



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

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	<ul style="list-style-type: none">•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	<ul style="list-style-type: none">•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.



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SECTION A. General description of small-scale project activity**A.1 Title of the small-scale project activity:**

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Biomass based power project of Rayapati Power Generation Private Limited
Version 01
05/01/2007

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

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Purpose

Power is the most essential input for industrialization and it is the fulcrum on which the future pace of growth and development of India rests. The demand for power continues to grow at a rapid rate outstripping the availability and the biomass based power plants hold the promise of narrowing this ever widening gap.

Of all the routes for conversion of biomass into useful energy, direct combustion of biomass has been recognized as an important route for generation of substantial quantities of grid quality power by utilizing vast amounts of agricultural and agro industrial residues and forest wastes, which are either being wasted or are being sub-optimally utilized in India.

Being aware of the advantages of the biomass based power plants and to take advantage of the abundantly available biomass in Chhattisgarh, the management of RPGPL has decided to install a biomass based power plant in Rajnandgaon in the State of Chhattisgarh to produce environmental friendly green power.

The plant will operate with Rice husk as the main fuel since the availability of this fuel meets the entire plant requirement. The other fuels likely to be used are crop residues. A detailed study of the biomass availability has been undertaken which indicated ample availability of biomass for uninterrupted operation of the plant.

The power generation scheme involves installation of One No.(1) 35TPH Nominal capacity Boiler with the superheater outlet steam parameters of 67 ata and 480 Deg C. The boiler and the turbogenerator will be installed with all the necessary auxiliary plants and system required for the efficient operation of the biomass based power generation.



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The gross power generation in the plant will be 7500KW. After meeting with the auxiliary consumption of the plant of about 900kW, the surplus power of 6600kW will be sold to Chhattisgarh State Electricity Board (CSEB) grid.

Contribution to Sustainable Development

Socio-Economic Well being

- The project activity will lead to generation of employment opportunities for the local population.
- The biomass resources to be collected and transported to the plant site from the adjoining fields will result in employment opportunities for the local population.
- The project activity will result in infrastructural development of the region thus resulting in promotion of industries in the area
- As the availability of job opportunities is expected to rise in the rural areas, it will lead to reduced migration of the rural population to urban areas.
- The project activity will provide stable and quality power to neighboring small industries, farmers and households.
- The project will create business opportunities for local stakeholders such as bankers, suppliers, manufacturers, contractors *etc.*
- The main resource for power generation is rice husk and crop residues. Rice husk and crop residues collected from the rice mills and farmers will be brought to the project site, thus generating additional revenue which otherwise is being under-utilized or burnt and does not have any commercial value.

Environmental well being

- Since, the project will involve use of 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 CO₂, CH₄ and NO_x. The major constituent of GHG emissions is CO₂ which about 98%, whereas CH₄ and NO_x constitute the remaining 2%. This can well be evidenced from the typical ultimate analysis¹ of biomass materials, which indicates the Nitrogen content is within 1 to 2%, therefore CH₄ emission is negligible. Hence the CO₂ is considered as the only GHG emissions from the biomass combustion.
- Since the biomass is formed by fixing the atmospheric CO₂ by the action of photosynthesis in the presence of sunlight, the CO₂ released due to combustion of biomass is assumed to be equal to the CO₂ fixed by the photosynthesis. Again the CO₂ released during the

¹ Chemical analysis of elements in the fuel (biomass)



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combustion will be consumed by the plant species for their growth. In view of the above, biomass combustion and growth of biomass and associated CO₂ consumption and release can be treated as cyclic process resulting in no net increase of CO₂ in the atmosphere. Hence, the project will not lead to GHG emissions.

In view of the above the project participant considers that the project activity contributes to 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	Rayapati Power Generation Private Limited (Private entity. Project developer.)	No

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

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

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The project activity is located in Thakurtola village, Rajnandgaon District, Chhattisgarh State of India.

