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

CONTENTS

Revision history of this document

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

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

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

Biomass based independent power project at Malwa Power Private Limited, Mukatsar, Punjab

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

Malwa Power Private Limited (MPPL) was incorporated in January 2002 as a Special Purpose Vehicle for setting up biomass based power plants. MPPL has set up the biomass based power plant at district Mukatsar in state of Punjab (project activity). The project activity generates electricity and sells it to the Punjab State Electricity Board (PSEB) through Power Purchase Agreement (PPA) contract. The major equipment of the project activity comprise a new 7.5 MW bleed cum condensing type turbine and one 31.5 tons per hour (TPH) and 67 atmosphere[1] (atm.) pressure boiler.

The purpose of the project activity is to utilize surplus biomass available in the region for effective generation of electricity for supply to grid to meet the ever-increasing demand for energy in the region. The project activity would reduce the Green House Gas (GHG) emissions produced by the regional grid generation mix, which is mainly dominated by fossil fuel based power plants.

Availability of biomass

Project activity would mostly use crop residues available in the area such as paddy straw, cotton stalk, mustard stalk, lops and tops of eucalyptus and popular trees, Julia Flora and use some quantity of agro-industry waste such as rice husk and saw dust. The total requirement of biomass is estimated to be 65,043 MT/annum at 90 % capacity utilisation and 72,270 MT/annum at 100% capacity utilisation for the project activity. The major sources of biomass generation are crop residues and agro-industry residues. As per the biomass assessment study carried out in three zones of 15 km radius, 15 to 25 km radius and 25-50 km radius, the total surplus biomass available after discounting for various end-uses is as follows:

Zone (km radius)	Crop residue	Agro-industry waste	Total
< 15	544,002	198,68	563,870
15-25	651,507	141,111	792,618

[1] 1 atmosphere = 1.033 kg/cm^2

25-50	795,775	-	795,775

So the surplus biomass availability for the project activity is more than the requirement.

Project activity's contribution to sustainable development

Government of India has stipulated social, economic, environmental and technological well-being as indicators for sustainable development in the interim approval guidelines[2] for CDM projects. MPPL believes that the project activity has beneficial effect on agriculture, rural industries and employment in the region and has the potential to shape the economic, environmental and social life of the people in the region, specially unemployed educated/uneducated youth with meagre resources.

Social well being:

- Since, the project is in a rural area, it would lead to overall development of the region.
- Since, the biomass resources are to be collected and transported to the plant site from the fields, employment opportunities are being generated for uneducated people having meager resources like bullock cart only, to collect the agro waste material and supply the same. MPPL is in the process of helping the unemployed, educated youth to secure loan from banks for procurement of tractors, trollies, chippers etc to transport the biomass to project site.
- Preference was given to employment of local people during construction and operation at project site thereby creating opportunities in the area for skilled and unskilled labour.

Economical well being:

- The project activity helped to create business opportunity for local stakeholders such as suppliers, manufacturers, contractors *etc*.
- Crop residues are collected from the farmers and brought to the project site, which otherwise would have remained under-utilized or just burnt. In other words, the project activity is generating commercial value for crop residues enabling the farmers to get better price out of their produce augmenting their income substantially thereby creating a positive impact on purchasing capacity of the individuals.
- Project activity would help to reduce the demand-supply gap in the power deficit regional grid.

[2] Ministry of Environment and Forest web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

- Project activity would help to reduce transmission losses due to generation of decentralised power close to load points. This has resulted in availability of quality power to nearby villages and industrial units.

Environmental well being

- Since, the project activity uses only biomass (carbon neutral fuel) for electricity generation it would eliminate an equivalent carbon dioxide which would have been otherwise generated to produce electricity.
- This electricity generation from the project activity would substitute the power generation by thermal power plants, which supply electricity to the regional grid. It would contribute towards the reduction in (demand) use of finite natural resource like coal, natural gas etc. minimizing depletion or else increasing availability to other important processes.

Technological well being

- The technology selected for the power plant is a modern and energy efficient one using a steam turbo generator with matching boiler capable of firing multiple fuels.
- Project activity serves a small demonstrative project for clean renewable energy generation in the state as it the first private sector biomass based power plant supplying power to grid in the state.

In view of the above arguments, MPPL considers that the project activity contributes to the sustainable development.

A.3. Project participants:

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	Malwa Power P. Ltd.	No

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

>>

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

>>

A.4.1.1. Host Party(ies):

India

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

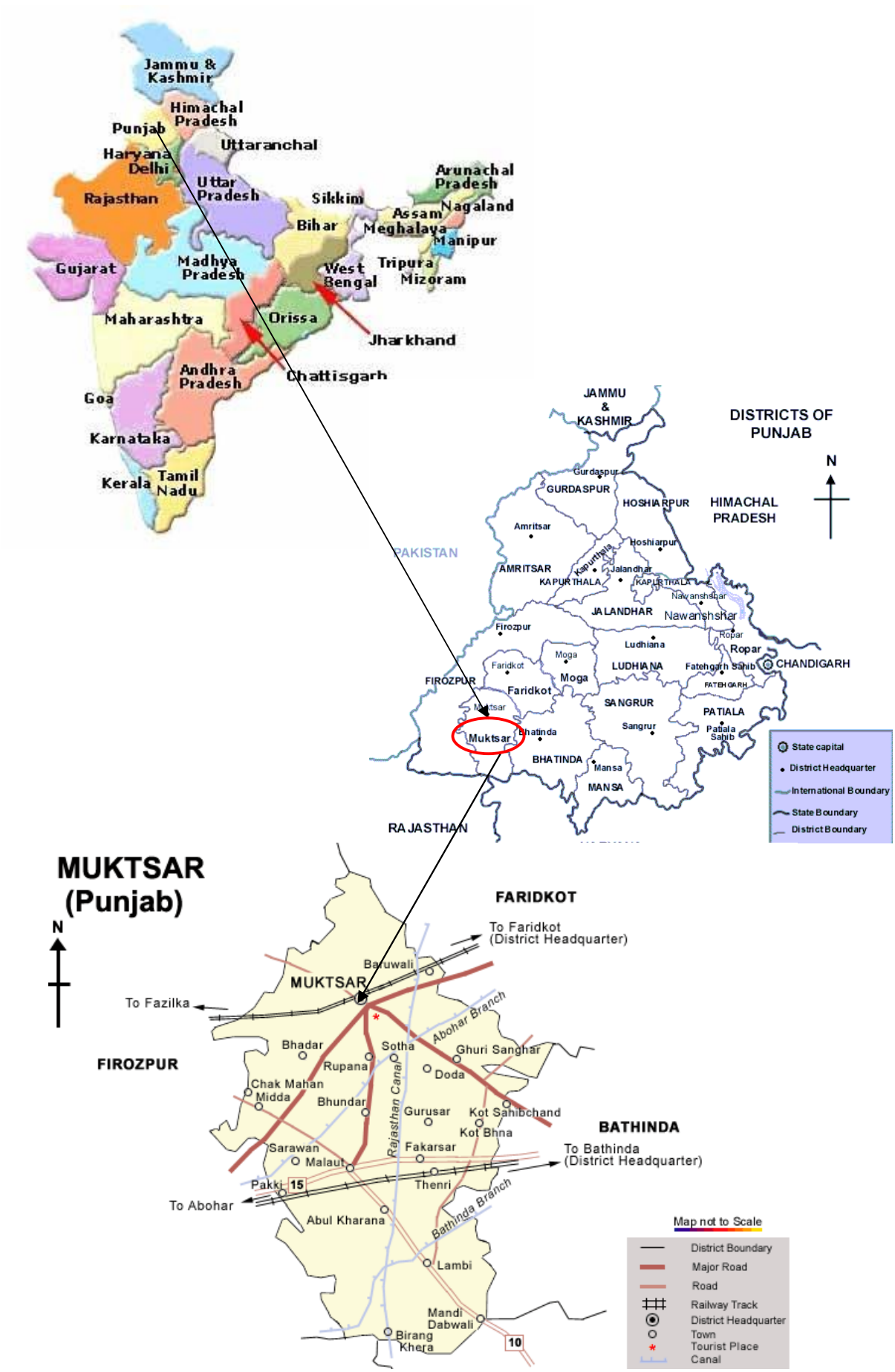
Punjab

A.4.1.3. City/Town/Community etc:

Village Gulabewalla , Tehsil Mukatsar , District Mukatsar

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

The project activity is located at Village Gulabewalla, District Mukatsar, Punjab. The Mukatsar district is situated in North West of Punjab. The soil is the district is primarily loamy soil which is very fertile in nature making it suitable for growth of crops. The district is richly endowed with natural and human resources making it suitable for development of agriculture and allied industries. The geographical location of Mukatsar is detailed in the maps below.


Jammu & Kashmir
Himachal Pradesh
Punjab
Uttaranchal
Haryana
Delhi
Uttar Pradesh
Rajasthan
Sikkim
Arunachal Pradesh
Nagaland
Assam
Meghalaya
Bihar
Manipur
Tripura
Mizoram
West Bengal
Gujarat
Madhya Pradesh
Maharashtra
Orissa
Jharkhand
Chattisgarh
Andhra Pradesh
Goa
Karnataka
Kerala
Tamil Nadu
PAKISTAN
JAMMU & KASHMIR
DISTRICTS OF PUNJAB
N
Gurdaspur
GURDASPUR
HOSHIARPUR
HIMACHAL PRADESH
Amritsar
Hoshiarpur
AMRITSAR
Kapurthala
Jalandhar
KAPURTHALA
Nawanshshar
JALANDHAR
Firozpur
Ludhiana
Ropar
Moga
Faridkot
LUDHIANA
Fatehgarh Sahib
CHANDIGARH
FIROZPUR
FATEHGARH
SANGRUR
PATIALA
Muktsar
Bhatinda
Sangrur
Patiala Sahib
BHATINDA
Mansa
MANSA
RAJASTHAN
State capital
District Headquarter
International Boundary
State Boundary
District Boundary
MUKTSAR (Punjab)
N
FARIDKOT
To Faridkot (District Headquarter)
Baruwali
MUKTSAR
To Fazilka
Abohar Branch
Bhadar
Sotha
Ghuri Sanghar
FIROZPUR
Rupana
Doda
Chak Mahan
Midda
Bhundar
Rajasthan Canal
Gurusar
Kot Sahibchand
Kot Bhna
BATHINDA
Sarawan
Malaut
Fakarsar
To Bathinda (District Headquarter)
Pakki
15
Thenri
To Abohar
Abul Kharana
Bathinda Branch
Lambi
Mandi Dabwali
Birang Khera
10
Map not to Scale
District Boundary
Major Road
Road
Railway Track
District Headquarter
Town
Tourist Place
Canal

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

Type I: Renewable Energy Projects

Category-D: Renewable electricity generation for a grid

The project activity is a biomass based power plant. The installed/rated capacity of the turbine is only 7.5 MW, which is less than the limit of 15 MW for renewable energy project activities to qualify under Type I project activities.

As per the provisions of Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities, (Version 07) Type ID "comprises renewables, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-renewable biomass fired generating unit".

Project activity comprises biomass based power plant supplying electricity to the grid. With above considerations, the Type I.D. is the most appropriate category for the project under discussion. The project activity does not comprise any electricity generation from non-renewable energy sources.

Technology of project activity

The power plant has boiler sized to produce a maximum of 31.5 TPH of steam and 7.5 MW steam turbine, which is a bleed cum condensing type machine. The steam conditions at the boiler heat outlet are a pressure of 67 atm. and temperature of 465 ^{0}C. Fluidized Bed Combustion type boiler has been selected, primarily due to its flexibility in fuel firing and as per the norms prescribed by Punjab Pollution Control Board. All the necessary auxiliary facilities of the power plant including Reverse Osmosis water treatment plant, cooling tower, condensate system, fuel storage and handling systems, electrical power evacuation system, ash handling system, fire fighting system, compressed air system, instrumentation and control system etc. have been provided for the power plant. The plant and equipment facilities have been designed to comply with the applicable stipulations / guidelines of statutory authorities such as State Pollution Control Board etc. Power is generated at 11 kV at the plant and is evacuated to grid at 66 kV through a 140% capacity transformer.

At 100 % capacity utilisation of boiler about 7.3 TPH of biomass (100 % biomass firing) is required. The fuel handling system has been designed for a capacity of 12 TPH. Combustion technology has been

selected for the power plant, wherein biomass is burnt as fuel in a steam generator to produce high-pressure steam, which is then expanded in turbo-generators to generate power.

There is no transfer of technology to the host country since the technology is available in India from reputed manufacturers.

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

The project activity leads to GHG on-site emissions in the form CO_2 from combustion of biomass which will be consumed by plant species, representing a cyclic process of carbon sequestration. Since, the biomass contains only negligible quantities of other elements like Nitrogen, Sulphur *etc*. release of other GHGs are considered as negligible. Hence energy generation from project activity does not lead to any GHG emissions.

The energy supplied by project activity to the grid would reduce anthropogenic GHG emissions as per the combined margin carbon intensity of the grid, which is mainly dominated by fossil fuel based power plants as given below.

Percentage generation from grid feeding sources[3] *(Year: 2004-05)*

Coal - 61.65 %

Gas - 11.52 %

Hydro - 22.74 %

Nuclear - 4.09 %

Project activity would supply energy equivalent of approximately 465.102 million kWh to the grid in a period of 10 years thereby resulting in total CO_2 emission reduction of 438,536 tons. In the absence of the project activity equivalent electricity would have to be supplied to the grid customers from a mix of power plants supplying power to grid and consequent CO_2 emissions would occur.

[3] http://www.nreb.nic.in/Reports/ar04-05/chapter2/annx2.7.pdf

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

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2005-2006	35,285
2006-2007	40,325
2007-2008	45,366
2008-2009	45,366
2009-2010	45,366
2010-2011	45,366
2011-2012	45,366
2012-2013	45,366
2013-2014	45,366
2014-2015	45,366
Total estimated reductions (tonnes of CO_2 e)	438,536
Total number of crediting years	10 years
Annual average over the crediting period of estimated reductions ((tonnes of CO_2 e)	43,854

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

No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity.

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

The project activity is not a debundled component of a large project activity as the project proponents have not registered or applied to register any small scale project activity:

- in same category; or
- whose project boundary is within 1 km of project boundary of the small scale 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:

Main Category: Type I - Renewable Energy Projects

Sub Category: I.D.-Renewable electricity generation for a grid

The reference has been taken from the list of the small-scale CDM project activity categories contained in 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 7.

