MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Hiriya Landfill Project
Reference number of the project activity	0147
Version number of the monitoring report	1
Completion date of the monitoring report	19/07/2012
Registration date of the project activity	06/02/2006
Monitoring period number and duration of this monitoring period	Monitoring period number: 5 Duration of the monitoring period: 197 days (01/01/2012 – 15/07/2012, first and last days included)
Project participant(s)	Dan Region Association of towns (DRAT) EcoTraders Ltd. EcoSecurities Ltd. EDF Trading Ltd.
Host Party(ies)	Israel
Sectoral scope(s) and applied methodology(ies)	Sectoral scope – 13: Waste handling and disposal Applied methodology: *ACM0001* ver. 11.0 - Consolidated baseline and monitoring methodology for landfill gas project activities
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	46,126.6
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	23,738

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project involves the collection and flaring of landfill gas at the Hiriya Landfill in Israel's Dan region, and the transportation of landfill gas to the nearby plant Offis Textile Ltd., where it is utilized for thermal energy generation. The project was registered on 06/02/2006, and the crediting period was renewed on 30/12/2011.

The first drill to collect biogas was made in August 2003, and the construction of the gas collection system continued through 2004. During 2005, and until June 2006, gas was only flared on-site. As of June 2006, the LFG has been conveyed through an underground pipeline to the nearby Offis Textile factory.

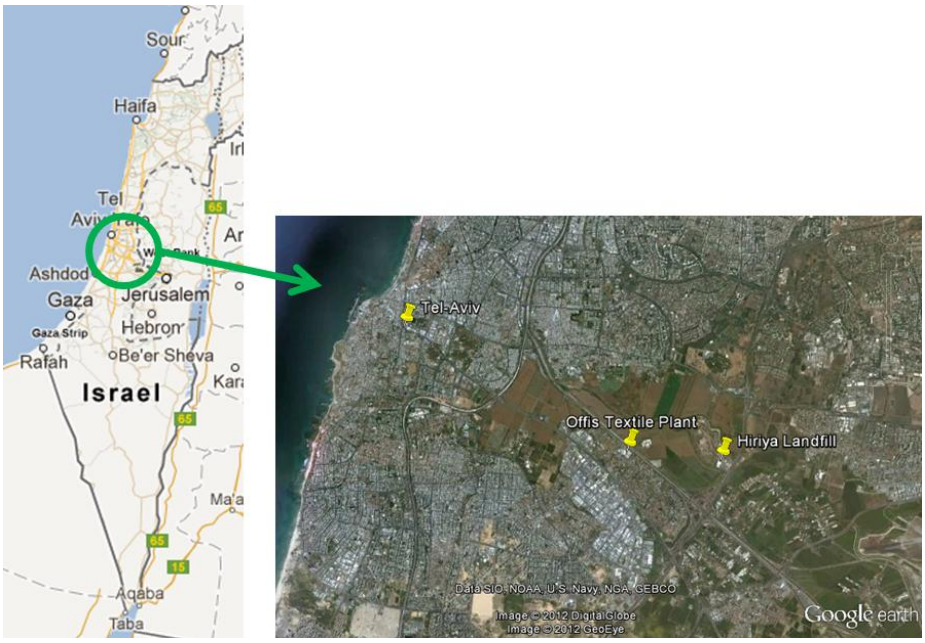
The project includes a gas collection system, leachate drainage system, flaring equipment and a transmission system which sends the gas to a nearby textile plant where it is combusted for thermal energy in industrial boilers.

During the monitoring period (01/01/2012 – 15/07/2012), 4,285,621 Nm^3 of landfill gas was extracted from the Hiriya Landfill, 261,170 Nm^3 of which was flared and 4,005,284 Nm^3 of which was utilized for thermal energy generation at the Offis Textile plant, resulting in a total emission reduction of 23,738 tCO_2e.

It is important to note that all further emission reductions which result from the replacement of fossil fuel with renewable energy at the Offis plant are not claimed by the Hiriya Landfill Project, as that component is registered as a separate CDM project (*Offis Textile Ltd. Fuel Switch, Israel No. 1757*).

A.2. Location of project activity

Host Party – Israel
Region – Dan Region
City - Hiriya landfill site: Near Moshav Ganot, some 7 km southeast of Tel Aviv
Offis Textile plant: 47 Moshe Sharet St., Azur, some 6.8 km southeast of Tel Aviv
Geographical Location - The Hiriya landfill site: 32°01‘36.93"N, 34°49‘26.71"E
The Offis Textile plant: 32°01‘45"N, 34°48‘15"E



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Israel	Public entity: Dan Region Association of Towns (DRAT)	No
	Private entity: EcoTraders Ltd.	
United Kingdom of Great Britain and Northern Ireland	Private entity: EcoSecurities Ltd.	No
	Private entity: EDF Trading Ltd.	

A.4. Reference of applied methodology

Applied methodology: *ACM0001* ver. 11.0 - Consolidated baseline and monitoring methodology for landfill gas project activities.

Applied tools:

- *"Tool to determine project emission from flaring gases containing methane"*
- *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption"* (version 01)
- *"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"* (version 5.1.0)
- "*Tool to calculate the emission factor for an electricity system*" (version 02.2.1)

A.5. Crediting period of project activity

Crediting Period: 01/01/2012-31/12/2018
Crediting Period Type: Renewable (7 years)

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The project activity involves the installation of state of the art landfill gas collection and combustion technologies.

The first drill to collect biogas was made in August 2003, and the construction of the gas collection system continued through 2004. During 2005, and until June 2006, gas was only flared on-site. As of June 2006, the LFG has been conveyed through an underground pipeline to the nearby Offis Textile factory.

The landfill gas collection system includes:

- vertical wells used to extract gas;
- optimal well spacing for maximum gas collection whilst minimizing costs;

- gas headers designed as a looping system in order to allow for partial or total loss of header function in one direction without losing gas system functionality, and
- Condensate extraction and storage systems designed at strategic low points throughout the gas system.