A.4.1.1. Host Party(ies):

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India

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

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Chhattisgarh

A.4.1.3. City/Town/Community etc:

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Rajnandgaon

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

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The plant is located in the village Thakurtola in district Rajnandgaon of Chhattisgarh state, India.



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The latitude and longitude of the site are N 21°5 and E 81°2



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

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Type: Renewable Energy Project (Small Scale)

Category: Grid Connected Renewable Electricity Generation

Technology/Measure: Biomass based renewable energy generation unit supplying electricity to and/or displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

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

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Years	Annual estimation of emission reductions in tonnes of CO ₂ e
2007 - 2008	29153
2008 - 2009	29153
2009 - 2010	29153
2010 - 2011	29153
2011 - 2012	29153
2012 - 2013	29153
2013 - 2014	29153
2014 - 2015	29153
2015 - 2016	29153
2016 - 2017	29153
Total estimated reductions (tones of CO ₂ e)	291530
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO ₂ e)	29153



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

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No public funding is available to the project. Project is implemented with equity of project proponent (RPGPL) and long term debt by IREDA.

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 proposed 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 proposed small-scale activity at the closest point.

In RPGPL's case, it does not fall under the debundled category and qualifies as a small scale CDM project. It is the single such project of the promoters. The conditions in paragraph 2 of Appendix C confirm that the proposed small-scale project activity is not a debundled component of a larger project activity.



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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:

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The small scale methodology applicable to the project activity is Type I – Renewable Energy Projects subset D - Grid connected renewable electricity generation

AMS I.D (Version 10, 23rd December 2006)

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

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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 10)**, in case of units which co-fire non renewable biomass or 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.

The project activity is a 7.5 MW Biomass based Power project which is less than the specified limit of 15 MW for Small scale Project activities. The project proposes to generate power using renewable biomass as fuel and will be exporting it to the Chhattisgarh State Electricity grid. Hence the small scale methodology applicable to the project activity is Type-I Renewable Energy Projects Subset D – Grid Connected renewable electricity generation.

B.3. Description of the project boundary:

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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 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, Western Regional grid is also included in the project boundary. As the plant uses only biomass residues the area where the biomass is extracted or produced is not included in the 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.

B.4. Description of baseline and its development:

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The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Weighted Average Emission Factor for the Western grid, the details of which are available on the following website.

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

The procedure for estimation of the baseline factor and the assumptions made has also been detailed in there.

For the purpose of estimation of the Carbon Emission Reductions, the Weighted Average Emission Factor for the Western Regional grid of 0.92 has been used.

<p>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 <u>small-scale</u> CDM project activity:</p>
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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 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) ;

Barriers due to prevailing practice:

Of the total power generation in Chhattisgarh, 85% is generated from coal based thermal power plants, which is indicative of the vast reserves of coal available in Chhattisgarh. 16% of the coal reserves estimated in India are in Chhattisgarh. At present, power generation with Biomass as a fuel, is not a common prevailing practice in India and in Chhattisgarh. In 2005-06, in Chhattisgarh, of the total installed capacity of 1415.8 MW, 1280 MW was coal based and the remaining 130 MW was generated through hydel power².

This illustrates the low penetration of such renewable energy projects and little willingness of entrepreneurs to change the current operating practices in the region. We may conclude from the above that the proposed project under discussion is not a common practice in the region. The practice of generating power by using biomass as primary fuel has not penetrated in the region. The comprehensive analysis on the common practices adopted for power generation in Chhattisgarh further justifies that the project is not a part of the baseline. The data on the state of biomass based power projects, suggests that the barriers, which are discussed in this section have hindered the growth of the sector.

² www.cseb-powerhub.com

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Though the project is not a common practice, the project proponent is keen to take up this new initiative of utilizing biomass as primary fuel by overcoming the various barriers to prevailing practices and set example for others. However, the project proponent is well aware of the various barriers to project implementation. However the barriers would be overcome with the availability of carbon financing against a sale consideration of carbon credits that would be generated once the project gets implemented. The project proponent took this CDM revenue stream during the planning stage.

