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

**CONTENTS**

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

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

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Indur 7.5 MW Non-Conventional Renewable Sources Biomass Power Project (Project Name in host country approval: 7.5 MW Biomass Power Project of Indur Green Power Pvt Ltd)

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

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Purpose

The purpose of the project essentially is to utilize the available biomass fuels[1] in the region effectively for generation of power. The generated power will be sold to the state grid for sustainable economic growth, conservation of environment through use of biomass fuels and Green House Gas (GHG) emission reduction. The project will also help to reduce the ever-increasing demand and supply gap of electricity.

The primary fuels proposed for the power plant are Rice Husk, Juliflora and Bagasse. The fuel requirement for 100% capacity is 26,850 t/yr of rice husk, 23,250 t/yr of bagasse and some quantity of Juliflora. Indur Green Power Private Limited (IGPPL) uses each of the fuels for a period of 4 months in a year and utilizes the availability of fuel from the Nizambad district. A survey carried out indicates that the fuels to be used are available in abundance within radii of 25 km from the plant site. Other fuels like cotton stalk, blackgram stalk and groundnut shell are also available abundantly and could be considered as alternative fuels. Nizamabad district is one of the prominent agriculturally and industrially developed districts of Andhra Pradesh.

Considering the adequate availability of bio-mass in the area, IGPPL have set up the power plant in Renjal Village, Bhodan Taluka, Nizamabad district, Andhra Pradesh.

The following local benefits are also experienced due to the setting up of project:

- Proper utilization of surplus biomass;
- Generation of eco-friendly green power;
- Avoidance of burning of agriculture waste;

[1] Sustainably grown renewable cyclic crops.

- Reduction of $CO_2$ emissions

Contribution to Sustainable Development

The project activity is a renewable energy power project for power generation and export of clean power to Transmission Corporation of Andhra Pradesh (APTRANSCO). This generation of power will substitute the power generated and fed to conventional fossil fuels dominated grid.

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and place immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources.

Since this project activity utilizes renewable energy source, it will positively contribute towards the reduction in (demand) use of finite natural resource like coal/gas/oil, minimizing depletion or else increasing its availability to other important processes.

Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines[2] for CDM projects.

1. Social well being
2. Economic well being
3. Environmental well being
4. Technological well being

Project activity contributes to the sustainable development in following way:

1. Social well being:

- Since, the project is proposed in a rural area, the project would lead to the development of the region.
- Since, the biomass resources are to be collected and transported to the plant site from the fields, opportunities are being generated for the rural people to collect and transport biomass. This will result in the enhanced employment of the rural people.

[2] Ministry of Environment and Forest web site http://envfor.nic.in/cdm/host_approval_criteria.htm#

- More and more rural industries will be set up as a consequence to the power plant in the area. This also will cause infrastructure development in the area, which ultimately leads to the rural development. This also prevents the migration of the rural poor to cities due to opportunities created by the power plant.
- In order to ensure sustained sources of raw material supply to the power plant, the company has embarked on encouraging energy plantation by the farmers in their wastelands.

2. Economical well being:

- The project activity generates employment in the local area. The project will also provide economic value to agricultural and wood wastes and provides stable and quality power to industry, farmers and households. The project will create a business opportunity for local stakeholders such as bankers, consultants, suppliers, manufacturers, contractors *etc.*
- The main resources for power generation are biomass fuels such as rice husk, Juliflora etc. Crop residues are collected from the farmers out of their field and brought to the project, thus generate additional revenue on account of supply of these crop residues to the project, which are otherwise being under-utilized / burnt so far with no commercial value. 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 contributes to the social and economic well being in the region.
- In order to ensure sustained sources of raw material supply to the power plant, the company has embarked on encouraging energy plantation by the farmers in their wastelands.

3. 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 emissions of $CO_2$, CH4 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[3] 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

[3] Chemical analysis of elements in the fuel (biomass).

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 growth of biomass and associated $CO_2$ consumption and release can be treated as cyclic process resulting in no net increase of $CO_2$ in the atmosphere. Hence, the project will not lead to GHG emissions.

4. Technological well being

The technology selected for the proposed project is a more energy efficient technology due to the following features. The project uses a steam turbo generator with matching boiler of traveling grate type capable of firing multiple fuels with highest possible system efficiency. In addition, the auxiliary power consumption for traveling grate type is relatively less than other efficient combustion system types.

In view of the above the project participant considers that the project activity profoundly contributes to the sustainable development.

**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 | Indur Green Power Private Limited. (Private entity) | No |
| (*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required. | | |

***See contact information in Annex-1 to this PDD***

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

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The project activity is a 7.5 MW capacity grid-connected biomass based renewable energy power plant with high-pressure steam turbine configuration. On an annual average basis, the project exports around 6.6 MW power to the APTRANSCO grid by considering auxiliary power consumption of 11%. The plant is operating at an annual average plant load factor of 80%.

Further, no transmission and distribution losses are considered while calculating GHG emission

reductions, since the project exports power to the APTRANSCO grid, which is located at about 0.5 km from the site.

The power plant has one condensing steam turbo generator unit with a matching boiler of traveling grate type capable of firing multi fuels with rice husk, bagasse and Juliflora as the main fuels. All necessary auxiliary facilities of the power plant are provided. The boiler is sized to produce a maximum of 33 tons per hour of steam. The steam turbine is a straight condensing type machine with uncontrolled bleeds for deaerator feed water heating. The steam conditions at the boiler heat outlet are a pressure of 67 kg/cm2 and temperature of $495^0$C. The higher steam parameters result in higher annual savings of fuel per annum when compared to lesser steam parameters like 44 kg/cm2 and temperature of 440 0C.

