BIOMASS BASED COGENERATION PROJECT AT NECTAR LIFE SCIENCES LTD.

M/s Nectar Lifesciences Limited

Project Title	Biomass Based Cogeneration Project at Nectar Life Sciences Ltd.
Version	05
Report ID	4th Monitoring period
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Project ID	251
Monitoring Period	01-01-2012 to 31-12-2012
Prepared By	M/s Nectar Lifesciences Limited
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Nectar Lifesciences Ltd (NecLife) is a 200 million US$ integrated pharmaceutical organization, offering comprehensive range of Cephalosporin Active Pharmaceutical Ingredients and Finished Dosage Forms. NecLife is engaged in the development and manufacture of quality intermediates, bulk actives and are one of the largest manufacturers of cephalosporin range of products and delivering innovative and affordable products to domestic as well as international markets. NecLife has tactically positioned itself in the global pharmaceutical industry. It has developed sustainable production systems to manufacture highest quality pharmaceutical products meeting diverse requirements of its customer base in over 45 countries worldwide.

The project activity at Neclife involved installation of a new biomass based cogeneration system at the pharmaceutical unit of Nectar Lifesciences Limited (NecLife). The cogeneration system included a Triveni make 6 MW single extraction cum condensing turbine generator and a Thermax make 40 TPH capacity AFBC boiler with a pressure rating of 67 kg/cm2 and temperature 490°C. The extraction from the turbine is 20 TPH at 6 Kg/cm^2 and 256°C. After extraction from the turbine the steam is fed into the processes via Desuperheating System (DSH) where water from deareater is added into the steam which increases the quantity of steam up to 24 TPH and decreases the temperature of steam as per the process requirements.

The aim of the project activity was the installation of a biomass fired cogeneration plant to meet the demand of power in Units (1 & 2) and process steam for the manufacturing process of Unit 2 complex of the pharmaceutical plant. The project activity was proposed considering the thermal and electrical energy required for the proposed menthol plant, menthol crystal plant, menthol distillation plant, sterile plant and the expansion of solvent recovery plant. The project activity is catering to existing electricity requirement of unit 1 complex and steam and electricity requirement of unit 2 complex.

The project has been commissioned on 27/05/2007 and has been under operation since then except for regular shuts considering O&M requirements.

The total GHG emissions considering the current monitoring period, i.e. 01/01/2012 to 31/12/2012 is **57,003** tCO_2.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 1. Energy Industries (Renewable/Non-Renewable Sources)
Type: I – Renewable Energy Projects

Category: C Thermal Energy production with or without electricity.

Further, the project does not belong to AFOLOU category and is not a grouped project activity.

1.3 Project Proponent

Organization name	Nectar Lifesciences Ltd.
Contact person	Mr. H.P. Singh
Title	Senior Vice President
Address	Village: Saidpur, Mohali District, Punjab
Telephone	+91-1762-308000/01
Email	hpsingh@neclife.com

Project proponent is fully responsible for the development of the project and will credit all VCUs.

1.4 Other Entities Involved in the Project

No other entities are involved in the project..

1.5 Project Start Date

Start date of the project is 27-May-2007.

1.6 Project Crediting Period

Start Date of Crediting Period: 27th May 2007
End Date of Crediting Period: 26th May 2017

The crediting period is for a period of 10 years which can be renewed at the maximum for two times.

1.7 Project Location

Nectar Lifesciences Ltd.
Village: Saidpura
Tehsil: Derabassi
District: Mohali

The Project activity is located near NH-21 (Ambala- Mandi Highway) in Eastern Punjab. The major town near the project activity is Chandigarh which is only 25 km away from the site.

The following table gives an idea about geographical location of project activity.

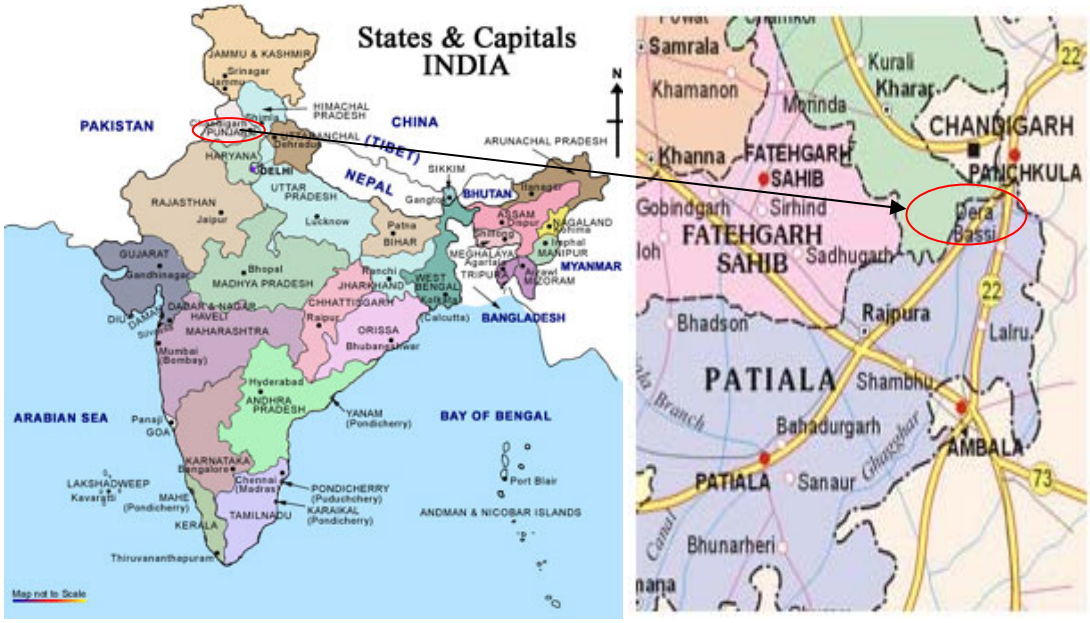
Longitude and Latitude (Unit I)

