CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

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Title: 7.5 MW Poultry Litter Project by Redan Infrastructure Private limited
Version: 4
Date: 12.04.2012

A.2. Description of the project activity:

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Redan Infrastructure Private Limited is setting up a 7.5 MW greenfield power project at Gangavaram village in Chittoor district of Andhra Pradesh. As a fuel for power generation, the project proposes to use poultry litter which is a waste product of the local poultry farming industry and is presently dumped in pits near the poultry farms, resulting in emissions of methane to the atmosphere. The proposed project activity will also utilize other biomass to the tune of 15%[1] of the total fuel consumption for electricity generation. The fuels will be burnt in a travelling grate type of boiler. The steam generated from the boiler is expanded in a bleed cum condensing turbo generator for power generation. The power generated by the project activity, after catering to the minor internal consumption shall be exported to the Southern Regional Electricity Grid of India. In the absence of the project activity, the grid dominated thermal power plants would generate an equivalent quantity of power, resulting in GHG emissions as per the carbon intensity of the fuel mix constituting the grid and the poultry litter would be continued to be dumped in the anaerobic lagoons in the fields, resulting in GHG emissions as per the carbon intensity of methane.

The main purpose of the project activity is to achieve GHG emission reductions and achieve sustainable development of the host country in the following ways:

1) *Change in AWMS system:* Curb methane emissions, which are released in the current practise i.e in anaerobic lagoons. The poultry litter and other biomass will be collected and brought to the plant, dried and used as fuel in the boiler, thereby reducing the methane emissions.
2) *Renewable energy generation system:* Poultry litter and biomass act as renewable source for electricity generation. Electricity will be fed to grid, thereby reducing the dependency on fossil fuels.

As explained in section B.4., the baseline scenario for the AWMS system is continuation of current practise i.e., anaerobic lagoons and for electricity generation is consumption of electricity from the grid. The baseline scenario for power generation is the generation of GHG intensive electrical energy by a majority of fossil-fuel grid connected power plants.

Hence the project activity shall result in a two-fold contribution towards GHG emission reductions:
a) GHG emission reductions by renewable energy based power generation substituting fossil-fuel fired thermal power generation in the grid.
b) GHG emission reductions by avoidance of methane emissions from the prevalent animal waste management system (AWMS).

[1] In terms of thermal energy to be supplied during combustion, the fuels' proportions are poultry litter: 85% and biomass: 15%. In terms of weight of the fuels to be used for combustion in the project, the fuels' proportions are poultry litter: 89% and biomass: 11%.

A synopsis of the present status of the project activity and major milestones achieved towards implementation have been provided below:

- Management Approval: January 2011
- UNFCCC and DNA notification: April 2011
- DOE Appointment for CDM validation: May 2011
- Commencement of CDM validation: May 2011
- First Equipment Purchase Order: August 2011 (start date)
- Present Status: Construction
- Expected Commissioning Date: 01/07/2013

The project is helping the Host Country fulfil its goals of promoting sustainable development. Specifically, the project satisfies the sustainable development guidelines provided by the Ministry of Environment and Forests in India. Each of the sustainable development indicators established by the Government of India have been analysed in the context of the project activity to assess the project's contribution to sustainable development. This analysis appears below.

Environmental well being:
The project uses a poultry litter waste for electricity generation and therefore does not emit additional greenhouse gases; which would have been generated as the poultry litter is currently being dumped into anaerobic lagoons. This project leads to the productive use of poultry litter for power generation. This leads to the minimisation of generation of methane in to the atmosphere. Also the PP proposes to dedicate 30% of the site as a green belt.

Social and Economic well being:
Specifically, the project:

- Increases employment opportunities in the area where the project is located, specifically, it is expected that jobs will be created during construction and in the area of civil works. In addition, various kinds of electro mechanical work would generate employment opportunity on a regular and permanent basis[2]
- Optimises the use of natural resources, avoid new uncontrolled waste disposal sites
- Diversifies the sources of electricity generation
- Uses clean and efficient technologies, and conserves natural resources

Technological well being:
The project showcases an innovative way to use low calorific value fuels, combining power generation from renewable resources and sustainable development in rural areas. With the majority of India's population living in rural areas and considering the desolate power supply situation in these areas, the project has an immense replication potential. The project presents technological innovations in boiler design to avoid slagging and corrosion problems caused by the fuel properties of poultry litter. The project uses a steam turbo generator with matching boiler of travelling grate type capable of firing multiple fuels.

A.3. Project participants:

[2]Source: Detailed Project Report (DPR)

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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)	Redan Infrastructure Private Limited (private entity)	No
Switzerland	Swiss Carbon Assets Ltd. (private entity)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>> India

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

>>
Andhra Pradesh

A.4.1.3. City/Town/Community etc.:

>>
Chittoor

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

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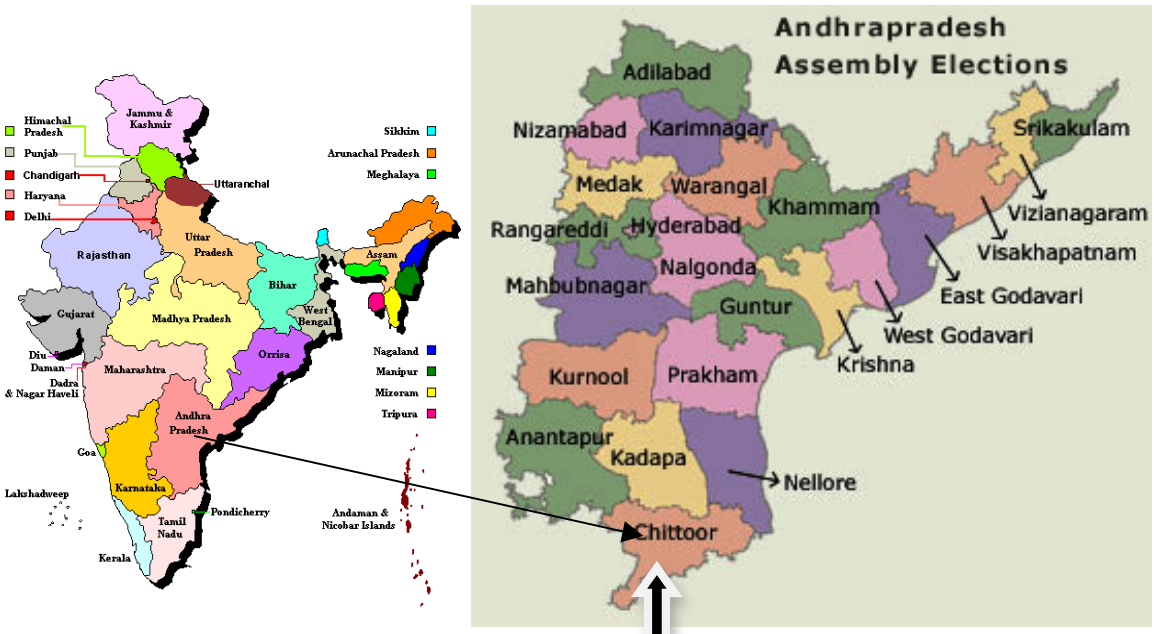
The project is situated in Gangavaram Village, Chitoor district in Andhra Pradesh. The site is at a distance of 2 km to the National Highway 219. Being located on the Bangalore- Chennai Highway, Chittoor is easily reachable from the major cities of South India. The place boasts of a well-laid out network of roadways and railways. Renigunta - Katpadi Railway line connects this region with all the major places of the state. Chittoor does not have its own airport, Tirupati airport is the nearest one. The project is located at 13° 13'56 N, 78° 43'24 E.



A.4.2. Category(ies) of project activity:

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The project complies to Sectoral Scope 13 and 15, and confirms to the large scale methodology ACM 0010 and also sectoral scope 1 – Energy industries (renewable/non renewable)

A.4.3. Technology to be employed by the project activity:

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The proposed project will generate 7.5 MW of power from a renewable source (poultry litter and other biomass fuels) and will supply electricity to the Southern grid. The technology to be employed in the power generation is standard direct combustion of fuel in a boiler and a steam turbine technology. It does not involve any fossil fuel combustion or other means of emissions of GHGs or other pollutants and hence the technology employed is environmentally safe.

In the pre-project scenario, the poultry litter generated from periodic cleaning of the poultry farms was left to decay in anaerobic lagoons created in pits. Electricity was generated by the grid connected power plants in the ratio of the existing grid mix. This results in GHG emissions from two sources:

- CH_4 emissions from the decay of poultry litter disposed in anaerobic lagoons near the poultry farms
- CO_2 emissions from electricity generation by the carbon intensive grid mix of the Southern Regional Grid of India

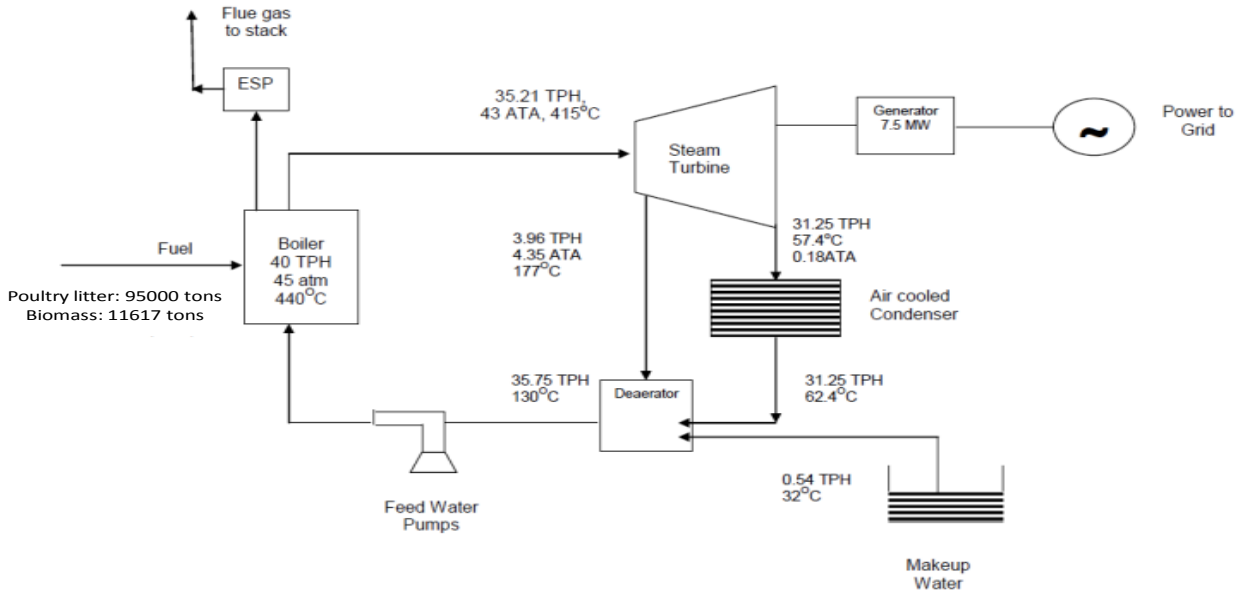
In the project activity, poultry litter and other biomass wastes shall be used for power generation. The project aims at adding electricity to the state grid as well as to find a more environmentally beneficial solution for handling and management of poultry litter. Poultry litter shall be mixed with other biomass (mango waste, groundnut shell, coconut coir& stem, cotton stalk and bengal gram husk), in order to achieve stable combustion of the fuel.

Poultry litter will be collected from the surrounding farms and brought to the plant where it will be dried and used as fuel directly, fed to the boilers. The boiler will use poultry litter as the primary fuel. According to the Ministry of Non Conventional Energy Sources in India, if required, such projects can also use up to 25% of other types of biomass as fuel.

Equipment Details for the project activity are as follows:

(a)	STEAM GENERATOR		
1.	Type of Broiler (Steam Generator)	:	Travel Grate Bed Boiler
2.	Capacity	:	40 tonnes / Hr
3.	Plant Load Factor	:	80%
(b)	GENERATOR		
1.	Generator Capacity	:	7500 KW
(c)	TURBINE		
1.	Type	:	Condensing (Fully)
2.	Output (Net)	:	7.5 MW
3.	Heat Rate	:	3700 Kcal/ kWh
4.	Type of Governing	:	Throttle

The process flow/ mass flow diagram for the project activity is provided below:



The expected operational lifetime of the project activity, based on the lifetimes of the major equipments to be used in the project activity is 20 years. This is as per the information received from the supplier(s).

The baseline scenario for the project activity is same as the pre-project scenario mentioned above in this section.

Considering the level of services provided by the project activity as compared to the baseline scenario, the final out of the project activity power plant, i.e., the electrical energy generation quantum shall be the same as that of the baseline scenario. This is because in the baseline scenario, the same amount of electrical energy shall be generated by the fossil-fuel dominated grid connected power plants constituting the Southern Regional Grid of India. Hence the same types and levels of services provided by the project activity would have been provided in the baseline scenario.

Furthermore, the project proponents wish to confirm that there is no technology transfer expected for implementing the project activity under consideration.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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Following table outlines the estimated reductions from this project:

Year	Annual estimation of emission reductions in tonnes of CO2e
July 2013 – June 2014	139,685
July 2014 – June 2015	139,685
July 2015 – June 2016	139,685
July 2016 – June 2017	139,685
July 2017 – June 2018	139,685
July 2018 – June 2019	139,685
July 2019 – June 2020	139,685
Total emission reductions over crediting time (tonnes of CO_2 e)	**977,795**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**139,685**

A.4.5. Public funding of the project activity:

>> There is no public funding available for this project.

SECTION B. Application of a baseline and monitoring methodology

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

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For the AWMS:
Methodology: ACM 0010
Version Number: 05
Sectoral scope: 13&15

For electricity generation component[3]:
Methodology: AMS I.D
Version Number: 17
Sectoral Scope: 01

Tools Used:
Tool of demonstration and assessment of additionality – Version 06.0.0
Tool to calculate the emission factor for an electricity system – Version 2.1.1
Tool to calculate baseline, project and/or leakage emissions from electricity consumption – Version 01

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

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Methodology	Applicability Criteria	Justification
ACM0010, version 05	This methodology is applicable generally to manure management on livestock farms where the existing anaerobic manure treatment system, within the project boundary, is replaced by one or a combination of more than one animal waste management systems (AWMSs) that result in less GHG emissions.	The project activity under consideration aims to replace the existing anaerobic poultry litter treatment system (solid storage for manure collection followed by uncovered anaerobic lagoon for manure management) in the poultry farms by another AWMS: burning the same as a fuel for power generation. This shall result in lesser GHG emissions by avoidance of methane release from the lagoons.
	This methodology is applicable to manure management projects with the following conditions:	The conditions are applicable to the project activity as demonstrated below:
	Farms where livestock populations,	The farms in the project boundary contain

[3]As per EB 8, Annex 1, para 6, *"If a proposed CDM project activity comprises different "sub-activities" requiring different methodologies, project participants may forward the proposal using one CDM-PDD but shall complete the methodologies sections (sections A.4.2, A.4.3, A.4.4. and B to E of the CDM-PDD) for each "sub- activity"."* Hence, in light of the project activity under consideration, there are two sub-activities requiring two different methodologies are AWMS component requiring ACM0010 and renewable energy generation component requiring AMS-I.D. These methodologies have been applied throughout the various sections of the PDD for each sub-section, in line with the quoted guidance.

