

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

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• 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.

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

Project Title: 4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd.

PDD Version: 2.0 (revised PDD for 2nd crediting period)

Date: April 24, 2008

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

The 4.5 MW Biomass (low density Crop Residues) based Power Generation unit of Malavalli Power Plant Pvt Ltd (MPPL) was registered as a CDM project on July 21st 2006. Later on, the project was also registered as a Gold Standard project and in spring 2007, when the project completed the first CER issuance process at UNFCCC, these credits became the first ever issued CERs awarded with the Gold Standard label. The first 7 year renewable crediting period started in August 1st 2001 and expires in July 31st 08. The project proponents are applying for a second crediting period between August 1st 2008 and July 31st 2015.

Purpose of the Project Activity

The purpose of the project is to utilise the available low-density crop residues (cane trash/coconut fronds) and other biomass fuels in the region effectively for generation of power. The 4.5 MW power plant was commissioned in August 2001 and has been exporting electricity to the state grid ever since; thereby contributing to sustainable economic growth, conservation of the environment through use of biomass residues and green house gas (GHG) emission reductions by displacing fossil fuel based electricity from the grid..

Malavalli Power Plant Pvt. Ltd. (MPPL) had a primary business mission of pioneering the utilisation of low density crop residues, which are not commonly used for power generation due to their low energy density and relative high moisture content. Such residues, such as cane trash (just the leaves, not the bagasse) and coconut fronds, are otherwise burnt on the fields (leading to high particulate emissions) or allowed to decompose (leading to methane release). After an intensive period of desk and field research (from 1997 to 2000) MPPL constructed the 4.5 MW power plant as a pilot project to showcase an innovative way to convert seemingly worthless biomass residues into a valuable energy source that contributes to sustainable development in rural areas by creating additional revenue streams for local farmers. The plant design does not have any coal handling equipment such as coal bunkers, coal mills, coal conveyers etc. Hence this plant can be operated only using biomass with over 70% of the fuel being low-density crop residues (primarily cane trash/coconut fronds). In case of non-availability of biomass, particularly during heavy rains, the plant is shutdown.

The plant location was kept at Kirugaval village in Malavalli Taluka of Mandya District, Karnataka for the following reasons.

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- * There was adequate availability of cane trash/coconut fronds in the vicinity.
- * The plant location is 35 km from the city of Mysore and 125 km from the city of Bangalore. This facilitates the building up of engineering resource and O&M organisation (with the required technical skills) to undertake a pioneering project.

Contribution to Sustainable Development**1. Socio-economic well being**

- The project has created 450 direct jobs within the biomass residue supply chain; since the biomass residues are to be collected and transported to the plant site from the fields, opportunities are being generated for the people to collect and transport biomass. Further 200 local jobs are created for operation and maintenance of the biomass power plant and organic fertiliser scheme.
- The project acts as a catalyst (and also provides support structures through a sister company Grameena Abhivrudhi Mandali) for rural entrepreneurial development and thereby secondary jobs creation.
- The project (through its sister company *Grameena Abhivrudhi Mandali*) undertakes services related to rural electricity distribution and thereby ensures better quality of service to the consumers while ensuring higher revenues/collections to the Distribution Utility.
- The project contributes to stability and quality of power supplied to the local industry, farmers and households, improving the conditions for economic activities and quality of life in the region.
- The project contributes approximately Rs. 45 million (USD 1 million) to the rural economy per year through the Biomass Supply Chain. It is emphasised that value is created for crop residues which were otherwise wasted in the fields (cane trash, coconut fronds etc.). In other words, the plant is generating commercial value to crop residues enabling the farmers to get better price out of their produce augmenting their income. The above benefits due to project activity ensure that the project would contribute to the social and economic well being in the region.

2. Environmental well being

- The project contributes to GHG emission reductions by displacing electricity from fossil fuel based power plants connected to the regional electricity grid.
- The project fires 100% biomass and thereby displaces the firing of fossil fuels, which in the Indian context would have been mainly coal with a high ash content (35-45%) or high sulphur content fuel oil (4-5%) .
- The project reduces the burning of cane trash on the fields, which would otherwise result in high particulate emissions as well as contamination of ground water.

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- The project reduces the release of methane through partial anaerobic decay of coconut fronds at the edge of coconut fields (Nevertheless, for the sake of conservativeness, these emission reductions are not considered in the CER calculations).
- The project encourages organic farming through production of organic fertiliser and distributing the same to farmers from whose field's crop residues have been collected.
- The project (through its sister company *Grameena Abhivrudhi Mandali*) sensitises farmers on energy conservation and thereby reduces ground water extraction through wasteful farming practices.

3. Technological well being

- The project showcases an innovative way to use low-density crop residues, combining power generation from renewable resources and sustainable development in rural areas. With more than 80% of India's population living in rural areas and considering the desolate power supply situation in these areas, the project has an immense replication potential.
- The project presents technological innovations in boiler design and special Operation and Maintenance Protocols in order to avoid slagging and corrosion problems caused by the fuel properties of low-density crop residues.
- The project uses a steam turbo generator with matching boiler of travelling grate type capable of firing multiple fuels in an energy efficient manner.

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:

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Name of Party involved (*) (host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
India (Host Country)	Malavalli Power Plant Pvt. Ltd. (private entity)	No
Switzerland (Annex I Country)	SouthPole Carbon Asset Management Ltd. (private entity)	No
Switzerland (Annex I Country)	Myclimate Foundation – The Climate Protection Partnership (private entity)	No

Details are provided in Annex-1

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

The project activity is a 4.5 MW (gross) capacity grid connected biomass (low density crop residue) based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project has potential to export around 27 GWh to the KPTCL grid by considering auxiliary power consumption of 11.5%. The Plant generated 29.82 GWh and exported 26.54 GWh during April 2003-March 2004.

Though as per MNES guidelines use of coal as a back up fuel is allowed (maximum up to 30%). The plant has never fired any fossil fuel. Furthermore, the project developers steadfastly focused on their mission of firing low density crop residues as primary fuel, even though this resulted in significantly lower levels of generation and plant outages during operations stabilisation phase (April 2001-March 2003). The plant is now performing satisfactorily with low density crop residues as primary fuel.

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 (cane trash, coconut fronds, toppings of plantation wood, corn cob/maize stalks). All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 22 tonnes per hour of steam. The steam turbine is a straight condensing type machine with one bleed off to deaerator for feed water heating. The steam conditions at the boiler heat outlet are at a pressure of 42 kg/cm² and temperature of 440 ± 5° C.

Technical details:

Type of steam generator:	Travelling grate
Fuel:	Sugar Cane trash, Coconut fronds, Corn Cobs, toppings of Plantation Wood
Fuel firing rate:	6.00 TPH
Main steam flow rate:	22.00 TPH
Main steam pressure:	42 ata
Main steam temperature:	440°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:	< 150 mg/Nm ³

Additional environmental and technical information:

1. There is 78% boiler efficiency. The biomass has on average 3000 kcal/kg heating capacity, and fuel consumption is around 1.4. kg/kWh.
2. The emission of NO_x is negligible as the temperature in the furnace is lower than 1000° C.
3. CO emission is negligible since the combustion efficiency in the boiler is 78%.
4. The greenhouse gas CO₂ that is emitted as a major gas during the firing of the plant, is reabsorbed by the agro-waste during its growth phase.
5. The sulphur content in biomass is 0.13% maximum.

