

Practical Considerations of LFG Analysis, Measurement, and Data Management to Receive CDM Credits

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Topics

- Evaluation of site
- Gas management
- Monitoring to collect CDM credits
- CDM Case Study

Evaluation of site

- Gas composition and flow measurements
- Gas migration measurements
- Information to be added to models

Estimation of the potential emission reduction

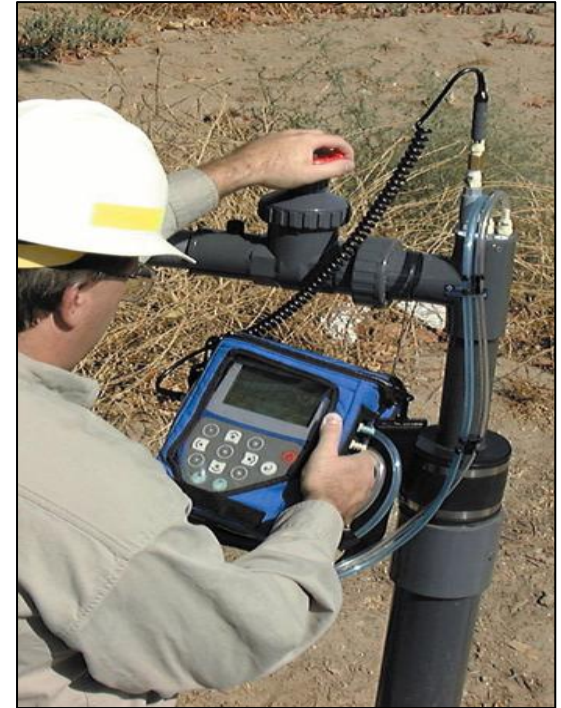


Gas Management

- Aim is to extract as much gas with fewest problems
- Improve System Reliability
- Reduce Well-field aging factor
- Improve Collection Efficiency
- Reduce Operation and Maintenance Costs
- Applicable to both CDM and non CDM projects

Gas Management

- Improvements due to:
 - Routine maintenance
 - Well-field tuning
 - Data Analysis and Management – trend analysis
 - Recommended surface improvements that: Reduce leakage – low flow of LFG and Reduce air infiltration – poor quality of LFG



Gas Management

- Improvements due to:
 - Proactive adjustment of system parameters results in fewer failures of equipment
 - Early detection of potential problems
 - High Condensate level
 - Low Flow
 - Sudden increase in O₂



Gas Management

- Analysers designed for Landfill gas measurement
- Easy to use
- Operators trained on usage and replacement of filters
- Manufacturers instructions on maintenance and calibration followed.

- This methodology is applicable to landfill gas capture project activities
- Gives the approved consolidated baseline and monitoring methodology
- Main measurements are flow, methane content, temperature and pressure
- Continuous monitoring with reporting an average in time intervals not greater than an hour

