CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

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SECTION A. General description of the small-scale project activity

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

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Perpetual 7.5 MW Non-Conventional Renewable Sources Biomass Power Project (Project name in Host country Approval: 7.5 MW Biomass Based Power project)

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

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Purpose

The purpose of the project essentially is to utilize the available biomass fuels[1] in the region effectively for generation of clean and green power. The generated power will be sold to the power deficit state grid for sustainable economic growth, conservation of environment through use of freely and abundantly available biomass fuels and Green House Gas (GHG) emission reduction. The project will also help certain extent to bridge the gap between the ever-increasing demand and supply of electricity in the state of Andhra Pradesh (AP).

The primary fuels proposed for the power plant are Rice Husk, Juliflora and Bagasse. The fuel requirement for 100% capacity is 26,850 t/yr of rice husk, 21,470 t/yr of juliflora and 23,250 t/yr of bagasse. Perpetual Energy Systems Private Limited (PESPL) proposes to use each of the fuels for a period of 4 months in a year and utilize the availability of fuel from the Vizianagaram district. A survey carried out indicates that the fuels to be used are available in abundance within radii of 25 km from the plant site. Other fuels like cotton stalk, blackgram stalk and groundnut shell are also available abundantly and will also be considered as alternative fuels. Vizianagaram district is one of the prominent agriculturally and industrially developed districts of Andhra Pradesh.
Considering the adequate availability of biomass in the area, PESL have set up a power plant at Appayyapeta village, Seetanagarm Mandal, Vizianagaram district, Andhra Pradesh.

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

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

[1] Sustainably grown renewable cyclic crops.

Contribution to Sustainable Development

The project activity is a renewable energy power project for power generation and export of clean power to Transmission Corporation of Andhra Pradesh (APTRANSCO). This generation of power will substitute the power generated and fed to conventional fossil fuels dominated grid.

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and place immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the effective utilization of Renewable Energy (RE) sources.

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.

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

Project activity contributes to the sustainable development in following way:

1. Social well being:

- Since, the project is in a rural area, the project has led to the development of the region.

- Since, the biomass resources are collected and transported to the plant site from the fields, opportunities are generated for the rural people to collect and transport biomass. This has resulted in the enhanced employment of the rural people.

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

- More and more rural industries are expected to be set up as a consequence to the power plant in the area. This also will cause infrastructure development in the area, which ultimately leads to the rural development. This also prevents the migration of the rural poor to cities large extent due to opportunities created by the power plant.

- In order to ensure sustained sources of raw material supply to the power plant, the company has embarked on encouraging energy plantation by the farmers in their wastelands.

2. Economical well being:

- The project activity has generated employment in the local area. The project has also provided economic value to agricultural and wood wastes and has provided stable and quality power to neighboring industries, farmers and households. The project has created business opportunities for local stakeholders such as bankers, consultants, suppliers, manufacturers, contractors *etc*.

- The main resources for power generation are biomass fuels such as rice husk, Juliflora etc. Crop residues are collected from the farmers out of their field and brought to the project, thus generate additional revenue on account of supply of these crop residues to the project, which are otherwise being under-utilized / burnt so far with no commercial value. In other words, the plant is generating commercial value to crop residues enabling the farmers to get better price out of their produce augmenting their income. The above benefits due to project activity ensure that the project contributes to the social and economic well being in the region.

3. Environmental well being

- Since, the project uses only biomass materials for power generation, which otherwise would have been a fossil fuel such as coal, lignite and gas, the project does not lead to GHG emissions. Combustion of biomass materials in the project result in GHG emissions of CO_2, CH4 and NOx. The major constituent of GHG emissions is CO_2 which about 98%, whereas CH_4 and NOx constitute the remaining 2%. This can well be evidenced from the typical ultimate analysis[3] of biomass materials, which indicates the Nitrogen content is within 1 to 2%, therefore CH_4 emission is negligible. Hence the CO_2 is considered as the only GHG emissions from the biomass combustion.

[3] Chemical analysis of elements in the fuel (biomass).

- Since the biomass is formed by fixing the atmospheric CO_2 by the action of photosynthesis in the presence of sunlight, the CO_2 released due to combustion of biomass is assumed to be equal to the CO_2 fixed by the photosynthesis. Again the CO_2 released during the combustion will be consumed by the plant species for their growth. In view of the above, biomass combustion and growth of biomass and associated CO_2 consumption and release can be treated as cyclic process resulting in no net increase of CO_2 in the atmosphere. Hence, the project activity will not lead to GHG emissions.

4. Technological well being

- The technology selected for the proposed project is a more energy efficient technology due to the following features. The project uses a steam turbo generator with matching boiler of traveling grate type capable of firing multiple fuels with highest possible system efficiency. In addition, the auxiliary power consumption for traveling grate type is relatively less than other efficient combustion systems.

In view of the above the project participant considers that the project activity profoundly contributes to the sustainable development.

A.3. Project participants:

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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	Perpetual Energy Systems Private Limited (Private entity)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

See contact information in Annex-1 to this PDD

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

>> The project activity is a 7.5 MW (gross) capacity grid-connected biomass based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project is

expected to export around 6.6 MW power to the APTRANSCO grid after considering auxiliary power consumption of 11%. The plant is operating at an annual average plant load factor of 80% and more.

