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

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>.

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

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

>>4.5 MW Biomass (Agricultural Residue) Based Power Generation Unit of M/s Matrix Power Pvt. Ltd. (MPPL). The following PDD is Version 3 dated May 18, 2006.

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

>> Purpose:

The purpose of the company is to develop and run a 4.5 MW (gross) power plant at Karempudi Village, Guntur district of Andhra Pradesh that would be based on the abundant agricultural residue available in the local villages. The agricultural residues are red gram stalks, chilli stalks and cotton stalks. The power generated is being sold to Transmission Corporation of Andhra Pradesh (APTRANSCO), which is part of the Indian Southern Region grid. Since this project activity utilises a renewable energy source, it positively contributes towards the reduction in GHG emissions. The project also helps reduce the ever increasing gap of supply and demand of electricity. The plant will also reduce transmission and distribution losses.

Sustainable development:
The Government of India requires that attention should be paid to three elements: social, economic and environmental well being.

Economic well being:
The reason for selecting this fuel for the plant is because agro-residues are a waste material that gets burnt in the fields after the harvest and there is an abundance of this fuel in the area. The project is surrounded by approximately 100,000 acres of red gram, chilli and cotton crops within a radius of 30 km, and each acre produces one tonne of this fuel. The project helps farmers who usually spend around 400 Rs/acre for clearing the agricultural residue; through this project they avoid this expense. The plant will also provide additional revenue for the farmers who use their tractors to transport the fuel. In other words, the plant is generating commercial value to crop residues enabling the farmers to get better price out of their produce and thus augmenting their income. The above benefits due to the project activity ensure that the project contributes to the social and economic well being in the region.

Social well being:
The other reason for trying to implement this concept is that the project helps landless labourers in the area by giving them employment. This fuel is available between the months of February to May during which season agricultural labourers do not have enough employment. The project thus reduces stress migration by providing employment in the summer months. The labourers load the tractors which collect the fuel and deliver it to the plant.

Environmental well being:
Since the project uses only biomass materials for power generation, which otherwise would have been a fossil fuel such as coal, lignite and gas, the project does not lead to GHG emissions. Combustion of biomass materials in the project result in GHG emission of CO_2, CH_4 and NOx. The major constituent of GHG emissions is CO_2 which about 98%, whereas CH_4 and NOx constitute the remaining 2%. This can well be evidenced from the typical ultimate analysis of biomass materials, which indicates the Nitrogen content is within 1 to 2%, therefore CH_4 emission is negligible. Hence, the CO_2 is considered as the only GHG emissions from the biomass combustion. Since the biomass is formed by fixing the atmospheric CO_2 by the action of photosynthesis in the presence of sunlight, the CO_2 released due to combustion of biomass is assumed to be equal to the CO_2 fixed by the photosynthesis. Again the CO_2 released during the combustion will be consumed by the plant species for their growth. In view of the above, biomass combustion and release can be treated as cyclic process resulting in no net increase of CO_2 in the atmosphere, Hence, the project does not lead to GHG emissions.

The main conclusion in the planning phase is that MPPL must use agricultural residue for the power plant for the above socio-economic reasons, and that it will not be viable without CER income.

Comparisons of economics of variable fuel sources shows that the price trends of agricultural residues and other available biomass fuels are very different; while agricultural residues are high cost they maintain a steady price through the project life time and the fuel cost of the plant thus remains predictable. On the other hand the comparative study of fuels like rice husk and Juliflora showed that while these fuels were less expensive at project inception they were expected to become and they have indeed become more expensive. The abundance of these fuels is much less than that of agricultural residue. Moreover fuels like rice husk and Juliflora have other users and therefore competition unlike agricultural residue. Biomass fuels are more expensive than coal and combined with higher costs of plant lead to the conclusion that environmental well-being will only be achieved if in addition to revenue from power sale there is CER income.

Technological well-being:
Research and Development work was conducted at Thermax's facilities in Pune. It was then concluded that in order to fire 100% agricultural residue in a boiler only a travelling grate boiler could be used and the steam temperature could not exceed 485 C. In the case of a fluidised bed boiler a minimum a 25 % coal had to be added with the 75% agricultural residue in order to prevent any agglomeration of the bed. This technology development indicated that the project is more risky than conventional coal. Yet it led to technological well-being of the country as improved technologies for non-conventional sources of energy become available.

In view of the above the project activity profoundly contributes to sustainable development and also meets the approval guidelines for CDM projects stipulated by the Government of India.

A.3. Project participants:

>>Table 1

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)	Mr. Abhiram Kasu Reddy Matrix Power Pvt Ltd.	No

	8-2-269/3/1, 257, Road No.2 Banjara Hills, Hyderabad - 500 033 Andhra Pradesh. Tel: 91-40-23546776; Fax : 91-40-23546776	

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

>> The project activity is a 4.5 MW (gross) capacity grid connected biomass (agricultural residue) based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project exports around 28.5 million units (kWh) to the APTRANSCO grid, which is part of the Southern Region grid, by considering auxiliary power consumption of 13%. The plant is operating at an annual average plant load factor of 83%. Though as per MNES guidelines and APCB consent to operate received for the project, use of coal as a fuel is allowed maximum up to 30% on an annual basis. Some amount of coal was used during the last two years to mitigate the effects of alkali corrosion which arises from using agricultural residue. However, after further development alkali corrosion was controlled without use of coal.

The power plant has one condensing steam turbo generator unit with a matching boiler of travelling grate type capable of firing multi fuels. The boiler was specifically designed to burn 100% agricultural residue (cotton stalks, chilli stalks and red gram stalks). All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 19.25 tonnes per hour of steam. The steam turbine is a straight condensing type machine with two bleed off, one to deaerator and one to Low Pressure (LP) heater for feed water heating. The steam conditions at the boiler heat outlet are at a pressure of 65 kg/cm2 and temperature of 480 ± 50°C. The higher steam parameters result in higher annual savings of fuel per annum when compared to lesser steam parameters such as 44 kg /cm2 and temperature of 440°C.

Technical details:

Type of steam generator:	Travelling grate
Fuel:	Cotton Stalk, Red Gram Stalk, Rice Husk, Juliflora, Chilli stalks.
Fuel firing rate:	5-6 TPH
Main steam flow rate:	19.25 TPH
Main steam pressure:	65 ata
Main steam temperature:	485°C
Power generation capability:	4.5 MW
Condenser vacuum:	0.1 bar
Cooling water temperature:	32°C
Dust collection equipment:	Electrostatic Precipitator
Outlet dust concentration:	115 mg/Nm3 @ 15%O2

There is a steam generation unit consisting of a stoker fired travelling grate type boiler manufactured by Thermax Ltd. The steam generator is a straight condensing type manufactured by Triveni Engineering Private Ltd. (Peter Brotherhood Design). The gross rating of the plant is 4.5 MW. The plant is situated on 25 acres of land, with raw water consumption of 600 cubic metres per day. The chimney height is 43 metres and the power evacuation is through a 33 KV line.

Additional environmental and technical information:

1. The emission of Nox is negligible as the temperature in the furnace is less than 1000 ^{0} C.
2. The sulphur content in biomass is 0.13% maximum.

3. The detrimental effect of SO_2 and Nox is partially mitigated by a greenbelt around the boundary of the plant. The plantation also helps to replenish oxygen.
4. The particulate emissions from the plant are controlled by the use of high efficiency (99%) Electrostatic Precipitators (ESP).
5. There is some contribution to thermal pollution of the atmosphere through the discharge of hot flue gases. The effect at ground level is minimal as the heat is dissipated to the higher levels of the atmosphere through the chimney.
6. Solid wastes include ash generated by the plant. This is drenched with water to avoid dust hazard, and is transported in closed containers to brick manufacturing units. The ash percentage is only 3% so there is hardly any ash produced.
7. Liquid wastes from the power plant will result mainly from the boiler blow down and demineralised plant. These liquid wastes are used for the greenbelt inside the plant.
8. Noise pollution is relatively low, and wherever the noise level exceeds the acceptable limits such as around the turbine etc, acoustic shields are provided.