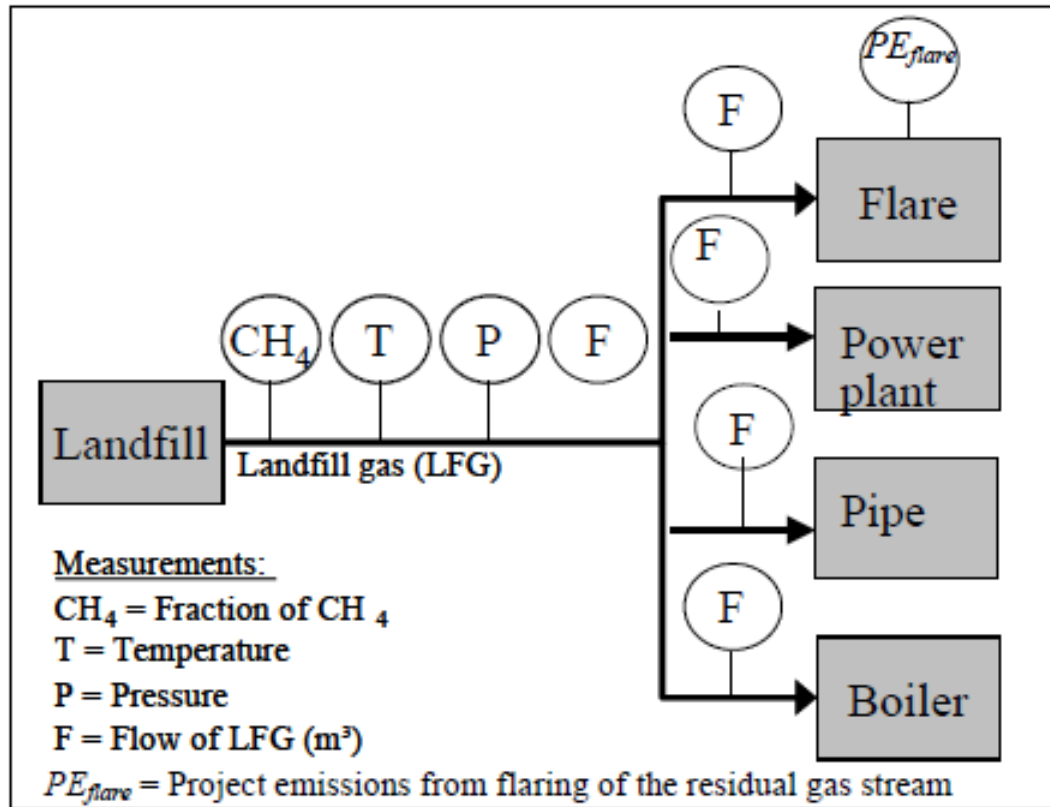


Figure 1: Monitoring Plan

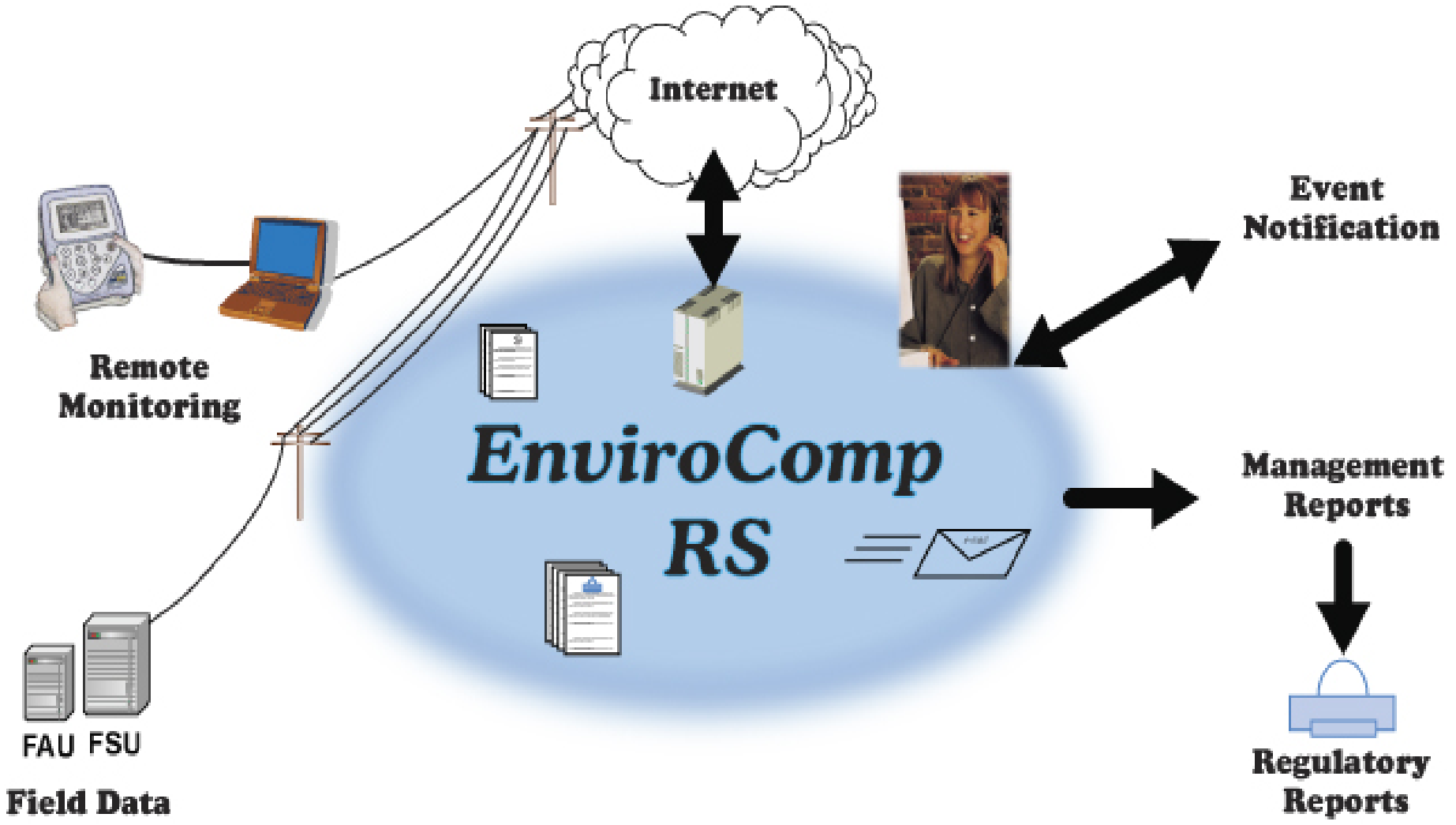
- Additional flow measurements if gas is split to Flare, Power Plant, Boiler or Pipe
- If using flare need to measure emissions from the flare