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

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**A.4.1.1. Host Party(ies):**

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**India**

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

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**Andhra Pradesh**

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

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**Nizamabad district**

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

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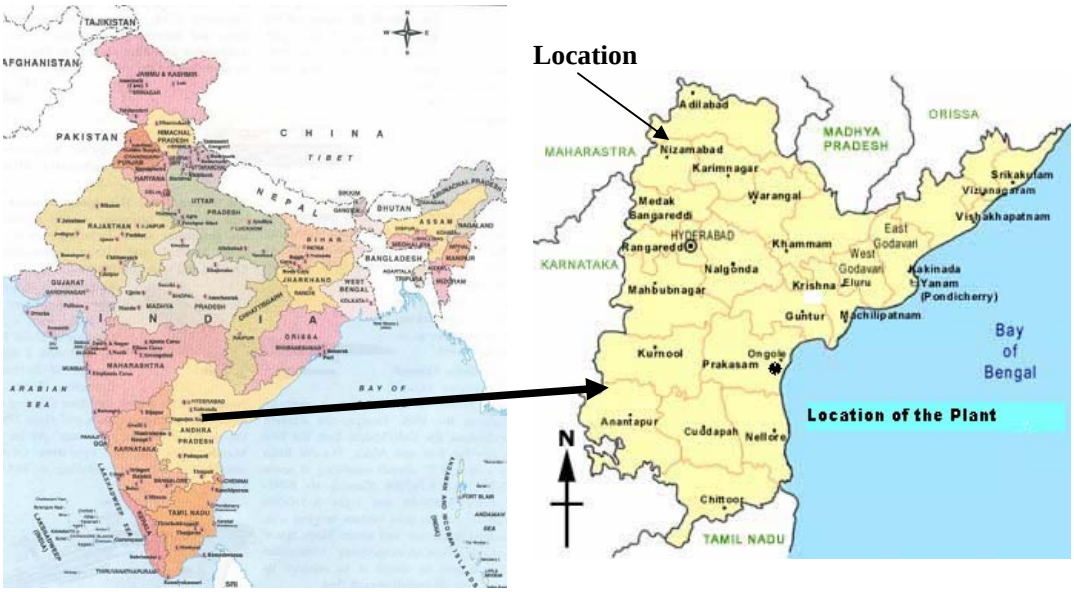
The plant is located in Renjal village, Bodhan Taluk Nizamabad district, Andhra Pradesh. The plot area of the site measures approximately 18 acres (72,842.85 $m^2$). The site is abetting Navipet-Kandakurthy road on the southern side and is surrounded by agricultural land on the eastern, northern and western side. The plant site is approachable by an all weather motorable road. There are connecting roads to the site from Nizamabad and Bodhan. Source of water for the plant is from the borewells in the plant site. Power generated from the plant is proposed to be evacuated to Andhra Pradesh Transmission Company (APTRANSCO) grid through their 132/33 kV Renjal sub station which is about 0.5 km from the site.




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

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As per Clause 2 of Type I.D of Appendix B of **simplified modalities and procedures for small-scale CDM project activities (Version 05: 25 February 2005),** in case of unit which co-fires renewable biomass and fossil fuel the capacity of the entire unit shall not exceed the limit of 15 MW, for the project to qualify as a small-scale CDM project. Therefore, the proposed project activity can be defined under

**Main Category:** Type I - Renewable Energy Project (Small Scale)

**Sub Category**: "D", Renewable Electricity Generation for a Grid (Biomass based Power Project)

**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:**

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The power plant uses environmentally sustainable 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 like Nitrogen, Sulphur *etc.* release of other GHG are considered as negligible. The biomass is $CO_2$ neutral and thus environmentally benign limiting greenhouse effect.

Conventional energy equivalent of around 296.04 Million kWh for a period of 7 years in AP would be

replaced by exporting power from the 7.5 MW non-conventional renewable sources biomass based power plant thereby resulting in $CO_2$ emission reduction of around 245,813 tons. In the absence of the proposed activity, the same energy load 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.

According to the draft 16th electrical power survey[4] 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. This puts tremendous pressure on fast depleting natural resources to use more to meet the continuous increase in demand. Effective utilization of abundantly available renewable sources to minimize the usage of fossil fuels is the need of the hour. However, due to various technical and policy related barriers (as mention in section B3) the share of renewable energy in the APTRANSCO grid is less than 1%.

The power plant not only justifies the shortage of power availability and energy but also the eco-friendly power generation.

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

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| Years | Annual estimation of emission reductions in tonnes of $CO_2e$ |
|---|---|
| 2003-2004 (10 months) | 28731 |
| 2004-2005 | 35116 |
| 2005-2006 | 35116 |
| 2006-2007 | 35116 |
| 2007-2008 | 35116 |
| 2008-2009 | 35116 |
| 2009-2010 | 35116 |
| 2010-2011 (2 months) | 6385 |
| Total estimated reductions (tones of CO2e) | **245,813** |
| Total number of crediting years | 7 |
| Annual average over the crediting period of estimated | 35,116 |

[4] CEA Publication

| Years | Annual estimation of emission reductions in tonnes of $CO_2e$ |
|---|---|
| reductions (tonnes of CO2 e) | |

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

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No public funding from parties included in Annex I is available to the project. Project is implemented with equity of project proponent (IGPPL) and long term debt by an Indian bank

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

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According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'Debundling' is defined as the fragmentation of a large project activity into smaller parts.

With reference to the criteria mentioned, this biomass power plant is not a de-bundled component of a large project activity as there is no registered small scale CDM project activity (previous 2 yrs) or an application to register another small scale CDM project activity by the same (IGPPL) project proponent, in the same project category and technology/measure with project boundary within 1 km radius of this project activity.

## SECTION B. Application of a baseline methodology:

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

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**Title:**

Renewable electricity generation for a grid

**Reference:**

The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW is available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Renewable technologies that supply electricity to the grid are covered in category I.D. The category comprises renewable such as small hydro, 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 nonrenewable biomass fired generation unit.

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

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**Main Category:** **Type I - Renewable Energy Power project**

**Sub Category:** **I. D Renewable Electricity Generation for a Grid**

As per the Kyoto Protocol (KP) baseline should be in accordance with the additionality criteria of article 12, paragraph 5(c), which states that the project activity must reduce emissions that are additional to any that, would occur in the absence of the certified project activity.

Document Appendix B to attachment 3 regarding indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, provides guidelines for preparation of Project Design Document (PDD) including baseline calculations. The category and the sub type of the activity are given above.

