Voluntary Carbon Standard
Project Description

18 November 2007

[Date of the VCS PD: 20.10.10]

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1 Description of Project:

1.1 Project title

Biomass Based Cogeneration Project at Nectar Life Sciences Ltd.
(Version-5)

1.2 Type/Category of the project

The project activity falls under the following types/categories of the Clean Development Mechanism under the Kyoto Protocol:

Project Type: Type I: Renewable Energy Projects
Sub Category C: Thermal energy for the user.
The methodology used for the project is AMS I C (Thermal Energy Production with or without electricity), Version – 15 in effect from 31 July 2009

As the project activity is the installation of biomass based cogeneration power plant hence it is an individual project activity and is not a grouped project activity.

1.3 Estimated amount of emission reductions over the crediting period including project size:

The project results in more than 5000 tonnes of CO_2 equivalent GHG emission reductions and less than 1,000,000 tonnes of CO_2 equivalent GHG emission reductions. Therefore, the project falls in the category of projects. Section 4.4 shows the estimated emission reductions from the project over the crediting period. The crediting period for the project is from May 2007 – April 2017.

Size of the project: The project activity under consideration is a biomass based cogeneration power plant having 40 TPH boiler with electric capacity equal to 6 MW. The said project activity is expected to reduce 54,003 tCO_2e emissions annually. The total installed capacity of the boiler in the project activity is 32.79 $MW_{Thermal}$ and the capacity for the individual component i.e. for heat and electricity is 13.11 $MW_{Thermal}$ and 18 $MW_{Thermal}$ which in total equal to 31.11 $MW_{Thermal}$.

1.4 A brief description 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 involves installation of a new biomass based cogeneration system at the pharmaceutical unit of Nectar Lifesciences Limited (NecLife). The cogeneration system includes 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. However the extraction from the turbine is 20 TPH at 256°C and 6 Kgf/cm2 and after extraction of the steam from the turbine the steam being supplied to Unit - 2 and Unit - 10 via Desuperheating Station (DSH) due to which there is an increase in the quantity of the steam i.e. up to 24 TPH and decrease in temperature but for more for extraction like 25 TPH the electricity generation capacity would decrease accordingly. The aim of the project activity is the installation of a biomass fired cogeneration plant to meet the present and future demand of power in Units (1 & 2) and process steam for the manufacturing process of Unit 2 of the pharmaceutical plant. The project activity was proposed considering the Thermal and Electrical energy required for the proposed new Menthol Plant, Menthol Crystal Plant, Menthol Distillation Plant, sterile plant and the expansion of solvent recovery plant. The project activity caters to existing electricity requirement of unit one and steam and electricity requirement of unit two (existing and expansion).

Type of Biomass available for the project activity:

However the primary fuel for the project activity is Rice Husk but some other biomass fuel are also available for the project activity which would be used partially and each will be monitor separately. The other biomass are Paddy straw, Mustard Stick, Mustard Husk, Barley, Sugarcane trash, Cotton Stick Desi, Bajra Stalk, Sunflower Stalk, Moong Straw, Arha Stick, Arhar Husk, Rice Husk, Saw Chips, Saw dust and bushes (sarkanda)

Pre-Project Scenario

Prior to the commissioning of the project, the demand of process steam of Unit 1was being met by two Furnace Oil fired boilers of 2.8 TPH and 2 TPH capacity and that of power was being met from the grid and DG sets were used as back up.

In case of Unit 2, the demand of process steam was being met from two furnace oil fired boilers of 2.5

TPH and 5 TPH capacity and the demand for power was met using grid and DG sets were used as back up. Therefore, in the pre-project scenario the steam demand of 7 TPH was being met from the Furnace Oil fired boilers of 12.3 TPH aggregate capacity and power demand from the grid and DG sets.

Boiler	**Capacity**
PI-3384	2 TPH (Unit One)
PI-3728.	2.5 TPH (Unit Two)
PI-4265.	2.8 TPH (Unit One)
PI-4235.	5 TPH (Unit Two)

In unit one and two the details of DG sets for backup in the pre project scenario is as given below in the following table.

Unit 1	
DG sets	**Capacity**

HSD based	1000kvA
HSD based	500kvA
HSD based	380kvA
Unit 2	
HSD based	1250kvA
HSD based	1000kvA
HSD based	500kvA
HSD based	250kvA

Post-Project Scenario

After installation of the co-generation plant, the power demand of both the units and the enhanced process steam demand of unit 2 of 20 TPH are being met by the said co-generation plant. The process steam demand of Unit 1 could not be satisfied from the co-generation plant as the plant is 2.5 km away from Unit 1. Moreover, the permission of laying a steam pipe from the co-generation plant to Unit 1 was not granted by the neighboring industries. More DG sets were added as the backup for the expansion carried out.

Details of the standby DG sets at present is as given in the following table

DG set in Unit-I	
HSD Based	1000kvA
HSD Based	500kvA
HSD Based	380kvA
DG set of Unit-2	
HSD Based	1000kvA
HSD Based	1250kvA
HSD Based	500kvA
HSD Based	250kvA
HSD Based	1000kvA
HSD Based	1250kvA
HSD Based	1250kva

Purpose of Project Activity

The purpose of the project activity is to reduce the GHG emissions using renewable fuels and also increase efficiency due to cogeneration.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

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.

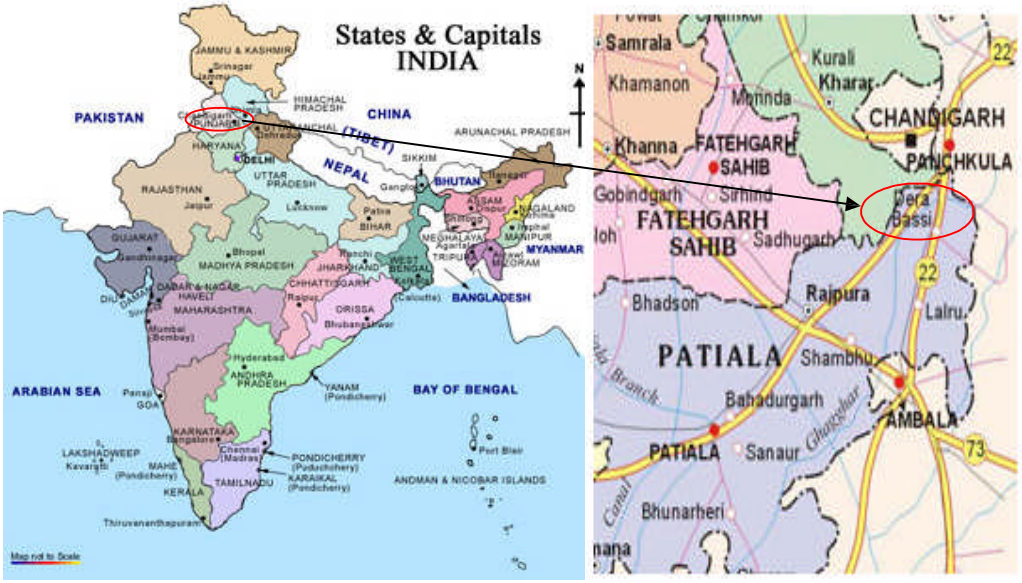
Table 1: Longitude and Latiude (Unit I)

Longitude	76°52'41" (east)
Latitude	30°35' 7" (north)

Table 1: Longitude and Latiude (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

1.6 Duration of the project activity/crediting period:

- Project start date:-Project Start date is the date on which project began reducing or removing GHG emissions i.e commissioning of the project 27th May 2007. The documentary proof for the same is commissioning certificate which is being submitted to DOE.
- Crediting period start date: Crediting period start date is defined as the date on which the first crediting period starts i.e. 27th May 2007 Commissioning of the project.
- VCS project crediting period: 10 Years fixed Crediting Period which may be renewed at most two times.
- The project life is taken as 20 years which is the life time of the boiler.

