PERIODIC MONITORING REPORT

Version 01,29th April 2009

Project Title

"Waste heat recovery from Process Gas Compressors (PGCs), Mumbai high south (offshore platform) and using the recovered heat to heat process heating oil."

UNFCCC Reference No. 0814

Date of Registration – 5-Feb-2007

Crediting Period – 05-Feb-2007 – 31-Mar-2009

PDD Referred – Version 02, dated 13-October-2006

Methodology Referred – AMS.II.D. Version 07, dated 28-November-2005

Current Monitoring Period – From 05-February-2007 to 31-March-2009 (Both days inclusive)

Project Location

Mumbai South Platform (MSP), Mumbai high, India.

Oil and Natural Gas Corporation (ONGC) Limited

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Project Description

The project activity recovers heat from the exhaust flue gases of two 'Process Gas Compressors' (PGC)[1], (used for compressing the associated gas in crude oil production activities), installed at ONGC's offshore Mumbai South platform (MSP). The MSP is a new platform and the waste heat recovery system is installed with the process gas compressor. This is the first platform in ONGC having process gas compressor with waste heat recovery unit. ONGC has installed waste heat recovery units (WHRU) at each of the PGC exhaust points, and the waste heat is used to heat process oil which is further used to heat various process streams in the crude oil production activities. The project activity has reduced the consumption of fossil fuels (natural gas), which would otherwise be used for heating of process oil for crude oil production activities.

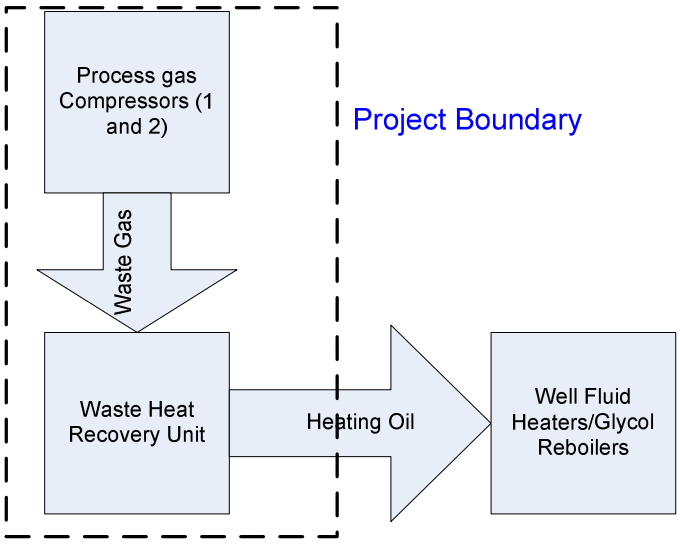
The WHRU is designed to extract heat from exhaust flue gases of process gas compressors and heat the well fluid and glycol reboiler in the glycol regeneration system. In the project activity the exhaust flue gases from PGC, which are at a very high temperature (approximate 450-500 deg C), is brought into contact with circulating process oil through a WHRU. The waste heat of exhaust flue gases of PGC is gained by the process oil, which is circulated from discharge of hot oil pump to the WHRU, through heat transfer. The hot process oil is circulated through two glycol re-boilers in the glycol regeneration system to heat glycol solution.

[1] http://cdm.unfccc.int/Projects/DB/DNV-CUK1166521170.66/view

Statement regarding the current status of the project activity

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

The purpose of the project activity is to recover heat from the exhaust flue gases of two 'Process Gas Compressors' (PGC), (used for compressing the associated gas in crude oil production activities),installed at ONGC's offshore Mumbai South platform (MSP). After the project activity project proponent has not made any changes in the project boundary.



Monitoring Period

ONGC has installed waste heat recovery units (WHRU) at each of the PGC exhaust points, and the waste heat is being used to heat process oil which is further used to heat various process streams in the crude oil production activities. For the present monitoring report, the monitoring period shall encompass the period from 05.02.2007 to 31.03.2009.

Baseline emissions Calculations

$E_d = Q_{oil} \times S_{oil} \times (T_{oil,\,in} - T_{oil,\,out}) \times H$

E_d – Energy recovered by WHRU in a day d (MJ per day)

Q_{oil} - Flow rate of Heating Oil (Tonne/ Hour)

S_{oil} – Specific heat of Heating Oil (MJ/tonne/^{0}C)

$T_{oil,\,in}$ – Inlet temperature of Heating Oil (^{0}C)

$T_{oil,\,out}$ – Outlet temperature of Heating Oil (^{0}C)

