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

CONTENTS

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

>>
Prathyusha Biomass Project
Version 1
17/09/2007

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

>>
The proposed CDM project activity is undertaken by Prathyusha PowerGen Pvt Ltd (PPPL) and is a biomass based power plant located in Thuvarasi village, near Tirunelveli in South of Tamil Nadu State, India. The plant will utilise agricultural wastes like rice husk and woody biomass available in the area of the plant, mainly Julia Flora. The purpose of the project activity is to generate electricity by combustion of the agricultural wastes. The electricity generated will be exported to the local grid authority, the Tamil Nadu Electricity Board (TNEB).

In India, the existing installed grid electricity generation capacity is predominately coal-based and therefore, electricity generation is a major source of carbon dioxide emissions[1]. To answer the high demand of electricity in India, capacity addition of power nowadays includes mainly large coal based power plants. The generation of power from biomass fuels will contribute to reducing greenhouse gas (GHG) emissions in the current energy mix. The project involves the installation of a high pressure boiler of 45 tonnes per hour steam capacity (67 kg/cm^2, 485°C) and a 10,000 kW capacity bleed cum condensing type steam turbine generator. The project activity will involve the collection of Julia Flora and rice husk within a 50 km radius of the plant.

The project will contribute to sustainable development through the increase of renewable energy sources in India and through the installation of an industrial facility in a rural area. This will create revenues in a remote area and provide new job opportunities for local labour. The project activity will create employment through the operation of the plant and through the collection of biomass fuels combusted in the plant. The demand for labour to operate the plant is estimated at 55 skilled and semi-skilled labour and the collection of biomass is estimated to create indirect employment of about 200 persons.

In addition to reducing the GHG emissions of the energy sector in India, the project activity will limit emissions of SOX and NOX, since these emissions are higher in coal based power plants. Moreover, the installation of an electrostatic precipitator (ESP) will reduce particulate matters (PM) emissions in the atmosphere.

A.3. Project participants:

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Name of Party Involved	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as a project participant

[1] Source: Central Electricity Authority (CEA), www.cea.nic.in

India (host)	Prathyusha PowerGen Pvt Ltd	No
France	AREVA Bioenergies SAS	No

The official contact for the project activity will be Prathyusha PowerGen Pvt Ltd as listed in Annex I.

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

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

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A.4.1.1. Host Party(ies):

>>
India

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

>>
Tamil Nadu state, Tirunelveli District

A.4.1.3. City/Town/Community etc:

>>
Thuvarasi village

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

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Project is located at southern end of Tamil Nadu, 18 km away from the main city of Tirunelveli and is surrounded by agricultural lands. The latitude and longitude of the plant are given hereafter.

Latitude	8°46'56.27" N
Longitude	77°36'08.96" E

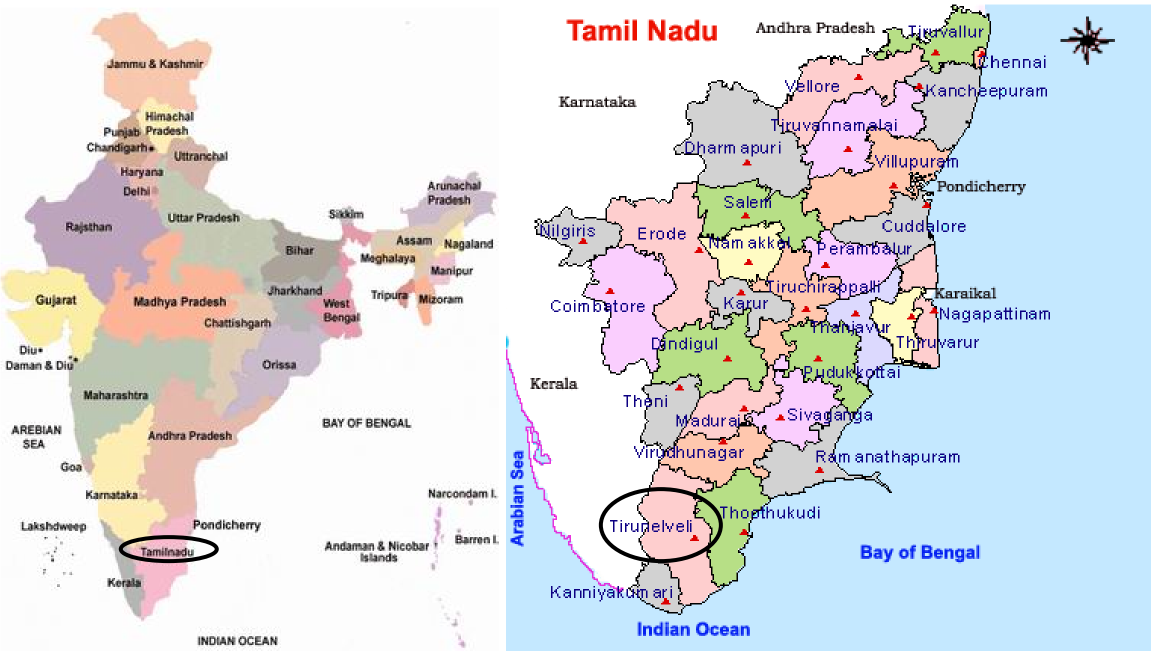

Figure 1 : Map of India and map of Tamil Nadu state

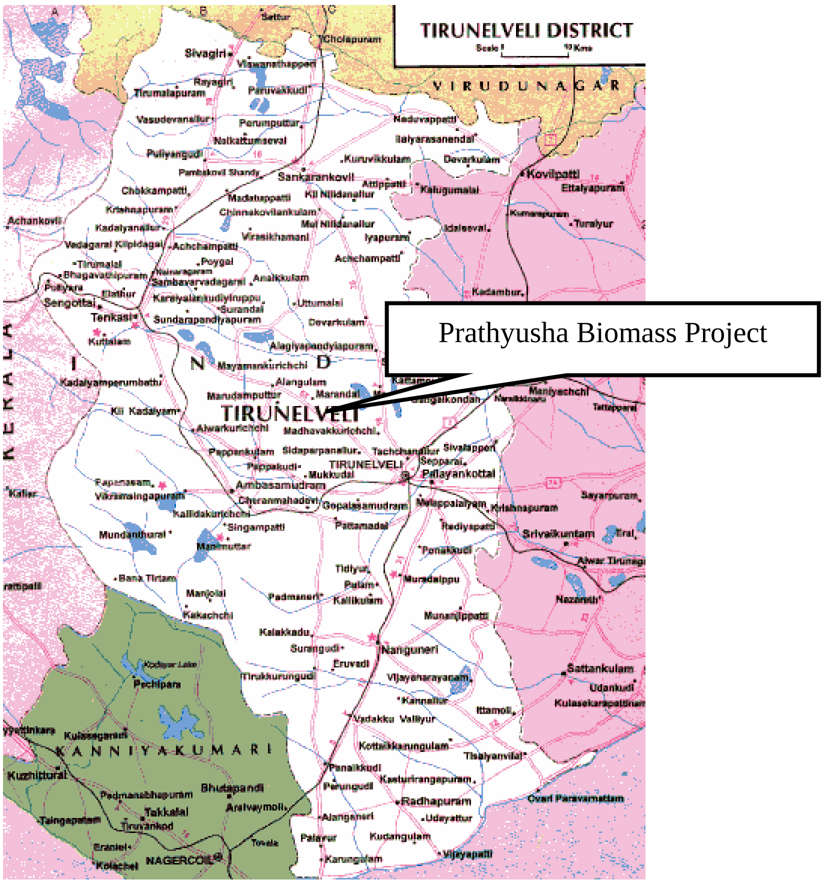

Figure 2 : Map of Tirunelveli District

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

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Category 1. Energy industries (renewable / non-renewable sources)
Type I – Renewable Energy Projects
ID – Grid connected renewable electricity generation

The project falls within the small scale generation of biomass electricity since the gross capacity of the plant is 10 MWe, therefore below the threshold of 15 MWe outlined in section ID of Appendix B of the simplified modalities and procedures for small scale CDM project activities. The biomass power plant will be connected to the grid and the electricity to be produced by the plant will replace existing and planned generation from the grid.