The effective landfill gas combustion technology includes:

- **Flaring:** BF200 AT(s) flare manufactured by Progetto Terra s.r.l.
- **Thermal energy production*:** As of June 2006, the LFG has been conveyed through an underground pipeline to the nearby Offis Textile factory, where it is combusted in the plant's boilers instead of heavy fuel oil (HFO), in order to produce thermal energy (steam and thermal oil). Both the extraction of the LFG from the Hiriya Landfill and its transmission to the Offis Plant are conducted and overseen by Ayalon Bio-Gas Ltd (formerly Gas-Dan).

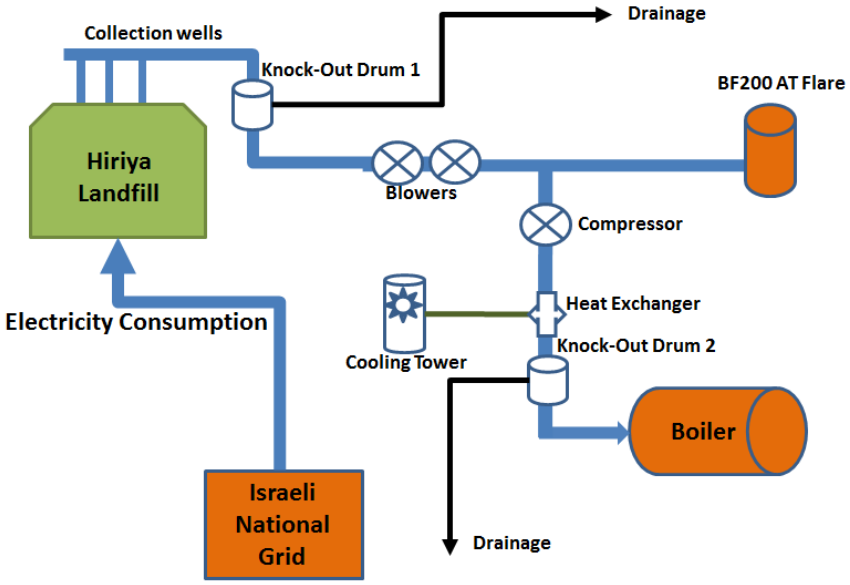
  Ayalon Bio-Gas was established in 2005 as a private company dedicated to constructing and operating the LFG transmission system supplying the Offis Textile plant with LFG from the Hiriya Landfill. After a lengthy bureaucratic process, the 3-km transmission system was constructed by Ayalon Bio-Gas in 2005.

  Three of the plant's six steam and oil boilers were retrofitted to operate on LFG between June 2006 and January 2007, with the plant beginning to utilize LFG for energy generation in June 2006. This was included the disassembly of the HFO burners and the installation of three new Weishaupt biogas burners. The remaining three boilers continue to operate on HFO.

  The biogas transmission system linking the Hiriya Landfill to the Offis Textile plant (combustion site), was constructed using rigid High Density Polyethylene (HDPE) piping welded into a single component. Furthermore, the pipeline was constructed in accordance with the Israeli standard for high-pressure natural gas systems, which is based on the Dutch standard NEN 3650: 2003, as well as in accordance with the U.S. standard UFGS 02551 N for low-pressure natural gas transmission systems. The pipeline runs underground at a depth of 1.25 to 4.75 meters, and the route is clearly marked along the surface.

*It is important to note that all further emission reductions which result from the replacement of fossil fuel with renewable energy at the Offis plant are not claimed by the Hiriya Landfill Project, as that component is registered as a separate CDM project (Offis Textile Ltd. Fuel Switch, Israel No. 1757).

Detailed technical diagram:



Special events during the monitoring period:

1. **Computer malfunctions**
   - During the monitoring period, several malfunctions and power outages have affected the continuity of the data collection process conducted automatically by the computerized control system.
   - The following table summarizes the malfunctions time and duration:

Start date of malfunction	End date of malfunction	Duration
11/01/2012	12/01/2012	24 hours
16/01/2012	16/01/2012	1 hour
10/02/2012	12/02/2012	46 hours
29/02/2012	01/03/2012	21 hours
18/04/2012	19/04/2012	18 hours
13/07/2012	14/07/2012	16 hours
Total		**126 hours**

   - In addressing the computer malfunctions and power outages, the project owner has taken a number of steps design to prevent as much as possible such malfunctions in the future. This includes upgrading the UPS system, purchasing a state-of-the-art computer, and improving the awareness of the relevant personnel regarding the importance of continuous power supply to the system.
   - During the periods in which it was nonetheless out of operation, the control system did not record the data required for the determination of emission reductions.
   - As per the methodology (*ACM0001* ver. 11.0), CERs shall be claimed ex-post based on actual monitoring of the required parameters. As the data was unavailable, no CERs are requested for the control system malfunction periods. **Therefore, and despite the fact that methane was properly destroyed by the project activity, no CERs are claimed for the malfunction periods. This approach reduces the requested amount of CERs, and is therefore conservative.**

2. **Electricity meter replacement**
   - On 03/06/2012, the Elnet-LT electricity meter was replaced with a brand new Elnet-LT electricity meter (of the exact same model).
   - The electricity meter was replaced due to an operational decision of Ayalon Bio-Gas and as part of the regular equipment service and replacement program.
   - **This event has no influence on requested CERs, since the electricity meters were replaced swiftly on-site, and the monitoring process was not affected.**

No request for prior approval of changes has been submitted during the monitoring period.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

N/A – No temporary deviations have been applied during this monitoring period,

B.2.2. Corrections

N/A – No corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this report.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

N/A – No permanent changes have been approved during this monitoring period or submitted with this report.

B.2.4. Changes to project design of registered project activity

N/A – No changes to project design of the registered project activity have been approved during this monitoring period or submitted with this report.

B.2.5. Changes to start date of crediting period

N/A – No changes to the crediting period have been approved during this monitoring period or submitted with this report.

