



IV. Organizational, Operational and Monitoring Obligations

IV.A. Obligations of the Operator

Monitoring the project's performance in terms of ERs achievement requires the fulfilment of operational data collection and processing obligations from the operator. The operator has the primary obligation to calculate the project ERs based on the most recent available information, following the ERs Calculation Procedure ("ERCP") presented in this MP. In addition he should provide an Organizational Structure in which the roles and responsibilities of monitoring personnel are identified, and a ERCP Quality Control Procedure. Examples are provided with this MP, however these need to be updated prior to start of operations.

In line with the example ERCP Organizational Structure, the aim is to have a ERCP Manager be responsible for performing the ERCP, and a 'MP Steering Committee' be responsible for supervising the ERCP Manager monitoring work. The ERCP Manager will report to the MP Steering Committee; and both the ERCP Manager and MP Steering Committee co-ordinately will report to the verifier (when the verification takes place), allowing for a successful verification of the project's accounted ERs.

If possible data required for the MP will come from calibrated meters (calibrated as indicated in suppliers manuals) and third party (i.e. electricity consumption). Where calibrated meters can not be used (e.g. the sampling of waste in order to determine the actual waste-composition), the ERCP Manager will develop standardised measuring and sampling procedures. The measurements and procedures can thus be easily verified by verifying DOE.

It is believed that the MP approach presented here will result in an accurate, yet conservative calculation of ERs. However some uncertainties may lead to a deviation between monitored and verified ERs, especially errors in the data monitoring and processing system. The operator is expected to prevent such errors and the verification audits are expected to uncover any possible errors. The Certified Emissions Reductions ("CERs") would be granted ex-post verification.

Table Annex 4.1: Monthly Data Collection – agents involved in the monitoring

Agent	Deliverable
The operator	<ul style="list-style-type: none"> shall measure the electricity consumption for equipment used on site. Data can be collected from installed kWh-instrument
	<ul style="list-style-type: none"> fuel consumption for equipment used on site. Data can be based upon the received invoices for fuel. Operator shall keep/file receipt of invoices
	<ul style="list-style-type: none"> produced compost that is trucked off of site. This information will be based upon weighbridge-data
	<ul style="list-style-type: none"> Sampling of the compost piles: operator will follow the sampling-procedure as indicated in this monitoring plan. This will result in the share of anaerobic samples which are required for calculating the CER's
	<ul style="list-style-type: none"> Quantity of waste supplied to the compost plant will be measured by a weighbridge. This information is required for calculation of the CER's
	<ul style="list-style-type: none"> (quarterly) measurement of the composition of the incoming waste in accordance with the procedure as indicated in this sampling plan



	<ul style="list-style-type: none"> Nr of vehicles per carrying capacity that bring in the waste or that truck off compost. Information can be based upon weighbridge-information. The distinguished “carrying-capacity-categories” will be proposed by operator to the DOE
BPD	<ul style="list-style-type: none"> Set available the annual report were the Emission Factor (CEF) can be based upon
Operator/expert/DOE	<ul style="list-style-type: none"> Estimate of additional distance travelled. Operator will provide information regarding the collection points for the waste and the physical location of the market for compost. This information will be shared with the DOE and/or expert and based upon that the additional distance travelled will be updated
Authorities	<ul style="list-style-type: none"> Annual verification of the MDreg or AF. MDreg or AF shall be discussed (meeting) with dedicated authorities and result of this shall be provided in writing

IV.B. Emissions Reductions Calculation Procedure and Required Spreadsheets

The ERCP is the basic instrument for gathering, recording and processing information that will result in the measured ERs. The operator shall consider the project’s ERCP as a manual. All data processing should be done in Excel. The ERCP is designed for monthly and yearly calculation.

To the verifier the required spreadsheets will be made available. The spreadsheet will be made up with a suitable program (e.g. excel). The sampling plan for sampling of the composting piles (determination of S_a and S_{od}) and for determination of the waste-composition is elaborated below. The remaining items to be monitored are self-explanatory.

The file name should include the date (MM/YY) in its title and a version control number

The year for the MP will run from January 1st to December 31st. The first crediting period goes from January 1st 2006 to December 1st 2012.