Longitude	76°52'41" (East)
Latitude	30°35'07" (North)

Longitude and Latitude (Unit II)

Longitude	76°52'51" (East)
Latitude	30°35'10" (North)

The following figure shows the location of the project activity:



Map showing the project site

The following are the ways of accessing to the project site:

Road : National Highway 21 (Ambala- Mandi Highway)

Rail : Chandigarh Railway Station

Airport : Chandigarh Airport

1.8 Title and Reference of Methodology

Title: Thermal energy production with or without electricity.
Reference: AMS-IC, Version 15

http://cdm.unfccc.int/methodologies/DB/6EL4AG49US2S1DNH55Y4S7GDQFA2JF

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits: The project is not a part of any emission trading program.
- Other Forms of Environmental Credit: The project proponent hereby confirms that the project has not sought or received any other GHG related environmental credit.
- Participation under Other GHG Programs: The project is not registered under any other GHG program.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

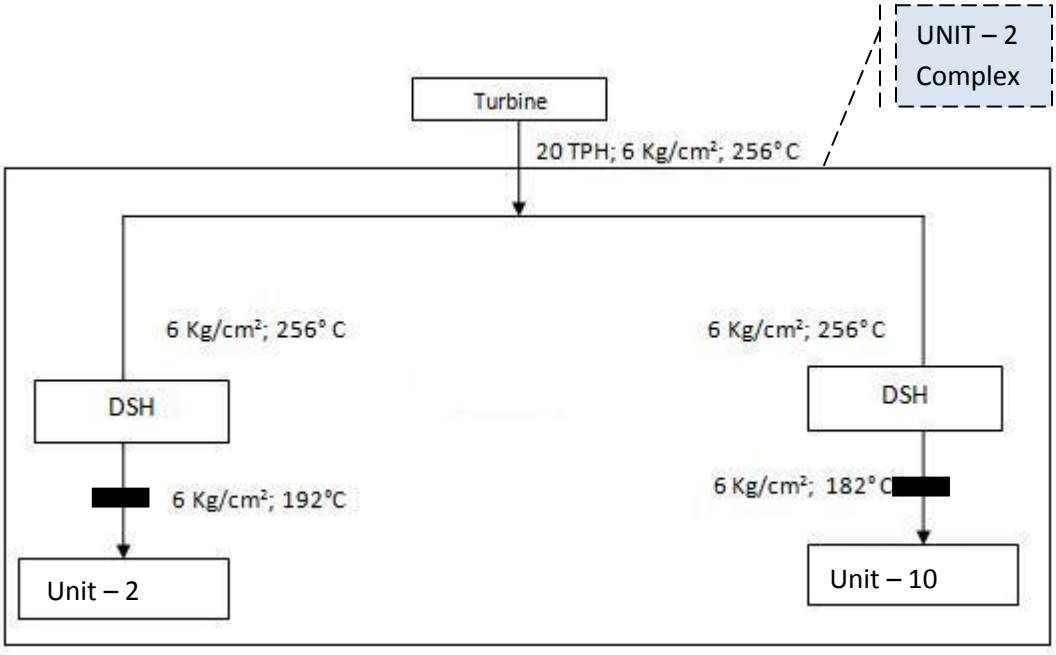
The project activity is in operation since 27/05/2007. The project is operating in successful manner. There are no separate events impacting the GHG emissions. Further there are no changes to the project proponent of the project activity.

As project activity is cogeneration activity it includes both steam generation and electricity generation.

