Reliance

MONITORING REPORT

CDM PROJECT IPCL-GC

" Demand Side Energy Conservation & Reduction Measures at IPCL –Gandhar Complex"

CDM Registration Reference No. 0445

RELIANCE INDUSTRIES LIMITED

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1.0 TITLE

DEMAND SIDE ENERGY CONSERVATION & REDUCTION MEASURES AT IPCL–GANDHAR COMPLEX

Document: Monitoring Report, Rev 4 dated 08/02/2008[1]

Monitoring Period: 17/05/2005 to 31/07/2006 (both days included)

2.0 INTRODUCTION

Reliance Industries Limited (RIL) has implemented CDM project at IPCL – Gandhar complex by carrying out reduction in energy required to produce chilled water by using waste and contaminated steam in vapor absorption chiller.

The purpose of this monitoring report is to calculate the Greenhouse Gas emission reduction achieved by this CDM project for the period of verification.

The first monitoring report covers the activity from 17th May 2005 till 31st July,2006. The start date of the project activity was 8th August 2003 and that of the crediting period is 17th May 2005.

3.0 REFERENCES

3.1 Sectoral Scope

Sectoral Scope 4: Manufacturing Industries

3.2 Approved Baseline Methodology

Main Category: Type II – Energy efficiency improvement projects
Sub Category: II.D - Energy Efficiency and fuel switching measures for industrial facilities

The reference has been taken from the list of the small - scale CDM Project activity categories contained in Appendix B of the simplified Methodologies & Procedures for small - scale CDM Project activity- version 7 (28th November 2005)

3.3 Approved Monitoring Methodology

[1] *Date format is dd/mm/yyyy*

Main Category: Type II – Energy Efficiency Improvement Projects
Sub Category: II .D - Energy Efficiency and Fuel Switching Measures for Industrial facilities

The reference has been taken from the list of the small - scale CDM Project activity categories contained in Appendix B of the simplified M&P for small - scale CDM Project activity- version 7 (28 th November 2005)

3.4 Project Design Document

Title:	Demand Side Energy Conservation & Reduction Measures At IPCL – Gandhar Complex
Version:	04
Date:	5th June 2006
Registration date:	19th August 2006
Registration No:	0445

4.0 PROJECT DESCRIPTION

4.1 CDM Project Description

The project activity consists of two measures. These measures are:

- **Measure 1:** Recovery and use of contaminated waste process steam (low pressure steam at 1.1kg/cm2g) to produce chilled water at EO-EG (Ethylene Oxide-Ethylene Glycol) plant by installing Vapor Absorption Refrigeration unit.

- **Measure 2:** Recovery and use of waste Intermediate Pressure (IP) steam to generate chilled water at PVC (Polyvinyl Chloride) Plant by installing Vapor Absorption Refrigeration unit.

There is no leakage of GHG emissions associated with the project.

4.2 Project Participants

Project participant: **Reliance Industries Limited**

4.3 Project location

The project activity is installed in the existing facitility of IPCL – Gandhar Complex, that is located 43 Km from Baruch city in Gujarat, India and having the coordinates 21^0 40' 26" N and 72^0 34' 18" E.

5.0 SUSTAINABILITY – ECONOMIC AND SOCIAL WELL BEING.

The project activity is an energy efficiency project which saves electrical energy by the installation of 4 nos. of Vapor Absorption Machines that use contaminated and waste steam to produce the chilled water. The aggregate energy saving achieved by this project activity is about 17.025 GWh_e that would have been required if the project had not been implemented.

This project, by reducing GHG emissions, contributes towards a better environment and hence works towards social well-being for all.

At Reliance Industries Limited contribution towards social welfare through multifarious activities is an ongoing process. The same has been outlined in the Project Design Document.

