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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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3.66 MW poultry litter based power generation project by Raus Power in India
Version: 05
Date: 11.12.2008

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

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The project activity consists in the generation of power for a grid system using biogenic waste generated in local poultry farms. The biogenic waste i.e poultry litter used by the proposed project would have been dumped near poultry farms to natural decay in the absence of the project activity causing atmospheric release of methane which is a potent greenhouse gas. Thus the project activity is also avoiding production of methane from natural decay of poultry litter. The project design comprises the installation of a 3.66 MW capacity power generation facility in Andhra Pradesh, a southern state of India. The project is developed by a private entity Raus Power Ltd. (hereafter referred to as the Project Developer). The generated net power will be exported to Andhra Pradesh Eastern Power Distribution Company Ltd.(APEPDCL), a public power utility company.

The project is helping the host country to fulfil its goals of promoting sustainable development. Specifically, the project satisfies the sustainable development guidelines provided by the Ministry of Environment and Forests (MoEF), the Designated National Authority (DNA) of India. Each of the sustainable development indicators established by the MoEF have been analysed in the context of the proposed CDM project activity to assess the project's contribution to sustainable development. This analysis appears below.

Environmental Sustainability
The project uses a renewable source of energy (poultry waste) for electricity generation and therefore does not emit additional greenhouse gases. Poultry litter which is currently being dumped near poultry farms is causing generation and release of methane into the atmosphere, apart from causing local environmental problems such as odour, pest generation etc. Thus by avoiding dumping of the poultry litter, the project contributes to the environmental well being and sustainability.

Social and economic sustainability
The project contributes to the economic development by generating additional employment and generation of an economic value to a waste. Thus the local unemployed residents as well as skilled manpower gets permanent employment due to the project activity and poultry farmers get additional revenue by selling the poultry litter to the power project. The project activity generates additional about 90 direct permanent jobs. Further the project activity creates about 210 indirect employment opportunities for collection, loading, transportation and unloading of biomass residues. The project activity creates various opportunities for rurally downtrodden people, contributes to remove social disparity by offering equal opportunities and alleviates poverty to some extent.

As per the contract signed between the poultry farmers and the project developer, poultry farmers get additional revenues of Rs.500/- per ton of poultry litter supplied to the project. The project activity also contributes to the flow of investments in the rural area where the project is implemented.

Technical Sustainability

The proposed project implements an innovative renewable energy technology that is not widely practiced in host country. The project uses poultry litter as a fuel for power generation which was not tried earlier on commercial scale. Further the project contributes to increase the renewable energy share in the national grid system. Due to decentralised power generation, the project activity also contributes to removal of power fluctuations in the local grid system.

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 (host)	Raus Power Ltd. (private entity)	No
Switzerland	South Pole Carbon Asset Management Ltd. (private entity)	No
Switzerland	Climate Cent Foundation (private entity)	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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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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Duppalapudi Village, East Godavari District

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

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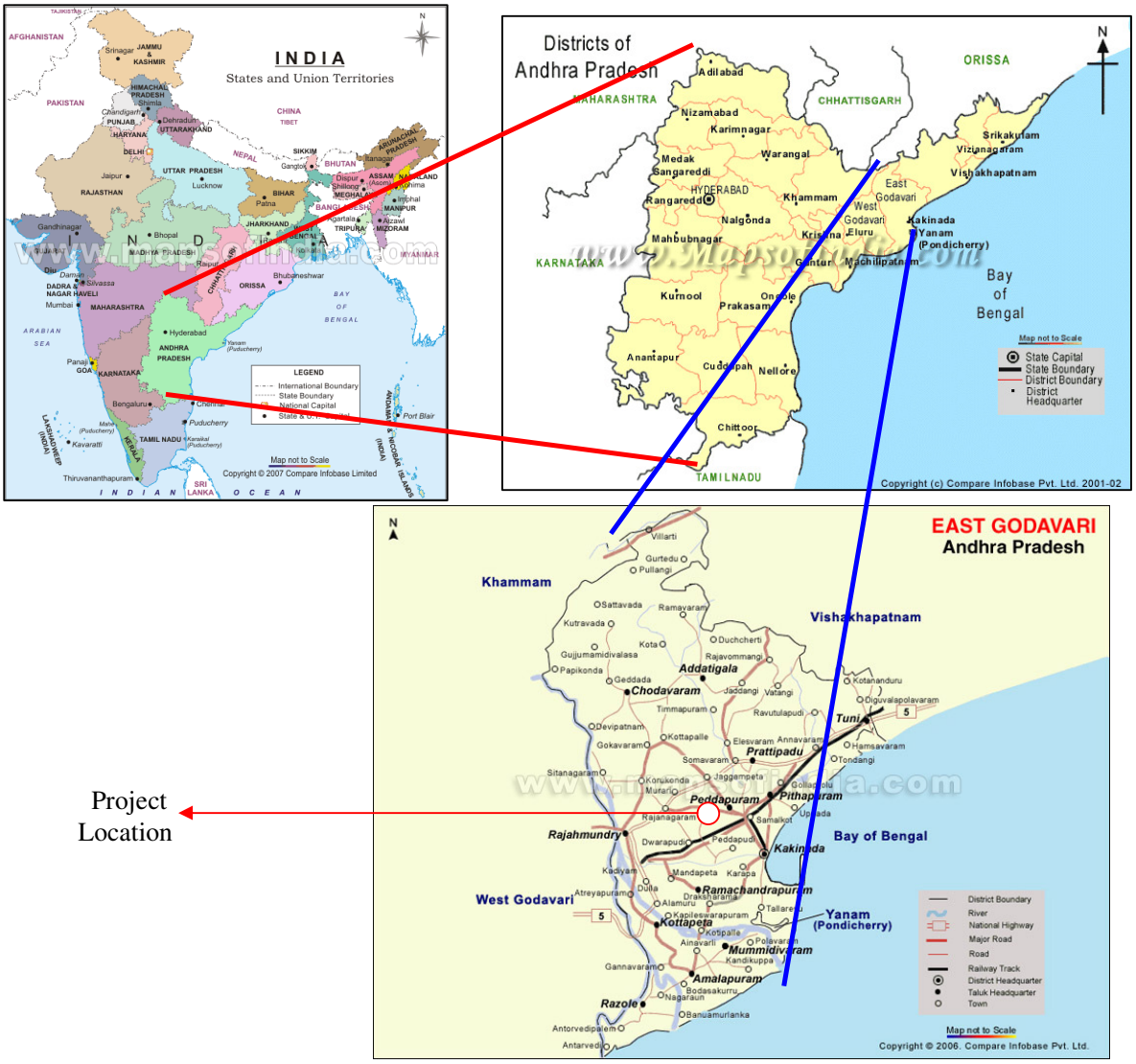
The physical location of the project activity is shown in the maps below. The latitude and longitude of the project site are 16°56'47.40" N and 81°56'22.92 E. The project site is located at a distance of 550 km from Hyderabad which is state capital of Andhra Pradesh. Hyderabad is well connected to the rest of India by Road, Rail and Air. The project site can be reached by road which is connected to state highway Kakinada to Rajahmundry and is located at a distance of 15 km from the National Highway. The nearest railway station Anaparthy which is located at a distance of 5 km from the project site.



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

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The types and categories / measures of the small scale project activity are furnished below.

Electricity component of the Project:

Type I: Renewable Energy Projects

Applied methodology: AMS I.D. Version 13: Grid connected renewable electricity generation

Methane avoidance component of the Project:

Type III: Other Project Activities

Applied methodology: AMS III.E. Version 15.1: Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment

Technology of the project activity is direct combustion of poultry litter in a boiler to generate high pressure and high temperature steam from water. The steam will then be used to generate electricity by a turbine driven alternator. Basically this technology is widely available in India, however using a poultry litter as a fuel is not widely implemented. In fact only a few projects were proposed earlier but the expertise is not widely dispersed. Thus project activity faces technological barriers for implementation. Thus the project activity contributes to the demonstration of the innovative technological option that is not widely accepted and once the project is operational leads to transfer of technology to other areas.

The main technical features of the project are provided below:

- One unit of travelling grate type boiler with a capacity of 20 TPH and operating parameters of 45 kg/cm^2 and 440 ºC
- One unit of steam turbine generator set of capacity 3.66 MW
- Generation voltage 11kV
- Transmission voltage 33kV
- Anticipated energy export 23084 MWh/year

The above technology / measure is safe and sound from the environmental point of view since the project will not contribute to any negative environmental impacts. The project participants have already conducted environmental impact analysis which shows that there would be no negative impacts on the local environment. The project only contributes to positive environmental impacts due to avoidance of dumping of litter.

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

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The chosen crediting period is 7 years starting from the date of registration of the project activity. The start date is mentioned in section C.2.1.1. The crediting period is of renewable type with two renewals after the expiry of the first crediting period. The project activity is expected to generate around 359,471 CERs during the first crediting period of 7 years with an annual average of 51,353 CERs. Information on estimates of CERs is furnished in the following table.