Policy Barriers

The national tariff policy requires the state electricity boards to implement a multi year tariff policy. However, Chhattisgarh being a relatively new state (carved out of the Indian state Madhya Pradesh in the year 2000), the CSEB had not been able to implement a multi year tariff policy due to lack of data. Multi year tariff framework would have given an indication of how the regulator works and provide clarity on the rules to be applied over a pre-defined future time period in advance, thereby giving a fair idea of the future scenario. In this way, the project proponent would have been aware of the outcome of various actions/events at least for the pre-defined future time period.

In the absence of a multi year tariff framework, the project proponent faced financial uncertainty. The single-year approach to regulation does not enable risk mitigation and is an impediment to private sector participation in the power sector. There was no certainty with regards to revenue and tariff determination principles and thus the financial viability was uncertain. However, the project proponent decided to proceed ahead with the proposed project inspite of the financial uncertainty.

Financial Barrier

Returns for biomass based power projects are highly sensitive to Biomass prices as raw material prices form a major part of the cost. The CDM fund for the project was considered by the project proponent 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 the increase in the cost of fuel prices.

Raw Material Price

Raw material (Rice Husk) cost per metric tonne since the time of inception (documented in Detailed Project Report) has increased from Rs. 550/- to Rs. 900/-. The total cost of generation per unit during the DPR preparation was estimated to be Rs. 0.95/-. However, with the increase in the biomass prices, the cost of generation alone is now estimated to be Rs.1.42/ kWh. The raw material cost may increase further subsequent to commissioning of the plant resulting in further erosion of the margin.

Tariff

The MNES had issued guidelines to state governments indicating that, considering 1994-95 as the base year, a tariff of Rs.2.25 kwh per unit should be issued with a minimum escalation of 5% every year. The project proponent was offered a tariff of Rs.2.25 in the year 2003 by CSEB. In the absence of definite

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indicators with regards to the tariff policy, during the year 2003, the project proponent assumed that the CSEB would in accordance with the MNES guidelines escalate the revenues at 5%.

In the year 2005, the CSEB issued a tariff order on a Cost-plus basis, in which an escalation of 5% for the biomass prices was considered for the variable component while the fixed component was reduced by Rs.0.03 to Rs.0.04 per unit. The tariffs applicable for RPGPL are provided in the table below:

Year of Operation	Fixed Cost Rs./Unit*	Variable Cost Rs./Unit**	Total	Assumed during DPR Stage
2007-08	1.55	1.18	2.73	2.25
2008-09	1.51	1.24	2.75	2.36
2009-10	1.47	1.30	2.77	2.48
2010-11	1.44	1.37	2.81	2.60
2011-12	1.40	1.43	2.83	2.73
2012-13	1.37	1.51	2.88	2.87
2013-14	1.34	1.58	2.92	3.02
2014-15	1.30	1.66	2.96	3.17
2015-16	1.27	1.74	3.01	3.32
2016-17	1.24	1.80^	3.04	3.49

* Specified for the first ten years of operation of the plant in the tariff order

** Specified for ten years from 2005-06 to 2014-15 in the tariff order

^ Assumed

The reduction of the fixed component would be justified in cases where the technology is fully developed. However, as was brought in the section on *Barriers in Prevailing practice*, the sector is dominated by coal based power plants whereas, biomass based power plants have been set up recently in the state.

CDM Benefits for 10 years

CERs	Rate (Euros)	Exchange rate	Million INR	Million Units replaced	Cost benefit per unit (Rs.)
29000	7	55	111	422.3	0.26

The CDM benefit per unit (kWh) of power replaced is about Rs. 0.25.

