Abstract of the feasibility study of Muribeca Landfill Gas to Energy CDM project, Brazil

1. Project Summary

This project aims to study the possibility of a proposed landfill gas to energy CDM project and prepare a Project Design Document (PDD) to be submitted to the CDM Executive Board. This project is to collect landfill gas and generate power at Muribeca landfill, which is located in City of Jabaotão, State of Pernambuco, Brazil.

The project is to reduce greenhouse gas (GHG) emissions by collecting and combusting landfill gas, which includes methane (CH_4), to generate electricity up to a generation capacity of 11.2 MW and flaring the remaining LFG which is not combusted in an electrical generator. The project is to supply renewable electricity to a local grid. The capture and combustion of CH_4 of LFG; in an engine generator and LFG flare system; transform CH_4 (Global Warming Potential (GWP): 21) into CO_2 (GWP: 1) and water, resulting in the avoidance of CH_4 release into the atmosphere. The estimated total GHG emission reduction (ER) to be achieved by the project is 3,303,934; 1,523,207; 1,298,669 tCO_2e for the duration of 7-year, 14-year, and 21-year crediting periods, respectively.

The Muribeca Landfill is located in the City of Jabaotão. This landfill accepts municipal and non-hazardous municipal waste. At the present time, about 80 % of the waste comes from the City of Recife and 20 % of the waste comes from the City of Jabaotão. The waste composition is reportedly 60 % organic waste, 15 % paper, 8 % plastic, 2 % metal, 2 % glass and 13 % other materials. The landfill is operated by a municipally-owned company named Empresa de Manutencão e Limpeza Urbana (EMLURB).

The Muribeca Landfill began operation in 1985 as an open dump. It was upgraded to a modern landfill in 1994. Currently most of the attributes of a modern sanitary landfill are in place including controlled access, well-maintained access roads, controlled dumping areas with waste compaction by bulldozers, and the application of up to 50 centimeters of intermediate soil cover in inactive areas. The landfill currently does not have a LFG collection and control system. The site does have a LFG venting system consisting of approximately 20 vents. The vents were constructed as the landfill was built by placing 1-m diameter concrete drain pipes in an upright position and filling it with rock.

The current plan is to continue to fill the site until it reaches an average elevation of 70 meters. It is currently forecast that the landfill will reach this elevation in 2009. At that time, the landfill will close, and a new landfill will be required. An additional 83-ha area has been reserved for a future landfill expansion. It has been proposed that a new landfill be constructed immediately adjacent to, and to the south of, the existing landfill. The landfill would occupy 70 hectares, a waste footprint of 23 hectares, and it would have a maximum elevation of 70 meters.

This project would contribute to sustainable development in Brazil. To collect LFG and generate energy is not a common practice in Brazil. This project could introduce a new technology of generating energy from LFG to cities of Jabaotão and Recife. By introducing this technology, it could also diversify the energy sources of Brazil; a significant proportion of which is mainly hydro electricity.

2. LFG analysis

The results of LFG analysis at Muribeca landfill site are as followings.

	CH_4	CO_2	O_2	N_2
Cell No.8	48%	39%	0%	13%
Cell No.9	52%	42%	1%	5%

3. Current and Planned Landfill Operation

<Current Operation>
The landfill currently has most of the attributes of a modern sanitary landfill, including:
- Controlled access;
- Waste receipts measured using entrance scales
- Well maintained access roads
- Controlled dumping area with compaction by bulldozers
- Placement of intermediate cover over inactive areas
- Stormwater runoff control
- Leachate management
- LFG vents

<Proposed LFG Technology>
(1) Proposed LFG system for the existing landfill area
- 190 Vertical Extraction Wells
- 40 Leachate Extraction Pumps
- LFG Collection Piping
- Condensate and Leachate Collection and Conveyance
- Flare Station