Years	Estimation of annual emission reductions in tonnes of CO2 e
2009	33,902
2010	43,603
2011	50,106
2012	54,466
2013	57,388
2014	59,346
2015	60,659
Total estimated reductions (tonnes of CO_2 e)	359,471
Total number of crediting Years	7
Annual average of estimated reductions over the crediting period (tonnes of CO_2 e)	51,353

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

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No public funding is involved in the project activity.

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

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The proposed small-scale project activity is not a debundled component of a larger project activity as there is NO registered small-scale CDM project activity or an application is made to register another small-scale CDM project activity:

- by 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 from the project boundary of the proposed small-scale activity at the closest point.

SECTION B. Application of a baseline and monitoring methodology

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

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Approved baseline and monitoring methodologies and methodological tools applied to the project activity are as follows:

Version 13 of AMS I.D, Grid connected renewable electricity generation
Version 15.1 of AMS III.E, Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment
Methodological tool: "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", version 02
Methodological tool: "Tool to calculate the emission factor for an electricity system", version 01

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

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Justification for using the approved small scale methodology AMS I.D

1. The Project is a new renewable biomass power plant and is connected to the grid system operated by APTRANSCO in Andhra Pradesh India in which fossil fuel-fired power plants account for the predominant share of electricity generation.

2. The renewable component of the of the unit does not exceed 15MW. The project participants do also confirm that the installed capacity of the project will not be increased throughout the crediting time of the project beyond the 15 MW threshold for small-scale CDM projects.

3. The unit is not a combined heat and power system

4. The unit is new and not an addition to an existing renewable power generation facility.

5. The project does not retrofit or modify existiong facility for renewable energy.

Justification for using the approved small scale methodology AMS III.E

1. The project activity is a measure that avoids the production of methane from biomass (poultry litter) that:
    a. Would have otherwise been left to decay under clearly anaerobic conditions throughout the crediting period in waste disposal sites (in open areas near poultry farms) without methane recovery, and
    b. The biomass is already deposited in waste disposal sites without methane recovery.

Due to the project activity, decay is prevented through controlled combustion of the biomass referred to in paragraph (a) above. The project activity results in emission reductions of less than 60 $ktCO_2e$ per year as estimated in subsequent sections.

2. Currently the poultry farmers are disposing the litter at nearby disposal sites, which are mostly low lying areas near the poultry farms or small pits dig out.
    a. The waste deposited in the disposal site is not homogeneous as they also receive agricultural wastes from nearby activities.
    b. To determine the MCF factor the methodological tool "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" has been applied. As per MCF definitions in the afore mentioned tool, the disposal practice in the baseline scenario fits into two potential disposal site types: (i) unmanaged waste disposal sites with high water table where an MCF factor of 0.8 would apply or (ii) unmanaged shallow waste disposal sites with less than 5 m depth where a MCF factor of 0.4 would apply. As a conservative approach project proponents decided to apply a MCF factor of 0.4 instead of 0.8.

3. There are no local regulations that would restrict the dumping of waste as carried out in the project activity.

4. The project activity does not recover or combust methane.

5. The project activity does not combust partially decayed biomass mined from the solid waste disposal site. Fresh poultry waste which is otherwise would have been disposed would be used in the project activity for direct combustion.

6. The combustion facility is only used for electricity generation.

7. Project design corresponds to the direct combustion of biomass and thus RDF/SB is not produced on site.

8. In the baseline, there would be no reduction in the amount of waste through regular open burning, since open burning was not noticed in the past anywhere in the project region. Further, the waste is not removed for other applications, since the poultry litter has no other applications in the region.

9. The project activity does not recover methane instead used for electricity generation through controlled combustion. There is no reduction in waste through regular open burning, and there is no removal for other applications. In the project activity there is no release of waste water. As explained above, the characteristics of the solid waste disposal site are known to allow estimation of its methane emissions.

10. The project activity generates residual waste which is the ash coming out of the boiler. This ash is disposed for on-land application in nearby agricultural fields since poultry litter ash can be used as organic manure. The combustion residues will not be stored under anaerobic conditions and will not be delivered to a landfill. Hence, emissions from residual wastes are not applicable.

B.3. Description of the project boundary:

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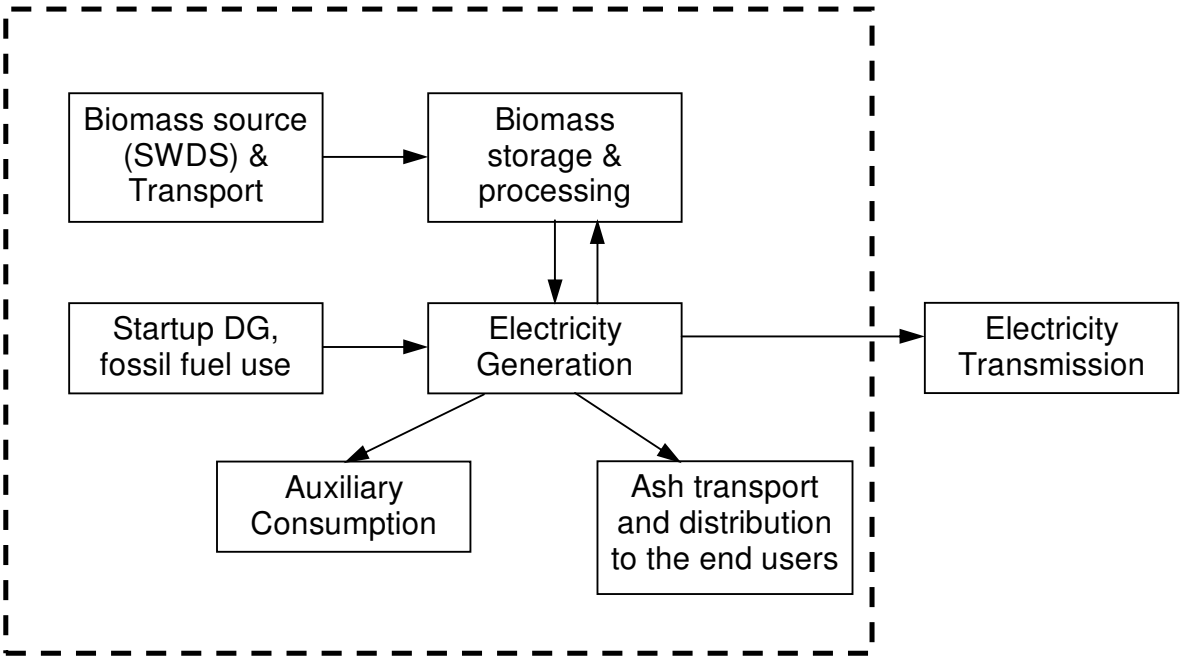
The project boundary is defined as the spatial extent around a project within which the project's impact (in terms of carbon emission reductions) will be assessed. As referred to in Appendix B for small-scale project activities, the project boundary for a small scale renewable energy project that provides electricity to a grid encompasses the physical, geographical site of the renewable generation source. For the Project activity this includes emissions from activities that occur at the project location as well as at waste dumping sites.

The system boundary for the baseline is defined as the southern regional grid system in India, and will include all direct emissions related to the electricity produced by power plants to be displaced by the Project. Additionally, the project boundary is extended to include physical and geographical sites where the litter would have been dumped, where the residues of controlled combustion are deposited and itineraries between them where the transportation of wastes and combustion residues occur. The project boundary is graphically represented below.



B.4. Description of baseline and its development:

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Baseline for grid electricity displacement:

The baseline scenario for the project activity is the continuation of operation of grid connected electricity generation sources in the southern region grid system. The equal amount of energy generated by the project activity would have been produced by other grid connected sources in the region. Hence, in accordance with the approved methodology AMS I.D, the baseline is developed following the guidance at para 9(a) as the kWh produced by the project activity multiplied by the southern region grid emission coefficient, calculated as a combined margin consisting of combination of operating margin and build margin.

The grid emission factor is fixed *ex ante* during the crediting period following the guidance provided in ACM0002, whose guidance is provided separately as a methodological tool "Tool to calculate the emission factor for an electricity system". Central Electricity Authority (CEA) has already announced grid emission factors for CDM project activities in India. Current version of grid emission factors is 3.0 updated on Dec 2008[1]. The same data has been used for the project activity. Data on official grid emission factors prepared by CEA can be found at www.cea.nic.in.

The key data and assumptions used in the baseline determination are provided below:

No.	Key data / assumption	Data value used	Source
1	Plant gross capacity	3.66 MW	Detailed project report
2	Auxiliary consumption	10% of the gross generation	Detailed project report
3	Plant load factor	80%	Detailed project report
4	Net electricity exported to the grid	23084 MWh	Calculated based on the above parameters
5	Southern region grid emission factor	0.854 tCO_2/MWh	Central Electricity Authority
6	Estimated baseline emissions	19,718 tCO_2	Calculated as in B.6.1 and as illustrated in B.6.3

Baseline for avoidance of methane production from biomass:

In the absence of the project activity the poultry litter would have otherwise been left to decay under clearly anaerobic conditions throughout the crediting period in solid waste disposal sites near the poultry farms and methane continuously emitted to the atmosphere. Hence, in accordance with the approved methodology, the yearly baseline emissions are calculated as the amount of methane that would have been emitted from the decay of the cumulative quantity of the waste diverted or removed from the disposal site, to date, by the project activity, calculated as the methane generation potential in accordance with the methodological tool.