The increase in the biomass prices and the reduction in tariffs has resulted in severe margin pressures rendering the project financially unsustainable. As against the benchmark of 16% IRR for biomass based power projects set by the Chhattisgarh Electricity Regulatory Commission (CERC), the project is currently expected to generate only around 7%. However, the project proponent has estimated a receipt of CDM funds of 111 Million INR (@ 7 Euros/Ton and Rs. 55 exchange rate) thus providing for an IRR of around 25%

Investment Barrier



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Chhattisgarh has relatively low level of industrialization in the state, has limited infrastructure³. This has acted as an impediment for its growth and consequently, Chhattisgarh is low on natural perception, and also ranks low on development indicators along with the perceived potential for development. There is an absence of a divergent industrial base in Chhattisgarh and current availability of skilled labour is further restricted to select industries. In spite of the above, the project proponent has decided to set up a biomass based power plant in the region which is expected to aid in Chhattisgarh's industrial development and particularly in the household electrification of the villages located near the project site.

Also, the state of Chhattisgarh is yet to undertake measures that would encourage private sector participation in the power sector. The Chhattisgarh State Electricity Regulation Commission (CSERC) in its tariff order, passed on the 15th of June 2005⁴, observed that the operational systems of the board were still those inherited from the erstwhile Madhya Pradesh Electricity Board (MPEB) and significant initiatives for structural reforms and improvement of the operational system were not being taken by the board as envisaged under the Electricity Act, 2003.

Though other progressive states in the country had implemented forward looking policies and offered a better investment climate for the private sector participation in the power sector, the project proponent decided to proceed ahead with setting up of the power project in Chhattisgarh which would result in utilization of the biomass generated in the state. In case the project proponent had decided against setting up of the facility, the state's potential to generate biomass based power would have been under utilized.

Other Barriers

Human component: RPGPL has ventured in to the biomass based power business for the first time. There may be problems associated with the technical know-how of the power plant operation, coping up with the changes in the power policies/subsidies etc., which may cause some problems associated with the operation of the plant in efficient and profitable manner.

Information component: Being a new entrants in to the field of power generation, there could be knowledge gap always in the areas of practices of commercial power generation and export, operation of power plant at varying grid conditions, solving unexpected technical snags and decision making etc.,

This discussion suggests that there are clear policy related threats and barrier to the proposed project activity, which can be mitigated to certain⁵ extent from CDM benefit.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:
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<http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN011830.pdf#search=%22embar king%20on%20a%20Visioning%20exercise%20it%20is%20important%22>

⁴http://chhattisgarhserc.org/pdf/Determination_of_Annual_Revenue_Requirement_ARR_and_Retail_Supply_Tariff_FY_2005-06.pdf

⁵ Uncertainty related to carbon market and cash flows is also a deterrent.



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Baseline

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Weighted Average Emission Factor for the Western grid, the details of which are available on the following website.

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

The procedures and formulas used for estimation of the baseline factor and the assumptions made has also been detailed in there.

For the purpose of estimation of CERs, the weighted emission factor of 0.92 has been used.

The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been identified as the mainstay fuel for power generation till 2012⁶. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner. In the first phase, five projects are planned to be setup by 2012, of which four are in the states of Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra which supply electricity to the western grid⁷.

From the above discussion, it may be concluded, that in the future, the grid electricity generation using fossil fuel based resources in the Western grid will increase. Hence, the baseline factor used for CER estimation by the project proponent may be considered conservative.

Project Emissions

The project proponent intends to use renewable biomass as fuel. However, in case of exigencies coal (based on regulations from IREDA/MNES on annual basis) instead of biomass may also be used. The CO₂ emissions during the usage of coal will be calculated in the following manner:

1. Using IPCC standard CO₂ emission factor

$$CE_c = Q * CC * EFC$$

where,

CE_c - 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

⁶ http://powermin.nic.in/JSP_SERVLETS/internal.jsp

⁷ pfc.gov.in/BrochureKarnatka5-03-06.pdf

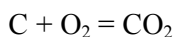


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CO₂ Emission [in kgs] = Stoichiometric CO₂ from carbon content of coal [based on total carbon content]

To have an estimate of the project CO₂ emission quantity due to combustion of coal along with the biomass, total carbon content of the coal should be known.

Combustion reaction for CO₂ emission is as under.