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

Appendix B of the simplified M&P for small-scale CDM project activities (Version 7) provides indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. As per this document the project activity falls under Category I.D.-Renewable electricity generation for a grid.

Baseline for projects under Type I.D has been detailed in paragraph 7 of Type I.D. described in Annex B of the simplified modalities and procedures for small-scale CDM project activities. It states that the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $kgCO_2/kWh$) calculated in a transparent and conservative manner as:

a) The average of the "approximate operating margin" and the "build margin", where:
   i. The "approximate operating margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of all generating sources surviving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;
   ii. The "build margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of recent capacity additions to the system, defined as the higher (in MWh) of most recent 20% of plants built or the 5 most recent plants;

OR

b) The weighted average emissions (in $kgCO_2equ/kWh$) of current generation mix.

Considering the available guidelines and the present project scenario, Nortern region grid has been chosen for baseline analysis by selecting "The average of the approximate operating margin and the build margin (combined margin)" for baseline calculations. Further details of the baseline are given in section B.5.

The operating margin estimates the effect of the project activity on the operation of existing power plants and the build margin estimates the effect of the project activity on the building of future power plants. There is a gap between demand and supply in the grid so there is likely addition of more power plants in the grid mix. Combined margin is calculated as average of operating and build margin, which takes into account the trend of the types of power plant coming up in the grid, thus the uncertainties get addressed by taking the said approach for baseline calculation

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:

The implementation of the biomass based project activity is a voluntary step undertaken by MPPL with no direct or indirect mandate by law. The main driving forces to this 'Climate change initiative' have been:

- GHG reduction and subsequent carbon financing against sale consideration of carbon credits.
- Rural Development of the region by creating job opportunities for the local people.
- Demonstration of developing such projects to the other entrepreneurs.

However, the project proponent was aware of the various barriers associated to project implementation. But it was felt that the availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers.

The barriers faced by the project activity are discussed below:

Prevailing practice barrier:

The prevailing and the common practice in the Indian power sector have been investments in the fossil fuel based power plants. This is mainly due to assured return on investments, economies of scale and easy availability of finances.

The Department of Science, Technology, Environment and Non-conventional Energy of Punjab Government had announced the New and Renewable Sources of Energy (NRSE) Policy in July 2001. This policy was formulated for promotion of energy generation through non-conventional sources of energy. The main objectives of the policy are to enhance the contribution of renewable energy, create conditions conducive for involvement of private investors in NRSE projects and create direct and indirect employment opportunities. Although progressive policy for promoting renewable energy power sources and potential for generating decentralized power of about 1500 MW[4] from biomass sources exists in Punjab, biomass based

[4] Notification No. 10/85/2000-STE(3)/1476-NRSE Policy, July 2001 of Govt. of Punjab

power plants supplying power to grid are still uncommon in the state of Punjab. Out of total generation mix of Punjab of 30,884 million kWh for year 2003-04 none was supplied by biomass based projects. This illustrates that practice of generating power from the biomass has not penetrated in the state and entrepreneurs are not willing to change the current operating practices in the region.

However, MPPL decided to go ahead with the implementation of the project activity taking CDM funding into consideration. MPPL is the **first Independent Power Producer** in the state to implement a biomass based power project supplying power to grid. The practice of generating power from the biomass has not penetrated in the state due to prohibitive barriers to project implementation discussed in this section.

Institutional barriers:

MPPL is selling power to PSEB through a 20 year Power Purchase Agreement (PPA) contract. As per the data available till 2001-02, PSEB has been incurring heavy commercial losses since last one decade. The commercial loss (with subsidy) for PSEB (off-taker) in the year 2000-01 was INR 14.76 billion[5]. For their cash in-flows the project proponent depends on the payments from PSEB against the sale of electricity to the grid and it is very likely that there could be problems with the cash inflows of project. However MPPL signed a PPA with PSEB in hoping that CDM funding would help to off-set the anticipated losses.

As per the NRSE Policy of 2001 by Government of Punjab, PSEB was supposed to purchase power from renewable power projects in the state @ INR 3.01 per kWh (base year 2000-01) with a 3 % annual increment upto 5 years. In the meantime Punjab State Electricity Regulatory Commission (PSERC) became functional and all the project developers of the renewable power projects were supposed to get the tariffs approved from PSERC. Taking this into deliberation, in the year 2002 PSEB filed a petition with the PSERC for revising the tariff to lower rates for purchase of power from these projects. Although the judgment has gone in the favour of developers of such renewable power projects, in line with NRSE Policy-2001, but likelihood of the PPA being renegotiated at later stage cannot be ruled out in the future due to precarious situation of PSEB. These revisions are bound to severely affect the sustainability of the project activity.

Even after PSERC's approval on the tariffs in March 2003, MPPL was not willing to go ahead with the implementation of the project activity due to PSEB's systems and inappropriate approach towards such renewable energy projects. However in order to avail the benefits from sale of carbon credits, MPPL initiated this GHG abatement project under Clean Development Mechanism.

[5] http://www.powermin.nic.in/indian_electricity_scenario/pdf/NR01005.pdf

It took PSEB almost one year after PSERC's approval on tariffs to sign PPA with MPPL. If this scenario continues, then it would significantly affect the development of other such projects due to reluctance of the financial institutions to support them and would hamper the growth of eco-friendly non-emissive power generation.

MPPL's success would depend on securing the proposed carbon finance and it would definitely encourage other entrepreneurs to come up with similar project activities contributing further towards GHG emission reduction through the huge untapped biomass based power potential.