As per MNES guidelines for the biomass based power plant projects, use of coal as a fuel is allowed maximum up to 30% on annual basis and the same has been considered for the conservative estimation of project emissions though the percent allowed by APPCB is less than the same. Although Perpetual is using coal as a fuel in case of shortage of biomass only, maximum use of coal (30%) has been considered for estimation of project emissions to arrive at conservative figure of GHG emission reductions. To arrive at the average CO2 emission factor of coal, low calorific Indian and high calorific imported coal has been considered for calculations and actual figures of calorific values and carbon contents needs to used during the verification.

Further, no transmission and distribution losses are considered while calculating GHG emission reductions, since the project exports power to the APTRANSCO grid, which is located at about 0.5 km from the site.

The power plant has one condensing steam turbo generator unit with a matching boiler of traveling grate type capable of firing multi fuels with rice husk, juliflora and bagasse as the main fuels. All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 33 tons per hour of steam. The steam turbine is a straight condensing type machine with uncontrolled bleeds for deaerator feed water heating. The steam conditions at the boiler heat outlet are a pressure of 67 kg/cm2 and temperature of 495^0C. The higher steam operating parameters result in higher annual savings of fuel per annum when compared to lesser steam operating parameters like 44 kg/cm2 and temperature of 440^0C.

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

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A.4.1.1. Host Party(ies):

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India

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

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Andhra Pradesh

A.4.1.3. City/Town/Community etc:

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Vizianagaram district

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

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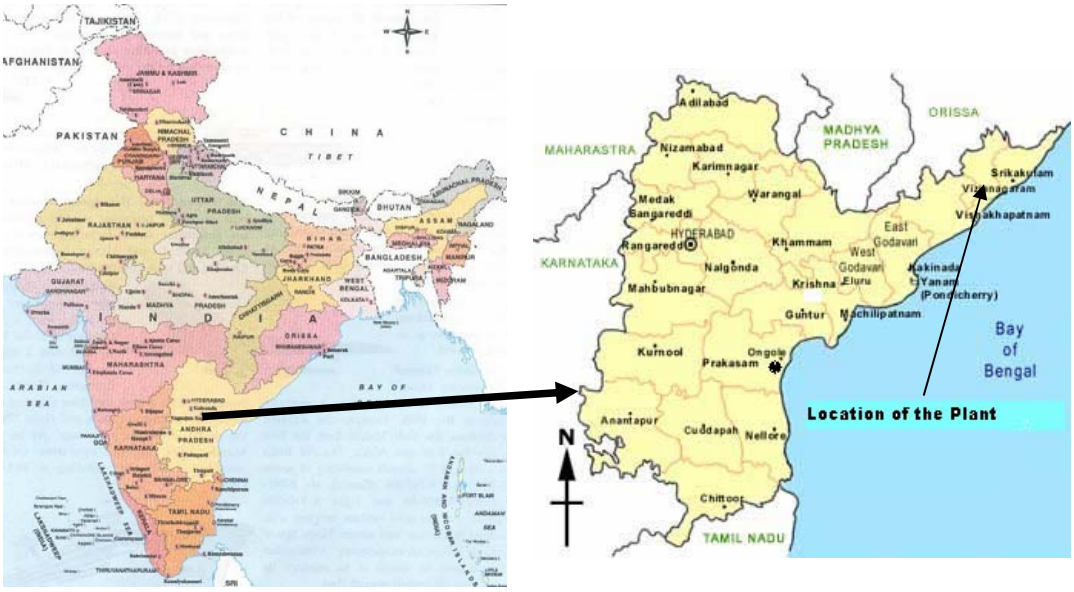
The plant is located at Appayyapeta village, Seetanagarm Mandal Vizianagaram district, Andhra Pradesh. The site for the plant has already been acquired and the plot area measures 18 acres (72,842.85 m^2). Suvarnamukhi river flows from the southern side of the plant site. The plant site is approachable by an all weather motorable road. Source of water for the plant is from the borewells in the plant site. Power generated from the plant is proposed to be evacuated to APSEB grid through their 132/33 kV Seetanagaram sub station which is about 0.5 km in East direction from the site.



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

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As per Clause 2 of Type I.D of Appendix B of **simplified modalities and procedures for small-scale CDM project activities (Version 05: 25 February 2005),** in case of unit which co-fires renewable biomass and fossil fuel the capacity of the entire unit shall not exceed the limit of 15 MW, for the project to qualify as a small-scale CDM project. Therefore, the proposed project activity can be defined under

Main Category: Type I - Renewable Energy Project (Small Scale)

Sub Category: "D", Renewable Electricity Generation for a Grid (Biomass based Power Project)

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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The power plant uses environmentally sustainable grown biomass. The GHG emissions of the combustion process, mainly CO_2, is consumed by plant species, representing a cyclic process. Since, the biomass contains only negligible quantities of other elements like Nitrogen, Sulphur *etc.* release of other GHG are considered as negligible. The biomass is CO_2 neutral and thus environmentally benign limiting greenhouse effect.

Clean and green energy equivalent of around 202.20 Million kWh for a period of 7 years in AP would be exported to state grid from the 7.5 MW non-conventional renewable sources biomass based power plant thereby resulting in CO_2 emission reduction of around 142,324 tonnes. In the absence of the proposed activity, the same energy load would have been taken-up by thermal power plants and emission of CO_2 would have occurred due to combustion of conventional fuels like coal / diesel/gas.

