CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

CDM – Executive Board

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

>>

Biomass Based Power Project of Balaji Agro Oils Ltd.
Version – 03
Date – 10/07/2007

A.2. Description of the small-scale project activity:

>>

Purpose

The purpose of the project activity is to utilize the available biomass fuels[1] especially rice husk in the region effectively for generation of clean power. The generated clean and green power will be exported to the state grid for sustainable economic growth, conservation of environment through use of biomass fuels and for Green House Gas (GHG) emission reduction. The project will also help to reduce the already existing demand and supply gap of electricity to certain extent in the state of Andhra Pradesh.

The following local benefits are also experienced due to the setting up of project:

- Proper utilization of surplus biomass;
- Generation of eco-friendly green power;
- Avoidance of burning of agriculture waste;
- Reduction of CO_2 emissions

Balaji Agro Oils Ltd. (BAOL) is utilizing the available fuel (rice husk) from the paddy rich areas in and around Vijayawada of Krishna district. A survey carried out by Non-Renewable Energy Development Corporation of Andhra Pradesh (NEDCAP), before the commencement of the plant construction indicates that the fuels to be used are available in abundance within a radius of 75 km from the plant site. Considering the adequate availability of biomass in the area, BAOL have chosen the location of power plant in Davuluru village, Krishna district of Andhra Pradesh.

Contribution to Sustainable Development

The project activity is a renewable energy power project for power generation and export of clean power to APTRANSCO. This generation of power will substitute the power generated and fed through conventional fossil fuels dominated grid. Since this project activity utilizes renewable energy source, it will positively contribute towards the reduction in (demand) use of finite natural resource like coal/gas/oil, minimizing depletion or else increasing its availability to other important processes.

[1] Sustainably grown renewable cyclic crops.

CDM – Executive Board

Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines[2] for CDM projects.

1. Social well being
2. Economic well being
3. Environmental well being
4. Technological well being

The location in a rural backward area will help alleviate poverty to certain extent by generating both direct and indirect employment in the area of skilled/unskilled jobs for regular operation and maintenance of the power plant. The productive use of an agro waste will bring in associated economic and social benefits. The project will also help to bridge the gap of electricity demand and supply at local and national level.

The increase in demand of biomass exerted by the project will have a local effect on its price and will generate additional revenue for the regional biomass suppliers/ farmers. Generation of electricity using the same as fuel will evidently contribute to the economic well-being by generating revenue and inflow of funds. Local and central government will also be financially benefited from the project.

The project activity is a renewable energy power project, which will use waste biomass generated in the local region as a fuel for power generation and export clean power to APTRANSCO grid. This electricity generation will substitute the power generation by APTRANSCO using conventional sources of energy (which also includes high carbon emissive fuel) or make power available for additional demand. Thus it will reduce the CO_2 emissions which otherwise would have been emitted due to the generation of power by APTRANSCO grid generation mix.

The plant will use efficient and environment friendly technology of renewable energy sector. The technology is new though established. It includes a modern FBC boiler designed to operate with co-firing of two fuels– biomass as major fuel and coal as supplementary fuel, in case of biomass shortage. In view of the above the project participant considers that the project activity profoundly contributes to the sustainable development.

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Balaji Agro Oils Limited (Private entity. Project developer.)	No

See contact information in Annex-1 to this PDD

[2] Ministry of Environment and Forest web site http://envfor.nic.in/cdm/host_approval_criteria.htm#

A.4. Technical description of the small-scale project activity:

The project activity is 4.5 MW capacity grid-connected biomass based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project exports 3.725 MW power to the APTRANSCO by considering auxiliary power consumption of around 20%. The plant is operating at an annual average plant load factor of 80%. The Andhra Pradesh State Pollution Control Board (APPCB) has issued Consent for Establishment (CFE) to BAOL for using coal to a maximum of 20% in case of shortage of biomass. Further, no transmission and distribution losses are considered while calculating GHG emission reductions, since the project exports power to the Kankipadu Substation, which is located at about 5 km from the site.

The power plant has one condensing steam generator unit with a fluidized bed technology capable of firing multi fuels with rice husk as the main fuels. All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 35 tons per hour of steam. The steam turbine is an extraction type machine with controlled bleeds for de-aerator feed water heating. The installed capacity of the steam turbine generator is 6 MW. However, the plant operates at a capacity of 4.5 MW. The steam conditions at the boiler heat outlet are a pressure of 66 kg/cm^2 and temperature of 495^{0}C. The higher steam parameters result in higher annual savings of fuel per annum when compared to lesser steam operating parameters.

All the steam based power plants operate under the Rankine cycle where it is the combination of the various process like the isentropic compression of water in the boiler feed water pumps, reversible heat addition to the working fluid through the liquid, two phase and superheat states, isentropic expansion of the working medium in the turbine and constant pressure heat rejection to the atmosphere through the condenser and the cooling water system. The cycle to be adopted for the project activity will be modified Rankine Cycle with the addition of the Regenerative feed water heating. To improve the efficiency of the cycle the feed water from the condenser is heated with the steam extracted from the turbine. Because of the size of the plant there are limitations in the use of the number of stages for heating the feed water, and for this project only one stage of heating is done in a deaerator. Thermodynamically, energy recovery from the Rankine cycle is more dependent on the steam inlet temperature than the pressure and the higher the inlet steam temperature, higher the cycle efficiency.

A.4.1. Location of the small-scale project activity:

>>

A.4.1.1. Host Party(ies):

>>

India

A.4.1.2. Region/State/Province etc.:

>>

Andhra Pradesh

A.4.1.3. City/Town/Community etc:

>>

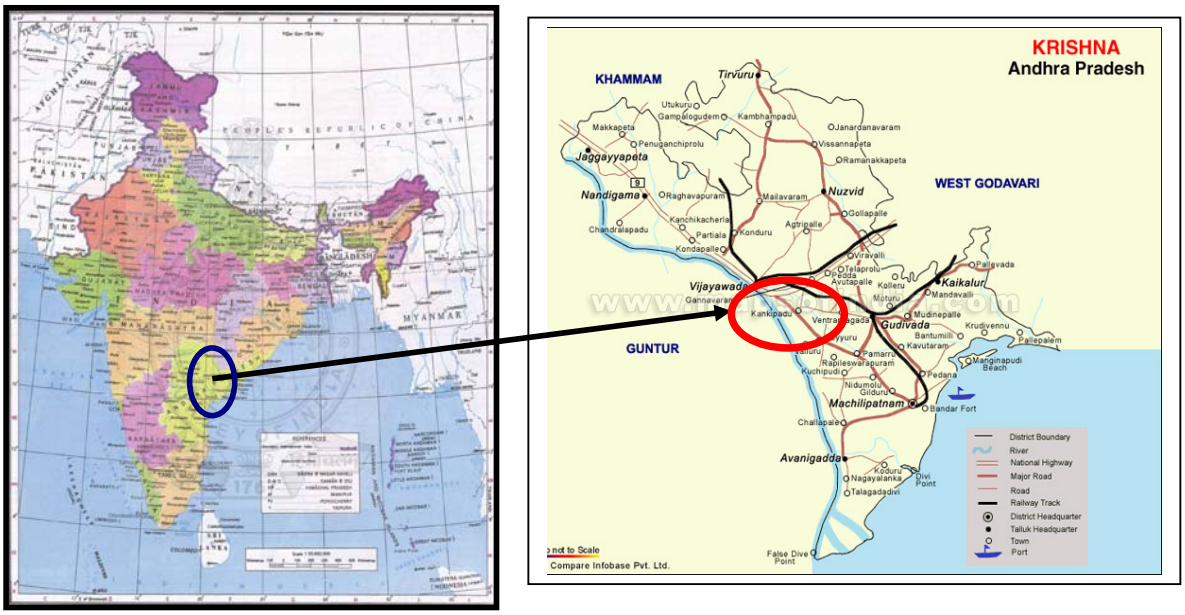
Krishna District

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

>>

The plant is located at Davuluru village, Krishna district of Andhra Pradesh. The site for the plant has been acquired and can be identified at the intersection of 16°31' East and 80°31'North. The site is well connected by roads and railway line and the nearest railway station is at Vijayawada and airport is at Vijayawada.

The plant's water requirements will be met by drawl from borewells, with in the plant. Power generated from the plant at 11 kV is being evacuated to APTRANSCO grid through their 33 kV Kankipadu sub station which is about 5 km from the plant.



A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

>>

As per Clause 2 & 3 of Type I.D of Appendix B of **simplified modalities and procedures for small-scale CDM project activities (Version 10: 23 December 2006**), If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW, and Biomass combined heat and power (co-generation) systems that supply electricity to and/or displace electricity from a grid are included in this category. To qualify under this category, the sum of all forms of energy output shall not exceed 45 $MW_{thermal}$ e.g. for a biomass based co-generating system the rating for all the boilers combined shall not exceed 45 $MW_{thermal.}$ for the project to qualify as a small-scale CDM project. Therefore, the project activity can be defined under

Type I: Renewable Energy Project (Small Scale)
Category: "D", Grid connected Renewable Electricity Generation (Renewable Biomass based Power Project)

Technology of the project

The technology adopted for the project activity is a standard and widely accepted practice for power generation using renewable sources. No technology transfer is required though know how for the project technology was not well established during project implementation stage in the state. Steam is generated in a high pressure boiler which is sized to produce a maximum of 35 tons per hour of steam. High pressure steam is passed through a straight condensing type machine with uncontrolled bleeds for de-aerator feed water heating to generate power to export to grid.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

>>

Years (January to December)	Annual estimation of emission reductions in tonnes of CO_2e
2007 (June to December)	9253
2008	16963
2009	16963
2010	16963
2011	16963
2012	16963
2013	16963
2014	16963
2015	16963
2016	16963
2017 (January to May)	7711

Total estimated reductions (tones of CO2e)	**169,632**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	16963

A.4.4. Public funding of the small-scale project activity:

>>

No Public funding . Project is implemented with equity of project proponent and long term debt by State Bank of India, Canara Bank and Andhra Bank.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'Debundling' is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities. A small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the small- scale activity at the closest point.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

>>

Title:

Grid connected Renewable electricity generation

Reference:

The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Renewable technologies that supply electricity to the grid are covered in category I.D. The category comprises renewable such as small hydro, wind, geothermal and renewable biomass that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generation unit.

B.2 Justification of the choice of the project category:

>>

Type I: Renewable Energy Power project

Category: **'**D'- Grid connected Renewable Electricity Generation

As per the Kyoto Protocol (KP) baseline should be in accordance with the additionality criteria of article 12, paragraph 5(c), which states that the project activity must reduce emissions that are additional to any that, would occur in the absence of the certified project activity.

Document Annex B to attachment 3 regarding indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, provides guidelines for preparation of Project Design Document (PDD) including baseline calculations. The category and the sub type of the activity are given above.

Baseline methodology mentioned in the paragraph no. 9 of Type I. D. of Appendix B of the simplified modalities and procedures for small scale CDM project activities, states that the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in transparent and conservative manner as under:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and built margin (BM) according to the procedures prescribed in the approved methodology

ACM002. Any of the four procedures for calculating the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM must be considered;

OR

b) The weighted average emissions (in $kgCO_2equ/kWh$) of current generation mix. The data of the year in which project generation occurs must be used.

Calculations must be based on data from an official source (where available) and made publicly available.

Based on the above guidelines provided in Version 10 of AMS I.D, the baseline emission factor is estimated using the combined margin approach as per the procedures laid in paragraph 9 of AMS I.D of Version 10. As this methodology suggested adopting the procedures laid in ACM0002, the same has been considered for calculations.

Southern Regional grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. It is observed that, in the southern regional grid generation mix, coal, diesel and gas based power projects are responsible for GHG emissions. The data published by Central Electricity Authority (CEA) has been used as the baseline emission factor. The baseline emission factor for southern grid as published by CEA is 0.860[3].

The Ministry of Power intends to achieve 100% rural electrification by the year 2012. India is highly dependent on its coal reserves which provide a sense of energy security. Hence, coal has been identified as the main fuel source for electricity generation. Several ultra mega power projects have been planned and are being commissioned in India in a phased manner by 2012. Considering the above fact, it is evident that in the future, the grid electricity generation using fossil fuel is likely to increase in Southern Regional Grid. Hence, the baseline factor considered for the calculation of the emission reductions may be considered conservative.

B.3. Description of the project boundary:

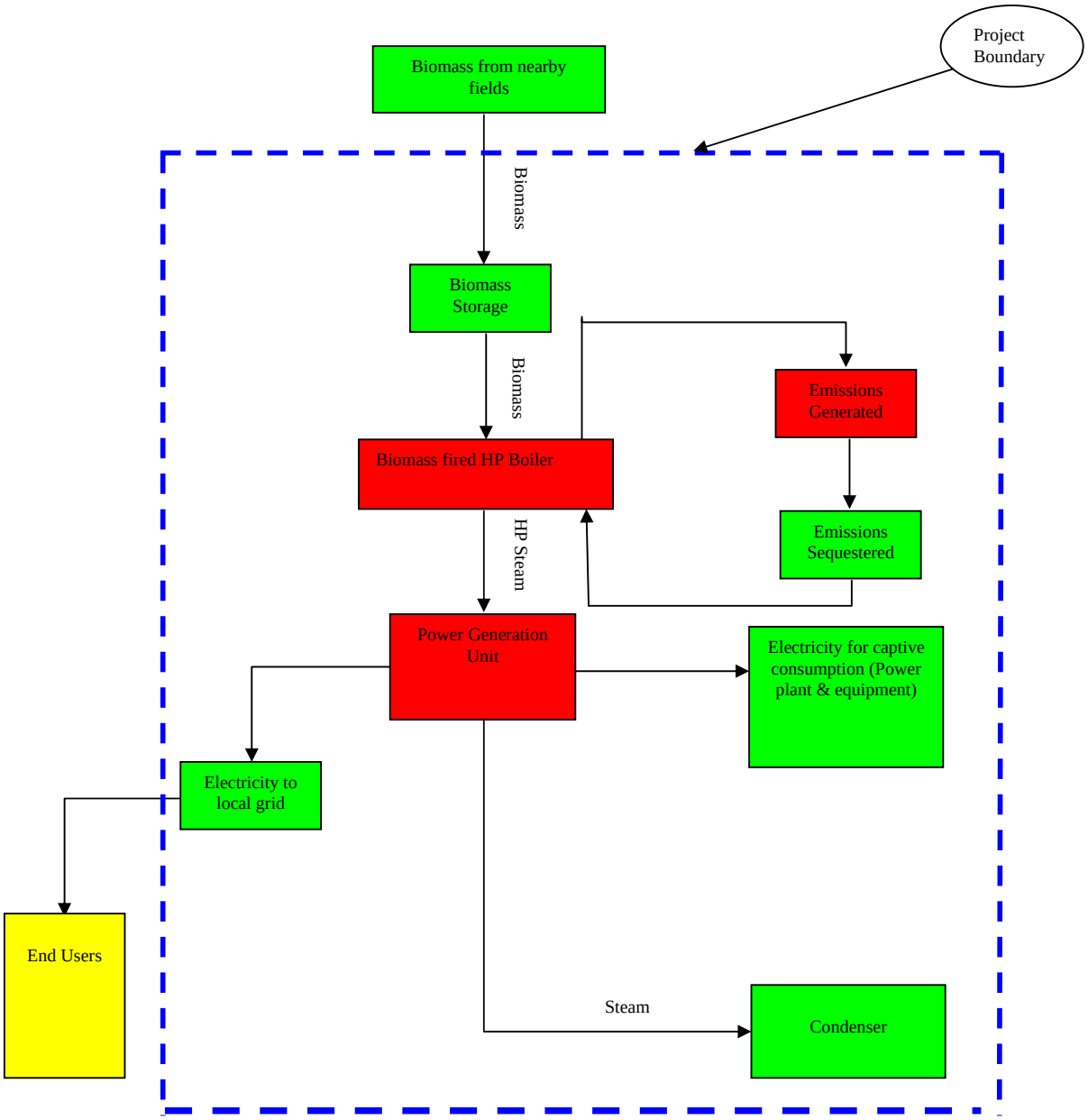
>>

As per the guidelines mentioned in Type I. D. of Annex B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source.

Hence, the project boundary covers the physical boundary of the project activity. The system boundary covers the terminal point of electricity generation, transportation to APTRANSCO grid and for the purpose of calculation of baseline emissions, Southern Regional grid is also included in the project boundary. As the plant uses only biomass residues or wastes (Paddy husk), the area where the biomass is extracted or produced is not included in the boundary.

[3] Source: CEA, http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Thus, boundary covers fuel storage and processing, boiler, Steam Turbine Generator (STG) and all other power generating equipments, auxiliary consumption units and electricity grid.



CDM – Executive Board

B.4. Description of baseline and its development:

>>

The baseline methodology has followed the one specified under Project category I.D in Appendix B of the Simplified M&P for small scale CDM project activities.

The baseline has been considered using 'Combined Margin' approach. Southern regional grid has been considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. The emission factor for the southern regional grid is taken as per the Central Electricity Authority (CEA), Govt. of India calculations provided at http://cea.nic.in (given in Annex – 3). The corresponding CO_2 emission reductions have been done and is enclosed as Enclosure-I. Project participant decided to adopt ex-ante baseline emission factor and is fixed for the entire crediting period considering the scale of the project activity and monitoring required.

The value of emission factor from the combined margin method for Southern regional grid is **0.860** $kgCO_2/kWh$[4].

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

As per the decision 17/cp.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Further referring to Appendix A to Annex B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants shall provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s) ;

1. Other Barriers (Financial Resources)

The CDM fund for the project was initially considered to cover the project risk related to the fuel (biomass) price increase in the future. The CDM fund is critical considering biomass availability and prices are seasonal, which depends on many external factors whereas the earnings for the power plant are at long term fixed rate. Therefore, the revenue from CDM could prove to be vital, as they would significantly improve the sustainability of the project, as the project can be rendered financially unstable due to

[4] Souce: http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

a. The increase in cost of fuel ; and
b. The change in tariff by virtue of revised tariff by the off taker

The above factors are true for the project activity and in absence of CDM funds it is very likely that project activity would have used (or may use) more financially viable option such as coal as fuel.

In addition to the above, the financial analysis of the project activity has been done with and with out CDM revenue. The IRR of the company with out CDM revenues is 13.94% which was below the standard returns from power plants of 16% and above[5]. The IRR of the project with CDM revenue will improve to 16.93% which is slightly more than the standard return prescribed by CEA.

Raw material cost per metric tonne since the time of operation of the plant has increased substantially as shown below. The increase has been due to the continuous increase in the fuel collection, handling, storage and transportation cost.

Fuel	2003-04	2004-05	2005-06	2006-07 (Present)
Rice Husk	1289	1133	1250	1500
Groundnut Shells	850	1008	1036	1170
Coconut Waste	-	581	500	645
Cotton Waste	-	-	-	500

The cost of generation per unit since the operation of the plant has been increasing and the details of the cost of production since the commercial operation of the plant have been provided below. As can be seen from the table, the total cost of generation is on an average of Rs. 3.60/kWh. The revenue on the export of power to the grid is Rs. 3.16/kWh which is a loss of approximately Rs. 0.40/kWh generation.

	2003-04	2004-05	2005-06	2006 (sep)
Raw Material	60675486	62659832	45420879	30799222
Salaries	1215455	1134764	1564001	833391
O&M	5314864	6238052	8718409	3174060
Interest	15244673	14113984	10447177	4727315
Depreciation	14647349	17740928	17863147	9045281
Total	97097827	101887560	84013613	48579269
Capital Cost of Project	185000000	185000000	185000000	185000000

[5] http://www.energywatch.org.in/india_powersector.htm; http://iis-db.stanford.edu/evnts/1565/India.pdf;

Total Generation	30181200	32750700	29656200	16138400
Cost of Generation				
Raw Material	2.0	1.9	1.5	1.9
Salaries	0.0	0.0	0.1	0.1
O&M	0.2	0.2	0.3	0.2
Interest	0.5	0.4	0.4	0.3
Depreciation	0.5	0.5	0.6	0.6
Variable Cost[6]	3.20	3.10	2.80	3.00
Fixed Cost[7]	0.61	0.56	0.62	1.15
Total Cost of Generation	**3.81**	**3.66**	**3.42**	**4.15**

CDM Benefits for 10 years

	CERs	Rate (Euros)	Exchange rate	Million INR	Million Units replaced	Cost benefit per unit (Rs.)
BAOL	169630	10	57	96.69	225	0.42

The CDM benefit per unit (kWh) of power replaced is about Rs. 0.42. This CDM benefit per unit of power would definitely help the plant to operate in sustainable manner.