(2) Proposed LFG system for the expansion landfill area
- Horizontal Collectors

(3) Proposed Electric Power Plant Configurations
- Two 50 % capacity inlet moisture separators sized for 65 Nm^3/min (each)
- Three 50 % capacity multi-stage centrifugal blowers with a capacity of 65 Nm^3/min (each)
- Inlet vacuum = 60 and discharge pressure = 3 psig (pounds per square inch gauge).
- The motors on the blowers will be about 150 hp in size;
- Three gas-to-are (fin fan type) heat exchangers;
- Two 50 % capacity moisture separators sized at 65 Nm^3/hr (each);
- Seven containerized Caterpillar 3520 engine/generators with a gross power output of 1.6 MW (each). Total capacity = 11.2 MW. Generation voltage = 4,160 V;
- Switchgear to aggregate the generators together and to supply MMC's to meet plant parasitic loads
- Switchgear, including a step-up transformer to increase the voltage from 4,160V to 69 kV
- A 5-km, 69-kV power transmission line.

The total estimated construction cost for the 11.2 MW reciprocating engine power plant will be $14,640,000, including the cost of interconnection and the 5 km tie line. The capital cost estimate of the wellfield and flare station was estimated to be $3,743,000. The total capital cost is estimated to be $18,383,000.

4. Waste Disposal at Existing and Expansion Landfill Areas

	Existing landfill area		Expansion landfill area	
Year	Total Annual Tonnes	Total Accumulated Tonnes	Total Annual Tonnes	Total Accumulated Tonnes
1994	767,370	767,370	0	0
1995	831,230	1,598,600	0	0
1996	939,961	2,538,561	0	0
1997	1,007,519	3,546,080	0	0
1998	928,967	4,475,047	0	0
1999	892,491	5,367,538	0	0
2000	959,626	6,327,164	0	0
2001	924,340	7,251,504	0	0

2002	1,006,297	8,257,801	0	0
2003	985,662	9,243,463	0	0
2004	1,000,000	10,243,463	0	0
2005	1,000,000	11,243,463	0	0
2006	1,000,000	12,243,463	0	0
2007	1,000,000	13,243,463	0	0
2008	1,000,000	14,243,463	0	0
2009	156,537	14,400,000	185,000	185,000
2010	0	14,400,000	185,000	370,000
2011	0	14,400,000	185,000	555,000
2012	0	14,400,000	185,000	740,000
2013	0	14,400,000	185,000	925,000
2014	0	14,400,000	185,000	1,110,000
2015	0	14,400,000	185,000	1,295,000
2016	0	14,400,000	185,000	1,480,000
2017	0	14,400,000	185,000	1,665,000
2018	0	14,400,000	220,000	1,885,000
2019	0	14,400,000	220,000	2,105,000
2020	0	14,400,000	220,000	2,325,000
2021	0	14,400,000	220,000	2,545,000
2022	0	14,400,000	220,000	2,765,000
2023	0	14,400,000	220,000	2,985,000
2024	0	14,400,000	220,000	3,205,000
2025	0	14,400,000	260,000	3,465,000
2026	0	14,400,000	260,000	3,725,000
2027	0	14,400,000	260,000	3,985,000
2028	0	14,400,000	260,000	4,245,000
2029	0	14,400,000	260,000	4,505,000
2030	0	14,400,000	295,000	4,800,000
2031	0	14,400,000	295,000	5,095,000
2032	0	14,400,000	295,000	5,390,000

5. Predicted LFG recovery from the project site

In order to estimate anthropogenic emissions by sources of GHG of the baseline, SCS Engineers modified the First Order Decay Model of the USEPA. The USEPA First Order Decay Model equation is as follows:

$$\boxed{Q_M = \sum_{i=1}^{n} 2\, k\, L_o\, M_i\, (e^{-k\, t_i})}$$

$\sum_{i=1}^{n}$ = sum from opening year +1 (i=1) through year of projection (n);

Q_M = maximum expected LFG generation flow rate (m^3/year) (=LFG recovery potential)

k = methane decay rate constant (1/year)

L_o = ultimate methane generation potential (m^3/Mg)

M_i = mass of solid waste disposed in the i^{th} year (Mg)

t_i = age of the waste disposed in the i^{th} year (year)