Methodology	Applicability Criteria	Justification
	comprising of cattle, buffalo, swine, sheep, goats, and/or poultry, is managed under confined conditions;	poultry populations housed in cages, i.e., in confined conditions. This is established by means of the study conducted in the region by an independent agency.
	Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries);	The poultry litter is dumped into anaerobic lagoons near the farms and not into any natural water resources. This is established by means of the study conducted in the region by an independent agency that talks about dumping of the poultry litter only in pits.
	In case of anaerobic lagoons treatments systems, the depth of the lagoons used for manure management under the baseline scenario should be at least 1m[4];	The pits near the poultry farms where the poultry litter is dumped in the form of anaerobic lagoons in the baseline scenario have a depth of more than 1m. This is established by means of the study conducted in the region by an independent agency.
	The annual average temperature in the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C;	The temperature of the Chittoor district of Andhra Pradesh state, where the site of the proposed project activity is located is always above 5°C[5].
	In the baseline the minimum retention time is greater than a month	The poultry litter is usually kept in the pits for not less than 45 days, i.e., more than one month in the baseline scenario. This is established by means of the study conducted in the region by an independent agency.
	The AWMS/process in the project case should ensure that no leakage of manure waste into ground water takes place	In the project case, the poultry litter will be used as a fuel in the boiler and therefore there is no leakage of manure into ground water.
AMS-I.D.	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	This project activity consists of renewable energy generation units that shall use poultry litter and other biomass for generation and supply of net electrical energy to the Southern Regional Grid of India. Furthermore, the fuels to be used in the project activity: poultry litter and other biomass is a renewable biomass, as established as per point 5 of the Glossary of CDM terms (Version 05), that states *"The biomass is the non-fossil fraction of an industrial or municipal waste"*. The poultry litter and other biomass to be used

[4] In particular, loading in the waste water streams has to be high enough to assure that the lagoon develops an anaerobic bottom layer and that algal oxygen production can be ruled out.

[5] http://www.yr.no/place/india/Andhra_Pradesh%2FChittoor/statistics.html

Methodology	Applicability Criteria	Justification
		by the project activity shall be sourced from the agriculture industry[6] and is non-fossil in nature. Thus these fuels are the non-fossil fraction of the agriculture industry waste; these are established as renewable biomass fuel.
	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A[7]) applies is included in Table 2.	As the net electricity generated by the project activity shall be exported to the Southern Regional Grid of India, it can be classified under AMS-I.D.
	This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s).	The project activity plans to install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant) as per option (A) under this point.
	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m2; • The project activity results in new reservoirs and the power	The project activity under consideration is not a hydro power plant and hence this point is not applicable.

[6] *"The Agriculture Industry encircles a variety of procedures wherein natural resources give rise to a number of products. Agriculture Industry consists of different activities which include harvesting crops, plants, livestock feeding, grazing etc."* Reference: http://www.economywatch.com/agriculture/

[7] AMS-I.D "Grid connected renewable electricity generation", AMS-I.F "Renewable electricity generation for captive use and mini-grid" and AMS-I.A "Electricity generation by the user"

Methodology	Applicability Criteria	Justification
	density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2	
	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity consists only of a renewable energy generation component of capacity 7.5MW, i.e., within 15MW.
	Combined heat and power (co-generation) systems are not eligible under this category.	The project activity under consideration is not a combined heat and power (cogeneration) system and hence this point is not applicable.
	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity consists only of a proposed newly implemented (Greenfield) renewable energy power plant of capacity 7.5MW, i.e., within 15MW. Hence it does not consist of any capacity addition measures to any existing power plant.
	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project activity consists only of a proposed newly implemented (Greenfield) renewable energy power plant of capacity 7.5MW, i.e., within 15MW. Hence it does not consist of any retrofitting measures.

B.3. Description of the sources and gases included in the project boundary:

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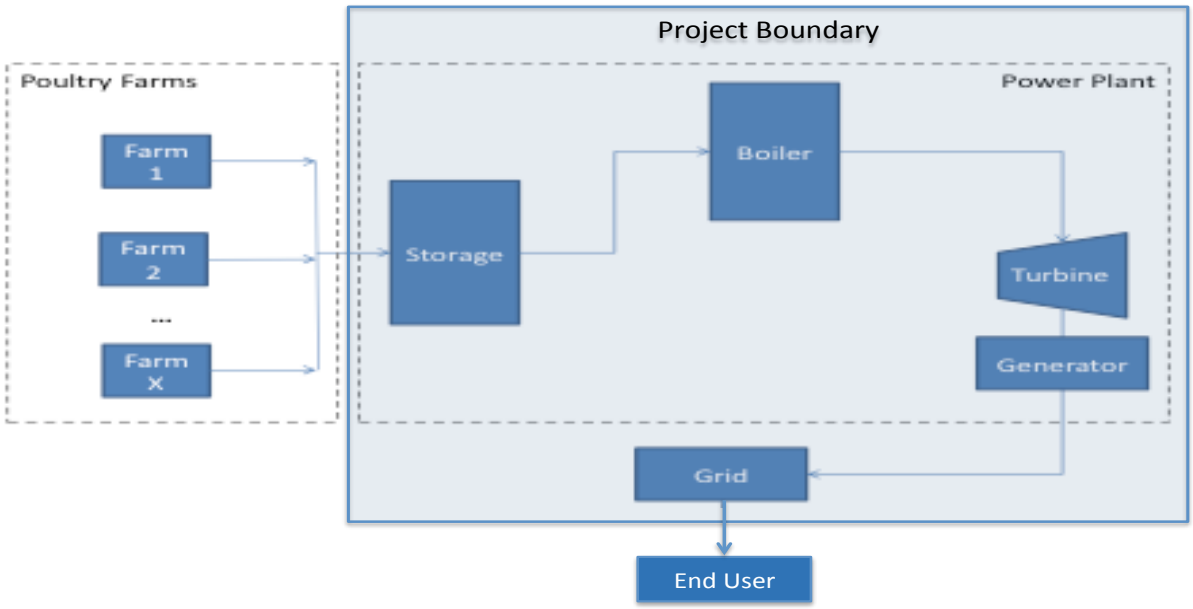
The project boundary is defined as the area or region around a project within which the project's impact (in terms of carbon emission reductions) will be assessed.

The system boundary for the baseline is defined as the Southern grid and will include all the direct emissions related to the electricity generated by the grid-connected power plants to be displaced by the project, thus reducing carbon dioxide emissions. Additionally, the project boundary can be extended to poultry litter based power plant, that shall receive and combust poultry litter for power generation, thus reducing methane emissions. The project boundary identified below is in line with the relevant guidelines of both the applied methodologies: ACM0010 (suggesting inclusion of the project scenario AWMS) and AMS-I.D (suggesting inclusion of the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to, i.e, the Southern grid).

Project Boundary



	Source	Gas		Justification / Explanation
Baseline	Direct emissions from the waste treatment processes	CH_4	Included	The major source of emissions in the baseline

	Source	Gas		Justification / Explanation
		N_2O	Excluded	The N2O emissions are accounted on a baseline scenario and project scenario basis for the direct and indirect N2O emissions, as follows: • Direct Emissions: o Baseline Scenario: The coefficient (EFN2O,D,j) is zero, hence baseline emissions are zero. o Project Scenario: IPCC does not talk about any N2O emission coefficients (corresponding to EFN2O,D,j from the methodology) from combustion of the poultry litter for energy generation. o All other parameters for baseline and project emissions calculations shall remain the same, like fuel quantity, proportion of fuel treated, etc. • Indirect Emissions: o Baseline Scenario: The coefficient (EFN2O,ID,j) is 0.010 o Project Scenario: The coefficient (EFN2O,ID,j) is 0.010 o All other parameters for baseline and project emissions calculations shall remain the same, like fuel quantity, proportion of fuel treated, etc. • Thus there are no incremental N2O emissions in the project scenario as compared to the baseline scenario. Thus N2O emissions have not been accounted for.
		CO_2	Excluded	CO_2emissions from the decomposition of organic waste are not accounted
	Emissions from electricity consumption / generation	CO_2	Included	Electricity may be consumed from the grid or generated onsite in the baseline scenario
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.

	Source	Gas		Justification / Explanation
	Emissions from thermal energy generation	CO_2	Included	If thermal energy generation is included in the project activity
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.

	Source	Gas		Justification / Explanation
Project Activity	Emissions from thermal energy generation	CO_2	Included	May be an important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from on-site electricity use	CO_2	Included	May be an important emission source. If electricity is generated from collected biogas, these emissions are not accounted for.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.

	Source	Gas		Justification / Explanation
	Direct emissions from the waste treatment processes	N_2O	Excluded	The N2O emissions are accounted on a baseline scenario and project scenario basis for the direct and indirect N2O emissions, as follows: • Direct Emissions: o Baseline Scenario: The coefficient (EFN2O,D,j) is zero, hence baseline emissions are zero. o Project Scenario: IPCC does not talk about any N2O emission coefficients (corresponding to EFN2O,D,j from the methodology) from combustion of the poultry litter for energy generation. o All other parameters for baseline and project emissions calculations shall remain the same, like fuel quantity, proportion of fuel treated, etc. • Indirect Emissions: o Baseline Scenario: The coefficient (EFN2O,ID,j) is 0.010 o Project Scenario: The coefficient (EFN2O,ID,j) is 0.010 o All other parameters for baseline and project emissions calculations shall remain the same, like fuel quantity, proportion of fuel treated, etc. Thus there are no incremental N2O emissions in the project scenario as compared to the baseline scenario. Thus N2O emissions have not been accounted for.
		CO_2	Excluded	CO_2emissions from the decomposition of organic waste are not accounted
		CH_4	Included	The emission from uncombusted methane, physical leakage, and minor CH4 emissions from aerobic treatment.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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For the AWMS component of the proposed project activity the baseline scenario is identified by using ACM0010/ version 05

According to the methodology, the baseline scenario is determined through the following steps:

Step 1: Define alternative scenarios to the proposed CDM project activity
Step 2: Barrier analysis
Step 3: Investment analysis
Step 4: Baseline revision at renewal of crediting period

Step 1: Define alternative scenarios to the proposed CDM project activity

(1) Identify realistic and credible alternative scenarios that are available either to the project participants or to other potential project developers for managing the manure. These alternative scenarios should include:

- *The proposed project activity not being registered as a CDM project activity;*
- *All other plausible and credible alternatives to the project activity scenario, including the common practices in the relevant sector. In doing so, the complete set of possible manure management systems listed in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Chapter 10, Table 10.17) should be taken into account. In drawing up a list of possible scenarios, possible combinations of different Animal Waste Management Systems (AWMS) should be taken into account;*
- *If applicable, continuation of the current situation (no project activity or other alternatives undertaken).*

Eliminate alternatives that are not in compliance with all applicable legal and regulatory requirements. Apply Sub-step 1b of the latest version of the "Tool for demonstration assessment and of additionality".

For the purpose of identifying alternative scenarios that are common practice, provide an analysis of other manure management practices implemented previously or currently underway. Projects are considered similar if they are in the same country/region, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide documented evidence. On the basis of that analysis, identify and include all alternative scenarios that are common practice.

Poultry manure is produced during day-to-day activities in the farm. The usual method of disposing the manure in project region is by flushing with water and collecting them in a pit (anaerobic lagoon) where it is kept for more than a month and then the decomposed manure is used as fertilizer.

According to ACM 0010, alternative scenarios include:
(1) Proposed project activity not being registered as a CDM project activity;
(2) Continuation of current situation: Uncovered Anaerobic Lagoon;
(3) All other plausible and credible alternatives.

Animal waste management systems (AWMS) could be several technical combinations. Based on options provided by IPCC (2006 version, chapter 10, page 44, table 10.17), the plausible scenarios include the following bullets.

All other plausible and credible alternatives are listed as follows:

- Daily Spread
- Pasture/Range/Paddock
- Solid Storage
- Dry lot
- Liquid/Slurry
- Uncovered anaerobic lagoons
- Pit storage below animal confinements
- Anaerobic digesters
- Burned for fuel
- Cattle and swine deep bedding
- Composting - In-Vessel
- Composting - Static Pile
- Composting - Intensive Windrow
- Composting - Passive Windrow
- Poultry Manure with Litter
- Poultry Manure without Litter
- Aerobic treatment

As all the above-mentioned alternatives are compliant with the relevant national regulations, as there are no laws prevalent or under discussion mandating any of the above treatment methods for poultry litter in India. These alternatives have been examined in further details especially by means of barrier analysis below. It may please be noted that the alternatives have been analysed as per the definitions provided in IPCC Volume 4 Chapter 10 as well as the possibility of implementation of the scenario on site, discussed in the light of barriers listed in the methodology AMS0010 and have been established by means of suitable evidences also listed in the methodology, like study reports, independent expert judgements, industry norms, etc.

Step II: Barrier analysis

Establish a complete list of barriers that would prevent alternative scenarios to occur in the absence of the CDM. Such barriers may include:

- *Investment barriers, inter alia:*
  - *Debt funding is not available for this type of innovative activities;*
  - *Neither access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented.*

- *Technological barriers, inter alia:*

- *Skilled and/or properly trained labour to operate and maintain the technology is not available and no education/training institution in the host country provides the needed skill, leading to equipment disrepair and malfunctioning;*
- *Lack of infrastructure for implementation of the technology.*

- *Barriers due to prevailing practice, inter alia:*
  - *The alternative is the "first of its kind": No alternative of this type is currently operational in the host country or region.*

Since the proposed project activity not being registered as a CDM project activity shall be one of the considered alternatives, any barrier that may prevent the project activity to occur shall be included in that list.

Apply Sub-step 1b "Consistency with mandatory laws and regulations" of Tool for "Demonstration assessment and of additionality" (Version 06.0.0). Eliminate alternatives that are not in compliance with all applicable legal and regulatory requirements.

Selection of alternative scenario to the proposed CDM project activity for Poultry Manure Management:

There is no set legal regulation in India for poultry litter disposal. As per a study conducted by an independent external agency, as per the prevailing practice, the poultry farms in the region collect the poultry litter below the animal confinements till the cages are cleaned. After cleaning, the poultry litter is dumped in pits near the poultry farms. There are no other practices for treatment of poultry litter in the region. Listed below are the proposed project activity and other plausible scenarios for the manure management systems at the poultry farms. Justification for including or excluding a scenario from consideration is provided. The overall criterion used in evaluating potential scenarios is to assess the 'practicality' and economics of a technology/approach. Said differently, it is essential to address if a given technology/system is both practical to implement and economically attractive to be adopted. Barrier analysis has been performed to exclude most alternatives as established below:

Pasture/Range/Paddock:
The manure from pasture and range grazing animals is allowed to lie as deposited, and is not managed.
This alternative is in compliance with the relevant local and national policies.
However, this is not applicable for poultry litter, as poultry birds are not grazing animals. This barrier analysis has not been performed on this alternative.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Daily spread:
Manure is routinely removed from a confinement facility and is applied to cropland or pasture within 24 hours of excretion.
This alternative is in compliance with the relevant local and national policies.
However, for the purpose of daily removal of poultry litter from the cages and application on the fields is not practiced as the quantity of litter accumulated on a daily basis in the cages is not high enough for daily removal, considering the requirement of manpower for the daily cleaning, as well as the requirement of a lot of fields (cropland or pasture) for spreading on a daily basis. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Solid Storage:
The storage of manure, typically for a period of several months, in unconfined piles or stacks. Manure is able to be stacked due to the presence of a sufficient amount of bedding material or loss of moisture by evaporation.
This alternative is in compliance with the relevant local and national policies.
In the poultry farms, the poultry litter is collected below the animal confinements and is stored for some months. However, it may be noted that this is not a permanent method of manure storage, as the cages are cleaned and the manure is removed every time the birds are removed and a fresh stock of birds are put in, in order to allow for space for collection of litter excreted by the fresh stock of birds. Thus this is practiced by the poultry farms in the region for only collection of litter before cleaning of the cages. However, it does not qualify as a permanent manure management system as the subsequent mechanism for poultry litter management is uncovered anaerobic lagoons, as established below in this section.
However, as this is a precursor of the actual baseline scenario to be identified by this exercise, methane emissions of this scenario shall be discounted from the baseline emissions.