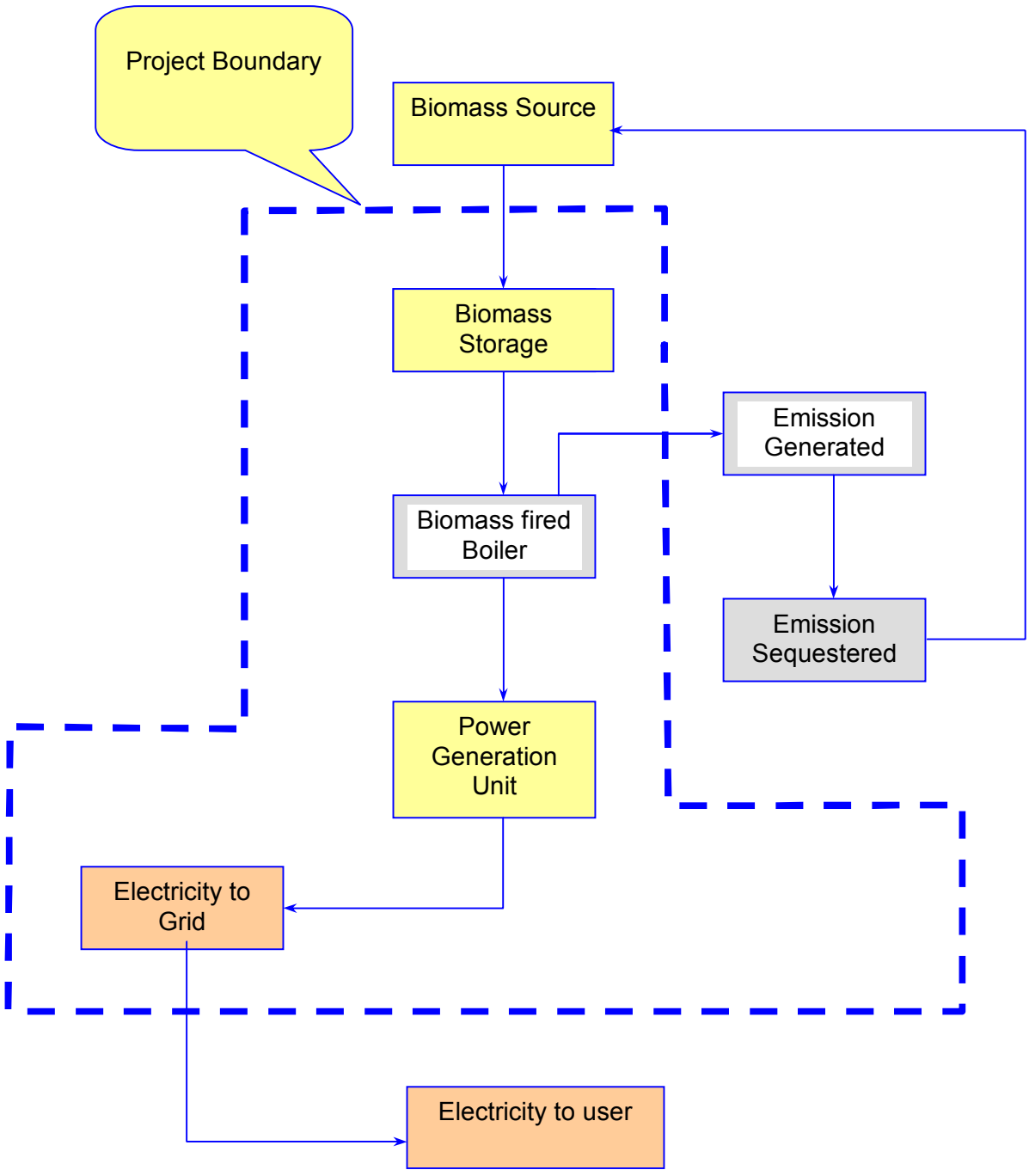
In absence of the project proponent's initiative to implement the project, the equivalent electricity would have been generated by the regional grid mix dominated by fossil fuel based power plants.

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

As mentioned under paragraph 4 of Type I.D. of '*Annex-B of the simplified modalities and procedures for small-scale CDM project activities'*, project boundary encompasses the physical, geographical site of the renewable generation source. For the project activity the project boundary is from the point of fuel storage to the point of electricity supply to the grid interconnection point where the project proponent has full control.

Thus, project boundary covers fuel storage, boiler, steam turbine generator and all other accessory equipments. However, for the purpose of calculation of baseline emissions, Northern region grid is also included in the boundary.

Flow chart and project boundary is illustrated in the following diagram:


Project Boundary
Biomass Source
Biomass Storage
Emission Generated
Biomass fired Boiler
Emission Sequestered
Power Generation Unit
Electricity to Grid
Electricity to user

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

Using the methodology available in paragraph 7 of Type I.D. described in Annex B of the simplified modalities and procedures for small-scale CDM project activities, **the average of the approximate operating margin and the build margin** (in kgCO_{2e}qu/kWh) of current generation mix of Northern region grid is used for the calculation of baseline.

Base line data

Carbon emission factor of grid

Northern region's present generation mix, thermal efficiency, and emission co-efficient are used to arrive at the net carbon intensity/baseline factor of the chosen grid. As per the provisions of the methodology the emission coefficient for the electricity displaced would be calculated in accordance with provisions of paragraph 7 of Type I.D. mentioned in Appendix B of Draft Simplified Modalities and Procedures for Small Scale CDM Project Activities for grid systems.

The provisions require the emission coefficient (measured in kg CO_2equ/kWh) to be calculated in a transparent and conservative manner as:

(a) The average of the "approximate operating margin" and the "build margin" (or combined margin)

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

Complete analysis of the electricity generation has been carried out for the calculation of the emission coefficient as per paragraph 7 (a) given above.

Combined Margin

The baseline methodology suggests that the project activity will have an effect on both the operating margin (i.e. the present power generation sources of the grid, weighted according to the actual participation in the grid mix) and the build margin (i.e. weighted average emissions of recent capacity additions) of the selected grid and the baseline emission factor would therefore incorporate an average of both these elements.

Operating Margin

The "approximate operating margin" is defined as the weighted average emissions (in kg CO_2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

The project activity would have some effect on the operating margin of the Northern region grid. The carbon emission factor as per the operating margin takes into consideration the power generation mix of 2004-2005 excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation of the selected grid, and the default value of emission factors of the fuel used for power generation.

Key parameters with their data sources

S No.	Key parameters	Data sources
1.	Generation data for all plants for the year 2004-05 (kWh)	Annual Reports of Northern Region Electricity Board (NREB) (http://www.nreb.nic.in/Reports/ar04-05/chapter2/annx2.7.pdf)
2.	Coal consumption	Annual Performance Review of Thermal Power Plants; CEA (http://www.cea.nic.in/Th_per_rev/CEA_Thermal%20Performance%20Review0405/SECTION-9.pdf)
3.	Calorific value of gas	IPCC
4.	Calorific value of coal	IPCC
5.	Oxidation factors	IPCC
6.	Efficiency of gas based power plants supplying power to grid	Emission Baselines-Estimating the Unknown, page 156: by International Energy Agency (www.iea.org/textbase/nppdf/free/2000/embase2000.pdf)

Emission factors

The emission factors are based on IPCC Guidelines for National Greenhouse Gas Inventories and are given below.

Fuel	Emission factor (tC/TJ)	Emission factor (tCO_2/TJ)
Natural gas	15.3	56.1

Sub-bituminous coal	25.8	94.6

The generation data collected and used is presented further in Table 1.

Average efficiency of gas/combustion turbine (peak load) works out to be 35 % and that for gas turbines in combined cycle works out to be 50 %[6]. On conservative basis average efficiency for base line calculations is considered as 50%. Standard emission factors given in IPCC for coal and gas (thermal generation) are applied over the expected generation mix and net emission factor is determined.

The formulae are presented in Section-E. Carbon Emission Factor of grid as per operating margin is 1.137 kg CO_2/kWh electricity generation.

Build Margin

The "build margin" emission factor is the weighted average emissions (in kg CO_2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants.

The project activity will have some effect on the build margin of the Northern region grid. The baseline factor as per the build margin takes into consideration the delay effect on the future projects and assumes that the past trend will continue in the future. Capacity additions of most recent 20 % of existing plants is greater than (in MWh) than 5 most recent plants hence, for our build margin calculation we would take into consideration 20 % of most recent plants built in Northern region given in Table 2. The key parameters for calculating build margin have been assumed same as that for calculating operating margin. Carbon Emission Factor of grid as per build margin is 0.748 kg CO_2/kWh electricity generation.

Net Carbon Emission Factor Grid for 2004-2005 as per combined margin = (OM + BM)/2 = 0.942 kg of CO_2 / kWh generation.