Baseline methodology mentioned in the paragraph no. 7 of Type I. D. of Appendix B of the simplified modalities and procedures for small scale CDM project activities, states that the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg $CO_2$/kWh) calculated in transparent and conservative manner as under:

a) The average of the "approximate operating margin" and "build margin", where;

i) The "Approximate operating margin" is the weighted average emissions (in kg CO2 equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

ii) The 'Build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[5] 20%[6] of existing plants or the 5 most recent plants";

OR

b) The weighted average emissions (in kg$CO_2$equ/kWh) of current generation mix.

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Considering the available guidelines and the present project scenario, ~~Andhra Pradesh (AP) state~~ southern regional grid, to which the project will feed the power, has been chosen for baseline analysis. The baseline data used to calculate the grid emission factor is given in Annex – III.

**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:**

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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.

As per the decision 17/cp.7 Para 43, 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.

Further referring to Appendix A to Appendix B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants

[5] Generation data available for the most recent year

[6] If 20% falls on part capacity of a plant, that plant is included in the calculation

shall provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s) ;

**1. Prevailing Practice barrier**

The total installed capacity of biomass power plants in the state of Andhra Pradesh is of around 70 MW before the construction start of Indur Green Power plant which was around 16% of the total sanctioned capacity of 410.55 MW by NEDCAP. This is due to the fact that there is a financial risk involved in the implementation and operation of these projects mainly towards higher fuel prices and instability in tariff policy. This proves the low penetration of the non-conventional energy based projects in AP. Also, significant rise in biomass prices year after year also caused lower penetration of power plants in the state. Project proponent had also witnessed the effect of increase in the biomass prices on the other installed biomass power plants in the state. This steep rise in price of biomass was not predicted though the availability of biomass in those regions was estimated as abundant for the power generation throughout its life cycle. The availability of the biomass in the region at competitive prices to operate the plant in sustained manner was not easy to predict with the likely scenario of setting up of more biomass based power plants in the region and state and also due to likely increase in the other usage areas for biomass in the state. Plant had taken risk due to these factors considering the availability of future revenue through carbon credits that could offset some of the difficulties.

The above-mentioned facts suggest that the biomass based power generation was a riskier business with the barriers and uncertainties mentioned than other alternatives like fossil fuel based power generation.

**2. Financial barrier**

The CDM fund for the project was initially considered to cover the project risk related to the fuel (biomass) price increase in the future. The CDM fund is critical considering biomass availability and prices are seasonal, which depends on many external factors whereas the earnings for the power plant are at long term fixed rate. Therefore, the revenue from CDM could prove to be vital, as they would significantly improve the sustainability of the project, as the project can be rendered financially unstable due to

a) The increase in cost of fuel ; and
b) The decrease in tariff by virtue of revised tariff by the off taker

The above factors are true for the project activity and in absence of CDM funds it is very likely that project activity would have used (or may use) more financially viable option such as coal as fuel.

Raw material cost since inception has increased, a brief comparison of which is given herewith.

| | DPR COST, RS. | EXISTING COST (2004-05),RS. |
|---|---|---|
| Rice husk | 1150 | 1350 |
| Bagasse | 775 | 875 |
| Juliflora | 700 | 850 |

Due to the increase in the raw material cost there has been a continuous increase in the cost per unit of generation since the project inception. It is envisaged that the raw material cost in the subsequent years would continue to increase.

IGPPL Power has also initiated energy plantation in 1 acre of land near the plant site to ensure continuous supply of raw material to the plant.

Due to the increase in the raw material cost there has been a continuous increase in the cost per unit of generation since the project inception. It is envisaged that the raw material cost in the subsequent years would continue to increase.

The initial PPA with off taker APTRANSCO was signed at a tariff of Rs. 2.25 per unit with base year as 1995-95 and 5% escalation per year. The tariff for the year 2003-04 was Rs. 3.48 per unit. However, with the revised7 tariff order by Andhra Pradesh Electricity Regulatory Commission (APERC), the tariff rate is Rs 2.88 per unit. This would result in heavy financial losses and put an additional burden on the financial sustainability of the project.

***CDM Benefit s for 7 years***

| | CERs | Rate (Euros) | Exchange rate | INR | Million Units replaced | Cost per unit (Rs.) |
|---|---|---|---|---|---|---|
| **IGPPL** | 245,813 | 5 | 55 | 67,598,604 | 296.05 | 0.23 |

The CDM benefit per unit (kWh) of power replaced is about Rs. 0.23. Hence, the total benefit for IGPPL including the tariff cost of Rs. 2.88 would amount to Rs. 3.11, which is slightly more than the existing cost of generation i.e. Rs. 3.10 per unit.

[7] APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004

It is envisaged that the raw material cost would further increase, which would lead to further increase in the cost of generation.

Thus the project justifies the need of CDM funds for the project activity, which will help in significantly improving the project competitiveness and financial sustainability due to reduction in tariffs and increase in raw material cost.

**3. Funding for the project:**

The project was initially considered finance from the Indian Renewable Energy Development Authority (IREDA) at net interest rate of 14.5%. The interest subsidy of 2% by IREDA was originally conceived in the financial closure of the project. However, due to the change in the government policy the subsidy was withdrawn. Hence, subsequently, the plant availed loan from Power finance Corporation (PFC) with the same interest rates.

**4. Policy related barriers**

APERC in a landmark order has proposed to reduce the power tariff rates for non-conventional energy sources. The rate per unit has been decreased from Rs 3.48/- per unit to Rs 2.88/- per unit. As per the new proposal the tariff rates will be of two parts – fixed and variable. The fixed cost is based on the year of commissioning and it will come down gradually over a period of 10 years, whereas variable cost will go up by 5% every year up to a control period of 5 years.

However, it has been observed that the cost of the fuel from inception to date has increased thereby increasing the cost of generation. This has resulted in creating an imbalance in the % increase in variable cost and operating cost.