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6. The detrimental effect of SO₂ and NO_x is negligible but further mitigated by a greenbelt around the boundary of the plant.
7. The particulate emissions from the plant are controlled by the use of high efficiency (99%) Electrostatic Precipitators (ESP).
8. 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.
9. Solid wastes include ash generated by the plant. This is drenched with water to avoid dust hazard, and is transported in closed containers. This ash used in an organic fertiliser production unit from where it is distributed to the farmers from whose fields, crop residues are collected. The ash percentage is only 6 % so there is 100% ash utilisation.
10. Liquid wastes from the power plant will result mainly from the boiler blow down and demineralised plant. These liquid wastes are treated in an effluent treatment plant (ETP) and is used for the greenbelt inside the plant.
11. Noise pollution is relatively low, however tight sealed doors are provided between the turbine hall and control room to prevent any abnormal noise.

A.4.1. Location of the <u>small-scale project activity</u>:
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A.4.1.1. <u>Host Party(ies)</u>:

India

A.4.1.2. <u>Region/State/Province etc.</u>:
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Karnataka

A.4.1.3. <u>City/Town/Community etc</u>:

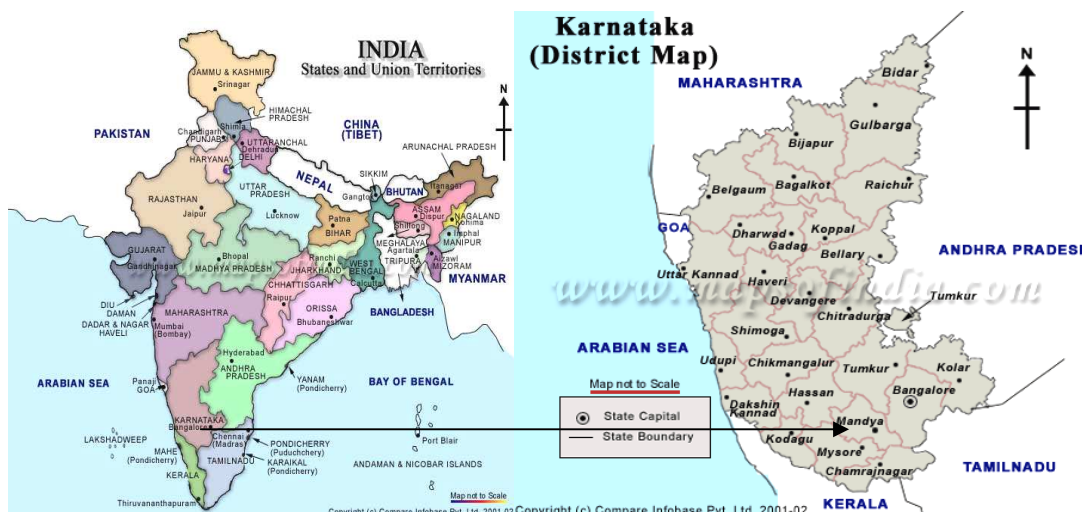
Kirugavalu Village, Malavalli Taluka

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

The Plant is located at Kirugaval village, Malavalli Taluka, Mandya District, Karnataka. The site is adjacent to the highway Bangalore – Kanakpura – Malavalli – Mysore.

Power generated from the plant is being evacuated through 66/11 KV MUSS at DG Koppalu of KPTCL (Karnataka Power Transmission Corporation Limited) which is located 1.1 km from the plant.

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The coordinates of the project location are:

Latitude: 12 deg – 28 N

Longitude: 77 deg – 8 E

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

According to Appendix B to the *Simplified Modalities and Procedures for Small-Scale CDM Project Activities*, the Project type and categories are defined as follows:

Project Type: I. RENEWABLE ENERGY PROJECTS

Project Category: I.D. Renewable electricity generation for a grid

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 sustainable grown biomass. The GHG emissions of the combustion process, mainly CO₂ are consumed by plant species, representing a cyclic process. Since, the biomass contains only negligible quantities of other elements such as lime Nitrogen, Sulphur etc., the release of other GHGs are considered as negligible. The biomass is CO₂ neutral and thus environmentally benign as it limits the greenhouse effect.

It is expected that conventional energy equivalent of around 150 GWh for the first 7 year crediting period will be replaced in Karnataka by the generation of power from the 4.5 MW non-conventional renewable sources biomass based power plant, thereby resulting in CO₂ emission reduction of around 112.5 tonnes. For the second crediting period it is expected that around 183.82 GWh will be exported from MPPL 4.5 MW. In the absence of the proposed activity, the same energy load would have been taken-up by thermal

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power plants and emission of CO₂ would have occurred due to combustion of conventional fuels like coal / gas.

The Karnataka Power Transmission Corporation Ltd (KPTCL) has responsibility for power purchase and transmission in Karnataka State where the present project activity is located. The main generation capacity is provided by plants built owned and operated by Karnataka Power Corporation Ltd. In addition, power is purchased from central government generating stations as KPCL is not in a position to provide adequate power generation capacity for the needs of the state. Karnataka was a pioneer in the development of hydropower and had a power surplus situation till the seventies. Due to rapid industrialization and other structural problems it is facing acute power shortage. In 2006-07, there was a power supply deficit of 849 MU in the state of Karnataka according to the Central Electricity Authority annual report 2006-2007. As per Karnataka Electricity Regulatory Commission last Tariff Order 2003, the mix of Thermal to Hydro/Non Conventional Energy (NCE) was 66:34. There are severe limitations in expanding large hydro capacity due to the relatively high level of already exploited resources (2901.4 MW). Consequently, the energy/peak load shortfall has been met largely from large coal fired Power Plants (viz. from NTPC Talcher / Ramagundam, NLC Neyveli, KPCL Bellary, Nagarjuna Power Mangalore) with continued uncertainty in hydro power generation (which is closely linked with rainfall). The MPPL 4.5MW biomass power plant has been important, not only due to the shortage of power availability and energy but also due to eco-friendly power generation.

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

The chosen crediting period for the project activity is renewable crediting period i.e., renewable after every 7 years. It is estimated that the project activity would generate about 140,000 CERs over the second crediting period. Annual estimates of emission reductions by the project activity during the above crediting period are furnished below.

Year	Annual estimation of emission reductions in tonnes of CO ₂ e
2008 (from 1 st of August 2008)	9,333
2009	20,000
2010	20,000
2011	20,000
2012	20,000
2013	20,000
2014	20,000
2015 (until the 31th of July)	10,667
Total estimated reductions (tonnes of CO ₂ e)	140,000
Total number of crediting Years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO ₂ e)	20,000

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

No public funding is involved in financing of this project. (See details in Annex - 2)

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

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

On basis of the above, the MPPL project cannot be considered a debundled component of a larger 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:

The approved CDM small-scale baseline and monitoring methodology AMS-I.D “Grid connected renewable electricity generation” (Version 13) is applied.

Reference: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

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

The project activity meets the eligibility criteria according to AMS.I.D version 13.

1. The project activity is renewable biomass that supply electricity to a distribution system that otherwise would have been supplied by the at least one fuel fired generating unit.

2. The capacity of the unit is 4.5MW and it does not exceed the limit of 15 MW for small scale projects.

B.3. Description of the project boundary:

The project boundary as specified under methodology AMS.I.D version 13 paragraph 6 encompasses the physical, geographical site of the renewable energy source. Hence, the project boundary covers the point of fuel supply to the point of power export to the grid where the project proponent has a full control. Hence, project boundary is considered within these terminal points. Thus, boundary covers fuel storage and processing, boiler, Steam Turbine generator (STG) and all other power generating equipments, and auxiliary consumption units.

B.4. Description of baseline and its development:

The baseline methodology has followed the one specified under methodology AMS.I.D, Version 13. The baseline has been considered using ‘Combined Margin’ approach. Southern regional grid has been considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. The emission factor for the southern regional grid is taken as per the Central Electricity Authority (CEA), Govt. of India calculations provided at <http://cea.nic.in> (provided in Annex – 3). Project participant decided to adopt ex-ante baseline emission factor and is fixed for the entire crediting period considering the scale of the project activity and monitoring required.