Since the project activity combusts freshly generated wastes, the baseline emissions at any year "y" during the crediting period is calculated using the amount and composition of wastes combusted since the

[1] Available in the public domain www,cea.nic.in

beginning of the project activity (year "x=1") up to the year "y", using the methodological tool. Baseline emissions exclude methane emissions that would have to be removed to comply with national or local safety requirement or legal regulations. To date there were no national or local safety requirement or legal regulations in India to remove methane emissions from disposal sites.

The key data and assumptions used in the baseline determination are provided below:

No.	Key data / assumption	Data value used	Source
1	Total biomass consumed by the project	54,020 tons per year	Project design report
2	Composition of biomass consumed	85% poultry litter 15% rice husk Biomass does not contain non-biomass carbon	Project design report
2	Poultry litter used by the project	45844 tons per year	Assumption, 85% of the gross annual fuel consumption
3	Category of litter	Food, food waste, beverages and tobacco, Rapid degrading	Justification provided in B.6.1
4	Ambient conditions	Tropical, wet MAT > 20ºC MAP > 1000 mm	Project design report. Official information on the normal rainfall in East Godavari District is available at www.eastgodavari.nic.in, under "district profile" and "climate", which indicated that the normal rainfall in the district is 1280 mm. At the same source the maximum temperature indicated is 48ºC.
5	Fraction of degradable organic content	38%	Methodological tool, value provided for food, food waste, beverages and tobacco, % dry weight
6	Decay rate (k_j)	0.4	Methodological tool, value provided for food, food waste, beverages and tobacco, rapid degrading
7	Baseline emissions	223,470 tCO_2 for first crediting period	Calculated as in B.6.1 and illustrated as in B.6.3

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

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CDM revenues are critical for the implementation of the project activity. Project participants considered CDM revenues at the time when the initial project panning was done. This is evident from the following timeline of implementation.

Table 1: Project timeline for CDM consideration

No.	Date	Description
1	29/12/2001	NEDCAP, a government run state level nodal agency for renewable energy sources in Andhra Pradesh, approved the project activity with a capacity of 3.0 MW
2	05/07/2002	Board of Directors of Raus Power Ltd. decided to develop the project as CDM project activity
3	12/07/2002	PPs appointed Greenpower Management Services (P) Ltd. Chennai, for developing the project as CDM project activity
4	03/08/2002	NEDCAP permitted PPs to enhance the project capacity to 3.66 MW
5	11/05/2005	NEDCAP permitted PPs to change the technology from biomethanation to direct combustion
6	14/02/2006	Southpole Carbon Asset Management Ltd., Switzerland approached Raus Power Ltd. to purchase CERs from the project activity
7	03/11/2006	IREDA sanctioned term loan of Rs.91.9 millions for the project
8	06/12/2006	Stakeholder consultation meeting was held according to the Gold Standard CDM requirements
9	16/04/2007	ERPA was signed between Raus Power and Climate Cent Foundation, with South Pole Carbon Asset Management as project CDM consultant
10	27/06/2007	State Bank of India sanctioned the balance term loan of Rs.17.6 millions for the project
11	26/07/2007	Project construction was started
12	1/11/2008	Planned project commission date

From the above table it is evident that the CDM was crucial for implementation of the project activity. Project construction could be started only after signing the ERPA and obtaining the balance term loan sanction from State Bank of India. In the absence of the CDM and balance term loan, the project would not have been implemented.

According to Attachment A to Appendix B of the simplified modalities and procedures for small scale CDM project activities, evidence as to why the proposed project is additional can be shown by conducting an analysis of at least one barrier to demonstrate that the project would not have occurred anyway. Below the existence of access-to-finance barrier[2], technological barrier and prevailing practice barrier have been demonstrated.

Access to finance barrier:
Due to the project activity being a technologically innovative and one of the first few cases[3] using poultry litter as fuel, sourcing of finances for the project has been a difficult task for the project participants.

[2] The access-to-finance barrier is demonstrated based on the "Non-binding best practice examples to demonstrate additionality for SSC project activities" (EB 35, Annex 34)

[3] This can be evidenced from the letter issued by Non-Conventional Energy Development Corporation of Andhra Pradesh Ltd., which is a AP Govt. owned nodal agency for non-conventional energy development in AP.

With much of persuasion the project participants could get financing only to certain extent from IREDA[4]. The rest of the finances are to be raised by project participants from their own resources and from other commercial banks. This puts additional financial burden on investors. For innovative projects unless returns are substantially higher sourcing of finances from commercial sources would be very difficult. Under the above conditions anticipated CDM revenues from sale of emission reductions influenced the decision to continue with the project. This is evident from the fact that IREDA was reluctant to sanction the required term loan and the project participants had to approach other commercial banks for the balance term loan. Finally after much persuasion and after demonstrating the additional revenues from CDM, State Bank of India (SBI) sanctioned the balance term loan for the project activity, however, at much higher interest rate than IREDA. IREDA sanctioned the term loan at an interest rate of 11.25% whereas SBI sanctioned the term loan at an interest of rate of 14.75%. Documentary evidence in the form of loan agreements are already submitted to the DOE. Further a letter issued by SBI that indicates the CDM consideration while sanctioning the term loan was provided to the DOE.

Technological barriers:

The proposed project activity has a significant technological barrier. As indicated earlier, the project activity is one of the first few cases that propose usage of poultry litter as fuel for power generation. No past experience with regard to technology and operation of similar plants has been available at the time of proposing this project activity. Out of the few projects proposed only one project activity got registered for CDM. Other projects are at different stages of implementation and yet to start to construction. Hence, the project activity bears a significant risk with regard to the success of technology. The main problems and risks anticipated with the burning of poultry litter in a boiler are:

- Burning of poultry litter on a commercial scale has not yet been tried in the host country. Hence, a significant uncertainty exists, which can influence the generation potential from the project activity. As a result the net power generation may be less than anticipated.
- Changing properties of poultry litter between seasons. One of the characteristic of the poultry litter is moisture content due to which sustainable boiler operations can not be assured during monsoon seasons, reducing the continuous power generation and affecting the operational lifetime of equipment. Test reports of the poultry litter that indicates changing properties has already been submitted to the DOE.
- Poultry litter absorbs moisture quickly and particularly in monsoon periods, poultry litter becomes moist quickly making it difficult to burn. This problem aggravates in the project region where the annual rainfall is high and is near to the sea coast. During these periods, other fuels such as coal have to be co-fired to sustain the fuel combustion, optimum operating parameters. Since the MNRE imposed restriction on the use of fossil fuels in the project, project participants considered other non-conventional fuels such as rice husk. This combination of poultry litter and rice husk/other biomass wastes triggered special design in the boiler and require special skills in operation and maintenance of the boiler.
- Influences of alkaline elements in the flue gas are not known. These elements may cause damage to the boiler reducing the availability factor and thus reducing the power generation. Several tests were conducted on burning of litter in boiler by the equipment manufacturer and several technological innovations had to be implemented. This added additional financial burden to the project participants. Yet the performance of these innovations are uncertain since the performance depends on realtime

[4] Indian Renewable Energy Development Agency Ltd., a financing arm working under the aegis of Ministry of New and Renewable Energy, Govt. of India.

conditions that prevail during the project operation. Details of these innovations were provided separately to the DOE.

- Special processing equipment such as driers may be required. However, the performance of these processing equipment is also not established for this kind of litter.

The above technical barriers and uncertainties pose risk for the investor and would eventually prevent the implementation of the project activity unless CDM revenues are available. The additional revenues from the sale of emission reductions can reward the investor for taking these risks. In this way the additional CDM revenues help to overcome this technological barrier.

Prevailing practice barriers:
The prevailing practice for small scale power generation in India is using fossil fuels or other biomass residues but not poultry litter. In Andhra Pradesh, there were several fossil fuel power projects in operation whose capacity is around 7400 MW and several biomass power projects whose total capacity is around 300 MW. Total installed capacity in Andhra Pradesh is around 11,642 MW[5] which includes fossil fuel fired, hydro, nuclear and renewables. For poultry based power projects type, till date only 7 similar projects were approved in Andhra Pradesh. Out of the 7 projects, one project was commissioned recently, but was not fully operationalized due to technical reasons. Remaining project activities are yet to start implementation, other than Raus Power Project. Documentary evidence to this is already provided to the DOE, in the form of a letter issued by NEDCAP.