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

>> Matrix Power Pvt Ltd.
Karempudi (PO)
Guntur District – 522 614
Telefax No : 08649 – 272592
Telephone No: 08649 – 272401

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:

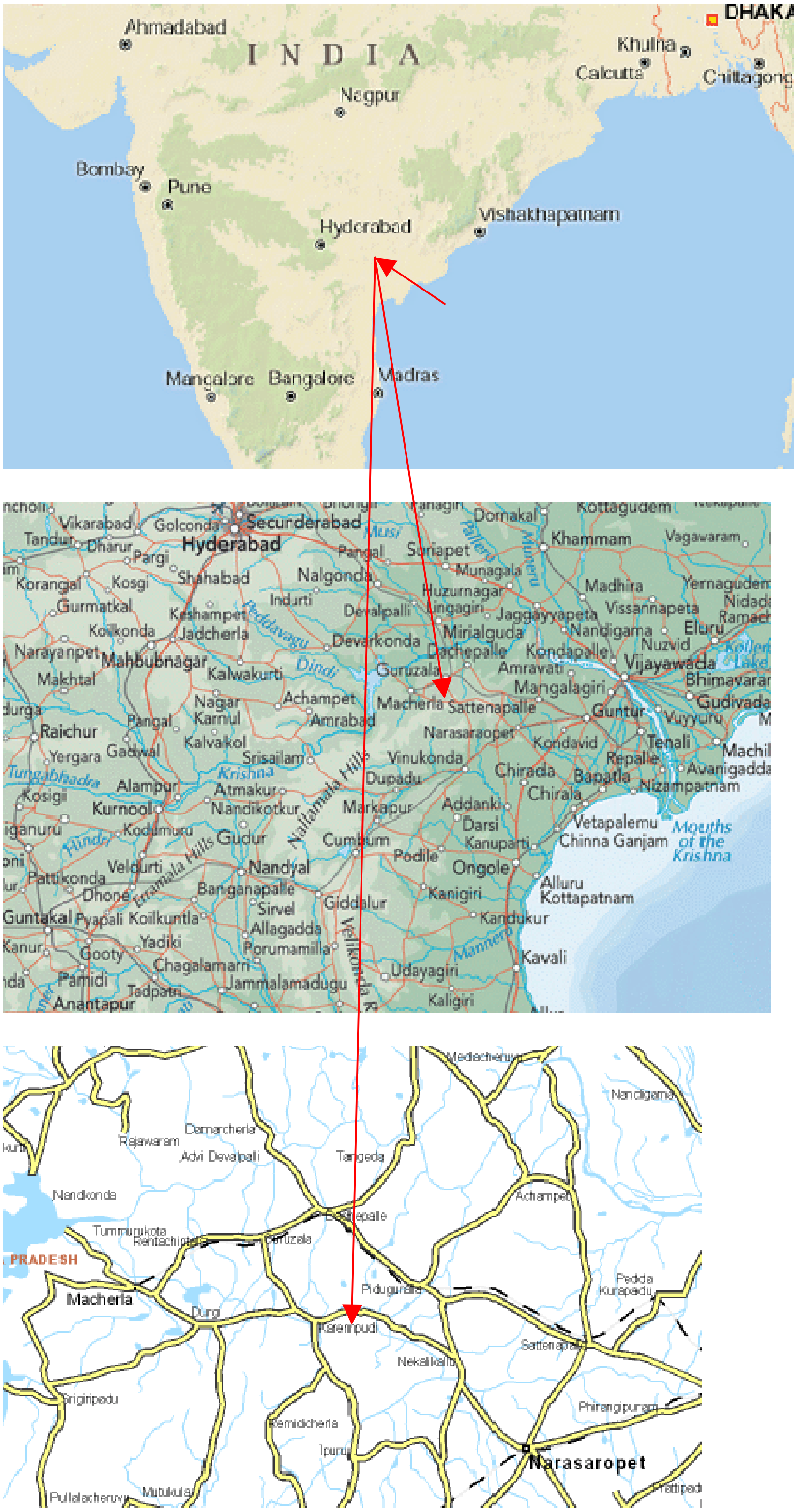
>> Karempudi village, Guntur District

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

>> The plant is located at Karempudi village, Guntur district, Andhra Pradesh. The site is well connected by roads. The site is generally plain and soil is of black cotton type. Nagarjuna Sagar main canal water is being used to meet the plant water requirement. Power generated from the plant is being evacuated to Transmission Corporation of Andhra Pradesh (APTRANSCO), which is part of the Southern Region grid, through their 33 kV Karempudi sub station which is 1.5 km from the plant.

The bearings of the project location are:
Latitude: 16 deg – 29 N
Longitude: 80 deg – 30 E

Maps showing exact location of plant at Karempudi:


DHAKA
Ahmadabad
I N D I A
Khulna
Calcutta
Chittagong
Nagpur
Bombay
Pune
Hyderabad
Vishakhapatnam
Mangalore
Bangalore
Madras
Vikarabad
Golconda
Secunderabad
Hyderabad
Dornakal
Kottagudem
Khammam
Vagavaram
Tandur
Dharur
Pargi
Pangal
Suriapet
Munagala
Shahabad
Nalgonda
Madhira
Korangal
Kosgi
Gurmatkal
Indurti
Huzurnagar
Devalpalli
Lingagiri
Jaggayyapeta
Vissannapeta
Keshampet
Jadcherla
Kodkonda
Devarkonda
Mirialguda
Nandigama
Eluru
Narayanpet
Mahbubnagar
Dachepalle
Kondapalle
Nuzvid
Vijayawada
Makhtal
Kalwakurti
Guruzala
Amravati
Mangalagiri
Bhimavaram
Achampet
Macherla
Sattenapalle
Gudivada
Nagar Karnul
Amrabad
Guntur
Vuyyuru
Raichur
Pangal
Narasaraopet
Kalvakol
Kondavid
Tenali
Yergara
Gadwal
Srisailam
Vinukonda
Repalle
Avanigadda
Tungabhadra
Krishna
Chirala
Bapatla
Alampur
Atmakur
Dupadu
Nizampatnam
Kosigi
Kurnool
Nandikotkur
Markapur
Addanki
Chirala
Vetapalemu
Mouths of the Krishna
Kodumuru
Gudur
Darsi
Chinna Ganjam
Nallamala Hills
Cumbum
Kanuparti
Hindri
Veldurti
Nandyal
Podile
Ongole
Pattikonda
Dhone
Erramala Hills
Banganapalle
Kanigiri
Alluru Kottapatnam
Sirvel
Giddalur
Guntakal
Pyapali
Koilkuntla
Kandukur
Allagadda
Kanur
Gooty
Yadiki
Porumamilla
Manneru
Kavali
Chagalamarri
Udayagiri
Pamidi
Tadpatri
Jammalamadugu
Kaligiri
Anantapur
Medacheruvu
Nandigama
Damarcherla
Rajawaram
Advi Devalpalli
Tangeda
Nandikonda
Achampet
Dachepalle
Tummurukota
Rentachintala
Guruzala
PRADESH
Pedda Kurapadu
Macherla
Piduguralla
Durgi
Karempudi
Sattenapalle
Nekarikallu
Rigiripadu
Phirangipuram
Remidicherla
Ipuru
Narasaropet
Pullalacheruvu
Mutukula
Yattipadu

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

>> Type and Category of the project activity:

The relevant project type and category is: Type I. RENEWABLE ENERGY PROJECTS, Category I.D. - Renewable electricity generation for a grid (according to: Appendix B of the simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories)[1]

Justification how the proposed activity conforms with the project type from Appendix B:

I.D. Renewable electricity generation for a grid

1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit. 2. If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component.

MPPL is a biomass renewable energy generation unit, and is below the 15 MW eligibility limit for a small-scale CDM project activity. MPPL is a biomass based power plant of less than 15 MW generating capacity supplying power directly to the electricity distributions system. As can be seen from the details furnished in section B 5.1. MPPL supplies electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit.

The state-of - the -art technology being used in this project is already available in India - no environmentally safe and sound technology and know-how is thus being transferred to the host party.

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

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

Conventional energy equivalent of around 32’519’600 kWh per annum for a first crediting period of 7 years in the Southern Region Grid would be replaced by generating power in the 4.5 MW non-conventional renewable sources biomass based power plant thereby resulting in CO_2 emission reduction of 24730 tonnes. In the absence of the proposed activity, the same energy generation would have been taken-up by thermal power plants and emission of CO_2 would have occurred due to combustion of conventional fuels like coal / gas.

[1] Note: In this SCCPDD all reference to the Simplified Small-scale Methodology I.C. refer to the version 05, 25 February 2005.

According to the draft 16th electrical power survey conducted by the Central Electricity Authority (CEA), the projected growth in the total energy consumption is expected to be 7.5% per annum for the period 1997-98 to 2004-05. The energy requirement – 392 billion kWh in 1997-98 is assessed to be 632 billion kWh in 2004-05. However, due to various barriers (as mention in section B3) the share of renewable energy generation in the Southern Region grid in 2005 is only 19%, compared to 25% in 2000, and is thus on declining trend. The power plant is not only justified due to the shortage of power availability and energy but also due to eco-friendly power generation. Details of the underlying assumptions and calculation of the baseline and the emission reductions are provided in section B and E of this SSCPDD.

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

>>Table 2

Operating year	Certified Emission Reductions (tonnes of CO_2)
2001-2002	10077
2002-2003	24185
2003-2004	22579
2004-2005	20317
2005-2006	24730
2006-2007	24730
2007-2008	24730
TOTAL estimated reductions (tonnes of CO_2 e)	151348
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	21621

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

>> No public funding involved

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

>> The small-scale project activity is not a debundled component of a large project activity since there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category or technology; and
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

SECTION B. Application of a baseline methodology:

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

>> Small-scale CDM Project, Type I – RENEWABLE ENERGY PROJECTS, I.D. Renewable electricity generation for a grid (according to: Annex B of simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories)

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

>>

A) This methodology is applicable as per definition in the Annex B of the simplified methodologies for selected small-scale CDM project activity categories, Type I.D Renewable energy generation for a grid:

> 1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and biomass, that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit.

B) Qualification under small-scale CDM according to:

> Para 2.: …. The eligibility limit of 15MW for a small-scale CDM project activity applies….

C) The baseline is applied in accordance with Paragraph 7 of the definitions:

> 7. ……….. the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as:
> (b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix.

