Revised Monitoring Plan

Version: 1.0
Date: 06/02/09
Project 0706 : "Supply side energy efficiency improvements in steam generation at CSL." by Chemplast Sanmar Ltd

SECTION D. Application of a monitoring methodology and plan:

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

This comes under the Appendix B of the simplified modalities & procedures for small-scale CDM project activities under Category IIB– "***Supply side energy efficiency improvements – generation"*** version 07/28 November 2005

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

The project is an energy efficiency project in steam generation (Type IIB) – the monitoring methodology and baseline are selected here as suggested in the document 'Simplified Modalities and Procedures for Small-Scale CDM project activities'

This project proposed to implement following monitoring methodology, this is in line with monitoring guidelines provided in appendix B: IIB– ***Supply side energy efficiency improvements – generation.***

Project utilizes waste gas streams from IC engines to produce steam in a waste heat recovery boiler (WHRB).It in turn cuts down on LSHS consumption for steam generation.

Baseline Emissions Calculations:
In the PDD, IPCC guidelines for emission coefficient of LSHS (74.1 kg CO2/GJ) and evaporation-ratio (design value) for LSHS boiler (13.5 tSteam/tLSHS) have been taken to calculate emission baseline (tCO2/ tSteam). Evaporation ratio is fixed ex-ante for the entire credit period.

Project Emission Calculations:
No emissions due to project activity sources.

Leakage Calculations:
According to guidelines in Category IIB- *If the energy efficiency technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.* This is not the case in the project activity.

Uncertainties in Project emissions and leakage estimate
There are no project emissions and leakage from in the project activity.

D.3 Data to be monitored:

ID number	*Data type*	*Data variable*	*Data unit*	*Measured (m), calculated (c) or estimated (e)*	*Recording frequency*	*Proportion of data to be monitored*	*How will the data be archived? (electronic / paper)*	*For how long is archived data to be kept?*	*Comment*
1.1	*CEF_{LSHS}*	*Emission factor*	*tCO2/tLSHS*	*(c)*	*Once during PDD development*	*100%*	*Electronic/ paper*	*Crediting period + 2 years*	*Based on IPCC default value, fixed ex-ante (3.07154 tCO2e/ tLSHS)*
1.2	*$Q_{steam,y}$*	*Steam Generated in WHRB boiler*	*tSteam/y*	*(m)*	*Monthly*	*100%*	*Electronic/ paper*	*Crediting period + 2 years*	*Plant data. Can be measured accurately using flow meters*
1.3	*$E\text{-}Ratio_{LSHS}$*	*Evaporation ratio of LSHS boiler*	*tSteam/tLSHS*	*(e)*	*Once during PDD development*	*100%*	*Electronic/ paper*	*Crediting period + 2 years*	*Design value for evaporation ratio is 11.43 tSteam/tLSHS, however a conservative value of 13.5 tSteam/tLSHS, has been used exante for CERs estimation (Reference: "Greenhouse Gas Emission Reduction from Industry in*

									asia and the pacific" (GERIAP), Performance Evaluation of Boiler August 2004
1.4	$Q_{Gas,y}$	*Gas used for power generation*	*CuM/year*	*(m)*	*Monthly*	*100%*	*Electronic/ paper*	*Crediting period + 2 years*	*The quantity of gas will be monitored using gas meter. Gas quantity has a direct impact only on electricity generation & associated efficiency calculations. Since the project activity covers only the steam generation. Monitoring of gas would not form part of emission reduction calculations associated with steam generation.*
1.5	$Q_{Electricity\_,y}$	*Electricity generated in the IC engine*	*KwH*	*(m)*	*Monthly*	*100%*	*Electronic/ paper*	*Crediting period + 2 years*	*Electricity generation in IC engine shall be monitored using electricity meter. However electricity generation in the IC engine doesn't have any direct impact on the emission reduction calculations.*