The technology to be employed is domestically available in India and the main equipments viz. boiler and turbine are supplied by well-known Indian manufacturers. The Indian subsidiary unit of AREVA Bioenergies SAS is the EPC contractor of the plant (EPC - Engineering, Procurement and Construction) and applies good engineering practises for project design and strict guidelines for execution. All equipments are designed as per the industry guidelines, meet the environmental and safety guidelines and comply with the criteria laid down by the national Pollution Control Board. The project will generate electricity using a 45 TPH (tonnes per hour) travelling grate boiler and a 10,000 kW capacity bleed cum condensing type steam turbo-generator. The technical parameters of boiler and turbo-generator are given below:

Travelling grate boiler		Turbo-generator	
MCR (Maximum Continuous Rating)	45 TPH	Steam parameters at turbine inlet	64 kg/cm^2(A), 480°C
Steam outlet parameters	67 kg/cm^2(A), 485°C	Condenser pressure	0.11 kg/cm^2
Feed-water temperature at economiser inlet	130°C	Generator rating	12.5MVA, 50Hz, 11 kV

Table 1 : Technical parameters of boiler and turbine

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

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A 7 year renewable crediting period has been chosen.

Years	Estimation of annual emission reductions in tonnes of CO2e
Year 1	48,970
Year 2	48,970
Year 3	48,970
Year 4	48,970
Year 5	48,970
Year 6	48,970
Year 7	48,970
Total estimated emission reductions (tonnes of CO2e)	342,788
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tCO2e)	48,970

Table 2 : Estimation of annual emission reductions in tonnes of CO2e

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

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No public funding will be invested in the project activity.

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

There is currently no registered CDM project at the site, either large scale or small scale, and there is no plan to set up any other power plant on the same site. The project is therefore not a debundled component of a large scale project activity.

SECTION B. Application of a baseline and monitoring methodology

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

>>
Type I – Renewable Energy Projects
ID – Grid connected renewable electricity generation
Version 12

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

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The power plant has a capacity of 10 MWe (gross power) and will produce power from agricultural wastes, mainly Julia Flora and rice husk. The plant is designed to burn up to 30% coal in case of scarcity of biomass fuel as per permitted rules for biomass power plants in India. However, coal will be used only in case of biomass shortage in the off-season and the main fuel will remain biomass. All equipments including the travelling grate steam generator and the steam turbine are designed for a 10 MWe capacity and any increase in the power production would result in investment in new equipments on the same site which is not the objective of the project owner. The Power Purchase Agreement (PPA) with TNEB indicates a 10 MWe capacity. Therefore, any additional new capacity installation at the site would result in a distinct project activity. Further to qualify under the small scale category, the sum of all forms of energy outputs shall not exceed 45 MWth, i.e. the boiler rating shall not exceed 45 MWth. The boiler rating is 45 MWth as demonstrated in the table below:

Boiler capacity	tonnes/hr	45
Energy of steam	kcal/kg	807.26
Energy of feed water	kcal/kg	131.76
Boiler rating	MWth	35.3

Table 3 : Calculation of thermal capacity of the plant

Thus, the project activity qualifies under small-scale project activities Type ID and will remain under the 15 MWe limit throughout the crediting period.

B.3. Description of the project boundary:

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The project boundary encompasses the biomass power plant, the regional grid and the transport of all fuels to be used by the plant.

We do not consider the disposal of ash in the boundary since a greater quantity of ash would arise in the baseline where a majority of the electricity is produced from coal. Coal has a much higher ash content percentage (around 40%) than Julia Flora (3%) and rice husk (18%). Ash from PPPL plant will be used in the nearby lands as a natural fertilizer and in the local manufacture of ash bricks.

The relevant grid is defined by the power plants connected physically to the electricity system that the CDM project power plant is connected to. The Indian power system is divided into five independent regional grids, namely Northern, Southern, Eastern, Western and North-Eastern. The state of Tamil Nadu where the plant is to be set up belongs to the Southern grid, along with Andhra Pradesh, Karnataka, Kerala and Puducherry. Therefore, the Southern grid is considered as the relevant grid for the project activity.

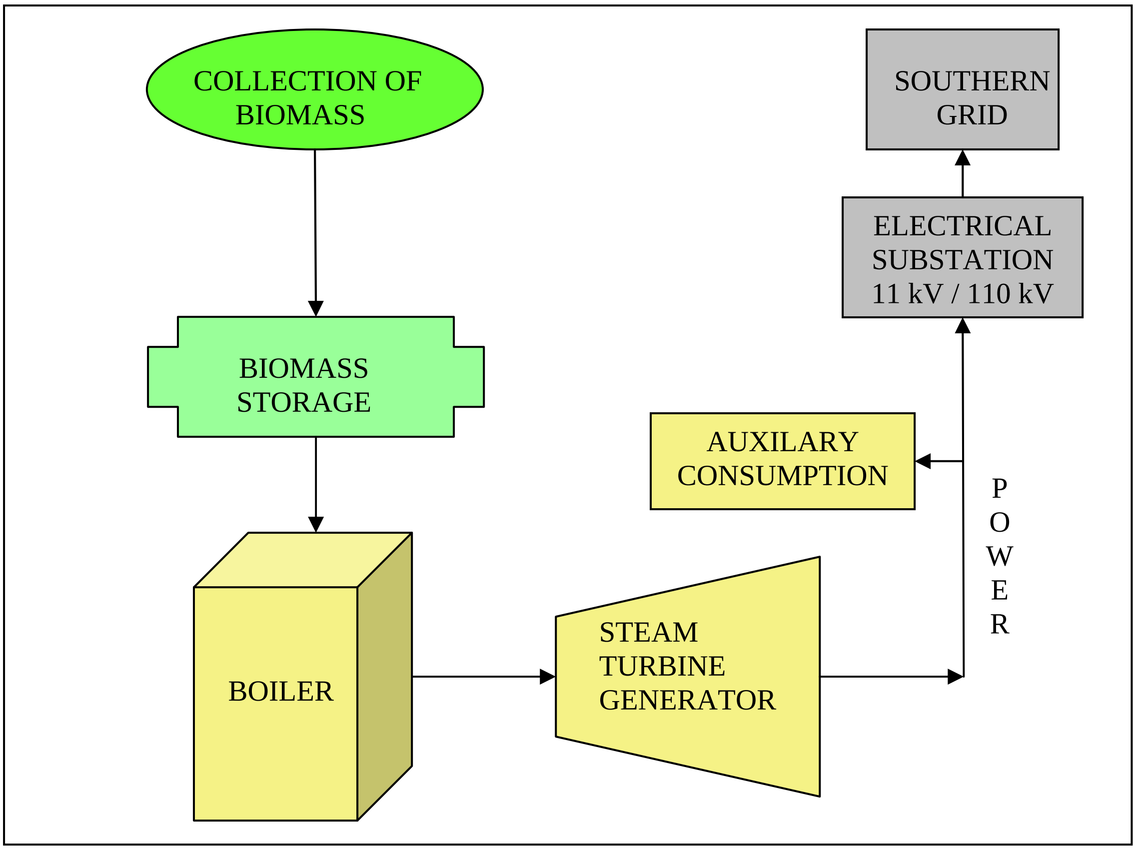

Figure 3 : Illustration of project boundaries

Leakage is considered accordingly to the “General guidance on leakage in biomass project activities” (Attachment C to Appendix B) and is addressed in section B.6.1. Generating equipment is not transferred from another activity so there is no leakage to be considered in terms of the transfer of equipment.

