



**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**

<b>Version Number</b>	<b>Date</b>	<b>Description and reason of revision</b>
01	21 January 2003	Initial adoption
02	8 July 2005	<ul style="list-style-type: none"><li>•The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.</li><li>•As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <a href="http://cdm.unfccc.int/Reference/Documents">http://cdm.unfccc.int/Reference/Documents</a>.</li></ul>
03	22 December 2006	<ul style="list-style-type: none"><li>•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.</li></ul>



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

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

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Biomass based Cogeneration Project of Vijay Agro Products Pvt. Ltd.  
Version 01  
15/02/2007

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

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Purpose

Vijay Agro Products Pvt. Ltd (VAPPL) has set up a 4.0 MW biomass based cogeneration plant in Enikepadu village of Krishna District in Andhra Pradesh. The objective of the power plant is to make use of the biomass wealth in the region and generate 4.0 MW, partly for captive consumption and partly to be supplied to the Transmission Corporation of Andhra Pradesh (APTRANSCO) grid. This is being done by utilizing the biomass waste locally available such as rice husk, rice straw, groundnut shells etc". The heat generated is also being supplied to the solvent extraction plant and has substituted the 12 TPA biomass fired boiler used for the operations for the solvent extraction plant prior to setting up of the power plant.

Project Description

The project is located at Enikepadu village, Krishna District situated at a distance of 5km from Vijayawada. The site is located on Chennai-Calcutta National Highway. The area has a high concentration of rice mills. The significant reason for selection of the site was its nearness to the raw material source. The total yield of husk in the area is about 3, 95,480 MT per annum while the requirement of biomass is 45,000MT per annum.

The site location offers the following advantages to Vijay Agro Products Pvt. Ltd: 1) Proximity to source of fuels viz., biomass 2) Availability of road and railway lines to facilitate transportation of plant equipment, biomass fuels as well as ash generated in the plant for disposal. 3) Assured availability of water. 4) Acceptability of site from an environmental perspective 6) Proximity to State Electricity Grid enabling transmission of power generated.

The main fuel to be used in the plant is Rice husk. The other fuels being used are, rice husk, rice straw, groundnut husk, etc available in the region.

Benefits of the project:

The setting up of the project has resulted in the following benefits:

- Proper utilization of surplus biomass;
- Generation of eco-friendly green power;
- Avoidance of burning of agriculture waste;
- Reduction of CO<sub>2</sub> emissions



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### Contribution to Sustainable Development

Project activity contributes to the sustainable development in following way:

#### Socio-Economic well being:

- The project activity has generated direct and indirect employment opportunities in the local area.
- The development of employment opportunity in the rural area results in reduced migration to urban areas in search of employment opportunities.
- The project provides economic value to agricultural waste and provides stable and quality power to farmers and households. The plant is generating commercial value for crop residues enabling the farmers to get a better price for their produce augmenting their income.
- The project has created business opportunities for local stakeholders such as bankers, consultants, transporters, suppliers, manufacturers, contractors *etc.*
- With increased economic activity in the area leading to increase in land prices, the asset value of the local people has increased.

#### Environmental well being

- The substitution of the conventional energy sources like coal, lignite and natural gas with power generated through biomass helps in mitigation of greenhouse gases. Combustion of biomass materials results in emissions of GHG gases viz., CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>x</sub>. The major constituent of GHG emissions is CO<sub>2</sub>, which is about 98%, whereas CH<sub>4</sub> and NO<sub>x</sub> constitute the remaining 2%. This can well be evidenced from the typical ultimate analysis<sup>1</sup> of biomass materials, which indicates the Nitrogen content is within 1 to 2%, therefore CH<sub>4</sub> emission is negligible. Hence CO<sub>2</sub> is considered as the only GHG emissions from the biomass combustion.
- Since the biomass is formed by fixing the atmospheric CO<sub>2</sub> by the action of photosynthesis in the presence of sunlight, the CO<sub>2</sub> released due to combustion of biomass is assumed to be equal to the CO<sub>2</sub> fixed by the photosynthesis. Again the CO<sub>2</sub> 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<sub>2</sub> consumption and release can be treated as cyclic process resulting in no net increase of CO<sub>2</sub> in the atmosphere. Hence, the project is not expected to lead to increased GHG emissions.