Dry Lot:
A paved or unpaved open confinement area without any significant vegetative cover where accumulating manure may be removed periodically.
This alternative is in compliance with the relevant local and national policies.
However, the prevalent practice in the poultry farms in the region is to remove the accumulated poultry litter only every time the birds are removed and the cages are cleaned and not periodically before that. One reason for this is that the quantity of litter accumulated in the cages is not high enough for removal on a weekly or fortnightly basis. Another factor prohibiting the implementation of this manure management system is the requirement of manpower for the periodic cleaning of the cages and removal of the litter. Furthermore, this system also is not a feasible option, as the poultry livestock housed within the cages have to be relocated before proceeding to clean the cages, which is not feasible. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Liquid/Slurry:
Manure is stored as excreted or with some minimal addition of water in either tanks or earthen ponds outside the animal housing, usually for periods less than one year.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up tanks or earthen ponds for the purpose of treatment/ storage of poultry litter and thus the poultry farmers have limited knowledge of such technology. As per the prevalent practice of the poultry farms, the manure is washed away with considerable quantities of water and stored in the pits dug out near the farms in the wet condition. There is an impermeable membrane like plastic sheet used in the bottom of the pit that does not permit interaction of the wet poultry litter in the pits with the earth below. Thus this prevailing mechanism cannot be defined as liquid/ slurry. Furthermore, the manure management practice under consideration also entails additional investment for the purpose of construction and maintenance of the said earthen tanks or earthen ponds outside the animal housing. Thus it is established that this alternative faces technological barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Uncovered anaerobic lagoons:

A type of liquid storage system designed and operated to combine waste stabilization and storage. Lagoon supernatant is usually used to remove manure from the associated confinement facilities to the lagoon. Anaerobic lagoons are designed with varying lengths of storage (up to a year or greater), depending on the climate region, the volatile solids loading rate, and other operational factors. The water from the lagoon may be recycled as flush water or used to irrigate and fertilise fields.
This alternative is in compliance with the relevant local and national policies.
As per the prevalent practice of the poultry farms, every time an existing batch of birds is removed and before a new batch is brought in, the cages are cleaned with water and the manure is removed and stored in the pits dug out near the farms in the wet condition. This practice is in line with this alternative.
Hence this is a plausible alternative to the project activity and is considered for further analyses.

Pit storage below animal confinements:
Collection and storage of manure usually with little or no added water typically below a slatted floor in an enclosed animal confinement facility, usually for periods less than one year.
This alternative is in compliance with the relevant local and national policies.
In the poultry farms, the poultry litter is collected below the animal confinements and is removed periodically every time the animal confinements are cleaned. However, slatted floors are not used by the local poultry farmers as per the prevalent practices and hence the poultry farms in the region do not practice this manure management system, as evident from the independent third party study conducted. It may also be noted that the cages housing the poultry birds do not represent enclosed animal confinement facilities, as the cages are open to the atmosphere for maintaining proper ventilation. Furthermore, the poultry farms in the region practice collection of poultry litter below the cages as solid storage and then store the litter in uncovered anaerobic lagoons after cleaning the cages. This is because of the fact that pit storage below the cages housing the poultry birds is not practiced as construction and maintenance of such pits entails additional investment. Thus this alternative faces investment barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Anaerobic digester:
Animal excreta with or without straw are collected and anaerobically digested in a large containment vessel or covered lagoon. Digesters are designed and operated for waste stabilization by the microbial reduction of complex organic compounds to CO2 and CH4, which is captured and flared or used as a fuel.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up anaerobic digesters for treatment of the poultry litter for capturing and flaring of methane. Furthermore, such digesters are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Burned for fuel:
The dung and urine are excreted on fields. The sun dried dung cakes are burned for fuel.
This alternative is in compliance with the relevant local and national policies.
However, this is not applicable for poultry litter as poultry (birds) do not excrete on the fields. The poultry farms in the region are also not mandated to burn the poultry litter as fuel. There are also no applications of the same in the farms as setting up a facility for energy recovery from fuel combustion and usage for specific purposes is beyond the scope of the poultry farmers. Furthermore, there are no such poultry litter based power generation facilities existing in the baseline scenario in the region, where the

poultry farmers can supply the poultry litter for burning as fuel. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Cattle and Swine deep bedding:
As manure accumulates, bedding is continually added to absorb moisture over a production cycle and possibly for as long as 6 to 12 months. This manure management system also is known as a bedded pack manure management system and may be combined with a dry lot or pasture.
This alternative is in compliance with the relevant local and national policies.
However, this is not applicable for poultry litter as poultry (birds) and only to cattle and swine as indicated. This barrier analysis has not been performed on this alternative.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Composting - In-Vessel:
Composting, typically in an enclosed channel, with forced aeration and continuous mixing.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up composting facilities for treatment of the poultry litter. Furthermore, such composting facilities are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Composting - Static Pile:
Composting, typically in an enclosed channel, with forced aeration and continuous mixing.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up composting facilities for treatment of the poultry litter. Furthermore, such composting facilities are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Composting - Intensive Windrow:
Composting in windrows with regular (at least daily) turning for mixing and aeration.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up composting facilities for treatment of the poultry litter. Furthermore, such composting facilities are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Composting - Passive Windrow:
Composting in windrows with infrequent turning for mixing and aeration.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up composting facilities for treatment of the poultry litter. Furthermore, such composting facilities are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Poultry Manure with Litter:
Similar to cattle and swine deep bedding except usually not combined with a dry lot or pasture. Typically used for all poultry breeder flocks and for the production of meat type chicken s(broilers) and other fowl. (Cattle and Swine deep bedding: As manure accumulates, bedding is continually added to absorb moisture over a production cycle and possibly for as long as 6 to 12 months. This manure management system also is known as a bedded pack manure management system and may be combined with a dry lot or pasture.)
This alternative is in compliance with the relevant local and national policies.
In the poultry farms, the poultry litter is collected below the animal confinements and is removed every time the birds are removed from the cages. The poultry farmers do not add bedding material neither undertake any other initiatives at constant intervals throughout a particular livestock raising cycle for absorbing moisture from the collected poultry litter over the production cycle, as it would entail additional manpower requirement for constant operation and supervision of the operational conditions. Thus the prevailing practice at the poultry farms in the region does not follow bedded pack manure management system. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Poultry Manure without Litter:
May be similar to open pits in enclosed animal confinement facilities or may be designed and operated to dry the manure as it accumulates. The latter is known as a high-rise manure management system and is a form of passive windrow composting when designed and operated properly.
This alternative is in compliance with the relevant local and national policies.
As per the prevalent manure management systems in the local poultry farms, the animal cages are confined and the litter is collected beneath the same. Hence the same does not represent open pits, orhigh-rise manure management system. Furthermore, construction and operation of such a facility is capital intensive as well as demands additional manpower. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Aerobic treatment:
The biological oxidation of manure collected as a liquid with either forced or natural aeration. Natural aeration is limited to aerobic and facultative ponds and wetland systems and is due primarily to photosynthesis. Hence, these systems typically become anoxic during periods without sunlight.
This alternative is in compliance with the relevant local and national policies.
The poultry farms in the region are not mandated to set up aerobic treatment facilities for handling of the poultry litter. Furthermore, such aerobic treatment facilities are capital intensive and require large investments that are beyond the scope of the core business of these farms. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Open Dumping:
This alternative is in compliance with the relevant local and national policies.
However this is not a feasible option and is not being followed in the region. This is owing to the fact that the poultry litter may be used as a fertiliser after its decomposition in pits and hence the same is widely practiced in the region. Furthermore, open dumping of poultry litter in the plain land/ fields requires vast expanse of lands, rendering it unsuitable for practice by the local populace. Hence this is not practiced by any poultry farms in the region. Thus this alternative faces prevailing practice barriers.
Hence this is not a plausible alternative to the project activity and is not considered for further analyses.

Conclusion:
As observed above, the prevalent poultry manure management systems prevalent in the poultry farms can be summarised as below.

- Pre project scenario:
  - *Before Cleaning:* Solid Storage
  - *After Cleaning:* Uncovered Anaerobic Lagoon

However, in the project scenario, the proposed poultry manure management systems are as follows:

- Post project scenario:
  - *Before Cleaning:* Solid Storage
  - *After Cleaning:* Combustion in boiler

Hence, there shall be no difference in the manure management system before cleaning, as it shall be solid storage in both cases. Hence it shall not be included in either the baseline scenario or in the project scenario. The alternative scenario to the CDM project activity selected for poultry manure is uncovered anaerobic lagoon, whereas it shall be combusted in the boiler in the project scenario. Hence it is observed that "solid storage" for collection followed by "uncovered anaerobic lagoon" for storage is the only one scenario alternative that is not prevented by any barrier. This alternative is not the proposed project activity not being registered as a CDM project activity. Thus this scenario alternative is the most plausible alternative scenario to the proposed CDM project activity, as per the methodology.

Furthermore, it may also be noted that in the baseline scenario, the poultry litter isstored in the solid storage method before cleaning, corresponding to an MCF of 5%. Considering the methane emissions in this scenario, the methane emissions in the subsequent scenario (uncovered anaerobic lagoon corresponding to an MCF of 80%), that shall correspond to the baseline emissions have been discounted by 5% by multiplying by a factor of 0.95.In the project scenario, the poultry litter shall be combusted in the boiler as fuel. As industrial boilers are designed to ensure a systematic combustion at high temperatures to ensure the maximum possible combustion, there shall be no methane emissions in the project scenario.

Selection of alternative scenario to the proposed CDM project activity for Electricity Generation:

In the absence of the proposed project activity, there is only one alternative scenario that there will be no implementation of any power plant for generation of electricity with poultry litter. Hence this is the most plausible alternative scenario to the proposed CDM project activity for Electricity Generation.

It may be noted that in this scenario, considering the point of outputs or services comparable with the proposed CDM project, the grid shall generate the same quantity of electrical energy with the existing grid mix, as the CDM project activity shall during its operations.

This scenario of grid generating the same quantity of electrical energy with the existing grid mix, as the CDM project activity shall during its operations is the baseline scenario for the renewable energy power plant in line with AMS-I.D.

The identified alternative scenario to the proposed CDM project activity is as follows:
As observed above, there is only one alternative scenario to the proposed CDM project activity that is not prevented by any barriers (there will be no implementation of any power plant for generation of electricity with poultry litter, along with collection of poultry litter as solid storage and disposal of poultry

litter into anaerobic lagoons). Hence this alternative is the most plausible alternative scenario to the proposed CDM project activity. Thus step III: Investment analysis need not be performed on this scenario.

Baseline Scenario

As per the methodology,

If there is only one scenario alternative that is not prevented by any barrier, and

(i) If this alternative is not the proposed project activity not being registered as a CDM project activity, then this scenario alternative is the most plausible baseline scenario;
(ii) If this alternative is the proposed project activity not being registered as a CDM project activity, then the project activity is the most plausible baseline scenario;

The baseline scenario shall be one of the project scenario alternatives discussed above, which shall be the most plausible one. As established above, the only plausible alternative scenario is thatthere will be no implementation of any power plant for generation of electricity with poultry litter, along with collection of poultry litter as solid storage and disposal of poultry litter into anaerobic lagoons. Hence, considering the baseline scenario for the proposed CDM project activity to deliver comparable outputs, in the event of no implementation of any power plant for generation of electricity with poultry litter, the grid shall generate the same quantity of electrical energywith the existing grid mix, as the CDM project activity shall during its operations. Furthermore, the collection of poultry litter as solid storage and disposal of poultry litter into anaerobic lagoons shall also happen in the baseline scenario for the project activity.

Thus the baseline scenario for the project activity represents the continuation of current practices, which is the generation of electricity as per the carbon intensity of the grid mix, resulting in GHG emissions as per the grid mix, along with collection of poultry litter as solid storage and disposal of poultry litter into anaerobic lagoons, releasing in methane emissions.

Step III: Investment analysis

Not required as established above.

Step 4: Baseline revision at renewal of crediting period

The PP at the renewal of each crediting period will undertake the relevance of baseline scenario identified above.

For the renewable energy component of the project activity, SSC CDM methodology AMS-I.D., version 17 has been used.

The baseline scenario represents the situation where the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and addition of power generation sources into the grid in the existing proportions. This would have resulted in GHG emissions as per the carbon intensity of the power plants constituting the grid mix. The GHG emission intensity of the grid where the project activity shall displace electricity, i.e., the Southern Regional Electricity Grid of India is 0.85 tCO_2/MWh.

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 CDM project activity (assessment and demonstration of additionality):

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Project start date is after the date of validation, therefore the PP is not required to demonstrate the timeline for serious CDM consideration.

The additionality of the project activity shall be demonstrated and assessed using the tool for *"Demonstration and assessment of additionality", version 06.0.0.*

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations.

Outcome of Step 1 (see section B.4 for analysis of various project scenarios, out of which the most plausible scenario as per the methodology is discussed below against the scenario of the proposed project activity implemented without CDM revenues):

The identified credible alternatives to the project activity that are in compliance with mandatory legislation and regulations, taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations are:

Scenario 1 - The continuation of current activity – This scenario is that there will be no implementation of any power plant for generation of electricity with poultry litter, along with collection of poultry litter as solid storage and disposal of poultry litter into anaerobic lagoons. In such a scenario, considering the delivery of comparable outputs, the grid shall generate the same quantity of electrical energy with the existing grid mix, as the CDM project activity shall during its operations.

Scenario 2 - The construction of the new renewable energy plant (without CDM revenues) – In this scenario, a new source of carbon neutral electricity will be available and will displace the higher carbon intensity electricity prevailing in the baseline scenario. Additionally, in this scenario generation of methane emissions will be avoided.

Step 2: Investment Analysis

The investment analysis below aims to show that "the proposed project activity is not (a) the most economically and financially attractive".

***Sub-step 2a* - Determine appropriate analysis method**

There are three options for investment analysis method:

- Simple Cost Analysis
- Investment Comparison Analysis and
- Benchmark Analysis

As the project gains revenue from the sale of generated electricity, Simple Cost Analysis is not applicable. Therefore, Benchmark Analysis will be used for the evaluation of the project investment. Furthermore, as per Para 16 of Guidance on the Assessment of Investment Analysis, Version 05, EB 62, Annex 62;

If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate.

The baseline of the project activity is the no project activity, in which case equivalent amount of electrical energy would be generated by grid electricity system through its currently operating power plants and by new capacity addition (which are mostly thermal). Therefore selection of benchmark analysis is in conformity with the above-mentioned guidance.

Sub-step 2b - Option III-Apply benchmark analysis

There are no benchmarks specified by national authorities for such projects in India. Local lending rates for commercial loans are taken into consideration for investment analysis. This parameter is appropriate and suitable as the benchmark for a project activity, as the returns from it should be enough to at least service the debt taken. It is also in line with the paragraph 6(b) of the Additionality Tool of UNFCCC/ CDM regarding Benchmark that provides options regarding benchmarks in the following manner:
*"Estimates of the cost of financing and required return on capital (e.g. **commercial lending rates** and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable project".*

The benchmark for the IRR calculations has been indicated as 12.75% in the Detailed Project Report for the project dated January 2011. It is same as the Prime Lending Rate (PLR) of the State Bank of India (the bank subsequently approached by the project proponent for loan application) at that time (12.75% in January 2011[8]), which is the minimum rate at which the bank shall provide loans for the project. It may also be noted that the interest rate of term loan sanctioned by the bank is still higher (13% as per the loan sanction letter issued by the State Bank of India), thus establishing the conservativeness of the benchmark chosen.