For the disposal of poultry litter the prevailing practice is to dump the litter in the nearby open areas. Due to the project activity, the poultry farmers need to collect the litter carefully and to discharge into the transportation vehicles to carry to the project site. It is a difficult task collecting the litter, transporting to the project site, processing at site, etc. Special transportation vehicles need to be employed for transportation to ensure no spillage of litter is caused all along the transportation path. At the project site special attention needs to be paid to properly store and process the litter using large storage sheds. Due to these reasons the tendency would be to allow dumping of the litter in open areas rather than collecting for combustion. Hence, the project activity faces prevailing practice barriers.

Due to all the above reasons, without the role of the CDM, the project activity would not have been proposed by the project participants. Availability of funds from sale of CDM revenues alleviate some of the above barriers and enhance the economic viability.

Summary of national policies and circumstances relevant to the baseline:

As already explained in B.4, the project activity is the generation of electricity for a grid system using renewable energy sources for a grid system and the baseline displacement is the continuation of operation of existing grid connected sources. Presently there were no national policies relevant to the baseline and that restrict the operation or expansion of existing grid connected sources. Hence, in the absence of the project activity, the baseline continues to be the operation of the grid connected sources.

Similarly, no regulations exist in the country that mandates the use of poultry litter for electricity generation or that prevent the dumping of litter in waste disposal sites. Further, there were no regulations

[5] Ministry of Power, Government of India, Annual report for 2006-07

that specify recovery of methane from litter disposal sites. Hence, in the absence of the project activity the litter continues to be dumped and to emit methane into the atmosphere.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission reductions due to the project activity occur from two components viz. grid electricity displacement and avoidance of methane production, expressed as:

$$ER_y = ER_{y,Elec} + ER_{y,CH4} \quad (1)$$

where:

ER_y	Total emission reductions achieved due to the project activity in the year *y*, tCO_2e
$ER_{y,Elec}$	Emission reductions achieved due to grid electricity displacement, in the year *y*, tCO_2
$ER_{y,CH4}$	Emission reductions achieved due to avoidance of methane production in the year *y*, tCO_2e

a) Emission reductions due to grid electricity displacement:

Emission reductions due to the project activity are determined as follows:

$$ER_{y,Elec} = BE_{y,Elec} - PE_{y,Elec} - L_y \quad (2)$$

where:

$BE_{y,Elec}$	Baseline emissions for grid electricity displacement in the year *y*, tCO_2
$PE_{y,Elec}$	Project emissions due to grid electricity displacement in the year *y*, tCO_2
L_y	Leakage due to the project activity in the year *y*, tCO_2

Baseline emissions ($BE_{y,Elec}$):

Approved methodology AMS I.D provides two options in para 9, for determining the baseline emissions:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.
b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix.

Project participants can choose any one of the above two options, however the emission factor shall be calculated in a transparent and conservative manner. For the project activity, project participants chose option (a) combined margin. For Indian electricity CDM project activities Central Electricity Authority (CEA) already determined grid emission factors for different regions for both options and were made publicly available. These emission factors were developed following the guidance provided in ACM0002 version 07, in a transparent and conservative manner. Complete information on the data used, calculated

emission factors and conservativeness can be obtained from www.cea.nic.in. Latest version of the emission factors is 3.0 dated December 2007 that used latest data set of 2006-2007.

The project activity is connected to Southern Region grid system and emission reductions due to the project activity are achieved by displacing the grid electricity of the southern region system. Thus the baseline emissions are estimated as the product of net electricity exported to the grid and the emission factor of the southern region grid system determined by CEA.. For the southern region grid system, the grid emission factor is 0.854 tCO_2/MWh.

The following formula is used for calculation of emission reductions due to the project activity.

$$BE_{y,Elec} = EG_y \cdot CEF_{Elec} \quad (3)$$

Where:

$BE_{y,Elec}$	Baseline emissions due to grid electricity displacement during the year *y*, in tCO_2
EG_y	Electricity exported to the grid during the year *y*, in MWh
CEF_{Elec}	Grid emission factor in tCO_2/MWh

In the above formula, EG_y is monitored *ex post* while the CEF_{Elec} is determined ex ante as 0.854 tCO_2/MWh.

Project emissions ($PE_{y,ELec}$)

Project emissions are the sum of emissions from auxiliary fossil fuel combustion and transportation of biomass wastes and combustion residues, expressed as:

$$PE_{y,Elec} = PE_{y,comb} + PE_{y,tramsp} \quad (4)$$

where:

$PE_{y,comb}$	Emissions from auxiliary fossil fuel combustion in the year y, in tCO_2e
$PE_{y,transp}$	Emissions from transportation of biomass wastes and combustion residues in the year *y*, tCO_2

Use of auxiliary fossil fuels is not allowed in the project activity as per the regulations of Ministry of New and Renewable Energy (MNRE). However, if any auxiliary fossil fuels are used during the crediting period, project emissions will be determined using the following formula.

$$PE_{y,comb} = Q_{y,fuel} \cdot EF_{y,fuel} \quad (5)$$

where:

$Q_{y,fuel}$	Quantity of auxiliary fossil fuel used in the year *y*, tonnes
$EF_{y,fuel}$	CO_2 emission factor for the combustion of the auxiliary fossil fuel, tCO_2/ton, according to latest IPCC guidelines.

CO_2 emissions from transportation of biomass wastes and combustion residues are considered as project emissions, since transportation is also included within the project boundary. The following formula is used to determine the emissions from transportation.

$$PE_{y,transp} = \left(Q_{y,w} / CT_{y,w}\right) \cdot DAF_w \cdot EF_{CO2} + \left(Q_{y,ash} / CT_{y,ash}\right) \cdot DAF_{ash} \cdot EF_{CO2} \quad (6)$$

where:

$Q_{y,w}$	Quantity of waste type *w* combusted in the year *y* (tons)
$CT_{y,w}$	Average truck capacity for waste type *w* transportation, (tonnes/truck)
DAF_w	Average incremental distance for waste type *w* transportation (km/truck)
EF_{CO2}	CO_2 emission factor from fuel use due to transportation (tCO2/km, IPCC default values or local values)
$Q_{y,ash}$	Quantity of combustion residues produced in the year *y* (tonnes)
$CT_{y,ash}$	Average truck capacity for combustion residues transportation (tonnes/truck)
DAF_{ash}	Average distance for combustion residues transportation (km/truck)

Quantity of waste/residue transported, truck capacity and average incremental distance will be monitored *ex post* during the crediting period.

The project activity doesn't produce refuse-derived fuel (RDF) or stabilized biomass (SB). Therefore no project emissions of transportation of RDF/SB have been calculated.

Leakage

Possible sources of leakage due to the project activity include shift of pre-project activities, emissions due to the production of biomass and competing uses for the biomass. The project activity consumes two types of biomass viz. poultry litter which is the main fuel and rice husk which is supplementary fuel consumed to a maximum of 15% of total annual fuel consumption. For the poultry litter, which is not commercially used for other purposes, leakage from the above sources is not applicable.

For rice husk, leakage from shift of pre-project activities and from production of biomass is not applicable. However, a small amount of leakage from shift of competing uses to fossil fuels may be applicable. To determine the leakage due to rice husk shifting from competing uses, project participants evaluate through surveys annually if there is a surplus of the biomass in the region of the project activity, which is not utilised. If it is demonstrated that the quantity of available biomass in the region i.e. within 50 km radius, is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage will be neglected otherwise this leakage will be estimated and deducted from the emission reductions, by applying a leakage penalty to the quantity of biomass residues, for which project participants cannot demonstrate that the use of the biomass residue does not result in leakage. The leakage penalty aims at adjusting emission reductions for leakage effects in a conservative manner, assuming that this quantity of biomass residues is substituted by the most carbon intensive fuel in the country, using the following formula.

$$L_y = EF_{CO2,FF} \cdot BF_{y,w} \cdot NCV_w \quad (7)$$

where:

$EF_{CO2,FF}$	Emission factor of the most carbon intensive fossil fuel in the country, in tCO_2/GJ
$BF_{y,w}$	Quantity of biomass fuel of type *w* used in the project and for which leakage cannot be ruled out, tons of dry matter
NCV_w	Net calorific value of the biomass residue type *w* (GJ/ton)

b) Emission reductions from avoidance of methane production from biomass:

Emission reductions from avoidance of methane production are expressed as follow:

$$ER_{y,CH4} = BE_{y,CH4} - PE_{y,CH4} - L_{y,CH4} \quad (8)$$

where:

$BE_{y,CH4}$	Baseline emissions from methane production in the year $_y$, tCO_2e
$PE_{y,CH4}$	Project emissions in the year *y*, tCO_2
$L_{y,CH4}$	Leakage in the year *y*, tCO_2

The project activity combusts only freshly generated wastes and not the partially decayed wastes. The baseline emissions of methane production from biomass are calculated as follows:

$$BE_{y,CH4} = BE_{CH4,SWDS,y} \cdot GWP_{CH4} \quad (9)$$

where:

$BE_{yCH4,SWDS,y}$	Yearly methane generation potential of the wastes diverted to be disposed in the landfill from the beginning of the project (x=1) upto the year y, calculated according to the methodological tool. (tCO_2e)
GWP_{CH4}	Global warming potential of Methane, (value of 21)

The poultry litter is left to decay in the absence of the project activity and hence, the baseline emissions comprise methane emitted from natural decay of the waste at disposal sites under anaerobic conditions.