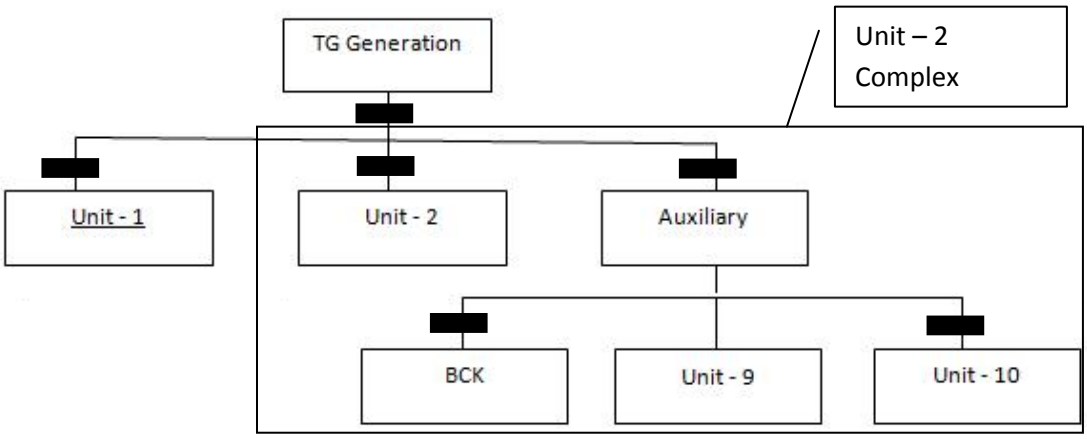
Steam

Final steam is supplied to Unit – 2 (SRP Plant, API Plant) and Unit – 10 (Menthol Distillation). Steam is extracted from the turbine and supplied to Unit – 2 and Unit – 10 passing through Desuperheating Systems (DSH). DSH reduces the temperature of superheated steam by injecting water into high velocity steam.

DSH reduces the temperature and increases the quantity of the steam therefore extracted steam goes higher up to 24 TPH for process heat. There are two DSH, one is between turbine and Unit- 2 and another is between turbine and Unit – 10. The pressure of the steam supplied to Unit- 2 and Unit – 10 is same, however temperature is slightly different. Following flow diagram of the extracted steam makes it clearer:



The metering system for electricity is explained by following flowchart:



As shown in the flowchart, unit – 1 feeder[1] , unit – 2 feeder and auxiliary feeder are connected to total generation feeder and further BCK feeder and unit -10 feeder are connected to auxiliary feeder . The electricity from auxiliary feeder is being dispatched to BCK unit, unit 10 and for meeting the net auxiliary requirement of co-generation plant. Net auxiliary consumption of co-generation plant can be calculated by subtracting the electric units consumed by BCK unit and unit 10 from the units of auxiliary meter. Further the shut down details for the project has been mentioned below;

Shut-down details are described in the below table:

MONTH	Hrs
JANUARY	68
FEBRAURY	50
MARCH	81
APRIL	51
MAY	41
JUNE	34
JULY	115
AUGUST	162
SEPTEMBER	159
OCTOBER	202
NOVEMBER	65
DECEMBER	2
Total Shut Down Hours	**1030**
Total Shut Down Days	**43**
Total Working Days	**323**

[1] All the feeders are getting metered.

2.2 Deviations

2.2.1 Methodology Deviations

There are no deviations from the monitoring plan. The registered monitoring plan is in compliance to the methodology applied in the project description.

2.2.2 Project Description Deviations

There are no deviations in the project description.

2.3 Grouped Project

The project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	η
Data unit	No Unit
Description	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity
Source of data	Being conservative taken 100% from the methodology.
Value applied:	100%
Justification of choice of data or description of measurement methods and procedures applied	The maximum value of 100% has been considered as an conservative estimate.
Purpose of the data	This data was used for the calculation of baseline emissions.
Comments	NA

Data / Parameter	EF_{coal}
Data unit	tCO_2e/TJ
Description	Emission Factor of Coal
Source of data	IPCC default values as per Table 1.4 Chapter 1, Volume 2 Energy of IPCC 2006 Publication (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf)
Value applied:	96.1
Justification of choice of data or description of measurement methods and procedures applied	Default value as published by IPCC has been applied
Purpose of the data	This data was used for the calculation of baseline emissions
Comments	NA

Data / Parameter	EF_D
Data unit	tCO_2/TJ
Description	Emission Factor of Diesel
Source of data	IPCC default value as per Table 1.4 Chapter 1, Volume 2 Energy of IPCC 2006 Publication (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf)
Value applied:	74.1
Justification of choice of data or description of measurement methods and procedures applied	Default value as published by IPCC has been applied
Purpose of the data	This data was used for the calculation of Project emission and Leakage emission.
Comments	NA

Data / Parameter	NCV_{Diesel}
Data unit	TJ/Tonne
Description	Net Calorific Value of Diesel
Source of data	IPCC default value as per Table 1.4 Chapter 1, Volume 2 Energy of IPCC 2006 Publication (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf)
Value applied:	0.043
Justification of choice of data or description of measurement methods and procedures applied	Default value as published by IPCC has been applied
Purpose of the data	This data was used for the calculation of Project emission and Leakage emission
Comments	NA

Data / Parameter	TL
Data unit	Tonnes
Description	Load of biomass on each truck
Source of data	It was estimated as the capacity of truck which carries biomass
Value applied:	8
Justification of choice of data or description of measurement methods and procedures applied	Based on industry estimates
Purpose of the data	This data was used for the calculation of Leakage emission
Comments	NA

Data / Parameter	M
Data unit	KM/Lit
Description	Average mileage of each truck
Source of data	A normalized and conservative fixed value was used
Value applied:	4
Justification of choice of data or description of measurement methods and procedures applied	Based on Industry estimates
Purpose of the data	This data was used for the calculation of Leakage emission
Comments	NA

Data / Parameter	D
Data unit	KG/Lit
Description	Density of Diesel
Source of data	A normalized and conservative fixed value was used.
Value applied:	0.87
Justification of choice of data or description of measurement methods	Industry Estimate

and procedures applied	
Purpose of the data	This data was used for the calculation of Leakage emission
Comments	NA