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 (*)	Private and/or public entity(ies)	Kindly indicate if the Party
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<sup>1</sup> Chemical analysis of elements in the fuel (biomass)



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((host) indicates a host Party)	project participants (*) (as applicable)	involved wishes to be considered as project participant (Yes/No)
India	Vijay Agro Products Private Limited (Private entity. Project developer. )	No

**A.4. Technical description of the small-scale project activity:**
**A.4.1. Location of the small-scale project activity:**

&gt;&gt;

The project activity is located in Enikepadu village in Krishna District, Andhra Pradesh, India.

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

&gt;&gt;

India

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

&gt;&gt;

Andhra Pradesh

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

&gt;&gt;

Krishna District.

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

&gt;&gt;

The site is located at Enikepadu village, Krishna District situated at a distance of 5km from Vijaywada. The site is located on the Chennai-Calcutta National Highway. The latitude and longitude of the site is approximately 16.31N and 80.39E.



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

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**Type:** Renewable Energy Project (Small Scale)

**Category:** Grid Connected Renewable Electricity Generation

**Technology/Measure:** Biomass based renewable energy unit supplying electricity to and/or displaces electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.



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<b>A.4.3 Estimated amount of emission reductions over the chosen <u>crediting period</u>:</b>
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<b>Years</b>	<b>Annual estimation of emission reductions in tonnes of CO<sub>2</sub>e</b>
2007 - 2008	15952
2008 - 2009	15952
2009 - 2010	15952
2010 - 2011	15952
2011 - 2012	15952
2012 - 2013	15952
2013 - 2014	15952
2014 - 2015	15952
2015 - 2016	15952
2016 - 2017	15952
Total estimated reductions (tones of CO <sub>2</sub> e)	159520
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO <sub>2</sub> e)	15952



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

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No public funding is available to the project. Project is implemented with equity of project proponent (VAPPL) and long term debt by State Bank of India.

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

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. A small-scale project activity that is part of a large project activity is not eligible to use 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.

In VAPPL's case, it does not fall under the debundled category and qualifies as a small scale CDM project. It is the single such project of the promoters. The conditions in paragraph 2 of Appendix C confirm that the proposed small-scale project activity is not a debundled component of a larger project activity.





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**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:**

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The small scale methodology applicable to the project activity is

Type I – Renewable Energy Projects,

Subset D - Grid connected renewable electricity generation

Version: 10 (23<sup>rd</sup> December 2006)

**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 are 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.

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

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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 10, 23<sup>rd</sup> December 2006)**, in case of units which co-fire non renewable biomass or 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.

The project activity is a 4.0 MW Biomass based Cogeneration project which is less than the specified limit of 15 MW for Small scale Project activities. The project proposes to generate power using renewable biomass as fuel and will be exporting it to the Andhra Pradesh State Electricity grid.

As this project activity is a 4 MW Biomass based Power project which is less than 15 MW with a thermal firing capacity of 20.4 MWth which is less than 45 MWth, this project activity can be defined under

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

**Sub Category:** “D”, Grid connected Renewable Electricity Generation (Renewable Biomass based Power Project)

**B.3. Description of the project boundary:**

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As per the guidelines mentioned in Type I. D. of Annex 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.

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. The project boundary is considered within these terminal points. However, for the purpose of calculation of baseline emissions, Southern Regional grid is also included in the project boundary. As the plant uses only biomass residues the area where the biomass is extracted or produced is not included in the boundary.

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

<b>B.4. Description of <u>baseline and its development</u>:</b>
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The baseline methodology has followed the one specified under Project category I.D in Appendix B of the Simplified M&P for small scale CDM project activities.

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the Southern grid, the details of which are available on the following website.

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

As per the latest guidelines in I.D to estimate the baseline emissions, the emission factor is calculated as per the procedures laid in paragraph 9 (a) & (b). As this methodology suggested adopting the procedures laid in ACM0002, the same has been considered for calculations. The baseline emissions and the emission reductions from project activity are estimated based on the quantum of electricity to be exported by the project activity to the grid and the **Baseline Emission Factor (BEF)** of the southern regional grid calculated as a **combined margin (CM)**, consisting of the combination of **operating margin (OM)** and **built margin (BM)** factors. The project proponent wishes to use the BEF calculated Ex-ante, and has fixed the same for the entire crediting period.

For the purpose of estimation of the Carbon Emission Reductions, the Combined Margin Factor for the Southern Regional grid of 0.86 has been used.

<b>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 <u>small-scale</u> CDM project activity:</b>
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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.