H – Working hours per day (Hours)

$$Ey = \sum_{1}^{d} E_d$$

Ey – Energy recovered by WHRU in year y (MJ per year)

d – Working days per year (days)

$$BEy = Ey \times EF_{NG}$$

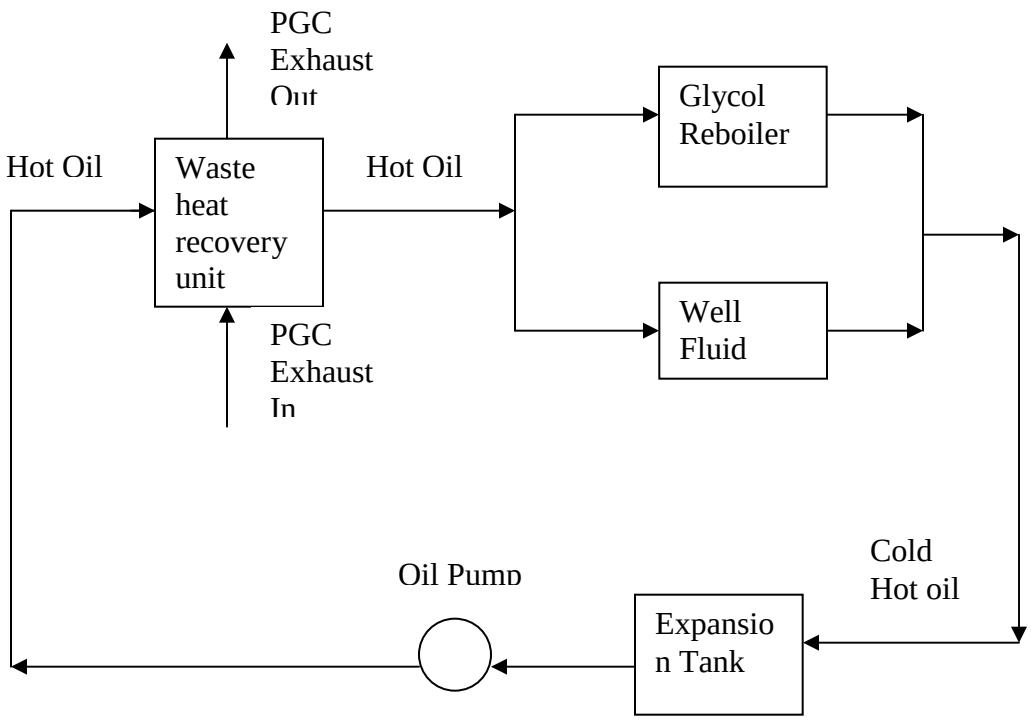
BEy = Baseline emission for energy saved during year y

EF_{NG} – Emission Factor for Natural Gas (tCO2e/MJ)

Parameters being monitored according to Monitoring Plan

The waste heat recovery unit is designed to extract heat from the exhaust flue gases of process gas compressors and further used to heat well fluid and glycol re-boiler in the glycol regeneration system. The system includes hot process oil expansion tank, hot process oil circulation pumps, hot process oil filters, hot process oil dump coolers and well fluid heaters. The recirculation of hot process oil takes place from the discharge of the hot process oil pump to the waste heat recovery units for picking up the heat from the exhaust flue gases. The hot process oil after picking up heat in the WHRU is available at 230^0C. Hot process oil is then circulated through (a) two glycol re-boilers in the glycol regeneration system to heat the glycol solution and (b) well fluid heaters to heat the well fluid. The outlet hot process oil from the heaters and re-boilers is collected back in the header, which is connected to hot process oil expansion tank. The cold hot process oil from this expansion tank is in continuous recirculation. The flow diagram is shown below:

Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :								
ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	Q_{oil} (Flowrate of heating oil)	Plant Data	Tonne/hr	M	Continuous	100%	Electronic/Paper	Monitored continuously and recorded daily Retention Period: Crediting period + 2 years Instrument used: online flowmeter
2	$T_{oil,in}$ (Inlet temp. of heating Oil)	Plant Data	^0C	M	Continuous	100%	Electronic/Paper	Monitored continuously and recorded daily Retention Period: Crediting period + 2 years Instrument used: Online temperature sensor based on thermocouple.
3	$T_{oil,out}$ (Outlet temp. of heating Oil)	Plant Data	^0C	M	Continuous	100%	Electronic/Paper	Monitored continuously and recorded daily Retention Period: Crediting period + 2 years Instrument used: Online temperature sensor based on thermocouple
4	H (Running Hours per day)	Plant Data	Hours	M	Continuous	100%	Electronic/Paper	Monitored continuously and recorded daily Retention Period: Crediting period + 2 years
5	D (working days per year)	Plant Data	Days	M	Continuous	100%	Electronic/Paper	Monitored continuously and recorded daily Retention Period: Crediting period + 2 years


PGC
Exhaust
Out
Hot Oil
Waste
heat
recovery
unit
Hot Oil
Glycol
Reboiler
Well
Fluid
PGC
Exhaust
In
Cold
Hot oil
Oil Pump
Expansio
n Tank