6.0 PARAMETERS BEING MONITORED ACCORDING TO MONITORING PLAN

Measure 1: EOEG PLANT

Sr.No	Input	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Review criteria	Reference
1.1	Power consumption	Clamp-on meter GECS/L/23	KW	m	Monthly	Parameters to determine the power consumed by M/c 1 of Measure-1	Excel work book (*CDM_PM_0506_002_Ver Cons.xls*) The data is further archived as electronic soft document
1.2	Operating Hours	Log Book	Hr	m	Daily	Parameters to determine operating hrs of M/c 1 inMeasure-1	"do"
1.3	Refrigeration Generated	TR-3101A	TR	m	Daily	Parameters to determine refrigeration generated by M/c1 of Measure-1	"do"
1.4	Power consumption	Clamp-on meter GECS/L/23	KW	m	Monthly	Parameters to determine the power consumed by M/c 2 of Measure-1	"do"
1.5	Operating Hours	Log Book	Hr	m	Daily	Parameters to determine operating hrs of M/c 2 inMeasure-1	"do"
1.6	Refrigeration Generated	TR-3101B	TR	m	Daily	Parameters to determine refrigeration generated by M/c1 of Measure-1	"do"

Measure 2: PVC PLANT

Sr.No	Imput	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Review criteria	Reference
2.1	Power consumption	Clamp-on meter GECS/L/23	KW	m	Monthly	Parameters to determine the power consumed by M/c 1 of Measure-2	Excel work book (*CDM_PM_0506_002_Ver Cons.xls*). The data is further archived as electronic soft document
2.2	Operating Hours	Log Book	Hr	m	Daily	Parameters to determine operating hrs of M/c 1 in Measure-2	"do"
2.3	Refrigeration Generated	TQR-RF9RTOT	TR	m	Daily	Parameters to determine refrigeration generated by M/c1 of Measure-2	"do"
2.4	Power consumption	Clamp-on meter GECS/L/23	KW	m	Monthly	Parameters to determine the power consumed by M/c 2 of Measure-2	"do"
2.5	Operating Hours	Log Book	Hr	m	Daily	Parameters to determine operating hrs of M/c 2 in Measure-2	"do"
2.6	Refrigeration Generated	TQR-RF10RTOT	TR	m	Daily	Parameters to determine refrigeration generated by M/c1 of Measure-2	"do"

Sr.No	Imput	Source of data	Data unit	Measured (m),	Recording	Review criteria	Reference

				calculated (c) or estimated (e)	**Frequency**		
3.1	Electricity Generated	Power Meter no. 2625055 & 2625056	MWH	m	Daily	Parameter to determine Base line GHG Emission	Excel work book (*CDM_PM_0506_002_Ver Cons.xls*). The data is further archived as electronic soft document
3.2	Fuel consumed for power generation	FT 313 FT 301 A	MT	m	Daily	Parameter to determine Base line GHG Emission	"do"

7.0 Quality Assurance (QA) / Quality Control (QC)

The site has a specific GHG Emission Reduction Management System RIL/CDM/MS/PDD/0506/002. Which takes care of all QA/QC This system is made as per the ISO guidelines. The site holds an ISO 9001:2000 certificate. The instruments required for monitoring the CDM Project have been listed in the critical category of instruments. In the event of malfunctioning of any instrument or automatic data logging system like DCS, emission reduction is accounted for as per the Monitoring Plan (Annex-3) of PDD. During eventualities, when DCS data is not available in PVC Plant, the refrigeration from the Vapor Absorption Machines are retrieved from the SCADA system that is installed for monitoring the performance of these machines only.

Reliance Industries Limited has many manufacturing units all over India. CDM projects are being taken up at all the sites. CDM Cell is the centralized department working with the site Central Technical Services (CTS) Department to implement and sustain the project.

8.0 EMISSION REDUCTIONS:

Total emission reduction per month from both the measures commencing from 17.05.2005 to 31.07.2006 are given below:

Months	Emission reduction (tonnes CO_2 e/ Month)		
	Measure 1	Measure 2	**Total**
May-05	179	315	494
Jun-05	334	583	917
Jul-05	400	559	959
Aug-05	389	706	1095
Sep-05	0	677	677
Oct-05	0	652	652
Nov-05	53	592	645
Dec-05	386	553	939
Jan-06	337	547	884
Feb-06	383	456	839
Mar-06	371	478	849
Apr-06	365	448	813
May-06	422	438	860
Jun-06	426	334	760
Jul-06	583	216	799
Total Emission reductions for the Monitoring period from 17.05.2006 to 31.07.2006 (tonnes CO_2 e)	**4628**	**7554**	**12182**

The reduction in emission of GHG was calculated as per the directives received from the EB (*see box below*) on the 'Request for Deviation' from Monitoring Plan of the registered PDD with regard to the monitoring of the quantity of refrigeration for the Measure 2. The main source of the data on quantity of refrigeration for Measure 2 has been the DCS. In the absence of data from DCS, the same has been obtained from SCADA and after applying a correction factor of 0.95 has been used in the calculation of emission reduction.