SCS Engineers used the model to estimate the projected LFG recovery rates for the landfill as follows:

Year	Disposal Rate (Mg/yr)	Refuse In-Place (Mg)	LFG Recovery Potential (m³/hr)	LFG Recovery Potential (mmBtu/hr)	Collection System Coverage (%)	Predicted LFG Recovery (m³/hr)	Predicted LFG Recovery (mmBtu/hr)
1994	767,370	767,370	0	0	0%	0	0
1995	831,230	1,598,600	2,807	50	0%	0	0
1996	939,961	2,538,561	5,002	89	0%	0	0
1997	1,007,519	3,546,080	6,949	124	0%	0	0
1998	928,967	4,475,047	8,587	153	0%	0	0
1999	892,491	5,367,538	9,482	169	0%	0	0
2000	959,626	6,327,164	10,020	179	0%	0	0
2001	924,340	7,251,504	10,688	191	0%	0	0
2002	1,006,297	8,257,801	11,071	198	0%	0	0
2003	985,662	9,243,463	11,684	209	0%	0	0
2004	1,000,000	10,243,463	12,080	216	0%	0	0
2005	1,000,000	11,243,463	12,451	222	0%	0	0
2006	1,000,000	12,243,463	12,752	228	0%	0	0
2007	1,000,000	13,243,463	13,001	232	65%	8,451	151
2008	1,000,000	14,243,463	13,212	236	65%	8,588	153
2009	156,537	14,400,000	13,395	239	65%	8,707	156
2010	0	14,400,000	10,470	187	80%	8,376	150
2011	0	14,400,000	7,886	141	80%	6,308	113
2012	0	14,400,000	6,090	109	80%	4,872	87
2013	0	14,400,000	4,829	86	80%	3,863	69
2014	0	14,400,000	3,929	70	80%	3,143	56
2015	0	14,400,000	3,276	59	80%	2,621	47
2016	0	14,400,000	2,793	50	80%	2,234	40
2017	0	14,400,000	2,426	43	80%	1,941	35
2018	0	14,400,000	2,141	38	80%	1,713	31
2019	0	14,400,000	1,913	34	80%	1,531	27
2020	0	14,400,000	1,727	31	80%	1,382	25
2021	0	14,400,000	1,571	28	80%	1,257	22
2022	0	14,400,000	1,438	26	80%	1,150	21
2023	0	14,400,000	1,322	24	80%	1,058	19
2024	0	14,400,000	1,220	22	80%	976	17
2025	0	14,400,000	1,128	20	80%	903	16
2026	0	14,400,000	1,046	19	80%	837	15
2027	0	14,400,000	971	17	80%	777	14
2028	0	14,400,000	903	16	80%	722	13
2029	0	14,400,000	840	15	80%	672	12
2030	0	14,400,000	783	14	80%	626	11
2031	0	14,400,000	730	13	80%	584	10
2032	0	14,400,000	682	12	80%	545	10
2033	0	14,400,000	636	11	80%	509	9
2034	0	14,400,000	595	11	80%	476	9
2035	0	14,400,000	556	10	80%	445	8
2036	0	14,400,000	521	9	80%	417	7
2037	0	14,400,000	488	9	80%	390	7
2038	0	14,400,000	457	8	80%	366	7
2039	0	14,400,000	429	8	80%	343	6
2040	0	14,400,000	402	7	80%	322	6

6. Calculation of GHG emission reduction from the project site

The formulae in ACM0001 will be used to estimate emissions reduction of the project activity.

The GHG emissions reduction achieved by the project activity during a given year “y” (ER_y) is the difference between the amount of methane actually destroyed/combusted during the year ($MD_{project,\,y}$) and the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{reg,y}$), times the approved Global Warming Potential value for methane (GWP_{CH4}).

$ER_y = (MD_{project,\,y} - MD_{reg,y}) * GWP_{CH4}$

ER_y is measured in tCO_2e. $MD_{project,\,y}$ and $MD_{reg,y}$ are measured in tCH_4. The approved GWP_{CH4} for the first committed period is 21 tCO_2e/tCH_4.