According to the draft 16th electrical power survey[4] conducted by the Central Electricity Authority (CEA), the projected growth in the total energy consumption is expected to be 7.5 % per annum for the period 1997-98 to 2004-05. The energy requirement - 392 billion kWh in 1997-98 - is assessed to be 632 billion kWh in 2004-05. This puts tremendous pressure on fast depleting natural resources to use more to meet the continuous increase in demand. Effective utilization of abundantly available renewable energy sources to minimize the usage of fossil fuels is the need of the hour. However, due to various technical and policy related barriers (as mention in section B3) the share of renewable energy in the APTRANSCO grid is minimal. The power plant not only justifies the shortage of power availability and energy but also the eco-friendly power generation.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual estimation of emission reductions in tonnes of CO_2e
2003-2004	20332
2004-2005	20332
2005-2006	20332

[4] CEA Publication

Years	Annual estimation of emission reductions in tonnes of CO_2e
2006-2007	20332
2007-2008	20332
2008-2009	20332
2009-2010	20332
Total estimated reductions (tones of CO2e)	**142,324**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	20,332

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

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No public funding from parties included in Annex I is available to the project. Project is implemented with equity of project proponent (PESPL) and long term debt by Indian bank.

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

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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.

With reference to the criteria mentioned, this biomass power plant is not a de-bundled component of a large project activity as there is no registered small scale CDM project activity (previous 2 yrs) or an application to register another small scale CDM project activity by the same (PESPL) project proponent, in the same project category and technology/measure with project boundary within 1 km radius of this project activity.

SECTION B. Application of a baseline methodology:

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

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Title:

Renewable electricity generation for a grid

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 is 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 biomass that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or nonrenewable biomass fired generation unit.

B.2 Project category applicable to the small-scale project activity:

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Main Category: **Type I - Renewable Energy Power project**

Sub Category: **I. D Renewable Electricity Generation for a Grid**

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. 7 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_2/kWh) calculated in transparent and conservative manner as under:

a) The average of the "approximate operating margin" and "build margin", where;

i) The "Approximate operating margin" is the weighted average emissions (in kg CO2 equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

ii) The 'Build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[5] 20%[6] of existing plants or the 5 most recent plants";

OR

b) The weighted average emissions (in kgCO_2equ/kWh) of current generation mix.

Considering the available guidelines and the present project scenario, Southern regional grid, to which the project will feed the power through AP state grid, has been chosen for baseline analysis. The baseline data used to calculate the grid emission factor is given in Annex – III.

B.3. 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:

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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 Appendix 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

[5] Generation data available for the most recent year

[6] If 20% falls on part capacity of a plant, that plant is included in the calculation

barrier(s) ;

1. Financial barrier

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 under external conditions like

a) The increase in cost of fuel ; and
b) The decrease 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 use more (or may use) financially viable option such as coal as fuel.

Raw material cost since inception has increased, a brief comparison of which is given herewith.

	DPR COST (RS.)	**EXISTING COST (2004-05) (RS.)**
Rice husk	1150	1350
Bagasse	775	875
Juliflora	700	850

Due to the increase in the raw material cost there has been a continuous increase in the cost per unit of generation since the project inception. It is envisaged that the raw material cost in the subsequent years would continue to increase.

PESPL Power has also initiated energy plantation in 1 acre of land near the plant site to ensure continuous supply of raw material to the plant.

Due to the increase in the raw material cost there has been a continuous increase in the cost per unit of generation since the project inception. The increase in the raw material cost, per unit of generation since the project inception has been observed. It is envisaged that the raw material cost in the subsequent years would continue to increase.

The initial PPA with the off taker APTRANSCO was signed at a tariff of Rs. 2.25 per unit with base year as 1995-96 and 5% escalation per year. The tariff for the year 2003-04 was Rs. 3.48 per unit. However, with the revised[7] tariff order by Andhra Pradesh Electricity Regulatory Commission (APERC), the tariff rate is Rs 2.88 per unit. This would result in heavy financial losses and put an additional burden on the financial sustainability of the project.

CDM Benefits per 7 years

	CERs	Rate (Euros)	Exchange rate	INR	Million Units replaced	Cost per unit (Rs.)
PESPL	142,324	5	55	39,138,969	202.2	0.19

The CDM benefit per unit (kWh) of power replaced is about Rs. 0.19. Hence, the total benefit for PESPL including the tariff cost of Rs. 2.88 would amount to Rs. 3.07, which is lower than the existing cost of generation i.e. Rs. 3.15 per unit.

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

PESPL also faces regulatory barrier in the form of changing tariff policy of APERC. There was a significant reduction in IRR of the project after introduction of new tariff order for renewable energy (RP 84 / 2003 in O.P. no. 1075 /2000 dated March 20, 2004), which made project financially vulnerable to government policies.

