

Verification of CDM Projects

Monitoring reports and records of data

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What is Verification?



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What is verification?

- *Audit of emission reductions achieved by the project*
- *Once the project is registered and has been monitored, the monitoring report will be verified by the DOE*
- *DOE will check:*
 - *Conformance of the actual project to the project design in the PDD*
 - *Conformance of monitoring with the monitoring plan in the PDD*
 - *Compliance of monitoring with the methodology*
 - *Correctness of data and assumptions*
 - *Correctness of calculations of emission reductions*
- *Site visit is mandatory*

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Importance of monitoring



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Why is monitoring so important?

- **Crediting Period can start as soon as the project is registered**

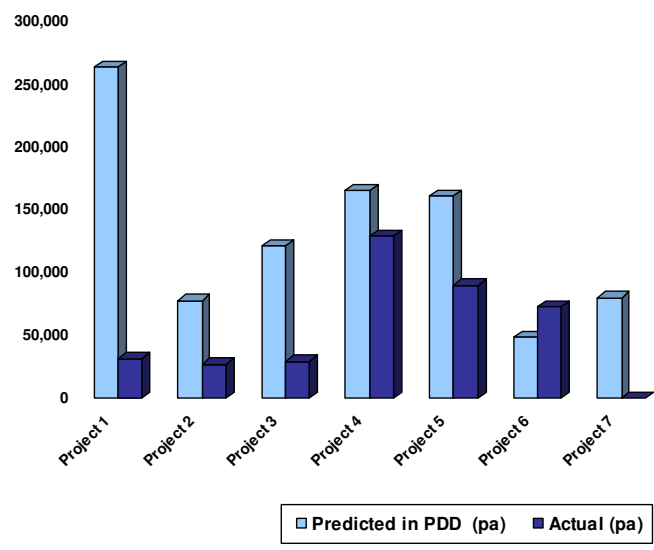
**No monitoring = no data = no carbon credits
= no revenue for the Project Participants**

- **Registered PDD does not automatically mean the project will get credits.**

**CERs are only issued after
successful monitoring and verification**

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Monitoring shows the REALITY of the project – eg:



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Monitoring - Who Does What?



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The Monitoring Plan

- Remember:
 - Monitoring requirements are defined in the APPROVED CDM METHODOLOGY
 - The monitoring plan for the Project Activity is set out in the REGISTERED PDD

IT IS A CDM REQUIREMENT THAT THE PROJECT
COMPLIES WITH THE REGISTERED PDD IN ALL RESPECTS

- includes:
 - Physical attributes of the project (technology, layout, capacity etc)
 - Monitored parameters
 - Management functions, frequency, QA/QC etc

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The Monitoring Plan

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The monitoring plan

- Part of the PDD - developed at the start of the project. Assessed by the validating DOE
- Shows how the emission reductions will be monitored
 - How each parameter will be monitored
 - Equipment
 - Data
 - Quality control & organisation
- The monitoring plan should:
 - comply with all requirements of the methodology & tools
 - be sufficient to ensure that emission reductions can be monitored and verified
 - provide quality assurance and quality control
 - be feasible – PPs must be able to implement it
 - be clear and concise; not give unnecessary detail

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The Monitoring Report

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Monitoring Report

The monitoring report sets out:

- General project information
- What monitoring methodology is applied, and what parameters are monitored
- How the monitoring has been carried out
- Tests applied, cross checking of data, calculations, QA/QC, data control etc
- Evidence cited
- The monitoring outcomes and claimed emission reductions

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What DOEs look for at verification



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Conformance between the actual project and the registered PDD

- Detailed project design is set out in the registered PDD
- The project must be implemented exactly as described
 - So make sure the PDD is accurate!
- Any differences in project design must be approved by the EB
 - Notification of changes
 - Request for approval of changes
- DOE will assess if changes have any impact on:
 - Methodology applicability
 - Additionality
- If the project is no longer additional, it will no longer be able to issue CERs
- If the methodology is no longer applicable the project may not be able to accurately quantify emission reductions, therefore may no longer be able to issue CERs

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Conformance of monitoring system with the monitoring plan in the PDD

- Monitoring must be carried out exactly in line with the monitoring plan in the PDD
 - Parameters and formulas were correctly applied;
 - Meters were calibrated;
 - Measurements took place with the right frequency and
 - QA/QC measures described in the PDD were operational.
- Discrepancies:
 - Revision of the monitoring plan
 - Deviation from the monitoring plan (for this monitoring period only)
- Differences that reduce the level of accuracy or completeness are not permitted
- Therefore the monitoring plan in the PDD should be carefully prepared, and should not contain unnecessary details

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The monitoring system



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Conformance with monitoring plan: example

Data / Parameter:	EG _{Facility}
Data unit:	MWh/y
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used:	Will be measured by two <u>GE series 12</u> meters that are factory calibrated digital meters.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,305,000 MWh
Description of measurement methods and procedures to be applied:	Continuous onsite measurement and <u>hourly recording by the Project owner</u> . The metering equipment is a digital energy meter factory calibrated having an <u>accuracy of 0.2</u> . The meter is <u>located in the 3rd transformer station, located 3 km from the project site</u> .
QA/QC procedures to be applied:	Meters will be checked and <u>calibrated every 3 months</u> by <u>the Protec Calibration laboratory (Johannesburg)</u> and measured data will be cross checked by electricity invoices and sales documents. The most conservative data will be used to calculate CERs generated by the Project during the verification. The calibration procedure will follow IEC standard <u>version 12.1.3 dated 12 July 2006</u> . In addition, <u>3 cross check meters will be installed at the 1st transformer station to measure electricity generated, electricity imported from the grid, and electricity exported to the grid</u> .