It is envisaged that the raw material cost would further increase, which would lead to further increase in the cost of generation.

Thus the project justifies the need of CDM funds for the project activity, which will help in significantly improving the project competitiveness and financial sustainability due to reduction in tariffs and increase in raw material cost.

2. Other Barriers (Policy Related)

BAOL has a power purchase agreement with APTRANSCO (the state power company) to purchase 100% of the power that can be exported. BAOL will be paid the tariff for the energy delivered at the interconnection point for sale to APTRANSCO at Rs. 2.25 paise per unit with escalation at 5% per annum with 1994-95 as the base year and to be revised on 1st April of every year up to the year 2003-04.

However, in a landmark decision APERC reduced the power tariffs from Rs. 3.48/- to Rs. 2.88/- per unit. As per the new proposal the tariff rates will be of two parts – fixed and variable. The fixed cost

[6] Variable Cost includes O & M cost and Fuel Cost
[7] Fixed Cost includes Captial Cost

is based on the year of commissioning and it will come down gradually over a period of 10 years, whereas variable cost will go up by 5% every year up to a control period of 5 years.

The year wise (for credit period) effect of tariff changes with respect to fixed and variable price & cost[8]

Fixed cost tariff:		Variable cost	
Year of operation	fixed cost (Rs./unit)	Financial year	Variable cost (Rs./unit)
1st	1.61	2004-05	1.27
2nd	1.57	2005-06	1.33
3rd	1.53	2006-07	1.40
4th	1.49	2007-08	1.47
5th	1.45	2008-09	1.54
6th	1.41		
7th	1.37		
8th	1.33		
9th	1.26		
10th	0.87		

As per the new policy initiative, plants operating with 80% PLF will be paid a fixed rate as per the PPA and the additional units generated at the additional PLF will be paid at a variable cost of Rs 1.20 and an increment of 21.50 paise (Rs. 0.215) per unit. Thus it is imperative that present incentive is not sufficient and the sustainability of the project will be at risk. To generate renewable power in excess of 80% PLF, the CDM funds can contribute towards viability of generation of the balance 20%, which will indirectly help in reduction of CO_2 emission, if not generated. Also, the PPA will be under revision every 5 years instead of 10 years as per the new proposal from APERC.

The existing APTRANSCO generation mix[9] comprises of (as on 31st July 2005):

- ✓ 50% thermal power plants;
- ✓ 12% Gas power plants;
- ✓ 32% hydro projects; and
- ✓ 6% Nuclear, renewable and other projects

This illustrates that biomass plants are still considered as rather financially risky proposition and with changing scenario, the CDM revenue will contribute to their financial stability. This discussion

[8] APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004

[9] http://aptranscorp.com/pact01.html

suggests that there are clear policy related threats and barrier to the project activity, which can be mitigated to certain[10] extent from CDM benefit.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Monitoring methodologies / guidelines mentioned in the UNFCCC document of "Annex B of the simplified modalities and procedures for small scale CDM project activities" for small scale projects (Type I: D) is considered as basis for monitoring methodology for the activity. The document states that the monitoring shall consist of metering the electricity generated by the renewable technology.

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of approved methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the power plant is of 4.5 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Southern Regional grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. It is observed that, in the southern regional grid generation mix, coal, diesel and gas based power projects are responsible for GHG emissions. The data published by Central Electricity Authority (CEA) has been used as the baseline emission factor. The baseline emission factor for southern grid as published by CEA is 0.860[11].

Leakage

As per the latest general guidance on leakage in biomass projects, for small scale energy CDM project activities involving renewable biomass, there are three types of emission sources that are potentially significant (>10% of emission reductions) and attributable to the project activities. These emission sources may be project emissions (if under the control of project participants, i.e. if the land area where the biomass is grown is included in the project boundary) or sources of leakage (if the source is not under control of project participants). The following table summarises for different types of biomass, the cases where the emission source is relevant and the cases where it is not.

[10] Uncertainty related to carbon market and cash flows is also a deterrent.

[11] Source: CEA, http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Biomass Type	Activity/Source	Shift of pre-project activities	Emissions from biomass generation / cultivation	Competing use of biomass
Biomass from forests	Existing forests	-	-	X
	New forests	X	X	-
Biomass from croplands or grasslands (woody or non woody)	In the absence of the project the land would be used as cropland/wetland	X	X	-
	In the absence of the project the land would be abandoned	-	X	-
Biomass residues or wastes	**Biomass residues or wastes are collected and used**	**-**	**-**	**X**

For the project activity, the following are considered to calculate the possible emissions due to leakage:

1. As the project activity uses only biomass residues and wastes, the implementation of activity did not lead to shift of pre project activities.
2. Also, the biomass that is being used in the plant is waste that is generated from various crops. This waste will anyhow be generated even in the absence of the project activity and would have burnt without using for any other purpose. The plant uses the waste generated and does not need application of fertilizer and clearance of lands. Hence, there are no emissions due to the same.
3. There is sufficient biomass available in the region and the same is revealed in Biomass assessment reports by Administrative Staff College of India (ASCI), Hyderabad. The availability of biomass material (Rice Husk, cotton, chilies, maize, etc) in the Krishna district where plant is located is around 27.35 lakh tones per annum. The total surplus biomass available after usage is estimated at 3.72 lakh tones per annum[12] which are 25% more than the present requirement including the project activity. The quantity of biomass that is available in the region is more than the quantity of biomass that is utilized including the project activity and hence the leakage can be neglected.

From the above analysis, it can be concluded that the project activity does not have any sources of leakage due to type of biomass utilised.

[12] Source: 'Socio Economic Impact Assessment of Biomass Power plants in India' – ASCI, Hyderabad

Biomass assessment in the region (Krishna District) will be carried out annually based on the latest available literature / data from the government sources to determine if the biomass is at least 25% larger than the total quantity utilized by the project activity as well as existing users. In the absence of the official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work.