The current generation mix of the Southern Region grid has been chosen for calculating the weighted average emissions. Details of this baseline are given in section B.3 and B.5.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

>> Reduction of GHG Emission by Sources

The anthropogenic GHG emissions by sources are reduced below what would have occurred in the absence of the proposed CDM project because if it were not for this project the users of electricity who are drawing power in Guntur and surrounding area from this plant, would otherwise be drawing this power from the generation mix in the Southern Region grid. In the Southern Region grid, Hydro and accounts for only 24% in 2000 of total generation and is in a declining trend, and biomass accounts for less than 1% of generation. Thus by substituting the power from the current generation mix with biomass power, the emissions associated with fossil fuels are avoided to the extent of the generation of power by MPPL multiplied by the emission factor of the current generation mix in the Southern Region grid. Direct on-site emissions that arise from the burning of biomass in the boiler include CO_2. However, the CO_2 released equals the amount of CO_2 taken up by the biomass during growing, therefore no net emission occur.

Barriers and Additionality

As per the Marrakesh Accords FCCC/CP/2001/13/Add.2, Section G. Validation and Registration, para 37. (d),

> the designated operational entity selected by project participants to validate a project activity, shall review the project design document and any supporting documentation to confirm that….: (d) The project activity is expected to result in a reduction in anthropogenic emissions by sources of greenhouse gases that are additional to any that would occur in the absence of the proposed project activity, in accordance with paragraphs 43 to 52.

The relevant section 43 states:

> A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity

and section 44. states:

> the baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A within the project boundary. A baseline shall be deemed to reasonably represent the anthropogenic emissions by sources that would occur in the absence of the proposed project activity if it is derived using a baseline methodology referred to in paragraphs 37 and 38 above (methodologies).

And section 48. states:

> in choosing a baseline methodology for a project activity, project participants shall select from among the following approaches the one deemed most appropriate for the project activity, taking into account any guidance by the executive board, and justify the appropriateness of their choice:
> (a) Existing actual or historical emissions, as applicable; or
> (b) Emissions from a technology that represents an economically attractive course of
> action, taking into account barriers to investment; or
> (c) The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

The baseline approach chosen is a) actual or historical emissions.

The chosen approach is actual emissions for the baseline year 2000. The reason for this choice is that the power being generated by the project activity is displacing grid power, and actual emissions arise from the generation sources in the grid. The system which is producing these actual emissions is to be chosen from one of the three lists of generating stations supplying the following three electricity systems:
- Andhra Pradesh State grid with generating stations located within the geographic boundary of Andhra Pradesh, plus share of electricity from central generating stations supplying power into the Andhra Pradesh state grid.

- National grid comprising all the generating stations in India. Power is generated at state level by State Electricity Board owned generating stations and private generating stations, plus by central power generating stations owned by national public sector utilities.
- Southern Region grid with generating stations in four Southern states interconnected to some degree through a regional grid, with electricity supplied across state boundaries as the need arises, including in the Southern Region grid electricity supplied by national public sector owned central generating stations.

The options have the following characteristics and advantages and/or disadvantages:

- The Andhra Pradesh grid is supplied 60.88% by APGEN generating stations, 7.51% by private stations, and 31.60% by its share of Central generating stations located inside its political boundary. In some ways this may be a suitable system to choose as the baseline, except for the fact that the central generating stations though located within Andhra Pradesh also supply power to neighboring states through the Southern region grid. Therefore the Andhra Pradesh grid cannot be said to constitute an independent system.

- The national grid in 2000 suffers from various problems identified by the Power Grid Corporation of India.[2] A perspective transmission plan has been evolved and put into implementation by POWERGRID for establishment of an integrated National Power Grid, in a phased manner, for strengthening the regional grids (five grids structured on geographical contiguity basis) and to support the generation capacity addition program of about 1,00,000 MW during X & XI Plans. Inter-regional power transfer capacity of 5000 MW in 2000 will rise to 9500 MW by the end of FY 04-05 is expected to be enhanced to 30,000 MW by year 2012. For creation of such a National Grid, total investment requirement in the central transmission sector during X & XI plan periods has been envisaged to be about Rs. 71,000 Crore (about USD 16 billion). Out of this, POWERGRID plans to invest about Rs. 50,000 Crore (70%), while the balance of Rs. 21,000 Crore (30%) is envisaged to be mobilized through Private Participation. Initially, considering wide variations in electrical parameters in the regional grids, primarily HVDC interconnections were established between the regions. This phase will be completed in the year 2002, thereby achieving inter-regional power transfer capacity of 5000 MW. Inter-regional power transfer capacity is planned to be enhanced to 30,000 MW by 2012 depending upon planned growth of generation capacity.

Thus even after adoption of the Electricity Act 2003, India cannot be said to have a national grid, even if by 2004 9500 MW out of total installed capacity of 112 684 MW is transferred between the regions. In 2000 interregional transfers was only 3000 MW. Therefore it would not be sensible to choose the national grid as the baseline "system".

- The Southern Regional grid: For the year 2000, 75.90% of the generation capacity is owned and operated by the states through electricity boards or electricity departments. The large central generating stations supply 20.07% to more than one state through the interstate transmission grid of the Southern Region grid. Bulk-power exchanges are still limited to supply from central generating units and surplus power exchanges from one state to another. Generation capacity is not centrally dispatched. Individual state power markets are too small for true competition among large IPPs since they cannot absorb large new generation additions rapidly. Private generators supply 4.03% of power in the Southern Region grid.

---

[2] www.powergridindia.com/

The argument against adopting the Andhra Pradesh grid as the "system" which provides the electricity to the grid in the absence of the project activity, is that Andhra Pradesh is getting 31.60% of its power from central generating stations which are also supplying other states, thus showing that the Andhra Pradesh grid is heavily interlinked with a grid extending beyond its political boundary.

The argument in favour of the Southern Region grid is that of the central generating stations in the Southern Region which are supplying in the four states covered by the Southern Region grid in none are not supplying outside of the Southern Region. In 2000 the Southern region is receiving only 3000 MW of power from outside the Southern Regional grid. This is only 11% of the total installed capacity of 27444.5 MW. Thus the Southern Region grid can be considered as having a relatively low interlinkage with the other four Regional grids, viz. through the Bhadrawati link up to the West and the Gazuwaka link to the East.

Thus the baseline for MPPL is chosen as the Southern Region Grid of India. This systems has a relatively clearly defined boundary and the list of generating stations in the Region can be easily established, along with the generation from each.

The generation mix in the Southern Region grid is predominantly coal, with some gas and some hydro. Biomass only makes up less than 1% of generation capacity in the Southern grid in 2000.

MPPL is facing barriers which business as usual thermal power plants in the Southern Region Grid do not face. These are cost of generation compared to coal fired plants and inadequate tariffs. Thus the baseline scenario, due to which there are emissions in the absence of the project activity, is the electricity generation in the Southern Region grid for 2000 as this is reasonable, transparent and conservative.[3]

As per Appendix B 25 Feb 2005 for Small Scale Projects, the baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity, and a barrier approach can be used to prove that the project activity does not represent the baseline scenario. The barriers are listed in Attachment A to Appendix B.

a)	Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions.

The feasibility studies conducted by Matrix showed that there were financial risks associated with the project. These were known way before the signing of the loan agreement which took place in August 2000. Matrix would not have taken the decision to go ahead / sign the loan agreement without sufficient assurance that there would be additional income in the form of carbon credits. In the following paragraphs the financial risks are dealt in more detail.

It is only after signing of the agreement through Women for Sustainable Development that Matrix decide to sign the loan agreement. A likely alternative to the biomass plant would have been the implementation of a mini hydel plant or a gas (isolated well) based plant of similar capacity. There were a number of

[3] See MNES baseline study

mini hydel plants and gas plants built from 1998 onwards in Andhra Pradesh whose return on equity is above 20%. There are a number of mini hydel plants located at around 30 km from the Matrix power plant. Only due to expectation of additional carbon revenue did Matrix decide to go ahead with the biomass based power plant, as the expectation was that carbon revenue would bring up the return on equity to at least the level of the competing options. Another likely alternative is the continued expansion of the coal based grid. This would of course not have been an option for the present project promoter, but in the absence of this project the Southern Regional Grid mix would continue. This kind of power is cheaper to produce, and therefore the regulatory agencies are supporting the local APTRANSCO in their bid to reduce tariffs paid to biomass power plants.

The explanation of the financial barriers is:

a) During the initial stages (before signing the loan agreement) of the project, the costs and the means of collection and transportation of cotton stalks to the project site were not known. Cotton and chilli stalks have very low bulk density (45 kg/m3). These were considerable risks, which could lead to increase in the cost of the fuel and the hamper the ability to procure as much fuel as possible in the available period (3-4 months of the year). A number of ways were tried. One of the ways was to bale the cotton stalks. A test was conducted in June 1999 on a New Holland Ford mobile baler. A letter from New Holland is attached in this regard. Though the baler could do the bailing, the cost of bailing was high and the time required to bale was also high. Moreover it was concluded for effective bailing huge acreage was required, unlike the two to ten acre plots available. All these tests led to the conclusion that carbon revenue was needed to offset the costs associated with this fuel.

b) In the project planning financials, the following high cost of agro-residues became apparent:

Use of Agricultural Residue	Fuel Cost	ROE
9%	1.62	14.00%
32%	1.91	8.50%

As can be seen, as the percentage of agricultural residue is increased, the return on equity is reduced and the fuel cost is increased.

b) It was also apparent that the cost of paddy husk and Juliflora would probably go up rapidly but the cost of cotton stalk (20% mud, 15% leaves and 40% moisture) would remain constant. Paddy husk has only 10 % moisture and has no mud or leaves. Juliflora has 30 % moisture and has no mud or leaves. These are thus sought after feed stocks. Matrix decided that it was necessary to take the risk to go with cotton stalk as prices could be controlled. But the technical risk was much more. The prediction regarding these price trends also turned out to be true.