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:

Demonstration of additionality

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 Malavalli and surrounding area from this plant, would otherwise be drawing this power from the grid. In Karnataka, Hydro and other renewables together would account only 30% of total power purchase in the immediate future. Furthermore, the incremental electricity supply, in the future, will be over 90% from coal fired power plants. Thus by substituting the power from the grid with biomass power, the emissions associated with fossil fuels (Indian coal) are avoided.

Further referring to Attachment A to Appendix B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants have identified the following barriers to show that the project would not have occurred anyway.

a) Investment Barrier:

The project pioneered the utilization of low density crop residues, which otherwise are burnt in the fields causing environmental pollution (and not contributing to any economic activity). Successful implementation of the project has created 450 rural jobs and adds Rs. 45 million to the rural economy per year.

In view of the pioneering nature the project was sized as 4.5 MW as against the more standard rating (for Biomass Power Plants in India of 7.5 to 8 MW). This results in higher cost of generation due to

- Approximately 9% higher heat rate (resulting in higher fuel cost of approximately Rs. 0.20/Kwh)
- Approximately 10% higher unit capital cost (resulting in approximately Rs. 0.10/Kwh higher capital servicing costs during first 10 years)
- Same fixed O & M costs (resulting in approximately Rs. 0.15/Kwh higher unit O & M costs)
- Higher unburnts, lower availability and higher plant O & M costs in view of slagging/corrosion in the Boiler (resulting in approximately Rs. 0.05/Kwh higher O & M costs).

Consequently MPPL's "pilot plant", rated 4.5 MW, firing low density crop residues as primary fuel has higher cost of generation of Rs. 0.50/Kwh as compared to a more standard biomass power plant, rated 8 MW, firing mill residues (rice husk, bagasse)/wood.

On account of the project's pioneering nature there were various incremental costs that had to be incurred during the units stabilisation phase (August 2001 – March 2003). During this period

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MPPL suffered a loss of Rs.37.77 million. This increased the financial costs and thereby cost of generation. Attached Financial report (as on March 31st, 2004) gives audited figures, which substantiates the above facts.

The Project Promoters avoid any use of forest wood and/or coal, to meet their goal of showcasing a techno-economically viable crop residue fired Power Plant.

From the above, it is clear that a financially more viable alternative of an 8 MW rice husk/bagasse/wood cum coal fired power plant would have been an economically more attractive alternative for the project developers but with significantly lesser contribution to sustainable development (Enclosure 1 – Financial comparison of technologies).

(b) Technological Barrier:

Firing of low density crop residues as primary fuel required various technological innovations related to fuel beneficiation systems as well as boiler design/O & M protocols.

Furthermore, the project implemented a 100% ash utilization scheme involving the production of organic fertilizer and distributing it to farmers from whose fields the crop residues were collected.

The above technological innovations resulted in the project incurring loss of Rs. 34.77 million between August 2001 to March 2003 (plant operations stabilisation phase).

Such developmental costs had been anticipated and the funding was expected through CDM.

(c) Barrier due to prevailing practice:

The project meets the electricity needs of surrounding 47 villages comprising 10,500 consumers.

The prevailing practice is to have energy generated from centralized coal power plants transported through transmission and distribution networks (losses of 34%) and sold at subsidized rates (average tariff Rs. 1.10/Kwh) with low collection efficiency (46%).

The project encouraged involvement of the local community in the crop residues supply chain as well as initiatives related to organic fertilizer production and electricity distribution.

Thereby the project is sensitizing the local community on the costs of electricity generation as well as need to pay user charges. In the process energy conservation is also being achieved. The above goals undoubtedly involve higher project risks but significantly reduce GHG emissions.

(d) Other Barriers :

(i) SHORTFALL IN ANTICIPATED PROJECT FUNDING

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The project is the first plant in India to adopt low density crop residues as primary fuel. As with any pioneering project there are significant developmental activities/costs, beyond normal plant construction costs.

The Government of Karnataka (GOK) had recognised the pioneering elements and more significantly sustainable development contribution of the project. Consequently, the following GOK support was anticipated by MPPL.

- Preference Capital contribution by Karnataka Renewable Energy Development Ltd. (KREDL) to the extent of Rs. 16.8 million. Towards this effect communications were exchanged between MPPL and KREDL on September 6th, 1999 and this matter was discussed on KREDL's Board of Directors meeting on February 19th, 2000 and June 29th, 2000.

On this premise MPPL promoters proceeded with construction of the project. Unfortunately, KREDL finally made equity contribution of only Rs.4.62 million. KREDL letter No. KRED/ 03/ MPPL/ 00/ 1082 dated October 19th, 2000 (Attachment A) lists out the total sequence of events.

- Capital Subsidy of Rs. 10 million. Towards this effect, Government of Karnataka passed GO No. DE 17 NCE 98 dated May 28th, 1999.

The nodal agency KREDL recommended, vide its letter ref. KRED/03/MPPL/01/393 dated November 20th, 2001 to the Principal Secretary, Dept. of Energy, Government of Karnataka that Rs.10 million Capital Subsidy may be released to MPPL (Attachment B).

Unfortunately this amount was not released.

As such, the project suffered a shortfall of Rs. 22.18 million from anticipated funding towards the developmental costs of a pioneering sustainable development project.

(ii) SHORTFALL IN RECEIPTS FROM KPTCL (POWER PURCHASER)

Furthermore, KPTCL (State owned Power Utility) has not been honouring the contracted Power Purchase Agreement, resulting in overdues of Rs. 11.18 million, as on March 31st, 2005.

(iii) PROCEDURAL DELAYS IN HOST COUNTRY APPROVAL

The project participants anticipated unforeseen development costs in both the construction as well as operations stabilisation phases of this pioneering project.

CDM funds were a key assumption. Towards this end the Chairman of MPPL visited SENTER and had discussions with Mr. Looijenstein during April 2001. Copies of relevant correspondence are attached (Attachment C).

The project developers obtained the CERUPT tender documents and made all efforts for participation. However, the same could not be successfully pursued on account of lack of clarity in procedural approvals at that time.

The project has received host country approval and copy of letter dated March 23rd, 2005 from Ministry of Environment & Forests (Indian DNA) is attached. (Attachment D).

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SUMMARY

All the above circumstances have placed the project in a very precarious financial position. Without receipt of CDM funds the project may be obliged to close down.

Such closure would automatically result in the local electricity needs (27 million Kwh/year) being met from coal fired Power generation and thereby result in higher GHG emissions.

Furthermore MPPL pioneering project has acted as a catalyst for biomass power plants in South India and more importantly has showcased how biomass power plants should be integrated with rural community development initiatives. It would hence be a shame if such a project is obliged to close down due to liquidity crisis caused by shortfall in anticipated developmental funding and lack of CDM funds.

B.6. Emission reductions**B.6.1. Explanation of methodological choices:*****Emission Reductions:***

$$(1) \text{ER}_y = \text{BE}_y - \text{PE}_y - \text{LE}_y$$

Where :

ER _y	Emission reductions in the year “y” (tCO ₂ e)
BE _y	Baseline emissions in the year “y” (tCO ₂ e)
PE _y	Project emissions in the year “y” (tCO ₂ e)
LE _y	Leakage emissions in the year “y” (tCO ₂ e)

Project emissions:

All the fuel used in the power plant is renewable biomass in the form of agro-waste. Renewable biomass is considered carbon neutral and hence GHG emission free.
Therefore there are no project activity emissions.

$$(2) \text{PE}_y = 0$$

Baseline emissions:

According to paragraph 9 of the methodology AMS.I.D version 13, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) as the combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the ‘Tool to calculate the emission factor for an electricity system’.

$$(3) \text{BE}_y = \text{W}_{\text{el},y} * \text{EF}_{\text{BM},y}$$

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BE _y	Baseline emissions in the year “y” (tCO ₂ e)
EF _{CM,y}	Combined margin emission factor of the generation mix in the year “y” (tCO ₂ e/MWh)
W _{el,y}	Electricity production exported to the grid in the year “y” (MWh/y)

$$(4) EF_{CM,y} = W_{OM} * EF_{OM,y} + W_{BM} * EF_{BM,y}$$

EF _{CM,y}	Combined margin emission factor of the generation mix in the year “y” (tCO ₂ e/MWh)
EF _{BM,y}	Build-in margin emission factor of the generation mix in the year “y” (tCO ₂ e/MWh)
EF _{OM,y}	Operating margin emission factor of the generation mix in the year “y” (tCO ₂ e/MWh)
W _{OM}	Weighting of operating margin emissions factor (%)
W _{BM}	Weighting of build-in margin emissions factor (%)

For a renewal of a crediting period, the ‘Tool to calculate the emission factor for an electricity system’ imposes to use $W_{OM} = 0.25$ and $W_{BM} = 0.75$.