***The year wise (for credit period) effect of tariff changes with respect to fixed and variable price & cost***

Fixed cost tariff:

| Year of operation | fixed cost (Rs./unit) |
|---|---|
| 1st | 1.61 |
| 2nd | 1.57 |
| 3rd | 1.53 |

Variable cost

| Financial year | Variable cost (Rs./unit) |
|---|---|
| 2004-05 | 1.27 |
| 2005-06 | 1.33 |
| 2006-07 | 1.40 |

| | | | |
|---|---|---|---|
| 4th | 1.49 | 2007-08 | 1.47 |
| 5th | 1.45 | 2008-09 | 1.54 |
| 6th | 1.41 | | |
| 7th | 1.37 | | |
| 8th | 1.33 | | |
| 9th | 1.26 | | |
| 10th | 0.87 | | |

The biomass plant had been successfully operating at a PLF between 85-90%. However, as per the new policy initiative, plants operating with 80% PLF will be paid a fixed rate as per the PPA and the additional units generated at the additional PLF will be paid at a variable cost of Rs 1.27 with an incentive of Rs.0.25 amounting to a total of Rs. 1.52.

Though the plant has a design capacity to operate at a higher PLF it does not operate as it is not financially viable. The variable cost of operating the plant at a PLF greater than 80% is about Rs. 1.70 per unit generation. However, with the revised policy, the proponent would be paid only Rs.1.52 per unit of excess generation making it financially unviable. However, with the additional CDM benefit of Rs.0.23 per unit, if made available, the total benefit for the proponent would be Rs.1.75 (i.e. Rs. 1.52 + Rs. 0.23) which is marginally higher than the variable cost and would encourage the proponent to operate at PLF greater than 80% to generate more CERs and also reduce the production, operation & maintenance cost.

Thus generating power in excess of 80% PLF will significantly hamper the sustainability of the project. The CDM funds can contribute towards viability of generation of the balance 20%, which will indirectly help in reduction of $CO_2$ emission, if not generated.

Thus it is imperative that the present tariff is not sufficient and will significantly impact the sustainability of the project. To generate renewable power, the CDM funds can contribute towards sustainability of the project, which will indirectly help in reduction of $CO_2$ emission, if not generated. Also, the power tariff will be under revision every 5 years instead of 10 years as per the new proposal from APERC.

The existing APTRANSCO generation mix comprises of:

- ✓ 57% thermal power plants;
- ✓ 42% hydro projects; and
- ✓ 1% wind and cogeneration projects

In thermal power plant category, coal based plants contribute for 46% and balance 11% is contributed by the gas based power plants. This illustrates that biomass plants are still considered as rather financially risky proposition and with changing scenario, the CDM revenue will contribute to their financial stability.

For example, earlier, there was 3rd party sale and the tariff was not supposed to be less than the high tension line (HT1) tariff of Rs.4.32. However with the advent of Regulatory Commission in 1999 there is no 3rd party sale. Earlier there was 2% wheeling charges on 3rd party sale and later it was changed to 28.4% and Rs. 0.50 per unit to neutralize the tariff of 3rd party and APTRANSCO. Hence, all the Biomass power plants have shifted their sale of power to APTRANSCO, wherein they have to abide by the APRANSCO policies.

This discussion suggests that there are clear policy related threats and barrier to the proposed project activity, which can be mitigated to certain[8] extent from CDM benefit.

**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:**

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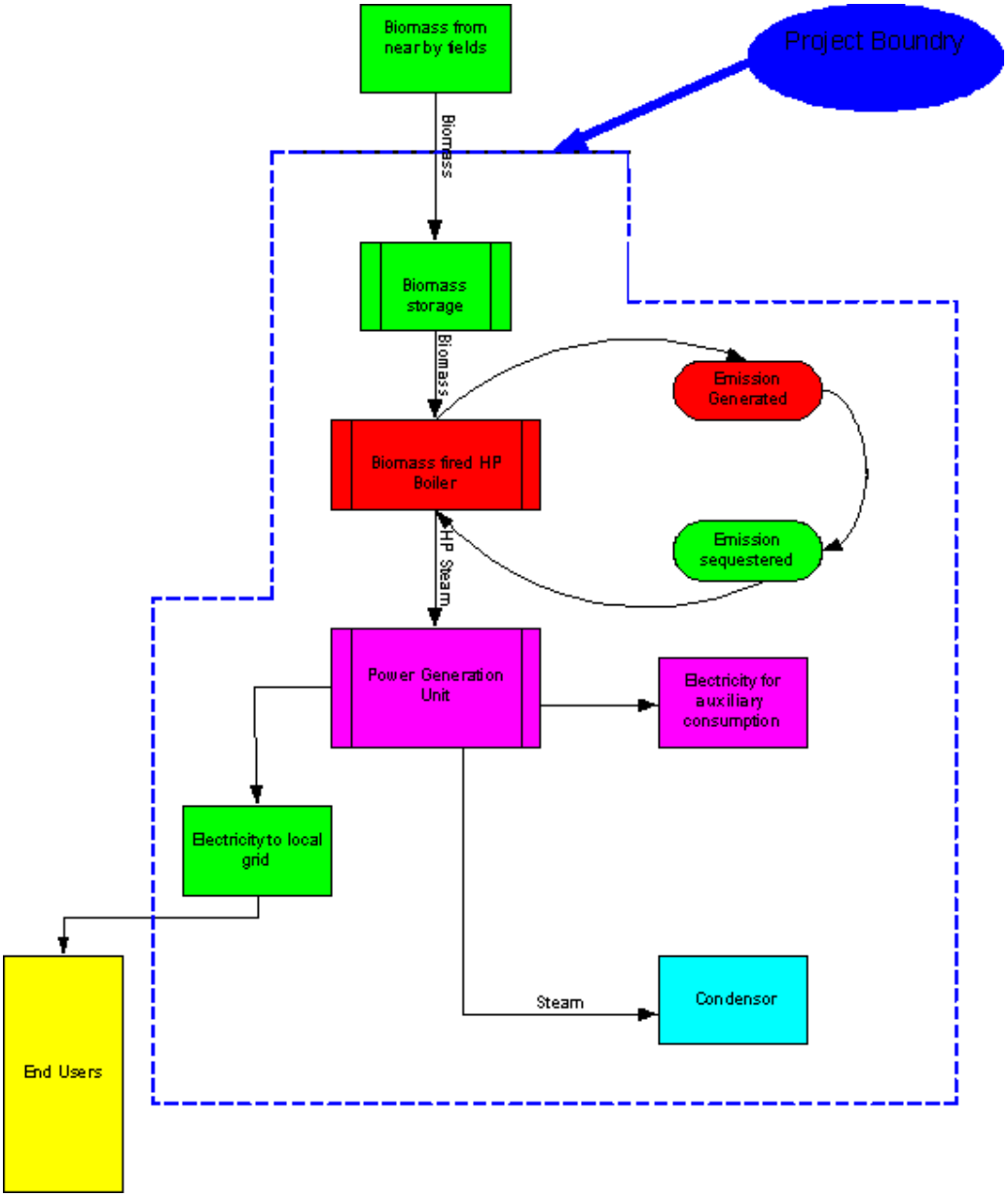
As per the guidelines mentioned in Type I. D. of Appendix B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source.