Additional information is included in the plan that is highly specific, and not required by the methodology. This could lead to problems at verification

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Compliance of monitoring with the methodology

- The monitoring must be 100% compliant with the requirements of the methodology
 - Methodology requirements are often very specific and challenging to implement – e.g. project emissions tool can require direct measurement of fuel used (flow meter) even if only a tiny quantity of fuel is consumed
 - If the methodology requirements cannot be met, this must be addressed at the PDD stage, by requesting a deviation from the methodology
 - Once a project is registered it may be too late to seek a deviation from the methodology requirements
- If the monitoring plan is not compliant it must be revised at the verification stage

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Correctness of data and assumptions

1. Primary data – MEASURED; eg
 - metering systems
 - solid fuel stock-takes
 - delivery frequency
 - production volumes
2. Default data – from appropriate source; eg
 - Global warming potentials
 - Grid emission factors
3. Calculated data; eg
 - Emission factors (tCO₂/t or tCO₂/m³ etc)
 - Fuel consumption as energy (TJ) (activity data (kg) x Net Calorific Value (J/kg))

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Meters: things DOEs will look for

- What is it primarily used for?
- Is this the original designed purpose for it?
- Is it for indicative or measurement purposes?
- Is it being used within its design parameters?
- Where is it located?
- Who is responsible for it?
- What is its status (maintenance, calibration etc)?
- How is its output collected and maintained?
- What is its output? (continuous, every second, hour, etc)
- How is data totalised/ interpolated to create hourly/daily totals?
- Are all system components compatible?
- Are there local buffers for holding data if something fails?
- Is the system fully automated, or are there manual steps?

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Calculated data: things DOEs will look for

- Data calculated based on monitored data and/or default values
- DOEs will check the correctness of calculations, including whether they are fully in line with the methodology
- Common errors include:
 - Units – are the correct units and conversions used
 - Calorific value - Net CV vs gross CV (or lower heating value (LHV) vs higher heating value (HHV))
 - Spreadsheets:
 - Manual transposition (eg 14729 instead of 14279)
 - Cut and paste from prior year or previous column
 - Excel formulae connect to wrong cells
 - Data missed from totals
 - Wrong assumptions of days in the month (28, 30, 31)
 - Old, outdated factors (eg gas density) embedded in formulae

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Correctness of calculations of ERs

- DOEs must check that
 - All data were available,
 - Data were crosschecked,
 - The right formulas were used, and
 - All assumptions, emission factors and default values were justified.

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Data Management

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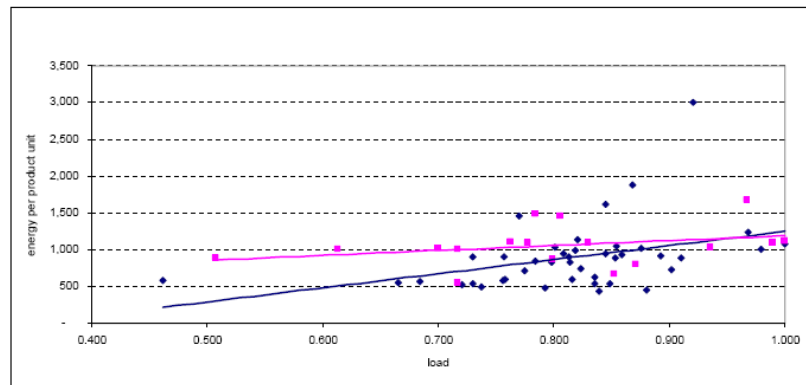
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Checking data

- DOEs will analyse data from a Top Down and Bottom up perspective
- Horizontal checks – across different data streams
- Vertical checks – along the data chain, back to source
- Data triangulation – approach from different directions
 - example – small scale electricity generation from renewables
 - monitoring of electricity generated by meter
 - how does that compare to expected and actual fuel consumed?
 - is there a trend from year to year, or during the year
- Data security: Always work on a copy of the original data