Where regulatory or contractual requirements do not specify $MD_{reg,\,y}$ an “Adjustment Factor (AF)” is used and justified, taking into account the project context. $MD_{reg,y}$ is determined as a following equation.

$MD_{reg,\,y} = MD_{project,\,y} * \mathrm{AF}$

In Brazil, there is no regulation that a part or all of the LFG which occurs from landfill must be collected. Moreover, at the Muribeca landfill site, the contracts do not mention anything about LFG collection. The only regulation is to install vents and vent a part of LFG for safety purpose. According to the central government, there was no plan to introduce a regulation which imposes LFG collection at the present. Therefore it is appropriate to assume that AF (Adjustment Factor) =0 at the present. However if the situation changes, the value of AF (=0) will be updated at any time from the monitoring result.

$AF=0$
$MD_{reg,y}= MD_{project,y} * 0$
$MD_{reg,y}=0$

Therefore at present $MD_{reg,y}$ can be assumed to be zero.

The methane destroyed by the project activity ($MD_{project,y}$) during a year is determined by monitoring the quantity of methane actually flared ($MD_{flared,\,y}$), and gas used to generate electricity ($MD_{electricity,\,y}$).

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

$MD_{flared,\,y} = LFG_{flared,\,y} * W_{CH4} * D_{CH4} * FE$

Where $MD_{flared,\,y}$ is the quantity of methane destroyed by flaring, $LFG_{flared,\,y}$ is the quantity of LFG flared during the year measured in cubic meters (m^3), W_{CH4} is the average methane fraction of the LFG as measured during the year and expressed as a fraction (in m^3CH_4/m^3LFG), FE is the flare efficiency, and D_{CH4} is the methane density expressed in tonnes of methane per cubic meter of methane (tCH_4/m^3CH_4).

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

Where $MD_{electricity,\,y}$ is the quantity of CH_4 destroyed by generation of electricity and $LFG_{electricity,\,y}$ is the quantity of LFG fed into the electricity generator.

$MD_{project,\,y} = (LFG_{flared,\,y} * W_{CH4} * D_{CH4} * FE) + (LFG_{electricity,\,y} * W_{CH4} * D_{CH4})$

Therefore, the GHG emission reduction can be calculated as follows;
$ER_y = ((LFG_{flared,\,y} * \mathrm{FE}) + LFG_{electricity,\,y}) * W_{CH4} * D_{CH4} * GWP_{CH4}$

All of these parameters will be monitored as instructed by the monitoring plan.

7. Financial Analysis of the project

Financial analysis was conducted to the proposed project.

The followings are the assumptions used:

- Gross plant capacity (kW) 11,200
- Plant net capacity (kW) 9,649
- Plant availability 90%
- Net plant heat rate (Btu/kW) 14,140
- Initial power sales rate ($/kWh) $0.050
- Power sales rate escalation 3% p.a.
- Initial LFG cost ($/mm/Btu) $0.50
- LFG cost escalation 3% p.a.
- LFG initial operation and maintenance cost ($/kWh) $0.0190
- Operation and maintenance cost escalation 3% p.a.
- CER value ($/tonne) $6.00
- CER escalation 0% p.a.
- Capital cost $18,383,000

IRR for the proposed CDM project without CER revenue is -1.3 % . On the other hand IRR with CER revenue is 20.8%.

8. Baseline Methodology

ACM0001: Consolidated baseline methodology for LFG project activities will be applied to the project.
The proposed project activity meets the applicability condition of ACM0001 because the project's baseline is the partial or total atmospheric release of the gas, and the project falls into situation b) of ACM0001's applicability.

> b) The captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources;

9. Baseline and Additionality

ACM0001 states that the project's additionality should be demonstrated and assessed using "the tools for the demonstration and assessment of additionality".

<u>Step 0: Preliminary screen based on the starting date of the project activity</u>
The project is expected to start on January 1st, 2007. The crediting period will start only after the registration of the project. Step 0 does not need to be considered.