CDM Credits

- Strong QA/QC procedure for the calibration of equipment is needed.
- Prove measurements taken are accurate and tamper proof.
- ISO17025





CDM Credits

- Training of on site staff
- Routine maintenance
- Additional measurements
- Routine review of data

Case Study

- General Project Information
- Registration Process
- Methodology Selected & Implemented
 - Recent changes
- Monitoring Equipment Implemented
 - Equipment for current methodology
- Quality Assurance and Quality Control
- Reporting and Analysis of Data
- Current Project Status and Results



- Joint Venture between S.A. Paulista & EcoSecurities
 - Brazilian Civil Engineering & Construction firm
 - Environmental finance company – GHG
- CDM Project 0008
 - Brazil and Netherlands
 - First registered CDM landfill project
 - Large scale project – >15 Megawatt output/reduction
>15 Kilotonne reduction in anthropogenic emissions
 - Consist of two sites; Adrianopolis & Marambaia
 - Flaring Landfill Gas and generating electricity
 - First phase is complete and operating successfully

Adrianopolis Landfill

- NW Rio de Janeiro
Brazil
 - Close to suburb of
~800,000
 - Transmission lines
- Active Site
 - Feb 2003
 - 1,000 T/day
 - Active collection
 - ~80 wells
 - ~46% CH₄
1,300m³/h
 - Max 9,000m³/h



Marambaia

- Adjacent to Adrianopolis
- Closed Site
 - 1986 -Feb 2003
 - ~700,000 to 2,000,000 Tons
 - Active collection
 - ~35 wells
 - ~25% CH₄
300m³/h



Registration Process

- Develop
 - Project Design Document (PDD)
 - Project activities
 - Baseline Study
 - Duration & credit period of project
 - Monitoring Plan (MP) & Calculations
- Review / Certification
 - Designated Operating Entity (DOE)
 - Validate request for registration
 - Verify emission reductions
 - CDM Executive Board
- Respond / Revise
 - Corrective Action Request (CAR)
 - New Information Request (NIR)