[6] Emission Baselines-Estimating the Unknown, page 156: by International Energy Agency (www.iea.org/textbase/nppdf/free/2000/embase2000.pdf)

Table 1: Generation and fuel consumption details (2004-05)

Name	Type	Fuel	Generation (million kWh)	Coal Consumption (000' tones)
Badarpur TPS	Thermal	Coal	5462.78	3732
Singrauli STPS	Thermal	Coal	15803.34	10336
Rihand STPS	Thermal	Coal	7988.06	4768
Dadri NCTPS	Thermal	Coal	6842.52	4432
Unchahar-I TPS	Thermal	Coal	3342.83	4604
Unchahar-II TPS	Thermal	Coal	3438.28	-
Tanda TPS	Thermal	Coal	3254.67	2596
Anta GPS	Thermal	Gas	2595.77	-
Auriya GPS	Thermal	Gas	4119.47	-
Dadri GPS	Thermal	Gas	5527.71	-
Faridabad GPS	Thermal	Gas	3172.01	-
Bairasiul	Hydro	Hydel	689.67	-
Salal	Hydro	Hydel	3443.29	-
Tanakpur HPS	Hydro	Hydel	495.17	-
Chamera HPS	Hydro	Hydel	3452.25	-
Uri HPS	Hydro	Hydel	2206.71	-
RAPS-A	Nuclear	Nuclear	1355.20	-
RAPS-B	Nuclear	Nuclear	2954.43	-
NAPS	Nuclear	Nuclear	2760.01	-
Bhakra Complex	Hydro	Hydel	4546.01	-
Dehar	Hydro	Hydel	3150.52	-
Pong	Hydro	Hydel	882.57	-
Delhi	Thermal	Coal	5203.80	-
SJVNL	Hydro	Hydel	1617.45	1330
Delhi	Thermal	Gas	4091.37	-
Haryana	Thermal	Coal	7192.41	5269
Haryana	Hydro	Hydel	251.73	-
H.P.	Hydro	Hydel	3666.39	-
J&K	Hydro	Hydel	851.03	-
J&K	Thermal	Gas	23.51	-
Punjab	Thermal	Coal	14390.42	9520
Punjab	Hydro	Hydel	4420.43	-
Rajasthan	Thermal	Coal	17330.79	11133
Rajasthan	Thermal	Gas	360.70	-
Rajasthan	Hydro	Hydel	494.07	-
U.P.	Thermal	Coal	19788.21	15559
U.P.	Hydro	Hydel	2063.04	-
Uttaranchal	Hydro	Hydel	3452.96	-
TOTAL			**172681.58**	**73279.00**

Table2: Power plants considered for calculating build margin

Plants supplying power to Northern grid are arranged in descending order of date of commissioning
Total generation for 2004-05 = 172681.585
20 % of total generation = 34536.32

	Plant	Date of commissioning	MW	Generation in 2004-2005 (Million kWh)[7]	Fuel Type
1.	Chamera HEP-II (Unit 1)	2003-2004	100	1344.07	Hydro
2.	Chamera HEP-II (Unit 2)	2003-2004	100		Hydro
3.	Chamera HEP-II (Unit 3)	2002-2003	100		Hydro
4.	SJVPNL	2003-2004	1500	5108.77	Hydro
5.	Baspa-II (Unit 3)	2003-2004	100	398.94	Hydro
6.	Suratgarh-III (Unit-5)	2003-2004	250	1698.37	Coal
7.	Kota TPS-IV (Unit-6)	2003-2004	195	1302.49	Coal
8.	Baspa-II (Unit 1 & 2)	2002-2003	200	797.88	Hydro
9.	Pragati CCGT (Unit II)	2002-2003	104.6	790.21	Gas
10.	Pragati CCGT (Unit III)	2002-2003	121.2	915.61	Gas
11.	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.5	114.19	Gas
12.	Ramgarh CCGT Stage -II (GT-2)	2002-2003	37.8	115.11	Gas
13.	Upper Sindh Extn (HPS)(1)	2001-2002	35	32.12	Hydro
14.	Suratgarh stage-II (3 & 4)	2001-2002	500	3396.74	Coal
15.	Upper Sindh Stage II (2)	2001-2002	35	32.12	Hydro
16.	Malana-1 & 2	2001-2002	86	266.08	Hydro
17.	Panipat TPS Stage 4 (Unit-6)	2000-2001	210	1269.31	Coal
18.	Chenani Stage III (1,2,3)	2000-2001	7.5	19.10	Hydro
19.	Ghanvi HPS (2)	2000-2001	22.5	74.06	Hydro
20.	RAPP (Unit-4)	2000-2001	220	1309.70	Nuclear
21.	Ranjit Sagar (Unit-1,2,3,4)	2000-2001	600	1131.37	Hydro
22.	Gumma HPS	2000-2001	3	4.35	Hydro
23.	Faridabad CCGT (Unit 1) (NTPC)	2000-2001	144	1030.59	Gas
24.	Suratgarh TPS 2	1999-2000	250	1698.37	Coal
25.	RAPS-B (2)	1999-2000	220	1309.70	Nuclear
26.	Uppersindh-2 HPS #1	1999-2000	35	32.12	Hydro
27.	Faridabad GPS 1 & 2 (NTPC)	1999-2000	286	2046.86	Gas
28.	Unchahar-II TPS #2	1999-2000	210	1559.75	Coal
29.	Unchahar-II TPS #1	1998-1999	210	1559.75	Coal
30.	Suratgarh TPS #1	1998-1999	250	1698.37	Coal
31.	GHGTPLM (Unit 1)	1998-1999	210	1453.23	Coal
32.	GHGTPLM (Unit 2)	1997-1998	210	1453.23	Coal
33.	Tanda TPS (Unit-4)	1997-1998	110	731.54	Coal
Total				**34694.10**	
20% of Generation				**34536.32**	

[7] http://www.nrldc.org/docs/grmar2005.pdf

Date of completing the final draft of this baseline section was 06/03/2006.

Malwa Power P. Ltd has determined the baseline and they are project participant as listed in Annex 1 of this document.

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

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

>>

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

23/02/2004

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

20y-0m

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

Project activity would use fixed 10 year 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:

01/05/2005

C.2.2.2. Length:

10y-0m

SECTION D. Application of a monitoring methodology and plan:

>>

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

Title: Monitoring Methodology for the category I D – Renewable electricity generation for a grid

Reference: 'Paragraph 9' as provided in Type I.D. of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 7.

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

As established in Section A.4.2, the project activity falls under Category I.D and can use the monitoring methodology for type I.D project activities.

The methodology requires the project-monitoring plan to consist of metering the electricity generated by the renewable technology. In order to monitor the mitigation of GHG due to the project activity, the total energy exported and imported need to be measured. The net energy supplied to grid (difference of energy exported and imported) by the project activity multiplied by emission factor for Northern region grid, would form the baseline for the project activity.

GHG SOURCES

Direct On-Site Emissions

Direct on-site emissions after implementation of the project arise from the combustion of biomass in the boiler. These emissions mainly include CO_2. However, CO_2 released is taken up by the biomass when it grows, therefore no net emissions occur.

Direct Off-Site Emissions

Direct off-site emissions in the project activity arise from the biomass transport. The same type of CO_2 emission occurs during transportation of coal from coal mines to thermal power plants and distance between the coal mine and power plant is much higher as compared to the average transportation distance considered between project site and biomass collection centres and hence higher CO_2 emissions.

Indirect On-Site Emissions

The indirect on site GHG source is the consumption of energy and the emission of GHGs involved in the construction of biomass based power plant.

Considering the life of the cogeneration plant and the emissions to be avoided in the life span, emissions from the above-mentioned source is too small and hence neglected.

No other indirect on-site emissions are anticipated from the project activity.