<u>Step 1: Identification of alternatives to the project activity consistent with current laws and regulations</u>

- **Alternative scenario 1**: Install LFG collecting system, flare system, and engines to supply electricity to a grid (the proposed CDM project).
- **Alternative scenario 2**: Install LFG collecting system and gas pipelines to supply gas to a local gas company.
- **Alternative scenario 3**: Install LFG collecting system and flare system to destroy methane.
- **Alternative scenario 4**: LFG is vented to the atmosphere for the safety purposes, but does not install LFG collection system which is to continue the current practice.

After careful reviews, it can be concluded that alternative scenario 1 and 4 are the realistic and credible alternatives.

<u>Step 2: Investment analysis</u>

Option III. Benchmark analysis is chosen to perform investment analysis

As a financial indicator for a project activity a project IRR would be used as the most suitable for alternative scenario 1. The IRR of alternative scenario 1 was -1.3 %.

As a financial benchmark the yield of Brazilian government bond would be appropriate and used; the yield of Brazilian government bond for 14 years was 8.875% (2005, 12, 30).

Comparing the project IRR of alternative scenario 1 of -1.3% and the financial benchmark of 8.9%, alternative scenario 1 has a less favorable indicator, meaning a lower IRR, than the benchmark used. Alternative scenario 1 can be judged to be not economically attractive.
We also conducted sensitive analysis, and the same result was obtained.

<u>Step 4: Common practice analysis</u>
Generally, it is difficult to gain profit from collecting LFG and generating electricity in Brazil because the sales price per unit for a renewable energy is very low.
To the best of our knowledge, there is no LFG to energy projects in Brazil, private or public, without any intention of CDM registration.

Therefore, alternative scenario 1 cannot be implemented without a CDM registration.

As the above result show, alternative scenario 4 is the only scenario left. Alternative scenario 4 is to vent LFG to the atmosphere for the safety purpose, as required by the current law in Brazil. The investment required for this alternative is minor and includes only the cost for the vents. Clearly alternative 4 is the least cost effective and most likely to happen without CDM activity. Therefore, alternative 4 is the baseline scenario

<u>Step 5: Impact of CDM registration</u>
The impact of this project to be registered as a CDM project would be as follows.
(1) The amount of GHG can be reduced.
(2) A project income can be obtained from the sales profit of CER.
As demonstrated in Step 1 to 4, the proposed CDM project without CDM project (alternative scenario 1) cannot be implemented, because of financial hurdles. On the other hand, the proposed CDM project with CDM increased its IRR rate up to 20.3% . The sales profit of CER enable the proposed CDM project activity to be undertaken.

The above steps were passed, and it can be concluded that the project activity is additional.

10. Estimated GHG emission reductions

In the estimate of GHG emission reductions, it is assumed that all predicted LFG recovery would be flared, and flare efficiency (FE) is multiplied to the total amount of Methane recovery.

Methane emissions reduction estimates	=	Predicted LFG recovery	*	Operating hours	*	Methane contents	*	Flare efficiency	*	Methane density	*	Methane GWP
				8,760		50		98		0.0007168		21
(tonnes CO_2e)		(m^3/hr)		(hours/yr)		(%)		(%)		(tCH_4/m^3CH_4)		

Predicted LFG recovery and Methane Emission Reduction Estimates

Year	Predicted LFG recovery			Methane Emissions Reduction Estimates	
	m^3/hr	cfm	mmBtu/hr	tonnesCH_4/yr	tonnesCO_2e/yr
2007	8,451	4,974	151	26,001	546,013
2008	8,588	5,055	153	26,423	554,889
2009	8,707	5,125	156	26,789	562,567
2010	8,376	4,930	150	25,771	541,191
2011	6,308	3,713	113	19,410	407,607
2012	5,911	3,479	106	18,187	381,918
2013	4,794	2,822	86	14,750	309,749
2014	3,979	2,342	71	12,244	257,119
2015	4,044	2,380	72	12,442	261,275
2016	3,514	2,069	63	10,813	227,080
2017	3,092	1,820	55	9,513	199,783
2018	3,308	1,947	59	10,177	213,720
2019	2,958	1,741	53	9,100	191,104
2020	2,679	1,577	48	8,244	173,126
2021	3,146	1,851	56	9,678	203,248
2022	2,845	1,675	51	8,754	183,828
2023	2,593	1,526	46	7,977	167,509
2024	3,002	1,767	54	9,237	193,986
2025	2,725	1,604	49	8,385	176,075
2026	3,023	1,780	54	9,303	195,355
2027	2,765	1,628	49	8,508	178,668
Total				291,706	6,125,810