B.2.6. Types of changes specific to afforestation or reforestation project activity

N/A – The project activity is neither an afforestation nor a reforestation project activity.

SECTION C. Description of monitoring system

The monitoring methodology is based on direct measurement of the amount of landfill gas captured and destroyed at the flare platform and thermal energy units. The main variables that need to be determined are the quantity of methane actually captured ($MD_{project,y}$), quantity of methane flared ($MD_{flared,y}$) and the quantity of methane used to produce thermal energy ($MD_{thermal,y}$).

The methodology also measures the energy consumed by the project activity that is produced using fossil fuels.

To determine these variables, the following parameters are monitored:

Quantity of Methane Destroyed

1. The amount of landfill gas collected (in Nm³, using a continuous flow meter), where the total quantity ($LFG_{total,y}$), as well as the quantities fed to the flare ($LFG_{flare,y}$) and to the boilers ($LFG_{thermal,y}$), are measured continuously.
2. The fraction of methane in the landfill gas ($w_{CH4,y}$) is measured with a continuous analyzer;

As per *ACM0001* (version 11.0), a **continuous monitoring system** for methane fraction of the landfill gas and LFG flow is one that continuously acquires data from the process (continuous sampling) in order to process it and deliver the required information (methane fraction of the landfill gas and LFG flow) as an average value in a time interval not greater than an hour. In accordance with the methodology, a computerized continuous monitoring system was developed and installed on-site. The computerized system

aggregates the data input from the monitoring equipment and stores the data. The computerized system automatically calculates the quantity of methane destroyed using paired values of the methane fraction of the landfill gas and LFG flow which are averaged for the same time interval (i.e. methane fraction of landfill gas averaged at hour x is used with LFG flow which is averaged at the same hour x).

Operating hours of the energy generation equipment is monitored in order to ensure methane destruction is claimed for methane used in the energy generation equipment when the equipment is operational.

As this project does not involve avoided disposal of waste at a solid waste disposal site, emission reductions are determined based on direct monitoring of the quantity of LFG extracted from the landfill and the methane fraction of the landfill gas. As such, the determination of the amount of methane generated in the landfill is not required, and the project activity does not monitor the data needed to determine this parameter in accordance with the *"Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"*.

Project Emissions from the Flaring of the Residual Gas Stream

Due to the fact that a default flare efficiency is used, as per the "*Tool to determine project emissions from flaring gases containing methane*" the temperature of the flare exhaust gas (T_{flare}) is monitored continuously by a type S thermocouple (which is more accurate than type N thermocouple; the approved monitoring plan requires a type N or better thermocouple).

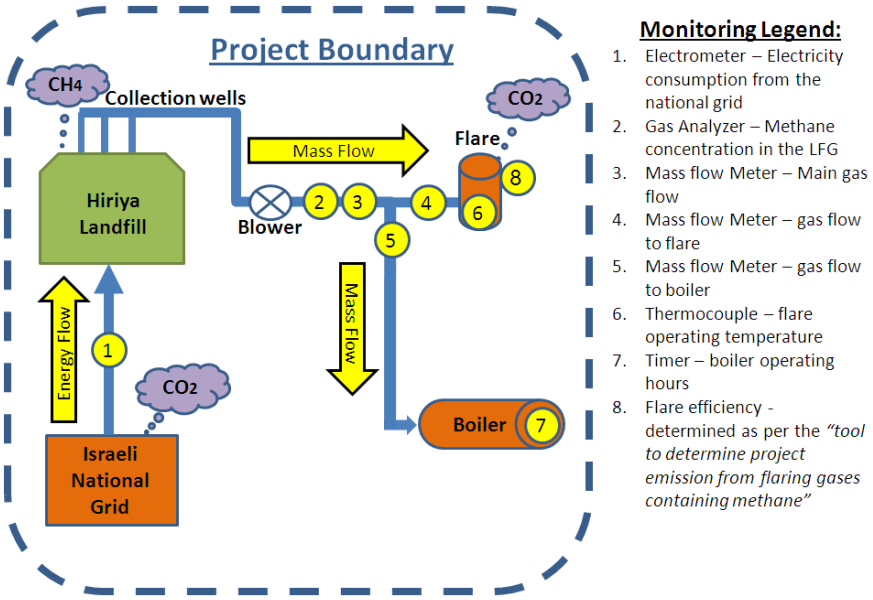
The computerized control system continuously aggregates the data as recorded by the various meters, and automatically determines the correct default flare efficiency on an hourly basis, based on the temperature of the flare exhaust gas, time of operation and LFG flow to flare. The determined efficiency values are used for the calculation of the project emissions from flaring.

Monitoring Responsibilities and Data Management

All monitoring is undertaken by the site manager (Ayalon Bio-Gas technician), who is also responsible for ensuring timely maintenance, testing and calibration of the monitoring equipment, as required.

All data is recorded monthly and reviewed by off-site personnel (CDM consultant) in order to ensure that the data is accurate and that the values do not deviate from the appropriate range defined for each parameter.

The monitoring is supervised by DRAT's chief engineer, who serves as the CDM project manager. The CDM project manager conducts biweekly meetings with the site manager and the CDM consultant, and in addition is immediately informed of special events that occur.
All records shall be archived either electronically or in paper form and kept for at least two years after the end of the crediting period.



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

*Note: As per the *guidelines for completing the monitoring report form* ver. 02.0, "Data that are fixed before registration and/or at the renewal of crediting period and **are used during this monitoring period** should be included here under section D.1".
Parameters that were used in order to determine the ex-ante estimation of emission reductions ($BE_{CH4,SWDS,y}$, φ, OX, F, DOC_f, MCF, DOC_j, k_j, f, $W_{j,x}$,W_x, $P_{n,j,x}$), and parameters that were used in order to determine the grid emission factor ($FC_{i,m,y}$, $NCV_{i,y}$, $EF_{CO2,i,y}$, $EG_{m,y}$), **but were not used** during this monitoring period, were therefore not included in this section of the monitoring report.