Southern Regional grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. It is observed that, in the southern regional grid generation mix, coal, diesel and gas based power projects are responsible for GHG emissions. The data published by Central Electricity Authority (CEA) has been used as the baseline emission factor¹.

Leakage:

As per the approved methodology AMS I.D, leakage is to be considered, if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. The project is a green field activity and there is no transfer of equipment to or from the project activity. Hence leakage due to transfer of equipment is zero.

Hence:

$$(5) LE_y = LE_{b,y} + LE_{t,y}$$

Where :

LE _y	Leakage emissions in the year “y” (tCO ₂ e)
LE _{b,y}	Leakage emissions from biomass competition in the year “y” (tCO ₂ e)
LE _{t,y}	Leakage emissions from biomass transporaton in the year “y” (tCO ₂ e)

Leakage from biomass competition:

As per the latest general guidance on leakage in biomass project activities (Eb 28 version 2 Attachment C to Appendix B, Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories), for small scale energy CDM project activities involving renewable biomass, there are three types of emission sources that are potentially significant (>10% of emission reductions) and attributable to the project activities. These emission sources may be project emissions (if under the control of project participants, i.e. if the land area where the biomass is grown is included in the project boundary) or sources of leakage (if the source is not under control of project participants). The following

¹ Source: CEA, <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

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table summarises for different types of biomass, the cases where the emission source is relevant and the cases where it is not.

Biomass type	Activity source	Shift of pre-project activities	Emission form biomass generation/cultivation	Competing use of biomass
Biomass from forest	Existing forests			X
	New forests	X	X	
Biomass from croplands or grasslands (woody or non woody)	In the absence of the project the land would be used as cropland/wetland	X	X	
	In the absence of the project the land would be abandoned		X	
Biomass residues or wastes	Biomass residues are collected and used			X

The project activity is generating electricity using biomass residues, hence, according to the Attachment C to Appendix B “indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories”, the leakage source applicable is “Competing use of biomass”.

The leakage affect due to competing uses of biomass will be monitored every year during the crediting period to ensure that the implementation of project activity does not lead to any increase in GHG emissions from fossil fuel combustion or other sources due to diversion of biomass residues from the other uses to the project as a result of project activity. The project participant will evaluate annually if there is surplus of biomass in the region of the project activity, which is not utilized. Biomass assessment in the region will be carried out annually based on the latest available literature / data from the government sources to determine if the biomass is at least 25% larger than the total quantity utilized by the project activity as well as existing users. In the absence of official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work. If it is found that the project leads to leakage affect, the emissions due to leakage will be estimated and deducted from the emission reductions.

$$(6) LQ_{\text{Biomass}} = [TQ_{\text{Biomass}} - (BQ_{\text{project}} + BQ_{\text{other users}}) * 1.25]$$

LQ_{Biomass}	Quantity of Biomass less than the required 25% larger than combined usage (in Kg)
TQ_{Biomass}	Total Biomass Quantity available in the region in Kg
BQ_{project}	Biomass Quantity utilized by project activity in Kg
$BQ_{\text{others users}}$	Biomass Quantity utilized by other users in Kg

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In case LQ_{Biomass} is positive (+) then there would be no leakage, hence Leakage will be zero. However, if LQ_{Biomass} is negative (-), then the leakage shall be calculated using the following formula:

$$(7) LE_{t,b} = -(LQ_{\text{Biomass}}) \times NCV_{\text{Biomass}} \times EF_{\text{Coal}}$$

$LE_{t,y}$ Leakage from biomass competition (tCO₂)
 LQ_{Biomass} Quantity of Biomass less than the required 25% larger than combined usage (in Kg)
 NCV_{Biomass} Net Calorific Value of Biomass (in TJ/Kg)
 EF_{Coal} Emission Factor of Coal (IPCC Default, tCO₂/TJ)

Leakage from transport:

The project may result in a change in transport emissions. This would occur when the waste is transported from waste collecting points, in the collection area, to the treatment facility.

In this case, project participants shall document an overview of collection points from where the waste will be collected, their approximate distance (in km) to the treatment facility, existing landfills and their approximate distance (in km) to the nearest end-user.

For calculations of the emissions, IPCC default values for fuel consumption and emission factors may be used. The CO₂ emissions are calculated from the quantity of fuel used and the specific CO₂-emission factor of the fuel for vehicles i to n, as follows:

$$(8) LE_{t,y} = \sum_{i=1}^n NO_{\text{vehicles},i,y} \times DT_{i,y} \times D_{\text{fuel}} \times EF_{\text{fuel}}$$

Where:

$LE_{t,y}$ Leakage emissions from biomass transporaton in the year “y” (tCO₂e)
 $NO_{\text{vehicles},i,y}$ Number of vehicles for transport with similar loading capacity
 y
 $DT_{i,y}$ Annual diesel consumption by vehicle type i (l)
 D_{fuel} Fuel density (kg/l), if necessary
 EF_{fuel} Emission factor of the fuel (tCO₂/tfuel)

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

Data / Parameter:	EF_{OM} and EF_{BM}
Data unit:	tCO ₂ e/MWh
Description:	Operating and Build-in margin emission factor of the southern Indian grid
Source of data used:	Government of India, Ministry of Power, Central Electricity Authority
Value applied:	EF _{OM} = 1.004 and EF _{BM} = 0.705
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official and publicly available values published by the CEA on an annual basis.

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Any comment:	
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Data / Parameter:	W_{OM} and W_{BM}
Data unit:	---
Description:	Weight of the operating and build-in margin
Source of data used:	UNFCCC
Value applied:	$W_{OM} = 0.25$ and $W_{BM} = 0.75$
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default weight values for renewal of a crediting period according to the “Tool for calculation of the emission factor for renewable energy system”.
Any comment:	

Data / Parameter:	D_{fuel}
Data unit:	kg/l
Description:	Fuel density of diesel for biomass transportation
Source of data used:	CO2 Baseline Database for the Indian Power Sector, User Guide, Version 3.0
Value applied:	0.830
Justification of the choice of data or description of measurement methods and procedures actually applied :	National default value.
Any comment:	

Data / Parameter:	E_{fuel}
Data unit:	(tCO ₂ /t _{fuel})
Description:	Emission factor of the fuel
Source of data used:	IPCC 2006
Value applied:	3.185
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value for diesel
Any comment:	

Data / Parameter:	E_{F_{Coal}}
Data unit:	(gCO ₂ /MJ)
Description:	Carbon emissions factor of Coal used
Source of data used:	India's Initial National Communication to the United Nations Framework Convention on Climate Change

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Value applied:	95.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	National default value
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The emission reductions from the project activity are calculated in the following steps:

Step 1: Calculating the Operating Margin emission factor ($EF_{OM,y}$)

The operating margin emission factor has been calculated using 3 year data calculated by Central Electricity Authority (CEA) in their CO₂ baseline database.