	Paddy Husk Rs/ton	Juliflora Rs/ton	Cotton Rs/ton
Year 1	850.00	650.00	400.00
Year 2	1050.00	700.00	410.00
Year 3	1200.00	800.00	400.00

The above costs are inclusive of transportation and purchase cost. The effective price of cotton stalks after the mud, leaves and moisture is higher than that of Juliflora and paddy husk. However, the price of cotton stalks is more stable than that of paddy husk and Juliflora. But cotton stalk involves more risk, more labour, more management input, and generally much more effort.

Before project inception tariff uncertainties made it difficult for the project promoter to conclude with certainty that the plant will break-even. As detailed above, agro-residues are an expensive form of fuel, and need additional effort to make them useful for use in the plant. This difficulty is not taken into account during tariff setting. The unit cost of service is higher for the project case than for other alternatives. The details are as follows:

Table 3

Particulars	2001-02	2002-03	2003-04	2004-05
Export – Units	11971700	28140500	28593300	26455400
Revenue	37830572	93426460	94929756	81828795
Fuel cost	16789456	45614450	54630282	52540702
Salaries	2366143	5681245	4624003	5169145
Interest	9211323	13836027	13283823	11780381
Loan	0	0	0	16428571
Admin+insurance+R&M	5311363	12995560	15041497	15189223
Rev – Exp	4152287	15299178	7350151	-2850656
Gross	4152287	15299178	7350151	-2850656
Return on equity	0	15.79%	10.42%	0.00%

The unit cost of service including loan repayment is 3.82 Rs/kWh.

This compares with cost of conventional power as per the table[4] below:

Table 4

COST AT 80 % PLF	Distance in km								
	200	300	500	800	1000	1200	1500	1800	2000
Domestic Coal PH	1.56	1.59	1.62	1.69	1.73	1.77	1.83	1.88	1.92
Domestic Coal LC	1.58	1.63	1.73	1.88	1.97	2.06	2.20	2.31	2.36
Imported Coal At Port	2.15	2.18	2.22	2.29	2.32	2.36	2.42	2.48	2.52
Imported Coal LC	2.11	2.15	2.22	2.32	2.39	2.46	2.56	2.65	2.69
Lignite At PH	2.11	2.14	2.18	2.25	2.28	2.32	2.38	2.44	2.48

[4] Report of the expert committee for fuels on power generation, Executive Summary, Government of India, Central Electricity Authority, Planning Wing, New Delhi, February 2004.

LNG At Port	2.16	2.19	2.23	2.29	2.33	2.36	2.42	2.47	2.51
Naphtha At Port	4.33	4.36	4.39	4.46	4.49	4.53	4.59	4.64	4.68
Naphtha At LC	4.19	4.22	4.27	4.36	4.41	4.47	4.55	4.62	4.66
Gas Along Pipeline	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Diesel At LC	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96	5.96

It is apparent that biomass is competing against much cheaper conventional fuels.

The reason for the high cost of biomass power is:

a) Cost of purchase of fuel at farm gate and transportation to site: the cost of the fuel rises as the imperfect market information about agricultural residue is removed.
b) Uncertain burning characteristics which may lead to more frequent plant shut down to prevent adverse impacts on boiler: this in turn leads to reduced power generation.
c) The cost of agricultural residue per ton of procurement is only 450 RS. However this one ton consists of leaves (20%), mud (15%) and moisture around (40%). Therefore, only 50 % of the residue procured will be available for use. The processing cost of agricultural residue is almost 250 – 300 RS/ton and the calorific value is approximately 3500 kcal/kg. The ash from agricultural residues has high potassium chlorides, which leads to super heater corrosion. Due to the above reasons the cost of using agricultural residue fuel is around 1.9 Rs/unit.

In August 2000 MPPL started developing the project and as per the power purchase agreement signed the company could sell the power to third parties or the government. MPPL came into production by August 15, 2001. Thereafter the Government forced the company to sign a new power purchase agreement due to which MPPL could not sell power to third parties and had to sell power to government only at the rates mentioned below till April 1 2004. It was understood that the rates would be even lower after Aril 1st 2004. But by this time the plant was commissioned and the project promoters had to accept the Government terms.

April 1 2005 - March 31, 2001	= Rs 3.00/unit
April 1 2001 - March 31, 2002	= Rs 3.16/unit
April 1 2002 - March 31, 2003	= Rs 3.32/unit
April 1 2003 - March 31, 2004	= Rs 3.48/unit
April 1 2004 – March 31, 2003	= Rs 3.1/unit (Pending in Court)

The uncertainty in the tariff as can be seen from the above is a major risk that the promoter has to take, with tariffs always being below the generation cost.

On the other hand as detailed above, power generation costs for business as usual plants are cheaper. Coal and lignite fired power for the Southern Region grid which make up 68.21% of the generation is generated at Rs 1.56 – 2.48 / kWh in 2004, compared with Rs 3.82 / kWh for Matrix. Thus there is an additional price to be paid for the benefit of generating zero emission power. As per Ministry of Non-Conventional Energy tariffs for renewable energy biomass plants are 2.50 Rs/kWh in 1995 with 5% escalation every year. But tariff revision induced Andhra Pradesh to lower the tariff to a lower point than the MNES recommended rate, thus creating uncertainty for MPPL and making the plant unprofitable.

Thus emission reductions would not occur in the absence of the project activity, and the project activity faces an investment barrier which has to be overcome with CDM.

b)	Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

The research and development that has gone into coal fired plant in India has not been done for biomass plants to the same extent. Whilst boiler technology is generally well-established, adaptation of boilers to different characteristics of agro-residues and woody biomass has not been finalised for all location specific fuel characteristics. Thus moisture content, gaseous emissions during burning, ash behaviour, and ash management for fuels with different ash content has to be analysed and handled by the project promoters in situ as their knowledge of their specific conditions improves. This leads to a greater requirement for hands-on management and R&D, careful observation of plant performance, and this in turn is a discouragement to setting up MPPL. Agricultural residue procurement, storage, processing and combustion is still territory needing research and development.

In terms of the technical barriers, the following are provided:

a) Certificate from Thermax Ltd., Pune and Correspondence with Mr. Bob. Rossi, PSEG, USA.

The certificate from Thermax clearly indicates that Matrix was intending to use a fuel, which had never been done before. Moreover it also depicts that there are risks regarding the combustion of cotton and chilli stalks. Initial tests revealed that the cotton stalks could be fired in a fluidized bed boiler. However 25-30 % coal had to be used with the cotton stalks to maintain stable combustion. This scenario however would lead to addition of carbon dioxide into the atmosphere, which is against the purpose of a non-conventional project. Moreover there weren't any proven technology at that time which could shred the cotton and chilli stalk to the size required for feeding into a fluidized bed boiler.

Further tests revealed that cotton and chilli stalks could be used in a travelling grate boiler without the use of coal. However, the aspect of corrosion due to cotton/chilli ash could not be addressed satisfactorily.

Attached also is an email from Mr. Bob Rossi of PSEG, USA who is an expert in combustion and has vast experience in firing various fuels. The email also depicts the risks associated with cotton/chilli stalk combustion.

From the above it can be concluded that Matrix was aware of the technological risk associated with firing cotton and chilli stalks way before the decision to go ahead with the project, i.e. the signing of the loan agreement that took place in August 2000.

b) As predicted before the commencement of the project the following modifications were done to the superheater of the boiler over the past few years to prevent corrosion and damage to the boiler due to the combustion of cotton stalks and chilli stalks. The modifications mentioned below lead to heavy investment, reduction in boiler efficiency and reduction in plant load factor. The following documentary evidence is provided to justify the same.

(1) 4 IBR certificates
(2) Purchase order Rishabh Engineers for supply of additional soot-blower
(3) Purchase order Thermax Ltd., Pune for design of a new superheater coil
(4) Drawing depicting the old and the new design dated 17/06/2005

As per IBR Certificate dated 2002, in the year 2002 half portion of the superheater coils were replaced. Coils supports made of Incoloy were used. Just in under a year half portion of the superheater area was damaged due to corrosion.

As per IBR Certificate dated 2003, in the year 2003 all the superheater coils were replaced. The tube thickness of the superheater coils was increased from 3.66 to 4.06 thickness. Coil supports made of Stainless steel and a different design were used this time. All the superheater coils were T22 instead of a mix of T11 and T22.

As per IBR Certificate dated 2004, in the year 2004 the flow path in the superheater was modified. The inlet and outlet headers were reversed. This was done to reduce the temperature of the superheater coils to an extent. As per IBR Certificate dated 2005, in the year 2005 all the superheater coils were replaced. A new design was employed and an additional soot blower was added. The coil supports were also modified. This is clearly depicted in the drawing provided.

These kinds of issues were the kind which we had anticipated prior to project inception. CDM revenues were expected to compensate for down time as well as inadequate tariffs.