1.7 Conditions prior to project initiation:

As Explained in section 1.4 of the document, the project is biomass based Greenfield cogeneration system installed at the pharmaceutical unit of Nectar Lifesciences Limited (NecLife). In the absence of project activity Neclife was using –

1. Grid electricity and DG sets for its Power requirement.
2. Fossil fuel fired saturated steam boiler for Process Steam.

Table 2: Detail of Baseline Equipment

Boiler	**Capacity**
PI-3384	2 TPH
PI-3728.	2.5 TPH
PI-4265.	2.8 TPH
PI-4235.	5 TPH

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The project activity involves the utilisation of biomass residue for meeting the demands of the captive power generation and steam generation in the pharmaceutical unit. As the power and steam is generated from the burning of biomass residue, the project leads to emission reductions, as compared to what would have been happened by the utilisation of coal based cogeneration plant.

1.9 Project technologies, products, services and the expected level of activity:

The end product of the activity is heat generation (in form of steam) and electricity production. Biomass power conversion technologies for power production can be classified into one of the three following categories: direct combustion technologies, gasification technologies, and pyrolysis. Direct combustion technologies are probably the most widely known option for simultaneous power and heat generation from biomass. The technology applied to the project involves the oxidation of the biomass in excess air so as to yield hot gases that can be used to produce steam in boilers which in turn leads to the electricity generation. The extraction steam would be used to cater to the steam requirement of the plant and balance steam will generate power in condensing mode.

Technical Specifications of the Cogeneration unit

Boiler Specifications:

The installed boiler is 40 TPH outdoor, natural circulation, bi-drum, balanced draft and FBC type with bottom supported by RCC construction. The boiler is 100% ricehusk based boiler-(Overbed). The pressure parts of the boiler comprise with evaporation system (Steam drum, water drum, boiler bank, inbed tubes, water wall), necessary headers, downcomers and risers, economizer, super heater and inter stage attempter

(with fixed spray nozzle). Apart from these it consists of tabular air pre-heater with air pre-heater tubes and tube sheets, piping for feed water and main steam, valves and fittings, two number of FD fans (2*50%) and one ID fan (1*100%) with drive motor. Overbed fuel-feeding components consists of4 Nos. screw feeders with VFDs, Air distribution plate, fluid bed air nozzles and access doors for combuster, SH zone, Bank zone and Eco zone. The boiler is also equipped with field sensors and actuators for boiler control consisting of three elements drum level control, furnace draft control and bed temperature control (on-off). Operating parameters of the boiler are tabulated in following table.

Table 3a:

Steam Flow	40,000 kg/hr
Steam Pressure at superheater outlet	67 kg/cm^2 (g)
Steam Temperature at Suprerheater outlet	490 +/- 5 deg C

Turbine Specifications

Installed turbine is a steam turbine. It is multistage, nozzle governed, Horizontal spindle, extraction cum condensing impulse type turbine with two bearings. It consists of hydraulic opearated stop and emergency valve with integral steam striner for inlet. Turbine in trhe project activity is also equipped with various safety devices like over speed trip and alarm, low lube oil pressure trip and alarm, low control oil pressure trip and alarm, high thrust wear trip and alarm, high exhaust/condenser pressure trip and alarm, manual trip, remote emergency trip and DP across lube oil filters high alarm.

Other components of the turbine are gearbox, Couplings, governing system, condensing system and lubrication system. Operating parameters of turbine are tabulated in following table.

Table 3 b:

Rated Power	6000 kW
Rated Speed	8250 RPM
Type	Multistage, impulse, nozzle governed controlled extraction cum condensing turbine

Product and Services: As the given project activity is a Cogeneration power plant. As per steam and power demand evaluation report.

Table 3c: Standby Equipment presently available

Unit 1	
DG sets	**Capacity**
HSD based	1000kvA
HSD based	500kvA
HSD based	380kvA
Unit 2	
HSD based	1250kvA
HSD based	1250kvA
HSD based	1250kvA
HSD based	1000kvA

HSD based	1000kvA
HSD based	500kvA
HSD based	250kvA

1.10 Compliance with relevant local laws and regulations related to the project:

The project activity complies with all local laws and regulations applicable to the Co-generation plant and has got all the consents necessary to operate. These include:

- Consent to operate by Pollution Control Board granted on dated 02/08/2006.
- Boiler Inspection Certificate for year 2007-08, 2008-09 and 2009-10.
- Sanction of 6 MW biomass fired captive power plant by Punjab State Electricity Board on dated 5/06/07
- Electrical Inspection Certificate from Punjab State Electricity Board issued on dated 11/06/07

The proof of the same will be provided to the validator.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

Risks caused by Accidents: For some accidental occasions caused by disobeying the rules and regulations, such as fire resulted from smoking, malfunction of power supply and electrical equipment, turbines and generators may be suddenly shut down in emergency.

Risks due to unavailability of Biomass due to natural disaster and unforeseen circumstances:
The natural disasters like drought in the region may account for less production of crops in the district/state and hence the availability of the biomass may hamper which could result in less or no generation for that period. Also at that time price could escalate as there is no regulatory body in India to govern/control the prices of biomass. Apart from this, certain related policy issues also add to the barriers. The Punjab government is not favouring the excess cultivation of paddy crop due the higher demand for irrigation required this further could result in shortage of rice husk in nearby future and hence escalating its price.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The Co-generation project has been installed with the aim of producing electricity and steam in an efficient way. The electricity generated from the project activity meets the power demand of Nectar Lifesciences Limited. Hence, it contributes towards filling the gap between demand and supply in the Northern region as far as the power scenario is considered. Also, the steam produced is further used in manufacturing process in Nectar Lifesciences Limited.

Thus, it is evident that project proponent has initiated this project with an aim to produce Power and Steam, and not merely for creating GHG emissions primarily for the purpose of their subsequent removal.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The project has not created any other form of environmental credit.

1.14 Project rejected under other GHG programs (if applicable):

The proposed project activity has not been rejected by any other GHG programs as yet however the project activity was in CDM validation and has been withdrawn from validation.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

M/s Nectar life sciences Limited is the project developer and the owner of the credits. The project promoter is ensuring operation and maintenance of all the equipments for their efficient functioning. The entire data specific to the monitoring of the project shall be recorded as explained in the monitoring plan in section 3.4 of the PD. The data shall be made available to the DOE during the validation and verification process by the project proponent whereas the PD and MR preparation is done by M/s Gensol Consultants Private Limited.