IV.B.1: Sampling plan of composting piles for determination of oxygen deficiency (S_a and S_{od})

The sampling plan for determination of the possible anaerobic circumstances within the composting piles is based upon general statistical methods like the one describe by Salant and Rea (Salant, 1994, Rea 1997; handbook-2-Task_2_Community Assessment_050425.doc) and on the equation below:

$$n = [t_p^2 * p * (1-p) * N] / [t_p^2 * p * (1-p) + (N-1) * y^2]$$

in which

n	=	sample size
t_p	=	1.96 for 95% confidence level
N	=	population size
p	=	for the true proportion which in a most conservative is set as 0.5
y	=	sampling error

For this case, the population is the “air-molecules within the garbage/composting piles”. Therefore the population size is extremely high and it can be calculated that for y (sampling error) = 20%, the sample size should be 25, hence Project Proponent shall measure daily at 25 spots the O_2 –content (~ 9000 measurements/year).



Oxygen-measurements (25 spots/day) are taken evenly spread over the garbage/composting piles, taken into account the following stipulations:

- Oxygen will be measured at the top layer and at the bottom layer, hence 2 samples in vertical alignment (height of composting piles are presumed to be 3 mtr)
- The width of the grid must fit within the width of the composting piles (assumed to be 20 mtr in this case)
- Within every grid, the measurement will be done ad random every day

Table Annex 4.3: Sampling grid for oxygen measurements

Amount of garbage/compost	Amount of garbage/compost	Daily nr of oxygen-samples	m3/sample	Sampling grid (lxwxl in m)
1,500 ton	2,500 m3	25	100 m3	6x10x1.5
2,250 ton	3,750 m3	25	150 m3	10x10x1.5
3,000 ton	5,000 m3	25	200 m3	13x10x1.5
4,500 ton	7,500 m3	25	300 m3	20x10x1.5
6,000 ton	10,000 m3	25	400 m3	26x10x1.5
9,000 ton	15,000 m3	25	600 m3	20x20x1.5
12,000 ton	20,000 m3	25	800 m3	27x20x1.5
18,000 ton	30,000 m3	25	1200 m3	40x20x1.5
24,000 ton	40,000 m3	25	1600 m3	53x20x1.5
21,000 ton	35,000 m3	25	1400 m3	47x20x1.5
31,500 ton	52,500 m3	25	2100 m3	70x20x1.5
42,000 ton	70,000 m3	25	2800 m3	93x20x1.5

IV.B.2 Sampling plan for waste-composition

In accordance with the NM0025 the waste composition is measured at least quarterly. The purpose of these measurements are to determine the fraction of each waste stream within the total waste input going to the composting facility. In accordance with the methodology the following waste-streams are to be distinguished:

- A Paper and textiles
- B Garden and park waste and other (non-food) organic putrescibles
- C Food waste
- D Wood and straw waste
- E Inert

The sampling plan for determination of the share of different types of waste is based upon general statistical methods like the one describe by Salant and Rea (Salant, 1994, Rea 1997; handbook-2-Task_2_Community Assessment_050425.doc) and on the equation below:

$$n = [t_p^2 * p * (1-p) * N] / [t_p^2 * p * (1-p) + (N-1) * y^2]$$

in which

- n = sample size
- t_p = 1.96 for 95% confidence level
- N = population size
- p = for the true proportion which in a most conservative is set as 0.5
- y = sampling error

Table Annex 4.3: required sampling amounts for 95% confidence level and 20% sampling error

Total amount of waste	10% sampling error	20% sampling error
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input (kg/day)		
100	49	20
250	70	22
500	81	23
750	85	23
1,000	88	23
2,500	93	24
5,000	94	24
10,000	95	24
25,000	96	24
50,000	96	24
100,000	96	24
1,000,000	96	24
100,000,000	96	24

From the table (table Annex 4.3) above it is clear that the sample-size is independent from the size of the composting facility in case this exceeds the 10,000 kg input per day; a minimum of 96 kg or 24 kg is required in order to get a representative impression of the waste-input with a 10% or 20% sampling error. In order to meet the requirement as indicated in the methodology a 24 kg sample would be sufficient (20% sampling error).

