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

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>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

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

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

Title of the small scale project	:	12 MW hydropower plant in Bhandardara in Maharashtra, India.
Version of the document	:	05
Date	:	18/03/2010
UN Ref No	:	UNFCCC00000430CDMP

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

Purpose of project activity

The main purpose of the project activity is to generate electricity from the potential energy in the water released from Bhandardara dam and export the net electricity to the grid.

Project description

The Bhandardara dam (Wilson dam) is operated and maintained by Government of Maharashtra Irrigation Department (GOMID), now renamed as Government of Maharashtra Water Resources Department, hereinafter referred to as GOMID/GOMWRD. The Bhandardara dam is one of the oldest masonry gravity dams in Maharashtra state. The construction of the dam started in 1910 and was completed in 1926. There are two hydro power plants near Bhandardara dam. One is the project activity, which is 12 MW foot of dam hydropower plant and is known as BH-1. Another hydroelectric project of 34 MW was constructed later 10 kilometres downstream from BH-1, which is referred as BH-2. BH-1 is the small scale project activity.

The project activity (BH-1) is constructed at the foot of a hill adjacent to the Bhandardara dam. BH-1 was originally built by the GOMID with a single hydropower generating unit of 10 MW in 1984. In Maharashtra state, all state owned hydroelectric plants are constructed by GOWRD and handed over to Maharashtra State Electricity Board (MSEB) (now Maharashtra State Electricity Generation Company) for operation and maintenance. The generating unit at BH-1 was commissioned in 1986 and entered commercial operation in 1987. After operating for eight years, a mishap occurred which severely damaged the entire plant and the plant ceased to operate. The rehabilitation and operation of this plant was awarded on a lease, own, operate and transfer basis to Dodson – Lindblom International Inc (DLI),

an Ohio, USA, based company. DLI is part of DLZ Corporation, one of the foremost engineering and water resource companies in the Midwestern United States. An operating company by the name of Dodson – Lindblom Hydro Power Private Limited (DLHPPL) was formed to implement and operate the hydropower plants in India. Although, technically it was called rehabilitation, the work almost involved construction of new plant. The damaged equipment was beyond use and could not be used and hence disposed as scrap. The accident had caused such damage that entire plant had to be reconstructed. The generated power from the project activity is connected to state electricity grid owned and operated by Maharashtra State Transmission Company Ltd (MSTCL).

Process

The water released from the Bhandardara reservoir for irrigation purposes is conducted to a turbine in the power plant and jetted on to the turbine. This action rotates the turbine, which in turn causes the rotation of the alternator connected to the turbine, thereby producing electricity. One 12 MW Francis type turbine is installed in BH1 with availability of overload capacity. The maximum generation possible at the dam site is 14.84 MW as dictated by the topological conditions at site[1]. The generated electricity from the project activity after auxiliary consumption is exported to MSTCL grid.

Power generation

BH-1 project is one of several water management projects in the upper Pravara river basin. The electricity generation from BH-1 is dependent on irrigation and domestic water releases from the Bhandardara reservoir. The catchment area for Bhandardara dam is 121.7 square kilometres. The gross storage of reservoir is 318 million cubic metres (MCM) and storage for power is 249 MCM. The electricity is generated from the water released from the dam. The project activity exported to the grid 19,714.8 MWh in the year 2001 (27/07/2001 to 31/12/2001), exported 36110.4 MWh in the calendar year 2002, exported 45,268.8 MWh in the year 2003 and 30,105.6 MWh in the year 2004 and 48,574.8 MWh in the year 2005, 42,600 MWh in the year 2006 and 46,543.2 MWh during 2007 to the grid. Bhandardara powerhouse (BH-2) of 34 MW capacity is located 10 kilometres downstream from BH-1. BH-1 has no impact on the generation of BH-2. BH-2 is designed as peaking project which has been transferred on lease to DLHPPL in December 2006 for refurbishment/rehabilitation and currently being operated and maintained by DLHPPL. The plant is designed to operate only during peak hours of demand. The control of the release of water for irrigation needs is exercised from Bhandardara dam. To satisfy the current

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[1] Reference: Hill diagram and chart for reservoir (Submitted to the DOE during project verification in 2009)

demand of irrigation, water is released at rates much larger than that can be utilised for power generation at BH-1. At the same time, farmers of the command area are not happy with inadequate irrigation water releases. To provide comprehensive solution to these problems, GOMID has been constructing a new irrigation dam, the Nilwande dam, along the Pravara river, about 20 kilometres downstream from BH-2. This dam, even when partially constructed to elevation of 613 metres (against full height of 648 metres) will facilitate regulation of water discharge from Bhandardara dam permitting sufficient storage so as to allow BH-1 to operate at optimum capacity and efficiency, while at the same time meeting the current irrigation demand. This dam is expected to be completed till height of 613 metres by end 2009. When Nilwande dam is commissioned to the elevation of 613 metres, power generation from BH-1 is expected to increase to 52,000 MWh in a year.

Contribution of the project activity to sustainable development in view of project participant

Contribution to sustainable development is generally measured through following attributes:

i) Social well being

ii) Economical well being

iii) Environmental well being

iv) Technological well being

i) Social well being

The social well being is assessed by contribution to improvement in living standards of the local community. The project activity should provide job opportunities to the local community, contribute in poverty alleviation of the local community and development of basic amenities to community leading to improvement in living standards of the community. During construction of the project activity, job opportunities were given to several local people. Since the project activity is in a rural area, project activity caused the improvement of basic amenities. Thus the project activity has contributed to social well being.

ii) Economic well being

The project activity has created direct and indirect job opportunities to the local community during construction and operation. During implementation of the project activity, several persons were provided with job opportunities continuously for long periods. During operation of the project activity, about 14 persons are employed directly, apart from indirect employment. Economic well being refers to additional investment consistent with the needs of the local community. DLHPPL has invested Rs. 520.7 million

(US$ 11.87 Million at I US$ = Rs.43.8) for the project activity. This investment is quite significant in a rural area. These activities have contributed to the economic well being of the local community.

iii) Environmental well being

The project activity produces electricity without any greenhouse gas (GHG) emissions. Additionally, the project activity generates electricity from "renewable energy source". The renewable energy source is generally defined as a source of energy that gets replenished naturally and does not suffer permanent depletion due to use.

The project activity is an environment friendly electricity generation project with no significant impact on the environment. This is a very important contribution of the project activity for environmental well being. Maharashtra electricity generation is predominantly thermal with nearly 75 % of installed capacity is thermal generation. Moreover, the project activity generates electricity from a renewable source of energy where the source gets replenished and is available for use. This is another important contribution of the project activity to the environmental well being.

Therefore, the following environmental benefits are derived from the project activity:

- Produces electricity without GHG emissions.
- Hydro power plant with no increase in volume of reservoir and no land inundation
- Produces electricity from a renewable energy source.
- Rural development as the project activity location is in rural area.

Environmental impacts on the environment due to the project activity is discussed elsewhere in this document.

iv) Technological well being

BH-1 was successfully rehabilitated and established that severely damaged plants can be successfully rehabilitated. In the absence of the project activity, valuable renewable energy would have been lost. The generated electricity from the project activity is connected to the grid. The project activity improves the supply of electricity with clean, renewable hydroelectric power while contributing to the regional/local economic development. Small-scale hydropower run-of-river plants provide local distributed generation, these small scale projects provide site-specific reliability and transmission and distribution benefits including:

- increased reliability, shorter and less extensive outages;
- lower reserve margin requirements;

- improved power quality;
- reduced lines losses;
- reactive power control;
- mitigation of transmission and distribution congestion, and;
- increased system capacity with reduced T&D investment.

In light of the above, DLHPPL believes that the project activity has contributed on all sustainable development attributes**.**

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 (Host Party)	Dodson –Lindblom Hydro Power Private Limited (DLHPPL)	No
The State of the Netherlands	IFC-Netherlands Carbon Facility (INCaF)	Yes

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.:

Maharashtra

A.4.1.3. City/Town/Community etc:

Bhandardara village, Akola Taluk, Ahmednagar district.