Data/Parameter	Regulatory requirements relating to landfill gas
Unit	--
Description	Regulatory requirements relating to landfill gas
Source of data	The host country's regulatory requirements relating to landfill gas as described in a letter from the Director of Solid Waste Division – The Israeli Ministry of Environmental Protection.
Value(s) applied	$MD_{BL,y}$ = 0
Purpose of data	Calculation of baseline emissions
Additional comment	Host Country regulations do not require the capture and destruction of LFG in abandoned landfills.

Data/Parameter	GWP_{CH4}
Unit	$tCO_2e/tCH4$
Description	Global warming potential of CH_4
Source of data	IPCC
Value(s) applied	21
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	D_{CH4} ; $\rho_{CH4,n}$
Unit	tCH_4/m^3CH_4
Description	Methane Density
Source of data	*ACM0001* (version 11.0), *"Tool to determine project emissions from flaring gases containing methane"*.
Value(s) applied	0.0007168 tCH_4/m^3CH_4
Purpose of data	Calculation of baseline emissions
Additional comment	Methane density at normal temperature and pressure

Data/Parameter	$EF_{EL,j,y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid-connected power generation in year y ($EF_{grid,CM,y}$), calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*."
Source of data	Calculated as per the *"Tool to calculate the emission factor for an electricity system"*
Value(s) applied	0.481
Purpose of data	Calculation of baseline emissions
Additional comment	As per the *"Tool to calculate the emission factor for an electricity system"*. All data will be stored electronically for the duration of the project activity plus two additional years.

D.2. Data and parameters monitored

*Note: During the monitoring period default values were applied in order to determine the project emission from flaring, as per the *"Tool to determine project emissions from flaring gases containing methane"*. Therefore, the parameters $t_{O2,h}$ (volumetric fraction of O_2 in the exhaust gas of the flare in the hour *h*) and $fv_{CH4,FG,h}$ (concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour *h*) have not been monitored and are not included in this section of the monitoring report.

In addition, as the parameter $MG_{PR,y}$ (amount of methane generated during year *y* of the project activity) is not required for the *ex-post* determination of emission reductions, it is not monitored in the context of the project activity and is not included in this section of the monitoring report.

Data/Parameter	$LFG_{total,y}$
Unit	Nm^3
Description	Total amount of landfill gas captured at Normal Temperature and Pressure
Measured/Calculated /Default	Measured
Source of data	Measured by a flow meter that also measures temperature and pressure and automatically normalizes the data to Normal Temperature and Pressure. Data aggregated monthly and yearly.
Value(s) of monitored parameter	**Month** / **LFG flow (Nm^3)** 01/2012 – 689,182 02/2012 – 644,918 03/2012 – 673,337 04/2012 – 590,157 05/2012 – 722,025 06/2012 – 635,902 07/2012 – 330,100 **Total – 4,285,621**
Monitoring equipment	Type: Rosemount 3095 MFC Flow Meter Accuracy class: ±0.9% of mass flow rate Serial number: 8392908 Calibration frequency: Annually Date of last calibration: 11/09/2011 Validity of calibration: 10/09/2012
Measuring/Reading/ Recording frequency	Monitored continuously.
Calculation method (if applicable)	Average value in a time interval not greater than an hour is used in the calculations of emission reductions.
QA/QC procedures	Flow meters are subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data	Calculation of baseline emissions

Additional comment	In accordance with *ACM0001* (version 11.0), no separate monitoring of temperature and pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters. Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.

<table>
<tr><td>Data/Parameter</td><td>$LFG_{flare,y}$</td></tr>
<tr><td>Unit</td><td>Nm^3</td></tr>
<tr><td>Description</td><td>Amount of landfill gas flared at Normal Temperature and Pressure</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Measured by a flow meter that also measures temperature and pressure and automatically normalizes the data to Normal Temperature and Pressure. Data aggregated monthly and yearly.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th>Month</th><th>LFG flow (Nm^3)</th></tr>
<tr><td>01/2012</td><td>38,016</td></tr>
<tr><td>02/2012</td><td>49,413</td></tr>
<tr><td>03/2012</td><td>16,388</td></tr>
<tr><td>04/2012</td><td>88,462</td></tr>
<tr><td>05/2012</td><td>33,117</td></tr>
<tr><td>06/2012</td><td>35,774</td></tr>
<tr><td>07/2012</td><td>0</td></tr>
<tr><td>Total</td><td>261,170</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td>Type</td><td>Rosemount 3095 MFC Flow Meter</td></tr>
<tr><td>Accuracy class</td><td>±0.9% of mass flow rate</td></tr>
<tr><td>Serial number</td><td>8392909</td></tr>
<tr><td>Calibration frequency</td><td>Annually</td></tr>
<tr><td>Date of last calibration</td><td>11/09/2011</td></tr>
<tr><td>Validity of calibration</td><td>10/09/2012</td></tr>
</table>
</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Monitored continuously.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Average value in a time interval not greater than an hour is used in the calculations of emission reductions.</td></tr>
<tr><td>QA/QC procedures</td><td>Flow meters are subject to a regular maintenance and testing regime to ensure accuracy.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>In accordance with ACM0001 (version 11.0), no separate monitoring of temperature and pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters.
Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.</td></tr>
</table>