Thus emission reductions would not occur in the absence of the project activity, and the project activity faces a technological barrier which has to be overcome with CDM incentive.

c)	Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

The prevailing practice is coal fired power in the Southern grid region. MPPL has to somehow try and fit with very imperfect Government incentives for biomass plants. The Government is in principle interested in promoting biomass based power plants, but the Central government recommendations are not followed at state level as power is a subject which under the constitution of India is handled by both the centre and the states. This means that states have the power to overrule recommendations by the centre. Andhra Pradesh state has subjected MPPL to tariff uncertainty. This is a regulatory and policy environment which is not encouraging to MPPL, and in this uncertain environment, prevailing practice continues to be large centralised coal fired plants handled by national thermal power corporation and others.

Thus emission reductions would not occur in the absence of the project activity, and the project activity faces a barrier due to prevailing practice as demonstrated in the baseline case, which has to be overcome with CDM incentive.

(d)	Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Other barriers to the project activity include the difficulty of getting suitable EPC contractors willing to engage in an in-depth study of the local fuel and associated problems; prevailing conditions are more conducive to use of woody biomass rather than agro-residue, but in the absence of fuelwood forestry on a large scale by official bodies including the forest department, MPPL may have to engage in captive fuel forestry. This involves a large amount of planning, financing, land lease acquisition, land preparation, all of which is more than what coal fired plants are expected to do. Coal fired plants have a ready infrastructure for coal firing technology as well as fuel supply which they may call upon. The same is not the case for biomass fuel. Thus much management time will be taken up with fuel analysis, R&D, fuel supply planning, procurement, and planting. The associated uncertainties are a barrier to the successful implementation of MPPL.

The hope is that the CDM will enable the project activity to overcome the described barriers. Only if CDM funds are available can the proposed project use more percentage of agricultural residue which benefits the local farmers, local labourers, reduces the risk associated with fuel price increase, and repay the loans.

As seen even though the PPA is binding there is tremendous influence by the government on the PPA which is the biggest risk that MPPL face and one of the reasons why the company needs CER money. The government does not honour its own contractual commitments.

The described project activity is thus additional because the various barriers faced by the project prove that the baseline is reasonable, and represents the project scenario in the absence of the project activity, and that the emission reduction which is achieved by the project is additional to what would have occurred in the absence of the project.

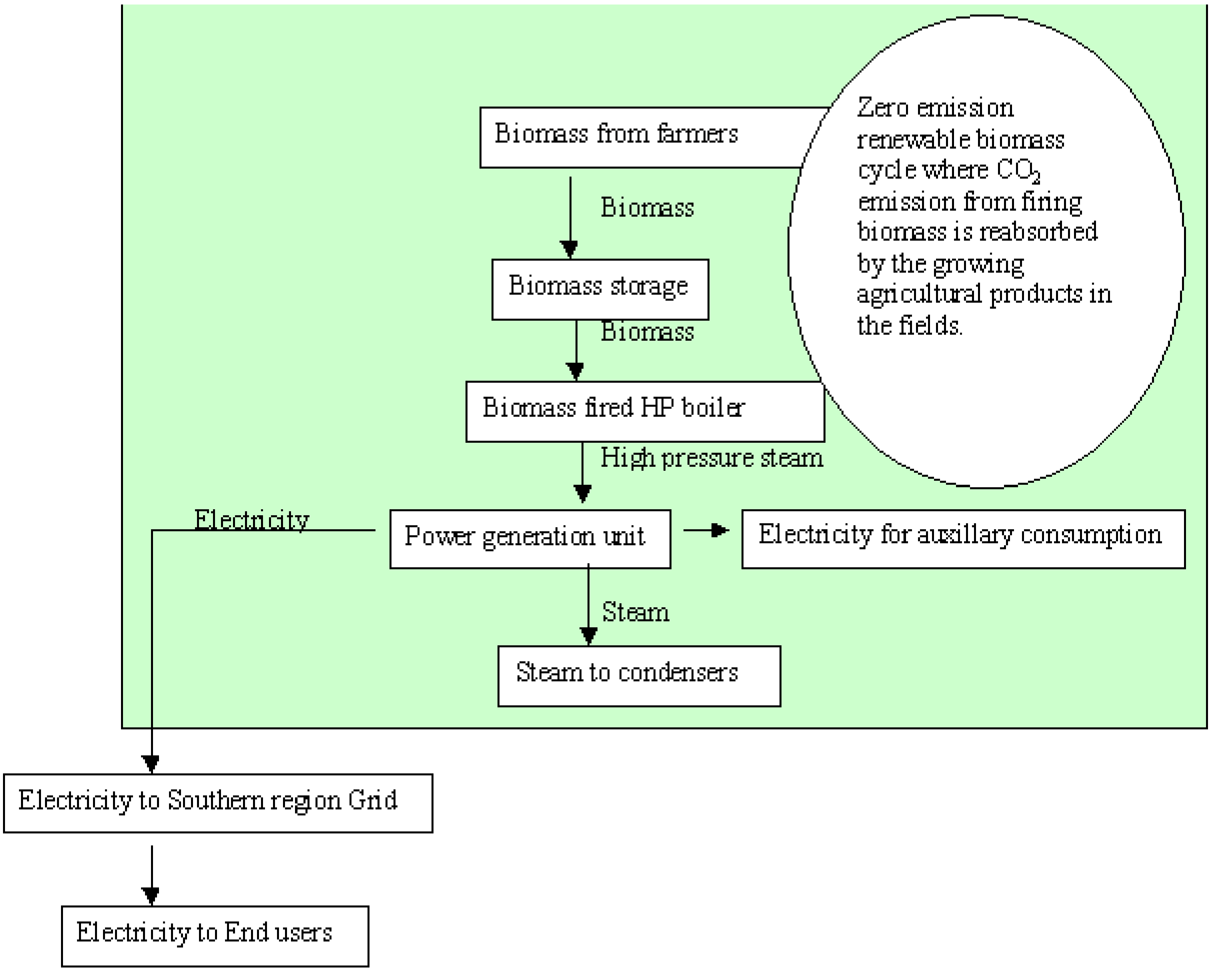
B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>>>> As per Paragraph 4 of the small-scale baseline methodology I.D. Renewable electricity generation for a grid:

The project boundary encompasses the physical, geographical site of the renewable generation source.

The project boundary covers the point of fuel supply to the point of power export to the grid where the project proponent has a full control. The project thus covers fuel storage and processing, boiler, Steam Turbine generator (STG) and all other power generating equipments, and consumption units within the power plant site. Around 200 000 kWh/ yr are drawn from the grid for start up and shut down operations.

Boundary diagram:



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

>> The following methodology will be applied: I.D. Renewable electricity generation for a grid. The baseline is applied in accordance with Paragraph 7 of the definitions:

7. ……….. the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as:

(b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix.

Since the project activity is generating power in the Southern grid region and feeding it into the Southern Region grid, the baseline for this project activity is the function of the generation mix in the Southern Region grid in India. Using the methodology available for small-scale project activities as discussed in section B2 above, the weighted average emission (in kg CO_2equ/kWh) of current generation mix in the Southern Region grid in India[5] is used for the calculation of baseline. It is observed that, in the Southern Region grid generation mix, coal and gas based power projects are responsible for GHG emissions.

[5] http://www.cea.nic.in

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

If the coal and gas based power generation mix generated the same amount of electricity, it would be causing the emissions that are now being avoided by the project activity. Hence, the baseline calculated using the method indicated represents the realistic anthropogenic emission amount by sources that would occur in the absence of the project activity.

Details on the emission coefficient

Year 2000 is considered the base year. CEA generation data for plants located in the Southern Region grid as tabulated below is used to derive the installed Southern Region grid gross power generation for 2000. In order to arrive at the detailed break up of the power generation mix in the Southern Region grid, data was complied from the CEA website. Actual generation figures are available for 2000 from MNES and CEA.

Table 5 Detailed break up of Installed capacity and generation in the Southern Region grid 2000 and Emission Factor and Total Emissions[6]

BASELINE INFORMATION FOR THE SOUTHERN REGION (2000) - MATRIX

Power station	Owner	Installed capacity **MW**	Fuel	Generation GWh	Emission Factor IPCC **tCO2/GWh**	Emissions tCO2
Karnataka						
Raichur	KPCL	1260	Coal 3E	8904	1079.5184	9612032
Yelahanka	VVNL	120	Diesel	658	638.39245	420062
Bellary	Pvt	25.2	Diesel	13	638.39245	8299
Torangallu IMP	Jindal	260	Gas	1170	483.53488	565735
Tanir Bavi	GMR	220	Naptha	0	638.39245	0
Kaiga	NPC	440	Nuclear	1886	0	0
Belgaum	Tata	81.3	Diesel	0	638.39245	0
Total Hydro	KPCL	3066.6	Hydro	10892	0	0
Subtotal				23523		10606129
Andhra Pradesh						
K_Gudam	APGENCO	1170	Coal 3E	7639	1327.4518	10140404
Vijayawada	APGENCO	1260	Coal 3E	10199	1043.5345	10643008
Ramagundam	APGENCO	62.5	Coal 3E	443	1280.7913	567390
Nellore	APGENCO	30	Coal 3E	171	1487.2047	254312
Rayal Seema	APGENCO	420	Coal 3E	3476	1052.6293	3658939
Vijeshwaran	APGPC	272.3	Gas	1978	483.5349	956431