The methane emissions avoided in the baseline are quantified using the first order decay model (FOD) as described in the methodological tool approved by the CDM EB. The following formula is used to determine the methane emissions from the solid waste disposal site.

$$\mathrm{BE_{CH4,SWDS,y}} = \varphi \cdot (1-\mathrm{f}) \cdot \mathrm{GWP_{CH4}} \cdot (1-\mathrm{OX}) \cdot \frac{16}{12} \cdot \mathrm{F} \cdot \mathrm{DOC_f} \cdot \mathrm{MCF} \cdot \sum_{x=1}^{y} \sum_{j} \mathrm{W_{j,x}} \cdot \mathrm{DOC_j} \cdot \mathrm{e}^{-k_j \cdot (y-x)} \cdot \left(1-\mathrm{e}^{-k_j}\right) \quad (10)$$

Where:

$BE_{CH4,SWDS,y}$	Methane emissions avoided during the year *y* from preventing waste disposal at the solid waste disposal site (SWDS) during the period from the start of the project activity to the end of the year y (tCO_2e)
Φ	Model correction factor to account for model uncertainties (0.9)

f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose
MCF	Methane correction factor
$W_{j,x}$	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)
DOC_j	Fraction of degradable organic carbon (by weight) in the waste type *j*
k_j	Decay rate for the waste type *j*
j	Waste type category (index)
x	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)
y	Year for which methane emissions are calculated

The following baseline data has been applied for the project activity.

Amount of organic waste type j prevented from disposal in the SWDS ($W_{j,x}$)

In determining the amount of waste prevented from disposal in the SWDS ($W_{j,x}$) as input in formula 10 above, the percentage of the biomass that is combusted in the project activity and which would have been dumped in a waste disposal site in the baseline situation and also would have remained in the waste disposal site for a sufficient period of time to decay has been determined. A quantitative analysis has been carried out using waste disposal data of past 3 years 2006, 2007 and 2008. A survey has been carried out in the project region to obtain the required data for the quantitative analysis. Reports have been submitted to the DOE for validation. As per the reports, it has been determined that no amount of poultry litter has been removed for other uses from waste disposal sites and the full proportion of the waste combusted in the project activity would have been dumped in the waste disposal sites. Hence, for ex ante purposes, the ratio has been considered as 1 in the PDD. The quantitative analysis would be carried out every year during the crediting period and the data of 3 years immediately preceeding the crediting year would be used for determining the appropriate ratio. For example, if it was determined in the survey that 10% of poultry litter was removed for other uses; the biomass waste combusted in the project activity would be discounted by 10% for baseline emission calculations. Annual survey for the availability of biomass has been included in the data and parameters monitored.

Fraction of degradable organic content

Poultry litter is considered under the category of Food, food waste, beverages and tobacco which is one of the six categories specified in the Methodological tool “Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site”.

Poultry litter is a biogenic waste or excretes of the poultry birds and do not contain any heartwood or lignin. Hence, poultry litter cannot be categorized under wood and wood products. For the same reason, it cannot be categorized under the garden, yard and park waste. Based on the physical and chemical characteristics poultry litter cannot be categorized under paper and cardboard, textiles, glass, plastic, metal and other inert waste.

Based on the test reports of poultry litter, the Carbon to Nitrogen ratio (C:N Ratio) is between 7 and 15, which is very small and hence poultry has been considered to be rapidly degrading material. Accordingly, the poultry litter is considered under rapidly degrading category of food, food waste and tobacco.

Since these materials are available in almost dry form, the fraction of degradable organic carbon (by weight) *DOCj* is considered as 38% in accordance with the methodological tool.

Decay rate for the waste type j

The project site is located in Eastern coastal area of Andhra Pradesh state where the ambient is tropical with mean annual temperature above 20ºC. The mean annual precipitation in the project region is also above 1000 mm. Under these conditions, in accordance with the methodological tool, the decay rate k_j is considered as 0.4.

Other parameters

Taking guidance from the methodological tool, other parameters considered in determination of methane emissions are considered as under:

Φ	0.9	Model correction factor to account for model uncertainties
f	0	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
GWP_{CH4}	21	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
OX	0	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	0.5	Fraction of methane in the SWDS gas (volume fraction) (0.5)
DOCf	0.5	Fraction of degradable organic carbon (DOC) that can decompose
MCF	0.4	Methane correction factor

Applying the above parameters the methane emissions avoided in the baseline emissions will be calculated for each year.

Project emissions:

Approved methodology AMS III.E considered the following emission sources under project emissions.

(a) CO_2 emissions related to combustion of the non-biomass carbon content of the waste and auxiliary fossil fuels used in the combustion facility
(b) Incremental CO_2 emissions due to incremental distances between the collection point to the controlled combustion site and to the baseline disposal site as well as transportation of combustion residues and final waste from controlled burning site to disposal site.
(c) CO_2 emissions related to the fossil fuel and/or electricity consumed by the project activity facilities including the equipment for air pollution control equipment required by regulations.

Out of the above sources, sources (a) and (b) are already considered in the grid electricity displacement component. For, source (c), project activity does not consume fossil fuels, hence, the emissions from fossil fuels is not required here. However, the project activity consumes grid electricity for auxiliary

equipment including air pollution control equipment. This electricity consumption is already considered within the auxiliary consumption. Only net electricity exported to the grid after deducting the auxiliary consumption from the gross electricity generation is considered for emission reductions. Hence, emissions from grid electricity consumption are not separately considered.

Leakage:

No leakage is applicable under the approved methodology AMS III.E since the equipment used for controlled combustion and electricity generation is not transferred from another activity and no existing equipment is transferred to another activity.

Ex ante estimates of emissions and reductions when applying the above formula are provided in section B.6.3 and B.6.4.

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

Data / Parameter:	**CEF_{Elec}**
Data unit:	tCO_2/MWh
Description:	Emission factor of the southern region grid system
Source of data used:	Central Electricity Authority, publicly available official data
Value applied:	0.854
Justification of the choice of data or description of measurement methods and procedures actually applied :	The emission factor is calculated by Central Electricity Authority for Indian CDM project activities following the guidance provided in approved consolidated methodology ACM0002 version 06. The data used in determination of grid emission factor is of high accuracy since the generation data is being directly monitored for all power generating sources in grid system by CEA. As explained in section B.6, the value is applied directly from the CEA baseline data for the most recent year 2006-2007, as a fixed *ex ante* emission factor.
Any comment:	Document is publicly available in the official website of the Central Electricity Authority at www.cea.nic.in. Value determined *ex ante* during the first crediting period of 7 years and is subjected to revalidation at the start of subsequent crediting periods.

Data / Parameter:	**Φ**
Data unit:	-
Description:	Model correction factor to account for model uncertainties
Source of data used:	Methodological tool of UNFCCC CDM
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.
Any comment:	

Data / Parameter:	OX
Data unit:	-
Description:	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data used:	Methodological tool of UNFCCC CDM
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	No oxidation factor is applicable since no cover material is used for the waste at solid waste disposal site.
Any comment:	

Data / Parameter:	F
Data unit:	-
Description:	Fraction of methane in the SWDS gas (volume of fraction)
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.
Any comment:	

Data / Parameter:	DOCf
Data unit:	-
Description:	Fraction of degradable organic carbon (DOC) that can decompose
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on the methodological tool to determine methane emissions avoided from dumping waste at a solid waste disposal site
Any comment:	

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories
Value applied:	0.4
Justification of the	To determine the MCF factor the methodological tool “Tool to determine

choice of data or description of measurement methods and procedures actually applied :	methane emissions avoided from dumping waste at a solid waste disposal site" has been applied. As per MCF definitions in the afore mentioned tool, the disposal practice in the baseline scenario fits into two potential disposal site types: (i) unmanaged solid waste disposal sites with high water table where an MCF factor of 0.8 would apply or (ii) unmanaged shallow solid waste disposal sites with less than 5 m depth where a MCF factor of 0.4 would apply. As a conservative approach a factor, project proponents decided to apply a MCF factor of 0.4 instead of 0.8.
Any comment:	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS

Data / Parameter:	**DOCj**
Data unit:	-
Description:	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value applied:	38%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The biomass wastes used in the project activity are poultry litter All these wastes are attributed to the Food, Food waste, beverages and Tobacco (other than sludge) category as justified in section B.6.1. The wastes are available in dry form hence, % dry waste is considered. According to the methodological tool the factor DOCj is 38% for the above category.
Any comment:	

Data / Parameter:	**kj**
Data unit:	-
Description:	Decay rate for the waste type j
Source of data used:	IPCC 2006 guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 3.3)
Value applied:	0.40
Justification of the choice of data or description of measurement methods and procedures actually applied :	The project region is tropical with a mean annual temperature of more than 20ºC and has mean annual precipitation more than 1000 mm. Hence, the value of 0.40 given by the methodological tool has been considered for food, food waste and tobacco category (other than sludge). Based on the above ambient conditions, the project site cannot be considered to be in boreal and temperate climate zone as per the methodological tool.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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Ex ante calculation of emission reductions are furnished below:

a) Emission reductions from grid electricity displacement:

Baseline emissions are calculated using formula (3) as follows:

$$BE_{y,Elec} = EG_y \cdot CEF_{Elec}$$

In the above formula, the following values are used for determination of *ex ante* baseline emissions.

