



**Monitoring report form**  
**(Version 05.1)**

*Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.*

**MONITORING REPORT**

<b>Title of the project activity</b>	The TIMARPUR-OKHLA Waste Management Company Pvt Ltd's (Towmcl) integrated waste to energy project in Delhi	
<b>UNFCCC reference number of the project activity</b>	1254	
<b>Version number of the monitoring report</b>	1	
<b>Completion date of the monitoring report</b>	15/10/2015	
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring period number: 2 Duration of the monitoring period: 01/09/2012 – 30/06/2015	
<b>Project participant(s)</b>	TIMARPUR-OKHLA Waste Management Company Pvt. Ltd	
<b>Host Party</b>	India	
<b>Sectoral scope(s)</b>	Sectoral scope 13	
<b>Selected methodology(ies)</b>	Applied methodology: AM0025 (version 06) "Avoided emissions from organic waste through alternative waste treatment process"	
<b>Selected standardized baseline(s)</b>	NA	
<b>Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD</b>	708,311	
<b>Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	7,916	252,451

## SECTION A. Description of project activity

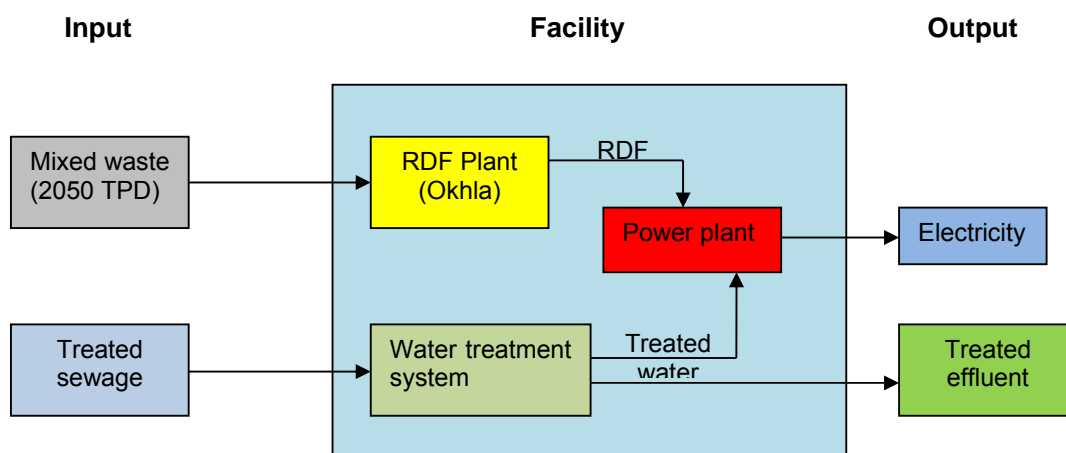
### A.1. Purpose and general description of project activity

The purpose of the project activity is to address a critical environmental problem faced in solid waste management by both MCD and NDMC. This will contribute in significant reduction of greenhouse gas emissions, which otherwise would have taken place in form of methane emission from solid waste being dumped in the open landfill (dump) sites. In addition, the project activity will also address to some extent the acute energy crisis faced by northern India by producing 20.9 MW of clean electricity that will be supplied to the state electricity grid. By displacing carbon intensive grid energy with a renewable, carbon neutral energy source, the project activity further reduces carbon dioxide emissions over the project life. Replicable technology, environmental, and sustainable development benefits also result from the project activity. These include: introducing efficient municipal waste management technology; reducing power shortages in the state of Delhi India; and, fostering sustainable economic growth through promoting energy self-sufficiency and proper waste management in Delhi, India.

The project was earlier envisaged to be developed at two different location, i.e. Timarpur and Okhla. About 650 Tonne Per Day (TPD) of Municipal Solid Waste (MSW) was envisaged to be processed at the Timarpur site while 1300 TPD of MSW was envisaged to be processed at Okhla site for the preparation of Refuse Derived Fuel (RDF). Additionally, 100 TPD of green waste (waste collected from garden like dry leaves, cut grass, etc) was to be utilized at Okhla site for generation of Compost and biogas through composting and biomethanation plant respectively. The PP had also envisaged to generate electricity to the tune of 16 MW by utilizing the RDF produced from the project activity.

The project activity involves processing of 2050 TPD of MSW to generate about 20.9 MW of power using a turbine at the Okhla site. At a PLF of 90% the gross energy generation is expected to be 151.30 GWh/year considering an operation period of 335 days. Auxiliary consumption is envisaged to be 18% of the power produced.

### *Design implemented*



The first boiler of the project activity was successfully commissioned on 10/03/2012 by TOWMCL at Okhla, Delhi, and two more boilers were made operational in the monitoring period. The major equipment deployed for the project activity is as follows:

**Boiler Details**

Description	
No of boilers	4
Steam generating capacity of each boiler (tons per hour)	26
Steam pressure at super-heated outlet (kg/cm <sup>2</sup> )	41
Steam temperature at super-heated outlet (° C)	400 $\pm$ 5
Feed water temperature at economizer inlet (° C)	130

In the monitoring period, 3 boilers were commissioned and the fourth boiler is in planning stage. The three boilers were commissioned on the following dates:

Boiler 1: 10<sup>th</sup> March 2012

Boiler 2: 10<sup>th</sup> March 2012

Boiler 3: 26<sup>th</sup> May 2012

**Note:** Since, the first boiler was commissioned on 10<sup>th</sup> March 2012 PP is considering emission reductions from the same day in the monitoring period.

**Turbine details:**

Description	
Capacity of Turbine (MW)	20.9
Capacity of Turbo generator (MW)	21
Steam pressure at the inlet (kg/cm <sup>2</sup> )	38
Steam temperature at the inlet (° C)	395

**Trommel details:**

Description	
Size of sieve (mm)	15

The turbo generator will be a bleeding cum condensing type and of high efficiency. The technology for the boilers and turbines is well established and the project activity does not involve any transfer of technology. The technology being used is environmentally safe and sound.

This is the second monitoring period associated with TOWMCL project activity. The period covered in this monitoring report is from 01.09.2012 to 30/06/2015 (Both days included). The CERs generated in the monitoring period are 7,916 CERs till 31<sup>st</sup> Dec 2012 and 252,451 CERs from 01/01/2013 to 30/06/2015. In the first monitoring period 12,478 CERs were issued by UNFCCC for the period of 30/03/2011 to 31/08/2012.

**A.2. Location of project activity**

The project activity is located in the complex at Okhla in Delhi, India. The nearest international airport is Indira Gandhi International airport. The location detail of the project activity along with the map is given below:

Location	Latitude	Longitude
Okhla	28° 33'	77° 17'

**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 whether the Party involved wishes to be considered as project participant (yes/no)
India (Host country)	M/s TIMARPUR-OKHLA Waste Management Company Pvt Ltd	No

**A.4. Reference of applied methodology and standardized baseline**

Approved baseline methodology AM0025 (version 06); "Avoided emissions from organic waste through alternative waste treatment process"

**A.5. Crediting period of project activity**

A fixed crediting period of 10 years has been chosen and the start date of crediting period is 30/03/2011 – 29/03/2021

**A.6. Contact information of responsible persons/entities**

Mr. Neelesh Gupta  
28, Shivaji Park,  
New Delhi – 110015, India  
Mob: +919873930842  
Tel: +911145021625  
Fax: +911145021982  
Email: neelesh.gupta@jindalecopolis.com

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

The project activity by TOWMCL will process 2050 TPD of municipal solid waste generated in the region of Delhi to produce RDF. The RDF will be further utilized to produce electricity which will be fed into the state electricity grid. The first boiler for the project activity was successfully commissioned on 10/03/2012 and is operational since then. Two more boilers were made operational in the reporting period and the fourth boiler is in planning stage. However, the operation was shutdown at certain instances due to unforeseen instances.

The monitoring period is from 01/09/2012 to 30/06/2015.

**B.2. Post-registration changes****B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

There is no temporary deviation from registered monitoring plan or the applied methodology

**B.2.2. Corrections**

There are no corrections.

**B.2.3. Changes to start date of crediting period**

A request for change in crediting period was submitted with UNFCCC. The same was approved by UNFCCC and the crediting period is now modified from 01/04/2009 – 31/03/2019 to 30/03/2011 – 29/03/2021. The change is reflected on the UNFCCC website.

**B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration**

No.