The $EF_{OM,y}$ is estimated to be:

For the year 2004-2005 the $EF_{OM,Y}$ is 1.001 tCO₂/MWh

For the year 2005-2006 the $EF_{OM,Y}$ is 1.008 tCO₂/MWh

For the year 2006-2007 the $EF_{OM,Y}$ is 1.003 tCO₂/MWh

Thus the final $EF_{OM,Y}$ based on three years average is estimated to be **1.004 tCO₂/MWh**.

Step 2: Calculation of the Build Margin Emission Factor $EF_{BM,Y}$

The $EF_{BM,y}$ is estimated as **0.705 tCO₂/MWh** (with sample group m constituting most recent capacity additions to the grid comprising 20% of the system generation), for the year 2006-07 as given in CEA database.

Step 3: Calculation of Baseline Emission Factor EF_y

Calculate the baseline emission factor EF_y as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = w_{OM} EF_{OM,y} + w_{BM} . EF_{BM,y}$$

$$\text{Baseline Emission factor: } 0.25 * EF_{OM,y} + 0.75 * EF_{BM,y} = \mathbf{0.780 \text{ tCO}_2/\text{MWh}}$$

Step 4: Calculation of Baseline Emissions (BE_y)

The net electricity supplied by the project in a year is estimated to be 26.26 GWh

Hence, baseline emissions are estimated as follows: $BE_y = 26.26 * 0.780 = 20,483 \text{ tCO}_2\text{e/yr}$

Step 5: calculation of leakage from transportation

Five vehicles are dedicated to biomass transportation, the annual diesel consumption of the 5 trucks is estimated to 182,870 liters.

Hence :

$$LE_{t,y} = 182.870 * 3.185 * 0.83 = 483.4 \text{ tCO}_2\text{e}$$

Step 6: calculation of leakage from biomass competition

To ensure that there is a surplus of biomass within a radius of 150km of the plant site a Biomass Assessment Study in the project region was carried out by the local NGO, Span Educational and Charitable Trust. The survey showed that the availability of biomass material (Coconut fronds, rice husk, cane trash groundnut husk etc) in the four districts that supplies the project activity with biomass (Mandaya, Mysore, Hassan and Chamarajanagar) is around 2,169,668 tonnes. The total biomass surplus in the four districts is 630,115 tonnes which corresponds to a surplus of about 29%. To be conservative, the peak requirement of MPPL, which is a consumption of 56,400 tonnes, has been used in the leakage calculation. Thus the total surplus of biomass available after usage of the project is estimated at 573,715 tonnes which equals a surplus of 26.44%. This demonstrates that the quantity of available biomass is more than 25% larger than the quantity of biomass that is utilized including the project activity. From the survey it is also clear that MPPLs usage of the surplus biomass is relatively small compared to the total amount of surplus in the region. From the regional surplus of 630,115 tonnes, MPPL uses less than 10%. About 81% of the biomass used by MPPL is cane trash and coconut fronds. Since MPPL 4.5 MW is the only plant capable of firing these fuels, they have no competitive use and thus 100% of the available amounts of these biomass types are surplus. From the above analysis, it can be concluded that the project activity does not have any sources of leakage due to type of biomass utilized. Hence, the leakage emissions due to competing use of biomass is neglected.

As no competition from biomass has been reported: $LE_{b,y} = 0$

Step 7: Calculation of Emission Reductions (ER_y)

The emission reductions by the project activity during a given year y is the difference between Baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y).

$$\begin{aligned} ER_y &= BE_y - PE_y - L_y \\ &= 20,483 - 483 \\ &= 20,000 \text{ tCO}_2\text{e} \end{aligned}$$

B.6.4 Summary of the ex-ante estimation of emission reductions:Total emission reductions (tonnes CO₂e)

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Year	Emission of project activity emissions (tCO ₂ e)	Estimation of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
1	0	20,483	483	20,000
2	0	20,483	483	20,000
3	0	20,483	483	20,000
4	0	20,483	483	20,000
5	0	20,483	483	20,000
6	0	20,483	483	20,000
7	0	20,483	483	20,000
Total (tonnes CO ₂ e)	0	143,381	3,381	140,000

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

Data / Parameter:	NCV _{biomass}
Data unit:	(TJ/Kg)
Description:	Net Calorific Value of Biomass
Source of data to be used:	Analysis reports
Value of data	3000
Description of measurement methods and procedures to be applied:	Through sample testing in lab which will be done batch wise.
QA/QC procedures to be applied:	The data will be based on the laboratory analysis. The instruments used for the analysis will be checked for their calibration.
Any comment:	Based on the sample tests conducted.

Data / Parameter:	W _{gl,y}
Data unit:	MWh/y
Description:	Electricity production generated in the year “y”
Source of data to be used:	Facility measurements at project site
Value of data	29,500
Description of measurement methods and procedures to be applied:	The energy metre is the instrument which records the power generation
QA/QC procedures to	Meter is Calibrated and Regularly inspected by KPTCL.

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be applied:	
Any comment:	The data is archived both electronic and paper for the crediting period plus 2 years

Data / Parameter:	Wel,y
Data unit:	MWh/y
Description:	Electricity production exported to the grid in the year “y”
Source of data to be used:	Facility measurements at project site
Value of data	26,260
Description of measurement methods and procedures to be applied:	The plant is equipped with energy meters/export meters for monitoring and control purpose. Electricity Export is monitored through trivector meters (which are calibrated by Meter and Relay Testing Department of KPTCL).
QA/QC procedures to be applied:	Meter is Calibrated and Regularly inspected by KPTCL. There is a main meter and a check meter to provide for contingencies of any technical failure in the meter. To prevent tampering the meters are sealed by KPTCL. The energy metre is the instrument which records the power generation
Any comment:	The data is archived both electronic and paper for the crediting period plus 2 years

Data / Parameter:	TQ _{Biomass}
Data unit:	Tonnes
Description:	Total Biomass Quantity available in the region
Source of data to be used:	Official data or a specific biomass assessment study for the region
Value of data	2,169,668 tonnes per annum
Description of measurement methods and procedures to be applied:	The project participant will evaluate annually the total biomass quantity available in the region.
QA/QC procedures to be applied:	Biomass assessment in the region will be carried out annually based on the latest available literature / data from the government sources. In absence of official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work.
Any comment:	

Data / Parameter:	BQ _{others users}
Data unit:	Tonnes
Description:	Biomass Quantity utilized by other users in the region
Source of data to be used:	Official data or a specific biomass assessment study
Value of data	1,539,553 tonnes per annum
Description of measurement methods and procedures to be applied:	The project participant will evaluate annually the total biomass quantity utilized by others in the region.

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applied:	
QA/QC procedures to be applied:	Biomass assessment in the region will be carried out annually based on the latest available literature / data from the government sources. In absence of official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work.
Any comment:	

Data / Parameter:	BQ _{project}
Data unit:	Tonnes
Description:	Biomass Quantity utilized by project activity
Source of data to be used:	A fuel receipt note, maintaining besides other information, the type of transport and quantity/type of biomass delivered to the plant each day
Value of data	Cane Trash: 9,300 t/year Coconut fronds: 18,800 t/year Rice Husk: 6,000 t/year Chips from Coconut fronds rear portion / Bagasse: 5,300 t/year Forestry residues, saw mill waste and Plantation Wood (like eucalyptus and casuarina): 3,000 t/year. Plantation Wood cropping: 5,000 t/year
Description of measurement methods and procedures to be applied:	Biomass supply vehicles are weighed through an electronic weigh bridge, immediately on entry into the Biomass Power Plant.
QA/QC procedures to be applied:	The electronic weigh bridge is periodically calibrated by Deputy Controller Weights & Measurements District Office, which is a statutory body.
Any comment:	These above quantities are the expected amount of each type of biomass that is expected to be used in the plant. If other sort of biomass is used they will be monitored the same way.