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. Funding for the project:

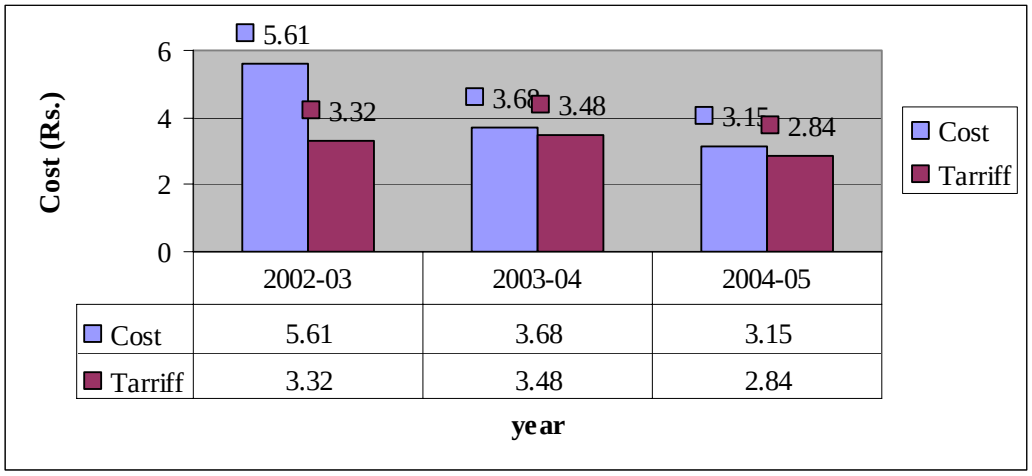
The project was initially considered finance from the Indian Renewable Energy Development Authority (IREDA) at net interest rate of 14.5%. The interest subsidy of 2% by IREDA was originally conceived in the financial closure of the project. However, due to the change in the government policy the subsidy was withdrawn. Hence, subsequently, the plant availed loan from Power finance Corporation (PFC) with the same interest rates.

3. Policy related barriers

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

APERC in a landmark order[3] has proposed to reduce the power tariff rates for non-conventional energy sources. The rate per unit has been decreased from Rs 3.48/- per unit 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 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.

However, it has been observed that the cost of the fuel from inception to date has increased, thereby increasing the cost of generation. This has resulted in creating an imbalance in the % increase in variable cost and operating cost. The cost of per unit generation as against the tariff received is shown below. It is clearly evident that the project has been operating at losses due to the higher operating cost and lower tariff order. Hence, the CDM funds would ensure that the project is financially sustained and make the project financially viable.



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

Fixed cost tariff:

Year of operation	fixed cost (Rs./unit)
1st	1.61
2nd	1.57
3rd	1.53
4th	1.49
5th	1.45
6th	1.41
7th	1.37
8th	1.33
9th	1.26
10th	0.87

Variable cost

Financial year	Variable cost (Rs./unit)
2004-05	1.27
2005-06	1.33
2006-07	1.40
2007-08	1.47
2008-09	1.54

The biomass plant had been successfully operating at a PLF between 85-90%. However, 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 1.27 with an incentive of Rs.0.25 amounting to a total of Rs. 1.52.

Though the plant has a design capacity to operate at a higher PLF it does not operate as it is not financially viable. The average variable cost of operating the plant at a PLF greater than 80% is about Rs. 1.96 per unit generation.
Thus it is imperative that, to generate power in excess of 80% PLF will significantly damper the sustainability of the project without CDM funds. 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.

Thus it is imperative that the present tariff is not sufficient and will significantly impact the sustainability of the project. To generate renewable power, the CDM funds can contribute towards sustainability of the project, which will indirectly help in reduction of CO_2 emission, if not generated. Also, the power tariff will be under revision every 5 years instead of 10 years as per the new proposal from APERC.

The existing APTRANSCO generation mix comprises of:

- ✓ 57% thermal power plants;
- ✓ 42% hydro projects; and
- ✓ 1% wind and cogeneration projects

In thermal power plant category, coal based plants contribute for 46% and balance 11% is contributed by the gas based power plants. 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.

For example, earlier, there was 3rd party sale and the tariff was not supposed to be less than the high tension line (HT1) tariff of Rs.4.32. However with the advent of Regulatory Commission in 1999 there is no 3rd party sale. Earlier there was 2% wheeling charges on 3rd party sale and later it was changed to 28.4% and Rs. 0.50 per unit to neutralize the tariff of 3rd party and APTRANSCO. Hence, all the Biomass power plants have shifted their sale of power to APTRANSCO, wherein they have to abide by the APRANSCO policies.

This discussion suggests that there are clear policy related threats and barrier to the proposed project activity, which can be mitigated to certain[8] extent from CDM benefit.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