B.4. **Description of baseline and its development:**

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Referring to the simplified baseline and monitoring methodologies type ID, the baseline is the kWh produced by the renewable generating unit multiplied by the grid emission coefficient in $kgCO_2e/kWh$.

The electricity to be supplied to the grid by the power plant out of biomass fuels is expected to replace electricity produced from existing and planned electricity generation from the Southern grid, the majority of which is fossil fuel based. The baseline is calculated using a Combined Margin (CM) accordingly to the approved methodology ACM0002 Version 6. In India, the Central Electricity Authority (CEA) developed an official database of all grid-connected power stations for the purpose of establishing a consistent quantification of the CO_2 emission baseline. The latest version of the database available has been used for the project activity.

Baseline data	Key information	Source
Generation data, absolute and specific emissions of power stations and assumptions	Combined margin (including Imports), year 2005-2006	Central Electricity Authority: CO2 baseline database, version 2.0 dated 21st June 2007

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

Referring to Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM activities, the additionality analysis focuses on the barriers facing the project.

Investment barrier

Biomass fuel price estimated in the *Fuel Assessment Study Report* prepared in 2004 is 850 Rs/tonne. However, market prices of Julia Flora and rice husk have increased to 1,350 Rs/tonnes in 2007. This represents an average fuel price escalation above 10% per year. Such fuel price escalation seriously affects the plans of the project owner, who expected a maximum price of 900 Rs/tonne. In the IRR calculation below we consider a conservative fuel price escalation of 3% for the next 8 years (duration of the financial analysis). As of the preparation of this document, the project owner plans to use up to 10% of coal during the off-season (4 months per year) when biomass prices may escalate due to scarce availability of good quality biomass. This has been taken into consideration in the yearly CERs calculations.

Indian Independent Power Producers (IPP) using biomass as fuel are facing a second uncertainty linked to the power purchase tariff and therefore to the main revenue of the plant. This is written in the PPA of PPPL: “the price for the financial year 2004-2005 works out to 3.15 Rs/kWh and will be subject to retrospective modification as and when tariff orders are revised by TNERC”. Such revision can strongly affect the project financials. In the IRR calculation we assume that the tariff structure will not be modified by TNEB in the next 8 years. The cost of energy purchased by TNEB in the first year of operation is Rs.3.15/kWh and an escalation of 5% is provided under TNEB gazette for biomass plants until 2010. However, the overall cap shall be 90% of the HT tariff; therefore the electricity price is capped at 3.47 Rs/kWh.

Basic details of the project are provided in the table hereafter[2]. The profitability statement and IRR calculation are provided with and without consideration of the CDM. The IRR was calculated after 8 years which is the duration of loan repayment, adding the residual value of the asset in the 8th year.

Investment costs	Rs lakhs
Pre-operative cost	3 300
Civil cost	700
Total	4 000
Operationnal costs	Rs lakhs
O&M cost	100
O&M escalation	5%
Administrative costs	50
Administrative costs escalation	5%
Insurance costs	28
Insurance costs escalation	0%
Minimum Alternate Tax (MAT) with surcharge	12.265%
Depreciation under Companies Act	4.75%
Funding	Rs lakhs
Total project costs	4 000
Debt 1	1 547
Debt 2	1 348
Equity	1 105
Ratio debt:equity	72%
Interest 1	11.0%
Interest 2	11.5%

Electricity price		
Sale Price	3.15	Rs/kwh
Escalation	5%	per yr
Maximum	3.47	Rs/kwh
Carbon price		
CER price	10	€/tCO2
Change rate	55	Rs/€
Fuel price		
Fuel price	1 350	Rs/t
Escalation	3%	per yr
Technical		
Capacity	10	MW
Availability	330	days
Hours	24	hrs
PLF	85%	
Aux. Power consumption	11.5%	
Distribution losses	2.0%	
% of Julia Flora (season)	60%	
% of rice husk (round year)	40%	
% of coal (off-season)	10%	(4 months)
% of Juli Flora (off-season)	50%	(4 months)

Table 4 : Basic details of the Project

Year #	1	2	3	4	5	6	7	8
FY	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
PROFITABILITY STATEMENT								
Generation								
Electricity (MWh)	29789	59578	59578	59578	59578	59578	59578	59578
Emission reductions (tCO2e)	12242	48970	48970	48970	48970	48970	48970	48970
Revenue (Rs 1000)								
Electricity	91959	193114	202769	202769	202769	202769	202769	202769
Emission reductions	6733	26933	26933	26933	26933	26933	26933	26933
Costs (Rs 1000)								
Fuel	52148	107425	110648	113967	117386	120908	124535	128271
O&M	5000	10500	11025	11576	12155	12763	13401	14071
Administration	2500	5250	5513	5788	6078	6381	6700	7036
Insurance	1396	2791	2791	2791	2791	2791	2791	2791
Gross profit (EBITDA)								
EBITDA, no ER	30915	67148	72793	68647	64360	59926	55342	50601

[2] Excel sheet will be made available to the DOE at validation.

EBITDA, ER	37649	94081	99726	95580	91293	86860	82275	77534
Interests	23883	29006	24460	19646	14532	9086	3513	598
Depreciation @ 4.75%	19000	19000	19000	19000	19000	19000	19000	19000
Operating profit (EBT)								
EBT, no ER	-11968	19141	29333	30001	30827	31840	32828	31003
EBT, ER	-5234	46075	56266	56935	57760	58773	59762	57936
MAT, no ER	0	2348	3598	3680	3781	3905	4026	3802
MAT, ER	0	5651	6901	6983	7084	7209	7330	7106
Profit after tax								
Profit after tax, no ER	-11968	16794	25735	26322	27046	27935	28802	27200
Profit after tax, ER	-5234	40424	49365	49951	50676	51565	52432	50830

Table 5 : Profitability statement of the Project

Year #	0	1	2	3	4	5	6	7	8
FY	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
IRR CALCULATION									
Cash-flow, no ER	-400000	30915	67148	72793	68647	64360	59926	55342	50601
Cash-flow, ER	-400000	37649	94081	99726	95580	91293	86860	82275	77534
MAT, no ER		0	2348	3598	3680	3781	3905	4026	3802
MAT, ER		0	5651	6901	6983	7084	7209	7330	7106
Residual value of asset									267000
Net cash-flows, no ER	-400000	30915	64800	69195	64967	60579	56021	51316	313798
Net cash-flows, ER	-400000	37649	88430	92825	88597	84209	79651	74945	337428
IRR, no ER	**11.0%**								
IRR, ER	**16.5%**								

Table 6 : Calculation of Project IRR

The project IRR without emission reductions is 11%, whereas the IRR with revenue from emission reductions is 16.5%. CDM revenue therefore significantly increases the IRR, making the project viable and reduces project execution and operation risks.