Data / Parameter:	SQ _{region}
Data unit:	Tonnes
Description:	Surplus of biomass in the region of the project activity, which is not utilized.
Source of data to be used:	Official data or a specific biomass assessment study for the region
Value of data	573,715 tonnes
Description of measurement methods and procedures to be applied:	The project participant will evaluate annually if there is surplus of biomass in the region of the project activity, which is not utilized.
QA/QC procedures to be applied:	Biomass assessment in the region will be carried out annually based on the latest available literature / data from the government sources to determine the surplus of the biomass in the region. From the available biomass in the region the quantity utilized by the project activity as well as other users will be subtracted to calculate the surplus of biomass in the region. In the absence of official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work.

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Any comment:	
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Data / Parameter:	DT_{i,y}
Data unit:	KL/yr
Description:	additional diesel consumption by vehicle type i
Source of data to be used:	Fuel receipt notes
Value of data	Tractor 1 : 11,880 Tractor 2 : 300 Tractor 3 : 9,920 Truck 1 : 159,830 Truck 2 : 940
Description of measurement methods and procedures to be applied:	A fuel receipt note maintaining besides other information, the type of transport and quantity of biomass delivered to the plant each day
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	NO_{vehicles,i,y}
Data unit:	
Description:	Number of vehicles for transport with similar loading capacity
Source of data used:	
Value applied:	3 tractors and 2 trucks
Justification of the choice of data or description of measurement methods and procedures actually applied :	
QA/QC procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

The primary responsibility for the data measurement as per the monitoring plan will be carried out by the Plant Manager and necessary reports will be generated for the management i.e. Board of Directors or its committee for review. (Evidence provided to and verified by DNV).

Monitoring of emissions from transport: MPPL maintains a document called the Fuel Receipt Note which contains the following information (amongst other information), based on biomass supply to the Plant. (Evidence provided to and verified by DNV).

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1. Supplier Name
2. Security Register
 - Vehicle No.
 - Vehicle Type (Lorry, 4-Wheel Trolley, 2-Wheel Trolley, Bullock Cart)
3. Weightment Details
 - Receipt No.
 - Date
 - Fuel Type (named in the local language to include cane trash, coconut fronds, groundnut husk, rice husk, toppings of various types of plantation wood etc.)
 - Gross Weight
 - Tare Weight
 - Net Weight
 - Moisture %

Based on the information contained in the Fuel Receipt Notes, MPPL is able to monitor and estimate the emissions from transport that contribute to leakage from biomass supply to the Plant.

The management reviews the data collected and also suggest corrective actions wherever required. Management also examines the internal audit reports independent of the Plant manager's report. In particular the management take notes of deviations in data over the norms and monitor that the corrective actions have resulted in adherence to the standards. It is the responsibility of the Plant Manager to report to the management about compliance with management's instructions on corrective actions.

The company will introduce an internal audit system for the GHG compliance. The internal auditor appointed for the purpose will be an individual with necessary experience exclusively in GHG audits. The person appointed as an internal auditor is given clear instructions about his scope of work and reporting requirements. He is carrying out his work on monthly basis or as required by the monitoring plan. His report indicates the compliance requirements and achievements. He will work directly under the control of the Board of Directors and all his reports will be addressed to the Board directly. The internal auditor in particular reports to the management any non-compliance with corrective actions by the operating staff.

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

Date of completing the final draft of this baseline section:

12/02/2008

Name of person/entity determining the baseline:

Mr. Patrick Bürgi, South Pole Carbon Asset Management Ltd.

Please refer to Annex 1 for detailed contact information

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SECTION C. Duration of the project activity / crediting period**C.1 Duration of the project activity:**

Operational lifetime: 25y-0m

Length of second crediting period: 7y-0m

C.1.1. Starting date of the project activity:

The construction of the project activity started in 1 April 2000 and is operational since 1 August 2001. (Evidence provided to and verified by DNV).

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

25y-0m

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

The project was registered as a CDM project the 21 July 2006. The first 7 year renewable crediting period started 01 August 2001 and expires 31 July 2008. The project proponents are applying for a second crediting period between 01 August 2008 and 31 July 2015.

C.2.1. Renewable crediting period

Renewable crediting period is applicable as crediting period for the present project activity.

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

01/08/2008

C.2.1.2. Length of the second crediting period:

7y-0m

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

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

Since the project is a renewable energy biomass based power project it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. As per the government of India notification dated June 13, 2002 based on environment protection rule, 1986, public hearing and EIA is required for those industries / projects which are listed in the predefined list of ministry of environment and forest. Thermal power projects with investment of less than Rs. 1000 million 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 KPCB

It fires less than 20% of the total fuel fired as wood and that too only toppings of plantation wood (Eucalyptus & Casuarinas spp.).

Also, the project has received host country endorsement form Designated National Authority, Ministry of Environment and Forest, Government of India.

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

Not applicable

SECTION E. Stakeholders' comments

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

The local stakeholders' comments invitation and compilation process adapted was as follows:

All the individuals and organisations that are impacted by the project are perceived as stakeholders. They can be within the boundaries of the village, district, state or nation. On deciding above criteria for qualification of the stakeholders, the approval was to select the most appropriate representative body.

The following were identified as stakeholders of the project

- Local community / Administrative authorities
 1. Village Panchayat
 2. District Commissioner
 3. Biomass Suppliers
- Customer (KPTCL)
- Licensing and regulatory authorities like
 1. KREDL
 2. KSPCB (Karnataka State Pollution Control Board)
 3. MoEF (Ministry of Environment & Forest)
 4. CGWB (Central Ground Water Board)
 5. Electrical Inspectorate

The views of Local Community / Administrative Authorities were ensured through creation of "Grameena Abhivrudhi Mandali" which has nominees of the Taluka/Grama Panchayats and essentially is a representative body of the local community.

The views of the *customer* are enshrined in the Power Purchase Agreement that was signed with KPTCL in September 2000. (Evidence provided to and verified by DNV).

The views of *licensing/ regulatory authorities* are enshrined in approvals obtained from them. (Evidence provided to and verified by DNV).

Stakeholders' involvement

The village Panchayat / local elected body of representatives administering the local area is a true representative of the local population in a democracy like India. Hence, their consent / permission to set up the project is necessary. MPPL completed the necessary consultation and documented their approval for the project.

Local population comprises of the local people in and around the project area. The roles of the local people are as a beneficiary of the project. The local population are involved in the supply of the biomass and hence the project would be beneficial project for the local population. In addition, to this, the project would also lead to local manpower working at the plant site. Since, the project will provide good direct and indirect employment opportunities the local populace encouraged the project.

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Involvement of the village Panchayat and local population is ensured through creation of a not for profit society *Grameena Abhivrudhi Mandali* which is responsible for managing the Biomass Supply Chain, Organic Fertiliser distribution as well as provide sub-contract services to MESCOM (local Electricity Distribution Utility). The supervisory/governing boards of *Grameena Abhivrudhi Mandali* have nominated members from the Taluka Panchayat and Grama Panchayat.

The project did not involve displacement of any local population. In addition, the local population is a direct beneficiary through jobs created (650 in number) as well as reliable electricity supply from MPPL's 4.5 MW unit.

The distance between the electrical substation for power evacuation and the plant is 1.1 km, as such; installation of transmission lines did not create any inconvenience to the local population.

Karnataka Pollution Control Board (KPCB) has prescribed standards of environmental compliance and monitors the adherence to the standards. The project has received No Objection Certification (NOC) from KPCB to start and operate the plant.

Non-Conventional Energy Development Agency of Karnataka (KREDL) implements policies in respect of non-conventional renewable power projects in the state of Karnataka and has accorded approval to the project. Furthermore, KREDL is a minority share holder in MPPL.

