VEGA PROJECT

Landfill Biogas Management
Salvador da Bahia

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Concession contract:
- 20 years of operation + 20 years of post closure monitoring
- Attends European Standards (Bottom liner)

Capacity:
- total: 18.000.000 tons
- Input: 800.000 tons/ year
- 60% of organic matter
- Price: 25R$ / ton (6,5 Euro / ton)
1. CDM Project $\rightarrow$ CH$_4$ Emission Reduction

2. Gas-to-Energy Project

3. Sustainable development
CERs (Certified Emissions Reductions) Marginal costs > 20U$/tCO\textsubscript{2e} Opportunity costs

The Concept

ANNEX I Country
Company A
Marginal costs
> 20U$/tCO\textsubscript{2e}

CERs (Certified Emissions Reductions)

NON ANNEX I Country
Company B
Opportunity costs

Transfer of Clean Technology
Foreign Investments
Sustainable Development
CLEAN DEVELOPMENT MECHANISM

Project Cycle:

1) FEASIBILITY STUDY
2) DESIGN OF THE PROJECT
3) VALIDATION
4) EB - REGISTRATION

(Sita’s Guide book) - for landfills
(Baseline, MVP and PDD)

Local Stakeholders
Host government approval

Project validated by DNV Methodologies under review at CDM / EB
CLEAN DEVELOPMENT MECHANISM

Project Cycle: project implementation

5) INVESTMENTS + OPERATION

6) VERIFICATION

7) ISSUANCE OF CERs

Independent consultants DOE (≠ of validation)
LANDFILLS AND CDM IN BRAZIL

- Environmentally correct
- GHG Emission Reductions
- Sustainable Development

Yes → CDM Project

Foreign Investments
CLEAN DEVELOPMENT MECHANISM

Technical Issues

- **Baseline** - Scenario emissions occurring without project.
- **Additionality** - Occurs if the GHG emissions are reduced below from the emissions without the activity.

![Graph showing GHG emissions over time with baseline and project emissions compared](image-url)
CH$_4$ = 21 x CO$_2$
Today’s situation / concession contract:

- Atmospheric flares, isolated system: operation phase, cells not concluded;

20% to 25% of biogas destruction
concession contract obligation (technical proposal)
Biogas management:
Biogas capture system of high performance (efficiency above 80%), constituted by:

- final cover with GMB;

- Utilization of vertical and horizontal drains in more quantity (operational phase);

- partially leachate recirculation (bioreactor);

- destruction capacity suitable for the biogas production.
Network for biogas forced exhaustion
GAS-TO-ENERGY PROJECT

Biogas destruction units
1. CDM Project ➔ CH$_4$ Emission Reduction

2. Gas-to-Energy Project

3. Sustainable development
### Potential (based on theoretical estimation)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Biogas capture (Nm³/h)</th>
<th>Power (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>11.600</td>
<td>8</td>
</tr>
<tr>
<td>2020</td>
<td>38.000</td>
<td>40</td>
</tr>
</tbody>
</table>
1. Motors (Otto cycle):
   - best references
   - imported (≈1,000 US$/kW)

2. Boiler + Steam turbine (Rankini cycle)
   - national
   - no reference
   - under study
Barriers:

1. Technical uncertainties:
   - quality - ok (analysis by Spanish Lab)
   - quantity - ???
   - CDM will allow gas capture in real condition
   - Verification of theoretical estimation

2. Economical uncertainties:
   - capacity to be installed
   - electricity commercialization
   - dollar change
1. CDM Project ➞ CH$_4$ Emission Reduction

2. Gas-to-Energy Project

3. Sustainable development
The project itself:

- Transfer of technology for biogas capture efficiency
- Increasing of the apparent density (bioreactor) for better use of the areas.
- Renewable energy production;
Complemental actions:

- Financial resources to manage the Environmental Protection area called Joanes/Ipitanga;
- Environment education;
- Support for construction of a sorting center operated by former scavengers.