Hence for determination of the feasibility of the project activity, the IRR should be compared to the lending rate of 12.75%.

Sub-step 2c - Calculation and comparison of financial indicators

[8]Reference:
- http://www.nseindia.com/marketinfo/companyinfo/eod/announcements.jsp?symbol=sbin. Last accessed on 10/02/2012.
- http://articles.timesofindia.indiatimes.com/2011-02-12/india-business/28547471_1_loan-rates-base-rate-deposit-rates. Last accessed on 10/02/2012.

As the project is funded by both debt and equity, project IRR is considered an appropriate financial indicator for performing the financial analysis and demonstrating the additionality of the project. In order to analyse the financial viability of the project activity, the financial indicator that has been used is the project IRR of the project activity. The project IRR is one of the most commonly used tools to assess the feasibility and viability of the projects.

Hence an IRR calculation has been performed and it has been compared to the benchmark in the financial analysis. The key assumptions included for investment analysis are as below:

Total Project Cost (Source: Detailed Project Report):

INR 459.75 millions

Parameters and Assumptions for IRR calculations:

Item	Unit	Value	Source
Project Design:			
Capacity	MW	7.5	Detailed Project Report (dated January 2011)
Auxiliary consumption	%	10%	Detailed Project Report (dated January 2011)
Number of days of operation	days	365	Detailed Project Report (dated January 2011)
PLF	%	80%	Detailed Project Report (dated January 2011)
Transmission losses	%	0.50%	Detailed Project Report (dated January 2011)
Fuel and Expenses Data:			
Total fuel used	tonnes/ year	106617	Detailed Project Report (dated January 2011)
Poultry litter used	tonnes/ year	95000	Detailed Project Report (dated January 2011)
Biomass used	tonnes/ year	11617	Detailed Project Report (dated January 2011)
Poultry price	INR/ tonne	1100	Detailed Project Report (dated January 2011)
Biomass price	INR/ tonne	1800	Detailed Project Report (dated January 2011)
Ash sale rate (including transport price)	INR/ tonne	100	Detailed Project Report (dated January 2011)
Ash percentage in fuel	%	39	Detailed Project Report (dated January 2011)
Ash component in fuel	tonnes/ year	41,581	Detailed Project Report (dated January 2011)
Escalation in the ash sale price	%	5	Detailed Project Report (dated January 2011)
Escalation in fuel price	%	5	Detailed Project Report (dated January 2011)
O&M Expenses (percentage of total	%	4%	Detailed Project Report (dated January 2011)

Item	Unit	Value	Source
project cost)			
Escalation in O&M Expenses	%	5.72	Detailed Project Report (dated January 2011)
No. of years to set off Preliminary Expenses	years	5	Income Tax Act, Section 35D: Amortisation of certain preliminary expenses
Depreciation, Tax, Interest Rates:			
Depreciation Rate: Buildings	%	3.34%	Direct Taxes Ready Reckoner for FY 2010-11
Depreciation Rate: Plant machinery &Misc fixed assets	%	5.28%	Direct Taxes Ready Reckoner for FY 2010-11
Depreciation Rate: Electrical	%	7.07%	Direct Taxes Ready Reckoner for FY 2010-11
Depreciation Rate: As per Income Tax Act	%	80.00%	Income Tax Act
Minimum Salvage Value	%	10.00%	Central Electricity Regulatory Commission, Government of India Order dated 9/11/2010
Minimum Alternate Tax Rate for Companies	%	19.93%	Direct Taxes Ready Reckoner for FY 2010-11
Loan Repayment Details:			
Loan Interest Rate	%	12.75	Detailed Project Report (dated January 2011)
Loan Term	Years	10	Detailed Project Report (dated January 2011)
Construction and Moratorium Period	Years	1.5	Detailed Project Report (dated January 2011)
Principal Repayment Term	Years	8.5	Detailed Project Report (dated January 2011)
No. of monthly installments per year	-	12	Detailed Project Report (dated January 2011)
No. of installments for principal repayment	-	102	Detailed Project Report (dated January 2011)
Capital Subsidy:			
Capital Subsidy upon commissioning	INR Millions	15	Ministry of New and Renewable Energy: Programme on Recovery of Energy from Industrial Wastes for the year 2010-11, dated 26/04/2010 (INR 0.2 Crore, i.e., INR 2 million per MW)
For Calculation of CDM revenues			
Annual CER potential of the project	tCO2e	1,02,000	Detailed Project Report (dated January 2011)
CER price	Euros/ tCO2e	11.4	http://www.climatespectator.com.au/commentary/cer-market-wrap-year-was
Euro-INR conversion	INR/ Euro	60.65	Euro-Rupee 2010 average:

Item	Unit	Value	Source
factor			http://www.oanda.com/currency/historical-rates/

Note: Most of the parameters for calculation of the IRR have been sourced from the Detailed Project Report (DPR) for the project activity, which outlines the project design specifications as well as the parameters used for assessment of financial analysis/project feasibility. This document has been prepared by an independent entity and has also been reviewed and approved by a third party – the lending authority (Reference: letter issued by the lending authority – State Bank of India to the DOE enclosing the DPR).

Electricity Tariff Related Parameters (as per PPA dated 11/08/2010):

PPA Values										
Year	1	2	3	4	5	6	7	8	9	10
Fixed Cost (INR/ kWh)	1.61	1.57	1.53	1.49	1.45	1.41	1.37	1.33	1.26	0.87
Financial Year	2009-10	2010-11	2011-12	2012-13	2013-14					
Variable Cost (INR/ kWh)	2.54	2.67	2.80	2.94	3.09					

Calculations										
Fixed Cost										
Year	1	2	3	4	5	6	7	8	9	10
Decrease in fixed cost (%)		2.48	2.55	2.61	2.68	2.76	2.84	2.92	5.26	30.95
Average decrease (%)	**6.12**									
Variable Cost										
Financial Year	2009-10	2010-11	2011-12	2012-13	2013-14					
Increase in variable cost (%)		5.12	4.87	5.00	5.10					
Average increase (%)	**5.02**									

The Internal Rate of Return (IRR) for the project is calculated as 9.81% without CDM revenue that is much lower than the benchmark of 12.75%. As a result, the revenue acquired from the operation of the power plant is not financially attractive to undertake the investment.

However, upon consideration of potential revenues from CDM, the returns from the project activity improve and reach acceptable limits. The project IRR with CDM revenues is 26.02%, which is crossing the benchmark and hence renders the project activity as a financially feasible investment proposition. Thus it is established that the project activity is financially viable only due the CDM revenues.

Sub-step 2d - Sensitivity Analysis

The sensitivity analysis is applied in order to examine the behaviour of the IRR to reasonable variations in the parameters that may affect the IRR substantially. As per the Guidelines for Investment Analysis, the parameters that have been chosen for sensitivity analysis are the Electricity Generation, Tariff, Poultry

Litter Cost, Biomass Cost, Operation & Maintenance (O&M) Cost and the Project Cost, as these represent 20% of total project costs or total project revenues, as well as other parameters considered critical. These parameters have been subjected to +/- 10% variation each and the results as well as the likelihood of the scenarios have been examined below:

Case	Original IRR	Benchmark	Variation	Changed IRR	
				+10%	-10%
a	9.81%	12.75%	**Electricity Generation**	10.83	7.30
b	9.81%	12.75%	**Tariff**	14.72	-0.02
c	9.81%	12.75%	**Poultry Litter Cost**	3.81	13.63
d	9.81%	12.75%	**Biomass Cost**	8.90	10.65
e	9.81%	12.75%	**O&M Cost**	8.96	10.59
f	9.81%	12.75%	**Project Cost**	7.50	12.41

a) The IRR is lesser than the benchmark.
b) Though the IRR crosses the benchmark in the +10% variation in tariff, this scenario is not possible, as the prices for power sale are already frozen as per the PPA signed by the project proponent with the APSPDCL on 11/08/2010 for supply of power and any increment in tariff is ruled out.
c) Though the IRR crosses the benchmark in the -10% variation of the poultry litter price from the price indicated in the DPR. However, this scenario is not possible as the price indicated in the DPR is lower than the prices presently quoted by various suppliers in the region. Thus reduction from the price considered in the DPR is highly unlikely.
d) The IRR is lesser than the benchmark.
e) The IRR is lesser than the benchmark.
f) The IRR is lesser than the benchmark.

Selecting the same parameters for variation, the sensitivity analysis has been performed again with an approach of variation of the parameters to such an extent that the IRR touches or just exceeds the benchmark. Results of the exercise have been presented below with an assessment of the likelihood of the scenario:

Case	i	ii	iii	iv	v	vi
Parameter	**Electricity Generation**	**Tariff**	**Poultry Litter Cost**	**Biomass Cost**	**O&M Cost**	**Project Cost**
Variation	31.25%	5.65%	-7.50%	-37.50%	-40.50%	-11.23%
Changed IRR	12.75%	12.75%	12.75%	12.75%	12.75%	12.75%
Benchmark	12.75%	12.75%	12.75%	12.75%	12.75%	12.75%

i. The IRR touches the benchmark for a 31.25% variation of the electricity generation. However, this scenario represents electricity generation at a PLF of 105% and sustained operations for the

entire project lifetime at a capacity above the rated capacity of the power plant is not possible. Hence this scenario is ruled out.

ii. The IRR touches the benchmark for a 5.65% variation of the tariff. However, this scenario is not possible, as the prices for power sale are already frozen as per the PPA signed by the project proponent with the APSPDCL for supply of power on 11/08/2010 and any increment in tariff is ruled out.

iii. The IRR touches the benchmark for a -7.50% variation of the poultry litter price from the price indicated in the DPR. However, this scenario is not possible as the price indicated in the DPR is lower than the prices presently quoted by various suppliers in the region. Thus reduction from the price considered in the DPR is highly unlikely.

iv. The IRR touches the benchmark for a -37.50% variation of the biomass price from the price indicated in the DPR. However, this scenario is not possible as the price indicated in the DPR is lower than the prices presently quoted by various suppliers in the region, as well as the price prescribed in the APERC Tariff Order. Thus reduction from the price considered in the DPR is highly unlikely.

v. The IRR touches the benchmark for a -40.50% variation of the O&M cost. However, this scenario is not possible as the project proponent has considered the O&M cost prescribed by the APERC Tariff Order for this category of power plants and such a substantial reduction from this value is highly unlikely.

vi. The IRR touches the benchmark for a -11.23% variation of the project cost. However, this scenario is not possible considering the fact that the historical average long term inflation rate of India is around 7.5% and has been even higher in recent years, as per the country's central bank: the Reserve Bank of India[9]. Hence the scenario of reduction of the project cost to the above mentioned extent is highly unlikely.

Step 3: Barriers Analysis:

The project proponent has opted for investment analysis to demonstrate additionality and hence barrier analysis has not been performed for the project activity under consideration.

Step4: Common practice analysis:

For the purpose of common practice analysis, projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory frame-work, investment climate, access to technology, access to financing, etc. India is a large country in which the economic development level, the industrial structure, the fundamental infrastructure, development strategy and the policy framework is different throughout the country. As such a number of key economic factors vary from state to state. These include tariff rates of products, the cost of materials, the cost of electricity and other utilities such as water, the cost of labour and services and the types of loan that can be obtained. All these factors vary among various states. Therefore, the Andhra Pradesh state is selected as the region for common practice.

[9]Reference: http://www.rbi.org.in/scripts/BS_SpeechesView.aspx?Id=610. Last accessed 10/02/2012.

Please refer to Annex 5: "LIST OF POWER PLANTS FOR COMMON PRACTICE ANALYSIS" of this document for details on the common practice analysis by means of the list of similar project activities in the region that have been commissioned before the conception of the project activity under consideration. There it is established that number of similar projects – N_{all} is 20 and the number of projects that apply technologies different that the project – N_{diff} is also 20.

Applying the formula $F = 1 – N_{diff}/N_{all}$, we get
$F = 1 – (20/20) = 0$, i.e., less than 0.2
And $N_{diff} – N_{all} = 20 – 20 = 0$, i.e., less than 3.

Hence it is established that the proposed project activity is not a common practice in the region and complies with all criteria laid out by the Additionality Tool and is thus deemed additional.

Conclusion: The project is not attractive in terms of financial viability, as evident from the results of the investment analysis. Only after the consideration of the potential CDM revenues, the project feasibility improves to acceptable limits and presents a business case to the project developer. Hence revenues from carbon credits are thus essential for the project owner for going ahead with the project implementation.

Prior Consideration of CDM:
As per the GUIDELINES ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM (EB 62, Annex 13),

II. Proposed project activities with a start date from 2 August 2008

The start date of the project activity is 01/08/2011 (purchase order to equipment supplier), i.e., after 02/08/2008. The project proponent has also sent written notifications of developing the project activity to the Indian DNA (confirmation of Host Country Approval application dated 05/07/2011) and UNFCCC (notification dated 21/04/2011) even before the start date of the project activity. This establishes the confirmation of the project towards the above-mentioned UNFCCC guideline.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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As per ACM0010; baseline emissions are:

$$BE_{y,ACM0010} = BE_{CH4,y} + BE_{N2O,y} + BE_{elec/heat,y} \quad \textbf{(1)}$$

Where:

BE_y	=	Baseline emissions in year y, in tCO_2e/year
$BE_{CH4,y}$	=	Baseline methane emissions in year y, in tCO_2e/year
$BE_{N2O,y}$	=	Baseline N_2O emissions in year y, in tCO_2e/year
$BE_{elec/heat,y}$	=	Baseline CO_2 emissions from electricity and/or heat used in the baseline, in tCO_2e/year

(i) Methane emissions

Manure management system in the baseline could be based on different treatment systems and on one or more stages. Therefore:

$$BE_{CH4,y} = GWP_{CH4} \cdot D_{CH4} * \sum_{j,LT} MCF_j * B_{0,LT} * N_{LT} * VS_{LT,y} * MS\%_{Bl,j} \quad \textbf{(2)}$$

Where:

$BE_{CH4,y}$	=	The annual baseline methane emissions in t CO2e/y
GWP_{CH4}	=	Global Warming Potential (GWP) of CH_4
D_{CH4}	=	CH_4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)
MCF_j	=	Annual methane conversion factor (MCF) for the baseline $AWMS_j$ from IPCC 2006 table 10.17, chapter 10, volume 4
$B_{0,LT}$	=	Maximum methane producing potential of the volatile solid generated, in m^3CH_4/kg_dm, by animal type LT
N_{LT}	=	Annual Average number of animals of type LT for the year *y*, expressed in numbers
$VS_{LT,y}$	=	Annual volatile solid for livestock LT entering all AWMS [on a dry matter weight basis (kg-dm/animal/year), as estimated below
$MS\%_{Bl,j}$	=	Fraction of manure handled in system j
LT	=	All types of livestock

In the above equation, the density of methane (D_{CH4}) has been provided at a temperature of 20 ºC and 1 atmospheric pressure. This has to be changed to the density of methane at the temperature and pressure at the disposal site (Chittoor District, Andhra Pradesh), using the Universal Gas Equation: $PV = nRT$,

Where,

P	=	absolute pressure of the gas measured in atmospheres
V	=	volume (in this equation the volume is expressed in liters)
N	=	amount of substance of gas (Also known as number of moles)
R	=	ideal, or universal, gas constant, equal to the product of Boltzmann's constant and Avogadro's constant
T	=	absolute temperature (in Kelvin, *i.e.*, 273 + ºC)

i.e., at the atmospheric pressure P_{atm}, the equation becomes

$$P_{atm}\frac{m_{CH4}}{D_{CH4}} = nRT, \text{ or, } P_{atm} = nRT\frac{D_{CH4}}{m_{CH4}} \quad \textbf{(2A)}$$

The value of D_{CH4} of a quantity of methane gas of mass m_{CH4}has been provided at T = 20 ºC and P_{atm} = 1 atmospheric pressure.