EG_y	- Net electricity exported to the grid	: 23,084 MWh
CEF_{Elec}	- Combined margin grid emission factor	: 0.854 tCO_2/MWh

In the above formula, EGy is the net electricity exported to the grid, calculated as the difference of the electricity exported and the electricity imported, as shown below:

$$EG_y = EG_{export,y} - EG_{import,y}$$

Where $EG_{export,y}$ and $EG_{import,y}$ are the electricity exported and electricity imported during the year y. Both parameters are monitored ex post using a single bidirectional energy meter.

By applying above values, *ex ante* baseline emissions due to the grid electricity displacement are determined as 19,718 tCO_2 per year.

Using formula (5), project emissions from fossil fuel combustion are calculated as 5 tCO_2/year as follows:

$$PE_{y,comb} = Q_{y,fuel} \cdot EF_{y,fuel}$$

In the above formula, quantity of fossil fuels is assumed to be 1.64 tons per year and an emission factor is considered as 3.185 tCO_2e/ton.

Project emissions from transportation are calculated using formula (6) as follows:

$$PE_{y,transp} = \left(Q_{y,w} / CT_{y,w}\right) \cdot DAF_w \cdot EF_{CO2} + \left(Q_{y,ash} / CT_{y,ash}\right) \cdot DAF_{ash} \cdot EF_{CO2}$$

Using the following values:

$Q_{y,w}$	Quantity of waste type *w* combusted in the year *y* (tons)	54,020	Detailed project report
$CT_{y,w}$	Average truck capacity for waste type *w* transportation, (tonnes/truck)	6	Assumed
DAF_w	Average incremental distance for waste type *w* transportation (km/truck)	50	Assumed
EF_{CO2}	CO_2 emission factor from fuel use due to transportation (tCO_2/km, IPCC default values or local values)		IPCC default value
$Q_{y,ash}$	Quantity of combustion residues	10,804	Detailed project report

	produced in the year *y* (tonnes)		
$CT_{y,ash}$	Average truck capacity for combustion residues transportation (tonnes/truck)	4	Assumed
DAF_{ash}	Average distance for combustion residues transportation (km/truck)		

Using the above values in formula (6), project emissions are estimated as 289 tCO_2e/year.

Leakage is considered to be zero due to the abundance of the availability of the poultry litter and rice husk within 50 km radius of the project site.

b) For avoidance of methane emission from natural decay:

Using formula (10) and the following values baseline emissions for avoidance of methane production are estimated as 14,473 tCO_2e during the first full year of 2009.

Φ	Model correction factor to account for model uncertainties	0.9	Methodological tool to determine methane emissions
f	Fraction of methane captured at the SWDS and flared, combusted or used in another manner	0	Methodological tool to determine methane emissions
GWP_{CH4}	Global Warming Potential (GWP) of methane, valid for the relevant commitment period	21	IPCC default value
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)	0	Methodological tool to determine methane emissions
F	Fraction of methane in the SWDS gas (volume fraction) (0.5)	0.5	Methodological tool to determine methane emissions
DOC_f	Fraction of degradable organic carbon (DOC) that can decompose	0.5	Methodological tool to determine methane emissions
MCF	Methane correction factor	0.4	Methodological tool to determine methane emissions
$W_{j,x}$	Amount of organic waste type *j* prevented from disposal in the SWDS in the year *x* (tons)	45,844	Detailed project report. Based on project design, total annual fuel requirement for the project is estimated as 67,525 tons or daily fuel requirement of

			185 tons. Considering a plant load factor of 80%, and fuel mix of 85:15 for poultry litter to rice husk, Annual and daily fuel requirements are calculated as 45,844 tons and 157 tons respectively. Remaining fuel is rice husk.
DOC_j	Fraction of degradable organic carbon (by weight) in the waste type *j*	38%	Methodological tool to determine methane emissions
k_j	Decay rate for the waste type *j*	0.4	Methodological tool to determine methane emissions
j	Waste type category (index)	Food, Food waste, beverages and tobacco	
x	Year during the crediting period: x runs from the first year of the first crediting period (x = 1) to the year y for which avoided emissions are calculated (x = y)	2	
y	Year for which methane emissions are calculated	2009	

Presently there are no national or local regulations in the country, hence the methane that would be destroyed is zero. Hence, following the formula (9) baseline emissions are estimated to be 14,473 tCO_2e.

Project emissions and leakage are considered to be zero, since they are considered in grid electricity displacement component.

Using formula (8), emission reductions from avoidance of methane production are calculated as 14,473 during the first full year 2009.

Summery of the above ex ante calculations are provided in tables below:

a) Baseline emissions for electricity exported to the grid:

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
$ER_{y,Elec}$, tCO_2	*19,718*	*19,718*	*19,718*	*19,718*	*19,718*	*19,718*	*19,718*

b) Baseline emissions for avoidance of methane emission from natural decay:

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
$ER_{y,CH4}$, tCO_{2e}	*14473*	*24175*	*30678*	*35037*	*37959*	*39918*	*41231*

d) Project emissions:

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*

$PE_{y,}$ tCO_{2e}	*289*	*289*	*289*	*289*	*289*	*289*	*289*

e) Emission Reductions:

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
$ER_{y,}$ tCO_{2e}	*33,902*	*43,603*	*50,106*	*54,466*	*57,388*	*59,346*	*60,659*

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

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Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2009	289	34,191	0	33,902
2010	289	43,892	0	43,603
2011	289	50,395	0	50,106
2012	289	54,754	0	54,466
2013	289	57,677	0	57,388
2014	289	59,635	0	59,346
2015	289	60,948	0	60,659
Total (tonnes of CO_2 e)	2023	361,493	0	359,471

In the above table, the year 2009 corresponds to the period starting from 01 Nov 2008 to 31 Oct 2009. The similar period applies for other years also in the crediting period.

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

The monitoring methodology has been designed to affectively monitor all the parameters as applicable in accordance with approved methodologies.

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{export,y}$**
Data unit:	MWh
Description:	Net electricity exported to the grid system during the year *y*
Source of data to be used:	Plant operational history
Value of data	23084
Description of measurement methods and procedures to be applied:	The total net energy exported by the project to the grid system will be measured using sophisticated energy meters. The data will be measured hourly and aggregated monthly.
QA/QC procedures to be applied:	Energy meters will be calibrated regularly to industry standards once in a year. Sales invoices / receipts of payments will be verified to cross check the electricity exported to the grid. Accuracy class of the energy meters installed is 0.2 which is best accuracy level so far existing in the industry.

Any comment:	Energy meters are bidirectional meters that measure both exports and imports.

Data / Parameter:	**$EG_{import,y}$**
Data unit:	MWh
Description:	Electricity imported by the project activity during the year *y*
Source of data to be used:	Plant operational history
Value of data	0
Description of measurement methods and procedures to be applied:	The electricity imported by the project will be measured using sophisticated energy meters. The data will be measured hourly and aggregated monthly. Energy meters are bidirectional meters that measure both export and import.
QA/QC procedures to be applied:	Energy meters will be calibrated regularly to industry standards once in a year. Sales invoices / receipts of payments will be verified to cross check the electricity exported to the grid. Accuracy class of the energy meters installed is 0.2 which is best accuracy level so far existing in the industry.
Any comment:	Energy meters are bidirectional meters that measure both exports and imports. Electricity imports are generally required for the project during shutdowns / startups / maintenance purposes. Hence, this amount of electricity import is not considered as auxiliary consumption. Hence, the value of data is shown as zero.

Data / Parameter:	**$EG_{y,gross}$**
Data unit:	MWh
Description:	Gross energy generated by the project activity in the year *y*
Source of data to be used:	Plant operational history
Value of data	25649
Description of measurement methods and procedures to be applied:	The gross energy generated by the project activity is measured by using sophisticated energy meters. The data will be measured hourly and aggregated monthly.
QA/QC procedures to be applied:	Energy meters will be calibrated regularly to industry standards, once in a year. Accuracy class of the energy meters installed is 0.2 which is best accuracy level so far existing in the industry.
Any comment:	

Data / Parameter:	**$EG_{y,aux}$**
Data unit:	MWh
Description:	Auxiliary consumption by the project activity during the year *y*
Source of data to be used:	Plant operational history
Value of data	2308
Description of measurement methods and procedures to be applied:	The electricity consumed by plant auxiliary equipment is measured by using energy meters. The data will be measured hourly and aggregated monthly.
QA/QC procedures to	Energy meters will be calibrated regularly to industry standards once in a year.

be applied:	Accuracy class of the energy meters installed is 0.2 which is best accuracy level so far existing in the industry.
Any comment:	Gross energy generated and auxiliary consumption are for information purposes. For calculation of emission reductions due to the project activity, only the net energy exported to the grid system will be considered, after deducting imports from the grid system if any.