6 See attached excel spreadsheet for formulas

Peddapuram CCGT	REL	220	Gas	0	483.5349	0
Jegurupadu GT	GVK	235.4	Gas	1658	483.5349	801700
Kondapalli	Kondapalli Th	350	Gas	679	483.5349	328320
LVS Power	LVS Power	36.8	Diesel	0	638.39245	0
Godavari GT	Spectrum	208	Gas	1567	483.5349	757699
R'gundam STPS	NTPC	2100	Coal	16422	1053.0089	17292513
Simhadri	NTPC	1000	Coal	0	1053.009	0
Total Hydro	APGENCO	3211	Hydro	7729	0	0
Subtotal				51961		45400720
Kerala						
Brahamapuram DG	KSEB	106.5	Diesel	319	638.39245	203647
Kozikode DG	KSEB	128.8	Diesel	460	638.39245	293660
Cochin CCGT	REL	174	NG	154	483.5349	74464
Kayamkulam	NTPC	350	NG	1945	483.5349	940475
Total Hydro	KSEB	1828.5	Hydro	6221	0	0
Subtotal				9099		1512247
TamilNadu						
Ennore	TNEB	450	Coal 3E	753	1693.6695	1275333
Tutikorin	TNEB	1050	Coal 9T	7931	1063.0765	8431260
Mettur	TNEB	840	Coal 9T	6423	1063.0765	6828140
North Chennai	TNEB	630	Coal 3E	4358	1053.0248	4589081
Basin Bridge	TNEB	120	NG	165	483.5349	79783
Nariman GT	TNEB	10	NG	16	483.5349	7736
Kovilakalappal	TNEB	107	NG	36	483.5349	17407
Samayanallur	Madurai P	106	Diesel	0	638.3925	0
P Nallur CCGT	PPNPG	330.5	NG	0	483.5349	0
Samalpatti DG	Samalpatti	105.7	Diesel	91	638.3925	58093
Basin Bridge DG	Vasavi	200	Diesel	1281	638.3925	817780
Neyveli STI	NLC Th	600	Lignite	4158	1225.477	5095534
Neyveli STII	NLC Th	1470	Lignite	10519	1225.477	12890796
Neyveli FST Ext	NLC Th	420	Lignite	0	1225.477	0
KKKAM NUC	NPC	340	Nuclear	2513	0	0
Total Hydro	TNEB	1995.9	Hydro	5441		0
Subtotal				43685		40090948
Pondichery						
Karaikal GT	PPCL	32.5	Gas	233	483.5349	112663
Sub total				233		112663

Total				128501		97722709

Table 6

Carbon Emission Factor for Southern Region

Fuel	Generation GWh (2000)	Emissions tCO2	%
Hydro	30283	0	23.57
Nuclear	4399	0	3.42
Coal	66719	73292416	51.92
Diesel	2822	1801543.5	2.20
NG	9601	4642418.3	7.47
Lignite	14677	17986331	11.42
Total	128501	97722709	100.00

Average $\sum EF_{baseline}$ **760.48** tCO2/GWh

Table 7

Project emissions:

	Kg coal	MJ/kg	MJ	t CO_2/MJ	t CO_2
2001-2002	0				0
2002-2003	0				0
2003-2004	1600000	15.7	25120000	0.00009469	2378.6
2004-2005	2000000	15.7	31400000	0.00009469	2973.3
2005-2006	0				0
2006-2007	0				0
2007-2008	0				0

Table 8

Emission Reductions from the Project Activity

The emission reductions from the project activity are calculated by taking the generation by the project activity, minus the annual consumption from the Southern Region grid for plant start up and shut down, multiplied by the emissions factor, minus emissions from coal for the relevant year.

Operating year	Certified Emission Reductions (tonnes of CO_2)
2001-2002	10077
2002-2003	24185
2003-2004	22579
2004-2005	20317
2005-2006	24730
2006-2007	24730
2007-2008	24730
TOTAL estimated reductions (tonnes of CO_2 e)	151348
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	21621

Therefore, a conventional energy equivalent of 32’718’600 kWh gross, and 32’519’600 net power generated annually in the Southern Region grid area would be saved by generating power from the 4.5 MW Biomass based power plant which in turn will reduce 24730 tonnes of CO_2 emissions per annum.

Date of completing this baseline: 18th May 2006

Name of person/entity determining the baseline: Matrix Power Pvt Ltd.

The person/entity is also the project participant and is the designated official contact for this project activity and their details are listed in annex 1.

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

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

>>21-y-0-m

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

>>15/08/2001

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

>>25-y-0-m

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

>>renewable

C.2.1. Renewable crediting period:

>>3 x 7-y-0-m

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

>>15/08/2001

C.2.1.2. Length of the first crediting period:

>>7-y-0-m

C.2.2. Fixed crediting period:

>>N/A

C.2.2.1. Starting date:

>>N/A

C.2.2.2. Length:

>> N/A

SECTION D. Application of a monitoring methodology and plan:

>> The Monitoring and Verification procedures define a project specific standard against which the project's performance (i.e. GHG emissions) and conformance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods including a computerised data capture system, and techniques for data interpretation for monitoring and verifying GHG emissions with specific focus on technical/efficiency/performance parameters. It also allows scope for review, scrutiny and benchmarking against established norms for monitoring and verification. The M&V protocol provides a range of data estimation, measurement and collection options and techniques, in each case indicating preferred options consistent with good practice to allow project managers, and operational staff, auditors and verifiers to apply the most practical and cost effective measurement approaches to the project. The aim is to enable this project to have clear, credible and accurate monitoring, evaluation and verification procedures. The purpose of the procedures is to direct and support continuous monitoring of project performance and project indicators, to determine project outcomes and GHG reductions.

The monitoring here will be relatively straightforward as kWh generated translates directly into tonnes of CO_2 saved.

Matrix Power Pvt Ltd will have the authority and responsibility for project operation, monitoring and reporting.

Monitoring procedure: A representative of Matrix Power Pvt Ltd designated to perform the monitoring for CDM will visit the plant every month and collect the generation figures. The designated representative of Matrix Power Pvt Ltd will check that the electricity metres have not been tampered with. They will check the monthly figures based on the daily reports filled in by the operators. This will be done by making a spot check with operators and with the main consumer (APTRANSCO) to check whether the plant was really running when the logbook says it was. The designated representative of Matrix Power Pvt Ltd will check that the energy metre reading and the logbook data is the same. Once a year the energy metre will be calibrated, or immediately if there is any ground for suspicion. The designated representative of Matrix Power Pvt Ltd will check that biomass is being collected sustainably, in other words than no non-renewable biomass is being harvested or fired.

The monitoring equipment is the energy metre. Provided the sealed casing is not broken and water or dust is not allowed to get in, this single piece of monitoring equipment does not require maintenance. The other parameters that are being logged at the site are technically not necessary for CDM monitoring (biomass consumption, calorific value of biomass) . However, the data will help early detection of possible problems that might then lead to reduced kWh output and therefore reduced generation of CERs.

Though MPPL will not be using coal, coal consumption will also be monitored for sake on completeness.

Internal audit, project performance reviews, procedures for corrective actions

The designated representative of Matrix Power Pvt Ltd will hold review meetings with the project promoters every 4 months. The meetings will cover project performance review, and a timetable for corrective actions. The log sheets and report by the designated representative of Matrix Power Pvt Ltd on the monitoring information will be reviewed, and promoters will note any possible causes for worry about issues such as low PLF, biomass availability, quality of biomass, or any other issues that could lead to lower output and lower production of CERs and take corrective actions. The designated representative of Matrix Power Pvt Ltd will follow up to see whether corrective action is taken, and the company will communicate with validators early in case any major problem might be on the horizon prior to them commencing the annual verification work.

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

>> The monitoring methodology from the corresponding baseline methodology Type I.D. Renewable electricity generation for a grid is used. Para 9 states:

> 9. Monitoring shall consist of metering the electricity generated by the renewable technology. In the case of co-fired plants, the amount of biomass and fossil fuel input shall be monitored.

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

>> The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. Details of approved methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the

power plant is of 4.5 MW capacity, the indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories is applied.

In this methodology there is no need to monitor the baseline for the duration of the first crediting period.