As discussed before, the viability of the project depends mainly on the feed-in tariff, the generation of electricity from biomass and the biomass fuel price. The sensitivity of the project IRR to biomass fuel escalation, the PLF and the maximum feed-in tariff has been worked out. Results are displayed in the graphs hereafter. Fuel escalation ranges from 1 to 5%, while PLF varies from 80 to 90% and maximum feed-in tariff ranges from INR 3.31 to 3.65 per kWh which is minus/plus 5% of INR 3.47 per kWh.

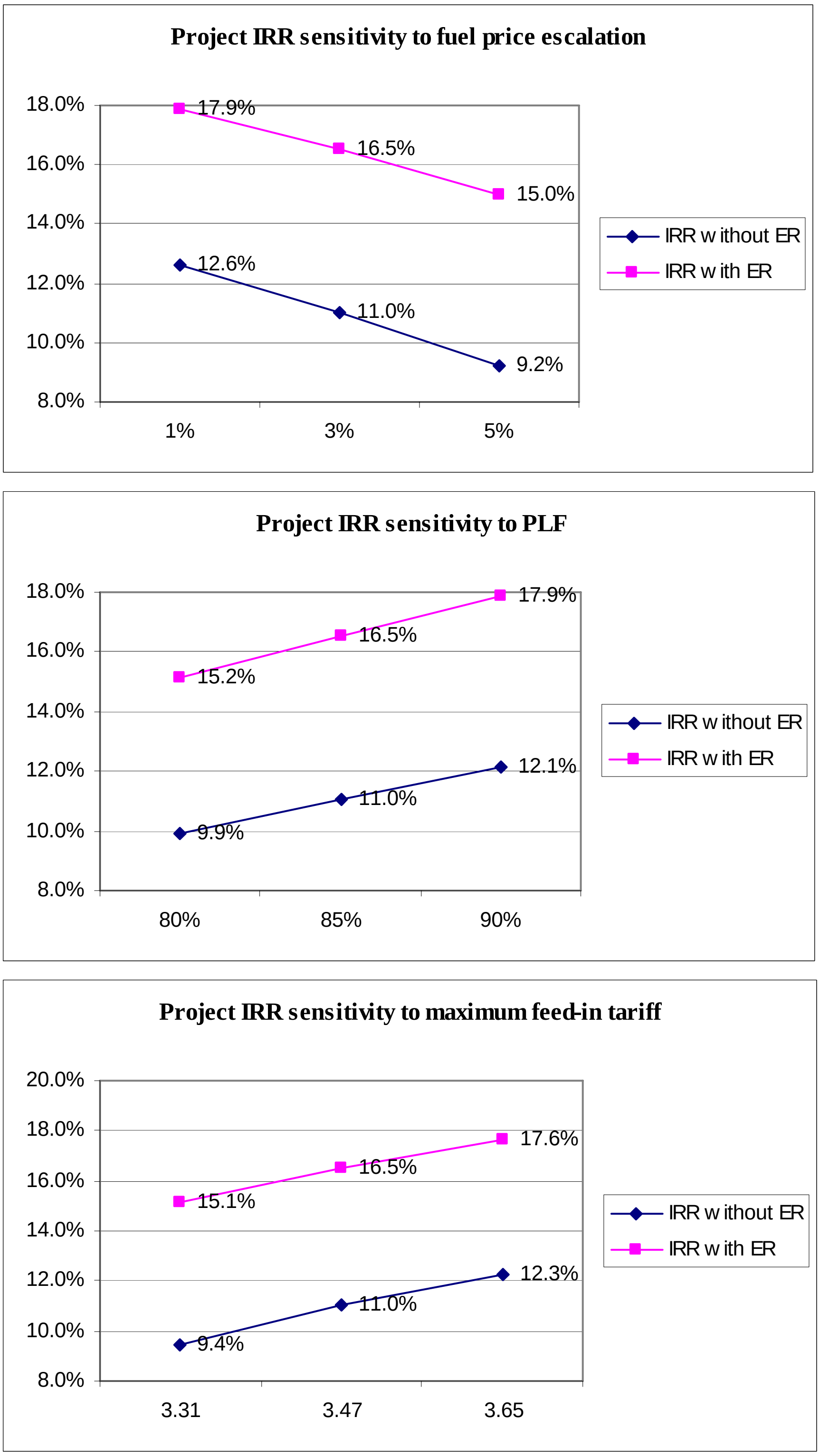

Figure 4 : IRR sensitivity to fuel price escalation, PLF and feed-in tariff

The maximum IRR without CDM in all cases above is 12.6%, which is not a sustainable investment for an electric utility in India and is very close to the current PLR (Prime Lending Rate) in India. PLR of the Reserve Bank of India is around 12.75-13.25%[3] and PLR of major Indian commercial banks for corporate loans is above 15%. With revenues from CDM, IRR ranges from 15 to 17.9%, which clearly mitigates financial barriers faced by the project owner and makes operation more sustainable in the long term, taking into account the uncertainties mentioned above.

As described in section B.6, the project owner is planning to use 10% coal during off-season, i.e. around 4 months per year. However, the project owner will balance biomass supply cost against the CDM revenue losses from the use of coal. Emission reductions revenue will directly limit the use of coal in case of biomass shortage or high biomass market prices.

Lastly, the terrain on which the power plant is built is rocky, which makes it harder to carry out civil work especially the foundation work of the main plant components (boiler, turbine hall, office, condenser). This factor has only been encountered during the start of the civil work and has increased the costs in the civil work borne by the project owner due to blasting of rocky terrain and also resulted in delayed construction of the civil works. As per the original schedule civil work was schedule for completion in April 2006 but could be completed only in March 2007. This resulted in increased costs to the project owner.

Technological barriers

1) Electrical:
The biomass power plant will be connected to the grid at the nearest substation, which is situated about 4.5 km from project site on the western direction of Tirunelveli, near Melakallur. As part of the project activity, the project owner will set up a distribution line to connect to the substation. At present a 110KV connection is available at this substation, whereas a 33 KV or 66kV connection is not available. A 33 KV or 66kV connection, which is usually used for biomass power plants in India, is also a cost effective solution. For this project there is no other option but to use the available 110kV system requiring higher investment. The availability of the substation is therefore a technological barrier entailing higher investment costs to project owner.

2) Water Availability:
Given that the plant is being established in a dry region, there could be further issues on water availability. In spite of the authorisation obtained from the Public Works Department to draw underground water to fulfil the requirements of the water-cooled condenser, the project owner is aware that the authorisation may not be given in the future after some time of operation. In that event, the plant owner will have to invest in an air-cooled condenser. The use of air-cooled condenser will reduce the efficiency of the plant by 1.25% since the condensing pressure is much higher (0.15kg/cm^2) than the condensing pressure obtained with a water-cooled condenser (0.11kg/cm^2). As the current clearance of the Public Works Department authorises the plant to use groundwater, no air-cooled condenser has been taken into consideration in the investment cost. However, the planning of the project layout has already envisaged a space provision for air cooled condenser. Further the turbine generator operating floor level was elevated to +7.00M to accommodate pipe work to air cooled condenser.