Assuming complete combustion of coal, following formula can be used for conservative estimation of CO₂ emissions.

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

where,

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

C - Carbon percentage in coal, %

Q - Quantity of coal burned, MT

In addition to coal, plant may also consume electricity from grid during start up and emergency. Due to the less volume of units consumption per annum compared to total export, the same quantity has not been considered in the calculation. However, the same will be monitored every month for the records purpose for the verification process. If the quantity of electricity import is considerable, the same will be deducted from the export units accordingly during verification process.

Leakage

As per the 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.

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



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

1. As the project activity will use only biomass residues, the implementation of activity will not lead to shift of pre project activities.
2. The biomass that will be used in the plant is generated from various crops. This waste will anyhow be generated even in the absence of the project activity and would be burnt without being used for any other purpose. Hence there are no emissions from the production of renewable biomass due to application of fertilizer and from clearance of lands.
3. There is sufficient biomass available in the region and the same is revealed in Biomass assessment reports by M/s S.R. Corporate Consultant (P) Ltd, Raipur. The availability of surplus rice husk alone in the area is around 2.04 lakh tones per annum which is much higher than the estimated 65000 tonnes to be used in the plant. This indicates the abundant availability of the biomass in the region. 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.

Hence EL= 0.

Emission Reduction

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

Where

ER	Emission reduction per annum by project activity (tonnes/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
EL	Emission leakage (tonnes/year) (= 0)

The total clean power exported to the grid per annum at the time of verification would be calculated from the Chhattisgarh State Electricity Board billings.

However for ex-ante calculations of emission reductions TP_{exp} has been calculated as shown below,:

$$TP_{exp} = TP_{gen} - TP_{aux} - TP_{loss}$$

Where

TP_{gen}	Total power generated
TP_{exp}	Total clean power export to grid per annum
TP_{aux}	Total auxiliary consumption of plant per annum
TP_{loss}	T&D loss

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



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Data / Parameter:	Baseline Emission Factor.
Data unit:	tCO ₂ /KWh
Description:	Baseline Emission Factor
Source of data used:	Central Electricity Authority, Ministry of Power
Value applied:	0.92
Justification of the choice of data or description of measurement methods and procedures actually applied :	<p><u>Justification for choice of Data:</u></p> <p>For the purpose of estimation of CERs, the weighted emission factor of 0.92 has been used.</p> <p>The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been identified as the mainstay fuel for power generation till 2012. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner. In the first phase , five projects are planned to be setup by 2012, of which four are in the states of Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra which supply electricity to the western grid.</p> <p>From the above discussion, it may be concluded, that in the future, the grid electricity generation using fossil fuel based resources in the Western grid will increase. Hence, the baseline factor used for CER estimation by the project proponent may be considered conservative.</p> <p>Measurement methods</p> <p>The details for the measurement methods and procedures applied are provided on the following website.</p> <p>http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</p>
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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Based on the methodology and formulas detailed in the above section, the Carbon Emission Reductions have been calculated and are provided in Appendix C.

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

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	Operating Years	Baseline Emissions (tonnes of CO₂)	Project Emissions (tonnes of CO₂)	Emission Reductions (tonnes of CO₂)
1.	2007-2008	39346	10193	29153
2	2008-2009	39346	10193	29153



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3	2009-2010	39346	10193	29153
4	2010-2011	39346	10193	29153
5.	2011-2012	39346	10193	29153
6.	2012-2013	39346	10193	29153
7.	2013-2014	39346	10193	29153
8.	2014-2015	39346	10193	29153
9.	2015-2016	39346	10193	29153
10.	2016-2017	39346	10193	29153
	Total	393460	101930	291530

B.7 Application of a monitoring methodology and description of the monitoring plan:**B.7.1 Data and parameters monitored:**

(Copy this table for each data and parameter)

Data / Parameter:	Power Exported
Data unit:	KWh
Description:	Power exported to the grid by the power plant during the crediting period.
Source of data to be used:	Monthly billing records of the Chhattisgarh State Electricity Board for the electricity supplied to the grid.
Value of data	42.77 Million Kwh per annum
Description of measurement methods and procedures to be applied:	Power exported will be recorded at the plant using meters to be installed in the control room in the plant. For applying monthly bill to CSEB the meter readings will be taken on 1 st of every month by CSEB officials in presence of company representatives and readings will be jointly certified.
QA/QC procedures to be applied:	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 comment:	The power exported would be cross checked using the meters installed for power generation and for auxiliary consumption. The difference between the meter readings for Power generation and auxiliary consumption should be equal to the Power exported.