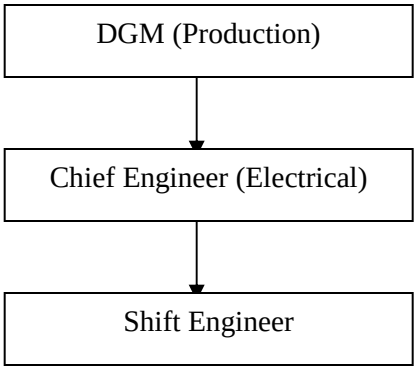
Measures to ensure the Results / uncertainty analysis

Sl No	Parameters used to determine Baseline	Unit	Remark
1	Q_{oil} (Flow rate of heating oil)	Tonne/hr	Monitored continuously and recorded daily
2	T_{oil}, in (inlet temp. of heating Oil)	^{0}c	Monitored continuously and recorded daily
3	$T_{oil,out}$ (Outlet temp. of heating Oil)	^{0}c	Monitored continuously and recorded daily
4	H (Running Hours per day)	Hours	Monitored continuously and recorded daily
5	D (working days per year)	Days	Monitored continuously and recorded daily

Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	*Low*	*ISO 9001 or similar management system will be used to retrieve data*
2	*Low*	*ISO 9001 or similar management system will be used to retrieve data*
3	*Low*	*ISO 9001 or similar management system will be used to retrieve data*
4	*Low*	*ISO 9001 or similar management system will be used to retrieve data*
5	*Low*	*ISO 9001 or similar management system will be used to retrieve data*

Roles & Responsibilities

The operational and management structure that is monitoring the project activity is shown below:



Roles and Responsibilities:

1. DGM (Production):

· Has the overall responsibility of monitoring measurements and reporting.

· Internal audit and performance conformance review

· Reviewing of records and dealing with monitored data

2. Chief Engineer (Electrical):

· To assist DGM in record handling, record checks, and review

· To assist DGM in internal audits

· Check the data recorded by shift engineer

3. Shift Engineer:

· Collect and record appropriate data mentioned in the monitoring table as per the monitoring frequency.

Annex I

Train A (5th Feb 2007 – 31st December 2007)

	Net energy recovered MJ/day Train A (5th Feb 2007 - 31st Dec 2007)
Februray	2399401.143
March	3440944.939
April	3115116.816
May	3497048.672
June	3823752.991
July	4344328.834
August	4105156.631
September	3568909.52
October	3272664.761
November	3294449.682
December	4334694.566
Total	39196468.55
Ey (Energy recovered by WHRU ia a year Y) TJ	39.1964
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	2199

Train B (5th Feb 2007 – 31st December 2007)

	Net energy recovered MJ/day Train B (5th Feb 2007 - 31st Dec 2007)
Februray	2460970.13
March	3076454.005
April	3173362.299
May	547760.5994
June	4262653.887
July	4631278.605
August	4775366.265
September	4312123.055
October	3309796.647
November	3604022.005
December	5776356.757
Total	39930144.3
Ey (Energy recovered by WHRU ia a year Y) TJ	39.9301
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	2240

Year 2008 Train A (1st January – 31st December 2008)

	Net energy recovered MJ/day Train A (1st Jan 2008 - 31st Dec 2008)
January	4551096.03
Februray	3732862.27
March	3684748.12
April	3214228.79
May	5483800.98
June	5085594.83
July	3806894.98
August	2843931.68
September	3780910.39
October	3701777.50
November	2626041.87
December	3099435.28
Total	45611322.72
Ey (Energy recovered by WHRU ia a year Y) TJ	45.6113
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	2259

Year 2008 Train B (1st January – 31st December 2008)

	Net energy recovered MJ/day Train B (1st Jan 2008 - 31st Dec 2008)
January	5525785.76
Februray	4530001.91
March	3400309.48
April	3541348.66
May	5318474.35
June	916441.80
July	4293186.27
August	3140455.32
September	4463890.20
October	4862786.17
November	2878859.50
December	3019518.81
Total	45891058.23
Ey (Energy recovered by WHRU ia a year Y) TJ	45.8910
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	2574

Year 2009 Train A (1st January – 31st March 2009)

	Net energy recovered MJ/day Train A (1st Jan 2009 - 31st Mar 2009)
January	2974142.10
Februray	3186020.31
March	2468738.74
Total	8628901.15
Ey (Energy recovered by WHRU ia a year Y) TJ	8.6289
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	484

Year 2009 Train B (1st January – 31st March 2009)

	Net energy recovered MJ/day Train B (1st Jan 2009 - 31st Mar 2009)
January	2285436.68
Februray	3173667.22
March	3186940.466
Total	8646044.366
Ey (Energy recovered by WHRU ia a year Y) TJ	8.6460
Emisson factor of Natural gas(tCO2e/TJ)	56.1
Baseline emissions for energy saved tCO2e	485

Emission Reductions

	Emission Reductions (tCO_2)	
	Train A	**Train B**
(5th February to 31st December) 2007	2199	2240
(1st January to 31st December) 2008	2559	2574
(1st January to 31st March) 2009	484	485
Total	**10541**	

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