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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 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:**

The project under consideration was conceptualized in July 2000 when Gouthami Solvents Oils Pvt. Ltd.'s 2.75 MW power plant was the sole biomass based project operational in the state of Andhra Pradesh. No other biomass based power plant was operational in Krishna district<sup>2</sup>. By the time of commissioning of the project, in January 2002, there were only two biomass based power projects operational in Krishna District with a total capacity of 12MW. The total installed capacity in the state of Andhra Pradesh then was only 72.75 MW. Even by April 2004, the total installed capacity in the state of Andhra Pradesh was 150.25 MW whereas a total capacity sanctioned was 410.55 had been sanctioned by NEDCAP<sup>3</sup>.

This illustrates the low penetration of such renewable energy projects and little willingness of entrepreneurs then to change the current operating practices in the region. It can be concluded from the above that the project under discussion was not a common practice in the region. The practice of generating power by using biomass as primary fuel had not penetrated in the region due to certain prohibitive barriers to project implementation. The comprehensive analysis on the common practices adopted for power generation in Andhra Pradesh further justifies that the project is not a part of the baseline. The data on the state of biomass based power projects, suggests that the barriers, which are discussed in this section have hindered the growth of the sector.

Though biomass based cogeneration plants was not a common practice, the project proponent took up this new initiative of utilizing biomass as primary fuel by overcoming the various barriers to prevailing practices and set example for others. The project proponent was well aware of the various barriers to project implementation. However the project proponent was aware that the barriers could be overcome with the availability of carbon financing against a sale consideration of carbon credits that would be generated once the project gets implemented. The project proponent took CDM revenue stream during the planning stage.

**2) Policy related barriers**

The Electricity Act, framed in 2003, ushered in far reaching changes in the power sector. As power sector requires significant amount of resources to meet the requirements, its ability to attract commercial capital needed to be ensured through relevant policy and regulatory actions. The Electricity Act, framed in 2003, provided for framing of Long term tariff policy, aimed at striking a balance between the interests of the consumers and the interests of the providers of the capital. The policy also enhanced predictability and financial viability orientation in the tariff setting process.

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<sup>2</sup> Annexure V of the report entitled 'Socio-Economic Impacts of Biomass Power Plants' prepared by ASCI and submitted to the Ministry of Nonconventional Energy sources, Government of India.

<sup>3</sup> APERC Order R.P. No.84/2003 in O.P. No. 1075 /2000 dated 20<sup>th</sup> March 2004.



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Multi year tariff framework gives an indication of how the regulator works and provides clarity on the rules to be applied over a pre-defined future time period in advance, thereby giving a fair idea of the future scenario. Independent Power Producers (IPP) thus are aware of the outcome of various actions/events at least for the pre-defined future time period.

However, the project under consideration was conceptualized, constructed and commissioned before the enforcement of the Electricity Act, 2003. In the absence of a long term tariff framework, the project proponent faced financial uncertainty. The short term approach to regulation did not enable risk mitigation and was an impediment to private sector participation in the power sector. There was no certainty with regards to revenue and tariff determination principles and thus the financial viability was uncertain. However, the project proponent decided to proceed ahead with the project inspite of the financial uncertainty as any downward revision of the tariff could be offset by CDM benefits.

### 3) Information Component

Vijay Agro Power Products Private Limited has been an agro based export oriented industrial company engaged in the process of extraction of oils by solvent extraction method, hydrogenation of commercial oils and refining of vegetable oils and is operational since August, 1984. The project promoters had no prior experience in operating a power plant. Being a new entrants in to the field of power generation, there could have been knowledge gaps in the areas of practices of commercial power generation and export, operation of power plant at varying grid conditions, solving unexpected technical snags and decision making etc.,

This discussion suggests that there were policy barriers to the setting up of the project which has been overcome by the project proponent. Hence the project activity may be considered as additional.

## **B.6. Emission reductions:**

<b>B.6.1. Explanation of methodological choices:</b>
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### **Baseline**

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the Southern grid, the details of which are available on the following website.

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

The procedures and formulas used for estimation of the baseline factor and the assumptions made has also been detailed in there.

For the purpose of estimation of CERs, the weighted emission factor of 0.86 has been used.

The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been



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identified as the mainstay fuel for power generation till 2012<sup>4</sup>. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner.<sup>5</sup>

From the above discussion, it may be concluded, that in the future, the grid electricity generation using fossil fuel based resources in the Southern grid will increase. Hence, the baseline factor used for CER estimation by the project proponent may be considered conservative.