As a buyer of the power, the KPTCL is a major stakeholder in the project. They hold the key to the commercial success of the project; KPTCL has cleared the project and signed Power Purchase Agreement (PPA) with MPPL (which has been duly approved by the Karnataka Electricity Regulatory Commission).

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.

E.2. Summary of the comments received:

The overall response to the stakeholder consultation meeting was very positive. It is fair to report that the Project has greatly improved the standard of living in at least 48 villages, through the distribution of reliable power of good quality.

Before the Malavalli Power Plant (MPP) was set up, the area received electricity for an average of 6 hours in 2 days, at a voltage of around 180-200 V. After MPP was set up, these same areas have a reliable electric supply for 18 hours every day at an improved voltage of 420 V. This has resulted in the expansion of existing industries as reported by Zakriya Khan, owner of Model Binny Rice Industries and Village Panchayat member. Mr. Khan is now able to run his rice mill upto 18 hours a day. Subsequently, he was even able to purchase a sophisticated paddy dryer.

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Due to the increased availability of water for irrigation, farmers are able to grow more than 1 crop a year. As MPP uses mostly cane trash and coconut fronds i.e. agricultural waste, as fuel, the farmers can now sell what would have otherwise been waste material. New industries such as saw mills are also becoming prevalent in the area, by virtue of the improved power supply.

It appears that one of the greatest assets of the Project has been the number of new jobs it has created. At least 500 new jobs including those for power plant staff and labour, from the biomass supply chain, and from power distribution, maintenance and revenue collection can be attributed directly to MPP. Employees at the Plant are familiar with emergency procedures and are required to attend a complete health check-up at a nearby clinic, once every two months.

In the past, locals were busy only 3 months of the year, during the cropping season. They now have work all year round, which has increased income generation and the ability to own income generating assets. Where according to them, “the bank was for the rich man”, they now have enough income to make transactions at the bank themselves.

On a social level, men have stopped idling away 9 months of the year in drinking, gambling and other social vices. The locals claim that women feel safer to walk on the roads due to the 24-hour activity at the Plant, as well as the improved lighting in villages. MPP has put Kirugaval Village on the map. There is now a permanent bus stop just near the Plant and regular bus services are now available in the area.

The MPP management is focused in its goal of sustainable development in the area. They maintain a practical and transparent relationship with all stakeholders and have created a fair and profitable working environment. Local stakeholders appear to be aware of the problems MPP has faced in the past. They appear committed to working together with the management in continuously improving the Project and thus reaping its benefits. (Evidence provided to and verified by DNV).

As mentioned previously, MPPL has already received the approvals and clearances for their project from all stakeholders, and in particular

- Consent from Central Ground Water Board
- Consent order of Establishment from Karnataka Pollution Control Board:
- Power Purchase Agreement with KPTCL
- Clearance from the Gram Panchayat
- Host country endorsement from DNA, MoEF, Government of India

Concerns related to environmental pollution, ground water extraction, employment of locals were expressed and adequately addressed. MPPL meets all performance norms stipulated by statutory/regulatory authorities. Reports to statutory bodies are submitted regularly and license renewals are obtained as required.

The Grama Panchayat’s concerns of local employment are more than adequately met as more than 80% of MPPL’s staff is locals.

Furthermore MPPL has addressed the concerns of the *local community* and ensured their active involvement through Grameena Abhivrudhi Mandali (GAM).

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GAM has created over 550 rural jobs in Biomass Supply Chain, Organic Fertiliser Production/Distribution, and Biomass Power Plant O & M and BPO services related to Electricity Distribution. GAM also contributes over Rs. 45 million/year to the rural economy.

Since GAM has in its Governing/Supervisory Board nominees of the Taluka/Grama Panchayat, it ensures that local community needs are understood and catered to the maximum extent feasible.

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

In the foregoing paragraph G.2, we have listed out the comments/concerns of stakeholders and how MPPL addressed the same. Monthly meetings with local community and Government of Karnataka officials ensures that there is an ongoing process of receiving feedback as well as course corrective actions (where required).

MPPL website: www.mpppl.com also receives comments and the company takes appropriate steps to meet stakeholders' expectations. On the whole, stakeholders are satisfied with the results of MPPL's pioneering project which has contributed significantly to the socio-economic development within Mandya District. This is documented in the following:

- * Report by CPRI (a unit under Union Ministry of Power), prepared during Nov 2002, which was funded by GTZ.
- * A film on MPPL's initiatives produced during Nov 2004, which was aired on BBC World during Feb 2005.

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

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

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Annex 3

BASELINE INFORMATION

Generation Data, Emission Data published by Central Electricity Authority, Government of India.

Weighted Average Emission Rate (tCO ₂ /MWh) (excl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.71	0.71	0.72
East	1.09	1.06	1.11	1.1	1.08	1.08	1.03
South	0.73	0.75	0.82	0.84	0.78	0.74	0.72
West	0.9	0.92	0.9	0.9	0.92	0.87	0.85
North-East	0.42	0.41	0.4	0.43	0.32	0.33	0.39
India	0.82	0.83	0.85	0.85	0.84	0.82	0.8

Simple Operating Margin (tCO ₂ /MWh) (excl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1	0.99	0.97	0.99	0.99
East	1.22	1.22	1.2	1.23	1.2	1.16	1.13
South	1.02	1	1.01	1	1	1.01	1
West	0.98	1.01	0.98	0.99	1.01	0.99	0.99
North-East	0.74	0.71	0.74	0.74	0.71	0.7	0.69
India	1.02	1.02	1.02	1.03	1.03	1.02	1.01

Build Margin (tCO ₂ /MWh) (excl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.6	0.63
East					0.9	0.97	0.93
South					0.7	0.71	0.71
West					0.77	0.63	0.59
North-East					0.15	0.15	0.23
India					0.69	0.68	0.68

Combined Margin (tCO ₂ /MWh) (excl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.76	0.76	0.77	0.76	0.75	0.8	0.81
East	1.06	1.06	1.05	1.07	1.05	1.06	1.03
South	0.86	0.85	0.86	0.85	0.85	0.86	0.85
West	0.87	0.89	0.88	0.88	0.89	0.81	0.79
North-East	0.44	0.43	0.44	0.44	0.43	0.42	0.46
India	0.86	0.86	0.86	0.86	0.86	0.85	0.85

GENERATION DATA

Gross Generation Total (GWh)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	144292	151185	155385	165735	168438	179751	191104
East	58936	64048	66237	73374	85776	93902	101939
South	129035	131902	136916	138517	144086	147355	161897
West	162320	165905	177399	172682	183955	188606	198246
North-East	2319	5332	5808	5867	7883	7778	6970
India	499911	518722	541764	558175	590138	617392	661277

Net Generation Total (GWh)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	135230	141415	144743	155043	157291	168206	179223
East	53530	58097	59841	68428	77968	86014	93818
South	121158	123630	127789	128373	134676	138329	152206
West	150412	153125	164448	159780	170726	176003	185493
North-East	5193	5213	5671	5752	7762	7653	6828
India	465345	481479	502492	517376	548423	576206	617567

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	25.90%	25.70%	26.10%	28.10%	26.80%	28.10%	27.10%
East	10.80%	13.40%	7.50%	10.30%	10.30%	7.20%	9.00%
South	28.10%	25.50%	18.30%	16.20%	21.60%	27.00%	28.30%
West	8.20%	8.50%	8.20%	9.10%	8.80%	12.00%	13.90%
North-East	42.20%	41.70%	45.80%	41.90%	55.50%	52.70%	44.10%
India	19.20%	18.90%	16.30%	17.10%	18.00%	20.10%	20.90%