Table 4.1: Contact information of project developer and Credit owner

Organization:	Nectar Lifesciences Ltd.
Village:	Saidpur
Tehsil:	Dera Bassi
District:	Mohali
State/Region:	Punjab
Postfix/ZIP:	
Country:	India
Telephone:	+91-1762-308000/01
FAX:	+91-1762-281187
E-Mail:	sales@neclife.com
URL:	www.neclife.com
Represented by:	
Title:	Sr. V.P
Salutation:	Mr.
Last Name:	Singh

Middle Name:	P
First Name:	H.
Department:	
Mobile:	+91-9447768858
Direct FAX:	
Direct tel:	
Personal E-Mail:	

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

In accordance with its corporate strategy of energy conservation and its commitment to socially responsible practices, Nectar Lifesciences Limited has selected eco-friendly and contemporary technology to establish new paradigms from an environmental perspective while also being committed towards development of the community. Thus the project's contribution towards sustainable development on criterion set by Ministry of Environment and Forest:

Socio -Economic well-being*:* The implementation of the project activity will generate direct and indirect employment opportunities for the local people, equipment supplier, contractors & technical consultants. This will help in the social and economic upliftment of the area.

Environmental well-being*:* The project activity is reducing GHG emissions through the generation of renewable energy and replacing it with non-fossil fuel based energy. In addition to the reduction in carbon dioxide (CO2) emissions the project implementation will result in reduction of other harmful gases (NOx and SOx) that arise from the combustion of fossil fuel used in power generation.

Technological well-being*:* Although, cogeneration plants of very small capacities have been tried by various pharmaceutical companies, such a large system is yet to be established. Due to the interface with the process and mismatch of the load of steam & power with such a large system, management has taken a risk by installing biomass based cogeneration power plant. Management feels that the successful sustenance and operation of this plant on biomass, with the help of GHG credits will attract other pharmaceutical industries to install biomass based power plant.

1.17 List of commercially sensitive information (if applicable):

Not applicable with respect to the proposed project.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Reference: The approved baseline methodology has been referred from the Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. From this reference, below categories are selected for the project activity.

Type I: Renewable Energy Projects
Methodology: I C Thermal Energy Production with or without electricity.
Category C: Thermal energy for the User.
The CDM methodology "AMS I C, Version – 15 in effect from 31 July 2009" is used for the VCS project.

The project activity is covered under Sectoral Scope – 1. Energy Industries (Renewable/non-renewable sources) as per 'List of Sectoral Scopes' available in UNFCCC website. As per the provisions of Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities, the small scale methodology AMS I.C i.e. "Type I – Renewable Energy Projects of category I.C – Thermal energy for the user with or without electricity", comprises cogeneration projects that displace/avoid fossil fuel consumption in the production of thermal energy (e.g. steam or process heat) and/or electricity.

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

Tabel 4: Justification for the choice of methodology

Applicability Criteria	Justification
1) This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel. Biomass-based co-generating systems that produce heat and electricity are included in this category.	Since the project activity is the installation of Biomass based Cogeneration power plant, therefore is in line with the given criterion.
2) Biomass-based co-generating systems that produce heat and electricity are included in this category. For the purpose of this methodology "Cogeneration" shall mean the simultaneous generation of thermal energy and	The project activity under consideration is a biomass based project activity and also the project activity involves onsite consumption of electric and thermal energy therefore in line with this applicability criterion.

<table>
<tr><td>electrical and/or mechanical energy in one process. Cogeneration system may supply one of the following:
(a) Electricity to a grid;
(b) Electricity and/or thermal energy (steam or heat) for on-site consumption or for consumption by other facilities;
(c) Combination of (a) and (b).</td><td></td></tr>
<tr><td>3) Where thermal generation capacity is specified by the manufacturer, it shall be less than 45 MW</td><td>This is a cogeneration project, thermal capacity is therefore, governed by the boiler output. The energy output of this boiler is 32.79[1] MW $_{thermal}$, which is less than 45 MW $_{thermal}$ as shown in the following table.

Calculation of Thermal Output of the Boiler
<table><tr><td>Boiler Capacity</td><td>TPH</td><td>40</td></tr><tr><td>Temperature</td><td>^{0}C</td><td>490</td></tr><tr><td>Pressure</td><td>kg/cm2</td><td>67</td></tr></table>
Also the combined thermal out put of the turbine and Extracted steam is 31.11 MW[2] $_{Thermal}$
The project therefore fulfils the given eligibility criteria too.</td></tr>
<tr><td>4)

For co-fired[3] systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal</td><td>In the project activity co firing of fossil fuel is not being practiced and the complete generation of steam and power is being done using biomass residue. However the total installed capacity of the project activity is under the specified limit as shown in previous applicability criterion no. 2</td></tr>
<tr><td>5) If the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3</td><td>The project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment is (13.11 MW$_{Thermal}$ and 18 MW$_{Thermal}$) 31.11 MW$_{Thermal}$.</td></tr>
</table>

[1] Calculations are given in the excel file being submitted along with PDD
[2] Calculations are given in the excel file being submitted along with PDD
[3] Co-fired system uses both fossil and renewable fuels.

shall be used for converting electrical energy to thermal energy (i.e., for renewable project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant)	
6) In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.	The Electricity and Heat produced by the project activity are being used for captive requirement.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