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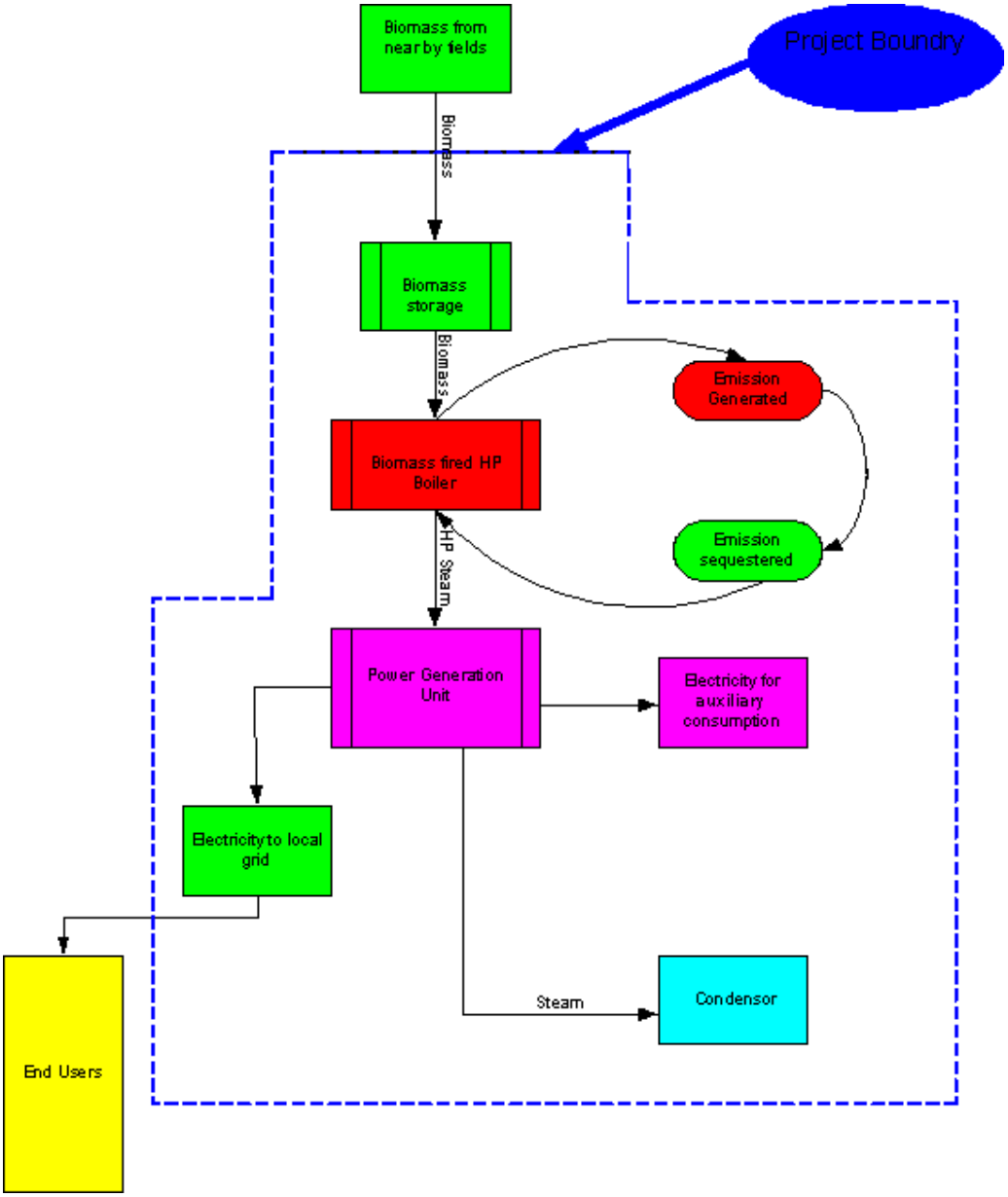
As per the guidelines mentioned in Type I. D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source.

Hence, the project boundary covers the point of fuel supply to the point of power export to the grid where the project proponent has a full control. Hence, project boundary is considered within these terminal points. However, for the purpose of calculation of baseline emissions, AP state electricity grid is also included in the project boundary.

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

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


Biomass from near by fields
Project Boundry
Biomass
Biomass storage
Biomass
Emission Generated
Biomass fired HP Boiler
HP Steam
Emission sequestered
Power Generation Unit
Electricity for auxiliary consumption
Electricity to local grid
End Users
Steam
Condensor

B.5. Details of the baseline and its development:

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Since the project activity is part of southern regional grid through AP state electricity grid, the baseline for this project activity is the function of the generation mix of southern regional grid. Using the methodology available for small-scale project activities as discussed in section B2 above, the combined margin emissions (in $kgCO_2equ/kWh$) of current generation mix of southern regional grid is used for the calculation of baseline. Actual CO_2 emission factors are used for the purpose.

All existing sources of power generation have been considered from various authentic sources. Percentage share of power generation from different fuel sources has been calculated. The IPCC emission factors for different sources of power generation have been considered wherever necessary. The baseline estimation has considered an ex-ante weighted average emission factor and the same will be used for throughout the project crediting period to reduce the monitoring cost.

Also, during the baseline estimation authentic information such as an average national calorific value of coal, actual coal consumed in power plants is used. IPCC emission factors are used for fuels. These values will be different for particular power plant. However, these are authentic values and the degree of uncertainty is low.

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

10/12/2005

Name of person/entity determining the baseline:

Perpetual Energy Systems Private Limited (as mentioned in Annex-I), who is also a project participant.

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

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C.1.1. Starting date of the small-scale project activity:

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Project started construction on 27th Jan 2002 after 1 January 2000 and is operational since March 23rd 2003.

C.1.2. Expected operational lifetime of the small-scale project activity:

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Life time of the project: 25 years

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

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C.2.1. Renewable crediting period:

>>

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

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Starting date of first crediting period: 24/03/2003

C.2.1.2. Length of the first crediting period:

>>
7 years (7y)

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Application of a monitoring methodology and plan:

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D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

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Monitoring methodologies / guidelines mentioned in the UNFCCC document of "Appendix 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.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

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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 is available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the power plant is of 7.5 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.

