MONITORING REPORT
(VERSION – 01)

"VGL - Waste Heat based 4 MW Captive Power Project at Raipur"
Reference no. UNFCCC 00000432-CDMP

Project Site:
Siltara Industrial Area, Phase II, Siltara,
Raipur – 493111
Chattisgarh, India.

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Current Status of the Project

The 4 MW Waste Heat Recovery (WHR) Project at Vandana Global Limited (VGL) in Raipur, Chattisgarh, India has started commercial production from 1st April 2005.

The project has been completed with major equipment supplied as follows:

Sl. No.	Equipment	Supplier
1	WHR Boiler	M/s Thermal Systems (Hyderabad) Pvt. Limited
2	Turbogenerator (TG)	Alstom Projects India Limited, Baroda.

Statement to what extent the project has been implemented as planned

The project has been completed as described in the Project Design Document (PDD).

The plant is in operation continuously (with outages – forced & planned) since 1st April 2005. VGL sponge iron plant has a 200 tonnes per day (tpd) capacity DRI kiln and is currently producing around 60000 tonnes per annum (tpa) of sponge iron. The WHR boiler is using waste heat of the flue gas from the sponge iron kiln to produce steam.

The steam is used to generate 4MW of power [equivalent to around 25 million kWh (MkWh) per annum]. The power generated is used to meet the captive power requirement of VGL plant and the surplus is wheeled through CSEB grid for supply to group companies.

Monitoring Period

The monitoring period is from 1st April 2005 to 31st October 2006(both days included).

Sustainability Issues

Environmental well-being: The project activity is a demonstration of clean technology implementation and does not by itself generate or release harmful gases. Hence, the project activity contributes to a better quality environment to the employees and the surrounding community. In India, coal is the most abundantly available fossil fuel and is mainly used for power generation. Power plants run by coal contribute around 70% of total power generation in the Western Regional electricity grid. The project activity curtails further depletion of non-renewable energy resources like coal, thus increasing its availability to other important processes in future. It also leads to reduction in GHG (CO_2), SOx and NOx emissions. The waste gases after heat transfer in the WHRB is led to exhaust stack through Electrostatic Precipitator (ESP) which reduces Suspended Particulate Matter (SPM) load to a large extent. SPM is collected in the hoppers of the ESP. The particulate matter collected in the hoppers is conveyed to existing ash silo by a conveyor belt and the ash is sold to brick manufacturer.

VGL regularly obtains the necessary environmental clearances from the Chattisgarh Environment Conservation Board (CECB).

Socio-economic well-being: Project activity has led to direct and indirect employment during stages of power plant construction and operation in the region. Also, with growing technological advancement the project activity contributes to capacity building in terms of technical knowledge and managerial skills.

The project shows less dependence of project proponent on grid electricity and better management of waste. This brings in related benefit for the employees and the local community.

Obtained Parameters According To Monitoring Plan

Table 1: As mentioned in section D.2.1.3 of the PDD, following project related parameters are monitored:

ID No. (refer section D of PDD)	Data variable	Units	Recording Frequency	Measured (m), Calculated (c) or estimated (e)	Uncertainty Level
1. EG_{gen}	Total WHR based electricity generated	kWh	Continuously	Online measurement	Low
2. EG_{aux}	Auxiliary consumption of Electricity from WHR sources	kWh	Continuously	Online measurement	Low
3. EG_y	Net WHR based electricity generated	kWh	Continuously	Calculated (EG_{gen} - $EG_{aux.}$)	Low
4. EF_y	CO_2 (combined margin) emission factor of the grid	tCO_2/ MWh	Once at the start of crediting period	Calculated ex-ante[1]	Low
5. $EF_{OM,y}$	CO2 operating margin emission factor of the grid	tCO2/ MWh	Once at the start of crediting period	Calculated	Low
6. $EF_{BM,y}$	CO2 Build Margin emission factor of the grid	tCO2/ MWh	Once at the start of crediting period	Calculated	Low
7. $F_{i,j,y}$	Amount of each fossil fuel consumed by each power source/ plant	t /year	Once at the start of crediting period	Calculated	Low
8. $COEF_{i,k}$	CO_2 emission coefficient of each fuel type	tCO_2/ t	Once at the start of crediting period	Calculated	Low

[1] The combined margin emission factor is calculated ex – ante for the entire crediting period by considering three year average for Simple OM and Option -1 (ex–ante) for BM calculation as per guidelines in ACM0002.

	and each power source/plant				
9. $GEN_{j,y}$	Electricity generation of each power source/plant	MWh/ year	Once at the start of crediting period	Calculated	Low

The Shift Engineer (Electrical) monitors through DCS hourly and eight hourly data on total power generation and auxiliary consumption.

The hourly data are recorded in the Generation Log Book and the eight hourly data are recorded in the Plant Log Book. The complete and accurate records in the Plant Log Book are signed by the Shift Engineer (Electrical). This report is sent to the Deputy Manager (Power Plant) for his review on a daily basis.