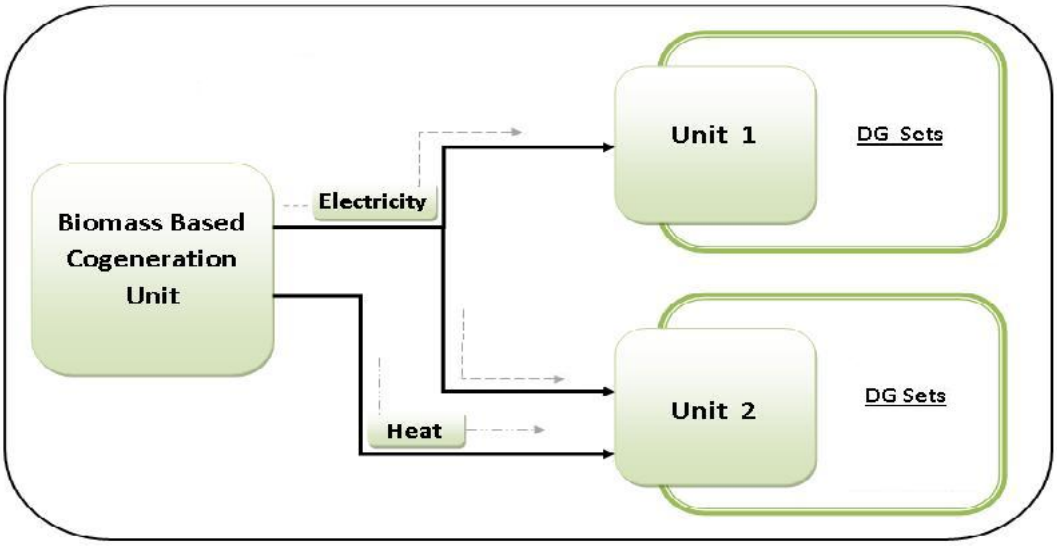
Table 5: Source and explanation

	Source	Gas	Included?	Justification / Explanation
Baseline Scenario	Grid Electricity	CO_2	Yes	CO_2 emissions from grid electricity which is being displaced by the Power from the biomass cogeneration.
		CH_4	No	Excluded for Simplification and for Being Conservative
		N_2O	No	Excluded for Simplification and for Being Conservative
	Coal fired Boiler	CO_2	Yes	CO_2 emissions from the FO fired boiler which would be used for heating requirements in the absence of Project activity
		CH_4	No	Excluded for Simplification and for Being Conservative
		N_2O	No	Excluded for Simplification and for Being Conservative
Project Scenario	Combustion of biomass residues for electricity and/or heat generation	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for Simplification and for Being Conservative
		N_20	No	Excluded for Simplification and for Being Conservative
	On-site fossil fuel consumption due to project	CO_2	Yes	CO_2 emissions from fossil fuels used by tractors for levelling of biomass
		CH_4	No	Excluded for Simplification and for Being Conservative
		N_20	No	Excluded for Simplification and for Being

	activity			Conservative
	Storage for biomass residues	CO_2	No	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for Simplification
		N_20	No	Excluded for simplification

The physical, geographical site of the project equipment producing the renewable energy delineates the project boundary. The boundary also extends to the industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity. Project

boundary delineates the cogeneration plant, unit one and unit two along with all DG sets as shown in diagram given below.



2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline has been developed keeping in mind the present and the future power and steam requirements. A detailed analysis carried out concluded that a boiler with 40 TPH capacity has to be installed with 6 MW turbine. Also according to AMS IC *Project activities producing both heat and electricity including cogeneration shall use one of the following baseline scenarios:*

(a) Electricity is imported from the grid and thermal energy (steam/heat) is produced using fossil fuel;

(b) Electricity is produced in an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel;

(c) A combination of (a) and (b);

(d) Electricity and thermal energy (steam/heat) are produced in a cogeneration unit using fossil fuel (with a possibility of export of electricity to the grid/other facilities and/or thermal energy to other facilities);

(e) Electricity is imported from the grid and/or produced in an on-site captive power plant using fossil fuels (with a possibility of export to the grid); steam/heat is produced from biomass;

(f) Electricity is produced in an on-site captive power plant using biomass (with a possibility of export to the grid) and/or imported from the grid; steam/heat is produced using fossil fuel;

(g) Electricity and/or thermal energy produced in a co-fired system

Based on all above options described in the applied methodology the possible alternative scenarios available to the project activity are described as below

Option 1: Installation of coal based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant.

Option 2: Continuation of Purchase of electricity from the grid and installation of 20 TPH saturated coal based steam boiler for meeting the steam requirements.

Option 3: Continuation of purchase of electricity from grid and installation of 20 TPH saturated biomass based steam boiler for meeting the steam requirements.

Option 4: Continuation of process steam generation from 7 TPH Furnace Oil fired boiler and installation of new 13 TPH furnace oil fired boiler for steam generation and purchase of electricity from grid.

Option 5: Continuation of process steam generation from 7 TPH Furnace Oil fired boiler and installation of new 13 TPH coal fired boiler for steam generation and purchase of electricity from grid

Option 6: Continuation of process steam generation from 7 TPH Furnace Oil fired boiler and installation of new 13 TPH biomass fired boiler for steam generation and purchase of electricity from grid

Option 7: Installation of biomass based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant without availing GHG credits.

Option 8: Installation of an on-site captive power plant using fossil (with a possibility of export to the grid) and thermal energy (steam/heat) is produced using fossil fuel;

Option 9: Installation of an on-site captive power plant using biomass (with a possibility of export to the grid)steam/heat is produced using fossil fuel.

Option 10: Electricity and thermal energy produced in a co-fired cogen system

There was not any barrier to alternative 1 i.e. Installation of coal based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement, therefore this option was a possible alternative to the project activity and is considered for levelized cost analysis.

Continue drawing power from state electricity grid was not considered as alternative to the project activity as project proponent has decided to set up a captive power plant for uninterrupted power supply. The said decision was taken solely to be power independent entity as the plant is a continuous process plant and any kind of interruption in power supply can lead to huge losses in the production chain. Also grid electricity in the region is not a reliable source as there is a huge difference in demand and supply scenario of power in the region. The data available clearly shows that there is a huge crunch of electricity at that time as well as at present. The following

table shows the notified power cuts on industries during month of October 2004[4].

UT	Industries (HT/LT)	Restrictions hours per day	Energy Cut LUs / day	Demand Cut (MW)	Restriction Timing
Chandigarh	HT	5	0.40	8	17:00 to 21:00
	LT	5	0.20	4	17:00 to 21:00
Punjab	PLR	3 Hrs	21 LU /day	700	1830 to 2130

According to ICRA Ltd.'s and CRSIL consolidated report on power sector rating submitted to ministry of power, Govt. Of India the DTR failure rate were also high at 11.5% in 2003-2004 and effectively lead to a lower quality of supply at the consumer end[5]. Also Hydro power plays a significant role for power generation in Punjab. In the lean season due to paucity of water the power generation decreases this also leads to instability of electricity. Sources in the PSEB (Punjab State Electricity Board) said there was shortage of 122 lakh units of power in Punjab every day the consumption of power in Punjab was 852.60 lakh units everyday while it has been getting 630.60 lakhs unit from all sources.[6] As assessed by Northern region electricity board the forecasted scenario of likely power supply during winter season was also not favourable[7].

	Dec 2004		Jan2005		Feb2005	
	MW	MU/Day	MW	MU/Day	MW	MU/Day
Regional Availability	22500	385.4	22590	383.8	23080	382.2
Regional Requirement	25780	468.4	26240	489.3	25760	478.5
Regional Shortages/Restrictions	3280 (12.7%)	83.0 (17.7%)	3650 13.9%)	105.5 21.6%)	2680 (10.4%)	96.3 (20.1%)

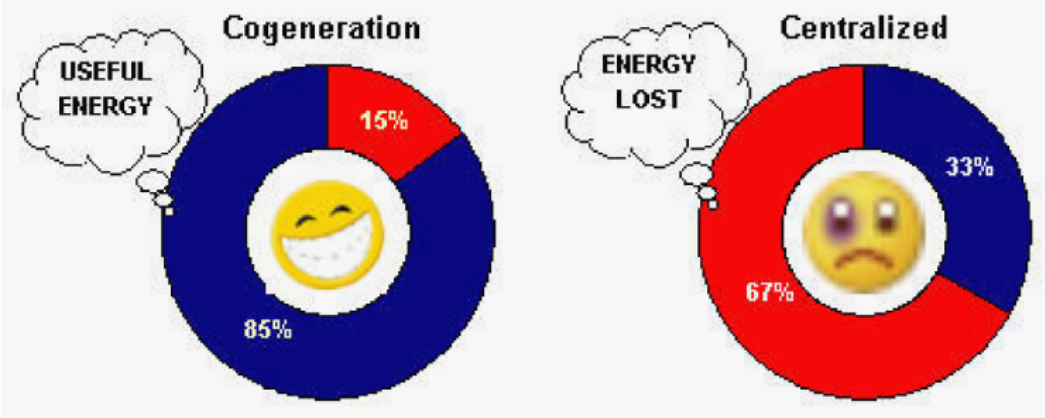
Also before the installation of a cogeneration plant the grid electricity backup was provided by DG sets and if we examine the data for year 2003 to 2005[8] we can conclude that on average 662.8 MWh of the total power i.e.