D.3 Data to be monitored:

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ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3.1	Power	Electricity generated	KWh	Measured	Daily	100%	Electronic	2 years	From the control room energy meter
D.3.2	Power	Auxiliary consumption	KWh	Measured	Daily	100%	Electronic	2 years	Based on the difference between energy generated and energy exported
D.3.3	Power	Power export	kWh	Measured	Daily measurement and monthly recording	100%	Electronic	2 years	Based on the readings from tri-vector meter in APTRANSCO sub station
D.3.4	Fuel	Biomass used	MT	Measured	Daily	100%	Paper	2 years	
D.3.5	Fuel	Avg. calorific value of Biomass used	Kcal/Kg	Measured	Monthly	100%	Paper	2 years	Through sample testing in lab. Tested monthly only if the source of biomass is different.
D.3.6	Fuel	Coal	MT	Measured	Daily	100%	Paper	2 years	
D.3.7	Fuel	Carbon content in coal	%	Measured	For each batch of coal	Grab sample	Paper	2 years	Through sample testing in lab. Tested every batch only if the source of fuel is different.
D.3.8	Fuel	Calorific value of coal	Kcal/Kg	Measured	For each batch of coal	Grab sample	Paper	2 years	Through sample testing in lab. Tested every batch only if the

ID number *(Please use numbers to ease cross-referencing to table D.6)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
									source of fuel is different.

Note: All the data will be archived for two years during the crediting period after issuance of CERS

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
3.1to 3.8	*Low*	*The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency*

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

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

Project proponent form 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.

D.6. Name of person/entity determining the monitoring methodology:

>>

Perpetual Energy Systems Private Limited, who is also a project participant

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>>

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

The project proponent uses biomass as fuel. However, the project proponent, in case of exigencies proposes to use coal as fuel instead of biomass. The CO_2 emissions during the usage of coal can be calculated in the following manner:

1.Using IPCC standard CO2 emission factor

$$CE_c = Q * CC * EFC$$

where,

CEc - Carbon-dioxide emission due to coal burning at project site, MT

CC - Calorific value of coal, kcal/ton

Q - Quantity of coal burned, MT

EFC - IPCC standard emission factor kg of CO2/kcal

OR

2. Using actual carbon content of the coal

CO_2 Emission [in kgs] = Stoichiometric CO_2 from carbon content of coal [based on total carbon content]

To have an estimate of the project CO_2 emission quantity due to combustion of coal along with the biomass, total carbon content of the coal should be known. Combustion reaction for CO_2 emission is as under.

$C + O_2 = CO_2$

Assuming complete combustion of coal, following formula can be used for conservative estimation of CO_2 emissions.

$$CE_c = (44/12) * C * Q$$

where,

CEc - Stoichiometric carbon-dioxide emission due to coal burning at project, MT

C - Carbon percentage in coal, %

Q - Quantity of coal burned, MT

Though project emissions due to the usage of coal will be estimated based on the procedures mentioned above during monitoring and verification stage, for the conservative estimation purpose, 30% of total generation was considered using coal in the baseline calculation sheet.

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

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 procured - 71,570 MT
- Average Distance between project site and biomass collection centers - 30 km
- Biomass load per truck - 5 MT
- Number of return trips - 14,314
- Consumption of Diesel per trip - 15 liters (4km/litre)
- Total Diesel consumption - 214,710 liters/annum
- CO_2 emission factor for Diesel (as per IPCC guidelines) - 74.10 tons CO_2 / TJ
- CO_2 emission per annum - 640 tons

The CO_2 emission (leakage) occurs during the transportation of coal from the mines to respective coal based power plants. The distance between the coal mines and the power plants is higher as compared to the transportation distance between biomass collection centers to biomass power project site and hence the higher CO_2 emissions. To be on conservative side, this leakage due to coal transportation has not been added while calculating the baseline of AP grid and hence a small leakage due to transportation of biomass has also been neglected from the calculations and estimations of emission reductions.

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 100 km and number of truck trips per annum are less than 1500, hence the emissions due to the same have also been neglected.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>>

Considering the negligible CO_2 emissions due to leakage due to fuel transportation, these emissions are considered to be zero. However, the emissions from the project using coal as supplementary fuel would be considered for the estimation of net GHG emissions.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

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 following approved methodology has been considered for baseline calculations.

Method: The average of the approximate operating margin and the build margin (Combined margin)

Method: Combined Margin

(a) Baseline Power Generation

$$P_{wlc} = P_{tot} - P_{lrc}$$

Where

P_{wlc}	Power generation by all sources, excluding hydro, biomass and nuclear
P_{tot}	Power generation by all sources of grid mix
P_{lrc}	Power generation by Hydel, nuclear, biomass projects

(b) Sectorwise baseline power generation

$$P_{fuel} = \frac{P_f}{P_{wlc}} x 100$$

Where

P_{fuel}	Share (in %) of power generation by each fuel used (coal and gas in present scenario), out of total power generation excluding Plrc
P_f	Power generation by fuel used (in million kWh units)

(c) Calculation of Operating Margin emission factor

$OM_{bef} = \sum P_{fuel} \; x \; E_{fuel}$ *for base year for Scenario 1*

Where

OM_{bef} OM emission factor of baseline calculated for each year (kg/kWh)

E_{fuel} Emission factor (actual or IPCC) for each fuel type considered (e.g coal, diesel, gas)

(d) Calculation of Build margin emission factor for each source of baseline generation mix