### **Project Emissions**

#### **Coal consumption**

The project proponent intends to use renewable biomass as fuel. However, in case of exigencies coal (based on regulations from IREDA/MNES on annual basis) instead of biomass may also be used. The CO<sub>2</sub> emissions during the usage of coal will be calculated in the following manner:

#### **1. Using IPCC standard CO<sub>2</sub> emission factor**

$$CE_c = Q * CC * EFC$$

where,

CE<sub>c</sub> - Carbon-dioxide emission due to coal burning at project site, MT

CC - Calorific value of coal, kcal/ton

Q - Quantity of coal burned, MT

EFC - IPCC standard emission factor kg of CO<sub>2</sub>/kcal

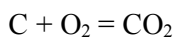
**OR**

#### **2. Using actual carbon content of the coal**

CO<sub>2</sub> Emission [in kgs] = Stoichiometric CO<sub>2</sub> from carbon content of coal [based on total carbon content]

To have an estimate of the project CO<sub>2</sub> emission quantity due to combustion of coal along with the biomass, total carbon content of the coal should be known.

Combustion reaction for CO<sub>2</sub> emission is as under.



Assuming complete combustion of coal, following formula can be used for conservative estimation of CO<sub>2</sub> emissions.

$$CE_c = (44/12) * C * Q$$

where,

CE<sub>c</sub> - Stoichiometric carbon-dioxide emission due to coal burning at project, MT

C - Carbon percentage in coal, %

Q - Quantity of coal burned, MT

<sup>4</sup> [http://powermin.nic.in/JSP\\_SERVLETS/internal.jsp](http://powermin.nic.in/JSP_SERVLETS/internal.jsp)

<sup>5</sup> [pfc.gov.in/BrochureKarnatka5-03-06.pdf](http://pfc.gov.in/BrochureKarnatka5-03-06.pdf)



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### Diesel consumption

In addition to coal, plant may also consume diesel from grid during start up and emergency. Due to the low volume of consumption per annum compared to total export, the same quantity has not been considered in the calculation of ex ante emissions. However, the same will be monitored every month for the records purpose for the verification process.

The project emission due to consumption of HSD will be calculated as follows:

$$PE_{HSD} = HSD_{CONS} * Density_{Diesel} * CV_{Diesel} * EF_{tCO2\ Diesel} * OF_{Diesel}$$

Where

$PE_{HSD}$	=	Project Emission due to use of HSD
$HSD_{CONS}$	=	HSD Consumption in Liters
$Density_{Diesel}$	=	Density of HSD
$CV_{Diesel}$	=	Calorific Value of HSD
$EF_{tCO2\ Diesel}$	=	IPCC Emission Factor for HSD
$OF_{Diesel}$	=	Oxidation Factor for HSD

### Leakage

As per the general guidance on leakage in biomass projects, 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 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	Emissions from biomass generation / cultivation	Competing use of biomass
Biomass from forests	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	-
<b>Biomass residues or wastes</b>	<b>Biomass residues or wastes are collected and used</b>	-	-	<b>X</b>

For the project activity, the following are considered to calculate the possible emissions due to leakage:



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1. As the project activity will use only biomass residues, the implementation of activity will not lead to shift of pre project activities.
2. The biomass that will be used in the plant is generated from various crops. This waste will anyhow be generated even in the absence of the project activity and would be burnt without being used for any other purpose. Hence there are no emissions from the production of renewable biomass due to application of fertilizer and from clearance of lands.
3. The biomass study undertaken in the region revealed that the surplus available biomass was 395480 MT while the plant requirement is about 45,000 MT. This indicates the abundant availability of the biomass in the region. The quantity of biomass that is available in the region is more than the quantity of biomass that is utilized including the project activity and hence the leakage can be neglected.

From the above analysis, it can be concluded that the project activity does not have any sources of leakage due to type of biomass utilised.

Hence Emission Leakage = 0.

### **Emission Reduction**

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

Where

ER	Emission reduction per annum by project activity (tonnes/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
EL	Emission leakage (tonnes/year) (= 0)

The total clean power exported to the grid per annum at the time of verification would be calculated from the APTRANSCO billings.

However for ex-ante calculations of emission reductions,  $TP_{exp}$  has been calculated as shown below,:

$$TP_{exp} = TP_{gen} - TP_{aux} - TP_{loss}$$

Where

$TP_{gen}$	Total power generated
$TP_{exp}$	Total clean power export to grid per annum
$TP_{aux}$	Total auxiliary consumption of plant per annum
$TP_{loss}$	T&D loss

T&D losses are very minor as the substation is located close to the power plant and hence is assumed to be zero. Auxiliary consumption of 10% and a plant load factor of 90% has been assumed for the ex ante calculations.