Considering the temperature T_y at the Chittoor District, Andhra Pradesh for the project year *y*, and the pressure at the T_y of the same quantity of methane gas of mass m_{CH4} would also be P_{atm} = 1 atmospheric pressure as the site is exposed to the atmosphere. Hence the equation changes to

$$nR(273+T_y)\frac{D_{CH4,\mathrm{T}}}{m_{CH4}} = nR(273+20)\frac{0.00067}{m_{CH4}} \quad \textbf{(2B)}$$

$$\text{or, } D_{CH4,\mathrm{Ty}} = \frac{293\times 0.00067}{(273+T_y)} \quad \textbf{(2C)}$$

Estimation of various variables and parameters for above equations:

(A) $VS_{LT,y}$

There are four ways to determine $VS_{LT,y}$, stated in the order of preference. For method 1,there is no published country specific data available since the situation is very different in different states of India; so we could not use method 1. Regarding method 2, the value of UE*GELT is not available and also thevalue for the energy intake of the chicken is not available and difficult to monitor therefore we could not use method 2. Therefore, the project activity adopted method 3 to calculate $VS_{LT,y}$ based on data availability.

(1) **Scaling default IPCC values $VS_{default}$ to adjust for a site-specific average animal weight as shown in equation below:**

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}} \right) \cdot VS_{default} \cdot nd_y \quad \textbf{(4)}$$

Where:

$VS_{LT,y}$	=	Adjusted volatile solid excretion per year on a dry-matter basis for a defined livestock population at the project site in kg-dm/animal/yr
W_{site}	=	Average animal weight of a defined population at the project site in kg
$W_{default}$	=	Default average animal weight of a defined population in kg from where the data on $VS_{default}$ is sourced (IPCC 2006 or US-EPA, whichever is lower)
$VS_{default}$	=	Default value (IPCC 2006 or US-EPA, whichever is lower) for the volatile solid excretion per day on a dry-matter basis for a defined livestock population in kg-dm/animal/day
nd_y	=	Number of days in year *y*where the treatment plant was operational

(B) Maximum Methane Production Potential ($B_{0,LT}$):

This value varies by species and diet. Default value is taken from tables 10A-4 through 10A-9 (IPCC 2006 Guidelines for National Greenhouse Gas Inventories volume 4, chapter 10) specific to the country where the project is implemented.

(C) Methane conversion factors (MCFs):

- The IPCC 2006 MCF values given in table 10.17 (chapter 10, volume 4) is used:
  - 80% MCF for uncovered anaerobic lagoon as the baseline manure management system
  - It is multiplied by a factor of 95% to account for the 5% MCF of the solid storage scenario before the litter enters the uncovered anaerobic lagoon
- A conservativeness factor should be applied by multiplying MCF values (estimated as per above bullet) with a value of 0.94, to account for the 20% uncertainty in the MCF values as reported by IPCC 2006.

(D) Annual Average number of animals (N_{LT}):

$$N_{LT} = N_{da} * \left(\frac{N_p}{365} \right) \quad \textbf{(5.a)}$$

Where:

N_{LT} = Annual average number of animals of type LT for the year y, expressed in numbers

N_{da} = Number of days animal is alive in the farm in the year y, expressed in numbers

N_p = Number of animals produced annually of type LT for the year y, expressed in numbers

If the project developer can monitor in a reliable and traceable way the daily stock of animals in the farm, discounting dead animals and animals discarded from the productive process from the daily stock, then the annual average number of animals (N_{LT}) may be calculated as an average of the daily stock of animals in the farm without considering dead animals and discarded animals. As continuous monitoring is not possible, therefore this method will not be used.

$$N_{LT} = \frac{\sum_{1}^{365} N_{AA}}{365} \quad \textbf{(5.b)}$$

Where:

N_{LT} = Annual average number of animals of type LT for the year y, expressed in numbers

N_{AA} = ***Daily stock of animals in the farm, discounting dead and discarded animals***

(ii) N_2O emissions from manure management

For simplification we are not claiming any emission reductions from N_2O emissions**..**

(iii) CO2 emission from electricity and heat within the project boundary

In the absence of the project activity, the prevalent AWMS does not entail any electricity or heat consumption. Hence there are no baseline emissions due to **electricity and heat within the project boundary**.

As per AMS-I.D., baseline emissions for renewable electricity generation are:

$BE_{y,AMS\text{-}I.D.} = EG_{BL,Y} * EF_{CO2,grid,y}$

Where:

BE_y = Baseline Emissions in year y (T CO2)

$EG_{BL,Y}$ = Quantity of net electricity supplied to the grid as a result of implementation of the CDM project activity

$EF_{CO2,grid,y}$ = CO2 emission factor of the gird in year y (TCO2/MWh), calculated as follows:

Calculation of $EF_{grid,CM,y}$

In accordance with the "Tool to calculate the emission factor for an electricity system", combined margin CO_2 emission factor for grid connected power generation is calculated stepwise as below:

The data used for the calculation of the baseline emission factor was obtained from the baseline calculations published by the CEA, Baseline Carbon Dioxide Emission Database Version 6.0[10], which uses ACM0002. A complete explanation of the assumptions employed by the CEA can be obtained from the *CO_2 Baseline Database for the Indian Power Sector - Version 6.0*.

Step 1: Identify the relevant electricity systems

For determining electricity emission factors, a **project electricity system** is defined by the spatial extent of power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Indian power system is divided into two regional grids, namely NEWNE and Southern grid. Each grid covers several states. Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid.

Each state in a regional grid meets their demand with their own generation facilities and also with allocation from power plants owned by the central sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the central sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. There are also electricity transfers between regional grids, and small exchanges in the form of cross-border imports and exports (e.g. from Bhutan). Recently, the Indian regional grids have started to work in synchronous mode, i.e. at same frequency.

States connected to different regional grids

Regional grid	**NEWNE Grid**				**Southern grid**
	Northern	**Eastern**	**Western**	**North Eastern**	**Southern**
States	Delhi Chandigarh Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand	Bihar, Orissa, West Bengal, Jharkhand and Sikkim , Andaman-Nicobar	Gujarat, Madhya Pradesh, Maharashtra, Goa and Chattisgarh,Daman&Diu, Dadar&NagarHaveli	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu Pondicherry, Lakshadweep

The Southern grid constitutes of Andhra Pradesh[11]. These states under the regional grid have their own power generating stations as well as centrally shared power-generating stations. While the power

[10]http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf
[11]http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

generated by own generating stations is fully owned and consumed through the respective state's grid systems, the power generated by central generating stations is shared by more than one state depending on their allocated share. Presently the share from central generating stations is a small portion of their own generation.

For the purpose of determining the emission reductions achieved by the Project the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1, EB 61) states that the "*project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints*". On this basis the Central Electricity Authority, *CO_2 Baseline Database for the Indian Power Sector - Version 6.0*[12]defines the project electricity systems within India in two regional grids. This is justified "*as electricity continues to be produced and consumed largely within the same region, as is evidenced by the relatively small volume of net transfers between the regions, and consequently it is appropriate to assume that the impacts of CDM project will be confined to the regional grid in which it is located*". The project is located in Andhra Pradesh and is therefore as per the CEA's grid definitions it is within the Southern regional grid. Also, it is preferable to take the regional grid as project boundary than the state boundary as it minimizes effect of inter-state power transactions, which are dynamic and vary widely. Considering free flow of electricity among member states the entire Southern grid is considered as a single entity for estimation of baseline.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The project participant has chosen Option I for the calculation of the operating and build margin emission factor i.e. off-grid power plants are not being included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

For the proposed project activity, simple OM method (option a) has been chosen to calculate the operating margin emission factor ($EF_{grid, OM, y}$). However, the simple OM method can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. The low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.

[12]http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

Share of Low Cost / Must-Run (% of Net Generation)

Grid	2003-04	2004-05	2005-06	2006-07	2007-08
NEWNE	17.4%	16.8%	18.0%	18.5%	19.0%
South	16.2%	21.6%	27.0%	28.3%	27.1%
India	17.1%	18.0%	20.1%	20.9%	21.0%

Ref: CO_2 Baseline Database for the Indian Power Sector – CEA, Version 03 and 04.

Percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) = 17.94 %

The calculation above shows that the generation from low-cost/must-run resources constitutes less than 50% of total grid generation, hence usage of the **Simple OM method** in the project case is justified.

The Simple OM emission factor can be calculated using either of the two following data vintages for years(s) *y*:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.

or

- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

The project proponent chooses the *Ex ante* option for estimating the simple OM emission factor wherein as described above a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period will be undertaken.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM method has been selected as justified above. The simple OM emission factor is calculated based on the net electricity generation of each power unit and a CO_2 emission factor for each power unit, as follows:

$$EF_{grid,OM,simple,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,,y}$ = Simple operating margin CO_2emission factor of in year y (tCO_2/MWh)

$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2emission factor of power unit m in year y (tCO_2/MWh)
M	=	All power units serving the grid in year y except low-cost / must-run power units
Y	=	The relevant year as per the data vintage chosen in step 3 i.e. the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Determination of $EF_{EL,m,y}$

The emission factor of each power unit m has been determined as follows:

$$EF_{EL,m,y} = \frac{\sum_{m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
$EG_{m,y}$	=	Net electricity generated and delivered to the grid by power unit m in year y (MWh)
M	=	All power units serving the grid in year y except low-cost / must-run power units
I	=	All fossil fuel types combusted in power plant / unit m in year y
Y	=	The relevant year as per the data vintage chosen in step 3 i.e. the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Determination of $EG_{m,y}$

Since, the calculations consider only grid power plants, $EG_{m,y}$ should has been determined as per the data provided by the Central Electricity Authority (CEA) CO_2 Baseline Database for the Indian Power Sector.

In India, the Central Electricity Authority (CEA) has estimated the baseline emission factor for the power sector. This data has also been endorsed by the DNA and is the most authentic information available in the public domain.

Step 5: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,OM,simple,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid, BM, y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year y (MWh)
$EF_{EL, m, y}$	=	CO_2 emission factor of power unit *m* in year y (tCO_2/MWh)
M	=	Power units included in the build margin
Y	=	Most recent historical year for which power generation data is available

Calculations for the Build Margin emission factor $EF_{gid, BM, y}$ is based on the most recent information available on the plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of the power plant capacity additions in the electricity system that comprise 20 % of the system generation and that have been built most recently.

Step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{CO_2} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

The following default values should be used for $w_{OM}$and w_{BM}:

- Wind and solar power generation project activities: w_{OM}= 0.75 and w_{BM}= 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.
- All other projects: w_{OM}= 0.5 and w_{BM}= 0.5 for the first crediting period, and w_{OM}= 0.25 and w_{BM}= 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

As mentioned before, the CEA has calculated the baseline emission factors for various regional grids in India according to the formulas specified above. This is the most authentic information available in the public domain. The baseline emission factor used in the calculation of baseline emissions for the proposed project activity is being referred from the same for transparency and conservativeness[13].

Therefore the total baseline emissions, considering aspects of both ACM0010 and AMS-I.D.baseline emission components are:

$BE_y = BE_{y,ACM0010} + BE_{y,AMS-I.D.}$

PROJECT EMISSIONS

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

As per ACM0010, project emissions shall be considered for the following:

$$PE_y = PE_{AD,y} + PE_{Aer,y} + PE_{N2O,y} + PE_{PL,y} + PE_{flare,y} + PE_{elec/heat} \quad \textbf{(10)}$$

Where:

$PE_{AD,y}$	=	Leakage from AWMS systems that capture's methane in t CO2e/yr
$PE_{Aer,y}$	=	Methane emissions from AWMS that aerobically treats the manure in t CO2e/yr
$PE_{N2O,y}$	=	Nitrous oxide emission from project manure waste management system in t CO2e/yr
$PE_{PL,y}$	=	Physical leakage of emissions from biogas network to flare the captured methane or supply to the facility where it is used for heat and/or electricity generation in t CO2e/yr
$PE_{flare,y}$	=	Project emissions from flaring of the residual gas stream in t CO2e/yr
$PE_{elec/heat}$	=	Project emissions from use of heat and/or electricity in the project case in t CO2e/yr

However, the manure management practice in the project scenario is the combustion of the poultry litter in the boiler as fuel for power generation. As soon as the poultry farms are cleaned and the manure is removed, it is collected and brought to the plant, where it is fired in the boiler. In other words, the poultry litter is not stored anywhere for considerable periods of time and thus there are no emissions of GHGs from poultry litter in the project scenario. Thus,

$PE_{AD,y}$= 0 as the project scenario AWMS does not entail any methane capture

$PE_{Aer,y}$= 0as the project scenario AWMS does not entail any aerobic treatment of manure

$PE_{N2O,y}$= 0 as the project scenario AWMS does not store manure for lengthy periods of time

$PE_{PL,y}$= 0as the project scenario AWMS does not entail any methane capture or biogas network

$PE_{flare,y}$= 0 as the project scenario AWMS does not entail any residual gas stream flaring

$PE_{elec/heat}$ = 0 as the electricity usage by the project activity power plant is already discounted as auxiliary consumption from the gross generation for the purpose of calculation of baseline emissions.

As per AMS-I.D., the project emissions shall be only due to the fossil-fuel consumption in the project activity, i.e., diesel consumption in the diesel generator (DG) set in the project boundary.

Fossil Fuel Combustion ($PE_{FF,y}$)

$PE_{FF,y}$is calculated as per the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" as follows:

$$PE_{FF,y} = PE_{FC,j,y}$$

Where:

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion for electricity generation using diesel genset 'j' during the year 'y' (tCO_2e / year).

For electricity generation, a DG set is to be used for emergency power supply to critical instruments only during plant shutdown, where its project emissions are calculated using the latest "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" using Option B: the CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type 'i',

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$PE_{FC,j,y}$	CO_2 emissions from fossil fuel combustion for electricity generation in diesel gen-set 'j' during the year 'y' (tCO_2e / year)
$FC_{i,j,y}$	Quantity of fuel type 'i' combusted for electricity generation in diesel gen-set 'j' during the year 'y' (mass or volume unit).
$COEF_{i,y}$	CO_2 emissions coefficient of fuel type 'i' in year 'y' (tCO_2e / mass or volume unit)
$NCV_{i,y}$	Weighted average net calorific value of the fuel type 'i' in year 'y' (GJ / mass or volume unit)
$EF_{CO2,i,y}$	Weighted average CO_2 emission factor of fuel type 'i' in year 'y' (tCO_2 / GJ)
i	the fuel type combusted for electricity generation in diesel gen-set 'j' during the year 'y'

If thefossil fuel quantity is measured in volume units, it shall be converted into mass units as follows:

$FC_{i,j,y\,(mass)} = FC_{i,j,y\,(volume)} \times \rho_{i,j,y}$, where the fuel consumption in volume terms (say litres) is converted into mass terms (say kgs) by multiplication by the density of the fuel (in kg/liter), obtained from relevant sources.

LEAKAGE

As per ACM0010, leakage covers the emissions of CH_4 and N_2O from land application of treated manure, outside the project boundary. Since poultry litter will be combusted and converted to ash in the project scenario within the project boundary, there will be no leakage emissions.