Indirect Off-Site Emissions

The indirect off-site emissions include GHG emissions resulting from the erection of the HT lines from the point of generation to the nearest HT lines.

Considering the life of the power plant and the emissions to be avoided in the life span, emissions from this source is also too small and hence neglected.

D.3 Data to be monitored:

1. Parameters affecting the emission reduction potential of the project activity

ID number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
1	Energy	Energy exported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point
2	Energy	Energy imported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point
3	Energy	Net saleable energy	kWh	C	Monthly	Total	Paper	2 years after end of crediting period	This is calculated as difference of 1and 2. It would be based on monthly bills raised by MPPL to PSEB
4	Energy	Energy generated	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at generation end
5	Energy	Auxiliary energy consumption	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at the plant

2. Fuel related parameters

ID Number	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
1	Fuel	Biomass Quantity	MT	M	Daily	100 %	Paper	2 years after end of crediting period	-
2	Fuel	Biomass – Calorific Value	kcal/Kg	M	Once in a year for each type of biomass	Actual sample tested	Paper	2 years after end of crediting period	Through sample testing
3	Fuel	Coal Quantity	MT	M	Daily	100 %	Paper	2 years after end of crediting period	-
4	Fuel	Carbon content in coal	%	M	For each batch of coal	Actual sample tested	Paper	2 years after end of crediting period	Through sample testing

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

Data	Uncertainty level of data (High Medium/Low)	Are QA/QC procedures planned for these data?	Outline explanation why QA/QC procedures are or are not being planned.
D.3.(a)1	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)2	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)3	Low	Yes	This data will be used for calculation of emission reductions by project activity.
D.3.(a)4	Low	Yes	This data will be used for calculation of emission reductions by project activity in case D.3.(a)1 is not available
D.3.(a)5	Low	Yes	This data will be used for calculation of emission reductions by project activity in case D.3.(a)2 is not available

Key Project Parameters affecting Emission Reductions

Total Power generated by the project: The power exported by MPPL would be monitored to the best accuracy and as per the table given in section D.3.

Auxiliary consumption: The power imported by MPPL would also be monitored to the best accuracy and as per the table given in section D.3. The total quantum of power consumed by the auxiliaries would affect the net power exported to the grid and therefore the amount of GHG reductions. Therefore any increase in the consumption pattern of the auxiliary system would be attended to.

Net Power exported to the grid: The project revenue is based on the net units exported by MPPL.

The general principles for monitoring above parameters are based on:

- Frequency
- Data recording
- Reliability

Frequency

Monthly joint meter reading of main meters installed at interconnection point shall be taken and signed by authorised officials of MPPL and PSEB on the first day of every month. Hourly data recording by the shift in-charge of MPPL will be there at generation end.

Data recording

Records of this joint meter reading would be maintained by MPPL and PSEB. Daily and monthly reports stating the generation, auxiliary consumption, and net power export would be prepared by the shift in-charge and verified by the plant manager.

Reliability

For measuring the delivery and import of energy by MPPL one main meter shall be maintained at interconnection point and one check meter shall be maintained at grid substation of PSEB. Main meter reading would form the basis of billing and emission reduction calculations, so long the meter is found to be within prescribed limits of error during half yearly check.

Monthly joint meter reading of main meters installed at interconnection point shall be taken and signed by authorised officials of MPPL and PSEB on the first day of every month. Records of this joint meter reading would be maintained by MPPL and PSEB.

MPPL would keep requisite sets of metering equipment, duly tested/calibrated, as spares, for replacement as and when required. Main or Check meter would be replaced by spare set of meter with, mutual consent of the parties when a faulty meter is required to be removed.

The Main and Check meter installed at interconnection point would be jointly inspected and sealed on behalf of the parties and shall not be interfered with, by either party except in presence of the other party.

The main and check meter would be test checked for accuracy every six months at PSEB's laboratory and sealed by PSEB and MPPL jointly.

If during half yearly test check, main meter is found to be within permissible limits of error and check meter is found to be beyond permissible limits, then billing as well as emission reduction calculation would be as per main meter as usual. However, the check meter would be calibrated and replaced with spare tested calibrated meter, as may be necessary.

If during half yearly test check, the main meter is found to be beyond permissible limits of error but check meter is found to be within permissible limits, then billing as well as emission reduction calculation for the month and upto date and time of the calibration/replacement of defective main meter shall be as per check meter. The main meter would be immediately calibrated and replaced with spare tested calibrated meter, as may be necessary where after billing as well as emission reduction calculation would be as per main meter.

If during half yearly test checks, the main meter and check meter are both found to be beyond permissible limits of error, then both meters would be immediately replaced with spare calibrated meters and correction would be applied to data recorded by main meter to arrive at correct energy figures for billing as well as emission reduction calculation purposes for period of the month and upto time of calibration/replacement of defective meter. Corrections in billing whenever necessary shall be applicable to the period between date and time of previous test calibration and date and time of test calibration in current month when error is observed and correction would be for full value of absolute error. For the purpose of correction to be applied the meter shall be tested at 100, 75, 50, 25 and 10 % load at 1.0, 0.85 and 0.75 lag power factors. Of these fifteen values, the error at load and power factor nearest the average monthly load served at the point during the period shall be taken as error to be applied for correction.

In case main meter at interconnection point becomes defective, billing and emission reduction calculation would be based on readings of check meter installed at grid sub-station. The defective equipment would be immediately replaced by MPPL.

If both, main and check meters become defective, then emission reduction calculations for the month would be based on hourly generation and auxiliary consumption data recorded by MPPL at generation end.

The meter installed at generation end would be test checked for accuracy every six months. If during half yearly test check, meter is found to be beyond permissible limits, then the meter would be calibrated or replaced with spare tested calibrated meter, as may be necessary.

MPPL shall archive and preserve all the monthly invoices raised against net saleable energy, for at least two years after end of the crediting period. MPPL shall also archive the complete metering data at generation end on paper and all the data would be preserved for at least two years after end of the crediting period.

The amount of biomass purchased, will be based on invoices / receipts from fuel contractors. The amount of biomass fed to the boiler would also be verified through audit reports.

Coal when used in exigencies would be quantified through invoices / receipts of fuel purchases. The amount of coal fed to the boiler would also be verified through audit reports.

The calorific value of type of biomass to be used in majority is already established and will be consistent in the region. Calorific values of any other biomass used, would be monitored

The calorific value of coal will be monitored prior to use.

All the records shall be kept at site itself.

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:

Hourly data recording by the shift in-charge of MPPL will be there at generation end. Daily and monthly reports stating the generation, auxiliary consumption, and net power export would be prepared by the shift in-charge and verified by the plant manager of MPPL. Records of joint meter reading would be maintained by plant manager of MPPL at site. Also PSEB would maintain the records of joint meter at their office. The plant manager would be a qualified diploma/degree engineer with 5-7 year experience in power industry. All the shift incharges would be diploma/degree holders and would undergo related training including plant operations, data monitoring, report generation etc.

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

Malwa Power P. Ltd has determined the monitoring methodology and they are project participant as listed in Annex 1 of this document.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

Since category I.D. does not indicate a specific formula to calculate the GHG emission reduction by sources, the formula is described below in E.1.2

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 activity leads to GHG on-site emissions in the form of CO_2 emissions from combustion of biomass. The project activity uses an environmentally renewable resource as fuel for power generation. The CO_2 emissions from biomass combustion process will be consumed by the plantations, representing a cyclic process of carbon sequestration.