$LQ_{Biomass} = [TQ_{Biomass} - (BQ_{project} + BQ_{other\ users})*1.25]$ ……(1)

$LQ_{Biomass}$ = Quantity of Biomass less than the required 25% larger than combined usage (in Kg)
$TQ_{Biomass}$ = Total Biomass Quantity available in the region in Kg
$BQ_{project}$ = Biomass Quantity utilized by project activity in Kg
$BQ_{others\ users}$ = Biomass Quantity utilized by other users in Kg

In case $LQ_{Biomass}$ is positive (+) then there would be no leakage, hence Leakage (L) will be zero. However, if $LQ_{Biomass}$ is negative (-), then the leakage would be due to the use of equivalent amount of coal in the region and the same shall be calculated using the following formule:

$L = \{[-(LQ_{Biomass}) \times NCV_{Biomass}]\} \times EF_{Coal}$ ……(2)

L = Leakage (t_{CO2})
$LQ_{Biomass}$ = Quantity of Biomass less than the required 25% larger than combined usage (in Kg)
$NCV_{Biomass}$ = Net Calorific Value of Biomass (in TJ/Kg)
EF_{Coal} = Emission Factor of Coal (IPCC Default, tCO_2/TJ)

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter	BEF
Data Unit:	t_{CO2}/GWh
Description:	Baseline Emission Factor for Southern Grid
Source of data used:	CEA
Value Applied:	0.860
Justification of the choice of data or description of measurement methods and procedures actually applied.	Combined Margin data for southern grid
Any Comments	Details of the calculation provided in Annex - 3

Data / Parameter	EF
Data Unit:	t_{CO2e}/TJ
Description:	CO_2 emission factor for each type of fuel

Source of data used:	IPCC Default Value
Value Applied:	Diesel: 20.2 (Source: IPCC)
Justification of the choice of data or description of measurement methods and procedures actually applied.	IPCC value has been used as no country specific value is available.
Any Comments	

Data / Parameter	OF_{Diesel}
Data Unit:	Not Applicable (Constant)
Description:	Oxidation Factor of each fuel type, i
Source of data used:	IPCC default values
Value Applied:	Diesel: 0.99 (Source: IPCC)
Justification of the choice of data or description of measurement methods and procedures actually applied.	IPCC value has been used as no country specific value is available.
Any Comments	

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline Emissions (Emission Reductions due to displacement of electricity or $ER_{electricity,y}$)

The basic assumptions for calculating baseline emissions of the project activity are due to the displacement of grid electricity. Hence, the following formula is applied for estimation of baseline emissions.

$ER_{electricity,y} = EF_{electricity,y} * EG_y$

The anticipated electricity export from the project activity during the year *y*, multiplied with emission factor as published by CEA (Combined Margin) for southern region grid 860 tCO2/GWh.

Project Emissions

The project proponent uses biomass as fuel. APPCB has issued Consent for Establishment to the project proponent allowing the use of coal upto a maximum of 20% as an alternate fuel during exigencies. Based on the coal consumption details of the plant, the average consumption over the last 4 years has been 15%. The same has been considered for calculation of the project emission. However, during the verification stage the CERs will be based on the actual.

The project emissions due to use of coal will be calculated using the following formulae:

$$PE_{coal} = (Q_{coal} * P_{carbon}) * 44/12$$

where,

PE = Project Emission due to coal burning at project, t_{CO2}
Q_{coal} = Total quantity of carbon used (Tons)
P_{carbon} = Percentage of Total Carbon in coal through ultimate analysis (%)

Leakage

No leakage emissions would occur due to implementation of project activity as the quantity of available biomass residues in the region is 25% larger than the quantity of biomass residues that are utilized, including the project activity.

The leakage activity identified, which contributes for GHG emissions outside the project boundary is transportation of biomass from biomass collection centers to biomass power project site. Calculation of leakage has been carried-out as under:

Biomass to be transported by trucks	49000	MT/year
Capacity of each truck	10	MT
Number of return trips	13	per day
Distance of procurement (average)	75	Km
Distance covered	1006.85	Km
Mileage (Average)	3	Km/litre
Total diesel consumption	335.62	litres/day
No of days of operation	365	days/year
Diesel consumption/year	122500	Litres
Diesel consumption/year	109025	kg
Density of diesel	0.89	kg/l
Calorific value of diesel	10072	Kcal/Kg
CO_2 emissions from diesel considering IPCC's oxidation factor of diesel as 0.99 tCO_2/TJ	74.1	TCO_2/ TJ
Annual GHG emissions	**340**	**tonnes/ year**

Since the leakage emission is less than 1% of the total emission reduction, the same has been neglected. In addition to above, project emissions also occur due to transportation of the fly ash for disposal. Plant generates around 10000 tons of fly ash per annum. Number of trips to dispose fly ash to destination is around 3 per day. However, the distance of transport of fly ash from the plant to brick manufacturers in the area is well below 25 km and number of truck trips per annum are less than 600, hence the emissions due to the same have also been neglected.

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Operating Years	Project Emissions (tonnes of CO_2)	Baseline Emissions (tonnes of CO_2)	Estimation of leakage (tonnes of CO_2)	Estimation of overall Emission Reductions (tonnes of CO_2)
2007-2008	4615	21578	0	16963
2008-2009	4615	21578	0	16963

2009-2010	4615	21578	0	16963
2010-2011	4615	21578	0	16963
2011-2012	4615	21578	0	16963
2012-2013	4615	21578	0	16963
2013-2014	4615	21578	0	16963
2014-2015	4615	21578	0	16963
2015-2016	4615	21578	0	16963
2016-2017	4615	21578	0	16963
Total (tonnes of CO_2e)	**46150**	**215780**	**0**	**169,630**

Therefore, a conventional energy equivalent of 250 Million kWh for a period of 10 years in AP would be saved by exporting power from the 4.5 MW Biomass based power plant which in turn will reduce 169,630 tons of CO_2 emissions considering baseline calculations.

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Parameter	E_{Gen}
Unit:	kWh
Description:	Electricity Generated
Source of Data:	Tri-vector Energy Meter
Value of Data:	28.5 million kWh per annum
Brief description of measurement methods and procedures to be applied:	The parameter is measured using a tri-vector energy meter available in the switch yard at BAOL.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards.
Any Comments	

Parameter	E_{Aux}
Unit:	kWh
Description:	Auxiliary Consumption
Source of Data:	Tri-vector Energy Meter
Value of Data:	3.4 million kWh per annum
Brief description of measurement methods and procedures to be applied:	The parameter will be calculated based on the export and total generation.

QA/QC procedures to be applied (if any):	The data will be directly monitored at the project site. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards
Any Comments	

Parameter	E_{Exp}
Unit:	kWh
Description:	Power Export
Source of Data:	Tri-vector Energy Meter
Value of Data:	25.09 million kWh per annum
Brief description of measurement methods and procedures to be applied:	The parameter is measured using a tri-vector energy meter available in the switch yard at APTRANSCO sub-station.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored by APTRANSCO. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards.
Any Comments	

Parameter	E_{imp}
Unit:	kWh
Description:	Power Import
Source of Data:	Tri-vector Energy Meter
Value of Data:	-----
Brief description of measurement methods and procedures to be applied:	The parameter is measured using a tri-vector energy meter available in the switch yard at APTRANSCO sub-station.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored by APTRANSCO. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards.
Any Comments	

Parameter	Q_{bio}
Unit:	MT
Description:	Fuel Used (Biomass)
Source of Data:	Weigh Bride reading
Value of Data:	-
Brief description of measurement methods and procedures to be applied:	The parameter is measured using a weigh bridge located at the project site. The truck carrying the fuel will be weighed twice upon entry with the biomass and during exit after unloading.
QA/QC procedures to be	The data will be directly measured and monitored at the project site.

applied (if any):	All relevant records will be checked to ensure consistency. The weigh bridge will be calibrated as per the standards.
Any Comments	The data on quantity of fuel will be separate for all types of fuels

Parameter	NCV_{bio}
Unit:	Kcal
Description:	NCV (Biomass)
Source of Data:	Analysis reports
Value of Data:	-
Brief description of measurement methods and procedures to be applied:	Through sample testing in lab which will be done batch wise.
QA/QC procedures to be applied (if any):	The data will be based on the laboratory analysis. The instruments used for the analysis will be checked for their calibration.
Any Comments	Based on the sample tests conducted.