D.3 Data to be monitored:

>>

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3.1.	Power	Total electricity generated	KWh	Measured	continuous	100%	Electronic and Paper	Crediting period plus 2 years	Measured on plant premises and monitored and recorded continuously. Manufacturers of the system should be reputable.
D.3.2	Power	Power Export	KWh	Measured	continuous	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by The State Electricity Board of Andhra Pradesh
D.3.3.	Power	Auxiliary consumption	kWh	Measured	continuous	100%	Electronic and Paper	Crediting period plus 2 years	
D.3.4	Fuel quantity	Biomass used	MT	Measured	Daily	>95%	Electronic and Paper	Crediting period plus 2 years	To be monitored at purchase and usage
D.3.5	Fuel quality	Calorific value of Biomass	Kcal/kg	Actual sample testing	Monthly	Grab Sample	Electronic and Paper	Crediting period plus 2 years	Sample testing
D.3.6.	Fuel quantity	Coal used	MT	Measured	Daily	>95%	Electronic and Paper	Crediting period plus 2 years	Coal is not likely to be used but as the plant is designed to fire up to 30% coal, monitor-ing should be done.
D.3.7	Fuel quality	Calorific value of Coal	Kcal/kg	Actual sample testing	Monthly	Sample	Electronic and Paper	Crediting period plus 2 years	Sample testing
D.3.8	Fuel quality	Carbon content of coal	%	Actual sample testing	Monthly	Sample	Electronic and Paper	Crediting period plus 2 years	Sample testing
D.3.9.	Equipment operation	Efficiency of power	%	Calc	continuous	100%	Electronic and Paper	Crediting period	

	specific	generation activity						plus 2 years	
D.3.10.	Operation specific	Plant heat rate	Kcal/kWh	Calc	continuous	100%	Electronic and Paper	Crediting period plus 2 years	

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

>>

ID number	Uncertainly level of data (High/medium/low)	Are QA/QC procedures planned for these data?	Outline explanation of why QA/QC procedures are/are not being planned.
D.3.1.	Low	Yes	This data will be used to calculate the emission reductions by project activity
D.3.2	Low	Yes	This data will be used as supporting information for calculation of emission reduction by project activity
D.3.3	Low	Yes	This data will be used as supporting information for calculation of emission reduction by project activity
D.3.4	Low	Yes	This data will be used to calculate emission reductions by project activity (to check coal numbers)
D.3.5.	Low	Yes	This data will be used as supporting information for calculation of emission reduction by project activity (to check coal numbers)
D.3.6	Low	Yes	This data will be used for calculation of project emissions if applicable
D.3.7	Low	Yes	This data will be used for calculation of project emissions if applicable
D.3.8.	Low	Yes	This data will be used for calculation of project emissions if applicable
D.3.9.	Low	Yes	This data will not be used to calculate the emission reductions by project activity but is an important parameter for plant performance
D.3.10.	Low	Yes	This data will not be used to calculate the emission reductions by project activity but is an important parameter for plant performance

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

>> As this is not a co-fired plant, there is technically no need to monitor the amount of biomass and/or fossil fuel input. However, because the plant is designed to fire up to 30% coal, the amount of coal as well as the amount of biomass used will be monitored. The amount of biomass purchased will be based on invoices from the farmers and a weighbridge slip. These invoices and slips are also checked by auditors once a year. A consultant is hired to conduct calorific value tests for the biomass fuels and check the emissions on a monthly basis. This will provide back up proof of whether or not coal was used. The amount, and quality of coal will also be monitored.

For purposes of calculating the emission reductions, the present project activity will not subtract internal auxiliary power consumption from total plant electricity generation. The emission reduction calculated does however take into account 200 000 kWh per annum that is drawn from the grid for start up and shut down operations when the plant is not running. This consumption is subtracted from the gross generation figure and the emission reduction is calculated.

There a total of three meters at the plant. One is a generation meter which is in the control room. The other two are an export meter and a back-up export meter which are at the sub-station. Both these meters are inspected by The State Electricity Board of Andhra Pradesh (APTRANSCO, a Government concern) on monthly basis. The emission reductions are calculated by taking the generation figures, less the power drawn from the grid for start up and shut down operations. Calculating emissions reductions from the gross generation (without subtracting the auxiliary consumption) is justified because no auxiliary consumption or transmission loss savings or any other losses are taken into account in the baseline generation case. It is justified however, and transparent, and conservative, to subtract the small amount of power drawn from the grid every year when the plant is not running and power is need for start-up or shut down.

This approach is justified because:

a) it is simple and transparent
b) for baseline purposes the project proponents have also taken power generated in the grid. This means that auxiliary power and other losses are not considered in the baseline case. The same is therefore done in the project case (less the power drawn from the grid as mentioned).

Monitoring plan and procedures

MPPL will keep the necessary records for verification by the DOE. The metre will be calibrated regularly by THE STATE ELECTRICITY BOARD OF ANDHRA PRADESH and MPPL and for CDM purposes the inspection certificates by APTRANSCO may be viewed. The daily monitoring information will be made available to the verifiers in the following form, with emission reductions calculated on the basis of the methodology given above in sections B2 and B3 and E2 below.

Date	Time	KWh Generation	KWh exported	Biomass consumed	Calorific value of biomass	Coal consumed	Calorific value of coal	Comments

The revenue is generated by units exported as measured by the power metres at the plant, and check metres at the high tension substation of the APTRANSCO. The invoices issued based on metre readings will also be detailed in the annual financial statements. Generation will be measured at the generation metre at the plant and the data captured in the computer. For CER monitoring purposes, gross generation figures are considered, combined, in the case where coal has been consumed, with the measurement of the quantity of biomass and/or coal used. This will provide the evidence of the quantity of energy generated with zero emissions, and the CERs will be computed from this value. The determination if any of the quality and quantity of coal fired will also help us determine the project emissions due to this in terms of mass of CO2. The project activity employs a computerised control system that will measure, record, report, monitor and continuously control various key parameters. These will include quantity and quality of biomass, quantity and quality of coal used, total power generated, power exported, etc (details in the table above). All monitoring and control functions will be done as per the internal standards and norms of MPPL. The instrumentation systems for the project are mainly micro processor based instruments with a desired level of accuracy. All instruments will be calibrated and marked at regular intervals so that the accuracy of measurement can be ensured at all times.

The quantity of emission reductions claimed by the project will only be a fraction of the total generated emissions from the grid, which depends on the actual generation mix of the grid in a particular year. APTRANSCO publishes yearly reports regarding performance of all the power generation units (including private sector units). Hence authentic data related to measurement, recording, monitoring and control of the generation mix of the APTRANSCO is ensured. The reports contain all information regarding type of generation like hydro, thermal, nuclear, renewable, installed capacity, de-rated capacity, performance of generation unit, actual generation, capacity additions during the year etc., which can be used for verification of the generation mix and emissions factors for baseline calculations for a particular year.

On-site emissions

Direct on-site emissions after the implementation of the project arise from burning biomass in the boiler. The emissions are mainly CO_2. However, the CO_2 released equals the amount of CO_2 taken up by the equivalent paddy plantation / biomass during growing. Therefore no net emissions occur. The other direct on-site emission source is combustion of coal in the boiler, if at all. The CO_2 generation from coal combustion is calculated as a project emission and deducted from the emission reduction that would have occurred if 100% biomass had been used. The methodology includes monitoring the quantity and quality of coal and the % of coal usage. The biomass availability varies seasonally. Crops are cultivated in 2 seasons, February to May and June to October. Adequate storage is required from November to June. Methane emissions may only occur during anaerobic conditions in such storage. This is not expected to contribute any significant GHGs even under anaerobic conditions. In principle nitrous oxide N_2O emissions could also arise from such storage. However, no data from emission on storage is available. We assume the amount of CH_4 and nitrous oxide emissions formed due to biomass storage (which will take place in the open air) to be comparable to the amount of CH_4 and N_2O arising from biomass when left on the field. As a consequence CH_4 and N_2O will not be influenced by the project and will not be taken into account during monitoring.

Direct off site emissions

These arise from the transportation of biomass. However, in the baseline, fuel transport has also not been taken into account. On average the distance the fuel has to be transported for coal-fired plants is more than for MPPL. MPPL will have no more than 25 km distances to cover. The figures are calculated but are not taken into account for project emission calculations.

As the plant uses existing biomass from existing crops, no additional biomass is grown on account of the project. Thus no additional uptake by sinks occurs.

Indirect on site emissions

These arise during the construction of the power plant. Considering the emission that will be avoided by the power plant during its life time, these are considered too small to need to be quantified and are thus not taken into account for monitoring purposes.

Fuel requirement, availability and utilisation

Quantity of biomass used in the boiler as fuel: After the conveyor, an approximate measure of the shift wise usage of biomass is done at this point by scaling the bunker. The same record is maintained manually in the register. Control of fuel feeding to the boiler is done by controlling the rpm of the motors of the feeder system. The amount of biomass used can be further verified by checking invoices and receipts from farmers and suppliers. A similar system has to be in place to check the amount of coal fired.

Quality of biomass: this will have to be checked in order to ensure smooth performance of the plant, and to comply with Government of India norms, though it will not affect emission reductions. A monitoring of the quality of coal similar to that for biomass will be maintained if appropriate.

Total power generated: this will be continuously monitored. If the interpretation of data is done correctly, various conclusions can be drawn. For example, lower utilisation of feeders will indicate possible use of coal even if not reported in the fuel log, etc. This is the figure that will be used for calculating the total emission reductions.

Power consumed by auxiliaries: this will be continuously monitored. All instruments carry tag plates to indicate date of calibration. This number will be monitored to check for any reduction in auxiliary consumption, which may indicate a surreptitious switch to coal.

Power exported to the grid**:** all instruments will be calibrated.

Efficiency of the power generation activity: quantity and major quality parameters of steam at the inlet to the turbine will be measured. Base don measured input and output parameters, the system efficiency will be calculated and monitored.

All the above parameters will demonstrate the performance of the project at any given time.

Leakage

Appendix B of the Simplified Methodologies for Small-scale CDM Project Activities states in Section A Paragraph 8: <u>In the case of the project activities using biomass, leakage shall be considered.</u>

The activity identified, which contributes for GHG emission outside the project boundary is transportation of biomass from biomass collection centres to biomass power project site. Calculation of leakage has been carried –out as under:

▪ Biomass to be procured	-	47’304 MT (dry weight)
▪ Wet weight (60% extra)		75’686.4 MT
▪ Average Distance between project Site and biomass collection centers	-	25 km
▪ Biomass load per truck	-	6 MT
▪ Number of trips	-	12614
• Consumption of Diesel per trip	-	12.5 litres (4 km/litre)
▪ Total Diesel consumption	-	157,675 litres per annum
▪ CO_2 emission factor for Diesel (as per IPCC guidelines)	-	2.68 kg/l
▪ CO_2 emission per annum	-	423 tons

The CO_2 emission (leakage) occurs during the transportation of coal from the mines to respective coal based power plants. The distance between the coal mines and the power plants is higher as compared to the transportation distance between biomass collection centres to biomass power project site and hence the CO_2 emissions are higher. To be on conservative side and for sake of transparency, this leakage due to coal transportation has not been added while calculating the baseline of generation in the Southern Region grid. Hence the leakage due to transportation of biomass has also been neglected from the calculations and estimations of emission reductions in the project case. No monitoring of leakage from transport is required.