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. Hence, project boundary is considered within these terminal points. However, for the purpose of calculation of baseline emissions, regional grid is also included in the project boundary.

Thus, boundary covers fuel storage and processing, boiler, Steam Turbine Generator (STG) and all other auxiliary consumption units and electricity grid.

[8] Uncertainty related to carbon market and cash flows is also a deterrent.




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

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Since the project activity is feeding power to AP state electricity grid which is connected with southern grid, the baseline for this project activity is the function of the generation mix of southern grid. Using the methodology available for small-scale project activities as discussed in section B2 above, the combined

margin emissions (in $kgCO_2equ/kWh$) of current generation mix of Southern regional grid is used for the calculation of baseline. Actual $CO_2$ emission factors are used for the purpose.

All existing sources of power generation have been considered from various authentic sources. Percentage share of power generation from different fuel sources has been calculated. The IPCC emission factors for different sources of power generation have been considered wherever necessary. The baseline estimation has considered an ex-ante weighted average emission factor and the same will be used for throughout the project crediting period to reduce the monitoring cost.

Also, during the baseline estimation authentic information such as an average national calorific value of coal is used. IPCC emission factors are used for fuels. These values will be different for particular power plant. However, these are authentic values and the degree of uncertainty is low.

Date of completing the final draft of this baseline section *(DD/MM/YYYY)*:

10/12/2005

Name of person/entity determining the baseline:

Indur Green Power Private Limited (as mentioned in Annex-I), who is also project participant.

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

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

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

>>

Project started construction on 15th October 2001 after 1 January 2000 and is operational since 15th February 2003

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

>>

Life time of the project: 25 year

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

>>

### C.2.1. Renewable crediting period:

>>

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

>>

Starting date of first crediting period: 16/02/2003

### C.2.1.2. Length of the first crediting period:

>>

**7 years (7-y)**

### C.2.2. Fixed crediting period:

>>

### C.2.2.1. Starting date:

>>

### C.2.2.2. Length:

>>

**SECTION D. Application of a monitoring methodology and plan:**

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

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Monitoring methodologies / guidelines mentioned in the UNFCCC document of "Appendix B of the simplified modalities and procedures for small scale CDM project activities" for small scale projects (Type I:D) is considered as basis for monitoring methodology for the activity. The document states that the monitoring shall consist of metering the electricity generated by the renewable technology.

**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 is available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the power plant is of 7.5 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

**D.3 Data to be monitored:**

>>

| ID number *(Please use numbers to ease cross-referencing to table D.6)* | 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 | Electricity generated | KWh | Measured | Daily | 100% | Paper/ Electronic | 2 years | Based on energy meter in plant control room |
| D.3.2 | Power | Auxiliary consumption | KWh | Measured | Daily | 100% | Paper/ Electronic | 2 years | Based on the difference between energy generated and exported |
| D.3.3 | Power | Power export | kWh | Measured | Daily measurement & monthly recording | 100% | Paper/ Electronic | 2 years | Based on tri-vector energy meter in APTRANSCO sub station |
| D.3.4 | Fuel | Biomass used | MT | Measured | Daily | 100% | Paper | 2 years | |
| D.3.5 | Fuel | Avg. calorific value of Biomass used | Kcal/Kg | Measured | Monthly | | Paper | 2 years | Through sample testing in lab. Tested as mentioned only if the source of fuel is different. |
| D.3.6 | Fuel | Coal | MT | Measured | Daily | 100% | Paper | 2 years | |
| D.3.7 | Fuel | Carbon content in coal | % | Measured | For each batch of coal | Grab sample | Paper | 2 years | Through sample testing in lab. Tested every batch only if the source of fuel is different. |
| D.3.8 | Fuel | Calorific value of coal | Kcal/Kg | Measured | For each batch of | Grab sample | Paper | 2 years | Through sample testing in lab. Tested |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | coal | | | | every batch only if the source of fuel is different. |

Note: Data to be achieved is for a period of 2 years during crediting period after issuance of CERs

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

>>

| Data | Uncertainty level of data (High/Medium/Low) | Explain QA/QC procedures planned for these data, or why such procedures are not necessary. |
|---|---|---|
| *D3.1to 3.8* | *Low* | *The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency* |

**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:**

>>

Project proponent implemented the following operational and management structure in order to monitor emission reductions and any leakage effects, generated by the project activity

Project proponent formed a CDM team/committee comprising of persons from relevant departments, which will be responsible for monitoring of all the parameters mentioned in this section. In the CDM team, a special group of operators will be formed who will be assigned responsibility of monitoring of different parameters and record keeping. On daily basis, the monitoring reports will be checked and discussed.

On monthly basis, these reports will be forwarded at the management level.

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

>>

Indur Green Power Private Limited, who is also a project participant

## SECTION E.: Estimation of GHG emissions by sources:

### E.1. Formulae used:

>>

### E.1.1 Selected formulae as provided in appendix B:

>>

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

>>

### 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:

>>

The project uses only biomass as fuel. However, if plant uses coal in future, the same will be accounted during the monitoring and verification stage to deduct from baseline emissions accordingly.