**B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

The project participant while implementing the project activity has not installed the bio methanation and composting process step as the project activity had adopted a better technology available which uses the heat generated in the boiler for pre heating the input waste thereby enhancing the efficiency of the boiler than that was envisaged at the time of registration of the project activity. Hence in the revised monitoring plan /1/, monitoring of the parameters related to composting and bio methanation have not been considered and these are:

- $P_{l,i}$ - is the leakage of methane emissions from the anaerobic digester.
- $EF_{c,N_2O}$ -is the Emission factor for  $N_2O$  emissions from the composting process
- $EF_{N_2O}$ - Aggregate  $N_2O$  emission factor for waste incineration.
- $EF_{CH_4}$ - Aggregate  $CH_4$  emission factor for waste incineration.
- $M_{compost}$ - is the total quantity of compost produced in year
- $M_a$ - is the total quantity of methane produced by the digester in year.
- $Q_{biomass}$ - is the amount of RDF combusted in tonnes per year.
- $Km_y$ -is the distance travelled by each truck for transporting compost

In the registered PDD section B.6.2, the parameter related to emission factor of e electricity grid is mentioned under both baseline emission parameters ( $CEF_{baseline}$ ) and project emission parameters ( $CEF_d$ ). Similarly,  $NCV_{fuel}$  are mentioned in the registered PDD section B.6.2 under both project emission parameters and leakage emission parameters. However, the parameters have the same values in the registered PDD under baseline/project/leakage emission parameters. In the revised PDD version 09 dated 30 January 2014 these repetitions have been avoided by retaining once under section B.6.2 of the revised PDD the parameter  $CEF_d$  that is emission factor of the grid electricity displaced by the project activity and  $NCV_{fuel}$  that is Net Calorific Value of diesel.

$RATE_{Compliancey}$ - In the revised PDD this parameter is included as a monitored parameter under section B.7.1

$EG_{PJ,FF,y}$ - Amount of electricity generated in an on-site fossil fuel fired power plant or consumed from grid in the project activity. This is measured with energy meter of accuracy class 0.2 and will be calibrated on annual basis. The recording will be done on daily basis. This parameter is now being monitored instead of  $MWh_e$  –electricity consumption mentioned in the registered PDD.

The following parameters are now proposed to be additionally monitored consequent upon the technology adopted.

- $DT_y$ - Average additional distance travelled by vehicle for ash and inert disposal compared to the baseline in year y is now proposed to be monitored to account for the project emission .
- Amount of RDF used outside the project boundary is proposed to be monitored based on the sale invoice. There will normally be no sale and the parameter is used for project emission calculations.
- $R_n$  -Weight of RDF sold offsite for which no sale invoices can be provided is also monitored .The quantity will be monitored based on weigh bridge report and is being monitored to account for project emission.
- $MC_{CH_4,r,y}$  -Monitored content of methane in the stack gas from RDF combustion in year y. This will be monitored by third party on quarterly basis. This parameter is being monitored to account for project emission.
- $MC_{N_2O,r,y}$  - Monitored content of nitrous oxide in the stack gas from RDF combustion in year y. This will be monitored by third party on quarterly basis. This parameter is being monitored to account for project emission.

Monitoring details were added/clarified in Table B.7.1 in for the following monitored parameters

- $R_c$ - Amount of RDF combusted in year, the parameter will be monitored on daily basis using load cells for the grab crane feeding waste to boiler,
- $VF_{consumption}$ - Vehicle fuel consumption in litres per kilometer for vehicle type which will be updated on an annual basis based on the latest publically available data and the conservative value will be adopted for the project and leakage emission calculations,
- $EG_d$ - Amount of electricity generated utilizing the RDF produced and exported to grid in the project activity during the year y which will be recorded on daily basis with the gross generation measured using meter of accuracy class 0.2. auxiliary consumption measured using meters of accuracy class 0.5,
- $A_{j,x}$ - Amount of organic waste type j prevented from disposal in the landfill in the year x (tonnes/year) which is based on the weighbridge receipt and charaterisation of waste done on quarterly basis by third party.
- $A_{ci,y}$ - Amount of residual waste type 'ci' from combustion of RDF which is based on the weighbridge receipt and characterization of waste done on quarterly basis by third party

$NO_{vehicles}$ - Vehicles per carrying capacity per year .This parameter is measured on daily basis and will be cross checked with the amount of ash and inert material transported and the carrying capacity of the truck.

The revised PDD was approved 24/06/2014 by CDM EB.

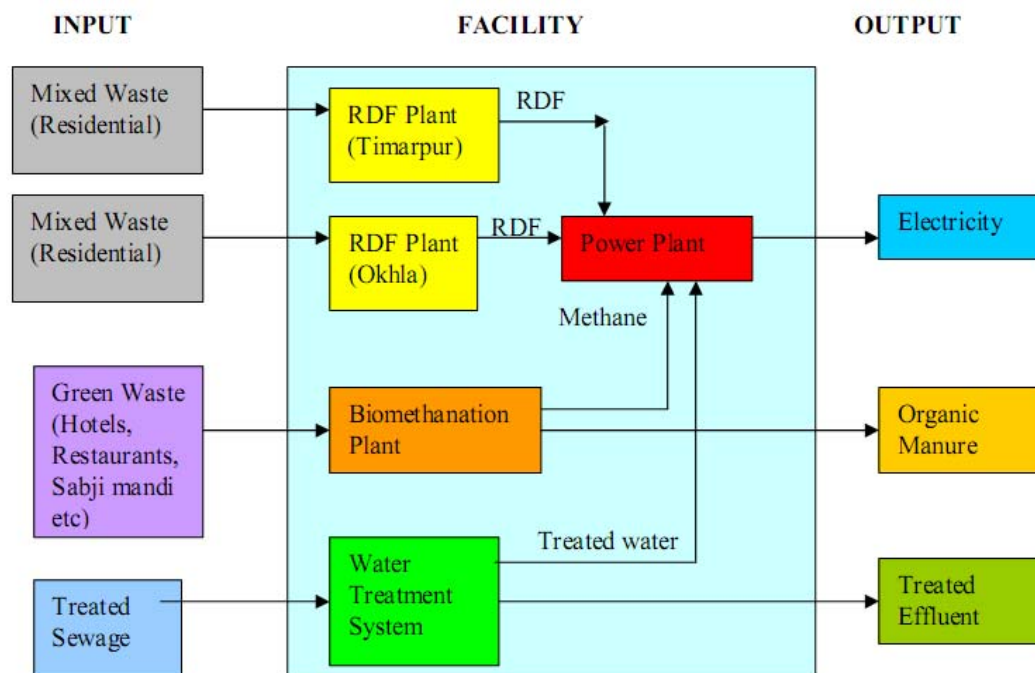
#### B.2.6. Changes to project design of registered project activity

There are certain permanent changes in the project activity from the registered PDD as highlighted below:

- The project was earlier envisaged to be developed at two different location, i.e. Timarpur and Okhla. About 650 Tonne Per Day (TPD) of Municipal Solid Waste (MSW) was envisaged to be processed at the Timarpur site while 1300 TPD of MSW was envisaged to be processed at

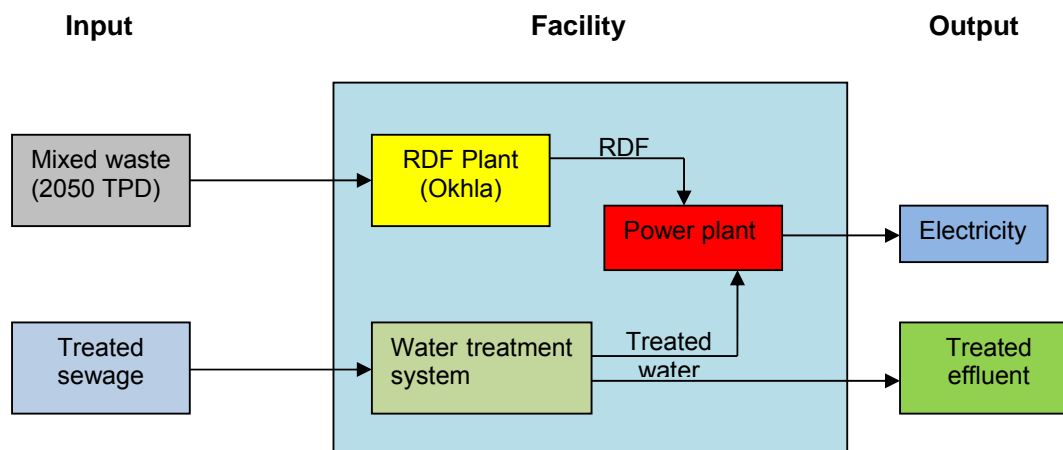
Okhla site for the preparation of Refuse Derived Fuel (RDF). Additionally, 100 TPD of green waste (waste collected from garden like dry leaves, cut grass, etc) was to be utilized at Okhla site for generation of Compost and biogas through composting and biomethanation plant respectively. The PP had also envisaged to generate electricity to the tune of 16 MW by utilizing the RDF produced from the project activity.