Parameter	$Q_{Fossil, i}$
Unit:	MT
Description:	Fuel Used (Coal)
Source of Data:	Weigh Bride reading
Value of Data:	-
Brief description of measurement methods and procedures to be applied:	The parameter is measured using a weigh bridge located at the project site. The truck carrying the fuel will be weighed twice, upon entry with the fuel and during exit after unloading.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The weigh bridge will be calibrated as per the standards.
Any Comments	The data on quantity of fuel will be separate for all types of fuels

Parameter	NCV_{Fossil}
Unit:	Kcal
Description:	Net Calorific Value of fossil fuel
Source of Data:	Coal: Lab Analysis HSD: Test report by Indian Oil Corporation Limited
Value of Data:	Coal: 3900 Diesel: 10200
Brief description of measurement methods and procedures to be applied:	The lab analysis of the coal samples will be done batch wise. IOCL value has been taken as the standard for diesel.
QA/QC procedures to be	The data will be directly measured and monitored at the project site.

applied (if any):	All relevant records will be checked to ensure consistency.
Any Comments	-

Parameter	P_{carbon}
Unit:	Percentage (%)
Description:	Total carbon content of Coal
Source of Data:	Lab Analysis
Value of Data:	-
Brief description of measurement methods and procedures to be applied:	The lab analysis of the coal samples will be done batch wise. The instruments used for the analysis will be checked for their calibration.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency.
Any Comments	-

B.7.2 Description of the monitoring plan:

>>

Project proponent implemented the following operational and management structure in order to monitor emission reductions and any leakage effects, generated by the project activity

Project proponent formed a CDM team/committee comprising of persons from relevant departments, which will be responsible for monitoring of all the parameters mentioned in this section. In the CDM team, a special group of operators will be formed who will be assigned responsibility of monitoring of different parameters and record keeping. On daily basis, the monitoring reports will be checked and discussed. On monthly basis, these reports will be forwarded at the management level.

CDM Team

Process Owners and Responsibilities

Plant Manager: Plant operation with the help of shift-in-charge. One shift-in-charge for each shift and the plant runs for 3 shifts per day. Coordinate with yard-in-charge and yard supervisors to monitor receipt of raw materials and consumptions. Coordinate with time office for staff duties and attendance. Reject any raw material based if not permitted to use.

Manager Stores and Purchase: Purchase of raw materials and equipments such as spares, etc, in consultation with Jt. Managing Director and Director Technical. Reject any raw material based if not permitted to use.

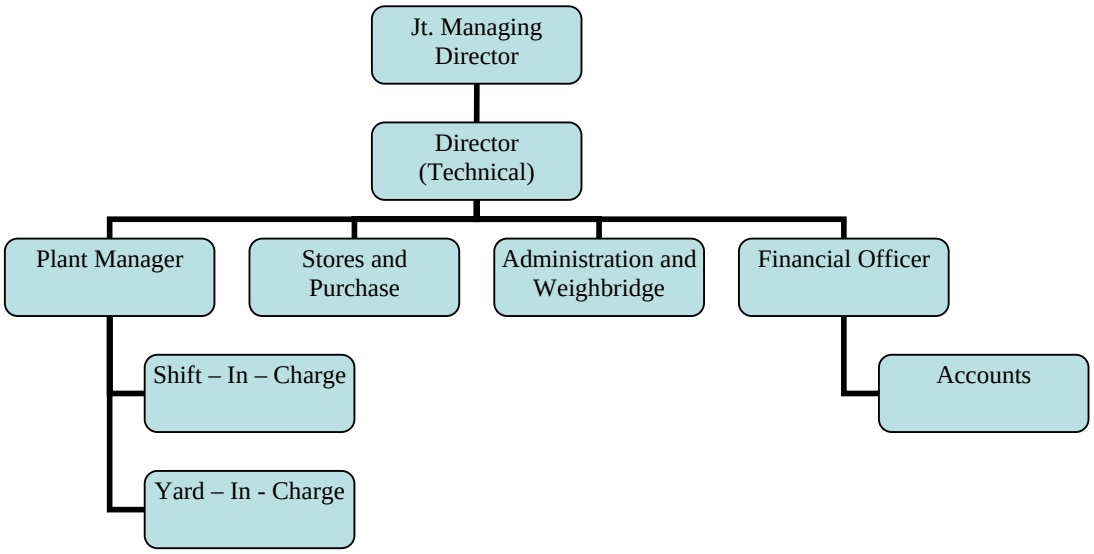
Weighbridge Operator: Weighing of raw materials and reporting the same to Jt. Managing Director on shift basis. Reject any raw material based if not permitted to use.

CDM – Executive Board

Financial Officer: Submission of bills, raise invoice, collection of payments from vendors and APTRANSCO in coordination with accounts department. Report to Jt. Managing Director on financial matters of the plant.

Accounts: to compile receipts from plant, purchase department, weighment slips, check for quantity and price and verify the bills, report to Financial Officer and Jt. Managing Director for final approval.

The organization chart is as given below:



B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

Date of completing the final draft of this baseline section: ***DD/MM/YYYY***

01/02/2007

Name of person/entity determining the baseline:

Balaji Agro Oils Limited, who is also a project participant (as mentioned in Annex-I)

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

Start date of the project is 19/12/2001 and is operational since 2nd June 2003.

C.1.2. Expected operational lifetime of the project activity:

>>

Life time of the project: 20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

15/06/2007. The project participant will not commence the crediting period prior to the date of registration.

C.2.2.2. Length:

>>

10 years (10-y)

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

The project being a renewable energy biomass based power project it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification dated June 13, 2002 based on environment protection rule, 1986, public hearing and EIA is required for those industries/projects which are listed in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs. 100 crore have been excluded from the list. Hence, it is not required by the host party.