### 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

>>

The leakage activity identified, which contributes for GHG emissions 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 | - | 71,570 MT |
| ▪ Average Distance between project site and biomass collection centres | - | 30 km |
| ▪ Biomass load per truck | - | 5 MT |
| ▪ Number of return trips | - | 14,314 |
| ▪ Consumption of Diesel per trip | | 15 liters (4km/litre) |
| ▪ Total Diesel consumption | - | 214,710 liters p.a |
| ▪ $CO_2$ emission factor for Diesel (as per IPCC guidelines) | - | 74.10 tons $CO_2$ / TJ |
| ▪ $CO_2$ emission per annum | - | 640 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 higher $CO_2$ emissions. To be on conservative side, this leakage due to coal transportation has not been added while calculating the baseline of southern regional grid and hence a small leakage due to transportation of biomass has been neglected from the calculations and estimations of emission reductions.

In addition to above, project emissions also occur due to transportation of the fly ash for disposal. Plant generates around 10000 tons of fly ash per annum. Number of trips to dispose fly ash to destination is around 3 per day. However, the distance of transport of fly ash from the plant to brick manufacturers in the area is well below 100 km and number of truck trips per annum are less than 1500, hence the emissions due to the same have also been neglected.

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

>>

Considering the negligible $CO_2$ emissions due to leakage and remote need to operate the plant using coal as a fuel during non-availability of biomass, net emissions by project activity are considered to be zero.

**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:**

>>

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 following approved methodology has been considered for baseline calculations.

**Method: The average of the approximate operating margin and the build margin (Combined margin)**

***Method: Combined Margin***

**(a) Baseline Power Generation**

$$P_{wlc} = P_{tot} - P_{lrc}$$

Where

$P_{wlc}$ Power generation by all sources, excluding hydro, biomass and nuclear

$P_{tot}$ Power generation by all sources of grid mix

$P_{lrc}$ Power generation by Hydel, nuclear, biomass projects

**(b) Sectorwise baseline power generation**

$$P_{fuel} = \frac{P_f}{P_{wlc}} x 100$$

Where

$P_{fuel}$ Share (in %) of power generation by each fuel used (coal and gas in present scenario), out of total power generation excluding Plrc

$P_f$ Power generation by fuel used (in million kWh units)

**(c) Calculation of Operating Margin emission factor**

$$OM_{bef} = \sum P_{fuel} \; x \; E_{fuel} \; \textit{for base year for Scenario 1}$$

Where

$OM_{bef}$ OM emission factor of baseline calculated for each year (kg/kWh)

$E_{fuel}$ Emission factor (actual or IPCC) for each fuel type considered (e.g coal, gas)

**(d) Calculation of Build margin emission factor for each source of baseline generation mix**

$BM_{yr}$ = Weighted average of emissions by recent 20% capacity additions or MWh of five most recent plants, which ever is higher

Where

$BM_{yr}$ = Build margin for base year (kg/kWh) = $\frac{\sum P'_f \; x \, E'_f}{\sum P'_f}$

Where

$P'_f$ Generation capacity from specific fuel in the most recent 20% power plant or five most recently built plants, whichever is higher

$E'_f$ Emission factor for the specific fuel in the most recent 20% power plants built or five most recently build plants

**(e) Combined Margin Factor**

CMF for each year crediting period

= $(OM_{bef} + BM_{yr}) / 2$ (in kg/kWh)

Final (net) baseline emission factor (NEFB) = 0.830

(Refer to Baseline excel sheet)

**(f) Power Generation and Export by project activity**

$TP_{gen} = TP_{exp} + TP_{loss}$

Where

| | |
|---|---|
| $TP_{gen}$ | Total power generared |
| $TP_{exp}$ | Total clean power export to grid per annum |
| $TP_{loss}$ | T&D loss |

**(g) Emission reduction by project activity**

$ER = TP_{exp} \times (NEF_B - NEF_p) - EL$

Where

| | |
|---|---|
| ER | Emission reduction per annum by project activity (tones/year) |
| $TP_{exp}$ | Total clean power export to grid per annum |
| $NEF_B$ | Final emission factor of baseline |
| $NEF_p$ | Net emission factor of project activity (=0) |
| EL | Emission leakage (tonnes/year) (= 0) |

Step by step calculation using combined margin methodology of $CO_2$ emissions due to burning of coal, diesel and gas for power generation and emission reductions by the project activity is as under.

| | | | | |
|---|---|---|---|---|
| **Step 1** | **:** | Net operating emission factor for coal, lignite | = | Actual emission factor for coal/lignite x % of generation by coal/lignite out of total generation excl. RE projects |
| **Step 2** | **:** | Net operating emission factor for gas, diesel | = | Step 1 is to be repeated for gas and diesel |
| **Step 3** | **:** | Operating margin factor | = | Net emission factor for coal + Net emission factor for gas + Net emission factor for Diesel |
| **Step 4** | **:** | Built Margin factor | = | Weighted average of emission factors of most recent 20% plants or 5 most recently built plant, whichever is higher |
| **Step 5** | **:** | Average of operating and build margin factor | = | (operating margin factor + built margin factor)/2 |

| | | | | |
|---|---|---|---|---|
| **Step 6** | **:** | Units exported to APTRANSCO | | Total Power generation –Total auxiliary consumption. |
| **Step 7** | **:** | $CO_2$ emission reduction | = | Units exported to AP grid x Average of operating and build margin factor |

**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:**

>>

Following formula is used to determine Emission reduction

| | | | | |
|---|---|---|---|---|
| **$CO_2$ emission reduction due to project activity** | = | Net $CO_2$ baseline emission x Electricity exported to grid (in kWh) | - | Project emission |
| | = | 245813 | - | 0 |
| | = | 245813 | | |

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

>>

| | Operating Years | Baseline Emissions (tonnes of $CO_2$) | Project Emissions (tonnes of $CO_2$) | Emission Reductions (tonnes of $CO_2$) |
|---|---|---|---|---|
| 1. | 2003-2004 | 28731 | 0 | 28731 |
| 2. | 2004-2005 | 35116 | 0 | 35116 |
| 3. | 2005-2006 | 35116 | 0 | 35116 |
| 4. | 2006-2007 | 35116 | 0 | 35116 |
| 5. | 2007-2008 | 35116 | 0 | 35116 |
| 6. | 2008-2009 | 35116 | 0 | 35116 |
| 7. | 2009-2010 | 35116 | 0 | 35116 |
| 8. | 2010-2011 | 6385 | 0 | 6385 |
| | | 245813 | | 245813 |

Therefore, an conventional energy equivalent of 296.0 Million kWh for a period of 7 years would be saved by exporting power from the 7.5 MW Biomass based power plant which in turn will reduce 245,813 tons of $CO_2$ emissions considering baseline calculations.