<b>B.6.2. Data and parameters that are available at validation:</b>
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<b>Data / Parameter:</b>	Baseline Emission Factor.
Data unit:	tCO <sub>2</sub> /KWh
Description:	Baseline Emission Factor
Source of data used:	Central Electricity Authority, Ministry of Power
Value applied:	0.86
Justification of the choice of data or description of measurement methods and procedures actually applied :	<p><u>Justification for choice of Data:</u></p> <p>For the purpose of estimation of CERs, the Combined margin of 0.86 has been used.</p> <p>The Ministry of power intends to achieve 100% rural electrification by the year 2012. India has large coal reserves which provide a ready and economical resource and ensure energy security. Hence, coal has been identified as the mainstay fuel for power generation till 2012. Nine ultra mega power projects of 4000 MW capacity each are being planned to be set up in a phased manner in the country. From the above discussion, it may be concluded, that in the future, the grid electricity generation using fossil fuel based resources in the Southern grid will increase. Hence, the baseline factor used for CER estimation by the project proponent may be considered conservative.</p> <p>Measurement methods</p> <p>The details for the measurement methods and procedures applied are provided on the following website.</p> <p><a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a></p>
Any comment:	

<b>Data / Parameter</b>	EF
<b>Data Unit:</b>	tCO <sub>2e</sub> /TJ
<b>Description:</b>	CO <sub>2</sub> emission factor for each type of fuel
<b>Source of data used:</b>	IPCC Default Value
<b>Value Applied:</b>	Diesel: 20.2 (Source: IPCC)
<b>Justification of the choice of data or description of measurement methods and procedures actually applied.</b>	IPCC value has been used as no country specific value is available.
<b>Any Comments</b>	

<b>Data / Parameter</b>	EF
<b>Data Unit:</b>	tCO <sub>2e</sub> /TJ
<b>Description:</b>	CO <sub>2</sub> emission factor for each type of fuel
<b>Source of data used:</b>	IPCC Default Value





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<b>Value Applied:</b>	Coal: 96.1 tC/TJ (Source: IPCC)
<b>Justification of the choice of data or description of measurement methods and procedures actually applied.</b>	IPCC value has been used as no country specific value is available.
<b>Any Comments</b>	

<b>Data / Parameter</b>	OF <sub>Diesel</sub>
<b>Data Unit:</b>	Not Applicable (Constant)
<b>Description:</b>	Oxidation Factor of Diesel,
<b>Source of data used:</b>	IPCC default values
<b>Value Applied:</b>	Diesel: 0.99
<b>Justification of the choice of data or description of measurement methods and procedures actually applied.</b>	IPCC value has been used as no country specific value is available.
<b>Any Comments</b>	

<b>Data / Parameter</b>	OF <sub>Coal</sub>
<b>Data Unit:</b>	Not Applicable (Constant)
<b>Description:</b>	Oxidation Factor of each fuel type, i
<b>Source of data used:</b>	IPCC default values
<b>Value Applied:</b>	Coal: 0.98
<b>Justification of the choice of data or description of measurement methods and procedures actually applied.</b>	IPCC value has been used as no country specific value is available.
<b>Any Comments</b>	

<b>B.6.3 Ex-ante calculation of emission reductions:</b>
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Based on the methodology and formulas detailed in the above section, the Carbon Emission Reductions have been calculated and are provided in Appendix C.

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

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	Operating Years	Project Emissions (tonnes of CO <sub>2</sub> )	Leakage (tonnes of CO <sub>2</sub> )	Baseline Emissions (tonnes of CO <sub>2</sub> )	Emission Reductions (tonnes of CO <sub>2</sub> )
1.	2007-2008	6116	0	22068	15952
2.	2008-2009	6116	0	22068	15952
3.	2009-2010	6116	0	22068	15952
4.	2010-2011	6116	0	22068	15952
5.	2011-2012	6116	0	22068	15952
6.	2012-2013	6116	0	22068	15952
7.	2013-2014	6116	0	22068	15952
8.	2014-2015	6116	0	22068	15952
9.	2015-2016	6116	0	22068	15952
10.	2016-2017	6116	0	22068	15952
	Total	61160	0	220680	159520

**B.7 Application of a monitoring methodology and description of the monitoring plan:****B.7.1 Data and parameters monitored:***(Copy this table for each data and parameter)*

<b>Data / Parameter:</b>	Power Exported ( $TP_{exp}$ )
Data unit:	KWh
Description:	Power exported to the grid by the power plant during the crediting period.
Source of data to be used:	Monthly billing records of APTRANSCO for the electricity supplied to the grid.
Value of data	42.77 Million Kwh per annum
Description of measurement methods and procedures to be applied:	Power exported will be recorded at the plant using meters to be installed in the control room in the plant. For applying monthly bill to CSEB the meter readings will be taken on 1 <sup>st</sup> of every month by CSEB officials in presence of company representatives and readings will be jointly certified.
QA/QC procedures to be applied:	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards
Any comment:	The power exported would be cross checked using the meters installed for power generation and for auxiliary consumption. The difference between the meter readings for Power generation and auxiliary consumption should be equal to the Power exported.