3.2 Data and Parameters Monitored

Data / Parameter	EG_y
Data unit	kWh
Description	Gross electricity generated from co-generation plant.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data is monitored by main energy meter.
Frequency of monitoring/recording	Daily, Monthly compilation
Value monitored:	38,475,700
Monitoring equipment	Sr. No.: 06744912 Make: L&T Accuracy: +/- 0.5% Data type: Measured Recording Frequency: Daily Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration on 21-03-2011, 20-03-2012 Latest calibration date: 19/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	NA

Data / Parameter	$EC_{Net\ Aux}$
Data unit	kWh
Description	Net electricity consumed by the co-generation plant.
Source of data	Calculated on actual basis as per the method described in "description of measurement method and procedures to be applied"
Description of measurement methods and procedures to be applied	Value has been calculated on actual basis with the help of the various energy meters installed at the co-generation plant as per the calculation method mentioned in the below row.
Frequency of monitoring/recording	Daily
Value monitored:	8,187,800
Monitoring equipment	Data type: Calculated Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Related energy meters calibrated annually
QA/QC procedures to be applied	The related energy meter has been calibrated annually by the accredited NABL approved independent third party.
Purpose of the data	Calculation of baseline emissions
Calculation method	The value has been calculated as following formula: $EC_{Net\ Aux} = EC_{Aux.} – (EC_{BCK} + EC_{Unit\ 10})$
Comments	NA

Data / Parameter	EC_{Aux}
Data unit	kWh
Description	It is the electricity consumed by BCK unit, Unit-10, and net auxiliary for the power plant.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data was monitored by auxiliary energy meter.
Frequency of monitoring/recording	Daily

Value monitored:	13,014,100
Monitoring equipment	Sr. No.: UPB09919 Make: Secure Accuracy: +/- 0.5% Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 20-03-2012 Latest calibration date: 19/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from auxiliary energy meter
Comments	NA

Data / Parameter	EC_{BCK}
Data unit	kWh
Description	Electricity consumed at BCK unit.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data was monitored by BCK energy meter.
Frequency of monitoring/recording	Daily
Value monitored:	140,220
Monitoring equipment	Sr. No.: 07882301 Make: L&T Accuracy: +/- 1% Data type: Measured

	Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 19/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from BCK energy meter.
Comments	NA

Data / Parameter	$EC_{Unit-10}$
Data unit	KWh
Description	Electricity consumed at Unit-10.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data was monitored by Unit-10 energy meter.
Frequency of monitoring/recording	Daily
Value monitored:	4,686,080
Monitoring equipment	Sr. No.: 07884932 Make: L&T Accuracy: +/- 1% Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 19/03/2013

Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from Unit-10 energy meter.
Comments	NA

Data / Parameter	EG_{Net}
Data unit	kWh
Description	Net electricity generated from cogeneration plant.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data was calculated by difference of gross electricity generation and net auxiliary electricity consumption.
Frequency of monitoring/recording	Daily
Value monitored:	30,287,900
Monitoring equipment	Data type: Calculated Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The meter for measuring EG_y and $EG_{Net\ Aux}$ is calibrated annually by the accredited NABL approved independent third party. The consistency of metered net electricity generation should be crosschecked with factory receipts / records
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was calculated as following method: $EG_{Net} = EG_y – EC_{Net\ Aux}$
Comments	NA

Data / Parameter	Q_{Unit-2}
Data unit	Tonnes
Description	Quantity of Steam which was supplied to unit-2.
Source of data	Plant log book and electronic database.
Description of measurement	Data was measured by steam flow meter.

methods and procedures to be applied	
Frequency of monitoring/recording	Daily
Value monitored:	180,756
Monitoring equipment	Sr. No.: 91G216756 Make: Yokogawa Data type: Measured Accuracy: 0.3% Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 18/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from Unit-2 steam flow meter.
Comments	NA

Data / Parameter	$Q_{Unit-10}$
Data unit	Tonnes
Description	Quantity of Steam which was supplied to unit-10.
Source of data	Plant log book and electronic database.
Description of measurement methods and procedures to be applied	Data was measured by steam flow meter.
Frequency of monitoring/recording	Daily
Value monitored:	32,230
Monitoring equipment	Sr. No.: 0700043 Make: ABB

	Accuracy: 0.26% Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 18/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from Unit-10 steam flow meter.
Comments	NA

Data / Parameter	T_{Unit-2}
Data unit	°C
Description	Plant of the Steam which was supplied to unit-2.
Source of data	Electricity log book and electronic database.
Description of measurement methods and procedures to be applied	Data was measured by steam temperature sensor.
Frequency of monitoring/recording	Hourly
Value monitored:	213
Monitoring equipment	Sr. No.: DSR 3219 Make: Actusays Accuracy: 0.1°C Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually

QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 18/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from Unit-2 steam temperature sensor.
Comments	NA

Data / Parameter	$T_{Unit-10}$
Data unit	°C
Description	Temperature of the Steam which was supplied to unit-10.
Source of data	Plant log book and electronic database.
Description of measurement methods and procedures to be applied	Data was measured by steam temperature sensor.
Frequency of monitoring/recording	Hourly
Value monitored:	164
Monitoring equipment	Sr. No.: TE 1100 Make; Actuasys Accuracy: 0.1°C Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 18/03/2013
Purpose of the data	Calculation of baseline emissions
Calculation method	The data was directly recorded from Unit-10 steam temperature sensor.