Data / Parameter:	Power Imported
Data unit:	KWh
Description:	Power imported from the grid by the power plant for start up purpose during the crediting period.
Source of data to be used:	Monthly billing records of the Chhattisgarh State Electricity Board for the electricity imported from the grid.
Value of data	0
Description of measurement methods	The data will be directly measured and monitored at the project site using meters



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and procedures to be applied:	to be installed at the plant site.
QA/QC procedures to be applied:	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 comment:	The power to be imported is very low as compared to the power generated. For ex ante estimation of CER, power imported is assumed to be zero.

Data / Parameter:	Power Generation.
Data unit:	KWh
Description:	Power generated by the plant.
Source of data to be used:	Meters to be installed at the plant site of RPGPL.
Value of data	47.52 Million Kwh per annum
Description of measurement methods and procedures to be applied:	The power generated will be measured through meters to be used at the plant site.
QA/QC procedures to be applied:	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 comment:	

Data / Parameter:	Auxiliary Consumption
Data unit:	KWh
Description:	Power consumed by the power plant for internal purposes.
Source of data to be used:	Meters to be installed at the plant site.
Value of data	4.75 Million Kwh per annum.
Description of measurement methods and procedures to be applied:	Auxiliary consumption will be measured through meters to be used at the plant site.
QA/QC procedures to be applied:	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 comment:	For the purpose of ex ante calculations of Emission Reductions, 10% auxiliary consumption has been assumed.

Data / Parameter:	Biomass quantity
Data unit:	MT
Description:	The quantity of the biomass to be used in the plant during the crediting period.
Source of data to be	RPGPL records.



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used:	
Value of data	-
Description of measurement methods and procedures to be applied:	The quantity of the biomass used will be recorded using weigh bridge to be installed at the plant site.
QA/QC procedures to be applied:	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 comment:	This parameter is not used in ex ante estimation of CERs. However, this parameter would be monitored and will be available during the verification process.

Data / Parameter:	Coal Quantity
Data unit:	MT
Description:	The quantity of the coal that may be used in the plant during the crediting period.
Source of data to be used:	Bills/Receipts furnished by coal suppliers.
Value of data	-
Description of measurement methods and procedures to be applied:	The quantity of the coal used will be recorded using weigh bridge to be installed at the plant site. The same may also be cross checked with the bills furnished by the coal suppliers
QA/QC procedures to be applied:	RPGPL will be monitoring the quantity of coal using a weigh bridge to be installed at the plant site to double check on the quantity of coal and ensure consistency.
Any comment:	The quantity of coal used during the crediting period would be monitored and recorded continuously and will be available during the verification process. For the purpose of estimation of CERs, it has been assumed that 20% of the power exported during the crediting period would be using coal.

Data / Parameter:	Calorific Value of Biomass
Data unit:	Kcal/Kg
Description:	Calorific Value of the biomass used to be used in the power plant during the crediting period.
Source of data to be used:	Annual/ Semi Annual/ Quarterly laboratory testing results.
Value of data	-
Description of measurement methods and procedures to be applied:	RPGPL will annually undertake lab testing to estimate the calorific value of the fuel being used in the plant. In case different sources of fuel are used, the testing will be done quarterly or semi annually.
QA/QC procedures to be applied:	
Any comment:	This parameter is not used in ex ante estimation of CERs. However, this