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<b>Data / Parameter:</b>	Power Generation. ( $TP_{gen}$ )
Data unit:	KWh
Description:	Power generated by the plant.
Source of data to be used:	Meters to be installed at the plant site of VAPPL.
Value of data	47.52 Million Kwh per annum
Description of measurement methods and procedures to be applied:	The power generated will be measured through meters to be used at the plant site.
QA/QC procedures to be applied:	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the standards
Any comment:	Assuming 330 working days

<b>Data / Parameter:</b>	Biomass quantity
Data unit:	MT
Description:	The quantity of the biomass to be used in the plant during the crediting period.
Source of data to be used:	VAPPL records.
Value of data	-
Description of measurement methods and procedures to be applied:	The quantity of the biomass used will be recorded using weigh bridge to be installed at the plant site.
QA/QC procedures to be applied:	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The weigh bridge will be calibrated as per the standards.
Any comment:	This parameter is not used in ex ante estimation of CERs. However, this parameter would be monitored and will be available during the verification process.

<b>Data / Parameter:</b>	Coal Quantity
Data unit:	MT
Description:	The quantity of the coal that may be used in the plant during the crediting period.
Source of data to be used:	Bills/Receipts furnished by coal suppliers.
Value of data	-
Description of measurement methods and procedures to be applied:	The quantity of the coal used will be recorded using weigh bridge to be installed at the plant site. The same may also be cross checked with the bills furnished by the coal suppliers



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QA/QC procedures to be applied:	VAPPL will be monitoring the quantity of coal using a weigh bridge to be installed at the plant site to double check on the quantity of coal and ensure consistency.
Any comment:	For the purpose of estimation of CERs, it has been assumed that 20% of the power exported during the crediting period would be using coal.

Parameter	Diesel Consumption (HSD <sub>CONS</sub> )
Unit:	KL
Description:	Fuel Used (HSD)
Source of Data:	Daily records of fuel usage.
Value of Data:	-
Brief description of measurement methods and procedures to be applied:	Level Gauge indicator for DG Set.
QA/QC procedures to be applied (if any):	The data will be directly measured and monitored at the project site. All relevant records will be checked to ensure consistency. The level gauge indicator shall be checked for consistency.
Any Comments	

<b>Data / Parameter:</b>	Calorific Value of Biomass
Data unit:	Kcal/Kg
Description:	Calorific Value of the biomass used to be used in the power plant during the crediting period.
Source of data to be used:	Annual/ Semi Annual/ Quarterly laboratory testing results.
Value of data	-
Description of measurement methods and procedures to be applied:	VAPPL will annually undertake lab testing to estimate the calorific value of the fuel being used in the plant. In case different sources of fuel are used, the testing will be done quarterly or semi annually.
QA/QC procedures to be applied:	
Any comment:	

<b>Data / Parameter:</b>	Calorific value of coal
Data unit:	Kcal/kg
Description:	Calorific Value of the coal that may be used in the power plant during the crediting period.
Source of data to be used:	Annual/ Semi Annual/ Quarterly laboratory testing results.
Value of data	-
Description of	VAPPL will annually undertake lab testing to estimate the calorific value of the



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measurement methods and procedures to be applied:	coal being used in the plant. In case different sources are used, every batch of coal will be tested.
QA/QC procedures to be applied:	
Any comment:	This parameter is not used in ex ante estimation of CERs. However, this parameter would be monitored and will be available during the verification process for cross checking and ensuring consistency.

<b>B.7.2 Description of the monitoring plan:</b>
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&gt;&gt;

Monitoring methodologies / guidelines mentioned in the UNFCCC document of “Annex 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 project proponent will monitor the electricity exported to the grid using meters to be installed at the plant. As the project proponent may use coal in case of exigencies, the quantity of coal consumed during the crediting period and the calorific value of the same will also be monitored. Additionally, the project proponent would also monitor the quantity of biomass used and the calorific value for the same. For start up purposes, VAPPL may consume diesel. The project proponent would also monitor the quantity of diesel consumed. The monitoring plan is detailed in Annex 4 as well.