Baseline data used for the calculation is provided in Annex-3 and the detailed calculation using the formulae is presented in an Excel Sheet (refer Enclosure – I to this PDD).

## 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 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. 100 crore have been excluded from the list. Hence, it is not required by the host party.

However, detailed environmental management plan is in place in the project activity location. Brief description on the measures taken towards the environment protection in the plant is given below:

1. Stack height of 50 m is provided for effective dispersion of pollutants.
2. The effluent generated in the plant will be treated in the Effluent Treatment Plant (ETP). The effluent characteristics after the treatment are in complying with the standards stipulated by A.P Pollution Control Board.
3. Electrostatic precipitator is provided to bring down the SPM emissions from boiler to 115 $mg/nm^3$.
4. Acidic and alkaline effluent streams coming from cation and anion units of DM plant are neutralized in a neutralization tank.
5. The boiler blow down due to its higher pH is neutralized before mixing with other effluent streams.
6. The sanitary waste water is treated in septic tank followed by soak pit.
7. Plantation of small and tall trees is done around the plant area for better environment.
8. The ash collected from the ESP is utilized for brick manufacturing.

## SECTION G. Stakeholders' comments:

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

>>

The local stakeholder comment invitation and compilation process involved is as follows:

The local stakeholders are immediately affected by the activities of the project. The effect is on the local environment, social life and economics. All the individuals and organizations falling in the above effects 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 idea was to decide most appropriate representatives who are covering above. During interaction of the corporate headquarter and the plant management, the stakeholders were identified as:

- Office bearers of the neighbouring villages local bodies
- Authorities of the District local administration
- Biomass suppliers
- Local NGOs
- Customer (APTRANSCO)
- Licensing and regulatory authorities like
    - NEDCAP
    - APPCB
    - MoEF (Govt. of India)
    - MNES (Govt. of India)

IGPPL has been constantly in touch with other identified stakeholders like licensing and regulatory authorities. Their views are reflected in the form of permissions granted for the project. In this aspect, the permission by NEDCA, MoEF, APPCB and MNES are indication of favorable impression for the project.

**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. IGPPL has already 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 will be involved in the supply of the

biomass and hence the project would be a 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 is encouraging the project.

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 less, installation of transmission lines will 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 Certificate (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 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 IGPPL has already signed Power Purchase Agreement (PPA) with APTRANSCO.

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, IGPPL has already received the approvals and clearances for their project from the following stakeholders:

- Consent order of Establishment and operation from Andhra Pradesh Pollution Control Board;
- Power Purchase Agreement with APTRANSCO;
- Clearance from the Gram Panchayat, Renjal village

Although, in India, public participation at any stage of project implementation is not required, being a CDM activity, project proponent has invited the local stakeholders including Sarpanch (head) of village, representative of local population, representative of local NGO and biomass suppliers to express their views on the project and the summary is presented as below.

Village Sarpanch (head of locally elected body) expressed his happiness about the implementation of project in his village since the project activity has created employment opportunities for the villagers and also for creating an additional means of revenue for local farmers/biomass waste suppliers which will positively help to improve living standard and the socio-economic condition of the village. Other benefit mentioned by Secretary of gram panchayat is additional revenue from the project activity in terms of tax, to gram panchayat, which will be utilized for the development of the village. One of the Zilla Parishad (ZP) member (village representative at district level) expressed that by various means the village has been benefited by the project activity, specifically the project has created source of income for poor farmers of the nearby area. Poor farmers are getting reasonable monitory gains for harvesting the available biomass and supplying it to project activity.

Representative biomass suppliers also expressed their happiness about project implementation by IGPPL in this area, which has provided them an opportunity of small business. They mentioned that it is providing employment for local labors, skilled and unskilled workers and preventing their transfer to nearby cities. It is also helping to improve economic standard of poor farmers of the region by giving them a reasonable value for their biomass waste. They further added that, the project activity has provided business opportunity for local transporters also.

In summary, every stakeholder expressed that the project activity is helping the socio-economic development of the village and nearby area without affecting the local environment adversely.

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

>>

The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, power purchase agreement, local clearance etc. were considered while preparation of CDM project development document.

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: | Indur Green Power Pvt. Ltd/. |
| Street/P.O.Box: | 3-5-821, 1st Floor, Hyderguda |
| Building: | Doshi Ford Building, |
| City: | Hyderabad |
| State/Region: | Andhra Pradesh |
| Postfix/ZIP: | 500 029 |
| Country: | India |
| Telephone: | 040-23241900 |
| FAX: | 040-25569066 |
| E-Mail: | |
| URL: | |
| Represented by: | |
| Title: | Mr. |
| Salutation: | |
| Last Name: | Rao |
| Middle Name: | |
| First Name: | Ramakoteshwar |
| Department: | Director |
| Mobile: | |
| Direct FAX: | 040-25569066 |
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## Annex 2

**INFORMATION REGARDING PUBLIC FUNDING**

No Public Funding is available to the project.

## Annex-3

## BASE LINE DATA

The methodology adopted for the calculation of the baseline is 'the combined margin emissions of the current generation mix". Year 2004-05 is considered as the base year for prediction of future capacity additions during the crediting period. Southern Grid generation data as tabulated in Enclosure-II is used for consideration of installed southern grid capacity and energy availability during the period 2004-05.