BM_{yr} = Weighted average of emissions by recent 20% capacity additions or MWh of five most recent plants, which ever is higher

Where

BM_{yr} = Build margin for base year (kg/kWh) = $\frac{\sum P'_f \; x \, E'_f}{\sum P'_f}$

Where

P'_f Generation capacity from specific fuel in the most recent 20% power plant or five most recently built plants, whichever is higher

E'_f Emission factor for the specific fuel in the most recent 20% power plants built or five most recently build plants

(e) Combined Margin Factor

CMF for each year crediting period

= $(OM_{bef} + BM_{yr}) / 2$ (in kg/kWh)

Final (net) baseline emission factor (NEFB) = 0.830

(Refer to Baseline excel sheet)

(f) Power Generation and Export by project activity

$TP_{gen} = TP_{exp} + TP_{loss}$

Where

TP_{gen}	Total power generared
TP_{exp}	Total clean power export to grid per annum
TP_{loss}	T&D loss

(g) Emission reduction by project activity

$$ER = TP_{exp} \times (NEF_B - NEF_p) - EL$$

Where

ER	Emission reduction per annum by project activity (tones/year)
TP_{exp}	Total clean power export to grid per annum
NEF_B	Final emission factor of baseline
NEF_p	Net emission factor of project activity (=0)
EL	Emission leakage (tonnes/year) (= 0)

Step by step calculation using combined margin methodology of CO_2 emissions due to burning of coal, diesel and gas for power generation and emission reductions by the project activity is as under.

Step 1	**:**	Net operating emission factor for coal, lignite	=	Actual emission factor for coal/lignite x % of generation by coal/lignite out of total generation excl. RE projects
Step 2	**:**	Net operating emission factor for gas, diesel	=	Step 1 is to be repeated for gas and diesel.
Step 3	**:**	Operating margin factor	=	Net emission factor for coal + Net emission factor for gas + Net emission factor for Diesel
Step 4	**:**	Built Margin factor	=	Weighted average of emission factors of most recent 20% plants or 5 most recently built plant, whichever is higher
Step 5	**:**	Average of operating and build margin factor	=	(operating margin factor + built margin factor)/2
Step 6	**:**	Units exported to APTRANSCO		Total Power generation –Total auxiliary consumption.
Step 7	**:**	CO_2 emission reduction	=	Units exported to AP grid x Average of operating and build margin factor

Since there is a gap between demand and supply in the grid, the export of power from the project activity to the grid will replace or get absorbed to partially fulfill the total power requirement.

If the same amount of electricity is generated by the coal. diesel and gas based power project mix, it adds to the emissions that are getting reduced by the project activity. Hence, the baseline calculated using

above methods / scenarios would represent the realistic anthropogenic emissions by sources that would occur in absence of the project activity.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

CO_2 emission reduction due to project activity	=	Net CO_2 baseline emissions x Electricity exported to grid (in kWh)	-	Project emissions
	=	253262	-	110938
	=	142324		

E.2 Table providing values obtained when applying formulae above:

>>

	Operating Years	Net Baseline Emission Factor (kg CO_2 /kWh)	Baseline Emissions (tonnes of CO_2)	Project Emissions (tonnes of CO_2)	Emission Reductions (tonnes of CO_2)
1.	2003-2004	0.830	36180	15848	20332
2.	2004-2005	0.830	36180	15848	20332
3.	2005-2006	0.830	36180	15848	20332
4.	2006-2007	0.830	36180	15848	20332
5.	2007-2008	0.830	36180	15848	20332
6.	2008-2009	0.830	36180	15848	20332
7.	2009-2010	0.830	36180	15848	20332
Total CERs			**253262**	**110938**	**142324**

Therefore, an conventional energy equivalent of 202.2 Million kWh for a period of 7 years (84 months) would be replaced by exporting power from the 7.5 MW Biomass based power plant which in turn will reduce 142,324 tons of CO_2 emissions considering baseline calculations.

Baseline data used for the calculation is provided in Annex-3 and the detailed calculation using the formulae is presented in an Excel Sheet (refer Enclosure – I to this PDD).

SECTION F.: Environmental impacts:

F.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 crores 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. The effluent generated in the plant will be treated in the Effluent Treatment Plant (ETP). The effluent characteristics after the treatment are in complying with the standards stipulated by A.P Pollution Control Board.
3. Electrostatic precipitator is provided to bring down the SPM emissions from boiler to 115 mg/nm^3.
4. The boiler blow down due to its higher pH is neutralized before mixing with other effluent streams.
5. The sanitary waste water is treated in septic tank followed by soak pit.
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.

SECTION G. Stakeholders' comments:

G.1. Brief description of 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 immediately affected by the activities of the project. The effect is on the local environment, social life and economics. All the individuals and organizations falling in the above effects are perceived as stakeholders. 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
- Authorities of the District local administration
- Biomass suppliers
- Local NGOs
- Customer (APTRANSCO)
- Licensing and regulatory authorities like
    - NEDCAP
    - APPCB
    - MoEF (Govt. of India)
    - MNES (Govt. of India)

PESPL 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 NEDCAP, MoEF, APPCB and MNES are indication of favorable impression for the project.

Stakeholders Involvement

The village *Panchayat* /local elected body of representatives administering the local area are true representative of the local population in a democracy like India. Hence, their consent / permission to set up the project is necessary. PESPL has already completed the necessary consultation and documented

their approval for the project.

