

# CDM - Monitoring & Reporting for Carbon Credits

Data Integrity, Validity, Security and Audit are key to CDM success.

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*(The full paper is available at [www.geotech.co.uk](http://www.geotech.co.uk) See: Downloads)*

## The Project Sites

The project is in Brazil and obtains certified emission reductions (CER) or carbon credits for a large scale, waste handling and disposal, clean development mechanism (CDM) project. Methane emissions are being reduced through collection and destruction of landfill gas (LFG). The project is a joint venture between environmental finance company, EcoSecurities, and Brazilian civil engineering and construction company, S.A.Paulista. LFG is collected and destroyed at two sites; Lixao de Marambaia (Marambaia) and Aterro Sanitario de Adrianopolis (Adrianopolis) both near Rio de Janeiro.

Marambaia is a closed landfill that has approximately two million tonnes of waste in place. It operated from 1986 until late 2002. Adrianopolis started accepting trash shortly after Marambaia closed and is currently accepting 1,000 tonnes of municipal solid waste daily and is designed to take up to 3,000 tonnes per day. Both sites have been approved for installation of a gas collection system, leachate drainage system, modular electric generation plant and flare facility. Currently the LFG is being flared and CER are being issued based on the monitoring and reporting of the LFG collection and flare operation. Electric generation both for the sites to use as well as for export to the local grid is planned for 2009.

## Data Collection and Reporting

Stakeholders required reports that met their validity requirements while aiding maximum methane collection and destruction. The methodology is comprehensive. It uses techniques from automated numerical analysis and trending through to manual review and verification of questionable data. The results of the audit validate the carbon credits requested by the site. Auditing requires clear, concise and transparent reporting and project experience also suggests methodologies which could provide operational and economic benefits to landfill projects worldwide.

Using the correct methodologies, monitoring equipment and protocols are critical for successful clean development mechanism (CDM) projects. Verification and validation are necessary at several places in the process. Good quality assurance/quality control (QA/QC), training and documentation help but from the original project design document (PDD) through to the request for issuance of certified emission reductions

(CER), each step of the process needs to be verified or validated.

Much verification happens on site during the data collection and reporting process. The strict QA/QC and data review process verifies that data



being used is correct. Weekly verification of the emission reductions are completed on site and more comprehensive internal audits and verifications are completed before submitting the CER issuance request. In addition to the on-site audits, an independent third-party, accredited as a designated operational entity (DOE), is required to review all aspects of the project.

## Project registration and approval

Prior to the project being registered the PDD requires validation and all aspects of the design monitoring and methodologies to be validated. For this project it was a three-phase process and began December 2002. The first phase was a desk review of the PDD. The second consisted of interviews with project stakeholders and the third included resolving identified issues and issuance of the validation report. Project validation occurred between December 2002 and August 2004. The project was successfully registered in November 2004. Though the process was long, the outcome was the project met all necessary UNFCCC requirements and was approved.

## Verification and certification

Annually a monitoring report accounting for emission reductions is submitted for issuance or CER. As with the project registration a DOE is required to review the project and requested emission reductions. During the verification, objective evidence that the emissions report meets the requirements of the MP, PDD and approved methodology must be clear. Additionally the data

reported must be complete and transparent. The primary objective of the verification is independent and objective determination of the monitored greenhouse gas (GHG) emission reductions. The verification is based on the registered PDD and monitoring plan (MP).

### **CDM Requirements and Additionality**

There are several procedures that are mandated by the United Nations Framework Convention on Climate Change (UNFCCC) to ensure that the CER is accurate, real and measurable. One of the keystone items to demonstrate real emission reduction is the requirement that **project reductions must be additional** to any that would have occurred in the absence of the project and net of any 'imported' energy from e.g., transportation of external electricity supplies. A baseline or business-as-usual scenario must be determined to demonstrate what reductions are additional, solely due to the project. The baseline methodology must be approved and since the UNFCCC requires that CDM project activities be public, transparent and accountable, the PDD and monitoring plan MP must be not only approved but also publicly available.

### **Quality assurance/quality control (QA/QC):**

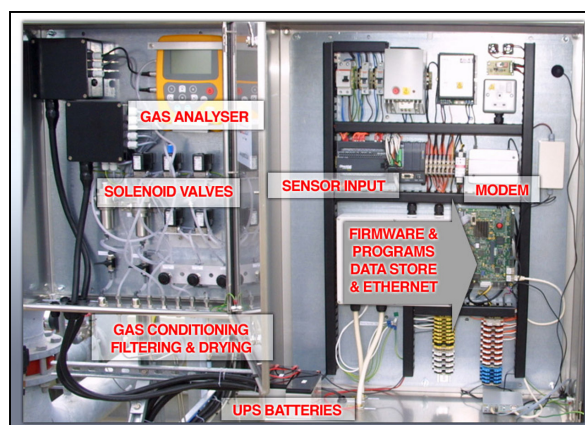
To ensure the accuracy of the monitoring and reporting CDM projects require QA/QC procedures. For this project daily manual monitoring records are checked for anomalies and filed for future reference. Automated LFG flow readings and methane concentration readings are checked with other automated readings such as flare temperature, concentration of carbon dioxide and oxygen in the LFG to ensure that the readings are valid. Questionable readings are quarantined and undergo more rigorous inspection. Trending, comparison to historical averages and correlation to other operational data received can often discern unusual changes in operations from inaccurate or invalid readings. Valid readings immediately calculate gross emission reductions. A key component of the QA/QC policy is service and calibration of measurement equipment. All instrumentation is maintained, serviced and calibrated in accordance with the manufactures specifications. In addition the analyzer that monitors the concentration of methane being flared is equipped with an automatic calibration system. The system automatically checks known calibration gases hourly and records the results. If necessary the analyzer will recalibrate itself. The project engineer checks the calibration readings daily to ensure accurate methane readings.

### **Equipment**

This project has been actively collecting and destroying LFG for over a year. During early construction the gas collection system and flare was

installed. The equipment is the best available technology but the minimum necessary for the application and meets the UNFCCC requirements. The gas collection system is monitored with a GEM2000 and Accuflo wellheads. It is monitored weekly or as necessary for tuning and QA/QC. The total gas flow to the flare is monitored for gas composition by a LANDTEC field analytical unit (FAU) every two minutes. The data is transmitted by the field server unit (FSU) every four minutes to a secured database where it is checked for validity and available for review through an online service. The FAU and FSU combine as an automated extraction monitoring system (AEMS).

After the gas composition is known, the gas passes a thermal mass flow meter to record the flow rate of the LFG being flared. A reading from the flow meter is taken by the FSU every two minutes,



combined with the gas composition reading and sent to the secure database for validity checking and processing. The last auditable monitoring data is the flare efficiency. This is currently done manually every six months. This project was initiated before the equipment to perform continual flare efficiency monitoring was available from LANDTEC and before it was an option in the monitoring methodology.

In addition to the required monitoring devices the flare is equipped with other sensors that are also read, transmitted and verified as back up and justification to the primary readings as well as useful operationally.

### **Conclusion:**

Current approved monitoring methodologies when combined with quality equipment, good project QA/QC and management can provide accurate, transparent and auditable data that will stand up to rigorous scrutiny. The equipment and technology necessary to successfully complete waste handling and disposal CDM projects is transferable to developing countries.