Other barriers

[3] Source: Reserve Bank of India, http://www.rbi.org.in/home.aspx

South Tamil Nadu is basically a dry region. According to the *Fuel Assessment Study Report,* the average rain fall is estimated as 750 to 800 mm per year, the largest rain occurring during the North East monsoon in October and November. Such rain fall is suited for dry crop cultivation only. In essence, crops harvest and, as a consequence, price of biomass residues are badly affected by climatic variation year after year. Therefore, the price of Julia Flora and rice husk can be considered as highly volatile. The revenue from CDM could be used in the future by the project owner to acquire dry lands nearby the power plant to grow Julia Flora. This would help the owner to mitigate risks arising from volatile fuel prices. Besides, the current power plant design does not include any High Pressure (HP) heater. On request of the owner, relevant space has been provided in the boiler to add a HP heater in the future, in the event of high fuel prices. The installation of a HP heater reduces the fuel consumption in the boiler, since the heat input to raise the quantity of steam to achieve its rated enthalpy is reduced. As a result, the overall plant heat rate improves which results in a reduction of annual fuel consumption in the project. The fuel that would be saved consequently is 2,800 to 3,300 tonnes annually on a 330 day operation. At the rate of INR 1,350 per tonne of biomass, it results in a saving of INR 4,000,000 annually. However, for this option to be implemented the input capital required will be approximately INR 15,000,000 and after meeting the interest burden over the repayment cycle will amount to INR 20,000,000.

Lastly, the plant will be using several kind of biomass. At present there is no network to collect, store and distribute the fuels to the plant. Creating and managing this system, which is dependent on the cooperation of multiple small farmers and middle-men, carries a significant financial risk. If the project developer had built a fossil fuel based plant this would not have been a problem since the distribution system for fossil fuels already exists and is well maintained.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission reductions (ER_y)

The emission reductions of the proposed project activity are calculated using the following equation:

$ER_y = BE_y – PE_y - L_y$

Where:

ER_y	emission reductions of the project activity during the year y in tons of CO_2e
BE_y	baseline emissions during the year y in tons of CO_2e
PE_y	project emissions during the year y in tons of CO_2e
L_y	leakage due to project activity during the year y in tons of CO_2e

Baseline emissions (BE_y)

The baseline emissions of the proposed project activity are calculated as follows:

$BE_y = P_{biomass,y} . EF_y$

Where:

$P_{biomass,y}$	quantity of electricity generated from biomass fuels exported to the grid during the year y in MWh as per version 12 of the small scale methodology Type I.D

EF_y grid based emission factor in tons of CO_2e per MWh, determined through the combined margin approach as per ACM0002 methodology, version 6

The quantity of electricity $P_{biomass,y}$ is the net electricity exported to the grid produced by the combustion of biomass fuels. $P_{biomass,y}$ is the lower of the two values calculated as below:

$$P_{biomass,y} = MIN\left(\left[\left(\sum_i \frac{Q_{i,biomass}}{SC_{i,biomass}}\right).(1-A)\right];\left[P_{total,y} - \left(\frac{Q_{coal}}{SC_{i,coal}}.(1-A)\right)\right]\right)$$

Where:

$Q_{i,biomass}$ quantity of biomass fuel i consumed during the year y in tonnes
$SC_{i,biomass}$ specific fuel consumption of biomass fuel i in tonnes per gross MWh
$P_{total,y}$ total electricity generated exported to the grid during the year y in MWh
Q_{coal} quantity of coal consumed during the year y in tonnes
$SC_{i,coal}$ specific fuel consumption of coal fuel in tonnes per gross MWh
A 11.5% (auxiliaries consumption)

The combined margin calculation is detailed in Annex 3 and is based on the average of the Operating Margin (OM) and Build Margin (BM). For the purpose of determining the OM, the simple OM method was used, since the proportion of low-cost/must-run power sources and dispatch data are not available in India, and low-cost/must-run power sources constitute less than 50% of the total grid generation. The CO_2 emission factor for net electricity imports is calculated using the average emission rate of the exporting grid.

Project emissions (PE_y)

Project emissions include emissions from electricity consumption from the grid during start up operation, emissions from the DG set used as a source of back up power, and transport emission of biomass fuels from the procurement area to the plant.

$PE_y = PE_{EC,y} + PE_{FC,y} + PET_y$

Where:

$PE_{EC,y}$ project emissions from electricity consumption by the project activity during the year y in tons of CO_2e
$PE_{FC,y}$ project emissions from fossil fuel combustion in the DG set during the year y in tons of CO_2e
PET_y emissions due to the transport of the biomass fuels to the plant during the year y in tons of CO_2e

Electricity is consumed by the power plant from the grid during the start up operation. The project emissions due to consumption of electricity from the grid are calculated using the following formula:

$PE_{EC,y} = EC_{PJ,y} \cdot EF_y$

Where:

$EC_{PJ,y}$	quantity of grid electricity consumed by the project activity during the year y in MWh
EF_y	emission factor for the grid in tCO_2 per MWh, determined through the combined margin approach as per ACM0002 methodology, version 6

The DG set is used by the power plant owner as a source of back up power in the event of total black out of the grid. The DG set will be used to provide power for the operation of the necessary auxiliaries required for the safe shut down of the power plant. Since, the power plant is exporting / importing power at a relatively high voltage level of 110kV, the chances of a complete black out is almost zero. However, in case the project owner has to use the DG set, the emissions due to its operation are calculated as follows:

$PE_{FC,y} = FC_{i,y} \cdot COEF_{i,y}$

Where:

$FC_{i,y}$	quantity of fossil fuel i combusted in the DG set during the year y in mass or volume unit
$COEF_{i,y}$	CO_2 emission coefficient of fuel i in year y in tCO_2 per mass or volume unit
i	diesel

The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the diesel, as follows:

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

Where :

$NCV_{i,y}$	weighted average net calorific value of fuel i in year y in TJ per mass or volume unit
$EF_{CO2,i,y}$	weighted average CO_2 emission factor of fuel i in year y in tCO_2 per TJ

The emissions due to the transport of the biomass fuels to the plant are calculated as follows:

$PET_y = N_y \cdot AVD_y \cdot EF_{km}$

Where:

N_y	number of trucks trips for the transportation of biomass to the plant during the year y
AVD_y	average round trip distance between the biomass fuel supply sites and the power plant site during the year y in km
EF_{km}	average emission factor for the trucks measured during the year y in tCO_2 per km

Leakage (L_y)

The leakage to be considered is the competing uses for the biomass. The project owner has completed a demand-supply report of the specific area of the proposed biomass plant. The fuel assessment study was conducted in 4 taluks in Tirunelveli District (Tirunelveli, Amba Samundram, Nanguneri and

Palayamkottai) and shows the availability of Julia Flora, acacia, rice husk and field residues like cotton stalk within a 50 km radius.

No.	Biomass fuel	Generation (tonnes/year)	Consumption (tonnes/year)	Surplus (tonnes/year)
1	Julia Flora	240 120	63 200	176 920
2	Acacia	23 000	11 000	12 000
3	Field level residues	43 000	3 000	40 000
4	Plantation residues	15 000	8 000	7 000
5	Industrial level residues	77 000	67 000	10 000
	TOTAL	398 120	152 200	245 920

Table 7 : Biomass fuel availability in the Project area

The plant needs about 80,000 tonnes/year of biomass, while the surplus of Julia Flora only is 176,920 tonnes/year. The quantity of available biomass in the region would therefore be 176,920 – 80,000 = 96,920 tonnes/year if the plant were to use only Julia Flora from external suppliers (which is a conservative assumption, since other fuels like rice husk will be used). The quantity of Julia Flora that is utilised including the project activity is 63,200 + 80,000 = 143,200 tonnes/year. As a consequence, the quantity of available biomass in the region is at least 25% larger than the quantity of biomass that is utilised including the project activity. As per Attachment C to Appendix B, this source of leakage can be neglected under the present situation.