8589.6 MWh has been generated by DG sets which imply that on average there is shortage of 7.5% of electricity annually and operation of DG sets is an expensive option for such a huge amount of electricity generation. Hence grid electricity was not considered as a viable and reliable source of alternative to the project activity. Therefore all alternatives with option of grid electricity have not been considered as an alternative to the project activity i.e. Option no.2 to 6 are not feasible therefore have not been considered further. Alternative 7 "i.e. Installation of

[4] http://www.nreb.nic.in/Meetings/SP_MEET/CHM_MTG_291104_MIN.pdf
[5] http://www.powermin.nic.in/whats_new/pdf/Final_2005.pdf (page no. 53 of the report)
[6] http://www.tribuneindia.com/2005/20050120/punjab1.htm
[7] http://www.nreb.nic.in/Meetings/SP_MEET/CHM_MTG_291104_MIN.pdf
[8] Log book data of DG operation has been provided to DOE for validation

biomass based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant without availing GHG credits" was a plausible baseline to the project activity and hence is considered for the levelized cost analysis.

Options 8 and 9 are not considered as the alternative to the project activity as these involves individual generation of power and thermal energy which is always a costly affair if compared with any kind of cogeneration. Cogeneration is the most efficient way of generating electricity, heat/cooling from a given amount of fuel. It saves between 15-40% of energy when compared with the separate production of electricity and heat[9].



Centralized thermal power plants convert only 33% of the energy available into useful energy. 2/3rd of primary energy is lost to the atmosphere in the form of heat adding to global warming and increasing the cost of electricity generated. A cogeneration system can enhance the total system efficiency from 85% to 90 %. Cogeneration systems generate power virtually free of cost since the steam is used twice, first to generate power and then to meet thermal demand of the process plant[10]. Hence options 8 and 9 were not considered as the alternative to the project activity. Option number 10 was also plausible baseline for the project activity as it involves the installation of co- fired cogeneration.

Hence as discussed above, there were only three feasible alternatives to the project activity:

Option 1: Installation of coal based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant.

Option 7: Installation of biomass based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant without availing GHG credits.

Option 10: Electricity and thermal energy produced in a co-fired cogen system

All these options have been assessed for financial attractiveness and found that the option number one was having least barriers and was most cost effective alternative among all three.

The proposed project activity cannot be carried out without availing the GHG credits because of the financial barriers faced by the project activity. As evident from the LC analysis generation of energy through alternative 1 is the cheapest option; which would have led to higher emission and was the most viable alternative. The details of the analysis have been explained in section 2.5.

[9] http://www.unep.fr/energy/information/publications/factsheets/pdf/cogeneration.pdf
[10] http://www.biogreenenergy.com/Library/Packaged%20Steam%20Turbine%20Cogeneration.pdf

The calculation of baseline emissions for electricity is according to the procedures laid in methodology **AMS 1 C version 15**. The emission factor for grid electricity shall be calculated as per the procedures detailed in AMS I.D.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

In accordance with paragraph 7 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in Appendix B may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A of Appendix. B. These barriers are:

• Investment barrier
• Technological barrier
• Barrier due to prevailing practice
• Other barriers

The implementation of the project activity is a voluntary step undertaken by the project proponent with no direct or indirect mandate by law.

The project proponent was aware of the various barriers associated to project implementation. But it was realized that the availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers. The additionality has been discussed based on the Annex 34 (EB
35). Some of the key barriers are discussed below:

1. Investment Barrier

The pre project steam requirement of the plant was 7 TPH. This was being supplied from the FO fired boilers aggregate capacity of 12.3 TPH. In the expansion plan, plant is upgrading its capacity 20 TPH. In line with that the power requirement of the plant would also be 6 MW. As analysed in section 2.4 only three alternatives were there for the project activity i.e.

Option 1: Installation of coal based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant.

Option 7: Installation of biomass based captive cogeneration power plant with extraction cum condensing turbine to meet the power and steam requirement of the plant without availing GHG credits.

Option 10: Electricity and thermal energy produced in a co-fired cogen system

All these options have been assessed for financial attractiveness and found that the option number one was having least barriers and was most cost effective alternative among all three.

Now as in all alternatives energy output in term of heat and electricity is same therefore a levelized cost analysis for generating the same amount of energy at boiler output point was carried out to study the financial feasibility of each alternative and the following results were obtained. Since all the three options are cogen plant the levelised cost analysis is carried out at boiler out put as turbine is same for all the three options.

Sr. No.	**Option**	**Rs./GJ**
1	Levelized Cost of Generation For Coal Based boiler of cogeneration plant	196.961
2	Levelized Cost of Generation For Biomass Based boiler of cogeneration plant	224.019
3	Levelized Cost of Generation for Cofired boiler of cogeneration plant (10% Coal, 90% Biomass)	223.131

As is evident from the above figures Alternative 1 would have been the cheapest alternative for power generation but would have led to higher GHG emissions in comparison with the project activity. Despite the fact, Biomass based cogeneration power being expensive in terms of higher unit cost of power generation (per unit cost Rs./GJ); Nectar Life Sciences Ltd. went ahead with a view to implement efficient environment friendly technology considering associated monitory benefits from emission reductions will come later.

Sensitivity Analysis:

Sr. No.	Options	10% increase in Coal cost	10% Decrease in coal cost	10% decrease in Biomass cost
1	Levelized Cost of Generation For Coal Based boiler of cogeneration plant (Rs/GJ)	216.339	177.583	196.961
2	Levelized Cost of Generation For Biomass Based boiler of cogeneration plant (Rs/GJ)	224.019	224.019	201.617
3	Levelized Cost of Generation for Cofired boiler of cogeneration plant (10% Coal, 90% Biomass) (Rs/GJ)	225.069	221.193	202.970

Hence it can be seen that the results are robust for a variation of +/- 10% on critical parameters. It is observed that even with 10% fluctuation in the fuel costs, coal based co-generation remains the cheapest option available to the project proponent.