EB Decision on Request for Deviation

"Request for Deviation - Issuance: Deviation from the monitoring plan of the registered PDD with regard to the monitoring of the tonne of refrigeration for the measure 2

The Board decided to accept the request for deviation to be applied only for the periods when data from DCS was not available and instruct the DOE to check the consistency of the reading from SCADA by means of calculations and/or comparison with the DCS data when both data are available, and apply a correction factor as necessary to ensure conservativeness of the approach. In the future, if the data recording system still fails repeatedly, emission reductions cannot be claimed during the periods when the system fails, and the project participant is asked to submit a revised monitoring plan to address the issue appropriately."

9.0 MEASURES TO ENSURE THE RESULTS / UNCERTAINTY ANALYSIS

The monitoring instruments are calibrated as per the procedures mentioned in the GHG Emission Reduction Management System RIL/CDM/MS/PDD/0506/002. The site holds an ISO 9001:2000 certificate. The instruments required for monitoring the CDM Project have been listed in the critical category of instruments. In the event of malfunctioning of any instrument, emission reduction is accounted for as per the Monitoring Plan (Annex-3) of PDD. In the case of Measure 2 data for calculation of emission reduction is compiled and calculated as per the EB decision on the 'Request for Deviation from Monitoring Plan of the registered PDD with regard to the monitoring of the quantity of refrigeration (Refer Section 8.0). Hence, the data logging system available are

For Measure 1

- The cumulative refrigeration figure as recorded by the IP21 system, or
- Daily report as printout from DCS

For Measure 2

- Daily report from DCS, or
- In the event that data from DCS are not available, the cumulative refrigeration for the day is calculated from the average refrigeration of the day as obtained from data recorded continuously by the SCADA system. This average is then multiplied by the operating hours and the product is corrected using a correction factor of 0.95.

Calculation procedure followed for data sourced from SCADA

Step 1:
Calculate the average refrigeration for the day

$$\mathbf{R}_{avg} = \frac{\sum R_{it}}{n}$$

Where, R_{it} Refrigeration generated by machine i at time t, i = 3, 4
n Number of data points

Step 2a:
If, $R_{avg} > 50$, calculate the total refrigeration generated

$$\mathbf{R}_{itot} = R_{avg} * O_i * 0.C_f$$

Where,
R_{itot} Total refrigeration generated by machine i per day, i = 3, 4
O_i Operating hours of machine i
C_f Correction factor = 0.95,

Correction factor[2]

$$C_{fVAR1} = \frac{\text{(Total refrigeration of 175 days for VAR-1)}}{\text{(Total refrigeration for the same days from SCADA)}} = 0.98$$

$$C_{fVAR2} = \frac{\text{(Total refrigeration of 169 days for VAR-2)}}{\text{(Total refrigeration for the same days from SCADA)}} = 0.99$$

C_f = 0.95, (conservative factor)

Step 2b:

If $R_{avg} < 50$, i.e. total for the day is less than 1200 TR, then, for the sake of being conservative, refrigeration for the day is considered as nil.

[2] The days on which refrigeration data is available from both DCS and SCADA sources, and the VAR machines were running for all 24 hours were considered to arrive at the correction factor.

10.0 ROLES AND RESPONSIBILITIES

CDM Cell at Mumbai is a central department that coordinates all activities related to CDM Projects at different sites of RIL/IPCL.

The roles and responsibilities have been established by introducing a project specific GHG Emission Reduction Management System RIL/CDM/MS/PDD/0506/002 that has made the project system-driven and not person-specific. This document gives detailed guidelines on emergency preparedness, calibration/measurement/monitoring/reporting of parameters, control of records, internal audits, performance review and corrective action, and outlines the responsibility matrix for sustaining the CDM project. The said Management system is also in line with the practices and procedures of ISO 9001:2000 at Gandhar Complex of IPCL.