Data / Parameter:	**$Q_{y,w}$ or $W_{j,x}$**
Data unit:	Tons
Description:	Quantity of waste type *w* or *j* transported to the project site during the year *y*
Source of data to be used:	Plant operational records
Value of data	54020 (45844 tons of poultry litter and 8176 tons of rice husk)
Description of measurement methods and procedures to be applied:	Each truck carrying the waste will be weighed twice using electronic weigh bridge installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of leaving. The waste weight is the difference in two weights. The data will be obtained by aggregating all the measured values for the full year.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards, once in a year. Purchase bills will be used to cross check the quantities. Accuracy level of the weighbridge is ±1%.
Any comment:	Each type of biomass waste combusted in the project will be monitored separately.

Data / Parameter:	**$Q_{y,fuel}$**
Data unit:	Tonnes
Description:	Quantity of auxiliary fossil fuel used in the year *y*
Source of data to be used:	Plant operational records
Value of data	1.64
Description of measurement methods and procedures to be applied:	Each truck carrying the fossil fuel will be weighed twice using electronic weigh bridge installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of exit. The fuel weight is the difference in two weights. The data will be obtained by aggregating all the measured values for the full year.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards, once in a year. Purchase bills will be used to cross check the quantities. Accuracy level of the weighbridge is ±1%.
Any comment:	

Data / Parameter:	**$Q_{y,ash}$**
Data unit:	Tons
Description:	Quantity of combustion residue transported to the end user during the year *y*
Source of data to be used:	Plant operational records
Value of data	10804

Description of measurement methods and procedures to be applied:	Each truck carrying the residue will be weighed using electronic weigh scale installed at the entrance of the plant premises, in empty condition at the entry and in loaded condition at the time of exit. The residue weight is the difference in two weights.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Any comment:	The value is based on the ash content of 20% in the poultry litter.

Data / Parameter:	**CTy,w**
Data unit:	Tonnes
Description:	Average capacity of trucks used for carrying the materials
Source of data to be used:	Plant operational records
Value of data	6
Description of measurement methods and procedures to be applied:	Each truck carrying the biomass will be weighed twice using electronic weigh scale installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of leaving. The waste weight is the difference in two weights. Average truck capacity will be determined by periodical or annual averaging of the measured weights.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards, once in a year. Accuracy level of the weighbridge is ±1%.
Any comment:	

Data / Parameter:	**CTy,ash**
Data unit:	Tonnes
Description:	Average capacity of trucks used for carrying the combustion residue
Source of data to be used:	Plant operational records
Value of data	4
Description of measurement methods and procedures to be applied:	Each truck carrying the residue will be weighed twice using electronic weigh scale installed at the entrance of the plant premises, in empty condition at the entry and in loaded condition at the time of exit. The residue weight is the difference in two weights. Average truck capacity will be determined by periodical or annual averaging of the measured weights.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards once in a year. Accuracy level of the weighbridge is ±1%.
Any comment:	

Data / Parameter:	**DAFw**
Data unit:	km
Description:	Average distance travelled by trucks for carrying different types of materials of type *w*
Source of data to be used:	Plant operational records
Value of data	50
Description of	Source of biomass materials and the distance travelled are recorded for each

measurement methods and procedures to be applied:	truck. Average distance travelled by trucks will be determined periodically or annually by averaging the monitored data.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**DAF_{ash}**
Data unit:	km
Description:	Average distance travelled by trucks for carrying combustion residue
Source of data to be used:	Plant operational records
Value of data	25
Description of measurement methods and procedures to be applied:	End users of combustion residues are recorded for each truck. Average distance travelled by trucks will be determined periodically or annually by averaging the monitored data.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$EF_{y,fuel}$**
Data unit:	tCO_2/ton
Description:	Emission factor of the auxiliary fossil fuel used
Source of data used:	IPCC
Value applied:	3.185
Justification of the choice of data or description of measurement methods and procedures actually applied :	Furnace oil / diesel oil is considered as an auxiliary fuel, for the purpose of ex ante emission calculations. However, use of any fossil fuel is not permitted in the project activity as per the license document.
Any comment:	

Data / Parameter:	**$EF_{CO2,transp}$**
Data unit:	tCO_2/km
Description:	Emission factor of the fossil fuel used for transportation
Source of data used:	IPCC
Value applied:	0.5223
Justification of the choice of data or description of measurement methods and procedures actually applied :	Diesel oil is the fuel to be used for transportation. Emission factor is calculated as the product of fuel efficiency (5 km/l), density of diesel (0.86 kg/liter, Ref: IOCL) and COEF for diesel (3.185 $kgCO_2$/km, Ref: IPCC default value). Fuel efficiency will be determined on yearly basis through sample measurements, using the monitored data on fuel type, fuel consumption and distance traveled for all truck types. Under the sample measurements, actual data on fuel type (Diesel oil), truck type (tractor trolley, light truck, medium truck etc.) and distance traveled. Atleast 10 measurements will be recorded for each fuel type and truck type. Fuel

	efficiencies will be determined for each set of data and an average of 10 values will be considered as the fuel efficiency for the year.
Any comment:	For ex ante calculations fuel efficiency of 5 km/liter is considered.

Data / Parameter:	$EF_{CO2,FF}$
Data unit:	tCO_2/GJ
Description:	Emission factor of the most carbon intensive fossil fuel in the country
Source of data used:	IPCC or local values
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Presently no leakage is anticipated. However, the local value will be used that is available in the year during which leakage occurs
Any comment:	This data item will be used for estimating leakage from shift of competing uses of rice husk

Data / Parameter:	**$BF_{y,w}$**
Data unit:	Tons
Description:	Quantity of waste type *w* used in the project during the year *y* for which leakage cannot be ruled out.
Source of data to be used:	Plant operational records
Value of data	0
Description of measurement methods and procedures to be applied:	Presently this value is fixed as Zero. However, this value will be replaced during the year when leakage cannot be ruled out. Each truck carrying the waste will be weighed twice using electronic weigh bridge installed at the entrance of the plant premises, in loaded condition at the entry and in empty condition at the time of leaving. The waste weight is the difference in two weights. The data will be obtained by aggregating all the measured values for the full year.
QA/QC procedures to be applied:	Weighing scale will be regularly calibrated to industry standards once in a year. Purchase bills will be used to cross check the quantities. Accuracy level of the weighbridge is ±1%.
Any comment:	

Data / Parameter:	NCV_{litter}
Data unit:	Kcal/kg
Description:	Net calorific value of the poultry litter
Source of data to be used:	Plant operational records
Value of data	2700
Description of measurement methods and procedures to be applied:	Poultry Litter will be tested for NCV in reputed laboratories four times a year

QA/QC procedures to be applied:	Not applicable, since the testing will be done by external entities.
Any comment:	

Data / Parameter:	NCV_{husk}
Data unit:	Kcal/kg
Description:	Net calorific value of the rice husk
Source of data to be used:	Plant operational records
Value of data	2700
Description of measurement methods and procedures to be applied:	Rice husk will be tested for NCV in reputed laboratories four times a year
QA/QC procedures to be applied:	Not applicable, since the testing will be done by external entities.
Any comment:	

Data / Parameter:	**NCV_w**
Data unit:	GJ/Tonne
Description:	Net calorific value of the biomass type w for which leakage cannot be ruled out
Source of data to be used:	Plant operational records
Value of data	0
Description of measurement methods and procedures to be applied:	Presently this value is fixed as Zero. However, this value will be replaced during the year when leakage cannot be ruled out. Biomass residue will be tested in reputed laboratories on yearly basis.
QA/QC procedures to be applied:	Not applicable, since the testing will be done by external entities.
Any comment:	This data item will be used for monitoring leakage from the use of rice husk or other biomass residue for which leakage cannot be ruled out.

Data / Parameter:	**$MD_{reg,y}$**
Data unit:	
Description:	Methane that would be destroyed or removed in the year y for safety or legal regulation
Source of data to be used:	Official data
Value of data	0
Description of measurement methods and procedures to be applied:	Presently this value is fixed as Zero as there are currently no regulations exists in the country. However, this value will be replaced during the year when a legal regulation is introduced. Existing of legal regulation will be checked every year.
QA/QC procedures to be applied:	Not applicable, since the testing will be done by external entities.
Any comment:	

Data / Parameter:	Availability of biomass
Data unit:	
Description:	Availability of biomass within the project region i.e. within 50 kms radius from the project location
Source of data to be used:	External entity survey report
Value of data	
Description of measurement methods and procedures to be applied:	An annual survey will be commissioned to identify the sources of each type of biomass (poultry litter, rice husk, or other biomass materials) that are used in the project activity including assessment of common practices, existing consumers of biomass and the quantity of surplus biomass available for the project activity. The survey would be commissioned to an independent external entity once in a year.
QA/QC procedures to be applied:	Not applicable, since the survey will be done by external entities.
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	-
Description:	Global warming potential (GWP) of methane, valid for the relevant commitment period
Source of data to be used:	Decisions under UNFCCC and the Kyoto Protocol (a value of 21 is to be applied for the first commitment period of the Kyoto Protocol).
Value of data	21
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	f
Data unit:	-
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Source of data to be used:	Written information from the operator of the solid waste disposal site and/or site visits at the solid waste disposal site
Value of data	0
Description of measurement methods and procedures to be applied:	Monitoring frequency : Annually. This value is zero, since no amount of methane is captured at the SWDS presently.
QA/QC procedures to be applied:	

Any comment:	

B.7.2 Description of the monitoring plan:

>>

The project developer RPL has planned and will implement monitoring procedures according to the monitoring methodology chosen for this project activity, ensuring that emission reductions are accounted for in an accurate and conservative manner.