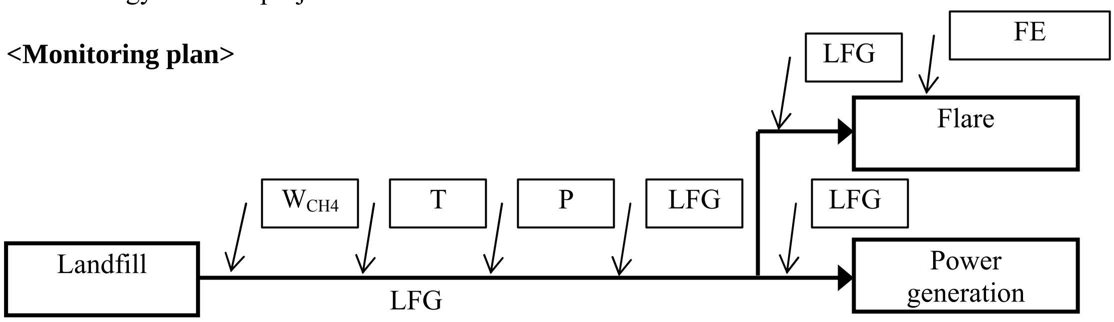
11. Quality Control and Quality Assurance

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1-3 LFGy	Low	Flow meters will be subject to regular maintenance and tests to ensure accuracy.
5. FE	Medium	Flare efficiency will be tested once within 180 days of the start-up of the Flare system. The test of Flare Efficiency will be repeated at 5 year intervals.
6. W_{CH4}	Low	The gas analyser will be subject to regular maintenance and testing to ensure accuracy.

12. Monitoring plan

The project will use the approved monitoring methodology ACM0001: Consolidated monitoring methodology for LFG project activities.

<Monitoring plan>



<Data to be collected>

ID Number	Date variable	Source of Data	Data unit	Measured(m) Calculated(c	Recording frequency	Proportion of data to be	Ho will the data be archived	Comment
1. $LFG_{total,y}$	Total amount of LFG captured	Flow meter	m^3	m	Continuously	100%	Electronic	Measured by a low meter. Date to be aggregated monthly and yearly.
2. $LFG_{flared,y}$	Amount of LFG flared	Flow meter	m^3	m	Continuously	100%	Electronic	Measured by a low meter. Date to be aggregated monthly and yearly.
3. $LFG_{electricity,\ y}$	Amount of LFG combusted in power plant	Flow meter	m^3	m	Continuously	100%	Electronic	Measured by a low meter. Date to be aggregated monthly and yearly.
5. FE	Flare/combustion efficiency, determined by the operation hours (1) and the CH_4 content in the exhaust gas (2)	Meter	%	m/c	(1) Continuously (2) Periodically	n/a	Electronic	(1) Continuous measurement of operation time of flare (2) Periodic measurement of the CH4 content of flare exhausts gas. The period of 5-year was recommended by SCS Engineers, because: · 5-year would be the typical interval that is required for exhaust testing of biogas flares in US.
6. W_{CH4}	Methane fraction in the LFG	Meter	m^3CH_4/ m^3LFG	m	Periodically	100%	Electronic	Preferably measured by continuous gas quality analyser.
7. T	Temperature of the LFG	Meter	Celsius	m	Periodically	100%	Electronic	Measured to determine the density of CH_4: D_{CH4}
8. P	Pressure of the LFG	Meter	m	m	Periodically	100%	Electronic	Measured to determine the density of CH_4: D_{CH4}
11	Regulatory requirements relating to LFG projects	Brazil Law	Test	n/a	Annually	100%	Electronic	Required for any changes to the AF

