FIRST MONITORING REPORT

Monitoring Period
02.04.2007 to 01.04.2009
(Both days included)

Version: 01
Date: 06/07/2009

Project 0935: Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)

Site:
Ahmedgarh, Sangrur District, Punjab

Shreyans Industries Limited (SIL)
Unit: Shreyans Papers
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1 Description of the project activity

1.1 Current Status of the Project

The project proponent, Shreyans Industries Limited (SIL), successfully commissioned the project activity "Methane recovery from waste water generated from wheat straw wash at Paper manufacturing unit of Shreyans Industries Limited (SIL)" on 1st September 2006.

The project activity is the installation of a high rate Upflow anaerobic sludge blanket (UASB) digester which captures methane and burns it for generating steam in boilers.

1.2 Statement to what extent the Project has been implemented as Planned

The project activity has been generating biogas continuously since commissioning. The project activity was commissioned on 1st September 2006. The project was registered as a CDM project activity with the UNFCCC on 2nd April 2007[1]. The Certified Emission Reductions (CERs) are being claimed for the period from 2nd April 2007 to 1st April 2009.

[1] http://cdm.unfccc.int/Projects/DB/SGS-UKL1171466454.8/view

2 Sustainability – Economic and Social Well-being

- The project activity construction and commissioning of a UASB digester and associated units have given employment opportunities to labours during construction in vicinity of plant.
- The open lagoon existing before the project activity emanated large quantity of methane into the atmosphere which is a potent GHG.
- Introduction of UASB digester in project activity captured methane, thereby mitigating emissions of GHG.
- The stench which emanated from open lagoon due to anaerobic decomposition of carbonaceous material has reduced after UASB digesters were commissioned.

3 Obtained Parameters According to Monitoring Plan

The project proponent has been monitoring the parameters as outlined in the registered PDD. The details of the monitoring parameters are as given below:

3.1 Flow rate of waste straw wash

Symbol	Q ,ww
Data unit	M3/day
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Liquid Flow meter
QA/QC	Flow rate measurement is essential for calculation of both baseline and project emissions. Flow meter complying with the standards is being used for monitoring.

3.2 COD (inlet)

Symbol	$COD_{ww,untreated}$
Data unit	Mg/litre
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Lab testing instruments/equipments
QA/QC	COD (Inlet) is a measure of methane generation potential of untreated waste water and is essential for calculating both baseline and project emissions. Analysis is done in laboratory for measurement. Standard procedures are being used for measurement.

3.3 COD (outlet)

Symbol	$COD_{ww, treated}$
Data unit	Mg/litre
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Lab testing instruments/equipments
QA/QC	COD (outlet) is a measure of methane generation potential of treated waste water from digester and is essential for calculating project emissions. Analysis is done in laboratory for measurement. Standard procedures are being used for measurement.

3.4 Electricity Consumption

Symbol	Electricity Consumption
Data unit	Million KWh
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Energy meter
QA/QC	Electricity consumption is measured by meter provided at plant.

3.5 Temperature of gas

Symbol	Temperature of gas
Data unit	^0C
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas flow meter
QA/QC	Temperature of gas is monitored for calculating the weight of biogas produced.

3.6 Pressure of gas

Symbol	Pressure of gas
Data unit	Kg/cm^2
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas flow meter
QA/QC	Pressure of gas is monitored for calculating the weight of biogas produced.

3.7 Volume of gas

Symbol	Volume of gas
Data unit	Nm^3
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas flow meter
QA/QC	Volume of gas is monitored for calculating the weight of biogas produced.

3.8 *Quantity of gas*

Symbol	Quantity of gas
Data unit	Tonnes
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas Flow meter
QA/QC	Quantity of gas produced is computed from its volume, temperature and pressure condition.

3.9 *Methane quantity generated*

Symbol	Methane quantity generated
Data unit	Tonnes
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas Chromatograph
QA/QC	Methane quantity is computed from the fraction of methane present in Biogas. Methane fraction is calculated in laboratory.

3.10 *Biogas fuelled*

Symbol	Biogas fuelled
Data unit	Tonnes
Frequency	Daily
Source of Data	Plant log books
Instrument used for monitoring	Gas Flow meter
QA/QC	Quantity of Biogas fuelled or flared gives an estimate of methane quantity flared.