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 a foot of a hill adjacent to the Bhandardara dam in Lake Arthur Hill

reservoir in the upper Pravara river basin. Bhandardara is in Akola Taluk in Ahmednagar district in the state of Maharashtra in India. River Pravara is a tributary of river Godavari. Maharashtra state is in the western part of India. Bhandardara is about 140 kilometers from Mumbai (Bombay), capital of Maharashtra state and one of the important cities of India. The nearest big town is Ghoti and closest railhead is at Igatpuri which is 40 kilometers away. Ghoti is 36 kilometers from the project activity and is on busy Mumbai–Agra national highway number 3. The nearest airport is at Mumbai, which is an international airport with connections to all major cities of the world.

The project activity is located at latitude 19° 33' 15" N and longitude 73° 45' 0" E and the location is depicted in following figures – Fig 1-3:

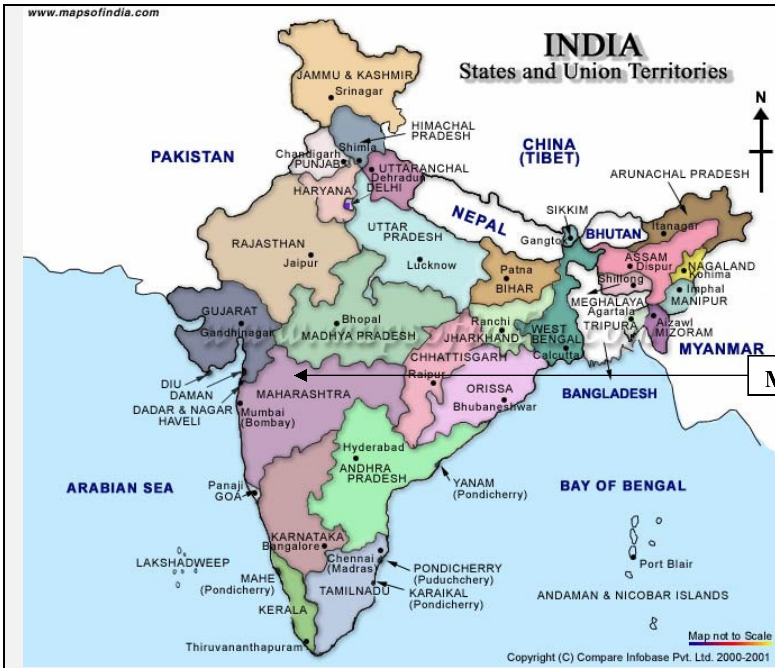

Fig – 1 showing Maharashtra state in Indian map

Maharashtra State

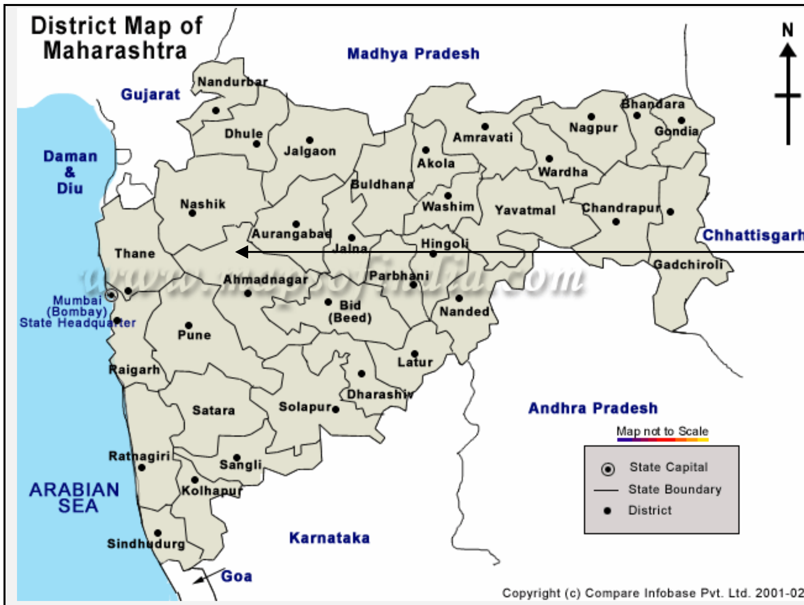

Fig 2- showing Ahmad nagar district in Maharashtra state

Ahmad nagar district

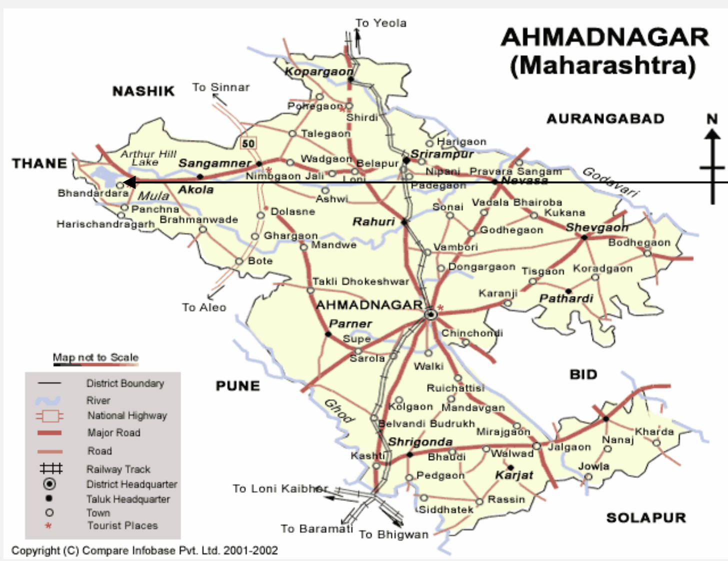

Fig –3 showing location of the project activity in Ahmad nagar district in Maharashtra map

Project activity site

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

Scope : 1

Sectoral Scope : Energy Industries (Renewable -Non renewable sources)

Type : I - Renewable energy project

Category : I.D - Grid connected renewable electricity generation

The project activity is a hydropower plant and the installed capacity is to generate 12 MW. The maximum instantaneous generation of the project is constrained up to 14.84 MW as per the Hill diagram for the reservoir; which is lesser than 15 MW. Also, as per the historical records for past generation till December 2009, the maximum instantaneous generation has not exceeded 14.84 MW. Thus, the project qualifies for small scale CDM project activity. As per the provisions of Appendix B of Simplified Modalities and Procedures for Small Scale CDM Project Activities Version, Type I.D version 13 dated 14/12/2007 "comprises renewable energy generation units, such as photovoltaics, **hydro**, tidal/wave, wind, geothermal, and renewable 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". The project activity comprises hydropower plant supplying electricity to the Maharashtra state grid, part of the Western regional grid, which is being supplied by several fossil fuel and non renewable generating units and having a combined margin emission factor of 0.69 kgCO_2/kWh derived from Central Electricity Authority (CEA), CO2 baseline database, Version 3.0, 15 December 2007. 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

The process is conversion of the potential energy, embodied in the water flowing from a higher point to a lower point, into mechanical energy and then into electrical energy. This flowing water is guided through a head race tunnel and penstock gate and jetted on to a turbine. This action rotates the turbine, which is connected to a synchronous generator. The rotation of turbine causes the rotation of the generator thereby producing electricity. The generated power is stepped up to 132 KV and exported to MSTCL grid, which is part of regional grid.

The technology employed is an established one. Francis turbine is employed in BH-1. The Francis turbine is the most widely used among water turbines (Figure 4). This is a type of hydraulic reactor turbine in which the flow exits the turbine blades in the radial direction. Francis turbines are common in

power generation and are used in applications where high flow rates are available at medium hydraulic head. Water enters the turbine through a volute casing and is directed onto the blades by wicket gates. The low momentum water then exits the turbine through a draft tube. A load is applied to the turbine by either means of a magnetic brake, and torque is measured by observing the deflection of calibrated springs. The performance is calculated by comparing the output energy to the energy supplied.

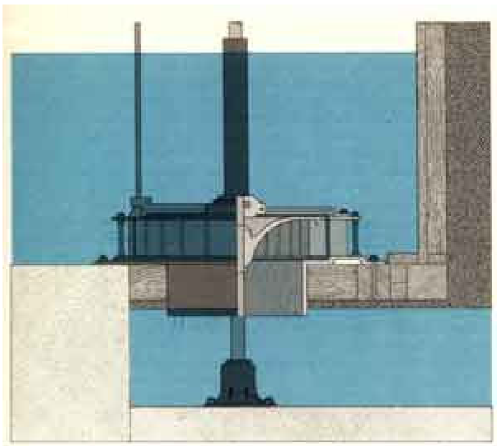

Fig 4 – A sketch showing Francis type turbine

Technical specification of BH-1

The power plant consists of water conductor, intake, power house, generation unit and a transformer.