As per AMS-I.D., leakage is to be considered if the energy generating equipment is transferred from another activity. However, as the energy generating equipment to be used in the project activity shall be procured brand new.
Furthermore, as per the biomass availability assessment study conducted by an independent external agency confirms that the poultry litter and biomass availability in the region is surplus (greater than 25% within the region of 200 km radius) to the requirements of the proposed power plant.

Hence it is established that there are no leakage emissions attributable to the power plant.

Emission Reduction

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions (BE_y) and the sum of project emissions (PE_y) and Leakage, as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(29)}$$

Emission reductions have been calculated in section B.6.3 in greater details.

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

(Copy this table for each data and parameter)

Data / Parameter:	nd_y
Data unit:	Number
Description:	Number of days the plant was operational in year y
Source of data used:	Project proponent
Value applied:	365
Justification of the choice of data or description of measurement methods and procedures actually applied :	In the absence of the project activity, the poultry litter from various farms would have been continuously been dumped in the pits all throughout the year.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	$MS\%_{Bl,j}$
Data unit:	Fraction
Description:	Fraction of manure handled in the system
Source of data used:	Project proponent
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The entire poultry litter that would be used in the project activity would have been dumped in the pits in the absence of the project activity. Furthermore, the total amount of poultry litter that shall enter the plant premises shall be used as a fuel for combustion in the boiler and shall not be employed for any other uses.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	MCF
Data unit:	-
Description:	Methane correction factor
Source of data used:	IPCC 2006, Table 10.17, Chapter 10 Volume 4
Value applied:	80%*95%*0.94
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC, as prescribed by the methodology ACM0010 for each of the scenarios at temperature≥ 28°C • Uncovered anaerobic lagoon • Solid Storage
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of

	the project activity.

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential for CH_4
Source of data used:	IPCC value
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	D_{CH4}
Data unit:	t/m^3
Description:	Density of methane
Source of data used:	ACM0010 (ver 5), page 8
Value applied:	0.00067
Justification of the choice of data or description of measurement methods and procedures actually applied :	0.00067 t/m^3 at room temperature 20^oC and 1 atm pressure. This value has been selected from a source stated by the methodology.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	$W_{default}$
Data unit:	Kg
Description:	Default average animal weight of a defined population
Source of data used:	IPCC volume 4, Table 10A-9
Value applied:	1.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	As a conservative approach, the PP has used the higher of the IPCC default values for the two types of birds (1.8Kgs for layer and 0.9Kgs for broiler), i.e., 1.8Kgs instead of using a weighted average as per the bird population to result in a conservative estimate of CERs.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	Fuel moisture content
Data unit:	%
Description:	Moisture content of the biomass/ poultry litter fuel
Source of data used:	Laboratory test reports
Value applied:	30
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is based on the laboratory tests of the various biomass/ poultry litter fuels to be used by the power plant and is reflected in the Detailed Project Report of the project activity. This value is also reliable considering the fact that the boiler design has also been carried out on the basis of this value.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	$EF_{CO2, grid,y}$
Data unit:	tCO2/MWh
Description:	Baseline emission factor of the Southern grid
Source of data used:	CEA version 6 data (http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf)
Value applied:	0.85
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is provided by the CEA, a Government of India source.
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ / kg
Description:	Net calorific value of the diesel fuel in year 'y'
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.043
Justification of the choice of data or description of measurement methods and procedures actually applied:	–
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	ρ_i

Data unit:	kg / litre
Description:	Density of diesel fuel
Source of data used:	CO2 Baseline Database for the Indian Power Sector by the Central Electricity Authority, Ministry of Power, Government of India: http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf
Value applied:	0.83
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value is provided by the CEA, a Government of India source.
Any comment:	This parameter shall be used where the fuel consumption is measured in volume terms for conversion into converted into mass terms. This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2 / GJ
Description:	CO_2 emission factor of diesel fuel in year 'y'
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.074
Justification of the choice of data or description of measurement methods and procedures actually applied :	–
Any comment:	This parameter shall be fixed for the entire duration of the first crediting period of the project activity and shall be revised upon renewal of crediting period of the project activity.

B.6.3. Ex-ante calculation of emission reductions:

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Ex-ante GHG emission reduction calculations:

For details, please refer to the ex-ante ER calculation spreadsheet.

Parameter	Symbol	Unit	Value
Global warming potential	$CH4_{GWP}$	tCO_2e/tCH_4	21
Methane density	D_{CH4}	t/m^3	0.00065
Annual methane conversion factor for baseline	MCF	NA	0.71
Maximum methane producing potential	$B_{0,LT}$	m^3CH_4/kg_dm	0.24
Number of days animal is alive in the farm	N_{da}	Day	252.72
Annual average number of animals of type Lt for	NLT		5872896

Parameter	Symbol	Unit	Value
year y			
Number of animals produced annually	N_p	head	8482143
Annual volatile solid for livestock LT entering all AWMS	VSLTY		7
Default value for volatile solid excretion per day on a dry -matter basis for a defined livestock population in Kg-dm/animal/day	$VS_{default}$	Kg –dm/ animal/ day	0.02
Fraction of manure handled in system J	MS%j	%	100%
Number of days treatment plant was operational in year y	nd_y	Day	365
Average weight of a defined population at the project site in kg	Wsite	Kg	1.79
Default average animal weight of a defined population in kg	$W_{default}$	Kg	1.8
	Capacity	MW	7.5
Grid Emission Factor	CEF	tCO2/MWh	0.85
	Hours of operation	24	24
Plant load factor	PLF		80%
Annual days of operation		days	365.00
Transmission loss			0.50%
Auxiliary consumption			10%

Bird Data - Source: Fuel availability report			
Item	**Value**	**Unit**	**Source**
Number of birds in district	12500000		Calculated
Litter produced per bird	11.2	kg	Study Report
Litter available	140000000	kg	Calculated
	140000	ton	Calculated
Poultry requirement for 7.5 MW power plant	95000	tons	DPR
Number of poultry birds required	8482143		Calculated
Avg weight of broiler (kg/bird)	1.9	Km	Study Report
Avg weight of Layer (kg/bird)	1.5	Km	Study Report
Therefore average weight of bird	1.7944	Km	Calculated
layers	3300000	Nos.	Study Report
broilers	9200000	Nos.	Study Report
Total Birds	12500000	Nos.	Calculated
Number of days broiler alive	45	days	Study Report
Cycle timing for Broiler	5	per year	Study Report
Total days broiler alive	225	days/year	Calculated
Number of days layer is alive	330	days/year	12-14 months usually, assumption is 330 days

Bird Data - Source: Fuel availability report			
Item	**Value**	**Unit**	**Source**
Average number of days bird is alive	253	days/year	Calculated

Transportation Calculations				
Item	**Value**	**Value**	**Unit**	**Source**
EF CO2 as per local conditions				
Fuel efficiency (Diesel)	3.5		km/l	A registered CDM project activity[14]. Can also be cross-verified from table 5 of a study available on the public domain[15]:
Density of diesel	0.85		kg/l	http://nccr.iitm.ac.in/ebook%20final.pdf
COEF for diesel (IPCC)	3.185		kgCO2/kg fuel	
$EF_{CO2,transp}$ as per local conditions	**0.7735**		**kgCO2/km**	
	0.0008		tCO2/km	
COEF for Diesel	1		ton/y	
NCVi	43.0		TJ/kt	As per IPCC , 2006, Chap-1, Table 1.2
OXIDi	1.0			As per IPCC 2006, Chap-1, Table 1.4
CEFi	20.2		tC/TJ	As per IPCC 2006, Chap-1, Table 1.4
COEFi	**3.185**		**tCO2/ton**	
Biomass Fuel Details				
Poultry litter	95000		tons/year	DPR
Biomass	11617		tons/year	DPR
Total	106617		tons/year	Calculated
Tons/truck	15			DPR
For Poultry Litter Quantity	One way	Two way		Fuel Availability report
66000	20	40	Km	
29000	75	150	Km	
95000		73.6		Calculation: average two way distance

[14] http://cdm.unfccc.int/filestorage/D/S/3/DS39OHJ6S26STTX5CM1XAD8EBC5VVS/ChambalPDD_Validation-Revision-8Dec-rev1Mar.pdf?t=dDJ8bHZkazZifDC6Jj0oNbPm4nuDtkNTawlk
[15] http://www.scribd.com/doc/50649519/A-STUDY-ON-CUSTOMER-SATISFACTION-AND-CUSTOMER-LOYALTY-AT-VST-MOTORS

Transportation Calculations				
Item	**Value**	**Value**	**Unit**	**Source**
For Biomass Quantity				
11617	50	100	Km	
Overall average two way distance considering all fuels		**76**	**Km**	**Calculation**

Parameter	Value	Unit
Electricity Generated	52,560	MWh
Transmission losses	263	MWh
Auxiliary consumption	5,256	MWh
Net electricity exported	47,041	MWh

Parameter	Unit	Value
Annual average temperature at the site	ºC	30
CH4 density at 20 ºC and 1 atm pressure	t/m3	0.00067
CH4 density at Ty	t/m3	0.00065

Baseline Emissions:
From Methane Avoidance: 99,700 tCO2e
From Renewable Energy Generation: 39,985 tCO2e

Project Emissions:

Transportation Emissions:
Transportation Emissions are calculated as 420 tCO2e per annum, which is 0.3%, i.e., much less than 10% of the GHG ER of the project activity. As per the General Guidance on leakage in biomass project activities, EB 47,GHG emissions for transport of raw materials and biomass can be neglected for SSC project activities if less than 10%. The the project activity can make use of the SSC guidance mentioned above[16]. It is established that transportation GHG emissions is 0.3%, i.e., much less than of 10% compared to the GHG emission reductions from the project activity under consideration need not be

[16]As per EB 8, Annex 1, para 6, *"If a proposed CDM project activity comprises different "sub-activities" requiring different methodologies, project participants may forward the proposal using one CDM-PDD but shall complete the methodologies sections (sections A.4.2, A.4.3, A.4.4. and B to E of the CDM-PDD) for each "sub- activity"."* Hence, in light of the project activity under consideration, there are two sub-activities requiring two different methodologies are AWMS component requiring ACM0010 and renewable energy generation component requiring AMS-I.D. These methodologies have been applied throughout the various sections of the PDD for each sub-section, in line with the quoted guidance. Furthermore, renewable energy power plant to be installed following SSC CDM methodology AMS-I.D., which has a capacity of 7.5MW, i.e., much less than the SSC cap of 15MW as per the methodology using renewable biomass fuels. The sub-activity also complies with all other applicability criteria of the SSC CDM methodology AMS-I.D. and can hence make use of all the SSC guidelines, like General Guidance on leakage in biomass project activities, EB 47. Furthermore, the biomass fuels (whose transportation emissions are being calculated) shall be used in the renewable energy power plant, i.e., the same sub-activity. Hence the project activity can make use of the General Guidance on leakage in biomass project activities, EB 47.

incorporated in the GHG ER calculations. Thus the project emissions from transportation need not be considered for GHG ER calculations as well as need not be included in the monitoring plan also.

DG Set Emissions:

Parameter	Symbol	Unit	Value	Source/Comment
Quantity of fuel combusted for electricity generation in diesel gen-set	$FC_{i,j,y}$	liters	0	Fuel consumption will only occur in emergencies when power plant is not operational and the grid is also not available, a confluence of events which is expected to be very rare; at other times the plant will run on grid electricity. Emergency DG set is only for critical instruments/control system during turbine trip and shutdown. Hence the value cannot be predicted at this stage and has been considered as 0 for ex-ante GHG ER calculations and shall be monitored ex-post.
Density of diesel fuel	ρ_i	kg/liter	0.83	
Net calorific value of the diesel fuel	$NCV_{i,y}$	GJ/kg	0.043	
CO2 emission factor of diesel fuel	$EF_{CO2,i,y}$	tCO2 / GJ	0.074	
CO2 emissions from fossil fuel combustion for electricity generation in diesel gen-set	$PE_{FC,j,y}$	tCO2e / year	0	Calculated

Thus, project emissions = 0

Emission Reductions:
GHG Emission Reductions = Baseline Emissions – Project Emissions = 139,685 tCO2e

For further details, please refer to the ex-ante GHG emission reductions calculation sheet furnished separately.

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

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Year	Baseline Emissions (tCO2e)	Project Emissions (tCO2e)	Leakage Emission (tCO2e)	Emission reduction (tCO2e)
July 2013 – June 2014	139,685	0	0	139,685
July 2014 – June 2015	139,685	0	0	139,685

Year	Baseline Emissions (tCO2e)	Project Emissions (tCO2e)	Leakage Emission (tCO2e)	Emission reduction (tCO2e)
July 2015 – June 2016	139,685	0	0	139,685
July 2016 – June 2017	139,685	0	0	139,685
July 2017 – June 2018	139,685	0	0	139,685
July 2018 – June 2019	139,685	0	0	139,685
July 2019 – June 2020	139,685	0	0	139,685
Total	**977,795**	**0**	**0**	**977,795**
Average	**139,685**	**0**	**0**	**139,685**

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

B.7.1 Data and parameters monitored:

For Baseline Emissions:

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh
Description:	Electricity exported to the grid
Source of data to be used:	Joint Meter Statements, that can be cross-checked against the electricity sale invoices
Value of data applied for the purpose of calculating expected emission reductions in section B.5	47,041
Description of measurement methods and procedures to be applied:	The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. This parameter shall be measured continuously by the main and check meters and recorded monthly, when the meter readings shall be taken in the presence of the representatives of the APSPDCL and PP. In case the main meter fails, the check meter readings shall be taken into consideration. On the other hand, if there are any issues with the main and check meters, then both meters shall be replaced and correction shall be applied on the main meter readings to arrive at the correct exported electricity quantum. If applicable, cross check of the net electricity supplied to a grid can be done as the gross energy generation in the project activity power plant minus the auxiliary/station electricity consumption, technical losses and electricity import from the grid to the project power plant measured at the grid interface/connection used for billing purposes.
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration by the APSPDCL as per their calibration schedule, expected to be at least once a year.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	
Data unit:	MWh
Description:	Gross Electricity Generation
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	52,560
Description of measurement methods and procedures to be applied:	The gross electricity generation shall be measured by energy meter installed in the plant.
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration by the plant personnel as per their internal calibration schedule, expected to be at least once a year.
Any comment:	This parameter shall not be a part of GHG ER calculations but has been introduced for crosscheck purposes. All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	
Data unit:	MWh
Description:	Auxiliary Consumption
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5,256
Description of measurement methods and procedures to be applied:	The auxiliary consumption (power plant self consumption) shall be measured by energy meter installed in the plant.
QA/QC procedures to be applied:	Electricity meters will undergo maintenance/calibration by the plant personnel as per their internal calibration schedule, expected to be at least once a year.
Any comment:	This parameter shall not be a part of GHG ER calculations but has been introduced for crosscheck purposes. All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	$MS\%_j$
Data unit:	Fraction
Description:	Fraction of manure handled in system j in project activity
Source of data to be used:	Project proponent

Value of data applied for the purpose of calculating expected emission reductions in section B.5	100%
Description of measurement methods and procedures to be applied:	The entire poultry litter that would be used in the project activity would have been dumped in the pits in the absence of the project activity. Furthermore, the total amount of poultry litter that shall enter the plant premises shall be used as a fuel for combustion in the boiler and shall not be employed for any other uses.
QA/QC procedures to be applied:	In case there are any other uses for the poultry litter in the plant premises, then the same shall be discounted by means of this parameter.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	$B_{0,LT}$
Data unit:	Fraction
Description:	Maximum methane producing potential of the volatile solid generated
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.24
Description of measurement methods and procedures to be applied:	Monitored and recorded annually from public domain literature like IPCC: IPCC 2006, table 10A-9,chapter10,Volume4
QA/QC procedures to be applied:	Not applicable as this value is sourced from reliable public domain sources
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	$VS_{LT,y}$
Data unit:	kg dry matter/animal/year
Description:	Volatile solid excretion per animal per day
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	7
Description of measurement methods and procedures to be applied:	Monitored and recorded annually from public domain literature like IPCC as local values are not available The values provided for this parameter by the US-EPA are not relevant to the project activity under consideration as they are not in terms of the same units.