This comparison will be undertaken annually before verification of the project to ensure that there is no leakage due to competing uses for biomass. For the calculation of the emission reductions, we assume that this source of leakage can be neglected during the crediting period.

$L_y = 0$

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

(Copy this table for each data and parameter)

Data / Parameter:	**$SC_{i,fuel}$**
Data unit:	Tonnes/MWh
Description:	Specific fuel consumption of the various fuels used
Source of data used:	Boiler data sheet, Supply contract agreement
Value applied:	1.064 (Julia Flora), 1.086 (rice husk), 0.610 (coal)
Justification of the choice of data or description of measurement methods and procedures actually applied :	We have used the power plant specific data to calculate the specific fuel consumptions (turbine heat rate, boiler efficiency per type of fuel, GCV of fuel).
Any comment:	Specific fuel consumptions are calculated per gross MWh.

Data / Parameter:	**EF_y**
Data unit:	tCO_2/MWh
Description:	Combined Margin 2005-2006 of the Southern grid, including Imports
Source of data used:	Central Electricity Authority (CEA) : CO2 Baseline Database, version 2.0 dated

	21st June 2007
Value applied:	0.86
Justification of the choice of data or description of measurement methods and procedures actually applied :	The database provided by CEA is an official publication of the Government of India and satisfies the guidance in the methodology ACM0002 Version 6.
Any comment:	Calculated as weighted average of Simple Operating Margin and Built Margin

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	TJ/kt (Tera Joules per kilo tonnes)
Description:	Weighted average net calorific value of fuel type *i* (diesel) in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2
Value applied	43.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value provided by the fuel supplier in invoices may not be available; therefore IPCC default value at the upper limit of the uncertainty at a 95% confidence interval is used.
Any comment:	Any future revision of the IPCC Guidelines shall be taken into account.

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO2/TJ
Description:	Weighted average CO_2 emission factor of fuel type *i* (diesel) in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.4
Value applied	74.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value provided by the fuel supplier in invoices may not be available; therefore IPCC default value at the upper limit of the uncertainty at a 95% confidence interval is used.
Any comment:	Any future revision of the IPCC Guidelines shall be taken into account.

Data / Parameter:	**$EF_{km,CO2}$**
Data unit:	tCO_2/km
Description:	Emissions factor for transport of biomass
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Section 1.4.1.3 (NCV of diesel); Chapter 3, Section 3.2.1.2 (road transport default CO_2e emission factor of diesel and fuel consumption for diesel vehicles) ; CEA CO2 Baseline Database (density of diesel)
Value applied:	0.0005417
Justification of the choice of data or	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval are used.

description of measurement methods and procedures actually applied :	Detail of the data used: - NCV of diesel = 43.3 TJ/Gg - Road transport default CO_2e emission factor of diesel = 74.8 tCO_2/TJ - Fuel consumption for diesel vehicles = 5 km/l - Density of diesel = 0.83 kg/l
Any comment:	Any future revision of the IPCC Guidelines shall be taken into account.

B.6.3 Ex-ante calculation of emission reductions:

>>

From section B.6.1, $L_y = 0$. Therefore, the emission reductions are given as:

$ER_y = BE_y – PE_y$

With

$BE_y = P_{biomass,y} . EF_y$

And

$$P_{biomass,y} = MIN\left(\left[\left(\sum_i \frac{Q_{i,biomass}}{SC_{i,biomass}}\right).(1-A)\right];\left[P_{total,y} - \left(\frac{Q_{coal}}{SC_{i,coal}}.(1-A)\right)\right]\right)$$

The quantity of electricity exported to the grid is based on the installed capacity, operating days, plant load factor (PLF) and auxiliary consumption. The plant will operate for 330 days per year at an average 85% PLF with an auxiliary consumption of 11.5% (A). The total quantity of electricity exported to the grid is then $P_{total,y}$ = 59,578 MWh annually. At the preparation of this document, it is estimated that an average of 10% coal will be used during the off-season, i.e. during 4 months per year. The quantity of coal consumed per year Q_{coal} is indeed estimated at 1,381 t/year. Using the formula above, the quantity of electricity generated from biomass fuels exported to the grid is then $P_{biomass,y}$ = 57,576 MWh annually. The details of EF_y are provided in Annex 3 and give a value of 0.86 tCO_2/MWh.
Therefore, BE_y = 57,576 * 0.86 = 49,516 tCO_2e/y

Project emissions are calculated as follows:

$PE_y = PE_{EC,y} + PE_{FC,y} + PET_y$

With

$PE_{EC,y} = EC_{PJ,y} . EF_y$

The project emissions from grid electricity consumption are calculated using an estimation of the electricity consumed by the plant auxiliaries during start up operations in a year. In average, there are 4 start-up operations per month, each of it lasting about 3 hours. The auxiliary power is 11.5% of 10 MW, i.e. 1150 kW. Therefore, the electricity consumed from the grid $EC_{PJ,y}$ is 152 MWh/year. The grid carbon factor EF_y is 0.86 tCO_2/MWh as detailed above.
Therefore, $PE_{EC,y}$ = 152 * 0.86 = 131 tCO_2e/y

At mentioned in B.6.1, there is very little chances of a complete black out at the voltage level of 110kV. Therefore, the quantity of diesel used in the DG set in the year is estimated to be zero in this document. In case the project owner uses the DG set in year y, equations detailed in B.6.1 will be used.
$PE_{FC,y} = 0$

The project emissions due to transport of the Julia Flora and the rice husk to the project plant are estimated as:

$PET_y = N_y \,.\, AVD_y \,.\, EF_{km}$

Julia Flora and rice husk will be procured from a radius of 50km from the plant. With a 40% rice husk and 60% Julia Flora combusted in the boiler, the plant fuel requirement is 45,966 t/y of Julia Flora and 31,290 t/y of rice husk. With each truck carrying an average load of 10 tonnes, the number of trips from the procurement area will be 7726. The average return distance will be 100 km. A CO_2 emission factor of 0.0005376 tCO_2/km calculated according to IPCC guidelines is applied to calculate the emissions from trucks.

$PET_y = 7726 * 100 * 0.0005376 = 415\ tCO_2e/y$

Thus,
$PE_y = PE_{EC,y} + PE_{FC,y} + PET_y = 131 + 0 + 415 = 546\ tCO_2e/y$

Therefore, the emission reductions are estimated as:
$ER_y = BE_y – PE_y = 48{,}970\ tCO_2e/y$

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

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
Year 1	546	49,516	0	48,970
Year 2	546	49,516	0	48,970
Year 3	546	49,516	0	48,970
Year 4	546	49,516	0	48,970
Year 5	546	49,516	0	48,970
Year 6	546	49,516	0	48,970
Year 7	546	49,516	0	48,970
Total tonnes of CO_2e	3,821	346,609	0	342,788