Bhandardara reservoir

Type of dam	Masonry gravity dam
Gross storage	318 million cubic metre (Mm^3)
Live storage for power	249 Mm^3
Top of dam	746.04 m

Water conductor

Number	1
Type	Steel
Design discharge	24 m^3/s
Size	3.0 m dia
Length	318.8 m

Intake

Full supply level	744.73 m

Minimum draw down level for power	720.7 m
Power house	
Type	Surface, RCC and masonry
Size	21.5 m x 29.25 m
Floor level	674.15 m
Level of CL of turbine	665.5 m
Capacity of OH crane	65/15 tonnes
Turbine unit	
Max gross head	77 m
Net design head	69 m
Design discharge	19.25 m^3/s
Type of generating unit	Vertical, Francis, top mounted thrust bearing
Number	1
Installed capacity	12.564 MW
Serial No.	V – 0037/1
Excitation	Static
Generator unit	
Guaranteed output	12 MW
Rated power factor	0.9
Efficiency at 0.9 power factor	97.62 % at 100 % load
	97.38 % at 75% load
	96.69 % at 50% load
	94.90 % at 25% load
Rated voltage	11 kV
Serial No.	C21 /001
Connection to grid	
Transformer capacity	132kV,17.5MVA, 3 phase, OMAN
Connection point	BH-1 switchyard
Protection System	Multi functional digital relay system
Control & monitoring operation	Computer based c/w interface for remote operation

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The project activity produces electricity with very little impact on the environment. There is no significant impact on air, water, and land due to the project activity. A brief impact on the environment

due to project activity is discussed in section D. Thus, an environmentally safe technology is transferred to the Host Party.

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

The emission reductions of the project activity arise from the electricity exported to the grid. The project activity is a hydropower plant generating electricity from a renewable source of energy. The renewable energy source is a source of energy that gets replenished naturally and does not suffer permanent depletion due to use.

The electricity generated from the project activity after auxiliary consumption is connected to the grid of MSTCL grid. The project activity would export about 356,000 MWh of electricity during the proposed second 7-year crediting period (27th July, 2008 – 26th July 2015). In the absence of the project activity, the same amount of electricity would be produced from other sources of energy with associated GHG emissions. The estimated total emission reductions by the project activity during the crediting period would be **245,640 tonnes of CO_2** equivalent for the second crediting period of 7 years (27th July, 2008 – 26th July 2015). Detailed estimates are given in section B.

S.No.	Year	Annual estimation of emission reductions in tonnes of CO_2e
1	27th July 2008 – 26th July 2009	30,360
2	27th July 2009 – 26th July 2010	35,880
3	27th July 2010 – 26th July 2011	35,880
4	27th July 2011 – 26th July 2012	35,880
5	27th July 2012 – 26th July 2013	35,880
6	27th July 2013 – 26th July 2014	35,880
7	27th July 2014 – 26th July 2015	35,880
	Total estimated reductions (tCO_2e)	245,640
	Total number of crediting years	7 years
	Annual average over the crediting period of estimated reductions (tCO_2e)	35,091

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

There is no public funding for the project activity from Annex 1 Parties.

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[2] of the Simplified Modalities & Procedures for Small Scale CDM Project Activities –

"1. Debundling is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity[3] that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities[4]. The full project activity or any component of the full project activity shall follow the regular CDM modalities and procedures.

2. 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; and
- 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.

3. If a proposed small-scale project activity is deemed to be a debundled component in accordance with paragraph 2 above, but total size of such an activity combined with the previous registered small-scale CDM project activity does not exceed the limits for small-scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7, the project activity can qualify to use simplified modalities and procedures for small-scale CDM project activities."

The project proponent confirms that within 2 years prior to the registration of the project activity, the project proponent has not registered any another small scale project activity.

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[2] This appendix has been developed in accordance with the simplified modalities and procedures for small- scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix B to that document.

[3] A project activity is a measure, operation or an action that aims at reducing GHG emissions. The Kyoto Protocol and the CDM modalities and procedures use the term "project activity" as opposed to "project". A project activity could therefore be a component/aspect of a project undertaken/planned.

[4] For the full text of the simplified modalities and procedures for small-scale CDM project activities see http://unfccc.int/cdm/ssc.htm.

The project proponents confirm that the proposed project activity is not a debundled component of a larger project activity. The project activity is an independent hydro power plant generating electricity and supplying to the grid.

It may be noted that the project proponent has been taking forward the following large scale project activity towards registration as CDM project at the UNFCCC with the title ‘Modification and retrofitting of the existing 34 MW hydropower plant at Bhandardara -2 (project activity) in Maharashtra state in India by Dodson – Lindblom Hydro Power Private Limited (DLHPPL)’, whose validation is nearly completion and is likely to be submitted for registration shortly. However, it may be noted that the Bhandardara powerhouse (BH-2) of 34 MW capacity is located 10 kilometres downstream from BH-1. BH-1 has no impact on the generation of BH-2. BH-2 is designed as peaking project which has been transferred on lease to DLHPPL in December 2006 for refurbishment/rehabilitation and currently being operated and maintained by DLHPPL.

Therefore, the project proponents have not registered or applied to register any small scale project activity:

- in the same project category and technology/measure;
- within the previous 2 years
- whose project boundary is within 1 km of project boundary of the small scale project activity.

SECTION B. Application of a baseline and monitoring methodology:

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

Title of approved baseline methodology: Renewable electricity generation for a grid in accordance with approved small scale methodology AMS I.D (version 13, dated 14/12/2007).

Type I : Renewable energy project

Category I.D : Grid connected renewable electricity generation

Reference : 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*'.

As defined in AMS 1.D (version 13 dated 14/12/2007), the 'Tool to calculate the emission factor for an electricity system (Version 01)', has been applied.

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

Technology /Measure as per AMS I.D	Measure of project activity
1. This category comprises renewable energy generation units 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 fired generating unit	The project activity is a renewable energy generation unit based on hydro source. The generated energy is supplied to MSTCL grid, which is part of western regional grid and is being supplied by several fossil fuel and non renewable biomass fired generating units. The project activity satisfies the mentioned criteria/ requirement.
2. If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.	The project activity has a renewable component (hydro power) only and the capacity of the project activity is 12 MW which is within the eligibility limit of 15 MW for a small scale CDM project activity.
3. Combined heat and power (co-generation)	This is not relevant to the project activity as the

Technology /Measure as per AMS I.D	Measure of project activity
systems are not eligible under this category.	project involves only hydro power generation
4. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	As apparent from the Section A.2 of the PDD, though BH-1 originally built by the GOMID with a single hydropower generating unit of 10 MW operated for about eight years after starting commercial operation in 1987, a mishap occurred which severely damaged the entire plant and the plant ceased to operate. The project activity of DLHPPL involved the rehabilitation and operation of this plant. Although, technically it was called rehabilitation, the work almost involved construction of new plant considering that the damaged equipment was beyond use and could not be used. The entire plant had to hence be reconstructed. Therefore it may be justified that the project activity involved complete replacement of the existing facility and did not involve any addition of renewable energy generation units at existing renewable energy power generation facility.
5. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	As also apparent from the above explanation the project activity by DLHPPL involved the rehabilitation and operation of the plant that was severely damaged and the work almost involved the construction of a new plant. Therefore it may be justified that the project activity does not seek to retrofit or modify an existing facility but involves complete replacement of the existing facility.

From the above table, it is evident that the project activity meets all the applicability conditions of the approved small scale methodology AMS I.D (version 13, dated 14/12/2007) - Grid connected renewable electricity generation as specified in *Appendix B of the simplified modalities and procedures for small scale CDM project activities*.

The project category is renewable electricity generation for a grid system, which is also fed by both fossil fuel and non fossil fuels. The non fossil fuels are hydro, nuclear, biomass and wind. Hence, the applicable baseline, as per paragraph (9) of AMS ID (version 13, dated 14/12/2007) as specified in *Appendix B of the simplified modalities and procedures for small scale CDM project activities*, is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2 eq/ kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system';

OR,

(b) The weighted average emissions (in kg CO_2 eq/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The calculations must be based on data from an official source (where available) and made publicly available.