QA/QC procedures to be applied:	Not applicable as this value is sourced from reliable public domain sources
Any comment:	The methodology provides the following options for this parameter: 1. Using published country specific data – published data for this parameter in the Indian context is not available 2. Estimation of VS based on dietary intake of livestock – relevant data on the dietary intake of the livestock is not available 3. Scaling default IPCC values $VS_{default}$ to adjust for a site-specific average animal weight – this approach is used as relevant data for the above two options is not available. Furthermore, since this option makes use of the IPCC data, it shall result in an conservative GHG ER estimate. All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	N_{da}
Data unit:	Number of days
Description:	Number of days animal is alive in the farm in the year y
Source of data to be used:	Project proponents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	252.72
Description of measurement methods and procedures to be applied:	Monitored and recorded monthly by the project proponent by regularly gathering information from the various poultry farms
QA/QC procedures to be applied:	The project proponent shall maintain records by gathering information from the various poultry farms on the number of livestock and the days spent in the farms. The consistency between the value and indirect information (records of sales, records of food purchases) shall also be assessed by the verifying DOE.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	N_p
Data unit:	Number
Description:	Number of animals produced annually of type LT for the year *y*
Source of data to be used:	Project proponents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8482143
Description of measurement methods	Monitored and recorded monthly by the project proponent by regularly gathering information from the various poultry farms

and procedures to be applied:	
QA/QC procedures to be applied:	The project proponent shall maintain records by gathering information from the various poultry farms on the number of livestock and the days spent in the farms. The consistency between the value and indirect information (records of sales, records of food purchases) shall also be assessed by the verifying DOE.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	W_{site}
Data unit:	Kg
Description:	Average animal weight of a defined livestock population at the project site
Source of data to be used:	Project proponents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.79 (Weighted average of broiler weight = 1.9 Kg and layer weight = 1.5 Kg.)
Description of measurement methods and procedures to be applied:	Monitored and recorded monthly by the project proponent by visiting and gathering information from the various poultry farms on a monthly basis or calculated as a weighted average of the poultry birds in the region by from a study conducted in the region by an independent external agency. Sampling procedures can be used to estimate this variable, taking into account the following guidance: • To ensure representativeness, each defined livestock population should be classified into a minimum of 3 age categories; • For each defined livestock population, a minimum of one monthly sample per age category should be taken; • When estimating baseline emissions and emissions released during baseline scenario from land application of the treated manure in the leakage section, the lower bound of the 95% confidence interval obtained from the sampling measurements should be used; • When estimating project emissions and emissions released during project activity from land application of the treated manure in the leakage section, the upper bound of the 95% confidence interval obtained from the sampling measurements should be used. The weights of the birds shall be taken for at least 3 weight categories.
QA/QC procedures to be applied:	Records shall be maintained by the project proponent.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	Project Poultry Litter/Biomass Fuel Consumption
Data unit:	Tonnes/year
Description:	Quantity of biomass/ poultry litter fuel of type i consumed in year *y*
Source of data to be	Plant Records

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Poultry Litter: 95,000 Other biomass: 11,617
Description of measurement methods and procedures to be applied:	The quantity of biomass and poultry litter entering the plant premises shall be measured continuously by the weigh-bridge installed at the entrance of the plant. The measurements may be cross-checked with an annual energy balance that is based on purchased quantities (e.g. with sales/receipts) and stock changes. If more than one type of biomass fuel is consumed, each shall be monitored separately. Cross-checking the measurements can be done with an annual energy balance that is based on purchased quantities (e.g. with sales/receipts) and stock changes. Checking can also be done on the consistency of measurements ex post with annual data on energy generation, fuels used and the efficiency of energy generation as determined *ex ante*.
QA/QC procedures to be applied:	Weigh-bridge shall be calibrated by the plant personnel at least once a year.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	T
Data unit:	^{o}C
Description:	Annual Average ambient temperature at Project site
Source of data to be used:	Project proponents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$30^{o}C$
Description of measurement methods and procedures to be applied:	Monitored and recorded monthly from public domain sources like: http://www.yr.no/place/india/Andhra_Pradesh%2FChittoor/statistics.html
QA/QC procedures to be applied:	Not applicable as this value is sourced from reliable public domain sources
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

For Project Emissions:

Data / Parameter:	
Data unit:	Kcal/kg
Description:	Net Calorific Value (NCV) of biomass/ poultry litter fuel of type i
Source of data to be used:	Plant Records

Value of data applied for the purpose of calculating expected emission reductions in section B.5	2350
Description of measurement methods and procedures to be applied:	NCV based on dry biomass shall be determined once in the first year of the crediting period. The NCV of each type of fuel used in the project activity shall be measured on a dry basis in laboratories according to relevant national standards on a quarterly basis for the first year of operation taking at least three samples for each measurement. The average value shall be used for the rest of the crediting period. Measurements shall be undertaken in line with national or international fuel standards.
QA/QC procedures to be applied:	Testing shall be done by relevant independent external laboratories having ISO17025 accreditation
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	Regulations
Data unit:	
Description:	Existence and enforcement of relevant regulation
Source of data to be used:	Project proponents
Value of data applied for the purpose of calculating expected emission reductions in section B.5	NA
Description of measurement methods and procedures to be applied:	Monitored and recorded at the start of the crediting period by the project proponent by public domain sources and/or independent agencies
QA/QC procedures to be applied:	Quality control for the existence and enforcement of relevant regulations and incentives is beyond the bounds of the project activity. Instead, the DOE shall verify the evidence collected.
Any comment:	All data pertaining to the parameter shall be archived in paper/ electronic format for at least 5 years post the crediting period of the project activity.

Data / Parameter:	$FC_{i,j,y}$
Data unit:	litres / year or kgs / year
Description:	The quantity of fuel type i (diesel fuel) combusted in process DG set j during the year y measured in volume terms or mass terms
Source of data to be used:	Plant records
Value of data applied	0

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Fuel consumption will be recorded monthly, specifically for each fuel (currently only diesel consumption is expected). Measurement maybe made in litres by means of flow meters or similar equipment and converted to tonnes using a constant for fuel specific density or scientifically proven fuel densities.
QA/QC procedures to be applied:	Monitoring equipment shall be calibrated once a year.
Any comment:	Fuel consumption will only occur in emergencies when power plant is not operational and the grid is also not available, a confluence of events which is expected to be very rare; at other times the plant will run on grid electricity. Emergency DG set is only for critical instruments/control system during turbine trip and shutdown. Hence the value has been considered as 0 for ex-ante GHG ER calculations and shall be monitored ex-post. If the fossil fuel quantity is measured in mass units, it shall be directly used in the GHG ER calculations.However, if the fossil fuel quantity is measured in volume units, it shall be converted into mass units as follows: $FC_{i,j,y\,(mass)} = FC_{i,j,y\,(volume)} \times \rho_{i,j,y}$, where the fuel consumption in volume terms (say liters) is converted into mass terms (say kgs) by multiplication by the density of the fuel (in kg/liter), obtained from relevant sources.

B.7.2. Description of the monitoring plan:

>>

Composition of CDM Team:

The following structure for the CDM team is proposed for monitoring of emission reductions due to the project activity. The team will perform various functions such as measuring, recording, storage of measured data and reporting. The CDM Team comprises of following members:

- CDM team head/ Project manager,
- Unit in-Charge,
- Shift In-Charge
- O&M team

Responsibility:

The CDM team head/ Project manager is responsible for overall functioning and maintenance of the project activity. Unit In-charge maintains all the data records and ensures the completeness and reliability of the data. The Shift In-charge maintains a day-to-day power generation and log.O&M team will be responsible for preventive maintenance and trouble free operation under the overall responsibility of site in-charge. Corrective action is taken immediately if any improper functioning or operation problem with the equipments is observed. Provincial Grid personnel will take reading of power export every month and this will form the basis for emission reduction estimations. Monthly/ annual monitoring reports will be compiled and an estimate of emission reduction will be submitted to CDM team head/ Project manager.

The net electricity exported to the grid would be monitored by joint meter readings of Main and Check meters installed at the interconnection point every month and would be recorded. Based on the data

recorded monthly bills would be raised to for payments against net electricity supplied. The reading of the Main Meter shall form the basis for the energy account. If in any month the readings of the Main Meter is found to be doubtful or beyond the permissible deviation, it shall be checked and calibrated in the presence of authorized representatives of both the parties. In this scenario, if the Check meter is found to be accurate then its reading shall be used for billing/emission reduction calculation purpose.

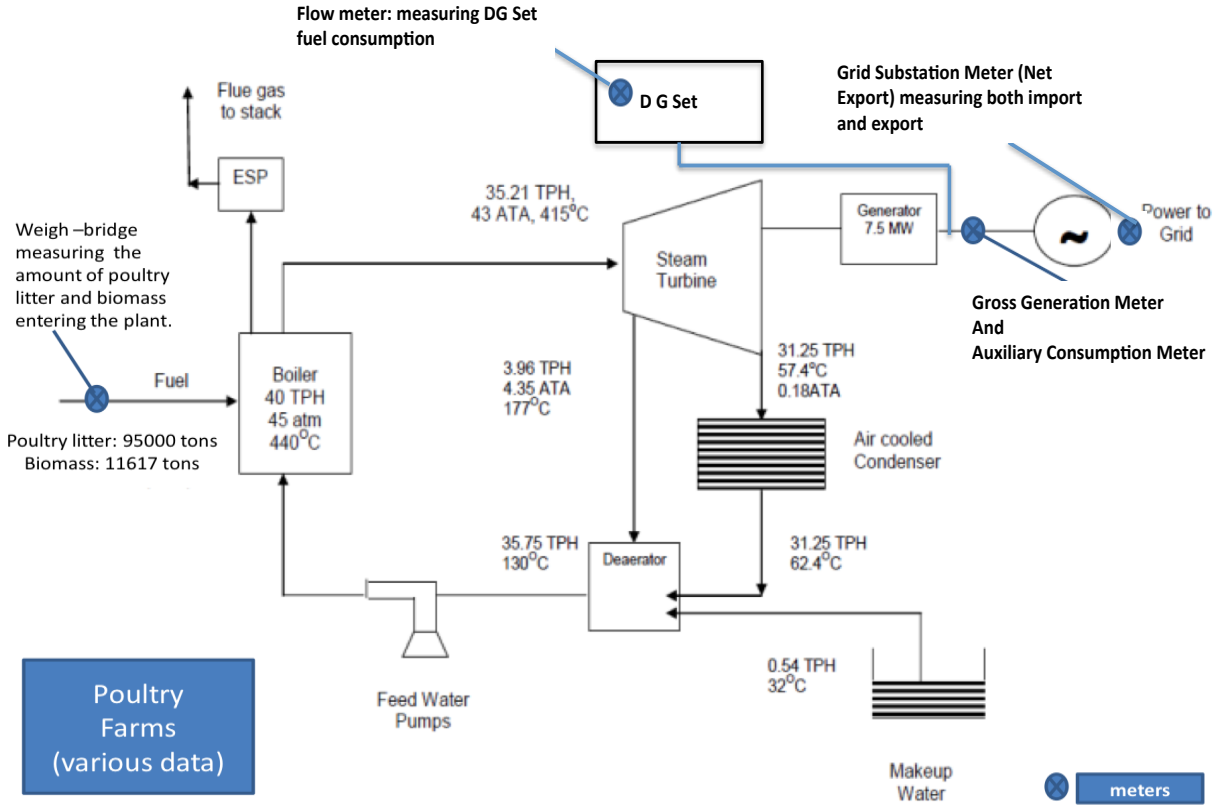
The total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads would be measured on a daily basis. This data can be used for cross checking purposes of the net electricity supplied by the project activity to the grid after accounting for various losses towards transformation, transmission and auxiliary consumption. The energy meters would be tested, calibrated and certified by a recognised Testing House/Laboratory, once during every year.

A CDM project team would be constituted with participation from relevant departments. People will be trained on CDM concept and monitoring plan. This team will be responsible for data collection and archiving. This team will meet periodically to review CDM project activity check data collected, emissions reduced etc. In case of any irregularity observed by any of the CDM team member, it would be informed to the concerned person for necessary actions. Officials employed by the project proponent under the supervision of the CDM project team shall also hold the responsibility of visiting the poultry farms in the region on a monthly basis in order to collect and record the data on the poultry population in each farm (no. of birds, type of birds, weight of birds constituting each age category and average days spent by the birds in the farm).

The calibration of the measuring devices shall be as follows:

- The export energy meters shall be calibrated by the APSPDCL as per their calibration schedule, expected to be at least once a year.
- The weigh-bridge at the plant entrance measuring the quantities of the incoming poultry litter and biomass shall be calibrated by the PP officials, at least once a year.
- The NCV testing of the biomass and poultry litter shall be carried out by the PP officials at least once a quarter for the first year of operation.

The location of the measurement meters to be used in the project activity, i.e., weigh-bridge and energy meters have been depicted below:



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

>>

Date of completion: 12 April 2012
Person responsible for baseline study:
K. Kartick
Head of Implementation – South Asia and Middle-East
South Pole Carbon Asset Management Ltd.
(Not a project proponent)

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:

>>

The start date of the project activity has been considered as the date of placement of purchase order to the equipment supplier, i.e., 01/08/2011.

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

>>

20years

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:

01/07/2013[17] or date of registration, whichever is later

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> NA

C.2.2.2. Length:

>> NA

[17] Tentative commissioning date

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

As per the notification S.O. 1533 (E) dated 14thSeptember, 2006 of the Ministry of Environment and Forests (MoEF), Government of India[18] regarding the requirement of Environmental Clearance, as the project activity is a Greenfield investment of less than INR 100 crores (i.e., INR 1000 million), EIA is not required for the project. Environmentally, these industrial waste to energy Power Plants have minimum adverse impact on the surroundings. Emissions and discharges would also be lower in comparison to coal-based projects. Industrial pollution of ash wastewater, fuel or noise would emanate from various systems of the Power Plant. But it does not harm the life and health of people. It would also not disturb Ecology and Environment. Adequate preventive measures have been envisaged to be adopted to check the percentage of pollutants with the prescribed limit as specified by the Government of Andhra Pradesh and Government of India.

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:

>>

There is no significant adverse impact on the environment due to the project activity, as considered significant by the projectparticipant or by the host Party. As mentioned in Section D.1, as per the notification S.O. 1533 (E) dated 14thSeptember, 2006 of the Ministry of Environment and Forests (MoEF), Government of India, no Environmental Clearance is required.

The major impacts of the proposed project activity on the environment, primarily positive are highlighted below:

As compared to the baseline scenario no negative environmental impact will arise as a result of the project activity. The baseline scenario involves the combustion of fossil fuels for the generation of grid-based power. The positive environmental impacts arising from the project activity are therefore:

- Reduction in carbon dioxide emissions from the replacement of fossil fuels which would be generated under the baseline scenario
- Reduction of the methane emissions arising from the decomposition of poultry litterwhich would be generated in the baseline scenario
- Reduction in the emissions of other harmful gases (NOx and SOx) that arise from the combustion of fossil fuels in power generation

The factory will meet all environmental legislations as set out by the State Pollution Control Board(SPCB) and there will be on-going monitoring of the plant by this state body.“Consent to Establish” for the project activity has already been received from state nodal agency and “Consent to Operate”

[18]Reference : http://envfor.nic.in/legis/eia/so1533.pdf

would be obtained annually, ensuring the compliance of the project activity to the relevant prevalent environmental legislatures.