### **Earlier design**



However, after accessing the success rate of existing technologies and availability of better technologies for such project activities the board took a decision to implement the project activity with a better technology (technical details are provided section A.4.3) and some design changes. The Timarpur site has been dropped from the project and the entire waste (1950 TPD) is now processed at the Okhla site. Further, the envisaged plants of biomethanation and composting are dropped as the green waste envisaged in the initial phase is not supplied to the project activity as a separate tender has been floated for the same. Instead, PP shall be now be sourcing an additional 100 TPD of MSW for the project activity. Also, since PP is implementing a better technology for waste processing and power generation, it was established that the RDF produced shall be capable of producing 20.9 MW of electricity instead of 16 MW as envisaged in the first place.

Therefore, the project activity would now involve processing of 2050 TPD of MSW to generate about 20.9 MW of power using a turbine at the Okhla site. At a PLF of 90% the gross energy generation is expected to be 151.30 GWh/year considering an operation period of 335 days. Auxiliary consumption is envisaged to be 18% of the power produced.

**Design implemented**

Annually, the project will sell 121.59 GWh of electricity out of which 60 GWh shall be sold to the local grid (otherwise being fed by Northern Grid) as per the PPA with tariff of 2.49 INR/KWh and 61.59 GWh is envisaged to be sold in the open access at a tariff of approx. 3.50 INR/KWh. However, in the registered PDD the project activity was envisaged to sell 101GWh to the grid at a tariff of 4.00 INR/KWh.

The revised PDD was approved 24/06/2014 by CDM EB.

#### **B.2.7. Types of changes specific to afforestation or reforestation project activity**

Not Applicable

### **SECTION C. Description of monitoring system**

#### **Measures to ensure the Results / uncertainty analysis**

All the monitoring equipments shall be calibrated by an independent agency, which is accredited with National Accreditation Board for Testing & Calibration Laboratories (NABL), Department of Science & Technology, Government of India on an annual basis. If during the yearly test check, any meter is found to be beyond permissible limits of error, it would be calibrated immediately.

As per the Power Purchase Agreement (PPA), the energy exported to the state Grid is recorded from two independent meters viz., Main Meter and Check Meter and reading of main meter is used for billing. In the event of main meter not in operation / fails, the reading of the check meter shall be used for billing. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded on regular interval, as defined in section D.7.2, and the same is being verified and approved by Manager (O&M).

#### **Emergency Procedure**

Though, all the measures are taken to avoid erroneous recording of the monitoring parameters, there might be certain situations which may include failure of various metering devices. To minimize the risk of data discrepancy a set of spare for different meters are maintained at the plant site. Further, regular checking and maintenance of all metering devices is carried out by plant personals at TOWMCL to maintain highest level of accuracy.



### Roles and responsibilities

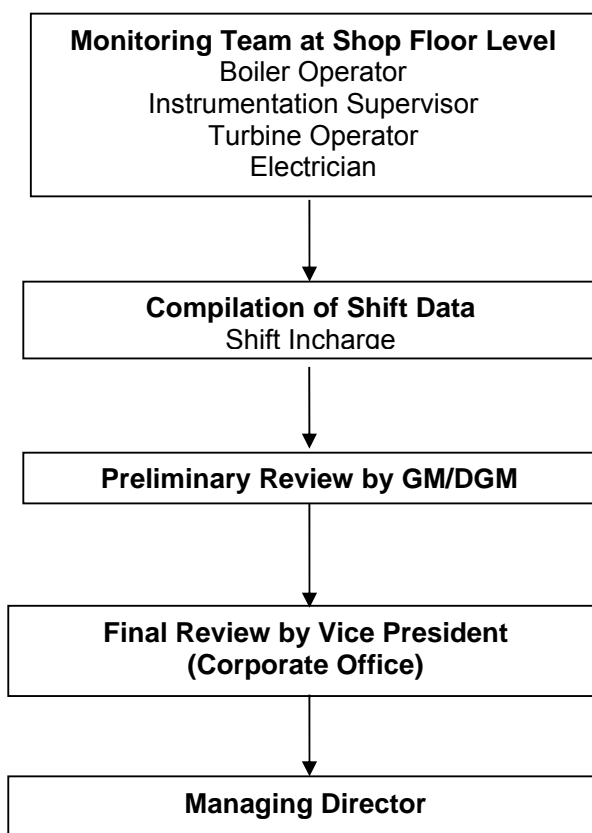
Different operators are responsible for monitoring of daily data of the waste received, RDF produced, RDF combusted, steam generated from boiler, steam fed to turbine, electricity generated, etc. The report is then sent to the Shift in-charge for the review. The diagram of the monitoring points is enclosed in Annexure – I.

Shift Electrician (Electrical) is responsible for taking meter readings for electricity generation daily.

Shift Incharge is responsible for compilation of data which is then sent to GM for preliminary review.

GM is responsible for reviewing the monitored parameters report on a daily basis and presenting a daily executive summary report to the Vice President Corporate office which is finally reported to Managing Director (MD), TOWMCL.

Organization structure responsible for monitoring and reporting of parameters involved in CDM project activity has been presented in the following flow chart.



## SECTION D. Data and parameters

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

Data/parameter:	CEF <sub>d</sub>
Unit	tCO <sub>2</sub> / MWh

Description	Emission factor of the grid electricity displaced by the project activity
Source of data	Ex-ante as fixed in registered PDD
Value(s) applied	0.75
Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Calculation of Baseline emissions
Additional comments	The same shall be applicable for the electricity exported to the grid

<b>Data/parameter:</b>	NCV <sub>fuel</sub>
Unit	MJ/ kg
Description	Net Calorific Value of diesel
Source of data	Ex-ante as fixed in registered PDD
Value(s) applied	43.3
Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Estimation of baseline emissions
Additional comments	-

<b>Data/parameter:</b>	EF <sub>fuel</sub>
Unit	tCO <sub>2</sub> / TJ
Description	CO <sub>2</sub> emission factor of diesel
Source of data	Ex-ante as fixed in registered PDD
Value(s) applied	74.1
Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Estimation of project emissions
Additional comments	-

<b>Data/parameter:</b>	CCW <sub>i</sub>																		
Unit	%																		
Description	Fraction of carbon content in waste type i																		
Source of data	Ex-ante as fixed in registered PDD																		
Value(s) applied	<table border="1"> <thead> <tr> <th>Waste type</th><th>Fraction of carbon content</th></tr> </thead> <tbody> <tr> <td>Paper/cardboard</td><td>46</td></tr> <tr> <td>Textiles</td><td>50</td></tr> <tr> <td>Food Waste</td><td>38</td></tr> <tr> <td>Wood</td><td>50</td></tr> <tr> <td>Garden and park waste</td><td>49</td></tr> <tr> <td>Rubber and leather</td><td>67</td></tr> <tr> <td>Plastics</td><td>75</td></tr> <tr> <td>other, inert waste</td><td>03</td></tr> </tbody> </table>	Waste type	Fraction of carbon content	Paper/cardboard	46	Textiles	50	Food Waste	38	Wood	50	Garden and park waste	49	Rubber and leather	67	Plastics	75	other, inert waste	03
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Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Estimation of baseline emissions
Additional comments	-

<b>Data/parameter:</b>	FCF <sub>i</sub>																		
Unit	%																		
Description	Fraction of fossil carbon content in waste type i																		
Source of data	Ex-ante as fixed in registered PDD																		
Value(s) applied	<table border="1"> <thead> <tr> <th>Waste type</th><th>Fraction of fossil carbon</th></tr> </thead> <tbody> <tr> <td>Paper/cardboard</td><td>1</td></tr> <tr> <td>Textiles</td><td>20</td></tr> <tr> <td>Food Waste</td><td>0</td></tr> <tr> <td>Wood</td><td>0</td></tr> <tr> <td>Garden and park waste</td><td>0</td></tr> <tr> <td>Rubber and leather</td><td>20</td></tr> <tr> <td>Plastics</td><td>100</td></tr> <tr> <td>other, inert waste</td><td>100</td></tr> </tbody> </table>	Waste type	Fraction of fossil carbon	Paper/cardboard	1	Textiles	20	Food Waste	0	Wood	0	Garden and park waste	0	Rubber and leather	20	Plastics	100	other, inert waste	100
Waste type	Fraction of fossil carbon																		
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Choice of data or measurement methods and procedures	Registered PDD																		
Purpose of data	Estimation of baseline emissions																		
Additional comments	-																		