Since the biomass contains negligible quantities of other elements like Nitrogen, Sulphur etc. release of other GHG emissions are considered negligible.

GHG emissions during on-site construction work are negligible compared to GHG reductions in the project lifetime and are not accounted for. Similarly emissions associated with transportation of construction materials are ignored.

In case of exigencies of biomass fuel scarcity, MPPL proposes to use coal as fuel. However the biomass is available in surplus in the region, and it can be safely assumed that coal will not be used in project scenario and emissions from such usage are not included. Hence the uncertainties in the project emissions are negligible. In case coal is used the CO_2 emissions during the usage of coal will be calculated in the following manner:

Tons of CO_2 = (44/12) x Percentage of total carbon in coal x Quantity of coal used in tons

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

As prescribed in Appendix B of the Simplified Modalities and Procedure for small-scale CDM project activities, for Category I.D leakage estimation is only required if renewable energy technology is equipment transferred from another activity. This does not apply to the project case. However, the only source of leakage activity identified, which contributes GHG emissions outside the project boundary is transportation of biomass from the areas within a 50 km radius to power plant. The same have been estimated below.

Emissions due to transportation of biomass		
Total biomass required	Ton/year	72270
Biomass transported by tractor trolly	Ton/year	72270
Biomass load per tractor trolly	Ton	5
Total no. of trips		14454
Average distance between project site and collection centres	Km	25
Consumption of diesel per trip (to and fro)(@5km/lit)	litres	10
Total diesel consumption	litres	144540
Calorific value of diesel	TJ/lit	0.0000283
Emission factor for diesel	t CO_2/TJ	74.1
Emissions due to transportation of biomass	**t CO_2 /year**	**303**

The same type of GHG emissions occur during transportation of coal from coal mines to respective thermal power plants. Since the distance between the coalmines and power plant is much higher as compared to the transportation distance of biomass, the GHG emissions would be higher in the earlier case. Considering the transportation leakages for the 2 fuels, there is a net positive addition on the baseline emission which will result in net increase in CO_2 reduction from the project. To be on conservative side, this CO_2 emission due to coal transportation and biomass transportation has not been considered while calculating the baseline emissions and project emissions respectively.

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

The emissions from the project due to use of coal (if any) would give the project activity emissions.

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:

Northern region grid has been considered as the baseline. Northern region's present power generation mix has been used to arrive at the net carbon intensity/baseline factor of the chosen grid. As per the provisions of the methodology the emission coefficient for the electricity displaced would be calculated in accordance with provisions of paragraph 7 (a) of Type I.D of '*Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities'*.

The emission coefficient has been calculated in a transparent and conservative manner as: **'the average of the approximate operating margin and the build margin'.**

The step-by-step calculation of base line emission is as follows:

STEP 1. Calculation of Operating Margin emission factor (EF_{OM})

$$EF_{OM} = \sum_{i,j} F_{i,j} \times COEF_{i,j} / \sum_{j} GEN_{j}$$

Where

$COEF_{i,j}$ - is the CO_2 emission coefficient of fuel i (t CO_2 / mass or volume unit of the fuel), calculated as given below and

$GEN_{j,}$ - is the electricity (MWh) delivered to the grid by source j

$F_{i,j}$ - is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j, calculated as given below

j - refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants

The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i$$

Where

NCV_i -is the net calorific value (energy content) per mass or volume unit of a fuel i

$EFCO_{2,i}$ -is the CO_2 emission factor per unit of energy of the fuel i

$OXID_i$ -is the oxidation factor of the fuel

STEP 2. Calculation of the Build Margin emission factor (EF_{BM})

It is calculated as the generation-weighted average emission factor (t CO_2/MWh) of a sample of power plants m of grid, as follows:

$$EF_{BM} = \sum_{i,m} F_{i,m} \times COEF_{i,m} / \sum_{m} GEN_{m}$$

Where

$F_{i,m}$, $COEF_{i,m}$ and GEN_{m} - are analogous to the variables described for the OM method above for plants m.

Calculations for the Build Margin emission factor EF_{BM} has been done as ex ante based on the most recent information available on plants already built for sample group m of northern grid at the time of PDD submission. The sample group m consists of the 20 % of power plants supplying electricity to grid that have been built most recently, since it comprises of larger annual power generation.

Further, none of the power plant capacity additions in the sample group have been registered as CDM project activities.

STEP 3. Calculation of the electricity baseline emission factor (EF_y)

It is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,}$) and the Build Margin emission factor ($EF_{BM,}$):

$$EF_y = W_{OM} \times EF_{OM} + W_{BM} \times EF_{BM}$$

where the weights W_{OM} and W_{BM}, by default, are 50% (i.e., $W_{OM} = W_{BM} = 0.5$), and $EF_{OM,}$ and EF_{BM} are calculated as described in Steps 1 and 2 above and are expressed in t CO_2/MWh.

$$BE_y = EF_y \times EG_y$$

Where

BE_y - are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y- is the net quantity of electricity generated by the project activity during the year y in MWh, and

EF_y- is the CO_2 baseline emission factor for the electricity displaced due to the project activity in tons CO_2/MWh.

If the same amount of electricity is generated by the Northern region grid mix, it adds to the emissions that are ultimately getting reduced by the project activity. Hence, the baseline calculated using above methods / scenarios would represent the realistic anthropogenic emissions by sources that would occur in absence of the project activity.

The uncertainties in the baseline, arising out of capacity additions trends are already taken into consideration during calculation of combined 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 = Baseline emission – Project Activity emission

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

Emission reductions by project activity for 10-year crediting period have been calculated and tabulated below:

Sr. No.	Operating Years	Net Baseline Emission Factor (kg of CO_2 / kWh)	Baseline Emissions (Tons of CO_2)	Project Emissions (Tons of CO_2)	Emission Reductions, (Tons of CO_2)
1.	2005-2006	0.942	35,285	0	35,285
2.	2006-2007	0.942	40,325	0	40,325
3.	2007-2008	0.942	45,366	0	45,366
4.	2008-2009	0.942	45,366	0	45,366
5.	2009-2010	0.942	45,366	0	45,366
6.	2010-2011	0.942	45,366	0	45,366
7.	2011-2012	0.942	45,366	0	45,366
8.	2012-2013	0.942	45,366	0	45,366
9.	2013-2014	0.942	45,366	0	45,366
10.	2014-2015	0.942	45,366	0	45,366
		Total CERs			**438,536**

Therefore a conventional energy equivalent of 465.102 million kWh for a period of 10 years would be saved by exporting power from the project activity which in turn would reduce 438,536 tons of CO_2 emissions considering baseline calculations.

SECTION F.: Environmental impacts:

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

Amendment dated 13 June 2002 to the Environment Impact Assessment (EIA) notification of 27 Jan 1994 of Ministry of Environment and Forest, Govt. of India says that EIA notification does not apply to entry number 19 of Schedule I of the notification if investment is less than INR 100 crore for new project. Since the cost of project activity is INR 24.29 crore only; the project activity does not fall under the purview of the EIA notification. Hence, documentation on analysis of environmental impacts is not required by the host party. However, the 'Consent to Operate' the power plant has been obtained from the Punjab Pollution Control Board.

The design philosophy of this project activity is driven by the concept of providing the energy with no impact on the environment. The environmental aspects of the project activity are discussed below.