On the basis of the reported parameters, a complete and accurate executive daily and monthly summary report is prepared and signed by the Deputy Manager (Power Plant) and sent to the Director (VGL) for proper administration.

Calculation of WHR Power Generation

Bi-monthly data waste heat based power generated is placed below.

Period	TG Generation (kWh)	Power Plant Auxilary Consumption (kWh)	Net Generation (kWh)
April 2005 - March 2006			
01.04.05 to 16.04.05	1595590	164800	1430790
16.04.05 to 16.05.05	2365128	229120	2136008
16.05.05 to 16.06.05	2332022	256800	2075222
16.06.05 to 14.07.05	1197500	156880	1040620
14.07.05 to 13.08.05	3355828	226870	3128958
13.08.05 to 13.09.05	2484522	183760	2300762
13.09.05 to 14.10.05	3259631	232640	3026991
14.10.05 to 14.11.05	3236354	251120	2985234
14.11.05 to 14.12.05	3420330	203980	3216350
14.12.05 to 14.01.06	1691173	124080	1567093
14.01.06 to 14.02.06	3137612	279608	2858004
14.02.06 to 13.03.06	2839138	339761	2499377
13.03.06 to 31.03.06	937622	126314	811308
TOTAL for (01/04/2005 to 31/03/2006)	31852450	2775733	29076717
April 2006 - October 2006			
01.04.06 TO 14.04.06	826700	133512	693188
14.04.06 TO 13.05.06	2834700	337781	2496919
14.05.06 TO 14.06.06	3267114	391934	2875180
14.06.06 TO 13.07.06	2252479	346219	1906260
14.07.06 TO 14.08.06	3362855	421963	2940892
14.08.06 TO 14.09.06	2718045	366514	2351531
15.09.06 to 13.10.06	1193716	162079	1031637
14.10.06 to 31.10.06	296831	87960	208871
TOTAL for (01/04/2006 to 31/10/2006)	16752440	2247962	14504478

Emission Reductions

Baseline Emissions:

Carbon dioxide emission factor as per the baseline adopted (kg CO_2/ kWh) = 0.759

Net WHR based power generated (kWh) = 43,581,195

Baseline emissions (tonnes of CO_2 equivalent) = 33,078

Project Emissions:

Project Emissions (tonnes of CO_2 e) = NIL

Emission Reductions:

Baseline emissions – Project emissions = 33078 – NIL

= 33078 tonnes of CO_2 e

Measures to ensure the results/uncertainty analysis

VGL has an In-house metering system and Export metering system, which monitor the overall performance of the waste heat recovery based CPP. The In-house metering system affecting the emission reductions from the project activity, mainly comprises of two meters

- One In-house Generation meter for TG set
- In-house Auxiliary consumption meter
- In-house captive consumer meters

The In-house Generation Meter (or the Energy Meter) is a micro-processor based metering device that monitors the total electricity units generated. The gross electricity generated from the waste heat recovery based power plant of VGL, can be verified against the Form G data.

The In-house Auxiliary consumption meter (or the Static Meter) is a micro-processor based metering device which monitors the net units of auxiliary electricity consumed by the CPP.

The net electricity generated from the waste heat recovery based power plant can be calculated as a difference between the gross electricity generation and the auxiliary consumption of the power plant.

In-house captive consumer meter (or the Kilowatt Hour Meters) is a micro-processor based metering device which gives data on consumption by various consuming units in VGL.

The External Metering System of CSEB consists of one export meter and one import meter both of which are micro-processor based metering devices installed within VGL Plant Premises. These meters are sealed, maintained and calibrated by CSEB.

The part of the net electricity generated from the waste heat recovery based power plant that is used for captive consumption of the sponge iron plant of VGL can be calculated as the difference between the total In-house consumption of VGL and the amount of electricity imported from CSEB grid (measured by the import meter). The net electricity generated from the waste heat recovery based power plant can be verified against the sum of the part of the net electricity generated from the waste heat recovery based power plant that is used for captive consumption of the sponge iron plant of VGL and the amount of electricity that is exported to CSEB grid (measured by the export meter).

All the metering devices of the In-house metering system are calibrated at regular intervals (as per statutory requirements and Electricity Act guidelines) so that the accuracy of measurement is ensured all the time. The other meters are calibrated internally and externally as per equipment supplier's calibration schedule following the standard procedures for calibration.

The CSEB personnel read the export meter reading and provide a monthly invoice of total power exported (wheeled) and imported. CSEB personnel regularly calibrate the meter. The calibration of this meter is not in the control of VGL.

Moreover, VGL regularly undertakes Internal Audits to determine whether the GHG abatement project conforms to the planned arrangements of the monitoring methodology and plan (including other criteria related to GHG performance parameters). The audit report provides information on results of audits and

recommends improvements to VGL management. All these measures ensure that uncertainty levels for all parameters are low.

Roles & Responsibilities

In the complete implementation and monitoring plan referred above, VGL is the sole agency responsible for implementation and monitoring.