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

B.7.1 Data and parameters monitored:	
(Copy this table for each data and parameter)	
Data / Parameter:	**$P_{total,y}$**
Data unit:	MWh per year
Description:	MWh exported to the grid (net electricity)
Source of data to be used:	Plant records maintained by the Plant Manager and sales to TNEB.
Value of data	59,578 MWh/yr
Description of measurement methods and procedures to be applied:	Data from the turbine generator will be continuously recorded by the Shift Electrical in-charge. This will be collated at the end of each day and reported to the Site in-charge. This will form the basis for calculations and will be tallied against the data record by the TNEB which will be taken monthly by the factory and officials from TNEB. In case there is a difference between the factory records and the TNEB record, the TNEB record will prevail.
QA/QC procedures to be applied:	The invoices generated for the sale of power to the grid and the TNEB record will form a QA/QC check.
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**$Q_{i,biomass}$**
Data unit:	Tonnes per year
Description:	Consumption of various biomass fuels used
Source of data used:	Plant records
Value of data	40,859 (Julia Flora), 31,290 (rice husk) with 10% coal during off-season 45,966 (Julia Flora), 31,290 (rice husk) without coal
Description of measurement methods and procedures to be applied:	The quantity of biomass will be measured by means of a weighbridge at the plant. 100% of the data will be monitored.
QA/QC procedures to be applied:	Transporters receipts and/or computer generated payment invoices will form a QA/QC check.
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**Q_{coal}**
Data unit:	Tonnes per year
Description:	Consumption of coal
Source of data used:	Plant records
Value of data	1,381
Description of measurement methods and procedures to be applied:	The quantity of coal purchased will be measured by means of a weighbridge at the plant. 100% of the data will be monitored.
QA/QC procedures to be applied:	Transporters receipts and/or computer generated payment invoices will form a QA/QC check.
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	MWh per year
Description:	Onsite consumption of electricity provided by the grid and attributable to the project activity during the year y
Source of data used:	Onsite measurements
Value of data	152
Description of measurement methods and procedures to be applied:	Electricity meters will be used. Meter employed in the switchyard are two way meters, which can measure both electricity export as well as import. The data will be monitored continuously, aggregated at least annually.
QA/QC procedures:	The electricity measured by the meters shall be cross checked with the bills from the Tamil Nadu Electricity Board (TNEB).
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**$FC_{i,y}$**
Data unit:	Mass or volume unit per year
Description:	Quantity of fuel type i (diesel) combusted in the DG set during the year *y*
Source of data to be used:	Onsite consumption of diesel
Value of data	0
Description of measurement methods and procedures to be applied:	The data will be monitored continuously through diesel bills, aggregated at least annually.
QA/QC procedures to be applied:	The purchased diesel invoices can be specifically identified for the CDM project. The diesel consumption quantities can be cross-checked with financial records.
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**N_y**
Data unit:	Integer
Description:	Number of trips undertaken to transport biomass to the project site
Source of data to be used:	Transporter receipts
Value of data	7,726
Description of measurement methods and procedures to be applied:	Each truck that enters the site will be recorded at the weighbridge from which the number of trucks per type of fuel will be established. 100% of the data will be monitored.
QA/QC procedures to be applied:	Transporters receipts and/or computer generated payment invoices will form a QA/QC check.
Any comment:	Data will be kept for the crediting period and two years thereafter.

Data / Parameter:	**AVD_y**
Data unit:	Km
Description:	Average return distance of trips undertaken to transport biomass to the project site
Source of data to be	Transporter receipts

used:	
Value of data	100 (= 50 . 2)
Description of measurement methods and procedures to be applied:	The average return distance will be recorded for each truck on entry to the site. 100% of the data will be monitored.
QA/QC procedures to be applied:	This data may be cross checked with payments for transportation of the material.
Any comment:	Data will be kept for the crediting period and two years thereafter.

B.7.2 Description of the monitoring plan:

>>

Electricity generation

As per the small scale methodology Type I.D, monitoring shall consist of metering the electricity generated by the renewable technology. The generation data from the turbine will be continuously recorded in the control room by electricity meters and a manual hourly record will be made by the Shift Electrical in-charge. This data will be collated at the end of each day by the Electrical in-charge and reported in the daily operating report to the Site in-charge. This data will form the basis of the ongoing calculation which will then be tallied against the monthly recordings taken by the TNEB and a representative of the factory.

The power imported from the grid during the start up of the power shall be recorded by electricity meter in the control room. The electricity meters are two way, which can monitor the flow of power to the grid as well as flow of power from the grid to the power plant. The power imported shall not be adjusted with the power exported to the grid. Both the power import and export will be monitored hourly in the control room by the Shift Electrical in-charge. This data will be collated at the end of each day by the Electrical in-charge and reported to the Site in-charge. It will be tallied against the bills received from TNEB for electricity imports.

The Site Head will be responsible for collating all electrical data monthly out of the daily data (electricity exported and electricity imported). He will transmit these data monthly to the Plant Manager.

The electricity meter will be calibrated annually by an outside independent third party. The Instrumentation Engineer will be in charge of the calibrations and of maintaining the records of the calibrations on site.

Fuel consumption

The consumption of each type of fuel will be monitored at the weighbridge installed at the site. The amount of each type of fuel brought in by the plant will be monitored separately by the weighbridge Operator. Besides, the measurement of transport emissions is undertaken through monitoring of the number of trucks delivering biomass and the average return distance to the site from which biomass is collected. These data will be collected continuously by the weighbridge Operator and will be collated at the end of each day per biomass type by the Plant Manager. The weighbridge records will be tallied against transporters receipts or against the computer generated payment invoices.

The consumption of diesel used in the DG set, if any, will be recorded through the bills of diesel delivered to the site. The consumption of diesel shall be collated monthly by the Plant Manager. This may be cross-checked against financial statement.

The Plant Manager will collate monthly the consumption of all types of fuels, the number of trucks, the average truck load and the average return distance out of the daily data.

The weighbridge will be calibrated annually by an outside independent third party. The Instrumentation Engineer will be in charge of the calibrations and of maintaining the records of the calibrations on site.

Evaluation of biomass surplus

As per Attachment C to Appendix B, the project participants will evaluate annually if there is a surplus of the biomass in the region of the project activity and undertake annually the comparison work out in B.6.1 to ensure that there is no leakage due to competing uses for biomass. The yearly evaluation of biomass surplus in the region will be the responsibility of PPPL.

General

The specific fuel consumption of each type of biomass fuel and the quantity of biomass fuels received by the plant will be used to calculate the electricity produced from biomass fuels. This amount will be compared with the amount of electricity generated calculated using specific fuel consumption of coal and the quantity of coal, if any. The lower of the two values will be used to calculate emission reductions.

The organization will train the staff to ensure that the monitoring process is appropriate and effective. The CDM data will be collated monthly in an excel file maintained by the Plant Manager (a specific template will be provided by AREVA Bioenergies). A detailed monitoring and verification report will be produced by the plant on a yearly basis.

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

>>
Completed on 17/09/2007 by AREVA Bioenergies SAS for M/s Prathyusha Power Pvt Ltd.

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:

>>
Beginning of civil work: 01/01/2006

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

>>
21 years

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

C.2.1. Renewable crediting period

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

>>
01/10/2007 or upon registration of the project activity with UNFCCC, 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:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

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

>>
The host Party requires the project to be in line with the environmental standards of the State where the project activity occurs, i.e. Tamil Nadu[4]. The project received air and water "Consents to establish" from the Tamil Nadu Pollution Control Board (TNPCB), dated 07/11/2005. The dust concentration in the flue gases leaving the chimney via the Electrostatic Precipitator (ESP) will be 115mg/Nm^3, the norm being 140mg/Nm3. Make-up water for boiler will be demineralised through a Reverse Osmosis (RO) plant. The water effluents coming from boiler blow-down, cooling tower blow-down, RO plant reject, softener and other auxiliaries will have a TDS (Total Dissolved Solids) concentration of less than 1900 mg/l, the norm being 2100 mg/l. Therefore, the equipments to be installed will meet the environmental standard and the power plant recently received from TNPCB the "Consent to operate". During the operation of the plant, TNPCB will perform on-going monitoring to ensure compliance of the power plant with environmental standards. Monitoring of air and water quality will be undertaken by the plant operator on a regular basis as per TNPCB guidelines after the plant is commissioned and details of this monitoring will be provided at each verification.