<b>Data/parameter:</b>	EF <sub>i</sub>
Unit	Fraction
Description	Combustion efficiency for waste type i
Source of data	Ex-ante as fixed in registered PDD
Value(s) applied	1
Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Estimation of project emissions
Additional comments	-

<b>Data/parameter:</b>	D <sub>fuel</sub>
Unit	Kg/l
Description	Density of diesel
Source of data	Ex-ante as fixed in registered PDD
Value(s) applied	0.84

Choice of data or measurement methods and procedures	Registered PDD
Purpose of data	Estimation of project emissions
Additional comments	-

## D.2. Data and parameters monitored

Data/parameter:	EG <sub>PJ,FF,y</sub>	
Unit	MWh	
Description	Amount of electricity consumed from grid in the project activity	
Measured/calculated/default	Measured	
Source of data	Logbook readings of the electricity import	
Value(s) of monitored parameter	01/09/2012 to 31/12/2012: 99 01/01/2013 to 30/06/2015: 780	
Monitoring equipment		
	Description	Meter details
	Sr. No.	05252046
	Class	0.2
	Make	Elster
	Date of calibration	01/02/2012
	2nd date of calibration	14/01/2013
	3 <sup>rd</sup> date of calibration	14/05/2013
	5th date of calibration	12/11/2014
	Next date of calibration	11/11/2015
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet	
Calculation method (if applicable):	Not applicable	
QA/QC procedures:	All Meters are calibrated by accredited external third party, as per standard procedures, on annual basis. The readings shall be cross checked with the bills received from the State load dispatch centre.	
Purpose of data:	For estimation of project emissions	
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.	

<b>Data/parameter:</b>	CEFelec
Unit	tCO <sub>2</sub> /MWh
Description	Emission factor for the electricity consumed in the project activity (import)
Measured/calculated/default	Calculated
Source of data	CEA database version 9.0
Value(s) of monitored parameter	0.9518
Monitoring equipment	-
Measuring/reading/recording frequency:	Measuring Frequency- Annually Recording Frequency- Annually Reporting Frequency- Annually

Calculation method (if applicable):	The same has been calculated referring the “tool to calculate the emission factor for an electricity system”, version 02.2.1
QA/QC procedures:	-
Purpose of data:	For estimation of project emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	<b>F<sub>cons</sub></b>																		
Unit	Litres																		
Description	Diesel consumption on-site during year 'y' of the crediting period																		
Measured/calculated/default	Measured																		
Source of data	Logbook data																		
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 44000 01/01/2013 – 30/06/2015: 118603.6																		
Monitoring equipment	<table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td><b>Sr. No.</b></td><td>110517</td></tr> <tr> <td><b>Class</b></td><td>0.5</td></tr> <tr> <td><b>Make</b></td><td>Kent oil meter</td></tr> <tr> <td><b>Date of calibration</b></td><td>05/01/2012</td></tr> <tr> <td><b>2nd date of calibration</b></td><td>05/01/2013</td></tr> <tr> <td><b>3<sup>rd</sup> date of calibration</b></td><td>05/01/2014</td></tr> <tr> <td><b>4<sup>th</sup> date of calibration</b></td><td>05/01/2015</td></tr> <tr> <td><b>Next date of calibration</b></td><td>04/01/2016</td></tr> </tbody> </table>	Description	Meter details	<b>Sr. No.</b>	110517	<b>Class</b>	0.5	<b>Make</b>	Kent oil meter	<b>Date of calibration</b>	05/01/2012	<b>2nd date of calibration</b>	05/01/2013	<b>3<sup>rd</sup> date of calibration</b>	05/01/2014	<b>4<sup>th</sup> date of calibration</b>	05/01/2015	<b>Next date of calibration</b>	04/01/2016
Description	Meter details																		
<b>Sr. No.</b>	110517																		
<b>Class</b>	0.5																		
<b>Make</b>	Kent oil meter																		
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<b>4<sup>th</sup> date of calibration</b>	05/01/2015																		
<b>Next date of calibration</b>	04/01/2016																		
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet																		
Calculation method (if applicable):	Not applicable																		
QA/QC procedures:	All Meters are calibrated by accredited external third party, as per standard procedures, on annual basis. The quantity of diesel consumed shall be cross checked with inventory and purchase during the monitoring period. The same shall be equal to or less than the checked value.																		
Purpose of data:	For estimation of project emissions																		
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.																		

<b>Data/parameter:</b>	<b>Rc</b>
Unit	Ton
Description	Amount of RDF combusted in year y
Measured/calculated/default	Measured
Source of data	Logbooks prepared using Load cell data
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 178556 01/01/2013 – 30/06/2015: 1376615.72

## Monitoring equipment

Description	Meter details
Sr. No.	1024
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	14/03/2016

Description	Meter details
Sr. No.	1025
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	14/03/2016

Description	Meter details
Sr. No.	1026
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	14/03/2016

Description	Meter details
Sr. No.	1027
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	14/03/2016

Description	Meter details
Sr. No.	1028
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	14/03/2016

Description	Meter details
Sr. No.	1029

	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
	<b>Next date of calibration</b>	14/03/2016
	<b>Description</b>	
	<b>Sr. No.</b>	1030
	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
	<b>Next date of calibration</b>	14/03/2016
	<b>Description</b>	
	<b>Sr. No.</b>	1031
	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
<b>Next date of calibration</b>	14/03/2016	
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet	
Calculation method (if applicable):	Not applicable	
QA/QC procedures:	The load cells of the grab crane are calibrated by external third party, as per standard procedures, on annual basis.	
Purpose of data:	For estimation of project emissions	
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.	

<b>Data/parameter:</b>	A <sub>i</sub>
Unit	MT
Description	Amount of waste type 'i' fed into the RDF combustor
Measured/calculated/default	Measured values
Source of data	Logbook data for incoming waste and third party report for physical characterization of waste

Value(s) of monitored parameter

**01/09/2012 to 31/12/2012:**

<b>Waste type</b>	<b>Quantity (MT)</b>
Paper/cardboard	137649.19
Textiles	93335.23
Food Waste	565471.38
Wood	122636.06
Garden and park waste	365202.34
Rubber and Leather	13389.42
Plastics	44011.73
Other, inert waste	0

**01/01/2013 to 30/06/2015**

<b>Waste type</b>	<b>Quantity (MT)</b>
Paper/cardboard	17565.65
Textiles	9533.11
Food Waste	46575.74
Wood	29437.12
Garden and park waste	35949.19
Rubber and Leather	7432.42
Plastics	6529.91
Other, inert waste	0.00

The figures have been calculated using the third party characterization certificates.



Monitoring equipment	<p>The weighbridge details are as follows:</p> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Weighbridge No</td><td>1</td></tr> <tr> <td>Sr. No.</td><td>85</td></tr> <tr> <td>Range</td><td>100 kg – 40 MT</td></tr> <tr> <td>Make</td><td>Endevour</td></tr> <tr> <td>Date of calibration</td><td>26/11/2011</td></tr> <tr> <td>2nd date of calibration</td><td>29/12/2012</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>28/12/2013</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>31/12/2014</td></tr> <tr> <td>Next date of calibration</td><td>30/12/2015</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Weighbridge No</td><td>2</td></tr> <tr> <td>Sr. No.</td><td>46</td></tr> <tr> <td>Range</td><td>100 kg – 40 MT</td></tr> <tr> <td>Make</td><td>Endevour</td></tr> <tr> <td>Date of calibration</td><td>26/11/2011</td></tr> <tr> <td>2nd date of calibration</td><td>29/12/2012</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>28/12/2013</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>31/12/2014</td></tr> <tr> <td>Next date of calibration</td><td>30/12/2015</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Weighbridge No</td><td>3</td></tr> <tr> <td>Sr. No.</td><td>47</td></tr> <tr> <td>Range</td><td>100 kg – 40 MT</td></tr> <tr> <td>Make</td><td>Endevour</td></tr> <tr> <td>Date of calibration</td><td>26/11/2011</td></tr> <tr> <td>2nd date of calibration</td><td>29/12/2012</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>28/12/2013</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>31/12/2014</td></tr> <tr> <td>Next date of calibration</td><td>30/12/2015</td></tr> </tbody> </table>	Description	Meter details	Weighbridge No	1	Sr. No.	85	Range	100 kg – 40 MT	Make	Endevour	Date of calibration	26/11/2011	2nd date of calibration	29/12/2012	3 <sup>rd</sup> date of calibration	28/12/2013	4 <sup>th</sup> date of calibration	31/12/2014	Next date of calibration	30/12/2015	Description	Meter details	Weighbridge No	2	Sr. No.	46	Range	100 kg – 40 MT	Make	Endevour	Date of calibration	26/11/2011	2nd date of calibration	29/12/2012	3 <sup>rd</sup> date of calibration	28/12/2013	4 <sup>th</sup> date of calibration	31/12/2014	Next date of calibration	30/12/2015	Description	Meter details	Weighbridge No	3	Sr. No.	47	Range	100 kg – 40 MT	Make	Endevour	Date of calibration	26/11/2011	2nd date of calibration	29/12/2012	3 <sup>rd</sup> date of calibration	28/12/2013	4 <sup>th</sup> date of calibration	31/12/2014	Next date of calibration	30/12/2015
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Measuring/reading/recording frequency:	<p><b><u>Incoming MSW</u></b>  Monitoring frequency: Daily basis  Recording frequency: Daily basis</p> <p>The physical characterization of MSW shall be carried out on annual basis.</p>																																																												
Calculation method (if applicable):	<p>Based on the physical characterization analysis, the quantity of different type of waste present in the MSW received shall be calculated. (The incoming MSW shall be measured on daily basis and consolidated on annual basis).</p> <p>Formulae: Quantity of annual waste * % of a type of waste (Paper, food, etc) as per third party report</p>																																																												
QA/QC procedures:	All weighbridge/load cells are calibrated by accredited external third party, as per standard procedures, on annual basis.																																																												
Purpose of data:	For estimation of project emissions																																																												
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.																																																												