However, detailed environmental management plan is in place in the project activity location. Brief description on the measures taken towards the environment protection in the plant is given below:

1. Stack height of 50 m is provided for effective dispersion of pollutants.
2. Electrostatic precipitator is provided to bring down the SPM emissions from boiler to 115 mg/Nm^3.
3. The boiler blow down due to its higher pH is neutralized before mixing with other effluent streams.
4. The sanitary waste water is treated in septic tank.
5. Reflected noise is reduced by the use of absorbent material on roofs, walls and floors.
6. Plantation of small and tall trees is done around the plant area for better environment.
7. The ash collected from the ESP is utilized for brick manufacturing/provided free to the farmers for use as manure in the agricultural fields.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Not Applicable

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

The local stakeholder comment invitation and compilation process involved is as follows:

The local stakeholders are those who face the immediate effect due to the project activities which involves effect on the local environment, social life and economics. They can be within the boundaries of the village, district, state or nation.

On deciding above criteria for qualification of the stakeholders, the idea was to decide most appropriate representatives who are covering above. During interaction of the corporate headquarter and the plant management, the stakeholders were identified as:

- Office bearers of the neighbouring villages local bodies
- Biomass suppliers
- Customer (APTRANSCO)
- Licensing and regulatory authorities like
  - NEDCAP
  - APPCB

BAOL has been constantly in touch with other identified stakeholders like licensing and regulatory authorities. Their views are reflected in the form of permissions granted for the project. In this aspect, the permission by APPCB is indication of favorable impression for the project.

BAOL had conducted the stakeholder consultation process on 23rd November 2006 at the plant site. Among the people present were the local villagers, village administrator, temporary employees at the plant site, and biomass supplier.

BAOL had invited the stakeholders to provide their general feedback on the project activity and specifically asked the villagers and their representative to give them information on how the project has helped them improve their livelihood. The biomass supplier/s was asked to provide them information on how they procure the biomass for the plant and also about the difficulties faced during the procurement. They were also asked whether there has been any improvement on the business opportunities in the area.

Stakeholders Involvement

The village *Panchayat* /local elected body of representatives are true representative of the local population in India. Hence, their consent / permission to set up the project are necessary. BAOL has already completed the necessary consultation and documented their approval for the project.
Local population comprises of the people from the village/town in and around the project area. The role

of the local population is as a beneficiary of the project. The local population will be involved in the supply of the biomass and hence the project would be a beneficial for the local population. In addition to this, the project activity would also lead to increased employment opportunities by employing local villagers working in the plant. Since, the project will provide good direct and indirect employment opportunities the local populace is encouraging the project.

The project does not require rehabilitation/resettlement of any local population. In addition, the local population is also an indirect consumer of the power that is supplied from the power plants.

The distance between the electrical substation for power evacuation and the plant is less than 1km and installation of transmission lines will not create any inconvenience to the local population.

APPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. The project has already received Consent for Establishment (CFE) from APPCB to start the plant.

Ministry of Non-Conventional Energy Sources (MNES) implements policies in respect of non-conventional renewable power projects in India and has accorded approval to the project.

As a buyer of the power, the APTRANSCO is a major stakeholder in the project. They hold the key to the commercial success of the project. APTRANSCO has already cleared the project and BAOL has already signed Power Purchase Agreement (PPA) with APTRANSCO.

The government of India, through Ministry of Non-conventional Energy Sources (MNES), has been promoting energy conservation, demand side management and viable renewable energy projects including wind, small hydro and bagasse cogeneration / bio-mass power. The project meets their requirements.

E.2. Summary of the comments received:

>>

As mentioned above, BAOL has already received the approvals and clearances for their project from the following stakeholders:

- Consent order of Establishment from APPCB;
- Power Purchase Agreement with APTRANSCO;
- Clearance from the Gram Panchayat, Davuluru village

Although, for this project, public participation at any stage of project implementation is not required, being a CDM activity, project proponent has invited the local stakeholders including Sarpanch (head) of village, representative of local population and biomass suppliers to express their views on the project by

sending letters to the concerned offices/persons and arranging a meeting at the project site. The summary of the feedback received is presented as below.

The Panchayat Office representative (Member of locally elected body) expressed his happiness about the implementation of project in his village since the project activity uses agricultural waste, it is giving the farmers additional revenue.

Representative biomass supplier also expressed their support to the project activity by BAOL in this area, which has provided them an opportunity of small business. Earlier the biomass supplier had to keep their truck idle as they did not have much business, with the implementation of the project, the suppliers not only run the existing trucks continuously, they have also bought new trucks to support their expanding business.

In summary, every stakeholder expressed that the project activity is helping the socio-economic development of the village and nearby area without affecting the local environment adversely.

E.3. Report on how due account was taken of any comments received:

>>

Not applicable. All positive comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Balaji Agro Oils Limited
Street/P.O.Box:	D. No. 74-2-19,
Building:	Krishna Nagar
City:	Vijayawada
State/Region:	Andhra Pradesh
Postfix/ZIP:	520 007
Country:	India
Telephone:	+91-866- 2823537
FAX:	+91-866- 2822673
E-Mail:	balajiagro@rediffmail.com
URL:	
Represented by:	
Title:	Director (Technical)
Salutation:	Mr.
Last Name:	Medabalimi
Middle Name:	-
First Name:	Bhanu Prasad
Department:	-
Mobile:	+91-98660-77674
Direct FAX:	+91-866- 2822673
Direct tel:	+91-866- 2823174
Personal E-Mail:	balajiagro@rediffmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding is available to the project.

Annex 3

BASELINE INFORMATION

Generation Data, Emission Data published by Central Electricity Authority, Government of India.
http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Gross Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	144,292	151,185	155,385	165,735	168,438	179,751
East	58,936	64,048	66,257	75,374	85,776	93,902
South	129,035	131,902	136,916	138,517	144,086	147,355
West	162,329	165,805	177,399	172,682	183,955	188,606
North-East	5,319	5,332	5,808	5,867	7,883	7,778
India	499,911	518,272	541,764	558,175	590,138	617,392

Net Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	135,230	141,415	144,743	155,043	157,291	168,206
East	53,350	58,097	59,841	68,428	77,968	86,014
South	121,158	123,630	127,789	128,373	134,676	138,329
West	150,412	153,125	164,448	159,780	170,726	176,003
North-East	5,195	5,213	5,671	5,752	7,762	7,655
India	465,345	481,479	502,492	517,376	548,423	576,206

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	25.9%	25.7%	26.1%	28.1%	26.8%	28.1%
East	10.8%	13.4%	7.5%	10.3%	10.5%	7.2%
South	28.1%	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.2%	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	42.2%	41.7%	45.8%	41.9%	55.5%	52.7%
India	19.2%	18.9%	16.3%	17.1%	18.0%	20.1%

Net Generation in Operating Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	100,189	105,076	106,942	111,450	115,151	120,869
East	47,570	50,308	55,377	61,378	69,746	79,863
South	87,114	92,103	104,449	107,603	105,568	100,978
West	138,071	140,173	150,889	145,264	155,731	154,918
North-East	3,002	3,039	3,074	3,343	3,456	3,621
India	375,947	390,700	420,730	429,040	449,653	460,249