As far as demand side leakage or market induced leakage is concerned, the biomass survey shows a surplus of biomass in the region to the extent that at least 20 such plants could come up utilising existing unutilised biomass in this and the adjoining District without impacting any other users. Thus there is no demand side or market induced leakage in this project activity.

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

>> Matrix Power Pvt Ltd.

The person/entity is also the project participant and is the designated official contact for this project activity.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>> Since the project emissions come from a renewable source, the emission reductions are equal to the baseline emissions, which are calculated as:

…………… the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:
(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

E.1.1 Selected formulae as provided in appendix B:

>> The following formula and values are used to obtain to total yearly emission reduction of the project activity:

$$CER_y = kWh_y \times EF - CO_{2C}$$

where:
CER_y : yearly Certified Emission Reductions
kWh_y : kWh generated in year y measured at the energy meter
EF = 0.76048 kg CO_2e / kWh
CO_{2C} = CO_2 from coal

Formula for tCO_{2C}:
tCO_{2C} = Kg coal x MJ/kg x EF
where:
Kg coal = as measured
MJ/kg = MJ energy from coal combustion = 15.7
EF: for sub-bituminous coal in tonnes CO_2/MJ as per IPCC = 0.00009469

And the generation figures for the first crediting period are:

Operating year	Generation in kWh less grid consumption
2001-2002	13251358
2002-2003	31802491
2003-2004	32818372
2004-2005	30625048
2005-2006	32519600
2006-2007	32519600
2007-2008	32519600

And the emissions reductions are:

Operating year	Baseline Emissions (tonnes of CO2)	Project Emissions (tonnes of CO2)	Certified Emission Reductions (tonnes of CO2)
2001-2002	10077	0	10077
2002-2003	24185	0	24185
2003-2004	24958	2379	22579
2004-2005	23290	2973	20317
2005-2006	24730	0	24730
2006-2007	24730	0	24730
2007-2008	24730	0	24730
TOTAL estimated reductions (tonnes of CO_2 e)			151348
Total number of crediting years			7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)			21621

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

>>N/A

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

>> N/A

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

>> N/A

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

>> N/A

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

>> N/A

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

>> N/A

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

>>Table 9

Operating year	Certified Emission Reductions (tonnes of CO_2)
2001-2002	10077
2002-2003	24185
2003-2004	22579
2004-2005	20317
2005-2006	24730
2006-2007	24730
2007-2008	24730
TOTAL estimated reductions (tonnes of CO_2 e)	151348
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	21621

SECTION F.: Environmental impacts:

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

>> The project being a renewable energy biomass based power project it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification based on environment protection rule, 1986, public hearing and EIA is required for those industries / projects which are listed in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs. 100 crores have been excluded from the list. Hence, not required by the host party.

The project has taken all the care to follow the rules and regulations for conservation of the environment prescribed by licensing authorities like APPCB.

Agricultural residues contain a maximum of 3 % ash and 90 % of this ash is converted to fly ash. The air emissions are kept below 115 mg/Nm^3 due to the electrostatic precipitator that is used by the power plant. Both the bottom ash and the fly ash are used by brick manufacturers.

Total waste water from the plant is used in maintaining the green belt that is spread over eight acres.

The steam conditions at the boiler heat outlet are at a pressure of 65 kg/cm^2 and temperature of 480 ± 50°C. The higher steam parameters result in higher annual savings of fuel per annum when compared to lesser steam parameters such as 44 kg /cm2 and temperature of 440°C.

The dust collection equipment is a electrostatic Precipitator. The Outlet dust concentration is 115 mg/Nm3 @ 15%O2, which is below prescribed norms.

There is a steam generation unit consisting of a stoker fired travelling grate type boiler manufactured by Thermax Ltd. The steam generator is a straight condensing type manufactured by Triveni Engineering Private Ltd. (Peter Brotherhood Design). The gross rating of the plant is 4.5 MW. The plant is situated on 25 acres of land, with raw water consumption of 600 cubic metres per day. The chimney height is 43 metres and the power evacuation is through a 33 KV line.

These parametres are within national limits and guidelines.

Additional environmental and technical information:

1. The emission of Nox is negligible as the temperature in the furnace is less than 1000 ^{0} C.
2. The sulphur content in biomass is 0.13% maximum.
3. The detrimental effect of SO_2 and Nox is partially mitigated by a greenbelt around the boundary of the plant. The plantation also helps to replenish oxygen.
4. The particulate emissions from the plant are controlled by the use of high efficiency (99%) Electrostatic Precipitators (ESP).
5. There is some contribution to thermal pollution of the atmosphere through the discharge of hot flue gases. The effect at ground level is minimal as the heat is dissipated to the higher levels of the atmosphere through the chimney.
6. Solid wastes include ash generated by the plant. This is drenched with water to avoid dust hazard, and is transported in closed containers to brick manufacturing units. The ash percentage is only 3% so there is hardly any ash produced.
7. Liquid wastes from the power plant will result mainly from the boiler blow down and demineralised plant. These liquid wastes are used for the greenbelt inside the plant.
8. Noise pollution is relatively low, and wherever the noise level exceeds the acceptable limits such as around the turbine etc, acoustic shields are provided.

Thus there are no adverse environmental impacts form this power plant other than what could be reasonably associated with the diligent and careful operation of such a plant.

SECTION G. Stakeholders' comments:

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

>> The local stakeholders are basically the farmers and agricultural labourers around the plant.

They are the most important stakeholders who will benefit from the agricultural residue collection and sale activities for providing fuel to the power plant. They are very keen for the plant to run on agricultural residues and are ready to provide all the inputs required.
Other stakeholders are the regulatory authorities, the purchasers of the power and other stakeholders. These are:

- The customer (APTRANSCO)
- Licensing and regulatory authorities like
- Non-Conventional Energy Development Corporation of Andhra Pradesh
- Andhra Pradesh Pollution Control Board
- Andhra Pradesh Irrigation Department
- MoEF (Govt of India)
- MNES (Govt. of India)

MPPL has been constantly in touch with other identified stakeholders like licensing and regulatory authorities. Their views are reflected in the form of permission granted for the project. In this aspect, the permission by NEDCAP, MoEF, APPCB and MNES are indication of favourable impression for the project. MPPL completed the necessary consultation with local stakeholders especially the suppliers of biomass. There was no real need to involve others as there was full support for the project at all levels. The project does not require displacement of any local population. In addition, the local population is also an indirect consumer of the power that is supplied from the power plants.

The distance between the electrical substation for power evacuation and the plant is very small so the installation of transmission lines does not create any inconvenience to the local population.

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

Non-Conventional Energy Development Agency of AP (NEDCAP) implements policies in respect of non-conventional renewable power projects in the state of Andhra Pradesh and has accorded approval to the project.

As a buyer of the power, the APTRANSCO which is part of the Southern Region grid is a major stakeholder in the project. They hold the key to the commercial success of the project, APTRANSCO has already cleared the project and MPPL has already signed Power Purchase Agreement (PPA) with APTRANSCO and is supplying power.

The Designated National Authority under Ministry of Environment and Forest has provided host county approval to the project.

The Government of India, through Ministry of Non-conventional Energy Sources (MNES), has been promoting energy conservation, demand side management and viable renewable energy projects including wind, small hydro and bagasse cogeneration / bio-mass power. The project meets their requirements.

G.2. Summary of the comments received:

>> As mentioned above, MPPL has already received all the required approvals and clearances for their project. Farmers and landless labourers expressed their happiness about project implementation by

MPPL in this area, which has provided them an opportunity of small business and employment. It is also helping to improve the general level of economic activity in the region.

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

>> The plant is set up in response to the need for local employment and off-farm opportunities in a very poor locality. To this extent the project itself is in response to stakeholder comments – viz. that they need jobs.

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Matrix Power Pvt Ltd
Street/P.O.Box:	8-2-269/3/1
Building:	257, Road No.2
City:	Banjara Hills, Hyderabad
State/Region:	Andhra Pradesh
Postcode/ZIP:	500033
Country:	INDIA
Telephone:	+91 40 3546776
FAX:	91 40 23546776
E-Mail:	abhiramkasu@hotmail.com
URL:	-
Represented by:	
Title:	Mr.
Salutation:	Reddy
Last Name:	Abhiram
Middle Name:	Kasu
First Name:	As above
Department:	Matrix Power Pvt Ltd
Mobile:	9848054515
Direct FAX:	91 40 23546776
Direct tel:	91 40 23546776
Personal E-Mail:	abhiramkasu@hotmail.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Not applicable. The CER buyer is not yet identified and is unlikely to be a public or multilateral fund entity. At the time of sale of CERs such a statement will be obtained from the buyer.

- - - - -