6. of the Annex 1 to the Executive Board eighth meeting report.

9. Assessment of strengths and weaknesses of the baseline methodology:

Strengths :

1 - Baseline scenario is determined through concession contract established prior to the development of the CDM project activity, serves as a clear and transparent reference.

2 – Emission reduction is calculated independently of any model for Landfill gas generation estimation whose accuracy is difficult to establish (possible errors of the models of more than 100%).

Weaknesses :

None identified

10. Other considerations, such as a description of how national and/or sectoral policies and circumstances have been taken into account:

National or sectoral policies are obligatorily taken into account when establishing a public contract.

<u>Applicability of methodology across project type and region</u>

The methodology could be applied in any other region for other gas capture project activities, as long as the concession obligation stipulates the amounts of landfill gas to be collected.

This, however, is not the case of most concession agreement today, what generally leads to bad management situation, or conflict situation between the concessionaire and its client.

On the other hand, the methodology could have a good influence on future contracts, by inciting public government agencies, or at least concessionaires, to define more clearly technical obligation in relation with landfill gas management in the call for tender term of reference or in the concessionaire proposal. As a matter of fact the fee per ton paid for waste disposal is directly impacted by the amount of gas that will be flared.

ANNEX 4

NEW MONITORING METHODOLOGY

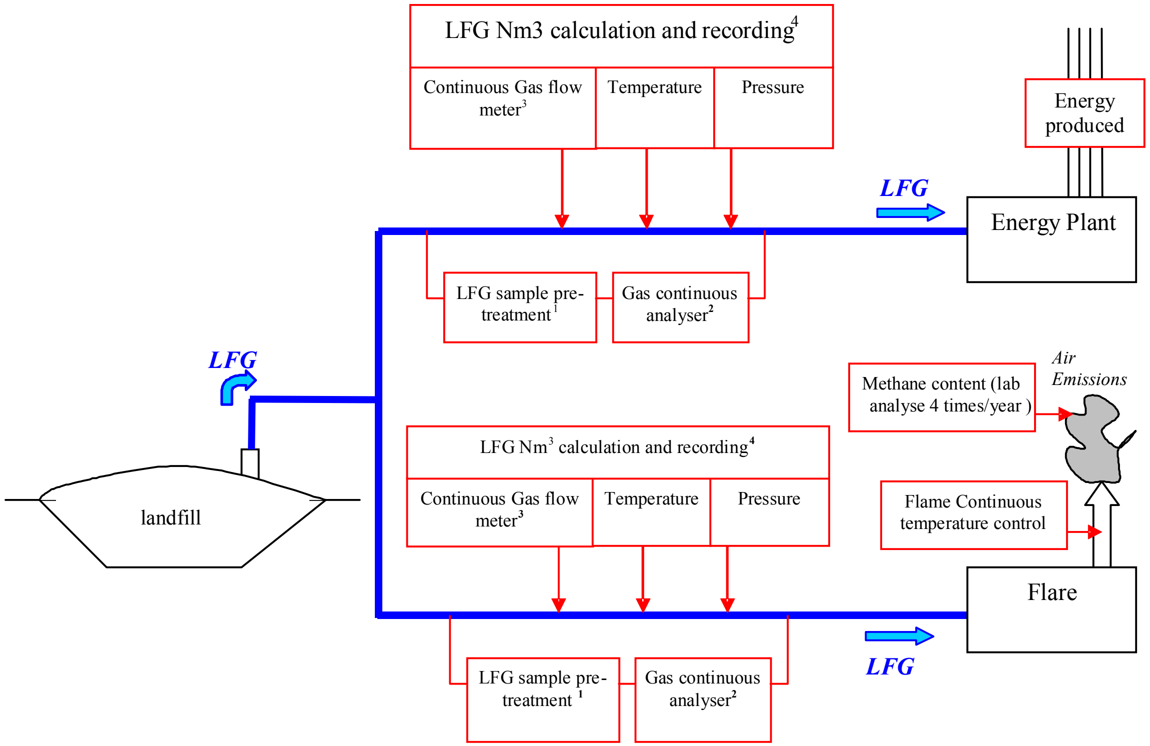
Proposed new monitoring methodology

A detailed explanation of Monitoring plan is provided through specific document called MVP and its specific Workbook (see joint documents)

1. Brief description of new methodology

Monitoring methodology is based on direct measurement of landfill gas captured and destroyed at the flare platform or, eventually at the energy production plant.

The concept is a continuous measurement of quantity and quality of LFG burned, as shown in beside scheme.



The monitoring methodology identify a preferred measurement system and a complementary measurement system.

The alternative measurement system is based on working Hours of blowers and Flares, and conversion factors coming from historical monitoring data.

Real Waste disposed

The amount of waste really disposed at the landfill is monitored directly at the weightbridge. That measurement is already used for waste disposal activity invoicing.