Data/Parameter	$LFG_{thermal,y}$
Unit	Nm^3
Description	Amount of landfill gas combusted in thermal energy generating equipment at Normal Temperature and Pressure
Measured/Calculated /Default	Measured
Source of data	Measured by a flow meter that also measures temperature and pressure and automatically normalizes the data to Normal Temperature and Pressure. Data aggregated monthly and yearly.
Value(s) of monitored parameter	<table><tr><th>Month</th><th>LFG flow (Nm^3)</th></tr><tr><td>01/2012</td><td>656,236</td></tr><tr><td>02/2012</td><td>594,333</td></tr><tr><td>03/2012</td><td>641,086</td></tr><tr><td>04/2012</td><td>500,585</td></tr><tr><td>05/2012</td><td>686,376</td></tr><tr><td>06/2012</td><td>597,927</td></tr><tr><td>07/2012</td><td>328,741</td></tr><tr><td>**Total**</td><td>**4,005,284**</td></tr></table>
Monitoring equipment	<table><tr><td>Type</td><td>Rosemount 3095 MFC Flow Meter</td></tr><tr><td>Accuracy class</td><td>±0.9% of mass flow rate</td></tr><tr><td>Serial number</td><td>8392907</td></tr><tr><td>Calibration frequency</td><td>Annually</td></tr><tr><td>Date of last calibration</td><td>11/09/2011</td></tr><tr><td>Validity of calibration</td><td>10/09/2012</td></tr></table>
Measuring/Reading/ Recording frequency	Monitored continuously.
Calculation method (if applicable)	Average value in a time interval not greater than an hour is used in the calculations of emission reductions.
QA/QC procedures	Flow meters are subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data	Calculation of baseline emissions
Additional comment	In accordance with *ACM0001* (version 11.0), no separate monitoring of temperature and pressure is necessary when using flow meters that automatically measure temperature and pressure, expressing LFG volumes in normalized cubic meters. Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.

Data/Parameter	$W_{CH4,y}\ (fv_{CH4,RG,h})$
Unit	$Nm^3\ CH_4/\ Nm^3$ LFG
Description	Methane fraction in the landfill gas.
Measured/Calculated /Default	Measured
Source of data	Measured continuously by project participants using a gas analyser.
Value(s) of monitored parameter	Average values in a time interval of one hour. See attached spreadsheet for values.
Monitoring equipment	Type: SearchPoint Optima Plus IR Accuracy class: Baseline < ±2% LEL, 50% FSD <±3% LEL Serial number: Z1258610380062 Calibration frequency: Annually Date of last calibration: 04/09/2011 Validity of calibration: 03/09/2012
Measuring/Reading/ Recording frequency	Monitored continuously (average value in a time interval not greater than an hour is used in the calculations of emission reductions.)
Calculation method (if applicable)	Average value in a time interval not greater than an hour is used in the calculations of emission reductions.
QA/QC procedures	The gas analyser is subject to a regular maintenance and testing regime to ensure accuracy.
Purpose of data	Calculation of baseline emissions
Additional comment	Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.

Data/Parameter	T_{flare}
Unit	^{o} C
Description	Temperature in the exhaust gas of the flare
Measured/Calculated /Default	Measured
Source of data	Monitored continuously by a type S thermocouple (which is more accurate than type N thermocouple; the approved monitoring plan requires a type N or better thermocouple).
Value(s) of monitored parameter	Monitored continuously. See attached spread sheet for minimal and maximal temperatures during the hour.
Monitoring equipment	<table><tr><td>Type</td><td>Type S Thermocouples</td></tr><tr><td>Accuracy class</td><td>2.2 ºC or 0.75% above 0 ºC (whichever is greater)</td></tr><tr><td>Serial number</td><td>43922</td></tr><tr><td>Calibration frequency</td><td>Thermocouples are replaced or tested every year</td></tr><tr><td>Date of last calibrations</td><td>Thermocouples were replaced on 29/12/2011</td></tr><tr><td>Validity of calibration</td><td>Thermocouples shall be replaced or tested before 29/12/2012</td></tr></table>
Measuring/Reading/ Recording frequency	Monitored continuously.
Calculation method (if applicable)	N/A
QA/QC procedures	Thermocouples are replaced or tested every year.
Purpose of data	Calculation of project emissions
Additional comment	Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and parameter is monitored accordingly.

Data/Parameter	$\eta_{flare,h}$
Unit	--
Description	Flare efficiency in hour *h*
Measured/Calculated /Default	Calculated
Source of data	As per *"Tool to determine project emissions from flaring gases containing methane"*
Value(s) of monitored parameter	90% / 50% / 0%
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Monitored continuously
Calculation method (if applicable)	Due to the fact that a default flare efficiency is used, as per the "*Tool to determine project emissions from flaring gases containing methane*" the temperature of the flare exhaust gas (T_{flare}) is monitored continuously by a type S thermocouple (which is more accurate than type N thermocouple; the approved monitoring plan requires a type N or better thermocouple). The computerized control system continuously aggregates the data as recorded by the various meters, and automatically determines the correct default flare efficiency on an hourly basis, based on the temperature of the flare exhaust gas, time of operation and LFG flow to flare. The determined efficiency values are used for the calculation of the project emissions from flaring.
QA/QC procedures	N/A
Purpose of data	Calculation of Project Emissions
Additional comment	As the project activity applied the default flare efficiency, steps 5-7 of the tool is applied. Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and parameter is monitored accordingly.