20% of Net Generation (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	27,046	28,283	28,949	31,009	31,458	33,641
East	10,670	11,619	11,968	13,686	15,594	17,203
South	24,232	24,726	25,558	25,675	26,935	27,666
West	30,082	30,625	32,890	31,956	34,145	35,201

North-East	1,039	1,043	1,134	1,150	1,552	1,531
India	93,069	96,296	100,498	103,475	109,685	115,241

Net Generation in Build Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					32,064	34,340
East					15,818	17,567
South					27,987	28,158
West					35,257	35,425
North-East					2,055	1,793
India					113,181	117,283

EMISSION DATA

Absolute Emissions Total (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515
South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Absolute Emissions OM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515
South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Absolute Emissions BM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					17,108,583	20,622,114
East					14,303,611	16,990,438
South					19,839,024	20,029,713
West					27,148,870	22,318,133
North-East					299,121	266,981
India					78,699,210	80,227,378

EMISSION FACTORS

Weighted Average Emission Rate (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.72	0.73	0.74	0.71	0.71	0.71
East	1.09	1.06	1.11	1.10	1.08	1.08
South	0.73	0.75	0.82	0.84	0.78	0.74
West	0.90	0.92	0.90	0.90	0.92	0.87

North-East	0.42	0.41	0.40	0.43	0.32	0.33
India	0.82	0.83	0.85	0.85	0.84	0.82

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.98	0.98	1.00	0.99	0.97	0.99
East	1.22	1.22	1.20	1.23	1.20	1.16
South	1.02	1.00	1.01	1.00	1.00	1.01
West	0.98	1.01	0.98	0.99	1.01	0.99
North-East	0.73	0.71	0.74	0.74	0.71	0.70
India	1.02	1.02	1.02	1.03	1.03	1.02

Build Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.53	0.60
East					0.90	0.97
South					0.71	0.71
West					0.77	0.63
North-East					0.15	0.15
India					0.70	0.68

Combined Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.76	0.76	0.77	0.76	0.75	0.80
East	1.06	1.06	1.05	1.07	1.05	1.06
South	0.87	0.85	0.86	0.86	0.85	0.86
West	0.87	0.89	0.88	0.88	0.89	0.81
North-East	0.44	0.43	0.44	0.44	0.43	0.42
India	0.86	0.86	0.86	0.86	0.86	0.85

Annex 4

MONITORING INFORMATION

All the parameters mentioned in the monitoring plan have been monitoring in the plant but in other formats. The entire process of monitoring has been streamlined and will be made available in the required format during the verification process and for subsequent useful purposes. The Fuel Consumption data, etc are being maintained in different formats. The data formats for CDM have already been finalized and started monitoring accordingly to ensure and demonstrate existence of MVP in the plant.

The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified and approved by Plant Manager. These records are being sent to Head Office for review by the Director and for corrective actions if necessary.

Further, Internal Auditors also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system.

The Plant is equipped with energy meters/export meters for monitoring and control purpose. The energy meters shall be tested and calibrated utilizing a standard meter. The standard meter shall be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Andhra Pradesh as per terms and conditions of supply. The tests of meters shall be jointly conducted by authorised representatives of both the parties and the results and correction so arrived at mutually will be applicable and binding on both the parties. The energy meters shall not be interfered with, tested or checked except in the presence of representatives of company and APTRANSCO. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced. The meters will be checked in presence of both the parties on mutually agreed periods. If during the test checks both the meters are found beyond permissible limits of error, both the meters shall be immediately replaced and the correction applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter. Corrections in exported energy shall be applicable to the period between the two previous monthly reading and the sate and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption are being recorded at the plant from the installed meters. However, for applying monthly bill to APTRANSCO the meter readings will be taken on 22nd of every month by APTRANSCO officials in presence of company representatives and readings will be jointly certified.

The following log sheets are being maintained for the critical equipment of the plant and readings are being recorded on day to day basis:

1. Turbine log
2. Boiler log
3. Electrical log

If both the main and check meters fail to record or if any of the PT fuses are blown out, the export energy will be computed on a mutually agreeable basis for the point of defect.

Power generation, export and auxiliary consumption, fuel consumption are being recorded at the plant daily and the same is being verified by Manager of the plant. These records sent to head office for review by the director and for corrective actions if necessary.

Emission levels are being monitored as per the statutory requirement. Plant emission levels are being monitored and the results are being sent to APPCB. For this purpose, the service of external agency is being utilized.

- - - - -

Appendix – A

CALCULATION OF BASELINE EMISSION FACTORS AND EMISSION REDUCTIONS DUE TO 4.5 MW BIOMASS BASED POWER PROJECT (BAOL)

Methedology Used: The weighted average emissions of current generation mix (Balaji Agro Oils Ltd.)

Year of offer		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
On-Site Project Emission Reductions												
Generation capacity , KW		4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Plant load factor, %		80	80	80	80	80	80	80	80	80	80	80
No. of hours of plant operation per annum		4320	7920	7920	7920	7920	7920	7920	7920	7920	7920	3600
No. of units generated in a year, millions		15.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	13.0
Auxilliary consumption per annum		1.9	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	1.6
No. of units exported to grid, millions		13.69	25.09	25.09	25.09	25.09	25.09	25.09	25.09	25.09	25.09	11.40
T&D losses considered on exportable power		0	0	0	0	0	0	0	0	0	0	0
No. of units replaced in the grid, millions units	225.82	13.69	25.09	25.09	25.09	25.09	25.09	25.09	25.09	25.09	25.09	11.40
Baseline emission factor considered, $kgCO_2/kWh$		0.860	0.860	0.860	0.860	0.860	0.860	0.860	0.860	0.860	0.860	0.860
Baseline emissions, tones		11770	21578	21578	21578	21578	21578	21578	21578	21578	21578	9808
Generation by coal as supplimentry fuel (15%)		2.333	4.277	4.277	4.277	4.277	4.277	4.277	4.277	4.277	4.277	1.944
Emission factor considered for coal, $kgCO_2/kWh$		1.079	1.079	1.079	1.079	1.079	1.079	1.079	1.079	1.079	1.079	1.079
Project emissions, tones		2517	4615	4615	4615	4615	4615	4615	4615	4615	4615	2098
Net greenhouse gas emissions, tones		9253	16963	16963	16963	16963	16963	16963	16963	16963	16963	7711
Actual green power to grid, millions units	225.82											
Carbon emission reductions in a year		9253	16963	16963	16963	16963	16963	16963	16963	16963	16963	7711
Commitment period												
No. of years of delivery of CERs	10 years											
Total number of CERs	169632		47.50									

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	total
Baseline emissions	11770	21578	21578	21578	21578	21578	21578	21578	21578	21578	9808	215779
Project emissions	2517	4615	4615	4615	4615	4615	4615	4615	4615	4615	2098	46147
Emission reductions	9253	16963	16963	16963	16963	16963	16963	16963	16963	16963	7711	169632