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 is formed who assigned responsibility of monitoring of different parameters and record are keeping. On daily basis, the monitoring reports will be checked and discussed. On monthly basis, these reports will be forwarded at the management level.

<b>B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)</b>
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&gt;&gt; 15/02/2007

Vijay Agro Products Private Limited (Project Proponent).



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

**C.1 Duration of the project activity:**

**C.1.1. Starting date of the project activity:**

>>

05/01/2002

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

>>

25 Years.

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

The project promoter intends to apply for a **Fixed Crediting Period**.

**C.2.1. Renewable crediting period**

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

>>

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

>>

**C.2.2. Fixed crediting period:**

**C.2.2.1. Starting date:**

>>

01/06/2007

(If the registration of the project is after 01/06/2007, the date of registration would be considered as the start date for the fixed crediting period)

**C.2.2.2. Length:**

>>

Ten years.



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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:**

>>

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.

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

>>

The environmental impacts are not considered to be significant by the project participant or the host party.

**SECTION E. Stakeholders' comments**

>>

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

>>

The local stakeholders were identified based on the impact or the possibility of impact due to the project activity. The Plant management and the Corporate Headquarter together identified the following as their local stakeholders:

a) Office bearers of the neighbouring villages, b) Residents of the neighbouring village c) Representative of APTRANSCO d) Representative of APPCB, e) Biomass suppliers.

The opinion of the institutional stakeholder about the project activity is reflected in the approvals received by VAPPL. However, in order to provide the local villagers, the biomass suppliers and other individuals an opportunity to express their view on the project activity and build a rapport with the local population, VAPPL decided to conduct a stakeholder meeting in its plant and invitations were sent in advance intimating them about the day, time, venue and the purpose of the meet.

**E.2. Summary of the comments received:**

>>

The stakeholder meeting was conducted on the 23<sup>rd</sup> of November 2006. Summary of the comments received from the stakeholders are provided below:



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Residents of Enikepadu village: The local villagers expressed their happiness with the setting up of the power plant in the region as it has provided them with opportunities for permanent employment. The employees from the local area opined that with the setting up of the power plant has helped in partially checking the migration to urban areas. Since the biomass is procured from the farmers, the power plant has created an additional source of revenue for them.

Office bearers of Enikepadu village: The representative of the panchayat opined that the power plant has resulted in economic development of the local areas. It has also generated indirect employment opportunities for transporters and local contractors and shop owners. The setting up of the power plant has resulted in improvement of the infrastructural facilities like approach roads. The panchayat revenues have also increased due to collection of taxes like building tax, library cess, non agricultural tax etc.

Representative of APTRANSCO: The representative of APTRANSCO expressed his support for the project activity as it has aided in reducing the power deficit in the region and has resulted in development of the local area through higher incomes and better infrastructure.

Representative of APPCB: The APPCB representative also expressed his satisfaction with the measures undertaken to mitigate the pollution due to the operations of the power plant and stated that VAPPL was meeting all of the APPCB norms.

Biomass Suppliers: The biomass suppliers stated that, with the setting up of the project activity, the income for the rice miller has increased, which in turn has resulted in higher income for the farmers in the local region. They also stated that the workers employed by them, prior to the setting up of the project activity, did not have permanent employment and used to work for daily wages. With the setting up of the project activity, they have got not only permanent employment but are also assured of higher wages.

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.

<b>E.3. Report on how due account was taken of any comments received:</b>
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All comments received were positive. No improvement opportunities were identified.





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

Organization:	Vijay Agro Products Pvt. Ltd
Street/P.O.Box:	Enikepadu Village
Building:	
City:	Vijayawada
State/Region:	Andhra Pradesh
Postfix/ZIP:	521 108
Country:	India
Telephone:	91 866 2842 50/51/52/53
FAX:	91 866 2842678
E-Mail:	<a href="mailto:vijayaag@hotmail.com">vijayaag@hotmail.com</a>
URL:	
Represented by:	
Title:	Chairman & Managing Director
Salutation:	Mr.
Last Name:	M.
Middle Name:	
First Name:	Rajaiah
Department:	
Mobile:	91 98481 22239
Direct FAX:	91 866 2842678
Direct tel:	91 866 2842227
Personal E-Mail:	<a href="mailto:vijayaag@hotmail.com">vijayaag@hotmail.com</a>



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**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

NO PUBLIC FUNDING IS AVAILABLE FOR THE PROJECT.