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	parameter would be monitored and will be available during the verification process for cross checking and ensuring consistency.
Data / Parameter:	Calorific value of coal
Data unit:	Kcal/kg
Description:	Calorific Value of the coal that may be used in the power plant during the crediting period.
Source of data to be used:	Annual/ Semi Annual/ Quarterly laboratory testing results.
Value of data	-
Description of measurement methods and procedures to be applied:	RPGPL will annually undertake lab testing to estimate the calorific value of the coal being used in the plant. In case different sources are used, every batch of coal will be tested.
QA/QC procedures to be applied:	
Any comment:	This parameter is not used in ex ante estimation of CERs. However, this parameter would be monitored and will be available during the verification process for cross checking and ensuring consistency.

B.7.2 Description of the monitoring plan:

>>

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 project proponent will monitor the electricity exported to the grid using meters to be installed at the plant. As the project proponent may use coal in case of exigencies, the quantity of coal consumed during the crediting period and the calorific value of the same will also be monitored. Additionally, the project proponent would also monitor the quantity of biomass used and the calorific value for the same. For start up purposes, RPGPL may import power from the grid. The project proponent would also monitor the quantity of power imported through meters to be installed at the plant. The monitoring plan is detailed in Annex 4 as well.

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 is formed who assigned responsibility of monitoring of different parameters and record are keeping. On daily basis, the monitoring reports will be checked and discussed. On monthly basis, these reports will be forwarded at the management level.

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



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>> 05/01/2007

Rayapati Power Generation Private Limited (Project Proponent).



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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 04/02/2005, the date on the sanction of loan by IREDA, which is after 1 January 2000.

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

>>

20 Years.

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

The project promoter intends to apply for a **Fixed Crediting Period**.

C.2.1. Renewable crediting period

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/04/2007

(If the registration of the project is after 01/04/2007, the date of registration would be considered as the start date for the fixed crediting period)

C.2.2.2. Length:

>>

Ten years.



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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.

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:

>>

The environmental impacts are not considered to be significant by the project participant or the host party.

SECTION E. Stakeholders' comments

>>

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

>>

The local stakeholders were identified based on the impact or the possibility of impact due to the project activity. The Plant management and the Corporate Headquarter together identified the following as their local stakeholders:

a) Office bearers and residents of the neighbouring villages, b) Suppliers c) Representative of CSEB, d) Transporters, e) Local employees, f) Local NGOs

The opinion of the institutional stakeholder about the project activity is reflected in the approvals received by RPGPL. However, in order to provide the local villagers, the biomass suppliers and other individuals an opportunity to express their view on the project activity and build a rapport with the local population, RPGPL decided to conduct a stakeholder meeting in its plant and invitations were sent in advance intimating them about the day, time, venue and the purpose of the meet.

E.2. Summary of the comments received:

>>



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The stakeholder meeting was conducted at RPGPL's proposed plant site on the 30th of August 2006 and was attended by the office bearer and the residents of Thakurtola, biomass suppliers and the employees of RPGPL, representative of the CSEB. Summary of the comments received from the stakeholders

Office bearer of Thakurtola and villagers: The Sarpanch of Thakurtola expressed pleasure with the setting up of the power project as it had provided the rural population with permanent employment opportunities. Also, the taxes to be paid by RPGPL would help in providing improving the services for the villagers. The villagers expected creation of indirect employment opportunity for some of them due to the project activity. Also, they expected the power situation in their village to improve after the commissioning of the plant.

Representative of CSEB: Stated that the power situation in the region was expected to improve with the setting up of the power project.

Employees: The villagers expressed their satisfaction with the setting up of the project activity as it provided them with a permanent employment opportunity and obviated the need for them to travel long distances for jobs.

Biomass Suppliers: The biomass suppliers too supported the setting up of the project as it would provide them with permanent employment opportunity. They also stated that business opportunity for transporters would also be created due to the setting up of the project activity.

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

>>

All comments received were positive. No improvement opportunities were identified.