This clearly indicates that the GHG revenue benefits were taken into consideration and it is only because of the GHG benefits that this option became feasible. In addition it is noted that Rice husk prices are most likely to be increase in near future unlike Coal prices there is no regulatory commission to control the price of rice husk. Hence the baseline for the project activity is coal based cogeneration plant having 40 TPH boiler with 6 MW turbine (20 TPH Extraction)

The specific GHG revenue impacts would be as follows:

- The financial benefit derived from the sale of VCUSs would help in overcoming the following real/perceived barriers:
  - Volatility in biomass prices
  - Reduced operating PLF due to anticipate operational and maintenance problem associated with the process.
  - Increased cost of man-power enduring higher quality operation and maintenance personnel, training and development expenses
- Attracting new players for carrying out same project activities

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

Type I – Renewable Energy Projects
AMS.I.C – Thermal energy for the user with or without electricity, Version 15
Scope 1, Energy Industries (Renewable/non-renewable sources)

As per the Simplified Baseline and Monitoring Methodologies the "Monitoring shall consist of metering the electricity and heat generated by the renewable technology"

The choice of methodology has been given above in section 2.2

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

- **Purpose of monitoring:** is to describe the data and information that will be collected in order to monitor and calculate the baseline emissions, the project emissions and the emission reductions from the project activity.

- **Types of data and information to be reported, including units of measurement**

  - Electricity generated from project activity (KWh)
  - Steam Generated (TPH)
  - Temperature (^{0}C)
  - Pressure (Kg/cm^2)
  - Efficiency of boilers (No Unit)
  - Quantity of Biomass Used (Tonnes)
  - calorific value of the biomass used (kcal/kg)

- **Origin of the data**

  - Joint Meter Records
  - Plant Log Book Data Records
  - Efficiency test reports
  - Invoice for sale of electricity to Grid

- **Monitoring times and periods, considering the needs of intended users**

Monitoring intervals

Readings of electricity generation, the consumption in the auxiliary and the steam consumption in the process	**Hourly basis**
Calorific value of the biomass used	**Daily basis**
Checking and Verification of monthly reports of calorific value of biomass used	**Annually**
Monitoring and reporting of emission reductions	**Monthly basis**
Calibration of meters	**Annually**
Archiving of data	**Data will be archived up to two years after completion of crediting period**
Mode of Storage	**Data will be stored electronically**

- **Monitoring roles and responsibilities**

Monitoring roles and responsibilities

ROLE	RESPONSIBILTY
Overall VCS	Overall VCS Senior Vice President
Monitoring of readings on daily basis	Shift Operators
Checking and verification of monthly records	External auditors
Maintenance all records pertaining to net electricity generated and net set steam used for the process	Dy. Manager (Inst. And Elec.)

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	**EGy**
Data unit:	KWh
Description:	Gross electricity generated by turbine generators
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated annually from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	Gross electricity generated is the total electricity generated by the turbo generator. The data from the project activity will be monitored as set out above, for the existing power plant hourly recordings of data will be taken from energy meters located at the site.
QA/QC procedures to be applied:	The meter will be calibrated annually by the accredited NABL approved independent third party. The consistency of metered net electricity generation should be cross-checked with factory receipts / records
Any comment:	NA

Data / Parameter:	**EG_{Aux}**
Data unit:	KWh
Description:	Auxiliary electricity
Source of data to be used:	Calculated on actual basis
Value of data applied for the purpose of calculating expected emission reductions	Calculated on actual basis however for future projections 10% auxiliary has been accounted. This is conservative
Description of measurement methods and procedures to be applied:	Will be calculated on actual basis with the help of energy meters
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	
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 to be used:	Being conservative taken 100%
Value of data applied for the purpose of calculating expected emission reductions	Being conservative taken 100%
Description of measurement methods and procedures to be applied:	NA
QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**Heat (From Steam)supply to process**
Data unit:	TJ
Description:	Thermal energy
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be estimated annually from the records/Logbook maintained at Neclife factory.
Description of measurement methods and procedures to be applied:	Steam flow is measured from steam output flow meter. Flow of steam in tonnes/hr is converted to TJ by calculation
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Q**
Data unit:	TPH
Description:	Quantity of extracted steam
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of	This value will be estimated annually from the

calculating expected emission reductions	records/Logbook maintained at Neclife factory.
Description of measurement methods and procedures to be applied:	Steam flow is measured from steam output flow meter. Flow of steam in tonnes/hr is converted to TJ by calculation
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**T**
Data unit:	^0C
Description:	Temperature of the process steam
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	180^0C
Description of measurement methods and procedures to be applied:	For measuring the temperature of process steam temperature transmitter is there from which value is recorded on hourly basis
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**P**
Data unit:	Kg/cm^2
Description:	Pressure of the process steam
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	6 kg/cm^2
Description of measurement methods and procedures to be applied:	For measuring the pressure of process steam pressure transmitter is provided from which value is recorded on hourly basis
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**EF_{coal}**
Data unit:	tCO_2e/TJ
Description:	Emission Factor of coal
Source of data to be used:	IPCC default value
Value of data applied for the purpose of calculating expected emission reductions	96.1
Description of measurement methods and procedures to be applied:	The value applied is the latest one.
QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Rice Husk used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Paddy straw used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Mustard Stick used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA
Data / Parameter:	Qy
Data unit:	Tonnes
Description:	Quantity of Mustard Husk used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.

calculating expected emission reductions	
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Barley used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Sugarcane trash used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Cotton Stick Desi used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices

Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Bajra Stalk used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Sunflower Stalk used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Moong Straw used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes

Description:	Quantity of Arhar Stick used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Arhar Husk used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Saw Chips used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of Saw dust used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.

Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**Qy**
Data unit:	Tonnes
Description:	Quantity of bushes(sarkanda) used
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**NCV**
Data unit:	Kcal/KG
Description:	Net Calorific Value of the fuels
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory for all fuel type used. However only three fuel will be used at a time and for all those fuels there is different conveyer belt.
Description of measurement methods and procedures to be applied:	The data from the project activity will be monitored as set out above, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**EF_D**
Data unit:	tCO_2e/TJ
Description:	Emission factor of Diesel
Source of data to be used:	IPCC default value
Value of data applied for the purpose of calculating expected emission reductions	74.1
Description of measurement methods and procedures to be applied:	The value applied is the latest one.

QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**NCV_{Diesel}**
Data unit:	TJ/Tonne
Description:	Net Calorific Value of Diesel
Source of data to be used:	IPCC default value
Value of data applied for the purpose of calculating expected emission reductions	0.043
Description of measurement methods and procedures to be applied:	The Fixed value has been taken from IPCC web link http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**TL**
Data unit:	Tonnes
Description:	Load of biomass on each truck
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory for all fuel type used.
Description of measurement methods and procedures to be applied:	The log book for entering the load in each truck will be maintained, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	
Any comment:	QA/QC will be as per best industrial practices
	NA

Data / Parameter:	**D_T**
Data unit:	Km
Description:	Distance travelled by each truck
Source of data to be used:	Nectar Lifesciences Limited factory records.
Value of data applied for the purpose of calculating expected emission reductions	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory for all fuel type used.
Description of measurement methods and procedures to be applied:	The log book for km travelled by each truck will be maintained, daily recordings of data will be taken from the site.
QA/QC procedures to be applied:	QA/QC will be as per best industrial practices
Any comment:	NA

Data / Parameter:	**M**
Data unit:	Km/Lit
Description:	Avearage mileage of each truck
Source of data to be used:	A normalised and conservative fixed value is being used
Value of data applied for the purpose of calculating expected emission reductions	4
Description of measurement methods and procedures to be applied:	A normalised and conservative fixed value is being used
QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**D**
Data unit:	Kg/Lit.
Description:	Density of Diesel
Source of data to be used:	A normalised and conservative fixed value is being used
Value of data applied for the purpose of calculating expected emission reductions	0.87
Description of measurement methods and procedures to be applied:	A normalised and conservative fixed value is being used
QA/QC procedures to be applied:	NA
Any comment:	NA

Data / Parameter:	**Q_D**
Data unit:	Lit/day.
Description:	Quantity of diesel consumed in tractors used for levelizing the piles/heaps of biomass
Source of data to be used:	This value will be calculated from the records maintained at Nectar Lifesciences Limited factory.
Value of data applied for the purpose of calculating expected emission reductions	90
Description of measurement methods and procedures to be applied:	Log book will be maintained for entering the quantity of diesel purchased for tractors.
QA/QC procedures to be applied:	NA
Any comment:	NA

3.4 Description of the monitoring plan

The overall VCS project manager for the proposed project activity will be the Senior Vice President–. The Senior Vice President will be supported by shift in charge. The readings of electricity generation, the consumption in the auxiliary and the steam consumption in the process will be monitored on a daily basis by the operators in shift and will be compiled in the form of daily energy report. This report will be based on the data gathered from the hourly

log sheets maintained in the cogeneration plant for the electricity generation, the consumption in the auxiliaries and the steam consumption in the process.

Simultaneously, the calorific value of the biomass used will be tested on the daily basis which will be complied in the form monthly reports and these reports will be checked and verified by the external auditor annually. Dy. Manager (Inst and Elec.) of the power plant will be maintaining all records pertaining to net electricity generated and net set steam used for the process. The hourly recording of data will be done by

shift operators that will be checked and verified by the In-charge of the respective fields at the end of each day. This data will be collated monthly and held on the spreadsheet tool which has been designed for the project activity (a sample of the report) by the Electrical, Mechanical and Ins. and will be cross checked by Dy. Manager (Inst and Elec.) The record of daily reports will be maintained pertaining to the net electricity and steam generated and will be sent to the Senior Vice President for verification. This will permit the monitoring and reporting of emission reductions on a monthly basis. The monitoring personnel currently maintain and review the factory records pertaining to the net electricity generated and net steam used for the process. The plant personnel are familiar with the process of monitoring and documentation; however, their training needs will be identified and attended.

The meter for gross electricity generated, the meter for auxiliary consumption and the steam flow meter will be calibrated annually as per the current practice and they will be maintained as per the instructions provided by their suppliers. The electricity and steam readings will also be stored in the DCS system as backup and this data will be archived on a monthly basis. The archived data will be available at the time of annual verification". Hence there will be no uncertainties or adjustments associated with data. An internal team will review the daily reports, monthly reports, procedure for data recording and maintenance reports of the meters.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

Type I: Renewable Energy Projects
Sub Category C: Thermal energy production with or without electricity.
AMS I C, Version – 15 in effect from 31 July 2009

The justification for the choice of methodology has been described in detail in section 2.2

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

The estimated 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 (case 12 (d)), the following equation shall be used:

$$BE_{cogen,CO_2,y} = [(EG_{PJ,thermal,y} + EG_{PJ,electrical,y} * 3.6) / \eta_{BL,cogen}] * EF_{FF,CO_2} \quad \textbf{(1)}$$

Where:

$BE_{cogen,CO_2,y}$	Baseline emissions from electricity and thermal energy displaced by the project activity during the year *y*; tCO_2e
$EG_{PJ,electrical,y}$	The amount of electricity supplied by the project activity during the year *y*; GWh
3.6	Conversion factor; TJ/GWh
$EG_{PJ,thermal,y}$	The net quantity of thermal energy supplied by the project activity during the year *y*; TJ
EF_{FF,CO_2}	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
$\eta_{BL,cogen}$	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

Year	Baseline Emission
2007 (starting from 27 May)	32,750
2008	54,878
2009	54,878
2010	54,878
2011	54,878
2012	54,878
2013	54,878
2014	54,878
2015	54,878
2016	54,878
2017 (till 26 May)	22,128
Total	**5,48,780**

The baseline emission for later years projected value is taken. Though, the benefit of VCUs would be claimed as calculated on actual values.

4.3 Quantifying GHG emissions and/or removals for the project:

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

Project Estimation on account of Tractors used for levelising the Rice husk		
Total Number of tractors	3	
Total Amount of Diesel consumed by Tractors	30	Liters/day (Maximum Assumed Quantity)
Total Diesel consumption by Tractors	29700	Liters/Anum
Density of diesel	0.87	kg/lit
Mass of diesel used	26	Tonnes
Calorific value of diesel	0.04303	TJ/Tonnes
Emission factor for diesel	74	tCO2e/TJ
Emissions due to transportation of biomass	82	**t CO2 /year**

Also as prescribed in AMS 1C., leakage estimation is required only if renewable energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. In this case, this is not applicable.

Also as per General guidance on leakage in biomass project activities the project participants shall evaluate ex ante if there is a surplus of the biomass in the region of the project activity, which is not utilised. According to said guidance it has to be demonstrated that at the beginning of each crediting period the quantity of available biomass in the region is at least 25% larger than the quantity of biomass that is utilised including the project activity. For this a biomass availability report is being submitted to DOE according to which the quantity of biomass in the region is more than 25% than the quantity of biomass that is utilised including the project activity therefore leakage on this part has not been considered.

The leakages on the account of transportation of biomass are calculated as below.

Leakage Estimation on account of tranportation of Biomass		
Total Biomass Requirements	91527	Tonnes per year
Truck capacity	8	Tonnes
Max. return distance between project site and collection centres	100	Km
Total Number of trips	11441	
Consumption of diesel per trip (to and fro)(@4km/lit)	25	Lit
Total Diesel consumption	286022	Lit

Density of diesel	0.87	kg/lit
Mass of diesel used	249	Tonnes
Calorific value of diesel	0.04303	TJ/Tonnes
Emission factor for diesel	74	tCO2e/TJ
Emissions due to transportation of biomass	793	**t CO2 /year**

These calculations are based on assumptions however the actual estimation of leakage would be done based on the actual data.