<table>
<tr><td>Data/Parameter</td><td>$EC_{PJ,j,y}$</td></tr>
<tr><td>Unit</td><td>MWh/y</td></tr>
<tr><td>Description</td><td>Quantity of electricity consumed from external sources by the project electricity consumption source j in year y</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Electricity meter</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th>Month</th><th>Electricity consumption (MWh)</th></tr>
<tr><td>01/2012</td><td>43.81</td></tr>
<tr><td>02/2012</td><td>40.64</td></tr>
<tr><td>03/2012</td><td>43.29</td></tr>
<tr><td>04/2012</td><td>35.75</td></tr>
<tr><td>05/2012</td><td>46.18</td></tr>
<tr><td>06/2012</td><td>40.35</td></tr>
<tr><td>07/2012</td><td>22.19</td></tr>
<tr><td>Total</td><td>272.21</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Monitored by two electricity meters:
<table>
<tr><td>Meter</td><td>M-9</td><td colspan="2">M-10*</td></tr>
<tr><td>Type</td><td>Elnet-Pico</td><td>Elnet-LT (removed on 03/06/2012)</td><td>Elnet-LT (installed on 03/06/2012)</td></tr>
<tr><td>Accuracy class</td><td>0.2</td><td>0.2</td><td>0.2</td></tr>
<tr><td>Serial number</td><td>98010118</td><td>60600100</td><td>20530057</td></tr>
<tr><td>Calibration frequency</td><td>Annual test</td><td>Annual test</td><td>Annual test</td></tr>
<tr><td>Date of last calibrations</td><td>Last test: 01/07/2012 (previous 10/07/2011)</td><td>Last test: 10/07/2011</td><td>Last test: 15/05/2012</td></tr>
<tr><td>Validity of calibration</td><td>09/07/2012</td><td>09/07/2012</td><td>14/05/2013</td></tr>
</table>
*Note: Please note that the electricity meter M-10 was replaced with a brand new meter of the exact same make and model on 03/06/2012.</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Monitored continuously</td></tr>
<tr><td>Calculation method (if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>Regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of Project Emissions</td></tr>
<tr><td>Additional comment</td><td>Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.</td></tr>
</table>

Data/Parameter	$PE_{flare,y}$
Unit	tCO_{2e}
Description	Project emissions from flaring of the residual gas stream in year *y*
Measured/Calculated /Default	Calculated
Source of data	Calculated as per the *"Tool to determine project emissions from flaring gases containing methane"*
Value(s) of monitored parameter	
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	N/A
Calculation method (if applicable)	As per the *"Tool to determine project emissions from flaring gases containing methane"*
QA/QC procedures	As per the *"Tool to determine project emissions from flaring gases containing methane"*
Purpose of data	Calculation of Project Emissions
Additional comment	Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.

Month	**Project emissions from flaring (tCO_{2e})**
01/2012	27.15
02/2012	37.22
03/2012	12.99
04/2012	271.71
05/2012	27.20
06/2012	29.26
07/2012	0
Total	**405.53**

Data/Parameter	$TDL_{j,y}$
Unit	-
Description	Average technical transmission and distribution losses for providing electricity to source *j*
Measured/Calculated /Default	Measured
Source of data	IEC Statistical Report 2010
Value(s) of monitored parameter	0.043
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Annually
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data	Calculation of Project Emissions
Additional comment	N/A

<table>
<tr><td>Data/Parameter</td><td>Operation of the energy generation equipment</td></tr>
<tr><td>Unit</td><td>Hours</td></tr>
<tr><td>Description</td><td>Operation of the energy generation equipment</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Timer</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th rowspan="2">Month</th><th colspan="3">Operating hours</th></tr>
<tr><th>Boiler 4</th><th>Boiler 5</th><th>Boiler 1</th></tr>
<tr><td>01/2012</td><td>8</td><td>578</td><td>551</td></tr>
<tr><td>02/2012</td><td>33</td><td>499</td><td>480</td></tr>
<tr><td>03/2012</td><td>38</td><td>512</td><td>550</td></tr>
<tr><td>04/2012</td><td>25</td><td>360</td><td>436</td></tr>
<tr><td>05/2012</td><td>37</td><td>710</td><td>559</td></tr>
<tr><td>06/2012</td><td>43</td><td>548</td><td>533</td></tr>
<tr><td>07/2012</td><td>14</td><td>275</td><td>270</td></tr>
<tr><td>Total</td><td>198</td><td>3,482</td><td>3,380</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td>Meter</td><td>Boil. 4 (LFG)</td><td>Boil. 5 (LFG)</td><td>Boil. 1 (LFG)</td></tr>
<tr><td>Type</td><td>B 621</td><td>THEBEN</td><td>THEBEN</td></tr>
<tr><td>Accuracy class</td><td>±1sec</td><td>±1sec</td><td>±1sec</td></tr>
<tr><td>Serial number</td><td>AC0006</td><td>AC0007</td><td>AC0012</td></tr>
<tr><td>Calibration frequency</td><td>Annually</td><td>Annually</td><td>Annually</td></tr>
<tr><td>Date of last calibration</td><td>28/05/2012
12/06/2011</td><td>28/05/2012
12/06/2011</td><td>28/05/2012
12/06/2011</td></tr>
<tr><td>Validity</td><td>27/05/2013</td><td>27/05/2013</td><td>27/05/2013</td></tr>
</table>
</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Monitored Annually</td></tr>
<tr><td>Calculation method (if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>N/A</td></tr>
<tr><td>Purpose of data</td><td>Calculation of Baseline Emissions</td></tr>
<tr><td>Additional comment</td><td>This is monitored to ensure methane destruction is claimed for methane used in the energy generation equipment when the equipment is operational.
Dan Region Association of Towns has ISO certifications 9001 & 14001. The monitoring of this parameter is described in detail in the work procedures of the Hiriya landfill CDM project, and the parameter is monitored accordingly.</td></tr>
</table>

D.3. Implementation of sampling plan

N/A – No sampling plan is required to be implemented

SECTION E. Calculation of emission reductions or GHG removals by sinks
E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

$$BE_y = \left(MD_{project,y} - MD_{BL,y}\right) * GWP_{CH4} + EL_{LFG,y} * CEF_{elec,BL,y} + ET_{LFG,y} * CEF_{ther,BL,y} \quad \textbf{(1)}$$

Where:

BE_y	Baseline emissions in year y	tCO_2e
$MD_{project,y}$	The amount of methane destroyed/combusted during the year	tCH_4
$MD_{BL,y}$	The amount of methane that would have been destroyed/combusted during the year in the absence of the project due to regulatory and/or contractual requirement	tCH_4
GWP_{CH4}	Global Warming Potential value of methane for the first commitment period	tCO_2e/tCH_4
$EL_{LFG,y}$	Net quantity of electricity produced using LFG, which in the absence of the project activity would have been produced by power plants connected to the grid or by an on-site/off-site fossil fuel based captive power generation, during year *y*. **Not applicable to the project – There is no electricity production in the Hiriya Landfill project.**	MWh
$CEF_{elec,BL,y}$	CO_2 emissions intensity of the baseline source of electricity displaced. **Not applicable to the project – There is no electricity production in the Hiriya Landfill project.**	tCO_2e/MWh
$ET_{LFG,y}$	The quantity of thermal energy produced utilizing the landfill gas, which in the absence of the project activity would have been produced from onsite/offsite fossil fuel fired boiler/air heater, during the year *y*. **Not applicable to the project – The emission reductions results from the production of thermal energy in the Offis Textile plant are part of the "*Offis Textile Ltd Fuel Switch, Israel*" project (No. 1757).**	TJ
$CEF_{ther,BL,y}$	CO_2 emissions intensity of the fuel used by boiler/air heater to generate thermal energy which is displaced by LFG based thermal energy generation. **Not applicable to the project – The emission reductions results from the production of thermal energy in the Offis Textile plant are part of the "*Offis Textile Ltd Fuel Switch, Israel*" project (No. 1757).**	tCO_2e/TJ

As previously described, the Hiriya Landfill has no regulatory and/or contractual requirement to destroy or combust methane. Therefore:

$MD_{BL,y} = 0$

Sample calculation – based on data monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$MD_{project,y}$ = 0.154 tCH_4
$MD_{BL,y}$ = 0 tCH_4
GWP_{CH4} = 21 tCO2e/tCH4
$\boldsymbol{BE_y}$ = (0.154-0)*21 = **3.234 tCO_2e**

According to *ACM0001* (version 11.0), $MD_{project,y}$ shall be determined *ex post* as the lesser of the following two values:

1. $MD_{total,y} = LFG_{total,y} * W_{CH4,y} * D_{CH4}$

Where:

$MD_{total,y}$	Quantity of total methane collected during the year *y*	tCH_4
$LFG_{total,y}$	Quantity of total landfill gas collected during the year *y*	Nm^3
$W_{CH4,y}$	Average methane fraction of the landfill gas as measured during the year *y*	Nm^3 CH_4 / Nm^3 LFG
D_{CH4}	Methane density	tCH_4/m^3CH_4

-or-

2. $MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y} + MD_{PL,y}$ **(2)**

Where:

$MD_{flared,y}$	Quantity of methane destroyed by flaring	tCH_4
$MD_{electricity,y}$	Quantity of methane destroyed by generation of electricity. **Not applicable to the project – There is no electricity production in the Hiriya Landfill project.**	
$MD_{thermal,y}$	Quantity of methane destroyed for the generation of thermal energy	tCH_4
$MD_{PL,y}$	Quantity of methane sent to the pipeline for feeding to the natural gas distribution network. **Not applicable to the project –methane from the Hiriya Landfill project is not sent to a pipeline for feeding to a natural gas distribution network.**	

Sample calculation – based on data monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$LFG_{total,y}$ = 620 Nm^3
$W_{CH4,y}$ = 39.2 Nm^3 CH_4/Nm^3 LFG
D_{CH4}= 0.0007168 tCH_4/m^3CH_4
$\boldsymbol{MD_{total,y}}$ = 620*(39.2/100)*0.0007168 = **0.174 tCH_4**

$MD_{flared,y}$ = 0.154 tCH_4
$MD_{thermal,y}$ = 0 tCH_4
$\boldsymbol{MD_{project,y}}$ = 0.154+0 = **0.154 tCH_4**

Min ($\boldsymbol{MD_{total,y}}$, $\boldsymbol{MD_{project,y}}$) = 0.154 tCH_4

*note: this is a sample calculation to demonstrate the calculation method. The actual comparison between these parameters, and use of the lesser value, was performed on a monthly basis, in accordance with the approved monitoring plan.

$$MD_{flared,y} = \left(LFG_{flare,y} * W_{CH4,y} * D_{CH4}\right) - \left(PE_{flare,y}/GWP_{CH4}\right) \quad \textbf{(3)}$$

Where:

$MD_{flared,y}$	Quantity of methane destroyed by flaring	tCH_4
$LFG_{flare,y}$	Quantity of landfill gas fed to the flare during the year *y*	Nm^3
$W_{CH4,y}$	Average methane fraction of the landfill gas as measured during the year *y*	Nm^3 CH_4 / Nm^3 LFG
D_{CH4}	Methane density	tCH_4/m^3CH_4
$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year *y*	tCO_2e
GWP_{CH4}	Global Warming Potential value of methane for the first commitment period	tCO2e/tCH4

As per methodology *ACM0001* (version 11.0), $PE_{flare,y}$ is determined using the procedure described in the *"Tool to determine project emissions from flaring gases containing methane"* (see below).

Sample calculation – based on data automatically monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$LFG_{flare,y}$ = 608 Nm^3
$W_{CH4,y}$ = 39.2 Nm^3 CH_4/Nm^3 LFG
D_{CH4}= 0.0007168 tCH_4/m^3CH_4
$PE_{flare,y}$ = 0.3587624 tCO_2e
GWP_{CH4} = 21 tCO2e/tCH4
$\boldsymbol{MD_{flared,y}}$ = [608*(39.2/100)*0.0007168]-(0.3587624/21) = **0.154 tCH_4**

$$MD_{thermal,y} = LFG_{thermal,y} * W_{CH4,y} * D_{CH4} \quad \textbf{(5)}$$

Where:

$MD_{thermal,y}$	Quantity of methane destroyed for the generation of thermal energy	tCH_4
$LFG_{thermal,y}$	Quantity of landfill gas fed into the thermal energy generating equipment	Nm^3
$W_{CH4,y}$	Average methane fraction of the landfill gas as measured during the year *y*	Nm^3 CH_4 / Nm^3 LFG
D_{CH4}	Methane density	tCH_4/m^3CH_4

Sample calculation – based on data automatically monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$LFG_{thermal,y}$ = 0 Nm^3
$W_{CH4,y}$ = 39.2 Nm^3 CH_4/Nm^3 LFG
D_{CH4}= 0.0007168 tCH_4/m^3CH_4
$\boldsymbol{MD_{thermal,y}}$ = 0*(39.2/100)*0.0007168 = **0 tCH_4**

E.2. Calculation of project emissions or actual net GHG removals by sinks

Project Emissions from Flaring ($PE_{flare,y}$)

As per methodology *ACM0001* (version 11.0), $PE_{flare,y}$ is determined using the procedure described in the *"Tool to determine project emissions from flaring gases containing methane."*

As the project activity shall apply the default flare efficiency of 90%/50%/0%, steps 5-7 of the tool are applied.