In order to arrive at the detailed break up of power generation mix in Southern Region, various documents and various web sites were refereed. The websites refereed for estimating the generation mix in southern regional grid are:

1. http://www.infraline.com
2. http://www.bisnetworld.net
3. http://www.apgenco.com
4. http://www.kptcl.com
5. http://cea.nic.in
6. http://www.tneb.org
7. http://www.ksebboard.com

As per the availability, actual generation figures as against the sector wise installed capacity were used. Wherever the break up of generation was not available, proportionate calculated figures were used so as to match the total energy availability.

**Annex 4**
**Monitoring Plan**

All the parameters mentioned in the monitoring plan have been monitoring in the plant but in other formats. The entire process of monitoring has been streamlined and will be made available in the required format during the verification process and for subsequent useful purposes. The Fuel Consumption data, etc are being maintained in different formats. The data formats for CDM have already been finalized and started monitoring accordingly to ensure and demonstrate existence of MVP in the plant.

The calibration of monitoring equipment is being maintained as per the requirement of APTRANSCO and the same is being done regularly. Power Generation, Export & Auxiliary Consumption, fuel consumption are being recorded daily and the same is being verified and approved by General Manager of the plant. These records are being sent to Head Office for review by the Director and for corrective actions if necessary.

The Plant is equipped with energy meters/export meters for monitoring and control purpose. There are two energy meters at APTRANSCO sub station to measure the export power, namely main meter and check meter with 0.2 class accuracy. The energy meters shall be tested and calibrated utilizing a standard meter. The standard meter shall be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of AP as per terms and conditions of supply. The tests of meters shall be jointly conducted by authorised representatives of both the parties and the results and correction so arrived at mutually will be applicable and binding on both the parties. The energy meters shall not be interfered with, tested or checked except in the presence of representatives of company and APTRANSCO. If any of the meters is found to be registered inaccurately, the affected meter will be immediately replaced. The meters will be checked in presence of both the parties on mutually agreed periods. If during the test checks both the meters are found beyond permissible limits of error, both the meters shall be immediately replaced and the correction applied to the consumption registered by the main meter to arrive at the correct energy exported for billing purposes for the period of one month up to the time of test check, computation of exported energy for the period thereafter till next monthly reading shall be as per the replaced meter. Corrections in exported energy shall be applicable to the period between the two previous monthly reading and the sate and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption are being recorded at the plant from the installed meters. However, for applying monthly bill to APTRANSCO the meter readings will be taken on 24$^{th}$ of every month by APTRANSCO officials in presence of company representatives and readings will be jointly certified.

The following log sheets are being maintained for the critical equipment of the plant and readings are being recorded on day to day basis:

1. Turbine log
2. Boiler log
3. Electrical log

If both the both and check meters fail to record or if any of the PT fuses are blown out, the export energy will be computed on a mutually agreeable basis for the point of defect.

Power generation, export and auxiliary consumption, fuel consumption are being recorded at the plant daily and the same is being verified by Manager of the plant. These records sent to head office for review by the director and for corrective actions if necessary.

Emission levels are being monitored as per the statutory requirement. Plant emission levels are being monitored and the results are being sent to APPCB. For this purpose, the service of external agency is being utilized.

## Appendix A
## Abbreviations

| | |
|---|---|
| AP | Andhra Pradesh |
| APERC | Andhra Pradesh Electricity Regulatory Commission |
| APPCB | Andhra Pradesh Pollution Control Board |
| APTRANSCO | Transmission Corporation of Andhra Pradesh |
| CDM | Clean Development Mechanism |
| CEA | Central Electricity Authority |
| CER | Certified Emission Reductions |
| Cm | Centimeter |
| $CO_2$ | Carbon Di oxide |
| DPR | Detailed Project Report |
| GHG | Greenhouse Gas |
| IGPPL | Indur Green Power Private Limited |
| IPCC | Inter governmental Panel on Climate Change |
| IPP | Independent Power Producers |
| IREDA | India Renewable Energy Development Agency |
| Kcal | Kilo Calories |
| Kg | Kilogram |
| KM | Kilometer |
| KP | Kyoto Protocol |
| KW | Kilowatt |
| KV | Kilovolts |
| kWh | Kilowatt hour |
| LP | Low Pressure |
| MNES | Ministry of Non-Conventional Energy Sources |
| MT | Metric Tons |
| MU | Million Units |
| MW | Megawatt |
| NEDCAP | Non Conventional Energy Development Corporation of Andhra Pradesh |
| NGO | Non Government Organizations |
| NOC | No Objection Certificate |
| PDD | Project Design Document |
| PIN | Project Idea Note |
| PLF | Plant Load Factor |
| PPA | Power Purchase Agreement |

| | |
|---|---|
| QA | Quality Assurance |
| QC | Quality Control |
| RE | Renewable Energy |
| SEB | State Electric Board |
| STG | Steam Turbine Generator |
| T&D | Transmission and Distribution |
| TJ | Tera Joule |
| UNFCCC | United Nations Framework Convention on Climate Change |

## Appendix B
## REFERENCE LIST

| Sr. No | References |
|---|---|
| 1. | Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) **http://cdm.unfccc.int** |
| 2. | Website of United Nations Framework Convention on Climate Change, **http://unfccc.int** |
| 3. | UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol |
| 4. | UNFCCC document: Annx B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories |
| 5. | Detailed project report on 7.5 Biomass based power project – IGPPL Power Private Limited |
| 6. | Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- **http://cea.nic.in** |
| 7. | CEA published document "16th Electric Power Survey of India" |
| 8. | Website of APGENCO, **www.apgenco.com** |
| 9. | Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, **http://mnes.nic.in** |
| 10. | Website of Indian Renewable Energy Development Agency (IREDA), **http://ireda.nic.in** |
| 11. | Andhra Pradesh Power Profile at **www.bisnetworld.net/bisnet/states** |
| 12. | **www.infraline.com/power/** |
| 13. | APERC tariff order, R.P. No.84 / 2003 in OP No 1075 / 2000 dated 20.03.2004. |
| 14. | Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. **http://envfor.nic.in** |