B.3. Description of the project boundary:

As mentioned under paragraph 6 of Type I.D. (Version 13, 14/12/2007) of '*Appendix -B of the simplified modalities and procedures for small-scale CDM project activities'*, Type I.D mentions that, the project boundary encompasses the physical, geographical site of the renewable generation source. For the project activity, the project boundary is from the point of water discharge from the reservoir to the point of electricity supply to the grid interconnection point. Thus the project boundary includes water diversion structure, power canal, penstock, power house, turbine, generator, power evacuation system to the grid, and the tail race canal. For calculation of baseline emission factor, the project boundary includes the western regional grid and the power plants connected to the grid.

B.4. Description of baseline and its development:

According to the methodology available in paragraph 9 of Type I.D. described in Appendix B of the simplified modalities and procedures for small-scale CDM project activities following approach can be used to establish the baseline i.e. the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

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

The approach proposed in the "Option (a)" i.e. "Combined Margin" has been used for ascertaining Baseline Emissions. As per the data published by the Central Electricity Authority (CEA), Ministry of Power, Govt. of India (CO2 baseline database, Version 3.0, dated 15 December 2007) and in line with the 'Tool to calculate the emission factor for an electricity system (Version 01)', the combined margin emission factor for the Western regional grid has been estimated at 0.69 kg CO_2/kWh for the second 7 years crediting period. This emission factor has been considered for calculation of emission reductions during the entire 7 year crediting period starting 27th July 2008 to 26th July 2015.

It may be noted that the CEA's CO2 baseline database, Version 3.0 is the latest available information on the emission factor of an electricity system for the Western regional grid that has been computed based on the data for the Financial Year (FY) 2006-07 including new stations and units commissioned in 2006-07. This version has also adapted calculations[5] to ensure consistency with the 'Tool to calculate the emission factor for an electricity system (Version 01), EB35, Annex 12'.

The section B.5 of this PDD which addresses the additionality of the project has been retained as it was in the registered PDD (as under Section B.3 of registered PDD) as this was validated by the DOE at the

[5] http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

time of registering the project at UNFCCC except for the section on 'Sectoral and national policies for hydropower development' as described below.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Sectoral and national policies for hydropower project

Hydropower is recognized as a renewable source of energy, which is non-polluting and environmentally benign. The history of hydropower generation in India is more than 100 years old. The first hydropower station in India was a small hydro power station of 130 KW commissioned in 1897 at Sidrapong near Darjeeling in West Bengal. With the advancement in technologies and increasing requirement of electricity, emphasize was shifted to large sized hydro power stations. In 1963, the hydropower had attained a share of 50.62% in the total installed capacity of power generation in India. While there has been a continuous increase in the installed capacity of hydropower stations, which now stands on 22,439 MW, the share of hydropower has been reduced to 25% currently as focus had been development of thermal fossil fuel based power plants.

Ministry of Power in the Government of India is responsible for the development of large hydro power projects in India. In order to maintain the balance between hydro power and thermal power, Ministry of Power has announced a Policy for accelerated development of hydro power in the country. Ministry of Non-conventional Energy Sources (MNES) is responsible for development of small and mini hydro projects of 3-25 MW station capacity. Ministry of Non-conventional Energy Sources has created a database of potential sites of small hydro based on information from various States and on studies conducted by Central Electricity Authority. An estimated potential of about 15,000 MW of small hydropower projects exists in India. Small and mini hydel projects have the potential to provide energy in remote and hilly areas where extension of grid system is un-economical. These projects although are not economically very attractive like large power plants, they are environmentally friendly and still are viable. 4,096 potential sites with an aggregate capacity of 10,071 MW for projects up to 25 MW capacity have been identified. India has 420 small hydro power projects up to 25 MW station capacity with an aggregate capacity of over 1423 MW out of total national installed capacity of generation mix of 123,462.81MW. Many projects for a total installed capacity of about 521 MW are under construction.

The small hydropower projects are developed in the potential regions by the State Electricity Boards/ State Agencies responsible for SHP development. Most of the SHP projects are grid connected. However, there are some projects, which are decentralized and are managed by local community/NGOs. Many states in India have announced policies for development of small hydropower projects with various incentives like wheeling of power produced, banking, attractive buy-back rate, facility for third party sale, etc. But still the capacity additions have not been very high. Still the share of small hydro power projects upto 25 MW is only 1.5% including the projects under construction.

In Maharashtra, hydropower projects are constructed by The Government of Maharashtra Water Resource Department (GOMWRD). After completion of construction, the project is handed over to MSEB for operation and maintenance. There are about 38 hydro power plants with total installed capacity of 2434 MW including small and large sized projects. There are four large hydropower projects through private investment for an installed capacity of 444 MW. There are only three small hydropower projects from private investment of which one is the project activity and the other two are Vajra and Chaskaman hydropower projects.

Since the Government could not establish hydroelectric project for want of resources, it was decided to invite private investment for establishing hydropower projects and approached Maharashtra Energy Regulatory Commission (MERC). The Commission conducted hearings and issued comments on the proposed policy (vide letter dated February 22, 2002). GOMWRD thereafter issued their policy through Government Resolution (G.R.No.HEP (7/2001) HP) dated November 28, 2002 for projects upto 25 MW. The projects were to be awarded to the private investors on a 30 year Build, Own and Operate basis. The tariff was decided GOMWRD has proposed tariffs for SHPs taking guidance from the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations 2004, for each year of the 30 years of the BOT period. It is assumed that at the end of the BOT period the absolute ownership of the SHP shall stand transferred to GOMWRD free of cost.

During the policy implementation process of GoM's policy dated 28.11.02, a number of suggestions were received requesting certain amendments to the provisions in the state policy in light of provisions of Electricity Act 2003. In line with this, the GoM has revised policy for development of SHPs up to 25 MW capacity, through the private sector participation. This revised policy dated 15th September 2005 by

GOMWRD[6] through Government Resolution No. PVT-1204/(160/2004)/ HP seeks to replace the earlier policy dated 28th November, 2002. The revised policy is intended to encourage the participation of both the Captive Power Producers (CPPs) and Independent Power Producers (IPPs) in development of SHP in the state. One of the prime objectives of this policy is to harness green power in the state with the help of Private sector. The revised policy would not affect the project activity, however it may be noted that the following promotional incentives were offered by the Government of Maharashtra (GoM) considering that the small hydropower plants (SHPs) are renewable non – polluting energy sources:

- ***"C-1** The developer is supposed to commission the project within 24 months from the date of authorisation. If the developer commissions the project at earlier date, he will be exempted from water royalty charges & maintenance charges to an extent of units generated before scheduled date of commissioning.*
- ***C-2** CPPs shall be exempted from Electricity Duty on the self consumption of electricity only for first five years after commissioning if the consumption unit is located in Maharashtra.*
- ***C-3** CPPs shall be exempted from tax on Sale of Electricity only if the consumption unit is located in Maharashtra.*
- ***C-4** Technical Consultancy at nominal charges.*
- ***C-5** Maharashtra Energy Development Agency, (MEDA), Pune shall assist the developers in getting incentives for SHPs from Ministry of Non-Conventional Energy Sources (MNES), Government of India (GoI)."*

It may be noted that the above incentives are not available to the project activity.

Justification for additionality of the project

Simplified modalities and procedures for small scale CDM project activities guides to establish additionality of the project activity as per Attachment A to Appendix B. The Attachment A to appendix B mentions various barriers and requires explanation to show that the project activity would not have occurred due to at least any one barrier.

Barrier analysis

Establishing the project activity is a voluntary step undertaken by DLHPPL 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.

[6] http://www.maharashtra.gov.in/pdf/hydroPowerPolicy.pdf

- 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:

Investment barriers

The project activity already faced investment barriers during construction and yet there are other barriers for investment in the project activity, which are discussed below.

Capital cost increase

When BH-1 was not under operation and had to be rehabilitated, neither GOMID nor MSEB had sufficient funds for the purpose. So, it was decided to revive the plant with private participation. Global bids were invited by GOMID to rehabilitate, operate and maintain the project on lease, build, operate and transfer basis. DLHPPL had bid for the project with capital cost estimation of Rs. 365.377 Millions (US$ 8.341 Million at 1 US$ = Indian Rs.43.8). The lease agreement, final approval at the cabinet level of Government of Maharashtra, power purchase agreement etc., took more than two years and during this time there was enormous increase in the capital cost which jumped to Rs.520.7 Million (US$11.888 Million). This had a negative effect on the bottom line reducing the return on investment. Further, the legal costs incurred for negotiation of various agreements was not considered as part of project cost. These legal costs had to be absorbed by the project proponents.