1.6	P_{Steam}	*Pressure of steam generated in the WHRB boiler*	*Kg/cm2*	*(m)*	*Daily*	*Once in a day*	*paper*	*Crediting period + 2 years*	*Plant data. Can be measured accurately using flow meter*
1.7	T_{Steam}	*Temperature of steam generated in the WHRB boiler*	*◦ C*	*(m)*	*Daily*	*Once in a day*	*Paper*	*Crediting period + 2 years*	*Plant data. Can be measured accurately using flow meter*
1.8	E_{steam}	*Enthalpy of steam generated in the WHRB boiler*	*Kcal/ kg*	*(c)*	*Monthly*	*Based on monthly average value of steam pressure and temperature*	*Paper*	*Crediting period + 2 years*	*Enthalpy shall be estimated directly from steam table* *The enthalpy of steam in the project activity (on cross check with enthalpy of baseline boiler) shall be equal or higher than the enthalpy of steam produced in the baseline boiler i.e. 580.4 kcal/ kg (The evaporation ratio in the baseline boiler is taken as 13.5 and corresponding enthalpy is estimated at 580.4 kcal/ kg).*

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:	

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1.2	Low	Sophisticated and modern meter (Vortex flow meter, VFM5095CE) is used for measuring this variable. High accuracy is being achieved. Detailed internal meter calibration procedure is available. Regular calibration based on this procedure would be conducted and records would be kept for verification. Once a year calibration would be done by reputed external company

1.4, 1.5	Low	As quantity of gas used and electricity generation in IC engine don't have any direct impact on emission reduction calculation, no QA/QC procedures are required. However as per standard operating practices, meters used for measurement of these variables would be calibrated periodically.
1.6, 1.7	Low	Sophisticated and modern meter (Vortex flow meter, VFM5095CE) is used for measuring this variable. High accuracy is being achieved. Detailed internal meter calibration procedure is available. Regular calibration based on this procedure would be conducted and records would be kept for verification. Once a year calibration would be done by reputed external company
1.8	Low	This is estimated values based on data values of 1.6, 1.7

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

Project Management Planning:
Equipments are supplied by Wartsila. Plant operations & maintenance is responsibility of equipment supplier, which is an ISO 9001 certified company. Wartsila is an ISO 9001 certified company and has well laid out plans for usual plant operations & maintenance.

Responsibility for CDM:
MD Chemplast: Overall responsibility for of registration of CDM project activity. *Plant Head Chemplast:* Overall responsibility of monitoring of CDM project activity. *Also* responsible for performance & maintenance data collection and monitoring report preparation. CSL has well chalked out plan for overall chemical plant operations & maintenance. These procedures are detailed out in the Quality management system (QMS), Environment, Health & safety manual (EHS).

Completeness-
The project activity has installed the latest state of art monitoring and control equipment that measure, record, report, monitor and control various key parameters. A daily log is maintained by the production team on issues relating to plant performance. A monthly MIS is prepared based on this data and is reviewed by plant head.

Reliability-
Calibration plan is part of usual plant operating procedures. All meters are calibrated periodically (once in six months at least). Calibration procedure for meters to be used for measurement of data is properly documented and has been standardised.

Frequency-

Data is captured on a continuous basis using latest measuring equipment; reporting happens as per the table D.3.

Training-
For plant operations & maintenance, people are well trained by equipment supplier. O&M functions are happening smoothly for last 1.5 years of operation. For any training need identified related to O&M, O&M contractor shall provide the same to the concerned people. For responsibilities owned by project participant, proper training would be provided to new people joining the team.

Internal Audit-
CDM audits shall be carried out every six months to check the correctness of procedures and data monitored by the internal auditing team entrusted for the work. Report on internal audits done, faults found and corrective action taken shall be maintained and kept for external auditing (verification).

Emergency Preparedness Plan-
The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. However to deal with any emergence, the plant also has a documented onsite emergency plan.

Report generation on monitoring:
After verification of the data and due diligence on corrective ness if required an annual report on monitoring and estimations shall be maintained by the CDM team and record to this effect shall be maintained for verification.

Environment Management Plan:
A documented environment management plan is available for plant personnel. Air quality, noise level etc are monitored as part of EMP. As part of environment impact monitoring, stack flue gases would also be monitored every three months.

D.6. Name of person/entity determining the monitoring methodology:

Chemplast Sanmar Limited