Methane Collected and Flared Worksheet

The amount of methane flared in the project scenario will be monitored from :

Preferred method

- amount of landfill gas collected [tonnes or m^3 : continuous flow meter]
- percentage of landfill gas that is methane [% - : continuous analyser]
- flare working hours

Complementary method

That complementary method is proposed to estimate volume of methane flared in case of unavailability of the continuous analyser.
The alternative method is less accurate than the preferred method. For that reason it will be based on conservatives factors to be used.

- amount of landfill gas collected [tonnes or m^3 : working hours of blower x blower capacity]
- percentage of landfill gas that is methane : lowest historical measurement of last 2 month [%]
- flare working hours

Notes : The blower capacity and the lowest percentage of methane in landfill gas will be obtained through historical measurement made with the “preferred method”.

Methane Collected and used at energy plant Worksheet *(in case energy generation is implemented in the future)*

The amount of methane used at energy plant will be monitored from:

Preferred method

- amount of landfill gas collected [tonnes or m^3 : continuous flow meter]
- percentage of landfill gas that is methane [% - : continuous analyser]

Complementary method

- Total amount of energy produced [MWh]
- Energy conversion factor of the plant : to be obtained from historical data obtained through the "preferred method"

Total energy produced at Energy Plant

The amount of electricity produced at the energy plant will be directly obtained through electric measurement equipment of the plant.

Sustainable development indicators will be followed too. Each one will have a specific reporting procedure.

2. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived

Please refer to spreadsheet "summary" worksheet in file "Vega MVP Workbook".
All data will be archived on electronic support through MVP workbook.
Each year will be generated a summary sheet that will be signed by Project Manager and archived on paper.

ID	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic : e / paper : p)	For how long is archived data kept?	Comment
2.1	Waste disposal	Annual Waste Landfilled	[metric tones]	m	Daily	100%	Daily : e Monthly : p	Project lifetime	Measured at weightbridge
2.2	LFG	Amount of methane flared	[t CH4]	m	Continuous	100%	Daily : e Monthly : p	Project lifetime	Measured by continuous gas quality analyzer and flow meter, or complementary method (% CH4, Sm^3/h of LFG, LFG temperature and pressure, flare temperature, flare working hours)
2.3	LFG	Amount of methane used at energy plant	[t CH4]	m	Continuous	100%	Daily : e Monthly : p	Project lifetime	Measured by continuous gas quality analyzer and flow meter, or complementary method (% CH4, Sm^3/h of LFG, LFG temperature and pressure, total amount of energy produced)

ID	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic : e / paper : p)	For how long is archived data kept?	Comment
2.4	LFG	Total amount of methane flared or used	[t CH4]	c	Daily	n/a	Daily : e Monthly : p	Project lifetime	Sum of 2.2 & 2.3
2.5	LFG	Amount of methane flaring required in baseline	[t CH4]	c	Annually	n/a	Annually : e & p	Project lifetime	Contractual amount adjusted by real waste entrance
2.6	LFG	Amount of methane collected in addition to requirement	[t CH4]	c	Annually	n/a	Annually : e & p	Project lifetime	
2.7	Emission Reduction	Annual Carbon Dioxide Equivalent Avoided	[t CO2e]	c	Annually	n/a	Annually : e & p	Project lifetime	

3. Potential sources of emissions which are significant and reasonably attributable to the project activity, but which are not included in the project boundary, and identification if and how data will be collected and archived on these emission sources

If electricity consumption for gas pumping represent a leakage, it will have to be monitored through the following table:

ID	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic : e / paper : p)	For how long is archived data kept?	Comment
3.1	Electricity	Total amount electricity used for gas pumping	[kWh]	m	continuously	100%	Daily : e Monthly : p	Project lifetime	

4. Assumptions used in elaborating the new methodology:

If exist leakage from electricity used at gas pumping station

Default emission factor associated with electricity used : to be indicated in PDD depending on origin of electricity used.

5. Please indicate whether quality control (QC) and quality assurance (QA) procedures are being undertaken for the items monitored. *(see tables in sections 2 and 3 above)*

Data	Uncertainty level of data (High/Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.
2.1	Low	yes	Already Included in Landfill ISO 9000/14000 certification. Specific procedure for calibration
2.2	Low	yes	Will be included in Landfill ISO 9000 / 14000 certification. Specific procedure to be developed for measurement equipment calibration and maintenance, as well as for calculation module
2.3	Low	yes	Will be included in Landfill ISO 9000 / 14000 certification scope. Specific procedure to be developed for measurement equipment calibration and maintenance, as well as for calculation module
2.4	Low (calculated)	yes	Will be included in Landfill ISO 9000 / 14000 certification scope
2.5	Low (calculated)	yes	Will be included in Landfill ISO 9000 / 14000 certification scope
2.6	Low (calculated)	yes	Will be included in Landfill ISO 9000 / 14000 certification scope
2.7	Low (calculated)	yes	Will be included in Landfill ISO 9000 / 14000 certification scope
3.1	Low	yes	Will be included in Landfill ISO 9000 / 14000 certification scope

6. What are the potential strengths and weaknesses of this methodology?

Strengths :

1 – direct and continuous measurement of real Emission Reduction at Project based on gas continuous methane analyser and gas flow meter. As a matter of fact, methane content in gas captured can vary for more than 20% during a same day, due to gas capture network conditions (dilution with air at wellheads, leakage on pipes, ...)