Data/parameter:	SG <sub>r,y</sub>
Unit	m <sup>3</sup> /hr
Description	Total volume of stack gas from RDF combustion in year y

Measured/calculated/default	Measured																																																						
Source of data	Online monitoring records																																																						
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 18081134.45 01/01/2013 – 30/06/2015: 126948409.11																																																						
Monitoring equipment	<p><b><u>Flow meter</u></b></p> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Sr. No.</td><td>01HTA20CF901</td></tr> <tr> <td>Model</td><td>YOKOGAWA</td></tr> <tr> <td>Accuracy</td><td>± 0.51% of FSR</td></tr> <tr> <td>Date of calibration</td><td>17/04/2012</td></tr> <tr> <td>2nd date of calibration</td><td>17/01/2013</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>17/01/2014</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>17/01/2015</td></tr> <tr> <td>Next date of calibration</td><td>17/01/2016</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Sr. No.</td><td>02HTA20CF901</td></tr> <tr> <td>Model</td><td>YOKOGAWA</td></tr> <tr> <td>Accuracy</td><td>± 0.51% of FSR</td></tr> <tr> <td>Date of calibration</td><td>17/04/2012</td></tr> <tr> <td>2nd date of calibration</td><td>17/01/2013</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>17/01/2014</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>17/01/2015</td></tr> <tr> <td>Next date of calibration</td><td>17/01/2016</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Description</th><th>Meter details</th></tr> </thead> <tbody> <tr> <td>Sr. No.</td><td>03HTA20CF901</td></tr> <tr> <td>Model</td><td>YOKOGAWA</td></tr> <tr> <td>Accuracy</td><td>± 0.51% of FSR</td></tr> <tr> <td>Date of calibration</td><td>17/04/2012</td></tr> <tr> <td>2nd date of calibration</td><td>17/01/2013</td></tr> <tr> <td>3<sup>rd</sup> date of calibration</td><td>17/01/2014</td></tr> <tr> <td>4<sup>th</sup> date of calibration</td><td>17/01/2015</td></tr> <tr> <td>Next date of calibration</td><td>17/01/2016</td></tr> </tbody> </table>	Description	Meter details	Sr. No.	01HTA20CF901	Model	YOKOGAWA	Accuracy	± 0.51% of FSR	Date of calibration	17/04/2012	2nd date of calibration	17/01/2013	3 <sup>rd</sup> date of calibration	17/01/2014	4 <sup>th</sup> date of calibration	17/01/2015	Next date of calibration	17/01/2016	Description	Meter details	Sr. No.	02HTA20CF901	Model	YOKOGAWA	Accuracy	± 0.51% of FSR	Date of calibration	17/04/2012	2nd date of calibration	17/01/2013	3 <sup>rd</sup> date of calibration	17/01/2014	4 <sup>th</sup> date of calibration	17/01/2015	Next date of calibration	17/01/2016	Description	Meter details	Sr. No.	03HTA20CF901	Model	YOKOGAWA	Accuracy	± 0.51% of FSR	Date of calibration	17/04/2012	2nd date of calibration	17/01/2013	3 <sup>rd</sup> date of calibration	17/01/2014	4 <sup>th</sup> date of calibration	17/01/2015	Next date of calibration	17/01/2016
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Measuring/reading/recording frequency:	<p>Measuring Frequency- Daily basis Recording Frequency- Daily basis</p> <p>The data is monitored in NM3 at 160 °C and 1000mbar. The values are then converted applying the formulae as:  <math display="block">"X" \text{ Nm}^3/\text{hr} \times (T+273) / (0+273) \times (1013/1013+P)</math> Where,  T= temp  P=Pressure</p>																																																						
Calculation method (if applicable):	-																																																						
QA/QC procedures:	-																																																						
Purpose of data:	For estimation of project emissions																																																						
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.																																																						

<b>Data/parameter:</b>	MC <sub>N<sub>2</sub>O,r,y</sub>
Unit	tN <sub>2</sub> O/m <sup>3</sup>
Description	Monitored content of nitrous oxide in the stack gas from RDF combustion in year y
Measured/calculated/default	Monitored
Source of data	Third party certificates
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 1.037 01/01/2013 – 30/06/2015: 10.37
Monitoring equipment	Third party monitoring is carried out and hence no monitoring equipment are maintained at the site.
Measuring/reading/recording frequency:	Measuring Frequency- Quarterly basis Recording Frequency- Quarterly basis
Calculation method (if applicable):	-
QA/QC procedures:	The data obtained is compared with previous values and the same is found to be in the same range. Also, calibration records of the equipment used by third parties shall be checked.
Purpose of data:	For estimation of project emissions
Additional comments:	Data will be archived till 2 years after the end of crediting period

<b>Data/parameter:</b>	VF <sub>consumption</sub>
Unit	Litre/km
Description	Vehicle fuel consumption in litres per kilometer for vehicle type i
Measured/calculated/default	Measured (Referred from publically available data)
Source of data	Literature available by World Bank ( <a href="http://siteresources.worldbank.org/INTSARREGTOPTRANSPORT/PublicationsandReports/20747263/Final_version03NOV2005.pdf">http://siteresources.worldbank.org/INTSARREGTOPTRANSPORT/PublicationsandReports/20747263/Final_version03NOV2005.pdf</a> )
Value(s) of monitored parameter	0.25
Monitoring equipment	NA
Measuring/reading/recording frequency:	Monitoring frequency: Annually Recording frequency: Annually
Calculation method (if applicable):	NA
QA/QC procedures:	Latest publically available data has been considered for calculation.
Purpose of data:	Estimation of project emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	MC <sub>CH<sub>4</sub>,r,y</sub>
Unit	tCH <sub>4</sub> /m <sup>3</sup>
Description	Monitored content of methane in the stack gas from RDF combustion in year y
Measured/calculated/default	Monitored
Source of data	Third party certificates
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 0.20 01/01/2013 – 30/06/2015: 0.37

Monitoring equipment	Third party monitoring is carried out and hence no monitoring equipment are maintained at the site.
Measuring/reading/recording frequency:	Measuring Frequency- Quarterly basis Recording Frequency- Quarterly basis
Calculation method (if applicable):	-
QA/QC procedures:	The data obtained is compared with previous values and the same is found to be in the same range
Purpose of data:	For estimation of project emissions
Additional comments:	Data will be archived till 2 years after the end of crediting period

<b>Data/parameter:</b>	MB <sub>y</sub>
Unit	t CH <sub>4</sub>
Description	Methane produced in the landfill in the absence of the project activity in year 'y'.
Measured/calculated/default	Calculated
Source of data	Calculated values as per the tool "Emission from solid waste disposal site", version 06.0.1
Value(s) of monitored parameter	01/09/2012 to 31/12/2012: 414.42 01/01/2013 to 30/06/2015: 8708.92
Monitoring equipment	-
Measuring/reading/recording frequency:	Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
Calculation method (if applicable):	Calculated as per the tool "Emission from solid waste disposal site"
QA/QC procedures:	-
Purpose of data:	For estimation of baseline emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	EG <sub>d</sub>
Unit	MWh
Description	Amount of electricity generated utilizing the RDF produced and exported to grid in the project activity during the year y
Measured/calculated/default	Measured
Source of data	Metering Records
Value(s) of monitored parameter	01/09/2012 to 31/12/2012: 31433.13 01/01/2013 to 30/06/2015: 271746.64