The project activity does not foresee any harmful impact on the ecology. There are no nearby forests, orzones high on biodiversity, or other environmentally sensitive locations around the factory that might beaffected negatively due to the project.

Green belt would also be developed in and around the plant premises to maintain the aesthetic nature and contribute positively to environment management.

SECTION E. Stakeholders' comments

>>

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

>>

Stakeholder consultation for the project activity has been conducted to account for the views of the local stakeholders. PP has indentified the stakeholders of project activity to be households in villages where project is proposed to be located and also invited comments from the technology providers.

The PP sent a letter for comments to all the identified stakeholders and also communicated about the project to the local people.

Sl. No.	Name	Category	Location
1	Gopi S Gurram	Management	Hyderabad
2	VenkateshKanneganti	Management	Palamaner / Gangavaram
3	Swaroop Reddy Kondlapudi	Management	Hyderabad
4	Venkaiah B	Management	Hyderabad
5	Satish K	Employee	Palamaner / Gangavaram
6	HariBabu	Consultant	Palamaner / Gangavaram
7	Sridharan R	Boiler Supplier	Chennai
8	Damodaran S	Boiler Supplier	Chennai
9	Narayanaprasad S	Turbine Supplier	Bangalore
10	Sivakumar K	Turbine Supplier	Bangalore
11	Ganguly P K	ACC Supplier	Kolkata
12	Krishna Kumar R K	Electricals Supplier	Hyderabad
13	SrinivasaRao D	Civil Architect	Hyderabad
14	Lakshminarayana I	Contour Designer	Hyderabad
15	Raju PV	Environment Management	Hyderabad
16	Sidda Reddy K	SBI – debt financing	Chittoor
17	Ramadas N	Transformers Supplier	Hyderabad
18	Prasad R H	Chimney Supplier	Mumbai
19	Anjaneya Prasad	Environmental Authority	Tirupati
20	Ashok	Environmental Authority	Tirupati
21	Dr. Muralidhar Naidu	NGO / Doctor	Punganur
22	Dr. Saraswathi	NGO / Doctor	Punganur
23	Rajesh Khanna	Local	Palamaner / Gangavaram
24	SubramanyamChetty	Local	Palamaner / Gangavaram
25	Gopi Krishna	Local	Palamaner /

Sl. No.	Name	Category	Location
			Gangavaram
26	Ram Mohan Gupta	Local	Palamaner / Gangavaram
27	PrakashBabu P	Local	Palamaner / Gangavaram
28	PandurangayyaChetty	Local	Palamaner / Gangavaram
29	Rajiv Samuel	Local	Palamaner / Gangavaram
30	Srinivasulu	Local	Palamaner / Gangavaram
31	Nazeer	Local	Palamaner / Gangavaram
32	Rajendra P T	AP Poultry Federation	Chittoor
33	Ramesh Babu	National Egg Coordination Committee	Chittoor
34	Prof. Naidu	Academic	Tirupati
35	Dr. Perumal	Balaji Hatcheries	Chittoor

E.2. Summary of the comments received:

>>

The local stakeholder comments received in the form of electronic mails have been provided below:

1. Mr. P. K. Ganguly

From: Krishna Banik
Sent: Monday, May 02, 2011 4:55 PM
To: gopi@redaninfra.com
Subject: 7.5 MW Poultry litter based power project in Gangavaram, Chittoor District.

Dear Shri S. Gurram, MD Redan Infrastructure Pvt. Ltd.

Please refer to your mail dtd. 22nd April '11.

At the outset I would like to place my appreciation in your effort and conviction in contributing towards the conversion of conventional souces of energy. It would certainly be a commendable job for the following :

1. Employment opportunities are there. People from various trades would also get the opportunity for employment.
2. Using of natural resources.
3. Power generation which is a need for the country.
4. Better utilization of plot plan to avoid usage of cultivated land.

The above is absolutely my personal feeling.

With regards,

P.K. Ganguly

Sr. General Manager - Heat Exchanger Divn.
Paharpur Cooling Towers Limited

8/1/B, Diamond Harbour Road, Kolkata 700 027, INDIA

Tel. : +91-33-40133 552, Fax : +91-33-2479 2188

Email : pk.ganguly@paharpur.com

2. Mr.Shivkumar S.

Reply - Invitation for comments

Tue May 03 2011 16:42:13 GMT+0530 (India Standard Time)

From: "Shivakumar" <skumars@tbg.trivenigroup.com>

To: "" <venkaiah@redaninfra.com>

Dear Sir,

Best regards,The objective of this company to put up a biomass based project in chittor district is well accepted & should be supported to commission at the earliest for the following reasons.

A. Power Plant runs on biomass fuel. (Non conventional energy)

B. Using of poultry litter as a fuel

C. Rural employment

D. Indirectly supporting farmers to sell there bioproduct at attractive price.

E. Clean Green Power generation concept.

Thanks

Shivakumar.S
Mktg & Sales
Triveni Turbine Limited
Bangalore

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

>>

The project proponent has taken into account all the comments received during the local stakeholder consultation process in the preparation of the relevant procedural documents like the CDM PDD. Furthermore, CDM PDD was made available for public viewing and commenting in the global stakeholder process and feedback received from the same has been used for revision of the necessary procedural documents.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Redan Infrastructure Private Limited
Street/P.O.Box:	
Building:	Plot No- 30, B.N Reddy Colony, Road No. 14, Banjara Hills
City:	Hyderabad
State/Region:	Andhra Pradesh
Postcode/ZIP:	500033
Country:	India
Telephone:	
FAX:	
E-Mail:	gopi@redaninfra.com
URL:	
Represented by:	Mr.GopiSridhar Gurram
Title:	Managing Director
Salutation:	Mr.
Last name:	Gurram
Middle name:	Sridhar
First name:	Gopi
Department:	
Mobile:	+91-9885449246
Direct FAX:	
Direct tel:	
Personal e-mail:	

Organization:	Swiss Carbon Assets Ltd.
Street/P.O.Box:	Technoparkstrasse 1
Building:	
City:	8005 Zurich
State/Region:	
Postcode/ZIP:	
Country:	Switzerland
Telephone:	+41 43 501 3550
FAX:	+41 43 501 3599
E-Mail:	registration@southpolecarbon.com
URL:	
Represented by:	Mr.RenatHeuberger
Title:	Mr.
Salutation:	CEO
Last name:	Heuberger
Middle name:	
First name:	Renat
Department:	
Mobile:	

Direct FAX:	
Direct tel:	
Personal e-mail:	r.heuberger@southpolecarbon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Parties included in Annex I in the said project activity.

Annex 3

BASELINE INFORMATION

The Emission Factor for the Grid

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin emission factor for the NEWNE grid, the details of which are available on the following website.
http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

The procedures and formulas used for estimation of the baseline factor and the assumptions made have also been detailed in there.As per the **Carbon Dioxide Emission Factor database, version 6.0**, given by **CEA**[19]**,** a statutory body under the Ministry of Power, the Emission factor for the Grid is the following:

Thus the emission factor for the SouthernRegional ElectricityGrid of India is **0.85tCO_2e/MWh**

19 http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

Annex 4

MONITORING INFORMATION

The monitoring plan has been already explained in section B.7.2. Relevant parameters to be monitored for estimation of GHG emission reductions from the project activity have also been considered in the monitoring plan outlined in section B.7.2. of this document.

Annex 5

LIST OF POWER PLANTS FOR COMMON PRACTICE ANALYSIS

The list of power projects in the region (state of Andhra Pradesh, India) using a similar technology as the project activity (combustion of fuel in boiler for power generation) has been compiled using the public domain information available from the Baseline Carbon Dioxide Emission Database Version 6.0[20] of the Central Electricity Authority, Government of India and the New and Renewable Energy Development Corporation of Andhra Pradesh Ltd (NREDCAP), formerly the Non-conventional Energy Development Corporation of Andhra Pradesh Limited (NEDCAP)[21], Government of Andhra Pradesh. This is an exhaustive or complete list of all such projects in the state as NREDCAP is the state nodal agency responsible for approving new and renewable energy projects and is the licencing authority in the state, thus maintains a detailed public domain database of such projects in the state.

In line with the guidance provided in the additionality tool, following is the list of projects identified that have output range as +/-50% of the design output or capacity as the project activity (i.e., 3.75MW to 10.25MW), rely on a broadly similar technology (power generation from fuel combustion in the boiler), are located in the applicable geographical area (i.e., Andhra Pradesh) and have started commercial operation before the start date of the project (01/08/2011).

Sl. No.	Project	Capacity (MW)	Project Proponent	Project Type	CDM Status	Similar Project?
1	Biomass based power plant by Ind Bharat Energies Ltd	6	Ind Bharat Energies Ltd	Biomass combustion for power generation	Listed as a CDM project	No
2	Biomass based power plant by HCL Agro Power Ltd	6	HCL Agro Power Ltd	Biomass combustion for power generation	-	Yes
3	Biomass based power plant by Jyoti Bio-Energy	4.5	Jyoti Bio-Energy Ltd	Biomass combustion for power generation	-	Yes
4	Biomass based power plant by Sudha Agro Oil & Chemical Industries Ltd	4	Sudha Agro Oil & Chemical Industries Ltd.	Biomass combustion for power generation	-	Yes
5	Biomass based power plant by Sree Rayalaseema Green Power Ltd	5.5	Sree Rayalaseema Green Power Ltd.	Biomass combustion for power generation	-	Yes
6	Biomass based power	6	Gayatri Agro	Biomass	Listed as	No

[20] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf
[21] http://w7ww.nedcap.gov.in/

Sl. No.	Project	Capacity (MW)	Project Proponent	Project Type	CDM Status	Similar Project?
	plant by Gayatri Agro Industrial Power Ltd		Industrial Power Ltd.	combustion for power generation	a CDM project	
7	Biomass based power plant by Jocil Ltd	6	Jocil Ltd.	Biomass combustion for power generation	-	Yes
8	Biomass based power plant by Vamshi Industries Ltd	4	Vamshi Industries Ltd.	Biomass combustion for power generation	-	Yes
9	Biomass based power plant by Gowthami Bio-Energies Ltd	6	Gowthami Bio-Energies Ltd.	Biomass combustion for power generation	-	Yes
10	Biomass based power plant by Matrix Power Ltd	4.5	Matrix Power Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
11	Biomass based power plant by SLS Power Ltd	6	SLS Power Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
12	Biomass based power plant by Roshni Powertech Ltd	6	Roshni Powertech Ltd.	Biomass combustion for power generation	-	Yes
13	Biomass based power plant by Satyakala Power Projects	4	Satyakala Power Projects Ltd.	Biomass combustion for power generation	-	Yes
14	Biomass based power plant by Varam Power Projects Ltd	6	Varam Power Projects Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
15	Biomass based power plant by Vijaya Agro Products Ltd	4	Vijaya Agro Products Ltd.	Biomass combustion for power generation	-	Yes
16	Biomass based power plant by My Home Power Ltd	9	My Home Power Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
17	Biomass based power plant by KMS Power Ltd	6	KMS Power Ltd.	Biomass combustion for power	Listed as a CDM project	No

Sl. No.	Project	Capacity (MW)	Project Proponent	Project Type	CDM Status	Similar Project?
				generation		
18	Biomass based power plant by Rithwik Energy Systems Ltd	6	Rithwik Energy Systems Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
19	Biomass based power plant by Veeraiah Non-Conventional Power Projects Ltd	4	Veeraiah Non-Conventional Power Projects Ltd.	Biomass combustion for power generation	-	Yes
20	Biomass based power plant by Rithwik Power Projects Ltd	6	Rithwik Power Projects Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
21	Biomass based power plant by Suchand Powergen Ltd	6	Suchand Powergen Ltd.	Biomass combustion for power generation	-	Yes
22	Biomass based power plant by Shalivahana Green Energy Ltd	6	Shalivahana Green Energy Ltd.	Biomass combustion for power generation	-	Yes
23	Biomass based power plant by Sri Kalyani Agro Products & Industries Ltd.	4	Sri Kalyani Agro Products & Industries Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
24	Biomass based power plant by Indur Green Power Ltd	6	Indur Green Power Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
25	Biomass based power plant by Shree Papers Ltd	4	Shree Papers Ltd.	Biomass combustion for power generation	-	Yes
26	Biomass based power plant by Perpetual Energy Systems Ltd	6	Perpetual Energy Systems Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
27	Biomass based power plant by Saro Power & Infrastructures Ltd	6	Saro Power & Infrastructures Ltd.	Biomass combustion for power generation	-	Yes
28	Biomass based power plant by Balaji Agro Oils Ltd	4.5	Balaji Agro Oils Ltd.	Biomass combustion for power	Listed as a CDM project	No

Sl. No.	Project	Capacity (MW)	Project Proponent	Project Type	CDM Status	Similar Project?
				generation		
29	Biomass based power plant by Agri Gold Projects Ltd	6	Agri Gold Projects Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
30	Biomass based power plant by Sri Rayalaseema Hi-Strength Hypo Ltd	6	Sri Rayalaseema Hi-Strength Hypo Ltd.	Biomass combustion for power generation	-	Yes
31	Biomass based power plant by Bollineni Casting & Steels Ltd	6	Bollineni Casting & Steels Ltd.	Biomass combustion for power generation	-	Yes
32	Biomass based power plant by Jyoti Bio-Energy Ltd	6	Jyoti Bio-Energy Ltd.	Biomass combustion for power generation	-	Yes
33	Biomass based power plant by Om Shakthi Renergies Ltd	6	Om Shakthi Renergies Ltd.	Biomass combustion for power generation	-	Yes
34	Biomass based power plant by Sri Balaji Biomass Power Ltd	6	Sri Balaji Biomass Power Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
35	Biomass based power plant by Satyamaharshi Power Corpn Ltd	6	Satyamaharshi Power Corpn Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
36	Biomass based power plant by Velagapudi Powergen Ltd.	4	Velagapudi Powergen Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
37	Biomass based power plant by Surya Teja Power Projects Ltd	6	Surya Teja Power Projects Ltd.	Biomass combustion for power generation	Listed as a CDM project	No
38	Municipal solid waste based power plant by SELCO International Ltd	6.6	SELCO International Ltd.	Municipal solid waste combustion for power generation	Listed as a CDM project	No
39	Municipal solid waste based power plant by Sri Ram Energy Systems Ltd	6	Sri Ram Energy Systems Ltd.	Municipal solid waste combustion for power	Listed as a CDM project	No

Sl. No.	Project	Capacity (MW)	Project Proponent	Project Type	CDM Status	Similar Project?
				generation		
40	Municipal solid waste based power plant by Shalivahana Projects Ltd	6	Shalivahana Projects Ltd.	Municipal solid waste combustion for power generation	-	Yes
41	Poultry Litter Based Power Project Shravana Power Projects Private Limited	7.5	Shravana Power Projects Private Limited	Poultry litter combustion for power generation	Listed as a CDM project	No

Furthermore, the projects that are listed in the UNFCCC/ CDM website[22] under any stage of the CDM cycle shall not be deemed similar and shall not be considered for further analyses, as indicated in the above table.

Thus, the number of projects identified similar to the project activity in the region and hence the value of number of similar projects (including the project activity under consideration) – N_{all} is 21.

In addition, the number of projects that apply technologies different that the project (i.e., not applying combustion of poultry litter as fuel and instead combustion of other fuels in the boiler) – N_{diff} is 20.

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[22] www.unfccc.int/cdm