Power Purchase Tariff

The power purchase tariff was calculated with capital cost of Rs.365.377 Millions where as the actual project cost was Rs.520.7 Millions. The increase in project cost due to delay in according approvals was not considered for tariff calculation. As a result, the power purchase tariff was reduced. The table given below gives the PPA tariff per kWh based on project cost of Rs. 365.377 millions (PPA tariff) and tariff based on Rs.520.7 millions .

Table B.3-1. Comparison of power purchase tariff*

Description	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
PPA tariff	Rs.2.52	Rs 2.43	Rs 2.34	Rs 2.25	Rs 2.16	Rs 2.08	Rs 2.00
Tariff based on	Rs. 3.01	Rs. 2.83	Rs. 2.77	Rs. 2.67	Rs. 2.61	Rs. 2.54	Rs. 2.47

increased project cost							

* The tariff includes royalty charges of Re.0.12 per kWh to GOWRD.

Reduction in power purchase tariff was a major investment barrier.

Financing barrier

Indian financial institutes and banks were not too keen on financing a small hydropower project. The project proponent had approached many Indian financial institutes and banks and the response from them was not encouraging. Therefore, overseas lenders were approached and 50 % of the debt portion was financed by a foreign lender and balance 50 % of the debt component was financed by Indian Renewable Energy Development Agency (IREDA) at a high interest rate of 16.5%.

Financial health of state electricity boards

A power purchase agreement has been signed with MSEB for purchase of all the power generated by the project activity. Most of the electricity boards in India are not financially sound and have huge gap in income and expenses. This gap is largely due to free / subsidised power to agriculture and domestic households. Due to this deficit in revenues, risk of delayed payment exists. This was also a major investment barrier for the project activity.

Technological barriers

As explained elsewhere, the project activity was a rehabilitation of an extensively damaged project. BH-1 project was originally established by Government of Maharashtra and operated by Maharashtra State Electricity Board. Mishap happened in 1995 and the plant became inoperative. MSEB/ Government of Maharashtra had no drive to rehabilitate the plant either due to financial constraints or other administrative reasons. The damage to the plant was so extensive that the rehabilitation of the plant was a real challenge. Since the project activity is located in a difficult terrain, rehabilitation of the plant was all the more difficult. Construction of water conductor system, dismantling of damaged machinery etc., posed challenges. Transportation of construction material and machinery to the project site was also difficult due to the terrain.

Hydrological risks

Water discharge

The BH-1 project depends on water released from the Bhandardara dam. Water discharge is a sensitive issue as it involves irrigation of the downstream "command area". Typically water releases during the

monsoon (June - October) occur during periods of high inflow when the reservoir is nearly full and releases have to be made to avoid overtopping of the dam. After the end of the monsoon cycle, releases are made for irrigation and drinking water purposes. These post-monsoon (November - May) releases occur in cycles of water demand as determined by GOMID. The information provided by GOMID during the bidding process indicated that all inflows into the dam in excess of the storage capacity would be available for power generation during the monsoon period as would all irrigation water released in the post-monsoon period. Under GoI norms applicable at the time, GOMID was to assume the hydrology risk for a period of seven years. However, during detailed negotiations, GOMID was not prepared to assume the hydrology risk (although majority of it is controlled by GOMID). Instead of allowing all available water above the intake for the power house, GOMID agreed to release 200 MCM of water through the power house during the post-monsoon period. GOMID also agreed to allow advance releases during the monsoon to minimize spills and maximize generation. If followed, this would allow generation of about 32 GWh during the post-monsoon period, which could result in a total generation of between 42 GWh and 45 GWh in a normal year.

However, due to a large demand for irrigation water in the command area during the post-monsoon period, GOMID has been releasing water at rates far in excess of the capacity of BH-1 and that contemplated by them when the release quantities were agreed to. This has resulted in a faster depletion of water stored in the reservoir and thus, a smaller quantity of water available for power generation, because a significant portion by-passes the power house. In addition, during the monsoon, GOMID's policy does not allow for advance releases to minimize spills. These factors have resulted in a significant reduction in the energy generation from the project. Under the current release policies, it is expected that the generation from the plant in a 75% dependable year will be in the range of 32 GWh as compared with the design energy value of 36 GWh for a corresponding year. These constitute a significant barrier to successful and profitable operation of the project.

Monsoons

The water availability in the reservoir depends on the monsoon rain. Over 65 % of the annual generation of the project activity is from post –monsoon releases. Of late, monsoons have become erratic and unreliable. Although, the monsoons largely follow a regular pattern, during recent years the phenomenon has been quite erratic and becoming more and more unpredictable.

Regulatory risks

Although Government of India was opening up the economy, the overseas investors were nervous and apprehensive about the regulations of statutory authorities. The regulatory risks were a barrier for investors, especially overseas investors.

Political risks

When there is a change in government, decisions taken by the earlier government were sometimes annulled or modified by the new government. Such things were not uncommon in India and this was also a barrier for the project activity.

Prevailing practice

The common prevailing practice in Indian power investment scene is investing in only medium or large scale conventional power projects, as several projects that are coming up are mostly large scale fossil fuel based power generation stations. This is mainly due to the assured return on investment, economies of scale and easy availability of finances.

Prevailing practice in the country

The total installed capacity of small hydropower plants in India is 1423 MW[7] and another 187 small hydropower plants are under construction with an installed capacity of 521 MW[2] totaling 1944 MW. The total installed capacity of power generation in India is 124,310.81 MW[8]as on 30 March, 2006 excluding small hydro, biomass and wind energy; the share of small hydropower projects is only 1.56 %. This shows that investing in small hydropower plants is not a common prevailing practice in India.

[7] http://www.mnes.nic.in/

[8] http://www.powermin.nic.in/

Prevailing practice in Maharashtra

The total installed capacity of small hydropower plants is 18 MW including the project activity of 12 MW. The total installed capacity and allocated capacity is 15,375 MW. Hence, the share of small hydropower plant in Maharashtra is only 0.1% including the project activity. If the project activity is excluded the share of private small hydropower plants is 0.03% only. This clearly shows that investment in small hydropower plants is not a common prevailing practice in Maharashtra state. The total installed capacity of hydro based power plants is 2902 MW (www.mahatransco.com)and thermal based power plants is 11591 MW in Maharashtra. The total installed capacity is 15375 MW, balance being nuclear, waste heat recovery plant and non conventional energy. Hence, the share of hydrogeneration is 18.8 % only where as thermal is 75.38%. This shows that the state is predominantly thermal and hence hydro generation is not a Business as Usual scenerio in Maharashtra.

CDM incentives for the project activity

The project activity was formulated in the year 2000. The project proponents are basically a USA based engineering company and were planning to invest in emerging markets like India. Since they were associated with hydroelectric projects, they were closely following the discussions and negotiations of the Kyoto Protocol as they had direct implications on their business. The project proponents had considered approximate CDM incentives in the financial calculations. Proof of the same has been provided to DOE.

Therefore in the light of above, the project activity is additional and not a baseline scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the simple operating margin and build margin emission factor for the western regional grid and the synopsis of which has been given in Annex – 3. For the purpose of estimation of emission reductions from the project activity, the combined margin emission factor has been estimated at 0.69 tCO_2/ MWh. The combined margin emission factor has been derived from the simple operating margin and build margin emission factors after considering/ factoring the weights of 0.25 and 0.75 for operating margin

(OM) and build margin (BM) emission factors relevant to the second crediting period as per the 'Tool to calculate the emission factor for an electricity system (Version 01)'.