13. Environmental impact

The possible environmental impacts of the projects are as followings;

- Reduce GHG emissions from landfill
- Improve surface and ground water quality around landfill
- Produce a low-level noise

14. Stakeholders' comment

(1) Mr. Jose Domingos Gonzalez Miguez, Ministry of Science and Technology of Brazil , Interministerial Commission on Global Climate Change
Mr. Miguez is taking charge of the approval of the CDM matter on behalf of DNA in Brazil. Mr. Miguez expressed that the Brazilian government would welcome this project and support as much as CDM projects, as possible in the future. To be approved as a CDM in Brazil, a project must contribute to the reduction of environmental impact in addition to sustainable development of Brazil. A Brazilian government does not require a partial assignment of CER. CER can be shared among the project shareholder and project participants.

(2) Mr. Marco Antonio de Araujo Capparelli, Ministry of the Environment Brazilian Institute for the Environment and Renewable National Resources IBAMA:
We consulted IBAMA regarding the status of environmental regulations and laws, and found that in Brazil there are no regulations or laws regarding collection of LFG. Although the collection of LFG is not obligated by the Brazilian government, it needs to be confirmed in each state and city.

(4) Mr. Luiz Quental Coutinho, Mr. Gerald Miranda Cavalcaniti, Ms. Terezinha Hunes Governemnt of Perunambuco:
The Government of Pernambuco is currently examining the development of the Muribeca landfill. However, there are some political conflicts between City of Recife and Jabaotão. Government of Pernambuco is very careful to handle Muribeca landfill issues.
Government of Pernambuco is favorable toward CDM projects in general, and expressed that they would like to cooperate with the project implementation as much as possible.

(5) Mr. Roberto Gomez, Secretariat of Sanitation and Environment:
The City of Jabaotão has the authority to permit the Muribeca landfill gas project. A private owner has the land ownership of Muribeca landfill. City of Jabaotão rent the land from the private owner, and EMLURB is commissioned to operate Muribeca landfill. Mr. Gomes showed a strong interest to the proposed CDM project idea at Muribeca landfill. He also expressed a high expectation for profits and advantages which the City of Jabaotão would be able to receive from the implementation of the project.

(6) Empresa de Manutenção e Limpęza Urbana (EMLURB)
We have briefly met a manager of the EMLURB at the meeting with State of Pernambuco. The close relationship with and support of the EMLURB are essential for the implementation of the project. Although the EMLURB has a strong interest in CDM project, they are in the process of their own study for the expansion area.

15. Implementation structure

Currently SCS Engineers and Natsource are planning to participate to the project. However, there is a possibility of a Japanese company to join the project.

16. Implementation Tasks and schedule

There are several tasks that must be completed in implementing Muribeca projects.

No	Content of task	Schedule
Task 1	Negotiate landfill gas rights agreement	2006 Feb to 2006 Apr
Task 2	Negotiate a CER sales agreement	2006 Mar to 2006 Apr
Task 3	Negotiate a power sales agreement	2006 Mar to 2006 Aug
Task 4	Register the project as CDM project	2006 May to 2006 Aug
Task 5	Design the wellfield and flare station	2006 Apr to 2006 Jun
Task 6	Obtain Permits for wellfield and flare station construction	2006 Jun to 2006 Jul
Task 7	Bid wellfield and flare station construction	2006 Jul to 2006 Aug
Task 8	Construction of the wellfield and flare station	2006 Aug to 2006 Dec
Task 9	Commence operation of the wellfield and flare station	2007 Jan to 2007 Feb
Task 10	Design the power plant	2006 Oct to 2006 Dec
Task 11	Obtain permits for power plant construction	2006 Nov to 2007 Jan
Task 12	Bid power plant construction	2007 Jan to 2007 Jan
Task 13	Construct the Power Plant	2007 Feb to 2007 Oct
Task 14	Commence Power Plant Operation	2007 Nov to 2007 Dec