RPL designates a person in charge for monitoring and recording of all the required information related to GHG emissions covered in this PDD. The designated person incharge will be directly under the control of the Managing Director of the company. He will collect, record and store the information for further archival or verification. Detailed responsibilities and authorities for project management, monitoring procedures and QA/QC procedures would be drawn up for the purpose and put in place. Duties thereof will be incorporated in the personnel's daily activity schedules to ensure data continuity and high-quality data collection. The collected information will be stored in the form of raw data in log books developed especially for the purpose of monitoring and recording data related to CDM protocols.

Data collected from the project site will be sent on a monthly basis to RPL's head office in Hyderabad for final processing (i.e. tabulation, report formatting, etc.). These records will form part of the registered monitoring protocol for use by verification agencies. All parameters monitored under the monitoring plan will be kept for a period of 2 years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

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

>>

Date of completion of the application of the baseline and monitoring methodology: 28/08/2007

Name of the responsible person / entity:

	Leading Author	Co-Author
Organization:	South Pole Carbon Asset Management Ltd.	
Street:	Technoparkstrasse 1	
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Represented by:		
Title:	Project Manager	Consultant
Salutation:	Mr.	Mr.
Last Name:	Camerata	Narendra
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Personal E-Mail:	t.camerata@southpolecarbon.com	narendra@energhg.in

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:

>>
12/02/2007

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

>>
25 y

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

C.2.1. Renewable crediting period

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

>>
01/02/2009 or the date of registration of the Project Activity, whichever occurs later.

C.2.1.2. Length of the first crediting period:

>>
7y 0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

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

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The project type and cost is the criteria for deciding whether analysis of environmental impacts of the project activity is required. Since, project type renewable power generation and the cost of the project is only Rs.168.5 million which is less than the threshold of Rs.1000 million, no documentation on the analysis of the environmental impacts of the project activity is required by the host Party. However, an environmental management plan is required for obtaining consent for establishment of the plant by the state pollution control board. An environmental management plan is already prepared, which will be made available to the DOE during validation.

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 considered insignificant; hence, no documentation is applicable.

SECTION E. Stakeholders' comments

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

>>

Project participants wish to develop the project activity as per the CDM Gold Standard Guidelines. As per the requirements of the Gold Standard, project participants conducted an initial stakeholder meeting on 6 December 2006 near the project site inviting the local stakeholders affected by the project activity.

All individuals affected by the project activity, private / public entities which are directly or indirectly involved in the project development process and Gold standard supporter NGOs were identified as stakeholders for the project activity. All the above stakeholders were contacted and invited to participate in the stakeholder meeting. Invitations were sent to all the above stakeholders together with information on project activity, environmental impacts and contribution to the sustainable development of the region. In addition, project activity and impacts were clearly explained during the stakeholders meeting.

The stakeholders attended at the consultation meeting include:

1. Local Panchayat (village administration) president, vice-president and members
2. Anaparthy Region Poultry Farmers Welfare Association, President, Vice President and Secretary
3. National Egg Coordination Committee, Treasurer
4. Potential biomass suppliers (local poultry farmers)
5. Local farmers (agriculture)
6. Local businessmen (Rice millers)

The following public entities were consulted as part of the stakeholder consultation and project development, though they did not participate in the above consultation meeting.

1. Non-conventional Energy Development Corporation of Andhra Pradesh Ltd. (NEDCAP)
2. Eastern Power Distribution Corporation of Andhra Pradesh Ltd. (APEPDCL)
3. Transmission Corporation of Andhra Pradesh Limited (APTRANSCO)
4. Eastern Power Distribution Corporation of Andhra Pradesh Ltd. (APEPDCL)
5. Andhra Pradesh Electricity Regulatory Commission (APERC)
6. Andhra Pradesh State Pollution Control Board (APSPCB)
7. Ground water department, East Godavari district

Complete details of the stakeholder consultation are provided separately as an attachment to this PDD.

E.2. Summary of the comments received:

>>

Some of the participants during the initial stakeholder meeting commented on some of the issues. The issues raised by these participants have been appended to this PDD in a separate document. However all comments have been positive and no negative comments have been received.

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

>>

All issues raised during the initial stakeholders meeting have been answered satisfactorily as given in attachment 1.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Raus Power Ltd.
Street/P.O.Box:	Tejaswi Apartments, Dwarakapuri Colony, Panjagutta
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Represented by:	
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Salutation:	Mr.
Last Name:	Krishna
Middle Name:	Murali
First Name:	I
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

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URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Mariono
Middle Name:	
First Name:	Renato
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in the project activity.

Annex 3

BASELINE INFORMATION

All baseline information is provided in Section B.6.1 and B.6.3.

Annex 4

MONITORING INFORMATION

Project participants implement the monitoring plan parallel to the implementation of project activity. Already the project design comprises necessary instruments as proposed in the monitoring plan so as to have a very low uncertainty and also to ensure emergency preparedness. The General Manager (Operations) will be given charge of GHG monitoring and will be supported by a team of experienced personnel in measurements and management information systems. The team as and when required avail the expertise of plant operating personnel, hence, at any time high quality GHG monitoring will be ensured. Necessary training would be imparted to the team regularly based on requirement and skill level.

The team also will be responsible for ensuring calibration requirements and tracking of previous calibrations. All instruments will be calibrated to the industry standards. All certificates will be stored properly for verification at a later date.

All measurements data, certificates, power generation data, fuel consumption data etc. will be stored for a period of 2 years after the last issuance of CERs.

* * *

Attachment 1

Summery of Comments received during stakeholder consultation meeting
(Section E.2 of PDD)

Comment No:1, By Mr.S. Ravikala Reddy, Rice miller

The participant raised the issue of ash handling and disposal from the project. Project developer responded that all ash generated by the project activity would be collected using closed systems and sold to farmers as the ash generated from burning of poultry litter is a good organic manure. He further stated that the ash quantity is very less due to the small size of the project. During collection and transportation, closed conveyors and closed trucks would be used to avoid leakage of ash.

Comment No.2, By Mr.Mukunda Reddy, Treasurer, NECC and poultry farmer

The participant asked the project developer how the poultry litter will be transported and moist litter would be handled. Project developer responded that the litter would be transported using closed trucks such that no litter would leak during transportation. Further, project developer informed that the moist litter would be available only during monsoon season, during that times, the litter would be dried within the project plant using boiler exhaust gases. Due to closed trucks, the moist litter would not pose any leakage problems during transportation.

Comment No.3, By Mr.S. Nageswar Rao, President, Village Panchayat

The participant asked project developers on whether project would result any sound pollution. Project developer responded that the sound pollution from the project activity is negligible. Further informed that, all sound generating equipment would be acoustically insulated to meet the standard accepted level.

Comment No.4, By Mr. M. Rama Krishna Reddy, Secretary, ARPFWS, Poultry farmer

The participant asked the project developer about the pollutants from the project activity. Project developer responded that the pollutants are negligible and would be treated within the plant using an effluent treatment plant. Liquid effluents would be treated in ETP and after treatment the same would be used for watering on site green belt plantation. Solid effluent from the project is only the ash which would be sold for on-land application as manure in agricultural fields.

Comment No.5, By Mr.S. Nageswar Rao, President, Village Panchayat

The participant raised the issue of water existing near the plant site and asked how the water pollution would be avoided. Project developer informed that the project site is 300m away from the water pond and cause no pollution. The project developer further informed that the road cum bund of the water pond is already strengthened by riveting such that no dust would raise and pollute the pond. The project developer assured that proper care would be taken during the project operation to suppress the dust from time to time.

Comment No.6, By Mr.S. Nageswar Rao, President, Village Panchayat

The participant requested the project developer to give preference to the local unemployed youth in the employment. Project developer agreed and assured that the local people would be employed in the project suitably depending on the skill level.

General Comments:

A number of other participants expressed that the project be implemented as early as possible since the immediate benefit from the project would be reduction of local pollution around the poultry farms. They expressed several problems faced from the accumulation of poultry litter.

At the end all the participants have signed the questionnaire and returned to the organizers. However, no comments have been included in the questionnaire.

* * *