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

(Copy this table for each data and parameter)

Data / Parameter:	**CO2 Emission Factor of grid (EF_y)**
Data unit:	tCO2 / MWh
Description:	**CO2 Emission Factor of the western regional grid**
Source of data used:	Central Electricity Authority (CEA), CO2 baseline database, Version 3.0, dated 15 December 2007
Value applied:	0.69
Justification of the choice of data or description of measurement methods and procedures actually applied :	CEA has estimated the simple operating margin and build margin emission factors for the Western regional grid. For calculating the CO2 emission factor as per combined margin method for the second crediting period, the weights of 0.25 for operating margin and 0.75 for build margin are considered as per 'Tool to calculate the emission factor for an electricity system (Version 01)
Any comment:	Details of emission factors as per CEA are given in Annex-3

Data / Parameter:	**Net calorific value of diesel (NCV_{diesel})**
Data unit:	GJ per mass unit (GJ/ ton)
Description:	Net calorific value of diesel
Source of data used:	IPCC default values
Value applied:	43.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default values at the upper limit of uncertainty at a 95% confidence intervals as provided in Table 1.2 of Chapter 1 of Vol 2 (Energy) of the 2006 IPCC guidelines on National GHG inventories, indicates that the NCV of diesel oil is 43.3 TJ/Gg which is equivalent to 43.3 GJ/ton
Any comment:	Future revision of the IPCC guidelines would be taken into account in case revisions occur during the current crediting period

Data / Parameter:	**CO2 Emission Factor of diesel (EF_{CO2_diesel})**
Data unit:	tCO2 /GJ
Description:	CO2 emission factor of diesel
Source of data used:	IPCC default values
Value applied:	0.0748
Justification of the choice of data or description of measurement methods and procedures actually	IPCC default values at the upper limit of uncertainty at a 95% confidence intervals as provided in Table 1.4 of Chapter 1 of Vol 2 (Energy) of the 2006 IPCC guidelines on National GHG inventories indicates that CO2 emission factor for diesel is 74,800 kg/TJ which is equivalent to 0.0748 tons/ GJ

applied :	
Any comment:	Future revision of the IPCC guidelines would be taken into account in case revision occur during the current crediting period

B.6.3 Ex-ante calculation of emission reductions:

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As per AMS ID (version 13, dated 14/12/2007), baseline emissions (BE_y in tCO_2) is the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).

$$BE_y = EG_y * EF_y$$

EGy = Net quantum of electricity supplied by the project activity to the grid in year "y"

EF_y = $EF_{Western\ grid,\ CM,\ y}$ = Baseline Emission Factor for the Western regional grid (Combined Margin Approach)

Calculation of electricity baseline emission factor (Combined Margin Approach)

The baseline emission factor has been calculated as a combined margin (CM), following the Baseline Methodology Procedure of the 'Tool to calculate the emission factor for an electricity system'. The steps as defined under the Baseline Methodology Procedure and the application to the project activity are detailed below:

Step 1: Identify the relevant electric power system

A regional grid definition is used and for the project activity, the simple operating and build margin emission factors estimated by Central Electricity Authority (CEA) for the Western Regional grid have been used to derive the combined margin emission factor for the second crediting period of the project activity.

Step 2: Select an operating margin (OM) method:

As per Step 2, the calculation of OM emission factor (EFgrid, OM,y) is based on one of the following methods:

(a) Simple OM or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM

Out of four methods mentioned defined in the Step 2, the Simple OM approach has been chosen for calculations since in the regional grid mix the low-cost/must run resources constitute less than 50% of total grid generation.

Further as per Step 2, the emission factor can be calculated using either of the two data vintages:

- ***Ex-ante option***: A 3 year generation-weighted average based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period

- ***Ex post option***: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

For the project activity, the Ex-ante option is chosen for emission factor estimation.

The Simple OM factor is calculated as under in Step 3

STEP 3: Calculate the Operating Margin emission factor (*EFgrid, OM,y*) according to the selected method:

The simple OM emissions factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/ MWh) of all generating power plants serving the system, not including low-cost / must run power plants/ units.

Of the three options provided under Step 3 (a), Option A has been used for calculating the Simple OM As per Option A, the simple OM emission factor is calculated as below:

$$EF_{Grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \; x \; NCV_{i,y} \; x \; EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

where,

$EF_{grid,\, OMsimple,y}$	- Simple operating margin CO2 emission factor in year y (tCO2/ MWh)
$FC_{i,m,y}$	- Amount of fossil fuel type *i* consumed by the power plant/ unit m in year y (mass or volume unit)
$NCV_{i,y}$	- Net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit)
$EF_{CO2,i,y}$	- CO2 emission factor of fossil fuel type i in year y (tCO2/ GJ)
$EG_{m,y}$	- Net electricity generated and delivered to the grid in year y by power plant/ unit m in year y (MWh)
M	- All power plants/ units serving the grid in year y except low-cost / must run power plants/ units
i	- All fossil fuel types combusted in power plant/ unit m in year y
y	- Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option) following the guidance on data vintage in step 2. For the project activity, the ex ante option is chosen

Step 4: Identify the cohort of power units to be included in the build margin:

The sample group of power units 'm' used to calculate the build margin consists of either

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

The set of power units that comprise larger annual generation would be used.

In terms of vintage of data, the Option 1 is chosen. As per Option 1: *For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE.*

STEP 5. Calculate the Build Margin emission factor

The build margin emission factor ($EF_{grid,BM,y}$) is the generation-weighted average emission factor (tCO2/MWh) of a sample of power units during the most recent year y for which power generation data is available calculated as follows:

$$EF_{Grid,BM,y} = \frac{\sum_m EG_{m,y} \, x \, EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

$EF_{grid,BM,y}$	- Build margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$	- Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	- CO2 emission factor of power unit m in year y (tCO2/ MWh)
m	- Power units included in the build margin
y	- Most recent historical year for which power generation data is available

The CO2 emission factor of each power unit m, $EF_{EL,m,y}$ is determined as per the guidance in step 3 (a) for simple OM using option B1 using for 'y', the most recent historical year for which power generation data is available and using for 'm' the power units included in the build margin. As per Option B1, if for the power units 'm', data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) is determine as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \; x \; NCV_{i,y} \; x \; EF_{CO2,i,y}}{EG_{m,y}}$$

Where,

$EF_{EL,m,y}$ - CO2 emission factor of power unit m in year y (tCO2/ MWh)

$FC_{i,m,y}$ - Amount of fossil fuel type i consumed by power unit m in year y (mass or volume unit)

$NCV_{i,y}$ - Net calorific value (energy content) of fossil fuel type in year y (GJ/ mass or volume unit)

$EF_{CO2, i,y}$ - CO2 emission factor of fossil fuel type i in year y (tCO2/ GJ)

$EF_{m,y,}$ - Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

i - All fossil fuel types combusted in power unit m in year y

y - Either three most recent years for which data is available at the time of submission of the CDM PDD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex-post option), following the guidance on data vintage in step 2. For the second crediting period, the ex-ante option is chosen.

Step 6: Calculation of Combined Margin Emission Factor:

The baseline emission factor of the Western regional grid ($EF_{Western\ grid,\ CM,\ y}$ in tCO_2/ MWh)) is calculated as the weighted average of the Operating Margin emission factor ($EF_{Grid,\ OM,\ y}$) and the Build Margin emission factor ($EF_{Grid,\ BM,\ y}$)

$EF_{Western\ grid,\ CM,\ y} = EF_{Grid,OM,\ y} \; x \; W_{OM} + EF_{Grid,\ BM,\ y} \; x \; W_{BM}$

$EF_{grid,\ OM,,\ y}$ - Simple operating margin CO2 emission factor in year y (tCO2/ MWh)

$EF_{grid,\ BM,\ y}$ - Build margin CO2 emission factor in year y (tCO2/MWh)

W_{OM} - Weighting of operating margin emission factor (%)

W_{BM}, - Weighting of build margin emission factor (%)

For hydro power projects, the default values of W_{OM} and W_{BM} are 50 % (i.e. $W_{OM} = W_{BM} = 0.5$) for the first crediting period only and for the second crediting period, W_{OM} and W_{BM} are 0.25 and 0.75 respectively.

As per the published data of the Central Electricity Authority (CEA), Ministry of Power, Government of India (CO2 baseline database, version 03, dated 15 December 2007):

$EF_{grid,\ OM,,\ y}$ i.e. the Simple Operating Margin emission factor of the Western Grid is 0.99 tCO2/ MWh

$EF_{grid,\ BM,\ y}$ i.e. the Build margin CO2 emission factor of the Western grid is 0.59 tCO2/MWh

The $EF_{Western\ grid,\ CM,\ y}$ i.e. the combined margin baseline emission factor of Western grid works out to 0.69 tCO2/ MWh based on the weights used for the second crediting period. The Emission Factor details are provided in Annex-3.

The total power exported to the grid by the project activity (EG_y) is estimated to be about 356,000 MWh during the 7 year crediting period (27th July 2008 – 26th July 2015). The baseline emissions for the crediting period, is estimated to be as follows:

BE_y = EG_y * $EF_{Western\ grid,\ CM,\ y}$

BE = 356,000 MWh * 0.69 tCO_2 eq/ MWh

= 245,640 tCO_2 eq during 7 year crediting period (27th July 2008 – 26th July 2015).