Monitoring equipment

**Gross generation meters:**

Description	Meter details
Sr. No.	GJU61733
Class	0.2
Make	Siemens
Date of calibration	17/01/2012
2nd date of calibration	12/01/2013
3 <sup>rd</sup> date of calibration	11/01/2014
4 <sup>th</sup> date of calibration	10/01/2015
Next date of calibration	10/01/2016

**Import/Export meter:**

Description	Meter details
Sr. No.	05252046
Class	0.2
Make	Elster
Date of calibration	01/02/2012
2nd date of calibration	14/01/2013
3 <sup>rd</sup> date of calibration	14/05/2013
5th date of calibration	12/11/2014
Next date of calibration	11/11/2015

**Auxiliary consumption meters:**

Description	Meter details
Sr. No.	203987/8967-2810
Class	0.5
Make	Conzerv
Date of calibration	16/01/2012
2nd date of calibration	12/01/2013
3 <sup>rd</sup> date of calibration	11/01/2014
4 <sup>th</sup> date of calibration	10/01/2015
Next date of calibration	10/01/2016

Description	Meter details
Sr. No.	205056/9635-3310
Class	0.5
Make	Conzerv
Date of calibration	16/01/2012
2nd date of calibration	12/01/2013
3 <sup>rd</sup> date of calibration	11/01/2014
4 <sup>th</sup> date of calibration	10/01/2015
Next date of calibration	10/01/2016

Description	Meter details
Sr. No.	205503/10130-3410
Class	0.5
Make	Conzerv
Date of calibration	16/01/2012
2nd date of calibration	12/01/2013
3 <sup>rd</sup> date of calibration	11/01/2014
4 <sup>th</sup> date of calibration	10/01/2015
Next date of calibration	10/01/2016

Measuring/reading/recording frequency:	Measuring Frequency- Continuous Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
Calculation method (if applicable):	Not applicable
QA/QC procedures:	The electricity exported to the state grid may be cross checked from the invoices raised by the state load dispatch centre. It may be equal or lesser than the electricity injected in the grid based on accounting done for actual scenario.
Purpose of data:	For estimation of baseline emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	RATE <sub>Compliance<sub>y</sub></sub>
Unit	Number
Description	Rate of Compliance
Measured/calculated/default	Default as per publically available information
Source of data	Status report on Municipal Solid Waste Management by Central Pollution Control Board (CPCB) of India ( <a href="http://www.cpcb.nic.in/divisionsofheadoffice/pcp/MSW_Report.pdf">http://www.cpcb.nic.in/divisionsofheadoffice/pcp/MSW_Report.pdf</a> )
Value(s) of monitored parameter	12.45%
Monitoring equipment	-
Measuring/reading/recording frequency:	Monitoring Frequency- Annually Recording Frequency- Annually
Calculation method (if applicable):	-
QA/QC procedures:	The source of the information is an authentic government source
Purpose of data:	Estimation of baseline emissions
Additional comments:	If the rate exceeds 50%, no CERs can be claimed

<b>Data/parameter:</b>	NO <sub>vehicles</sub>
Unit	Number
Description	Vehicles per carrying capacity per year
Measured/calculated/default	Monitored
Source of data	Logbook records
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 5802 01/01/2013 – 30/06/2015: 45972
Monitoring equipment	-
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	For estimation of leakage emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	DT <sub>y</sub>
Unit	Km

Description	Average additional distance travelled by vehicle for ash and inert disposal compared to the baseline in year y
Measured/calculated/default	Monitored
Source of data	Logbook records
Value(s) of monitored parameter	20
Monitoring equipment	-
Measuring/reading/recording frequency:	Monitoring Frequency- Annually Recording Frequency- Annually Reporting Frequency- Annually
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	For estimation of leakage emissions
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	Amount of RDF used outside the project boundary
Unit	Tons
Description	Project proponent shall monitor the amount of RDF sold for use outside of the project boundary
Measured/calculated/default	Monitored
Source of data	Sale invoices, if any
Value(s) of monitored parameter	0 (The PP is using the produced RDF to generate electricity at the project site. Therefore, the RDF is not envisaged to be sold outside the project boundary as per the project design)
Monitoring equipment	-
Measuring/reading/recording frequency:	Measuring Frequency- Weekly basis Recording Frequency- Weekly basis
Calculation method (if applicable):	-
QA/QC procedures:	The weighbridge shall be calibrated on annual basis.
Purpose of data:	For estimation of leakage emissions
Additional comments:	Data will be archived till 2 years after the end of crediting period

<b>Data/parameter:</b>	$A_{j,x}$
Unit	tonnes/year
Description	Amount of organic waste type j prevented from disposal in the landfill in the year x (tonnes/year)
Measured/calculated/default	calculated using measured values
Source of data	Records of incoming waste and physical characterization certificate from third party

Value(s) of monitored parameter	<b><u>01/09/2012 – 31/12/2012</u></b>	
	<b>Waste type</b>	<b>Quantity (MT)</b>
	Paper/cardboard	17565.65
	Textiles	9533.11
	Food Waste	46575.74
	Wood	29437.12
	Garden and park waste	35949.19
	<b><u>01/01/2013 – 30/06/2015</u></b>	
	<b>Waste type</b>	<b>Quantity (MT)</b>
	Paper/cardboard	137649.19
	Textiles	93335.23
	Food Waste	565471.38
	Wood	122636.06
	Garden and park waste	365202.34
Monitoring equipment	-	
Measuring/reading/recording frequency:	Measuring Frequency- Quarterly basis Recording Frequency- Quarterly basis, consolidated on annual basis	
Calculation method (if applicable):	The total amount of the waste received in the plant shall be segregated according to the physical characterization, carried out by the third party on a quarterly basis.	
QA/QC procedures:	The composition of waste shall be determined quarterly by a third party	
Purpose of data:	For estimation of baseline emissions	
Additional comments:	Data will be archived till 2 years after the end of crediting period	

<b>Data/parameter:</b>	$A_{ci,y}$
Unit	Tones/year
Description	Amount of residual waste type 'ci' from combustion of RDF
Measured/calculated/default	Measured
Source of data	weighbridge records and the physical characterization of the ash
Value(s) of monitored parameter	0 (The amount of residual waste coming out of RDF combustion is only inert material which could not be separated in the pre-processing stage)
Monitoring equipment	-
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis Reporting Frequency- Daily basis in ER spread sheet
Calculation method (if applicable):	-
QA/QC procedures:	The weighbridge shall be calibrated on annual basis
Purpose of data:	For estimation of leakage emissions
Additional comments:	Data will be archived till 2 years after the end of crediting period

<b>Data/parameter:</b>	$R_n$
Unit	Ton
Description	Weight of RDF sold offsite for which no sale invoices can be provided



Measured/calculated/default	Monitored
Source of data	Weighbridge records
Value(s) of monitored parameter	0 (The PP is using the produced RDF to generate electricity at the project site. Therefore, the RDF is not envisaged to be sold outside the project boundary as per the project design)
Monitoring equipment	The weighbridge details may be referred from data provided in previous parameters
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis
Calculation method (if applicable):	Not applicable
QA/QC procedures:	The weighbridge are calibrated on annual basis by a third party
Purpose of data:	-
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.

<b>Data/parameter:</b>	$R_t$
Unit	ton
Description	Total weight of RDF produced
Measured/calculated/default	Measured
Source of data	Logbooks prepared using Load cell data
Value(s) of monitored parameter	01/09/2012 – 31/12/2012: 176659 01/01/2013 – 30/06/2015: 1381597

## Monitoring equipment

Description	Meter details
Sr. No.	1024
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	13/03/2016

Description	Meter details
Sr. No.	1025
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	13/03/2016

Description	Meter details
Sr. No.	1026
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	13/03/2016

Description	Meter details
Sr. No.	1027
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	13/03/2016

Description	Meter details
Sr. No.	1028
Class	1
Make	Cell sensor
Date of calibration	06/01/2012
2nd date of calibration	14/03/2013
3 <sup>rd</sup> date of calibration	14/03/2014
4 <sup>th</sup> date of calibration	14/03/2015
Next date of calibration	13/03/2016

Description	Meter details
Sr. No.	1029

	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
	<b>Next date of calibration</b>	13/03/2016
	<b>Description</b>	<b>Meter details</b>
	<b>Sr. No.</b>	1030
	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
	<b>Next date of calibration</b>	13/03/2016
	<b>Description</b>	<b>Meter details</b>
	<b>Sr. No.</b>	1031
	<b>Class</b>	1
	<b>Make</b>	Cell sensor
	<b>Date of calibration</b>	06/01/2012
	<b>2nd date of calibration</b>	14/03/2013
	<b>3<sup>rd</sup> date of calibration</b>	14/03/2014
	<b>4<sup>th</sup> date of calibration</b>	14/03/2015
<b>Next date of calibration</b>	13/03/2016	
Measuring/reading/recording frequency:	Measuring Frequency- Daily basis Recording Frequency- Daily basis, consolidated on monthly basis Reporting Frequency- Monthly basis in ER spread sheet	
Calculation method (if applicable):	Not applicable	
QA/QC procedures:	The load cells of the grab crane are calibrated by accredited external third party, as per standard procedures, on annual basis.	
Purpose of data:	-	
Additional comments:	Data shall be archived till 2 years after the expiry of the crediting period.	