2 – existence of a more robust alternative monitoring system allowing to have an internal check, and Emission Reduction Calculation in case of problem with the preferred monitoring system.

weaknesses :

1 – sensibility of measurement equipment for gas quality (humidity, particulate, ...). Will need strong calibration QA/QC procedure.

7. Has the methodology been applied successfully elsewhere and, if so, in which circumstances?

The proposed monitoring methodology is commonly used on Landfill with gas to energy plant where it is necessary to have a strict contrl of fuel.

We can thus indicate the following sites, all of them within the Suez Group.

Hersin Coupigny (france)
SITA FD
Carrière de la Loisne - BP 25
62 350
France
Pas de Calais
Hersin Coupigny

Lewarde (france)
SITA Nord
Lieu dit "Les Planchettes"
59 287
France
Nord
Lewarde

Satrod (france):
SITA FD
ZI du Puits Charles / Poste: Satrod: 25 rue
Racondon, 42000 Saint Etienne
42230
France
Loire
Roche la Molière

Montebelluna (Italie)
SITA Italia
Via Fanzolo -
31044
Italy
Province de Trévise
Montebelluna

Palautordera (Espagne)

CESPA GR
Cami de les Valls
08460
Spain
Barcelona / Cataluña
Santa Maria de Palautordera

ANNEX 5 TO SALVADOR DE BAHIA LANDFILL GAS MANAGEMENT PROJECT

TABLE : BASELINE DATA

The following tables are directly extracted from the Project Monitoring Workbook

Factor Used for Converting Methane to Carbon Dioxide Equivalents[1]

Factor used (CO_2e/CH_4)	Period Applicable	Source
21	1996-present	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

[1] This table is updated as more scientific information becomes available or reporting guidelines are modified.

Key Variables in the Production and Collection of Methane

Variable	Units	Value
Lo (methane potential)	m3/tonne MSW	180
k (decay rate)		0.12
% of landfill gas captured that is methane as indicated in concession contract	%	50%
Collection Efficiency in Project	%	80%

Conversion Equivalents[1]

Factor	unit	Period Applicable	Description/Source
0.000662	tonnes CH4/m3(STP) CH4	default	Project manager should assess the density of the methane being collected and correct this factor so that it accurately represents the local situation.
X	MWh / tonnes of CH4	N/A	The efficiency of converting methane to electricity is highly variable, depending on the efficiency of the equipment, etc. The project operator will have to ascertain this factor based on the local conditions if energy generation is implemented.

[1] This table is updated as more scientific information becomes available or reporting guidelines are modified.

Projection of Waste Disposal and baseline landfillgas flaring at the Salvador de Bahia Landfill Site

Year	A : Annual tonnage of waste considered in Concession Contract : *[tones]*	B : Actual tonnage of Waste Disposed *[tones]*	C : Annual amount of landfillgas considered in Concession Contract : *[1000 Nm3 @50% CH4]*	D : Annual amount of landfillgas to consider in baseline : D = CxB/A : *[1000 Nm3 @50% CH4]*
1997		28,779		
1998		179,064		
1999		761,392		
2000	790,000	840,000	14,892	15,834
2001	810,000	869,752	14,892	15,990
2002	820,000	838,016	19,360	19,785
2003	840,000		28,784	
2004	860,000		37,230	
2005	870,000		43,187	
2006	890,000		48,399	
2007	910,000		52,122	
2008	930,000		59,568	
2009	950,000		63,291	
2010	960,000		67,014	
2011	980,000		70,737	
2012	1,000,000		74,460	
2013	1,020,000		78,183	
2014	1,040,000		81,906	
2015	1,060,000		83,768	
2016	1,080,000		85,629	
2017	1,150,000		87,863	
2018	1,180,000		89,352	
2019	1,150,000		85,108	

Methane Destruction Requirements per Concession Contract

Year	Methane Capture Requirements in contract (tones equivalent of CH4)*	Methane Capture Requirements adjusted by actual waste received (tones equivalent of CH4)
2001	4.914	5.276
2002	6.389	6.529
2003	9.499	0
2004	12.286	0
2005	14.252	0
2006	15.972	0
2007	17.200	0
2008	19.657	0
2009	20.886	0
2010	22.115	0
2011	23.343	0
2012	24.572	0
2013	25.800	0
2014	27.029	0
2015	27.643	0
2016	28.258	0
2017	28.995	0
2018	29.486	0
2019	28.086	0

* : see calculation details in Baseline study