Project Emissions (PE)

When the project activity is under operation, power required for operation and for lighting is consumed from the generated power and only the net energy is exported to the grid, which is measured and considered for calculation of emission reductions. When the plant does not produce electricity, the project activity imports electricity from the grid for the purpose of lighting, dewatering of seepage water and maintenance. However in the event of unavailability of grid power during non-generation period, plant would use power from standby DG sets

Therefore in the project activity there could be two sources of project emissions due to power consumption (a) due to electricity imports from MSEDCL grid (b) Operation of standby Diesel Generator (DG) set

(a) Project emissions from electricity imports: The electricity imported from the MSEDCL grid will be considered to contribute to project emissions if the electricity imported is equal to or more than 0.5 % of the electricity exported. This electricity imported would be monitored during the crediting period, however it is anticipated that the project emissions would be zero as the electricity imported has always been < 0.5% of the electricity exported during the last few years. The imports from the grid and net exports to the grid for the years 2001 –2007 are given in Table B.3-2 below:

Table B.3-2: Export and Import details of the project activity

Year	Net Export (MWh)	Import (MWh)	% Import v/s Export
2001	19,714.8	28.761	0.146%
2002	36,110.4	83.898	0.232%
2003	45,268.8	73.374	0.162%
2004	30,105.6	74.244	0.247%
2005	48,574.8	64.314	0.132%
2006	42,600.0	83.445	0.195%
2007	46,543.2	68.691	0.147%

As per Table B.3-2 above it can be observed that the annual electricity imported from the grid as a proportion of annual electricity exported to the grid ranges from 0.13-0.25% during the period 2001-07. Therefore, the project emissions due to this source (i.e. import of electricity from grid) has not been considered. However, it may be noted that for a particular month/ JMR period during a verification period, if the electricity imports pertaining to the project activity is greater than or equal to 0.5% of the electricity exported, in such an event the project emissions for that month/ JMR period would be accounted for. It needs to be noted here that the periods pertaining to the JMR for export data and the monthly billing records by MSEDCL for import data may not be the same (there would be a few days mis-match as JMR of the export meter is generally taken on the last day of every month whereas the monthly billing records for import data is generally issued by MSEDCL during the 1st week of the month). Though there is a slight mis-match in the dates of import and export data, it is considered that during the 7-year crediting period, this mis-match would be insignificant.

$PE_{Import,y} = E_{Import,y} \times EF_{Western\ grid,\ CM,\ y}$

$PE_{Import,y}$ is the project emissions from import of electricity from the grid during the year y

$E_{Import,y}$ is the electricity imported from the grid by the project activity during the year y (For the purpose of calculating project emissions this would include imports pertaining to only those periods / months during the year where the import is equal to or more than 0.5% of the export)

$EF_{Western\ grid,\ CM,\ y}$ is the CO2 emission factor of the Western regional grid

(b) Project emissions from standby DG sets:

There is a standby DG set available at BH-1. The DG set mainly operates as part of the routine maintenance and during the monitoring of emission levels. It needs to be noted the use of DG power for the project activity has not been significant in the previous years and therefore the project emissions from the same are not accounted for. However the data on diesel consumed in the DG set would be monitored during the crediting period. If the emissions from diesel consumption during the Joint Meter Reading (JMR) period is equal to or more than 0.5% of the emission reductions during that period then the project emissions on account of diesel consumed would be considered for that period in order to compute the net emission reductions.

For the purpose of calculating project emissions, the CO2 emissions from fossil fuel (diesel) combustion is calculated based on the quantity of fuel i.e. diesel combusted (DC) and the CO2 emission coefficient (COEF) of the fuel (diesel) as follows:

$$PE_{DC,y} = \sum_i DC_y \times COEF$$

Where,

- $PE_{DC,y}$ are the CO2 emissions from fossil fuel combustion (tCO2) during the year y
- DC_y is the quantity of fuel (diesel) combusted (mass unit) for the year (this pertains to the diesel consumption during those periods in the year when the project emissions due to diesel consumption is equal to or more than 0.5% of the emission reductions for that period)
- COEF is the CO2 emission coefficient of fuel i.e. diesel (tCO2/ mass unit)

The CO2 emission coefficient COEF is calculated based on net calorific value (NCV_{diesel}) and CO2 emission factor (EF_{CO2_diesel}) of the fuel i.e. diesel as follows:

$$COEF = NCV_{diesel} \times EF_{CO2\_diesel}$$

Where:

- COEF is the CO2 emission coefficient of fuel (tCO2/ mass unit)
- NCV_{diesel} is the net calorific value of the fuel (diesel) (GJ/ mass unit)
- EF_{CO2_diesel}, is the CO2 emission factor of fuel i.e. diesel.

The NCV_{diesel} and EF_{CO2_diesel} have been taken from the '2006 IPCC guidelines on National GHG inventories' as defined in section B.6.2'

Project emissions (PE) = $PE_{Import,y} + PE_{DC,y}$

Leakage

As per AMS 1.D, 'if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered'. In the project activity, there is no transfer of energy generating equipment and therefore the leakage from the project activity is considered as zero.

Formula used to determine Emission Reductions:

CO_2 emission reduction due to project activity = BE_y – PE - Leakage

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

S.No.	Year	Estimation of project activity emissions (tCO_2e)	Estimation of Baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
1	27th July 2008 – 26th July 2009	0	30,360	0	30,360
2	27th July 2009 – 26th July 2010	0	35,880	0	35,880
3	27th July 2010 – 26th July 2011	0	35,880	0	35,880
4	27th July 2011 – 26th July 2012	0	35,880	0	35,880
5	27th July 2012 – 26th July 2013	0	35,880	0	35,880
6	27th July 2013 – 26th July 2014	0	35,880	0	35,880
7	27th July 2014 – 26th July 2015	0	35,880	0	35,880
	Total (tonnes of CO_2e)	**0**	**245,640**	**0**	**245,640**

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)

Data / Parameter:	**Electricity Exported** (EG_y)
Data unit:	kWh
Description:	Electricity Exported to the grid by the project activity
Source of data to be used:	Joint Meter Readings (JMRs) taken and signed by authorised officials of MSEDCL
Value of data	44,000,000 kWh during first year and 52,000,000 kWh during subsequent years of the crediting period
Description of measurement methods and procedures to be applied:	The measurement at 132 KV side for supply to MSETCL grid gives the Energy supply reading. The units exported will be measured at the interconnection point. Monthly joint meter reading (JMR) of main and check meters installed at the substation shall be taken and signed by authorised officials of DLHPPL, MSEDCL, MSETCL and GOMWRD generally once every month. Joint meter reading of the main meter shall be the basis for monthly invoice of energy

	exported to the grid. Records of the joint meter reading of energy exported to the grid shall be maintained by DLHPPL, MSEDCL, MSETCL and GOMWRD. Daily and monthly reports stating the power export shall be prepared by the shift in-charge and verified by the plant manager of DLHPPL.
QA/QC procedures to be applied:	For measuring the energy exported to the grid, one main meter and one check meter are maintained. Joint meter reading of the main meter is the basis of billing and emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during the periodic check. Monthly joint meter reading of main and check meters are taken and signed by authorised officials of DLHPPL, MSEDCL, MSETCL and GOMWRD generally once every month. Records of this joint meter reading are maintained by DLHPPL, MSEDCL, MSETCL and GOMWRD. The Meters are checked for accuracy and calibration by the MSETCL as per the provisions in the power purchase agreement (PPA) prevailing at the time of respective accuracy check or calibration. As per the current PPA, the meters are checked for accuracy every six months and the calibration is done once in a year.
Any comment:	DLHPPL shall archive and preserve all the JMRs pertaining to the electricity exported and also the monthly invoices raised against saleable electricity, for at least two years after end of the crediting period. JMR of check meter shall be used for cross checking the export data.