However, on top of this, project-proponent wants to take into account:

1. the minimal size of the sample that practically can be obtained regarding the “grain-size” of the waste. Therefore a practical minimal sample size of 10 kg will be applied and
2. Project Proponent can not accept samples taken from only a very few trucks.

The above considerations are taken into account and are incorporated in the sampling instructions: The sampling instructions are indicated in the table Annex 4.4 below:

Table Annex 4.4: Sampling instruction for determination of waste composition

	50 ton/day	100 ton/day	200 ton/day	400 ton/day	700 ton/day
Expected daily nr. of vehicles	10	20	40	80	140
Sampling amount/vehicle	Equal per selected vehicle, with a minimum of 10 kg/vehicle				
Expected number of vehicles to be sampled	5 vehicles	10 vehicles	20 vehicles	20 vehicles	20 vehicles
Selection of the vehicles	Every 2 nd incoming vehicles	Every 2 nd incoming vehicle	Every 2 nd incoming vehicles	Every 4 th incoming vehicle	Every 7 th incoming vehicle
Total amount of waste collected for determination	> 50 kg	> 100 kg	> 200 kg	> 200 kg	> 200 kg

IV.B.3: Instructions for determination of different categories

To ensure that different categories are interpreted similar each quarter, Project Proponent shall prepare an instruction-book. The instruction book will contain pictures and descriptions what's included under the waste-categories A, B, C, D and E. These instructions will be the guidance during the quarterly determination work.

**V: Follow-up and manual**

The project developers and operators (SPC formed by World Wide Recycling and Waste Concern) will oversee the development of the project and will periodically carry out internal audits, when required with external assistance, to assure that project activities are in compliance with monitoring and operational requirements.

WWR/WC will adopt the instructions given in the MP and accomplish all activities related to the implementation of the procedures given in the Operational Manual. The main responsibilities of the operator are related to:

- *Data handling*: maintaining an adequate system for collecting, recording and storing data according to the protocols determined in the Monitoring Plan, checking data quality, collection and record keeping procedures regularly;
- *Reporting*: preparing periodic reports that include emission reductions generated, observations regarding Monitoring plan procedures;
- *Training*: assuring personnel training regarding the performance of the project activities and the Monitoring plan;
- *Quality control and quality assurance*: complying with quality control and quality assurance procedures to facilitate periodical audits and verification.

An Operational Manual to be produced by the developer of the project will include procedures for training, capacity building, proper handling and maintenance of equipment, emergency plans, and work conditions and security.

The Monitoring plan and Operational Manual will be validated by the DOE.

Quality control and quality assurance procedures

Regarding quality control and assurance procedures to be undertaken for the monitored data, the practices to be implemented in the context of the Matuail composting plant project are as follows:

Monitoring

Monitoring will be done in accordance with the instructions indicated in section D.2.

Monitoring records:

Daily readings of all field meters will be registered in either electronic form or on paper worksheets. Data collected will be entered in electronic worksheets and stored. Periodic controls of the field monitoring records will be carried out to check any deviation from the estimated CERs and according the Operational Manual for correction or future references.

Recommendations on system and procedures improvements will be presented. Periodic reports to evaluate performance and assist with performance management will be elaborated.

Equipment calibration and maintenance:

All meters and other sensors will be subject to regular maintenance and testing regime according to the technical specifications from the manufacturers to ensure accuracy and good performance.

Calibration of equipment will be performed periodically according to technical specifications and in agreement with recommendations given by suppliers and/or institutes.

Corrective actions:



Actions to handle and correct deviations from the Monitoring Plan and Operational Manual procedures will be implemented as these deviations are observed either by the operator or during internal audits. If necessary, technical meetings between the operator, the developer and the sponsor of the project will be held in order to define the corrective actions to be undertaken.

Site audits:

The authorities will make regular site audits to ensure that monitoring and operational procedures are being observed in accordance with the Monitoring Plan and the Operational Manual.

Training:

The operator personnel will be trained in equipment operation, data recording, reports writing, and operation, maintenance and emergency procedures in compliance with the Operational Manual.