The pollutants generated from the power plant include:

- Dust and particulate matter in the flue gas
- Fly ash from the hoppers
- Furnace bottom ash
- Effluent from water treatment plant
- Sewage from the plant

Control methods for air pollution

Dust and particulate matters

The pollution control norms stipulate a maximum dust concentration of 115mg//Nm^3. The power plant has an Electrostatic Precipitator, which separates the dust from the flue gas and dust concentration is the flue gas leaving the ESP is kept below 115 mg/Nm^3.

The dust concentration level in the chimney is periodically monitored. Corrective steps are taken, if the concentration is not as per the acceptable limits.

Sulphur-di-oxide and Nitrogen-di-oxide

The main fuel in the power plant is biomass, which does not have significant amount of sulphur in it. Hence, the sulphur dioxide is not produced. However, the stack height is as per the local pollution control board stipulations.

The nitrogen-di-oxides are not produced in firing.

Fly Ash and Bottom Ash

The ash collected from the bottom of furnace (bed ash) and the ash collected in the air heater hoppers and ESP hoppers is taken to an ash silo through a series of conveyors. The ash from the silo is disposed off to farmers, who use the ash as manure for the crops.

Control methods for water pollution

Effluents from Water Treatment Plant

Water drained from the water treatment plant is pumped to a neutralization pit so that the water let out is neutral. The neutralization pit has effluent resistant cement lining.

Boiler Blowdown

In order to maintain the solid concentration in the boiler feed water, two types of blowdown are employed in the boiler. One type is continuous blowdown and the other intermittent blowdown.

The blowdown water is at a temperature of approximately 100 ^{0}C. The quantity of blowdown is around 1.5 TPH. This water is taken to the neutralising pit, where it will get cooled naturally.

Sewage from the Power Plant Buildings

The sewage from the various power plant buildings is taken to a common septic tank through trenches. The sewage from the septic tank is disposed off manually.

Control methods for thermal pollution

The water used in the surface condenser to condense the steam is cooled in a cooling tower. The water let out from the cooling tower has a temperature very close to the ambient conditions.

Control methods for noise pollution

The major source of noise pollution in the power plant power plant is from the following:

- Rotating equipments like ID, FD and SA fans
- Feed pumps
- Boiler and superheater safety valves
- Start up vent
- Steam turbine

As per OSHA standards, the rotating equipments are designed to keep sound level between 85 to 90 dBA. The start up vent, safety valve outlets and the DG sets are provided with silencers to reduce the noise level to the acceptable limits. The power house building has been constructed suitably to keep the noise level within the acceptable limits.

SECTION G. Stakeholders' comments:

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

MPPL organised stakeholder consultation meetings with individual village panchayat (elected body of representatives administering the local area) in the area with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. Invitation for stakeholder consultation meetings were sent out requesting the members of village panchayat to participate and communicate any suggestions/objections regarding the project activity in writing. On the day of meeting, MPPL representatives presented the salient features of the company and the project activity to the participants and requested their suggestions/objections. The opinions expressed by them were recorded and are available for validation.

The other stakeholders identified for the project activity are as under:

1. Punjab Energy Development Agency
2. Punjab Pollution Control Board (PPCB)
3. Punjab State Electricity Board
4. Indian Renewable Energy Development Agency (IREDA)
5. Consultants

Stakeholders list includes the government and non-government parties, which were involved in the project activity at various stages. At the appropriate stage of the project development, MPPLL consulted them to get the comments. The comments received are available on request.

G.2. Summary of the comments received:

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 project activity has provided good direct employment opportunities to the local populace which is encouraging the project.

The project does not cause any adverse social impacts on local population. Rather, it would help in improvising their quality of life. MPPL has completed the necessary consultation and documented the approval by local population for power plant.

The Government of Punjab, through Chief Executive, Punjab Energy Development Agency (PEDA), under the Department of Science, Technology and Environment of Punjab had accorded the permission for setting up the project through Implementation Agreement.

PPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. PPCB have issued Consent To Establish the power plant under the provisions of Water (Prevention and Control of Pollution) Act, 1974 / Air (Prevention and Control of Pollution) Act, 1981.

As a buyer of the power, the PSEB is a major stakeholder in the project. They hold the key to the commercial success of the project. MPPL has already signed Power Purchase Agreement (PPA) with PSEB.

Indian Renewable Energy Development Agency (IREDA) has provided loan assistance for setting up the power plant.

Projects consultants were involved in the project activity to take care of the various pre contract and post contract issues / activities like preparation of basic and detailed engineering documents, preparation of tender documents, selection of vendors / suppliers. They were further involved in supervision of project operation, implementation, successful commissioning and trial run.

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

In view of various direct and indirect benefits (social, economical, environmental), no concerns were raised during the consultation with stakeholders, hence it is not required to take due account of the comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Malwa Power Private Limited
Street/P.O.Box:	43 Sector 27-C
Building:	--
City:	Faridabad
State/Region:	Haryana
Postcode/ZIP:	121003
Country:	India
Telephone:	+91 129 2277027
FAX:	+91 129 2275648
E-Mail:	info@malwapower.com
URL:	--
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Bansal
Middle Name:	Lalit
First Name:	Krishan
Department:	--
Mobile:	+ 91 9811059223
Direct FAX:	--
Direct tel:	--
Personal E-Mail:	klb@ddel.net

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding as part of project financing from parties included in Annex I of the convention is involved in the project activity.

ABBREVIATIONS

BM	Build Margin
CEA	Central Electricity Authority
CO_2	Carbon dioxide
DPR	Detailed Project Report
EIA	Environment Impact Assessment
GHG	Greenhouse gas
IPCC	Inter Governmental Panel On Climate Change
IREDA	Indian Renewable Energy Development Agency
Kg	Kilogram
Km	Kilometer
kW	Kilo watt
kWh	Kilo watt hour
MPPL	Malwa Power Private Limited
MW	Mega watt
NRSE	New and Renewable Sources of Energy
OM	Operating Margin
PDD	Project design document
PEDA	Punjab Energy Development Agency
PPA	Power Purchase Agreement
PPCB	Punjab Pollution Control Board
PSEB	Punjab State Electricity Board
SHR	Station Heat Rate
TPH	Tons per hour
UNFCCC	United Nations Framework Convention on Climate Change

LIST OF REFERENCES

Sl. No.	Particulars of the references
1.	United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
2.	UNFCCC document: Clean Development Mechanism, Simplified Project Design Document For Small Scale Project Activities (SSC-PDD), Version 02
3.	UNFCCC document: Simplified modalities and procedures for small–scale clean development mechanism project activities
4.	UNFCCC document: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, Version 07
5.	UNFCCC document: Determining the occurrence of debundling
6.	Power sector profile for Northern region-Ministry of Power
7.	Ministry of Power (MoP), Govt. of India, www.powermin.nic.in
8.	Punjab State Electricity Regulatory Commission (PSERC)-tariff order for PSEB-FY2003-04, www.pserc.nic.in
9.	Central Electricity Authority (CEA), Govt. of India, www.cea.nic.in
10.	Emission Baselines-Estimating the Unknown, International Energy Agency
11.	Ministry of Environment and Forest, http://envfor.nic.in/cdm/host_approval_criteria.htm
12.	Detailed Project Report for Biomass based Power Plant, Malwa Power Pvt. Ltd.
13.	Biomass Assessment Study, Malwa Power Pvt. Ltd.