Project Milestones

- 2001 S.A. Paulista granted 20 year concession
 - Decommissioning and rehabilitation of Marambaia
- Project Design Document & Monitoring plans
 - Prepared September 2002
 - Stakeholder interviews February 2003
 - Validated August 2004
 - Registration November 18, 2004
 - Credit period July 1st 2004
- March 15th 2007 Adrianopolis operational
- May 17th 2007 Marambaia operational
- February 17th to 19th 2008 site verification
- June 20th 2008 emission reductions verified

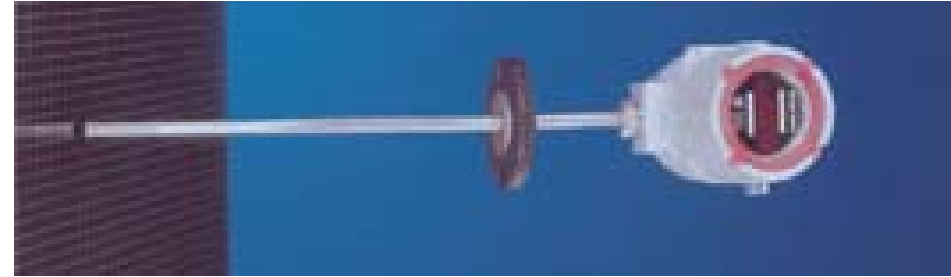
- AM0003 ver. 1 – Simplified financial analysis for landfill gas capture projects
 - Methane fraction in landfill gas
 - Flow of landfill gas to flare
 - Flare temperature
 - Flare efficiency
 - Flare run time
 - Gross electricity produced (future)
 - Generator heat rate (future)
 - 20% reduction at Marambaia
 - Adjustments for emissions due to project

Current Methodology

- Current AM0003 version 4
 - Retains monitoring from NovaGerar project
 - Adds monitoring of flare in accordance with Annex 13 “Tool to determine project emissions from flaring gases containing methane”
 - Continual monitoring of methane emissions from flare stack
 - Exhaust flow
 - Methane in and out for actual continuous efficiency

Monitoring Equipment

- Automated Extraction Monitoring System (AEMS)
- CH₄ – Field Analytical Unit (FAU)
- Flow – Thermal Mass
- Temperature “K” Thermocouple
- Flare Efficiency – Semi annual stack test
- Flare Run time – Logic and Fire eye
- Propane used for ignition – Logic and number of ignitions
- Electric meter and invoice from electric provider



Monitoring Equipment Version 4

- Flare Exhaust Monitor
 - Measures CH₄ in flare exhaust 0 – 500 ppm
 - Measures O₂ in flare exhaust 0 - 25%
- Integral portion of the Automated Extraction Monitoring System (AEMS)
 - Enables calculations of flare flow and efficiency

Without measurement
default value is 90%



Quality Control/Quality Assurance

■ Daily QA/QC

- Review of Envirocomp LFG Pro data; Calibration records, LFG composition, flare temperature, flow and run time.

■ Weekly QA/QC

- Review operation processes and procedures
- Review gross emission reductions, discount for LP used to ignite flare

■ Monthly QA/QC

- Custom LFG Pro reports
- Discount emission reductions for electricity used – generate net emission reductions



- 27 Documents
 - Project documents PDD, MP
 - Calibration certifications
 - Calculations
 - Operational & Maintenance
- Envrirocomp LFG Pro
 - Data at two minute interval
 - FAU Calibration data
 - Flare ignitions
 - Gross emission reductions



Results of Monitoring & Reporting

- Totals Reported
 - 11,344,724.65 m³ LFG Flared
 - ~10,000,000 from Adrianopolis
 - 29,099.80 kWh Electricity used
 - ~20,000 from Adrianopolis
 - 3.932 m³ LPG used ~ equal split between sites
- Emission Reductions Claimed
 - 67,303 tCO₂e
- Percentage Certified/Verified
 - 100%



CDM case study and other case studies
can be downloaded from

www.geotech.co.uk

Thank you for your attention