Comments	NA

Data / Parameter	P
Data unit	KG/cm^2
Description	Pressure of Steam which was supplied to unit-2 and unit-10.
Source of data	Plant log book and electronic database.
Description of measurement methods and procedures to be applied	Data was measured by pressure transmitter.
Frequency of monitoring/recording	Daily
Value monitored:	5.80
Monitoring equipment	Sr. No.: 91F935651 Make: Yokogawa Accuracy: 0.26% Data type: Measured Archiving policy: Paper & Electronic Responsibility: Manager (Power Plant) Calibration: Calibrated annually
QA/QC procedures to be applied	The meter is calibrated annually by the accredited NABL approved independent third party. Previous Calibration: 21-03-2011, 20-03-2012 Latest calibration date: 18/03/2013
Purpose of the data	Calculation of Project emissions
Calculation method	The data was directly recorded pressure transmitter.
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Rice Husk used.

Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of rice husk used in the boiler was calculated by estimation based on the number of times the hopper is filled in a day which is known as Bunker loading method.
Frequency of monitoring/recording	Daily
Value monitored:	82947.69
Monitoring equipment	Data type: Estimated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	Calculation description is mentioned above
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Paddy straw used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Paddy straw used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions

Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Mustard husk used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Mustard husk used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Barely used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Barely used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0

Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Sugarcane trash used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Sugarcane trash used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y

Data unit	Tonnes
Description	Quantity of Cotton sticks desi used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Cotton stick desi used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Bajra stalk used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Bajra stalk used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from

	factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Sunflower stalk used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Sunflower stalk used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Moong straw used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Moong straw used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.

Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Arhar Stick used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Arhar Stick used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Arhar husk used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Arhar husk used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	- -
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Saw chips used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Saw chips used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)

QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Saw dust used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Saw dust used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily
Value monitored:	4001.04
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_y
Data unit	Tonnes
Description	Quantity of Bushes (sarkanda) used.
Source of data	Electronic database.
Description of measurement methods and procedures to be applied	Quantity of Bushes (sarkanda) used in the boiler was calculated by spring balance system which is in place for all the 3 conveyer belts.
Frequency of monitoring/recording	Daily

Value monitored:	0
Monitoring equipment	Data type: Calculated Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values shown here can be cross checked from factory records.
Purpose of the data	Calculation of leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	$GCV_{Rice\ Husk}$
Data unit	Kcal/Kg
Description	Gross calorific value of the fuel (Biomass)
Source of data	It was taken from Plant log book.
Description of measurement methods and procedures to be applied	GCV of the fuels has been calculated using a Bomb Calorimeter and IR instrument present in the Lab at the project site.
Frequency of monitoring/recording	Daily
Value monitored:	3,150
Monitoring equipment	Sr. No.: T/A5 Make; TOSHNIWAL Data type: Measured Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The Bomb Calorimeter is calibrated annually by the accredited NABL approved independent third party. Calibrated on: 31/12/2011, 30/12/2012
Purpose of the data	The value of GCV is calculated from Bomb calorimeter and maintained at plant. It is used for calculation of baseline emissions
Calculation method	-

Comments	NA

Data / Parameter	$GCV_{Saw\ Dust}$
Data unit	Kcal/Kg
Description	Gross calorific value of the fuel (Biomass).
Source of data	It was taken from Nectar Lifesciences Limited factory records.
Description of measurement methods and procedures to be applied	GCV of the fuels has been calculated by Bomb Calorimeter and IR instrument present in the Lab at the project site.
Frequency of monitoring/recording	Daily
Value monitored:	3388
Monitoring equipment	Sr. No.: T/A5 Make; TOSHNIWAL Data type: Measured Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The Bomb Calorimeter is calibrated annually by the accredited NABL approved independent third party. Calibrated on: 31/12/2011, 30/12/2012
Purpose of the data	The value of GCV is calculated from Bomb calorimeter and maintained at plant. It is used for calculation of baseline emissions
Calculation method	-
Comments	NA

Data / Parameter	$MOISTURE_{Rice\ Husk}$
Data unit	%
Description	It represents the moisture content in the rice husk which resultant to decrease in calorific value.
Source of data	It has taken from Nectar Lifesciences Limited factory records.