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Annex 1**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Rayapati Power Generation Limited
Street/P.O.Box:	HO: #6-3-900/9, Flat No.203 & 204
Building:	Veeru Castle, Durga Nagar Colony, Punjagutta
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 082
Country:	India
Telephone:	91 40 23412424, 91 40 23411486
FAX:	91 40 23414545
E-Mail:	rpgpl@rediffmail.com
URL:	
Represented by:	
Title:	Vice President, Finance
Salutation:	Mr.
Last Name:	Tripathi
Middle Name:	
First Name:	Ravi
Department:	Finance
Mobile:	91 94405 85555
Direct FAX:	
Direct tel:	
Personal E-Mail:	tripathi_rc@sify.com



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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NO PUBLIC FUNDING IS AVAILABLE FOR THE PROJECT.



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Annex 3

BASELINE INFORMATION

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Weighted Average Emission Factor and the Combined Margin for the Western grid, the details of which are available on the following website.

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

The procedures and formulas used for estimation of the baseline factor and the assumptions made has also been detailed in there.



Annex 4

MONITORING INFORMATION

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

Internal Auditors will 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 will be equipped with energy meters/export meters for monitoring and control purpose. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Chhattisgarh as per terms and conditions of supply. The tests of meters will 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 will not be interfered with, tested or checked except in the presence of representatives of company and CSEB. 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 will 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 will be as per the replaced meter. Corrections in exported energy will be applicable to the period between the two previous monthly reading and the date and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption will be recorded at the plant from the installed meters. However, for applying monthly bill to CSEB the meter readings will be taken on 1st of every month by CSEB officials in presence of company representatives and readings will be jointly certified.

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

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

If both the both 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 will be recorded at the plant daily and the same will be verified by Manager of the plant. These records will be sent to the head office for review by the director and for corrective actions if necessary.

- - - - -



Appendix A
Abbreviations

CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
CSEB	Chhattisgarh State Electricity Board
CSPCB	Chhattisgarh State Pollution Control Board
Cm	Centimeter
CO ₂	Carbon Dioxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	Indian 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
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PLF	Plant Load Factor
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
RPGPL	Rayapati Power Generation Private Limited
SEB	State Electric Board
STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joule



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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.	UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol
4.	UNFCCC document: Appendix B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
5.	Detailed project report on 7.5 Biomass based power project – Rayapati Power Generation Private Limited
6.	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- http://cea.nic.in
7.	CEA published document “16 th Electric Power Survey of India”
8.	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, http://mnes.nic.in
9.	Website of Indian Renewable Energy Development Agency (IREDA), www.ireda.nic.in
10.	www.infraline.com/power/
11.	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. http://envfor.nic.in



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Appendix – C

On site Emissions	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Generation capacity , KW	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Plant load factor, %	90	90	90	90	90	90	90	90	90	90
No. of hours of plant operation per annum	7920	7920	7920	7920	7920	7920	7920	7920	7920	7920
No. of units generated in a year, millions	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52	47.52
Auxilliary consumption per annum	4.752	4.752	4.752	4.752	4.752	4.752	4.752	4.752	4.752	4.752
No. of units exported to grid, millions	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77
Total Units Exported to the Grid, Millions	427.7									
T&D losses considered on exportable power	0	0	0	0	0	0	0	0	0	0
No. of units replaced in the grid, millions units	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77	42.77
Baseline emission factor considered, kgCO ₂ /kWh	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Baseline emissions, tones	39346	39346	39346	39346	39346	39346	39346	39346	39346	39346
Generation by coal as supplimentary fuel (20%)	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55	8.55
Emission factor considered for coal, kgCO ₂ /kWh	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
Project emissions, tones	10193	10193	10193	10193	10193	10193	10193	10193	10193	10193
Total Project Emissions, Tonnes	101930									
Net greenhouse gas emissions, tones	29153	29153	29153	29153	29153	29153	29153	29153	29153	29153
Carbon emission reductions in a year	29153	29153	29153	29153	29153	29153	29153	29153	29153	29153
No. of years of delivery of CERs	10									
Total number of CERs	291530									