4 Monitored data for Methane generation

Month	Volume of wheat straw wash water treated (m^3)	COD inlet to UASB (mg/l)	Volume of wash water * COD inlet	COD outlet from UASB (mg/l)	Volume of wash water * COD inlet	Electricity consumption in UASB (million kWh/month)	Temp. of gas (^oC)	Pr. of gas (kg/cm^2)	Volume of gas generated (Nm^3)	Quantity of Bio gas generated (tonnes)	Methane quantity generated (tonnes)	Biogas fuelled (tonnes)
Year 2007-08												
Apr '07	75000	3915	294	994	75	0.017	25	1.0925	113893	97	55	97
May '07	78675	3949	311	919	72	0.018	35	1.0917	120118	99	55	99
Jun '07	76980	3723	287	933	72	0.018	36	1.0923	101315	83	47	83
Jul '07	74985	3708	278	994	75	0.017	37	1.0925	89486	73	41	73
Aug '07	75482	3715	280	994	75	0.018	36	1.0898	93073	77	43	77
Sep '07	75480	3745	283	985	74	0.017	36	1.0918	95890	79	44	79
Oct '07	76980	3728	287	1010	78	0.018	35	1.0914	105908	87	49	87
Nov '07	76688	3844	295	987	76	0.020	26	1.0917	105525	90	50	90
Dec '07	75675	3738	283	972	74	0.022	25	1.0926	96594	82	47	82
Jan '08	75670	3583	271	968	73	0.022	23	1.0907	80324	69	39	69
Feb '08	71085	3599	256	968	69	0.021	23	1.0906	71881	62	34	62
Mar '08	75948	3586	272	968	74	0.022	25	1.0940	88848	76	43	76
Apr '08	2485	3640	9	984	2	0.001	30	1.0899	2920	2	1	2
Total	**911133**	**3729**	**3405**	**975**	**888**	**0.233**	**30**	**1.0917**	**1165775**	**975**	**547**	**975**
Year 2008-09												
Apr '08	72493	3675	266	996	72	0.021	26	1.0925	69815	59	33	59
May '08	76732	3589	275	970	74	0.023	36	1.0905	69088	57	32	57

Jun '08	73812	3667	271	1006	74	0.022	39	1.0893	65920	53	30	53
Jul '08	72682	3664	266	986	72	0.021	39	1.0899	78411	64	36	64
Aug '08	71365	3658	261	988	71	0.021	39	1.0903	69205	56	32	56
Sep '08	70800	3665	259	999	71	0.021	39	1.0905	73571	60	34	60
Oct '08	70035	3676	257	1002	70	0.021	37	1.0905	72892	59	34	59
Nov '08	72073	3439	248	949	68	0.021	31	1.0888	79687	66	37	66
Dec '08	72409	3730	270	977	71	0.022	29	1.0888	89809	75	42	75
Jan '09	73096	3673	268	1018	74	0.022	27	1.0890	95335	80	45	80
Feb '09	61672	3243	200	912	56	0.019	26	1.0890	76200	64	36	64
Mar '09	65903	3715	245	977	64	0.020	31	1.0879	86566	72	40	72
Apr '09	2385	3640	9	960	2	0.001	33	1.0884	3199	3	1	3
Total	**855457**	**3618**	**3097**	**980**	**840**	**0.254**	**33**	**1.0896**	**929698**	**769**	**432**	**769**
Grand Total	**1766590**	**3673**	**6502**	**977**	**1728**	**0.487**	**32**	**1.0906**	**2095473**	**1744**	**979**	**1744**

5 Calculations for emission reduction

5.1 Project Emissions

$\mathbf{PE_y = PE_{y,\,power} + PE_{y,ww,treated} + PE_{y,s,final} + PE_{y,fugitive} + PE_{y,dissolved}}$

Where:
PE_y: project activity emissions in the year "y" (tonnes of CO_2 equivalent)
$PE_{y,power}$: emissions through electricity or diesel consumption in the year "y"
$PE_{y,ww,treated}$: emissions through degradable organic carbon in treated wastewater in year "y"
$PE_{y,s,final}$: emissions through anaerobic decay of the final sludge produced in the year "y".
$PE_{y,fugitive}$: emissions through methane release in capture and flare systems in year "y".
$PE_{y,dissolved}$: emissions through dissolved methane in treated wastewater in year "y"

$\mathbf{PE_{y,\,power} = EF*EC}$
Where:
EF = Emission factor for the Northern Grid measured in tCO2/Million KWh
EC = Electricity consumed in Million KWh/annum.