Net Generation in Operating Margin (GWh)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	100189	103076	106942	111430	113131	120889	130397
East	47570	50308	55377	61378	69746	79863	85375
South	87114	92103	104449	107603	105568	100978	109116
West	138071	140173	150889	145264	155731	154918	159681
North-East	3002	3039	3704	3343	3456	3621	3819
India	375947	390700	420730	429040	449653	460249	488587

20% of Net Generation (GWh)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	27046	28283	28949	31009	31458	33641	35845
East	10670	11619	11968	13686	15594	17203	18764
South	24232	24726	25558	25675	26935	27666	30441
West	30082	30623	32890	31936	34145	35201	37099
North-East	1039	1043	1134	1150	1552	1531	1366
India	93069	96296	100498	103475	109685	115241	123513

Net Generation in Build Margin (GWh)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					37064	34340	36311
East					15818	17567	18907
South					28513	28228	30442
West					35257	35425	38242
North-East					2055	1793	1437
India					113707	117353	125538

Weighted Average Emission Rate (tCO ₂ /MWh) (incl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.72	0.73	0.74
East	1.06	1.03	1.09	1.08	1.05	1.05	1
South	0.74	0.75	0.82	0.84	0.79	0.74	0.72
West	0.9	0.92	0.9	0.9	0.92	0.89	0.86
North-East	0.42	0.41	0.4	0.43	0.52	0.33	0.4
India	0.82	0.83	0.85	0.85	0.84	0.81	0.8

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1	0.99	0.98	1	1
East	1.22	1.19	1.17	1.2	1.17	1.13	1.09
South	1.02	1	1.01	1	1	1.01	1
West	0.98	1.01	0.99	0.99	1.01	1	0.99
North-East	0.74	0.71	0.74	0.74	0.9	0.7	0.7
India	1.01	1.02	1.02	1.02	1.02	1.02	1.01

Build Margin (tCO ₂ /MWh) (not adjusted for imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.6	0.63
East					0.9	0.97	0.93
South					0.7	0.71	0.71
West					0.77	0.63	0.59
North-East					0.15	0.15	0.23
India					0.69	0.68	0.68

Combined Margin in (tCO ₂ /MWh) (incl. Imports)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.76	0.76	0.77	0.76	0.76	0.8	0.81
East	1.06	1.05	1.04	1.05	1.04	1.03	1.01
South	0.86	0.85	0.86	0.85	0.85	0.86	0.85
West	0.87	0.89	0.88	0.88	0.89	0.82	0.79
North-East	0.44	0.43	0.44	0.44	0.52	0.42	0.46
India	0.85	0.86	0.86	0.86	0.86	0.85	0.84

EMISSION DATA

Absolute Emissions Total (tCO ₂)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	97866565	102743113	106808582	109996544	112212597	120102148	129554682
East	58026488	61427499	66593200	75312010	83956860	92517315	96360317
South	89019263	92178116	105239700	108123211	105603624	101760966	109251806
West	135192153	141597621	148557341	144127175	157781065	153933190	157722686
North-East	2207396	2159969	2285724	2462796	2468463	2532819	2645856
India	382311864	400106317	429484546	440221736	462022608	470846647	495535347

Absolute Emissions OM (tCO ₂)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	97866565	102743113	106808582	109996544	112212597	120102148	129554682
East	58026488	61427499	66593200	75312010	83956860	92517315	96360317
South	89019263	92178116	105239700	108123211	105603624	101760966	109251806
West	135192153	141597621	148557341	144127175	157781065	153933190	157722686
North-East	2207396	2159969	2285724	2462796	2468463	2532819	2645856
India	382311864	400106317	429484546	440221736	462022608	470846647	495535347

Absolute Emissions BM (tCO ₂)							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					17108583	20625908	22941127
East					14303611	16990438	17547736
South					20092752	20045639	21475360
West					27148870	22318133	22707948
North-East					299124	267051	325491
India					78952941	80747168	84997662

Net Imports (GWh) - Net exporting grids are set to zero							
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0	0	0	0	3616	5748	6812
East	489	555	357	1689	0	0	0
South	1162	1357	518	0	0	0	0
West	321	0	79				
IMPORT DATA							

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For calculation of the combined margin baseline emission factor, the methodological tool “Tool to calculate the emission factor for an electricity system” (Version 01) is used.

For information about the “Tool to calculate the emission factor for an electricity system” (Version 01), please visit:

<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>

Annex 4

MONITORING INFORMATION

“The primary responsibility for the data measurement as per the monitoring plan will be carried out by the Plant Manager and necessary reports will be generated for the management i.e. Board of Directors or its committee for review. (Evidence provided to and verified by DNV).

Monitoring of emissions from transport: MPPL maintains a document called the Fuel Receipt Note which contains the following information (amongst other information), based on biomass supply to the Plant. (Evidence provided to and verified by DNV).

1. Supplier Name
2. Security Register
 - Vehicle No.
 - Vehicle Type (Lorry, 4-Wheel Trolley, 2-Wheel Trolley, Bullock Cart)
3. Weightment Details
 - Receipt No.
 - Date
 - Fuel Type (named in the local language to include cane trash, coconut fronds, groundnut husk, rice husk, toppings of various types of plantation wood etc.)
 - Gross Weight
 - Tare Weight
 - Net Weight
 - Moisture %

Biomass supply vehicles are weighed through an electronic weigh bridge, immediately on entry into the Biomass Power Plant. The electronic weigh bridge is periodically calibrated by Deputy Controller Weights & Measurements District Office, which is a statutory body. Based on the information contained in the Fuel Receipt Notes, MPPL is able to monitor and estimate the emissions from transport that contribute to leakage from biomass supply to the Plant.

The plant is equipped with energy meters/export meters for monitoring and control purpose. Electricity Export is monitored through trivector meters (which are calibrated by Meter and Relay Testing Department of KPTCL). There is a main meter and a check meter to provide for contingencies of any technical failure in the meter. To prevent tampering the meters are sealed by KPTCL.

Maintenance and calibration of trivector meters (monitoring equipment for electricity exports) is carried out by Meter and Relay Testing Department of KPTCL.

Power generation and export will be daily and the same will be verified and approved by Plant Manager at the plant from the installed meters.

Electricity sales are recorded in monthly meter readings which are carried out on the 1st working day of the month subsequent to electricity sales, by KPTCL executives.

The management review the data collected and also suggest corrective actions wherever required.

Management also examine the internal audit reports independent of the Plant manager's report.

Management will in particular take note of deviations in data over the norms and monitor that the corrective actions have resulted in adherence to the standards. It will also be the responsibility of Plant

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Manager to report to the management about compliance with management's instructions on corrective actions.

The company has an internal audit system for the GHG compliance. The internal auditor appointed for the purpose is an individual with necessary experience exclusively in GHG audits. The person so appointed as an internal auditor is given clear instructions about his scope of work and reporting requirements. He is carrying out his work on monthly basis or as required by the monitoring plan. His report indicates the compliance requirements and achievements. He will work directly under the control of the Board of Directors and all his reports will be addressed to the Board directly. The internal auditor in particular will report to the management any non-compliance with corrective actions by the operating staff."

To ensure that there is no leakage affect due to competing uses of biomass the project participant will evaluate and monitor annually during the crediting period if there is surplus of biomass in the region of the project activity, which is not utilized. The yearly monitoring will ensure that the implementation of the project activity does not lead to any increase in GHG emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses, as a result of project activity. Biomass assessment in the region will be carried out annually based on the latest available literature / data from the government sources to determine if the biomass is at least 25% larger than the total quantity utilized by the project activity as well as existing users. In the absence of official data, a biomass assessment study will be carried out by employing third party assessors who have past experience of doing such work. If it is found that the biomass is less that 25% larger than the total quantity utilized by the project activity as well as existing users the project leads to leakage affect and the emissions due to leakage will be estimated and deducted from the emission reductions.