Description of measurement methods and procedures to be applied	Moisture of the fuel has been calculated using Dry Oven. A fixed quantity of fuel is weighted and then it is dried in the oven to remove the moisture. Dried fuel is weighted again and difference between the weight represents the moisture in the fuel. Moisture % =($Weight_{Before\ Drying}$ - $Weight_{After\ Drying}$)/ $Weight_{Before\ Drying}$
Frequency of monitoring/recording	Daily
Value monitored:	7
Monitoring equipment	Data type: Measured Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values can be cross checked from the plant records.
Purpose of the data	For calculation of baseline emissions
Calculation method	-
Comments	NA

Data / Parameter	$MOISTURE_{Saw\ Dust}$
Data unit	%
Description	It represents the moisture content in the saw dust which resultant to decrease in calorific value.
Source of data	It has taken from Nectar Lifesciences Limited factory records.
Description of measurement methods and procedures to be applied	Moisture of the fuel has been calculated using Dry Oven. A fixed quantity of fuel is weighted and then it is dried in the oven to remove the moisture. Dried fuel is weighted again and difference between the weight represents the moisture in the fuel. Moisture % =($Weight_{Before\ Drying}$ - $Weight_{After\ Drying}$)/ $Weight_{Before\ Drying}$
Frequency of monitoring/recording	Daily
Value monitored:	13
Monitoring equipment	Data type: Measured Archiving policy: Electronic

	Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	The values can be cross checked from the plant records.
Purpose of the data	For calculation of baseline emissions
Calculation method	-
Comments	NA

Data / Parameter	D_T
Data unit	KM
Description	Distance travelled by each truck carrying biomass.
Source of data	Nectar Lifesciences Limited factory log book in which records of the suppliers detail and declaration from the supplier stating the distance between initial point and dumping station are being maintained.
Description of measurement methods and procedures to be applied	The maximum round trip distance is 120 km. Being conservative fixed value of 150 km is used.
Frequency of monitoring/recording	Fixed conservative value is used.
Value monitored:	150
Monitoring equipment	Fixed conservative value is used.
QA/QC procedures to be applied	Declaration from all the husk providers is being submitted for this purpose.
Purpose of the data	Fixed value is used. Calculations of Leakage emissions
Calculation method	-
Comments	NA

Data / Parameter	Q_D
Data unit	Lit / Annum
Description	Quantity of diesel consumed in tractors used for levelizing the piles/heaps of biomass.
Source of data	This value has been referred from the diesel purchase log book at Nectar Life sciences Limited factory
Description of measurement methods and procedures to be applied	The value has been taken from the data recorded at the project site.
Frequency of monitoring/recording	Monthly

Value monitored:	36937.5
Monitoring equipment	Data type: Measured Frequency: Monthly Archiving policy: Electronic Responsibility: Manager (Power Plant)
QA/QC procedures to be applied	
Purpose of the data	This value has been referred from the diesel purchase log book at Nectar Lifesciences Limited factory
Calculation method	-
Comments	NA

3.3 Monitoring Plan

Monitoring Plan

Nectar Lifesciences Ltd. is responsible for implementation of the monitoring plan.

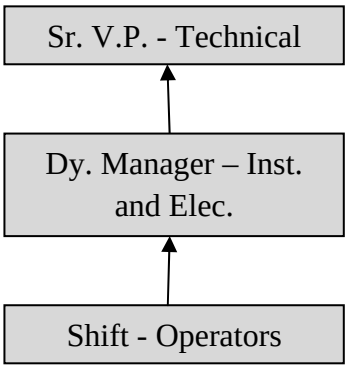
There are total 6 separate energy meters to measure the power produced and consumed at various units in the project activity. The electrical energy monitoring is required as the calculation of emission reduction is based on the electricity displaced from grid. The net auxiliary energy consumed by power plant is calculated as described in section 3.2.

The steam input is also required to be monitored, in order to calculate the emission reductions due to thermal energy displacement. The flow rate, pressure and temperature of steam supplied to processes of Unit – 2 and Unit – 10 are also monitored by steam flow meter, pressure gauge, totalizer, temperature gauge and RTD sensors. All instruments are calibrated annually to ensure the accuracy of the measurement.

All monitoring parameters according to the monitoring plan are being recorded as specified in section 3.2 above. Since the shift wise data logging is being carried out along with daily reporting, the uncertainty level of the monitored data used for calculating emission reduction is low.

- **Organizational Structure, responsibilities and competencies**

  Nectar Lifesciences Ltd. would ensure accuracy of the measurement system by adopting the following operational and management structure.



Sr. V.P. – Technical: is responsible for overall VCS project activity.

Dy. Manager – Inst. and Elec.: is responsible for maintenance all records pertaining to net electricity generation and net steam used for the process, calibration of meters and monitoring. Dy. Manager is qualified technical person with more than 5 years of experience in relevant field

Shift - Operators: are responsible for the eight hourly data recording of the relevant parameters mentioned in the monitoring plan.

- **Methods for generating, recording, storing, aggregating, collating and reporting data on monitored parameters.**

  Data generation for the monitored parameters is on actual readings shown by the various meters. The meters are calibrated annually with NABL accredited lab so that the accuracy of data can be assured.

  Recording of data is done on hourly basis for the steam flow and temperature and pressure in the log books and electricity is measured every eight hourly.

  Data is stored in plant log books.

  Aggregation and collation of data is done by engineers at the power plant on the daily basis in the excel sheet. Aggregation and collation of data is done in the excel sheet from the plant log books.

- **Procedure for handling internal auditing and non-conformities**

  In order to ensure the accurate reporting of the monitored parameters and to avoid any kind of disparity in the reported data, the following quality assurance measures have been adopted.

  Shift operator is assigned with the responsibility recording of parameters as per the monitoring plan. The shift engineer records / checks the observations in the plant log books on a daily basis and forwards the same in the soft form and hard form to the Dy. Manager. The Dy. Manager review the data received and compiles and generates a daily report and sends it to the Sr. V.P. (Technical) for his perusal.