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

The following table shows the estimation of overall emission reduction vintage wise. As the price of VCUs varies according to the vintages hence to make it clearer the PP will claim emission reduction according to vintage wise:

Year	**Estimation of baseline Emission (tCO2e)**	**Estimation of Project Emission (tCO2e)**	**Estimation of Leakage Emission (tCO2e)**	**Estimation of Overall Emission Reduction (tCO2e)**
2007 (starting from 27 May)	32,750	49	473	32,228
2008	54,878	82	793	54,003
2009	54,878	82	793	54,003
2010	54,878	82	793	54,003
2011	54,878	82	793	54,003
2012	54,878	82	793	54,003
2013	54,878	82	793	54,003
2014	54,878	82	793	54,003
2015	54,878	82	793	54,003
2016	54,878	82	793	54,003
2017 (till 26 May)	22,128	33	320	21,775
Total (tonnes of CO2e)	**5,48,780**	**820**	**7,930**	**5,40,030**

5 Environmental Impact:

The project activity does not fall under the purview of the schedule I of Environmental Impact Assessment notification 1994[11] of the Ministry of Environment and Forests, Government of India. The project activity does not require environment impact study to be undertaken as per regulations for pollution control in India. The project activity envisages the use of biomass residue as fuel in steam and power generation and displacement of fossil fuels. There is no adverse impact by the project activity on the environment (air, water, soil). It has only positive impacts in the form of emission reduction of GHG.

The project meets all the required environmental guidelines and regulations as applicable by state government. Required consents and approval required are taken care of by notifying the Punjab Pollution Control Board.

Various positive environmental benefits arising from the project activity are listed as follows:

1) Reduction in CO_2 emissions due to the replacement of fossil fuels by biomass
2) Reduction in NO_x and SO_x emission in comparison with the fossil fuel emissions. Further the required norms are met by the use of Electrostatic precipitator
3) Reduction in the ash content, it being 10-15% as compared to 30-40% of fossil fuels and disposing it off in low lying areas.
4) Treatment of the cooling tower effluent and the boiler blow down in an effluent treatment plant, which meets the COD and BOD requirements of the Pollution Control Board.

The project proponent has installed the following devices for ensuring environmental quality:

- Electrostatic Precipitator as an air pollution control measure and its continuous monitoring is done by SPM analyser, and regular checking is carried out by Punjab Pollution Control Board.
- The rejected water which is coming from the power plant is used for Ash Quenching and Gardening.

[11] http://www.tnpcb.gov.in/environmental.html

6 Stakeholder's comments:

The Local Stakeholders meeting for the project was held on 14/09/2006 at the project site. The primary local stakeholders in the project activity were identified as:

a) Residents and Sarpanch (Village President) of the neighbouring villages (Saidpura, Haripur Hinduan and

Kuranwala) including gram panchayat,

b) Employees and labourers at the project site.

c) Social Activists of the region

d) PSEB Officials

The Stakeholders were invited by giving notice mentioning the date, time and venue of the Stakeholders meeting. Also the Gram Panchayat was given an invitation letter for the same. Around 25 numbers of Local Stakeholders were present during the meeting.

Stakeholders' Involvement:

The project proponents had involved all the stakeholders in the discussion for setting up the Project and had convened a meeting to hold extensive discussions with the stakeholders. After an address by the Project Proponent regarding the project, its benefits and the environment activities, queries were invited from them which were answered to their satisfaction. The local population welcomed the project due to benefits like development of infrastructure in the area and additional sources of income during construction, employment etc.

An attendance of the stakeholders present in the meeting was carried out and also the stakeholders were asked to present their comments in a written format by newspaper advertisement (Akali Patrika) on dated 26/10/2006.

Since no negative comments were received for the project activity and positive comments were given by the local stake holders at the meeting, the local stakeholders meeting passed through due public consultation.

Comments by Participants

I . *Mr. BalbirSingh, Sarpanch, Resident- Haripur Hindua*

Neclife initiative to generated electricity from biomass based generation set will immensely help farmers to disperse there field crop and will also considered as a positive set by Neclife for improving the environment of Haripur Hindua

2. *Mr. Jaspal Singh, Sarpanch, Resident-Saidpura*

Along with the environment conservation aspects, the substitution will also help the diversion of diesel from plant site to other needy ones like transport sector and hence will help in there growth also.

3. *Mr Phool Chand, Resident-Saidpura*

We welcome Neclife's initiative to generated and exports electricity to regional gird, as it will bring better infrastructure and better employment scenarios in the region. Along with that, the project will substantially help in reducing emissions, at present caused by coal fired based thermal power plants in Punjab.

4. *Mr. Baldev Singh, Resident-Saidpura*

As explained by representatives from DSCL regarding the CDM and Carbon revenue,

guess this will help other big market player to shift from diesel power generation torenewable biomass energy and hence the Neclife project is widely accepted and seen as a path breaking initiative in the Derabassi region.

5. *Mr. Raj Kumar, Resident-Saidpura*

We were skeptical about the CO2 generation due to burning of biomass but as informed by the Neclife authority and DSCL representatives, about the sequestration of CO_2 by the plant itself, we are now assured of this environmental conservation initiative will benefit the environment of local areas.

6. *Mr. Jaspal Singh, Resident- Saidpura*

Neclife has been an active participant in terms of welfare and initiating sustainable development activities in the region. They have shown full support to government bodies and local communities for infrastructure development in the region and helped them whatever ways they can. We anticipate a similar support form Neclife with there Biomass power project.

7. *Mr. Abha Rain, Resident- Haripur Hindua*

Neclife management has always been responsible towards its social obligation, projected through its clearer and cleaner communication with the local communities. Hence we support the initiative taken by Neclife.

8. *Mr. Yad Ram, Resident-Haripur Hindua*

Many welfare activities done by Neclife like canal development in the region and providing support to other small income generation activity has bought good relations between the unit and the local communities and we anticipate it to continue the same manner and grow in future.

9. *Mr.Ramesh Chang Resident- Haripur Hindua*

The establishment of better education facility with support from government institution is always been the priority of Neclife unit and we anticipate more such development planned in future by them.

Stakeholders' comments at the meeting demonstrated that the co-generation project would help in improving the power scenario in the nearby areas by displacing the plant's requirement to draw electricity from the state grid and process heat requirement from fuel oil based boilers. No negative comments have been received for the project activity.

7 Schedule:

S. No.	Event Related to VCU	Date of Event
1)	Purchase order of turbine	25.11.05
2)	Purchase order of boiler	20.12.05
3)	Purchase Order of ESP	28.03.06
4)	Consent to operate from Punjab Pollution Control Board	2.08.06
5)	Local Stakeholders Meeting	14.09.06
6)	Commissioning Certificate	27.05.07
7)	Sanction of 6 MW Biomass Fired Captive Power Plant by PSEB	June 07
8)	Proposal for VCS verification from BVQi	14.11.08
9)	Contract with Gensol Consultants Pvt. Ltd. for VCS	18.03.09
10)	Completion of VCS PD	July 2009
11	Frequency of Monitoring and reporting of the project	Annually

8 Ownership:

8.1 Proof of Title:

Owner of the project activity is M/s Nectar Life Sciences Pvt. Ltd. And documents showing proof of title and ownership of the emission reductions are as follows:

- Purchase Order of Turbine dated 25/11/2005
- Purchase Order of Boiler dated 20/12/2005
- Consent to operate from Punjab Pollution Control Board dated 20/08/2006

These documents would be provided to the validator.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

India is non annex country. There are no emission reduction targets on India and it doesn't fall under the preview of any compliance driven emission trading programme. Hence this section is not applicable for the project activity.