### D.3. Implementation of sampling plan

Waste characterization assessment for the Municipal Solid Waste (MSW) received from MCD/ NDMC has been done on quarterly basis. The characterization process is conducted by a NABL accredited laboratory in line with the applicable IS standards laid down for the municipal solid waste.

Sampling procedure for collecting a representative sample at Okhla plant is as follows:  
MSW is received through roughly 250 trucks. MSW in each vehicle is weighted at the weighbridge station and weight is noted. Subsequently, about 10 kgs of MSW is collected from the truck from different locations and depths within the truck quantity. This procedure is carried out for collecting

samples from all the trucks for the day. The collected samples are heaped up under a roof so that moisture loss does not occur.

The MSW heap is thoroughly turned repeatedly (for about 5-6 times) for mixing the contents. The MSW is then spread on concrete floor and one final sample of about 10 kg is collected. This sample is then segregated into 15 parts according to the requirements of the physical characterization. The sample thus collected is taken for analysis for the following physio-chemical parameters. Test protocols adopted for waste analysis are in accordance with standards prescribed by IS/ USEPS/ AISTM.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

Baseline emissions are calculated as follows:

$$BE_y = MB_y \cdot GWP_{CH_4} + EG_{d,y} \cdot CEF_d$$

Where,

$$\begin{aligned} MB_y &= \text{Methane produced in landfill in absence of the project activity in year } y \\ GWP_{CH_4} &= \text{Global warming potential of methane} \\ EG_{d,y} &= \text{Amount of electricity generated using RDF produced and exported to grid in year } y \\ CEF_d &= \text{Carbon emission factor for the displaced electricity source in project activity} \end{aligned}$$

As per the registered PDD,

$$MB_y = BE_{CH_4,SWDS,y}$$

Where  $BE_{CH_4,SWDS,y}$  is calculated in accordance of the methodological tool "Emissions from solid waste disposal sites" as follows:

$$BE_{CH_4,SWDS,y} = \phi_y \cdot (1 - f_y) \cdot GWP_{CH_4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j(y-x)} \cdot (1 - e^{-k_j})$$

$$BE_{CH_4,SWDS,y} = BE_{CH_4,food\ waste,y} + BE_{CH_4,garden\ waste,y} + BE_{CH_4,paper\ waste,y} + BE_{CH_4,textile\ waste,y} + BE_{CH_4,wooden\ waste,y}$$

Daily CO<sub>2</sub> emissions due to solid waste disposal are as follows:

Date	BE <sub>food,y</sub> (tCO <sub>2e</sub> )	BE <sub>garden,y</sub> (tCO <sub>2e</sub> )	BE <sub>paper,y</sub> (tCO <sub>2e</sub> )	BE <sub>textile,y</sub> (tCO <sub>2e</sub> )	BE <sub>wood,y</sub> (tCO <sub>2e</sub> )	BE <sub>y</sub> (tCO <sub>2e</sub> )
01/09/2012 – 31/12/2012	3391	2715	1855	604	1875	10,465
01/01/2013 – 30/06/2015	41471	27580	14537	5914	7812	97,313

Also, as per the registered PDD the baseline emissions should be adjusted as per the compliance rate of the existing MSW rules 2000 that mandates MSW treatment. Since, the compliance of the MSW rules is still not achieved and there is no latest publically available data regarding the same, PP has conservatively decided to consider the rate of compliance as 10% as depicted in registered PDD. Therefore, the adjusted baseline emission due to methane production in landfill site in absence of project activity is calculated as follows:

**01/09/2012 – 31/12/2012**

$$\begin{aligned}
 BE_{y,a} &= BE_{CH_4,SWDS,y} * (1 - RATE_{y,compliance}) \\
 &= 11,832.26 * (1 - 12.45\%) \\
 &= 10,359 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

$$\begin{aligned}
 BE_{y,a} &= BE_{CH_4,SWDS,y} * (1 - RATE_{y,compliance}) \\
 &= 248,660 * (1 - 12.45\%) \\
 &= 217,702 \text{ tCO}_2\text{e}
 \end{aligned}$$

***Power generation***

The daily data of RDF combustion, electricity generation and electricity exported is as follows:

Date	Amount of RDF combusted (MT)	Amount of electricity generated (MW)	Amount of electricity exported (MW)
01/09/2012 – 31/12/2012	178556	37644	31433.13
01/01/2013 – 30/06/2015	1376615.72	322313	271746.64

**01/09/2012 – 31/12/2012**

$$\begin{aligned}
 \text{Baseline emissions (BE}_y\text{)} &= MB_y * GWP_{CH_4} + EG_{d,y} * CEF_d \\
 &= 10,359 + 31433.13 * 0.75 \\
 &= 33,933 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

$$\begin{aligned}
 \text{Baseline emissions (BE}_y\text{)} &= MB_y * GWP_{CH_4} + EG_{d,y} * CEF_d \\
 &= 217,702 + 271746.64 * 0.75 \\
 &= 421,512 \text{ tCO}_2\text{e}
 \end{aligned}$$

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

The project emissions are calculated as follows:

$$PE_y = PE_{elec,y} + PE_{fuel,onsite,y} + PE_{r,y}$$

Where,

$$\begin{aligned}
 PE_{elec,y} &= \text{Emissions from electricity consumption on-site due to project activity in year } y \\
 PE_{fuel,onsite,y} &= \text{Emissions due to fossil fuel consumption on-site in year } y \\
 PE_{r,y} &= \text{Emissions from combustion of RDF in year } y
 \end{aligned}$$

***Project emissions from electricity usage:***

The value of electricity import for the project activity is as follows:

01/09/2012 – 31/12/2012 (MW)	99.43
01/01/2013 – 30/06/2015 (MW)	780

**01/09/2012 – 31/12/2012**

$$\begin{aligned}
 PE_{elec,y} &= MWH_{e,y} * CEF_{elec} \\
 &= 99.43 * 0.9518 \\
 &= 95 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

$$\begin{aligned}
 PE_{elec,y} &= MWH_{e,y} * CEF_{elec} \\
 &= 780 * 0.9518 \\
 &= 742 \text{ tCO}_2\text{e}
 \end{aligned}$$

***Project emissions from fuel usage:***

The diesel consumption in the Project activity is as follows:

Date	Diesel usage in boiler (Ltrs)	Diesel usage in DG set (Ltrs)	Diesel usage in vehicles (Ltrs)
01/09/2012 – 31/12/2012	44000	0	0
01/01/2013 – 30/06/2015	116958.1	1091	554.5
<b>Total</b>			

**01/09/2012 – 31/12/2012**

$$\begin{aligned}
 \text{Total diesel usage in the monitoring period} &= 44000 + 0 + 0 \\
 &= 44000
 \end{aligned}$$

$$\begin{aligned}
 PE_{fuel,onsite,y} &= F_{cons,y} * NCV_{fuel} * EF_{fuel} \\
 &= (((44000/1000) * 0.86) * 43.3 * 74.1)/1000 \\
 &= 119 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

$$\begin{aligned}
 \text{Total diesel usage in the monitoring period} &= 116958.1 + 1091 + 554.5 \\
 &= 44000
 \end{aligned}$$

$$\begin{aligned}
 PE_{fuel,onsite,y} &= F_{cons,y} * NCV_{fuel} * EF_{fuel} \\
 &= (((118603.6/1000) * 0.86) * 43.3 * 74.1)/1000 \\
 &= 320 \text{ tCO}_2\text{e}
 \end{aligned}$$

***Project emissions from combustion of RDF:***

The project emission from RDF combustion is calculated as follows:

$$PE_{r,y} = PE_{r,f,y} + PE_{r,s,y}$$

Where,

$$\begin{aligned}
 PE_{r,f,y} &= \text{Fossil based waste CO}_2 \text{ emissions from RDF combustion in year y} \\
 PE_{r,s,y} &= \text{Emissions from final stacks from RDF combustion in year y}
 \end{aligned}$$