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**Annex 3**

**BASELINE INFORMATION**

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the Southern grid, the details of which are available on the following website.

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

The procedures and formulas used for estimation of the baseline factor and the assumptions made have also been detailed in there.



#### Annex 4

### MONITORING INFORMATION

The calibration of monitoring equipment will be maintained as per the requirement of APTRANSCO and the same will be done regularly. Power Generation, Export & Auxiliary Consumption, fuel consumption will be recorded daily and the same will be verified and approved by Plant Manager. These records will be reviewed by the Director and for corrective actions if necessary.

Internal Auditors will also verify the monitoring data. As per the advices of the Internal Audit team, corrective actions will be taken up for more accurate future monitoring and reporting system.

The Plant will be equipped with energy meters/export meters for monitoring and control purpose. The energy meters will be tested and calibrated utilizing a standard meter. The standard meter will be calibrated once in a year at the approved laboratory of Govt. of India or Govt. of Andhra Pradesh as per terms and conditions of supply. The tests of meters will 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 will 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 will 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 will be as per the replaced meter. Corrections in exported energy will be applicable to the period between the two previous monthly reading and the date and time of test calibration in the current month when error is observed.

Power generation, export and auxiliary consumption will be recorded at the plant from the installed meters. However, for billing APTRANSCO, the meter readings will be taken on 1<sup>st</sup> of every month by APTRANSCO officials in presence of company representatives and readings will be jointly certified.

The following log sheets will be maintained for the critical equipment of the plant and readings will be 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 will be recorded at the plant daily and the same will be verified by Manager of the plant. These records will be sent to the head office for review by the director and for corrective actions if necessary.

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**Appendix A**  
**Abbreviations**

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 <sub>2</sub>	Carbon Dioxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
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
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PLF	Plant Load Factor
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SBI	State Bank of India
SEB	State Electric Board
STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joule



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UNFCCC      United Nations Framework Convention on Climate Change  
VAPPL      Vijay Agro Products Pvt. Ltd.



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**Appendix B**  
**REFERENCE LIST**

Sr. No	References
1.	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) <a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a>
2.	Website of United Nations Framework Convention on Climate Change, <a href="http://unfccc.int">http://unfccc.int</a>
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: Appendix B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
5.	Detailed project report for the Biomass based cogeneration project – Vijay Agro Products Pvt. Ltd.
6.	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India- <a href="http://cea.nic.in">http://cea.nic.in</a>
7.	CEA published document “16 <sup>th</sup> Electric Power Survey of India”
8.	Website of APTRANSCO, <a href="http://www.aptransco.com">www.aptransco.com</a>
9.	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, <a href="http://mnes.nic.in">http://mnes.nic.in</a>
10.	Website of Indian Renewable Energy Development Agency (IREDA), <a href="http://www.ireda.nic.in">www.ireda.nic.in</a>
11.	<a href="http://www.infraline.com/power/">www.infraline.com/power/</a>
12.	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. <a href="http://envfor.nic.in">http://envfor.nic.in</a>
13.	Website of APERC, <a href="http://www.ercap.org">www.ercap.org</a>
14.	Report on Socio-Economic impact of Biomass plants, ASCI, Hyderabad.

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**Appendix – C**

On site Emissions	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Generation capacity , KW	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Plant load factor, %	90	90	90	90	90	90	90	90	90	90
No. of hours of plant operation per annum	7920	7920	7920	7920	7920	7920	7920	7920	7920	7920
No. of units generated in a year, millions	28.512	28.512	28.512	28.512	28.512	28.512	28.512	28.512	28.512	28.512
Auxilliary consumption per annum	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
No. of units exported to grid, millions	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66
T&D losses considered on exportable power	0	0	0	0	0	0	0	0	0	0
No. of units replaced in the grid, millions units	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66	25.66
Baseline emission factor considered, kgCO <sub>2</sub> /kWh	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Baseline emissions, tones	22068	22068	22068	22068	22068	22068	22068	22068	22068	22068
Generation by coal as supplimentary fuel (20%)	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13
Emission factor considered for coal, kgCO <sub>2</sub> /kWh	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
Project emissions, tones	6115	6115	6115	6115	6115	6115	6115	6115	6115	6115
Net greenhouse gas emissions, tones	15952	15952	15952	15952	15952	15952	15952	15952	15952	15952
Carbon emission reductions in a year	15952	15952	15952	15952	15952	15952	15952	15952	15952	15952
No. of years of delivery of CERs	10									
Total number of CERs	159520									