As specified in the approved PDD, should in the future a system to continuously monitor the flare's exhaust gas be installed, the flare efficiency shall calculated as per steps 1-7 of the tool (for those hours in which the flare's exhaust gas was properly monitored in a continuous manner).

However, during this monitoring period no system to continuously monitor the flare's exhaust gas has been installed. Therefore, only steps 5-7 of the tool were applied.

Step 5: Determination of methane mass flow rate in the residual gas

$$TM_{RG,h} = FV_{RG,h} \times fv_{CH4,RG,h} \times \rho_{CH4,n} \quad \textbf{(13)}$$

Where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour *h*	kg/h
$FV_{RG,h}$	Volumetric flow rate of the residual gas at normal conditions in hour *h*	Nm^3/h
$fv_{CH4,RG,h}$	Volumetric fraction of methane in the residual gas in hour *h*	-
$\rho_{CH4,n}$	Density of methane at normal conditions	kg/Nm^3

Sample calculation – based on data automatically monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$FV_{RG,h}$ = 608 Nm^3/h
$fv_{CH4,RG,h}$ = 39.2 %
$\rho_{CH4,n}$ = 0.0007168
$\boldsymbol{TM_{RG,h}}$ = 608*(39.2/100)*0.0007168 = **0.171 kg/h**

Step 6: Determination of the hourly flare efficiency

In case of **enclosed flare and use of the default value** for the flare efficiency, the flare efficiency in the hour *h* ($\eta_{flare,h}$) is:

- 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500°C for more than 20 minutes during hour *h*

- 50% if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour *h*, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour *h*
- 90% if the temperature in the exhaust gas of the flare (T_{flare}) is above 500°C for more than 40 minutes during the hour *h* and the manufacturer's specifications on proper operation of the flare are met continuously during the hour *h*

Sample calculation – based on data automatically monitored and collected during one hour (8:00-9:00) on 25/02/2012:

- The temperature in the exhaust gas of the flare (T_{flare}) was below 500°C for 0 minutes during hour *h* (i.e. it was above 500°C for 60 minutes during hour *h*). **Therefore, the efficiency is not 0%.**
- Proper operation in accordance with manufacturer specifications**:**
  1. The minimum temperature in the exhaust gas of the flare (T_{flare}) was 874°C during the hour, and the maximum temperature was 985°C. **Therefore, the manufacturer's specifications on proper operation of the flare (800-1050 °C) are met continuously during the hour.**
  2. The minimal flow rate to the flare was 472 Nm3/h during the hour, and the maximal flow rate was 673 Nm3/h. **Therefore, the manufacturer's specifications on proper operation of the flare (400-2000 Nm3/h) are met continuously during the hour.**

Therefore, the flare efficiency during the hour is 90%.

Step 7: Calculation of annual project emissions from flaring

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} * \left(1 - \eta_{flare,h}\right) * \frac{GWP_{CH4}}{1000} \quad \textbf{(15)}$$

Where

$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year *y*	tCO_2e
$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour *h*	kg/h
$n_{flare,h}$	Flare efficiency in hour *h*	-
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period	tCO_2e/tCH_4

Sample calculation – based on data automatically monitored and collected during one hour (8:00-9:00) on 25/02/2012:

$TM_{RG,h}$ = 0.171 kg/h
$n_{flare,h}$ = 90%
GWP_{CH4} = 21 tCO_2e/tCH_4
$\boldsymbol{PE_{flare,y}}$ = 0.171 *(1-90/100)*21= **0.3587624 tCO_2e**

Project Emissions:

$PE_y = PE_{EC,y} + PE_{FC,j,y}$

Where:

PE_y	Project emissions in year *y*	tCO_2e/yr
$PE_{EC,y}$	Project emissions from electricity consumption in year *y*.	tCO_2/yr
$PE_{FC,j,y}$	Project emissions from heat consumption in year *y*. **Not applicable for the project activity – the project activity does not consume heat.**	tCO_2/yr

As per the methodology *ACM0001*, project emissions from electricity consumption ($PE_{EC,y}$) shall be calculated following the "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*". The generic approach describe in the tool has been used as follows:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y}) \quad \textbf{(13)}$$

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year *y*	tCO_2/yr
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source *j* in year *y*	MWh/yr
$EF_{EL,j,y}$	Emission factor for electricity generation for source *j* in year *y*	tCO_2/MWh
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*	-
j	Sources of electricity consumption in the project	-

Sample calculation – based on data automatically monitored and collected during the month of February 2012:

$EC_{PJ,j,y}$ = 40.64 MWh/yr
$EF_{EL,j,y}$ = 0.481 MWh/yr
$TDL_{j,y}$ = 0.043
$\boldsymbol{PE_{EC,y}}$ = 40.64*0.481*(1+0.043) = **20.38 tCO_2/yr**

E.3. Calculation of leakage

N/A – No leakage effects have to be accounted for under *ACM0001* (ver. 11.0).

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	23,875.1	136.56	0	23,738

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	(85,463/365)*197 = 46,126.6	23,738

E.6. Remarks on difference from estimated value in registered PDD

There has been no increase in the actual emission reductions achieved during the current monitoring period with respect to the ex-ante estimations stated in the registered CDM-PDD.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		