Local population comprises of the local people in and around the project area. The roles of the local people are 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 project for the local population. In addition to this, the project would also lead to local manpower working at the plant site. Since, the project will provide good direct and indirect employment opportunities the local populace is encouraging the project.
The project does not require displacement 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, installation of transmission lines have not create any inconvenience to the local population.

Andhra Pradesh Pollution Control Board (APPCB) has prescribed standards of environmental compliance and monitors the adherence to the standards. The project has already received No Objection Certificate (NOC) from APPCB to start the plant.

Non-conventional Energy Development Agency of AP (NEDCAP) implements policies in respect of non-conventional renewable power projects in the state of Andhra Pradesh 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 PESPL 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.

G.2. Summary of the comments received:

>>

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

- Consent order of Establishment and operation from Andhra Pradesh Pollution Control Board;
- Power Purchase Agreement with APTRANSCO;
- Clearance from the Gram Panchayat, Appayyapeta village

Although, in India, 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, representative of local NGO and biomass suppliers to express their views on the project and the summary is presented as below.

Village Sarpanch (head of locally elected body) expressed positive views about the setting up of project in their village since the project activity has opened doors for the creation of employment for the educated and uneducated villagers and also for creating an additional means of revenue for local farmers/biomass waste suppliers which will positively help to improve living standard and the socio-economic condition of the village. All other stakeholders in the project expressed their satisfaction that the area has been benefited in terms of development by the project activity, specifically the project has created source of income for poor farmers of the nearby area. Poor farmers are getting reasonable monitory gains for harvesting the available biomass and supplying it to project activity.

Most of the representative biomass suppliers also expressed their happiness about project set up in the area, which has provided them an opportunity to develop small business. They also indicated the employment opportunities for local labors, skilled and unskilled workers and preventing their transfer to nearby cities. They further added that, the project activity has provided business opportunity for local transporters also.

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.

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

>>

The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, power purchase agreement, local clearance etc. were considered

while preparation of CDM project development document.

Further, the document will be published on UNFCCC/Validator's website for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Perpetual Energy Systems Limited (PESL)
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Represented by:	
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Annex-2

Information Regarding Public Funding

No Public Funding is available to the project.

Annex-3

BASE LINE DATA

The methodology adopted for the calculation of the baseline is 'the combined margin emissions of the current generation mix". Year 2004-05 is considered as the base year for prediction of future capacity additions during the crediting period. Southern Grid generation data as tabulated in Enclosure-II is used for consideration of installed southern grid capacity and energy availability during the period 2004-05.

In order to arrive at the detailed break up of power generation mix in Southern Region, various documents and various web sites were refereed. The websites refereed for estimating the generation mix in Southern regional grid are:

1. http://www.infraline.com
2. http://www.bisnetworld.net
3. http://www.apgenco.com
4. http://www.kptcl.com
5. http://cea.nic.in
6. http://www.tneb.org
7. http://www.ksebboard.com

As per the availability, actual generation figures as against the sector wise installed capacity were used. Wherever the break up of generation was not available, proportionate calculated figures were used so as to match the total energy availability.

Annex 4
Monitoring Plan

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 General Manager of the plant.

The Plant is equipped with energy meters/export meters for monitoring and control purpose. There are two energy meters at APTRANSCO sub station to measure the export power, namely main meter and check meter with 0.2 class accuracy. 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 AP 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 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

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
Abbreviations

AP	Andhra Pradesh
APERC	Andhra Pradesh Electricity Regulatory Commission
APPCB	Andhra Pradesh Pollution Control Board
APTRANSCO	Transmission Corporation of Andhra Pradesh
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
Cm	Centimeter
CO_2	Carbon Di oxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Inter governmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	India Renewable Energy Development Agency
Kcal	Kilo Calories
Kg	Kilogram
KM	Kilometer
KP	Kyoto Protocol
KW	Kilowatt
KV	Kilovolts
kWh	Kilowatt hour
LP	Low Pressure
MNES	Ministry of Non-Conventional Energy Sources
MT	Metric Tons
MU	Million Units
MW	Megawatt
NEDCAP	Non Conventional Energy Development Corporation of Andhra Pradesh
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PESPL	Perpetual Energy Systems Private Limited
PIN	Project Idea Note
PLF	Plant Load Factor
PPA	Power Purchase Agreement

QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SEB	State Electric Board
STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joules
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B
REFERENCE LIST

Sr. No	References
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) **http://cdm.unfccc.int**
2.	Website of United Nations Framework Convention on Climate Change, **http://unfccc.int**
3.	Approved baseline and monitoring methodologies for CDM activities http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html
4.	UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol
5.	UNFCCC document: Annx B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
6.	Detailed project report on 7.5 Biomass based power project – Perpetual Energy Systems Private Limited
7.	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- **http://cea.nic.in**
8.	CEA published document "16th Electric Power Survey of India"
9.	Website of APGENCO, **www.apgenco.com**
10.	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, **http://mnes.nic.in**
11.	Website of Indian Renewable Energy Development Agency (IREDA), **http://ireda.nic.in**
12.	Andhra Pradesh Power Profile at **www.bisnetworld.net/bisnet/states**
13.	**www.infraline.com/power/**
14.	APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004.
15.	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. **http://envfor.nic.in**