*Emissions from fossil based waste*

$$PE_{r,f,y} = \sum A_i * CCW_i * FCF_i * EF_i * (44/12)$$

The value for the different waste types is calculated as follows:

**01/09/2012 – 31/12/2012**

Waste type	Quantity of waste	Fraction of carbon content	Fraction of fossil carbon	Combustion efficiency for waste	Fossil based emissions
	(MT)	(%)	(%)	(%)	(tCO <sub>2</sub> e)
Paper/cardboard	17565.65	0.46	0.01	1.00	296.27
Textiles	9533.11	0.5	0.2	1.00	3495.47
Food Waste	46575.74	0.38	0	1.00	0.00
Wood	29437.12	0.5	0	1.00	0.00
Garden and park waste	35949.19	0.49	0	1.00	0.00
Rubber and leather	7432.42	0.67	0.2	1.00	3651.79
Plastics	6529.91	0.75	1	1.00	17957.25
other, inert waste	0.00	0.03	1	1.00	0.00

**01/01/2013 – 30/06/2015**

Waste type	Quantity of waste	Fraction of carbon content	Fraction of fossil carbon	Combustion efficiency for waste	Fossil based emissions
	(MT)	(%)	(%)	(%)	(tCO <sub>2</sub> e)
Paper/cardboard	137649.19	0.46	0.01	1.00	2321.68
Textiles	93335.23	0.5	0.2	1.00	34222.92
Food Waste	565471.38	0.38	0	1.00	0.00
Wood	122636.06	0.5	0	1.00	0.00
Garden and park waste	365202.34	0.49	0	1.00	0.00
Rubber and leather	13389.42	0.67	0.2	1.00	6578.67
Plastics	44011.73	0.75	1	1.00	121032.25
other, inert waste	0.00	0.03	1	1.00	0.00

**01/09/2012 – 31/12/2012**

PE<sub>r,f,y</sub> = 25,401

**01/01/2013 – 30/06/2015**

PE<sub>r,f,y</sub> = 164,156

**Emissions from stack of RDF combustor**

For the calculation of the project emissions from stack gases of the RDF combustor Option 1 of the registered PDD has been chosen by the PP. The stack emission from project activity is as follows:

Date	Flow (NM3/hr)			Pressure NM3 (mbar)	Pressure m3 (mbar)	Temp NM3 (°C)	Temp m3 (°C)	Flow (m3/hr)		
	Boiler 1	Boiler 2	Boiler 3					Boiler 1	Boiler 2	Boiler 3
<b>01/09/2012 – 31/12/2012</b>	8047000.5	8188681	6325161	1013	2013	0	160	6449178.39	6562726.84	5069229.42
<b>01/01/2013 – 30/06/2015</b>	48619588.98	56484733.39	53296306.29	1013	2013	0	160	38965624.85	45269056.72	42713727.54

**01/09/2012 – 31/12/2012**

Total flow from stack = 6449178.39 + 6562726.84 + 5069229.42  
= 18081134.65

$$\begin{aligned}
 PE_{r,s,y} &= SG_{r,y} * MC_{N2O,r,y} * GWP_{N2O} + SG_{r,y} * MC_{CH4,r,y} * GWP_{CH4} \\
 &= 18081134.65 * (6.88/10^9) * 310 + 8165879.98 * (0/10^9) * 21 \\
 &= 326 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

Total flow from stack = 38965624.85 + 45269056.72 + 42713727.54  
= 126948409.1

$$\begin{aligned}
 PE_{r,s,y} &= SG_{r,y} * MC_{N2O,r,y} * GWP_{N2O} + SG_{r,y} * MC_{CH4,r,y} * GWP_{CH4} \\
 &= 126948409.1 * (6.88/10^9) * 310 + 8165879.98 * (0/10^9) * 25 \\
 &= 3223 \text{ tCO}_2\text{e}
 \end{aligned}$$



**E.3. Calculation of leakage**

The leakage emissions from the project activity are calculated as follows:

$$L_y = L_{t,y} + L_{r,y}$$

Where,

- $L_{t,y}$  = Leakage emissions from increased transport in year y  
 $L_{r,y}$  = Leakage emission from residual waste from the combustion of RDF in year y  
 (Since there is no residual waste from the processing activity in project activity, the value of this parameter is zero)

***Leakage emission from increased transport:***

There is no increase in the distance travelled for disposal of the collected waste from the collection points. This is because of the reason that the waste processing unit is being established at the landfill sites only where the waste was being dumped earlier also. However, there is transport of ash to the disposal site developed at a distance of 10 km from the project site. Project emissions for the same are accounted as leakage emissions for the project activity as follows:

$$L_{t,y} = \sum NO_{\text{vehicles},i,y} * km_{i,y} * VF_{\text{cons},i} * CV_{\text{fuel}} * D_{\text{fuel}} * EF_{\text{fuel}}$$

Where,

- $NO_{\text{vehicles},i,y}$  = No of vehicles for transport in year y  
 $km_{i,y}$  = average additional distance travelled by vehicle compared to baseline in year y  
 $VF_{\text{cons},i}$  = Vehicle fuel consumption in litres per kilometer  
 $CV_{\text{fuel}}$  = Calorific value of fuel  
 $D_{\text{fuel}}$  = Fuel density  
 $EF_{\text{fuel}}$  = Emission factor of the fuel

The total number of truck trip to dispose inert waste and the total distance travelled is as follows:

Date	Quantity (MT)	No of truck trips	Round trip distance (km)	total distance travelled (km)
<b>01/09/2012 – 31/12/2012</b>	67153.03	5802	20	116040
<b>01/01/2013 – 30/06/2015</b>	49003933.62	45972	20	919440

**01/09/2012 – 31/12/2012**

$$\begin{aligned}
 L_{t,y} &= (5802 * 20 * 0.25 * 43.3 * 0.84 * 74.1)/1000 \\
 &= 78 \text{ tCO}_2\text{e}
 \end{aligned}$$

**01/01/2013 – 30/06/2015**

$$\begin{aligned}
 L_{t,y} &= (45972 * 20 * 0.25 * 43.3 * 0.84 * 74.1)/1000 \\
 &= 620 \text{ tCO}_2\text{e}
 \end{aligned}$$

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	GHG emission reductions or net GHG removals by sinks (t CO <sub>2</sub> e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
<b>Total</b>	455,445	194,381	698	7,916	252,451	260,366

**E.5. Comparison of actual emission reductions or net 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 (t CO <sub>2</sub> e)	01/09/2012 – 29/03/2013: 89384 30/03/2013 – 29/03/2014: 238438 30/03/2014 – 29/30/2015: 294031 30/03/2015 – 30/06/2015: 86458 <b>Total: 708311</b>	260,366

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

The baseline emission from the methane production in absence of project activity is dependent on the physical characterization of the waste collected in year y and also on the parameters like “fraction of degradable organic content” and “decay rate for the waste”.

The composition of waste is dynamic the emission reduction may vary from the registered PDD and from one year to another. Also, the values for parameters “fraction of degradable organic content” and “decay rate for the waste” has been significantly decreased in the latest version of applicable tool – “Emissions from solid waste disposal sites”, version 06.0.1.

Therefore, the actual emission reductions are less than the estimated value of emission reduction for the period.

## Appendix 1. Contact information of project participants and responsible persons/entities

<b>Project participant and/or responsible person/ entity</b>	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
<b>Organization name</b>	TIMARPUR-OKHLA Waste Management Company Private Ltd.
<b>Street/P.O. Box</b>	28, Shivaji Marg
<b>Building</b>	
<b>City</b>	New Delhi
<b>State/region</b>	Delhi
<b>Postcode</b>	110 015
<b>Country</b>	India
<b>Telephone</b>	9111-45021983/984
<b>Fax</b>	9111-45021982
<b>E-mail</b>	Neelesh.gupta@jindalecopolis.com
<b>Website</b>	www.towmcl.com
<b>Contact person</b>	
<b>Title</b>	
<b>Salutation</b>	Mr
<b>Last name</b>	Gupta
<b>Middle name</b>	
<b>First name</b>	Neelesh
<b>Department</b>	Project
<b>Mobile</b>	91-9873930842
<b>Direct fax</b>	91-45021982
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**Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to the Host Party;</li> <li>• Remove reference to programme of activities;</li> <li>• Overall editorial improvement.</li> </ul>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;</li> <li>• Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>;</li> <li>• Editorial improvement.</li> </ul>
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		