For Year 2007-08:

$PE_{y,\,power}$ = 896 X 0.233= 209 tonnes

For Year 2008-09:

$PE_{y,\,power}$ = 896 X 0.254= 227 tonnes

$\mathbf{PE_{y,ww,treated} = \sum(Q_{y,ww} * COD_{y,ww,treated}) * Bo,_{ww} * MCF_{ww} * GWP\_CH_4}$
Where:
$Q_{y,ww}$: volume of wastewater treated in the crediting period (m^3)
$COD_{y,ww,treated}$: chemical oxygen demand of the treated wastewater in the year "y" (tonnes/m^3)
$Bo,_{ww}$: methane generation capacity of the treated wastewater $MCF_{ww,treated}$: methane conversion actor for the anaerobic decay of wastewater.
GWP_CH_4 Global Warming Potential for CH_4 (value of 21 is used)

For Year 2007-08:

$PE_{y,ww,treated}$ = 888 X 0.21 X 0.5 X 21 = 1957 tonnes

For Year 2008-09:

$PE_{y,ww,treated}$ = 840 X 0.21 X 0.5 X 21 = 1853 tonnes

$\mathbf{PE_{y,s,final} = S_{y,final} * DOC_{y,s,final} * DOCF * F * 16/12 * GWP\_CH_4}$
Where:
$PE_{y,s,final}$: Methane emissions from the anaerobic decay of the final sludge generated in the wastewater system in the year "y" (tonnes of CO_2 equivalent)
$S_{y,final}$: Amount of final sludge generated by the wastewater treatment in the year y (tonnes).
$DOC_{y,s,final}$: Degradable organic content of the final sludge generated by the wastewater treatment in the year y (mass fraction).

DOCF: Fraction of DOC dissimilated to biogas (IPCC default value is 0.77).
F: Fraction of CH_4 in landfill gas (IPCC default is 0.5).

For Year 2007-08:

$\mathbf{PE_{y,s,final}}$ **= 0 tonnes**

For Year 2008-09:

$\mathbf{PE_{y,s,final}}$ **= 0 tonnes**

$\mathbf{PE_{y,fugitive} = PE_{y,fugitive,ww} + PE_{y,fugitive,s}}$
Where:
$PE_{y,fugitive,ww}$: Fugitive emissions through capture and flare inefficiencies in the anaerobic wastewater treatment in the year "y" (tonnes of CO_2 equivalent)
$PE_{y,fugitive,s}$: Fugitive emissions through capture and flare inefficiencies in the anaerobic sludge treatment in the year "y" (tonnes of CO_2 equivalent)

$\mathbf{PE_{y,fugitive,ww} = (1 - CFE_{ww}) * ME_{y,ww,untreated} * GWP\_CH_4}$
Where:
CFE_{ww}: capture and flare efficiency of the methane recovery and combustion equipment in the wastewater treatment
$ME_{y,ww,untreated}$: methane emission potential of the untreated wastewater in the year "y" (tonnes)

$\mathbf{ME_{y,ww,untreated} = \sum(Q_{y,ww} * COD_{y,ww,untreated}) * Bo_{,ww} * MCF_{ww,untreated}}$
Where:
$COD_{y,ww,untreated}$ Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tonnes/m^3)
MCFww,untreated methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2007-08:

$\mathbf{ME_{y,ww,untreated}}$ **= 3405 X 0.21 X 1 = 715 tonnes**

$\mathbf{PE_{y,fugitive,ww}}$ **= (1-0.9) X 715 X 21 = 1502 tonnes**

For Year 2008-09:

$\mathbf{ME_{y,ww,untreated}}$ **= 3097 X 0.21 X 1 = 650 tonnes**

$\mathbf{PE_{y,fugitive,ww}}$ **= (1-0.9) X 650 X 21 = 1366 tonnes**

$\mathbf{PE_{y,dissolved} = Q_{y,ww} * [CH_4]_{y,ww,treated} * GWP\_CH_4}$

For Year 2007-08:

$\mathbf{PE_{y,dissolved}}$ **= 911133 X** $\mathbf{10e^{-4}}$ **X 21 = 1913 tonnes**

For Year 2008-09:

$\mathbf{PE_{y,dissolved} = 855457 \times 10e^{-4} \times 21 = 1796}$ **tonnes**

For Year 2007-08:
Project activity emissions = **5581 tonnes of CO_2e equivalent per annum**

For Year 2008-09:
Project activity emissions = **5242 tonnes of CO_2e equivalent per annum**

*5.2 **Baseline Emissions***

Baseline emissions for the project activity include methane generation emission potential of untreated wastewater and or sludge.

$\mathbf{BE_y = ME_{y,ww,untreated} + ME_{y,s,untreated}}$
Where:
BE_y = Baseline emissions in year 'y'
$ME_{y,ww,untreated}$: Methane generation potential of untreated wastewater 'y'
$ME_{y,s,untreated}$: Methane generation potential of untreated sludge 'y'

$\mathbf{ME_{y,ww,untreated} = \sum(Q_{y,ww} * COD_{y,ww,untreated}) * Bo_{,ww} * MCF_{ww,untreated} * GWP\_CH_4}$
Where:
$COD_{y,ww,untreated}$: Chemical oxygen demand of the wastewater entering the anaerobic treatment reactor/system with methane capture in the year "y" (tonnes/m^3)
$MCF_{ww,untreated}$: methane conversion factor for the anaerobic decay of the untreated wastewater.

For Year 2007-08:

$\mathbf{ME_{y,ww,untreated} = 3405 \times 0.21 \times 1 \times 21 = 15017}$ **tonnes**

For Year 2008-09:

$\mathbf{ME_{y,ww,untreated} = 3097 \times 0.21 \times 1 \times 21 = 13656}$ **tonnes**

$\mathbf{ME_{y,s,untreated} = S_{y,untreated} * DOC_{y,s,untreated} * DOCF * F * 16/12}$
Where:
$S_{y,untreated}$: amount of untreated sludge generated in the year "y" (tonnes)
$DOC_{y,s,untreated}$: Degradable organic content of the untreated sludge generated in the year y (mass fraction).

For Year 2007-08:

$\mathbf{ME_{y,s,untreated} = 0}$

For Year 2008-09:

$\mathbf{ME_{y,s,untreated} = 0}$

Year	Baseline emissions (tonnes of CO_2)	Project emissions (tonnes of CO_2)	Leakages (tonnes of CO_2)	Emission reductions (tonnes of CO_2)
2007-2008	15,017	5,581	0	9,436
2008-2009	13,656	5,242	0	8,414

For the entire crediting period:

Emission reduction = Baseline emissions – Project emissions

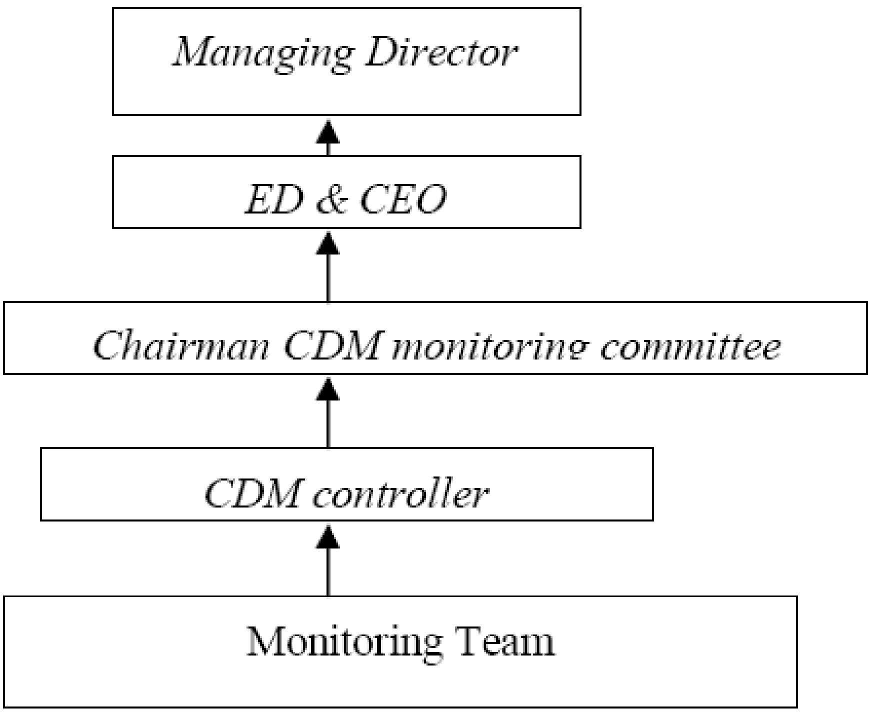
Baseline emissions = 28673 tonnes CO_2 equivalent per annum
Project emissions = 10823 tonnes CO_2 equivalent per annum
Emission reduction = 28673 – 10823
= 17850 tonnes CO_2 equivalent per annum

6 Measures to ensure the Results / uncertainty analysis

Roles and responsibilities

SIL has planned an operation and management structure for the project activity with roles and responsibilities of individuals defined. The management is responsible for monitoring and reporting of the parameters involved. All parameters are being monitored and reported in a transparent manner so that they can be easily verified by DOE. SIL constituted a CDM monitoring team which is responsible for the overall monitoring and management of the projects. CDM team comprises of monitoring supervisors having responsibility of operating and monitoring the plant. Parameters involved in the project activity at Digester, Lab and Cogeneration. Supervisor at cogeneration unit is responsible for monitoring parameters related to co-generation", whereas supervisors at lab and digesters take care of monitoring at lab and digesters respectively.

Daily report of the parameters monitored is being reported to CDM controller for verification. Chairman CDM monitoring committee is in charge of CDM cell and report to ED & CEO who would review the reports on monthly basis and subsequently send reports to the Managing Director. Management structure for monitoring and reporting is presented in following block diagram:



The calibration of all monitoring equipment is being carried out regularly. The following table indicates the details of meters including their accuracy levels and calibration dates:

Monitored Parameter	Monitoring Equipment/ Instrument	Meter Type	Meter Serial No.	Model No.	Protection/ Accuracy Class	Date of Calibration/Testing				
Flow rate of waste water wash	Flow meter	Forbes Marshall	060765	IFS 4000	IP67	07-March-07	06-March-08	02-March-09	-	-
COD (inlet)	Test Reports	CPPRI	-	-	-	07-April-07	15-November-07	12-June-08	14-November-08	12-May-09
COD (outlet)	Test Reports	CPPRI	-	-	-	07-April-07	15-November-07	12-June-08	14-November-08	12-May-09
Electricity Consumption	Energy Meter	L&T	06894046	ACRUX	Class 1	28-September-06	-	-	-	-
	Energy Meter	HPL-SOCOMEC Pvt. Ltd.	IK028575	CT-2E	Class 1	-	28-August-07	-	-	-
	Energy Meter	L&T	08813568	ACRUX	Class 1	-	-	21-April-08	-	-
Temperature of Gas	Flow meter	Manas Microsystems Pvt. Ltd.	01071078J	µCS 3001-NOT-2WM	-	12-January-07	11-January-08	07-January-09	-	-
Pressure of Gas	Flow meter	Manas Microsystems Pvt. Ltd.	01071078J	µCS 3001-NOT-	-	12-January-07	11-January-08	07-January-09	-	-

				2WM						
Volume of Gas generated	Flow meter	Manas Microsystems Pvt. Ltd.	01071078J	μCS 3001-NOT-2WM	-	12-January-07	11-January-08	07-January-09	-	-
Methane Fraction	GLC	Netel Make	06/030	OMEGA QC+	-	14-November-06	13-November-07	11-November-08	-	-