Positive environmental impacts arise with the project activity, among others:
- Reduction of GHG emissions compared to the baseline scenario involving fossil fuel power plants;

[4] The effluent standards for water and air as prescribed by Tamil Nadu Pollution Control Board (TNPCB) are available on the website http://www.tnpcb.gov.in/general0.html

- Lesser quantity of ash in case of Julia Flora and rice husk in comparison to Indian coal which contains about 40% ash;
- Lower emissions of SOX and NOX compared to coal combustion, the biomass feedstock have a lower sulphur content in comparison to coal and produce less NOX;
- Development of a neem trees "green belt" around the plant.

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

>>

The environmental impacts of the project activity are not considered significant by the project participant or the host Party.

SECTION E. Stakeholders' comments

>>

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

>>

The stakeholder review is conducted on three levels:

A local stakeholder review

A national stakeholder review which will be undertaken through the approval by the Ministry of Environment and Forests (the Indian DNA) and consent to operate from the Tamil Nadu Pollution Control Board.

The local stakeholders review was conducted through notices posted in the local newspapers and through a general stakeholders meeting at project site. Newspaper notices were posted on 22/08/2007 and the general stakeholders meeting was held on 03/09/2007 at Power Plant site.

The *"Gram panchayat"* (a locally elected representative) has been approached and informed of the project; a no objection certificate was issued on 11/10/2006.

The institutions are already in place for the national stakeholder review and any comments arising from these processes are incorporated prior to registration. The project is submitted to the Indian DNA in early August 2007 and is awaiting their approval.

Other stakeholders that have been notified of the project, through consents and approvals required for the investment, are the Tamil Nadu Electricity Board, the Pollution Control Board and the State Boiler and State Electrical Inspectorate. These parties have approved the project and provided the necessary approvals required to date. The Tamil Nadu Renewable Energy Development Authority (TEDA) has been informed of the project by the Tamil Nadu Electricity Board.

E.2. Summary of the comments received:

>>

No comments were received by the project owner following to the notice publication in the newspapers.

During the stakeholder meeting at site, participants expressed positive feedback on the project, especially employment opportunities created directly or indirectly through the operation of the plant. Besides, the farmers pointed out that after the power plant commissioning they have secondary means of livelihood. The villagers expressed concern regarding the conservation of ground water resources.

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

>>

The project owner will make sure to be in close interaction with the Public Works Department (PWD), which is responsible for granting the permission to the owner for drawing ground water for the project. The permission issued by the PWD ensures a proper control of water table in the region by the local authorities.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Prathyusha PowerGen Pvt Ltd
Street/P.O.Box:	# 25-40-12, Gangulavari Street
Building:	Prathyusha House
City:	Vishakhapatnam
State/Region:	Andhra Pradesh
Postfix/ZIP:	530 001
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URL:	
Represented by:	Mr.Raja Rao
Title:	Chairman
Salutation:	
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Represented by:	Gilles David
Title:	Director
Salutation:	
Last Name:	David
Middle Name:	
First Name:	Gilles
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	gilles.david@areva-td.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the project activity.

Annex 3

BASELINE INFORMATION

Accordingly to the methodology to calculate baseline emissions, the emission coefficient of the grid can either be calculated either through a combined margin (CM) approach according to the procedures described in methodology ACM0002 or through the weighted average emissions of the current generation mix. The data of the year in which the project generation occurs are not available in India, so the CM approach is used.

The combined margin consists of the calculation of the average of the Operating Margin (OM) and the Build Margin (BM). We use OM and BM calculated by the CEA and available on the website www.cea.nic.in. In calculating the OM, CEA selects the simple OM option, since required data for "Dispatch data analysis" and "Simple adjusted operating margin" are not available in India.

The first step in selecting the Simple OM is to show that the proportion of low-cost/must run resources are less than 50% of total generation in average of the 5 most recent years. Low cost/must-run resources typically include hydro, wind, low cost biomass, nuclear and solar generation. Low-cost/must run resources identified are restricted to hydro and nuclear (the CEA does not provide any generation data from biomass and wind resources in the Southern Region). The following table from the CEA database clearly demonstrates the low percentage that low-cost/must run sources constitute of total generation and therefore confirms the choice of Simple OM.

Share of must-run sources (Hydro/Nuclear), % of Net generation

	2001-02	2002-03	2003-04	2004-05	2005-06
South	25.5%	18.3%	16.2%	21.6%	27.0%

Source: CEA database, version 2

Net imports from connected grid systems must also be considered. As outlined in ACM0002, net imports from connected systems are only accounted for in the Operating Margin calculation. Approach c) of the methodology is used:
"c) the average emission rate of the exporting grid, if and only if net imports do not exceed 20% of total generation in the project electricity system"

According to the table hereafter, net imports from other regional grids account for less than 20% of total generation and therefore the combined margin of the exporting grid may be selected.

Share of Net Imports (% of Net Generation)

	2001-02	2002-03	2003-04	2004-05	2005-06
South	1.1%	0.4%	0.0%	0.0%	0.0%

Source: CEA database, version 2

The Simple OM, $EF_{OM,y}$, is calculated ex-ante using the full generation average for the most recent 3 years for which data are available at the submission of the PDD. The CEA database gives the following values for the Southern grid, including imports:

$EF_{OM,y}$ = 1.00 tCO_2/MWh

In considering the BM, $EF_{BM, y}$, ACM0002 requires to calculate the carbon emissions factor based on an examination of recent capacity additions to the Southern region grid. The build margin is calculated in the CEA database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The total net generation of the grid under consideration is 138,329 GWh, 20% of which is 27,666 GWh. The CEA database gives the following value for Southern grid:
$EF_{BM, y}$ = 0.71 tCO2/MWh

The weights applied to the operating and build margin are fixed at 0.5, therefore in order to calculate the combined margin we apply these to the Simple OM and BM as calculated above. The following table shows this calculation arriving at the combined margin EF_y of 0.86 tCO_2/MWh.

Calculation of the combined margin

	tCO_2/MWh
Simple OM, $EF_{OM, y}$	1.00
Build margin $EF_{BM, y}$	0.71
Combined margin, EF_y	**0.86**

Annex 4

MONITORING INFORMATION

In addition to the measures for monitoring listed in section B.7.2 the following systems will be put in place to monitor the project activity.

As outlined the environmental monitoring will be undertaken by qualified independent third party agencies and records of these reports will be kept on site along with the necessary consents from the Tamil Nadu Pollution Control Board.

Complete training for the operation of the boiler and turbine and their auxiliaries will be provided at the time of commissioning by the Indian subsidiary unit of AREVA Bioenergies. A complete set of documentation will be provided to support this training and the on-going operation and maintenance of the equipment. Additional training on CDM data monitoring will be provided to the operators and it is expected that they will gain additional recognised technical qualifications through this training.

The monitoring of the project activity will be the responsibility of PPPL. The monitored data will be reported to AREVA by the Plant Manager on a monthly basis for the calculation and estimation of emission reductions. This data will be checked against initial estimates. If the project is not performing as expected, on the basis of the monthly data, a report will be sent to PPPL outlining where the project is deviating in its generation of emission reductions.

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