  Emergency Preparedness Plan

  In order to avoid any kind of discrepancies in the monitoring procedures the following emergency preparedness plan has been adopted at the plant.

  - The spare meter duly calibrated is available at the plant for replacement in case of failure of any of the installed meters.
  - In orders to monitor the parameters with the acceptable accuracy, all the meters are calibrated annually.

  The above mentioned emergency preparedness plan has been in place at the plant site since beginning of the monitoring period.

  No failure of any meter was reported during the current monitoring period.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The actual annual emission reductions are calculated considering 6 MW of electricity and 20 TPH of steam extraction.
For electricity and thermal energy (steam/heat) produced in a cogeneration unit, using fossil fuel, the following equation shall be used:

$$BE_{cogen,CO2,y} = [(EG_{PJ,thermal,y} + EG_{PJ,electrical,y} *3.6)/ \eta_{BL,cogen}] *EF_{FF,CO2}$$

Where:

$BE_{cogen,CO2,y}$	The baseline emissions from electricity and steam displaced by the project activity during the year y; tCO_2
$EG_{PJ,thermal,y}$	The net quantity of thermal energy supplied by the project activity during the year y; TJ
$EG_{PJ,electrical,y}$	The amount of electricity supplied by the project activity during the year y; GWh
3.6	Conversion factor; TJ/GWh
$\eta_{BL,cogen}$	The total efficiency (including both thermal and electrical) of the cogeneration plant using fossil fuel that would have been used in the absence of the project activity. Efficiency should be calculated as the total energy produced (electricity and steam/heat extracted) divided by thermal energy of the fuel used.
$EF_{FF,CO2}$	The CO_2 emission factor of the fossil fuel that would have been used in the baseline cogeneration plant; tCO_2 / TJ obtained from reliable local or national data if available, otherwise IPCC default emission factors are used

Summary of data related to electricity generation and steam generation (Unit – 2 & Unit – 10 separately) is provided in Section - 5 at the end of this report. All the supporting related to data has been provided for cross verification.

Calculation for the month of January 2012 is shown below:

$BE_{cogen,CO2} = [(EG_{PJ,thermal} + EG_{PJ,electrical} *3.6)/\eta_{BL,cogen}] *EF_{FF,CO2}$

$BE_{cogen,\ CO2} = [(44.20 + 2.94 * 3.6) /100\%] *96.1$

$= 5,265\ tCO_2e$

Being conservative, efficiency of the plant has been considered 100%.

Similarly the baseline emissions from the project activity have been calculated for subsequent months.

Month	$EG_{PJ,thermal}$	$EG_{PJ,electrical}$	Conversion Factor	$\eta_{BL,cogen}$	$EF_{Coal,CO2}$	$BE_{cogen,CO2,2012}$
	TJ	*GWh*	TJ/GWh	*100%*	t_{CO2} / *TJ*	t_{CO2}
	a	B	c	d	e	{(a+b*c)/d}*e
Jan-12	44.20	2.94	3.6	100%	96.1	5265
Feb-12	40.61	2.67	3.6	100%	96.1	4827
Mar-12	44.66	2.75	3.6	100%	96.1	5242
Apr-12	44.99	2.78	3.6	100%	96.1	5284
May-12	46.76	3.04	3.6	100%	96.1	5547
Jun-12	44.35	2.93	3.6	100%	96.1	5275
Jul-12	44.18	2.38	3.6	100%	96.1	5071
Aug-12	38.71	2.10	3.6	100%	96.1	4446
Sep-12	37.52	1.83	3.6	100%	96.1	4239
Oct-12	20.81	0.75	3.6	100%	96.1	2260
Nov-12	44.21	2.70	3.6	100%	96.1	5182
Dec-12	45.86	3.41	3.6	100%	96.1	5588
Total	**496.86**	**30.29**				**58226**

Baseline emissions for project activity calculated ex ante in registered PD dated 20th Oct. 2010 is 54,878 tCO_2, but for the year 2012 the baseline emissions increased to 58,226 tCO_2 which is 6.10% higher. However due to this increase, additionality of the project does not hamper. The higher emission reductions are achieved due to plant being able to achieve a higher PLF as compared to the PLF assumed in the PD.

4.2 Project Emissions

The project emission in the project activity is accounted from the quantity of diesel used in the tractors for levelizing the piles/heaps of biomass. Data for diesel consumption is taken from the plant records.
As described in section 4.3 of the PD, the algorithm used in the calculation of project emission is explained below and the complete calculation is being submitted to the DOE.

Algorithm for the calculation of Project Emission:

$P.E. = (Q_D * D / 1000) * NCV_{Diesel} * EF_D$

Where:

P.E.	Project emission from the project activity; tCO_2e
Q_D	Quantity of diesel consumed in tractors used for levelizing the piles/heaps of biomass; Liters
D	Density of diesel; Kg/Liter

NCV_{Diesel} Net Calorific Value of diesel; TJ/Tonnes

EF_D Emission factor of diesel; tCO_2e/TJ

Values of the above variables are taken from the monitoring plan.