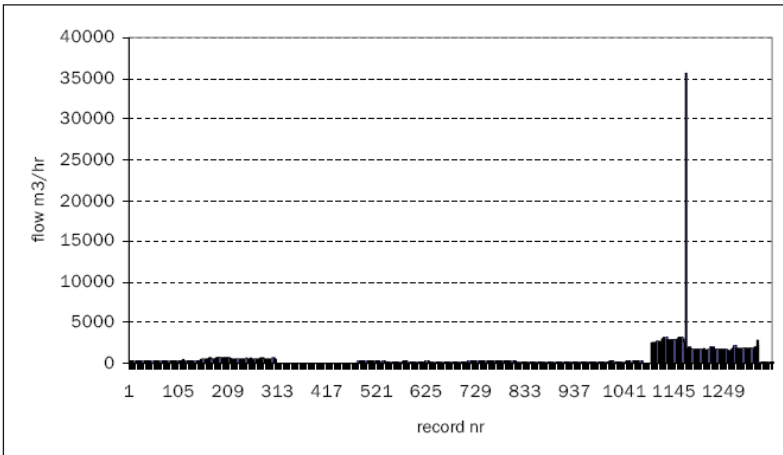
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Visualising data is helpful

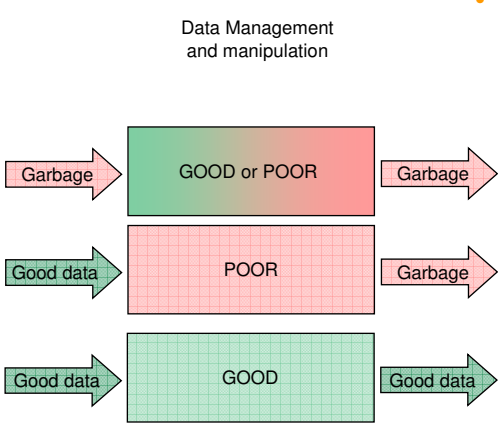


Cc

Does anything stand out?



Data management



- Data problems arise in a number of areas
 - **Human error** – data transposition, errors in spreadsheets or model assumptions
 - **Data security** - unauthorised access, wrong level of access i.e. access to input function and calculations
 - **Inherent inaccuracies** in the metering systems or methods
 - **Uncertainty** – what is the metering tolerance eg +/- 2.5%, what is acceptable?

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Quality assurance and quality control



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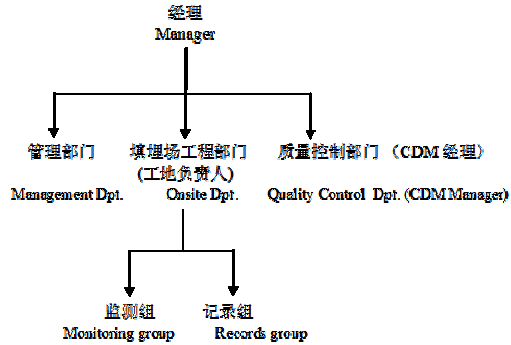
Quality Assurance/Quality Control (QA/QC)

- How does the site:
 - Program key activities (maintenance, calibration etc)
 - Ensure activities have been undertaken
 - Manage collection of source data
 - Control the transfer of information (manual retyping, uploads etc)
 - Protect data:
 - Protect spreadsheets
 - Check input data
 - Check calculation outputs
 - Check final data
- Defined roles and responsibilities?
- Is there dependence on one or two key staff?

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Organisational responsibilities

- Site must be clear on who does what
- Org chart or manual is normally needed
- Staff should be qualified to carry out monitoring - training records



(公司填埋场工程组织结构示图)
Company landfill operation organization chart
监测值班人员分三组，按 8 小时工作时间交接班。
Onsite monitoring group will be in 3 shifts, each shift lasts 8 hrs

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Potential pitfalls at verification



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Potential pitfalls at verification

- **PDD inconsistencies, e.g. generator capacity greater than stated in PDD**
- **Meters do not have calibration records**
- **No organisation chart**
- **No training done**
- **Data recording frequency not in line with meth**
- **Line diagram in PDD completely wrong compared with the real situation**
- **Meters are broken or missing (parameters not monitored)**
- **Data storage is haphazard**
- **Calculations not transparent ('back of the envelope...')**
- **Files missing**
- **etc...**

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Avoiding pitfalls

- **Check project has been implemented exactly as described in the PDD**
- **Review monitoring plan in PDD & ensure it is 100% compliant with the methodology, e.g.**
 - Installed capacity
 - Fuels used
 - Load factor
- **Ensure monitoring system on site 100% complies with the PDD and methodology, e.g.**
 - Data recording frequency in line with meth
 - Equipment: Meter layout and type, accuracy, make and model, maintenance requirements
 - Organisational structure
 - Data transfer and storage processes
- **Ensure data and records are complete, e.g.**
 - Complete set of monitored data
 - Sales receipts or other cross check sources
 - Calibration records are complete and to the correct standards
 - Records of data checks & sign off
- **Ensure site and staff are prepared, e.g.**
 - Received appropriate training
 - Documents are all ready & available
 - Staff are available at the time of the verification visit
 - All monitoring systems are functioning properly
 - Ask staff questions and ensure they know what they are doing

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Exercise



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Monitoring & verification exercise



- You have a registered biomass power plant project with an upcoming verification
 1. What are the 4 key things the verifier will check?
 2. What would you do to ensure (i) the site and staff are ready for the verification visit and that (ii) data and records are complete? List at least 2 examples for each

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Thank You

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