For the month of January, project emissions from the project activity are calculated as:

P.E. = (2750 * 0.87/1000) * 0.04303 * 74.1

= 7.63 tCO_2e

The project emission on the account of tractor used for levelizing the piles of biomass for subsequent months is tabulated below:

Month	**Q_D**	**$Density_{Diesel}$**	**Conversion**	**NCV_{Diesel}**	**EF_{Diesel}**	**PE_{2012}**	**PE_{2012}**
	Litres	**Kg/Litre**	**Tonnes/Kg**	**TJ/Tonnes**	***t_{CO2} / TJ***	***t_{CO2}***	***t_{CO2}***
	a	**B**	**c**	**d**	***e***	***(a*b/c)*d*e***	***Roundup***
Jan-12	2750	0.87	1000	0.04303	74.1	7.63	8.00
Feb-12	2600	0.87	1000	0.04303	74.1	7.21	8.00
Mar-12	2777	0.87	1000	0.04303	74.1	7.70	8.00
Apr-12	2489	0.87	1000	0.04303	74.1	6.90	7.00
May-12	2754	0.87	1000	0.04303	74.1	7.64	8.00
Jun-12	2747	0.87	1000	0.04303	74.1	7.62	8.00
Jul-12	2668	0.87	1000	0.04303	74.1	7.40	8.00
Aug-12	2710	0.87	1000	0.04303	74.1	7.52	8.00
Sep-12	2691	0.87	1000	0.04303	74.1	7.46	8.00
Oct-12	1955	0.87	1000	0.04303	74.1	5.42	6.00
Nov-12	2750	0.87	1000	0.04303	74.1	7.63	8.00
Dec-12	2375	0.87	1000	0.04303	74.1	6.59	7.00
Total	**31266**					**86.73**	**92**

4.3 Leakage

The leakage for the project activity has been calculated on the account of biomass transported. For the month of January 2012, the leakage calculation has been shown as below:
Total biomass transported in the project boundary:

Fuel	Kg	Tons
Bajra Stalk	0	0
Arhar Husk	0	0
Musterd Husk	0	0
Barley	0	0
Sugarcane trash	0	0
Moong Straw	0	0
Arhar Stick	0	0

Saw Chips	0	0
Paddy Straw	0	0
Cotton Stick	0	0
Sarkanda	0	0
Sawdust	483599	483.599
Sunflower	0	0
Rice Husk	7396279	7396.279
Total	7879878	7879.878

Leakage Estimation			
Total Biomass Requirements	7879.878	Tonnes per month	a = Taken from Plant records
Truck capacity	8	Tonnes	b = Fixed Ex-Ante Values
Max. return distance between project site and collection centres	150	Km	c = Conservative Value Chosen
Total Number of trips	985		d = a/b
Consumption of diesel per trip (to and fro)(@4km/lit)	37.5	Lit	e = Fixed Ex Ante Value
Total Diesel consumption	36937.5	Lit	f = d*e
Density of diesel	0.87	kg/lit	g = Fixed Ex Ante Value
Mass of diesel used	32.135625	Tonnes	h = f*g/1000
Calorific value of diesel	0.04303	TJ/Tonnes	I = Fixed Ex Ante Value
Emission factor for diesel	74.1	tCO_2e/TJ	j = Fixed Ex Ante value
Emissions due to transportation of biomass	102.47	tCO_2e /month	k = h*i*j

Leakage emissions for the subsequent months (2012) have been tabulated below:

January	102.47	t CO_2 /month
February	92.17	t CO_2 /month
March	97.37	t CO_2 /month
April	98.82	t CO_2 /month
May	105.38	t CO_2 /month
June	97.58	t CO_2 /month
July	92.06	t CO_2 /month
August	80.41	t CO_2 /month
September	90.19	t CO_2 /month
October	77.19	t CO_2 /month
November	95.91	t CO_2 /month
December	101.63	t CO_2 /month
Total	**1131**	**t CO_2 /Annum**

4.4 Net GHG Emission Reductions and Removals

The net GHG emission reductions from the project activity are calculated as:

ERy = BEy − PEy – Ly

ERy = 5,265-8-102 = 5,155 tCO_2e

Above calculation shows the ER for the month of January 2012:

$ER_{Jan\text{-}2012}$ = 5,155

Emission Reductions for the subsequent months have been tabulated below:

Month - 2012	**BE_{2012}**	**PE_{2012}**	**L_{2012}**	**ER_{2012}**
	tCO_2e	**tCO_2e**	**tCO_2e**	**tCO_2e**
	a	**b**	**c**	**d= a-b-c**
January	5,265	8	102	5,155
February	4,827	8	92	4,727
March	5,242	8	97	5,136
April	5,284	7	99	5,178
May	5,547	8	105	5,433
June	5,275	8	98	5,170
July	5,071	8	92	4,971
August	4,446	8	80	4,358
September	4,239	8	90	4,141
October	2,260	6	77	2,177
November	5,182	8	96	5,078
December	5,588	7	102	5,479
Total	**58,226**	**92**	**1,131**	**57,003**

Total emission reductions during the period 01/01/2012 to 31/12/2012 are 57,003 **tCO_2e**.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2012	**58,226**	**92**	**1,131**	**57,003**
Total	**58,226**	**92**	**1,131**	**57,003**