B.7.1 Data and parameters monitored:
(Copy this table for each data and parameter)

Data / Parameter:	**Electricity Imported (E_{Import})**
Data unit:	kWh
Description:	Electricity Imported from the grid by the project activity
Source of data to be used:	Monthly billing records of MSEDCL
Value of data	-
Description of measurement methods and procedures to be applied:	The energy is imported at 33KV feeder and a separate independent energy meter is installed by MSEDCL to measure the units imported by DLHPPL. The units imported are recorded monthly and bills are issued by MSEDCL Bills of MSEDCL shall be the source of data for electricity imported. This data will be used to estimate the emissions due to the electricity imported from the grid and it will be considered as part of project emissions when on a monthly basis the electricity imported is equal to or more than 0.5 % of the electricity exported.
QA/QC procedures to be applied:	Import meter is under the custody of MSEDCL, and DLHPPL has no access to meter and therefore the calibration details pertaining to the same. Hence calibration records are not maintained by DLHPPL for the import meter.
Any comment:	-

B.7.1 Data and parameters monitored:	
(Copy this table for each data and parameter)	
Data / Parameter:	**Gross Electricity Generation (E_{Gen})**
Data unit:	KWh
Description:	Gross electricity generated by the project activity
Source of data to be used:	Joint Meter Readings (JMRs) taken and signed by authorised officials of MSEDCL
Value of data	44,806,520 kWh in year first year and 52,953,160 kWh in the subsequent years of the crediting period.
Description of measurement methods and procedures to be applied:	The generation meter measures the units generated. The Monthly joint meter reading (JMR) of the generation meter shall be taken and signed by authorised officials of DLHPPL, MSEDCL, MSETCL and GOMWRD generally once every month. Records of the joint meter reading of energy generated shall be maintained by DLHPPL, MSEDCL, MSETCL and GOMWRD. Daily and monthly reports stating the power generated shall also be prepared by the shift in-charge and verified by the plant manager of DLHPPL which shall be used to cross check the generation. The generation is measured in plant premises at generator terminals and is monitored and recorded continuously through PLC.
QA/QC procedures to be applied:	The data will be directly measured and monitored at the project site. The meters installed at the generator end shall be checked for accuracy for every six months and the calibration is done once in a year. If the accuracy of meter is found to be beyond permissible limit even after calibration then the meter shall be replaced with spare tested, calibrated meter
Any comment:	DLHPPL shall archive all the JMRs and 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.

B.7.1 Data and parameters monitored:	
(Copy this table for each data and parameter)	
Data / Parameter:	Auxiliary Consumption
Data unit:	KWh
Description:	Unit consumed by the project activity
Source of data to be used:	Joint Meter Readings (JMRs) taken and signed by authorised officials of MSEDCL
Value of data	806,520 kWh during first year and 953,160 kWh during the subsequent years of the crediting period
Description of measurement methods	The difference between the gross electricity generation (E_{Gen}) and electricity exported to the grid (EG_y) as per the JMR gives the total Auxiliary Consumption

and procedures to be applied:	in the plant. This Auxiliary consumption includes losses in Generator step up transformer, in cables and in excitation system, which are not actually measured. Besides these other auxiliary consumption are measured at Unit Auxiliary Board
QA/QC procedures to be applied:	The data is calculated using the gross electricity generation and electricity exported as per the JMRs.
Any comment:	This data would be calculated based on gross electricity generation and electricity exported as per the JMRs. This data will also be used in calculating electricity export in the event of simultaneous failure and /or defect in accuracy of both the main meters and check meters.

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**Diesel consumption (DC)**
Data unit:	Tons
Description:	Diesel consumed by the standby DG set
Source of data to be used:	Daily records of levels in the diesel storage tanks as per the plant log book.
Value of data	-
Description of measurement methods and procedures to be applied:	The diesel quantity available in the diesel storage tanks is recorded daily by DLHPPL in the plant log book. The diesel consumption would be recorded in the logbook in litres. However, based on the density of diesel of about 0.88[9] kg/litre, the diesel consumption in tons would be calculated for use in the equation to compute project emissions (PE) as per section B.6.3.
QA/QC procedures to be applied:	-
Any comment:	For crosschecking the diesel consumed, the records of issuance of diesel from stores to the diesel storage tank is monitored by DLHPPL and this would be in multiples of 20 litres.

Data / Parameter:	**Hourly Electricity Export (HEE_{main_meter})**
Data unit:	kWh
Description:	Hourly electricity exported to the grid by the project activity as recorded at the main meter and check meter. This parameter is relevant to conditions/ circumstances (those days) where the dates of Joint Meter Readings (JMRs) pertaining to the project activity do not match the individual verification periods.
Source of data to be used:	Log book records for the main meter.
Value of data applied	-

[9] Reference: Requirement of High Speed Diesel (HSD) fuel as per IS 1460: 1995 as specified under Motor spirit and High Speed Diesel Control Orders by the Ministry and Petroleum and Natural Gas (MoPNG) dated 28 December 1998 available at http://petroleum.nic.in/newgazette/GN%20No.511%20dtd%2029-12-98.pdf

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	This data is recorded on an hourly basis by DLHPPL based on data recorded at the main meter.
QA/QC procedures to be applied:	For measuring the hourly energy exported to the grid, one main meter and one check meter are maintained. The hourly meter reading of the main meter is the basis of emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during the periodic check. Hourly meter reading of the check meters would be used for cross checking. The meters are checked for accuracy and calibration by the MSETCL as per the provisions in the power purchase agreement (PPA) prevailing at the time of respective accuracy check or calibration. As per the current PPA, the meters are checked for accuracy every six months and the calibration is done once in a year.
Any comment:	This parameter is relevant to conditions/ circumstances (those days) where the dates of Joint Meter Readings (JMRs) pertaining to the project activity do not match the individual verification periods

B.7.2 Description of the monitoring plan:

>>

Key project parameters affecting emission reductions:

Electricity generated by the project activity: The power exported by the project activity would be monitored to the best accuracy and as per section B.7.1.

Power exported to the grid: The project revenue is based on the units exported by the project activity.

The general principles for monitoring above parameters are based on:

- Frequency
- Data recording
- Reliability
- Experience and training

Frequency

Joint meter reading (JMR) of main and check meters installed at the substation shall be taken and signed by authorised officials of DLHPPL, MSEDCL, MSETCL and GOMWRD generally once every month. Daily data recording by the shift in-charge of DLHPPL is there at generation end. Joint meter reading shall be the basis for monthly invoice of energy exported to the grid.

Data recording

Records of the joint meter reading of energy generated and exported to the grid would be maintained by DLHPPL, MSEDCL, MSETCL and GOMWRD. Daily and monthly reports stating the generation and power export would be prepared by the shift in-charge and verified by the plant manager.

Reliability

For measuring the energy exported to the grid, one main meter and one check meter are maintained. Joint meter reading of the main meter is the basis of billing and emission reduction calculations, so long the meter is found to be within prescribed limits of error during the periodic check.

Joint meter reading of main and check meters are taken and signed by authorised officials of DLHPPL, MSEDCL, MSETCL and GOMWRD once every month. Records of this joint meter reading are maintained by DLHPPL, MSEDCL**,** MSETCL and GOMWRD.

The main and check meters installed are jointly inspected and sealed and are not interfered with, by either DLHPPL, MSEDCL or MSETCL except in presence of the other party. The meters are checked for accuracy and calibration by the MSETCL as per the provisions in the power purchase agreement (PPA) prevailing at the time of respective accuracy check or calibration. As per the current PPA, the meters are checked for accuracy every six months and the calibration is done once in a year. The meters are checked for accuracy and/or calibrated at MSETCL's laboratory and sealed by MSEDCL, MSETCL and DLHPPL jointly.

If during periodic 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 calculations are as per main meter as usual. However, the check meter would be calibrated and/ or replaced if required. If during

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 up to 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/ or replaced, as may be necessary where after billing as well as emission reduction calculation would be as per main meter.

If during the periodic test checks, the main and check meter are both found to be beyond permissible limits of error, then both the meters would be immediately calibrated or replaced if required..In such an event, the emission reduction calculations for the period (which starts on the day of the previous accuracy or calibration which ever is later and ends on the day when the meter is calibrated and/ or replaced – also referred to as 'defect period') would be calculated based on the gross electricity generation data taken from the JMR and the auxiliary consumption. For this purpose, the auxiliary consumption would be worked out as a percentage of gross electricity generation pertaining to the same calendar period (also referred to as 'reference period') as that of the defect period corresponding to the previous year. The percentage auxiliary consumption will be the maximum of the monthly percentage auxiliary consumption in the reference period. This maximum of the monthly percentage auxiliary consumption would be used to compute the electricity export and therefore the emission reduction for the defect period.

The meters installed at the generator end shall be checked for accuracy every six months at the MSETCL laboratory and the calibration is done once in a year at MSETCL. If the accuracy of the meter is found to be beyond permissible limit even after calibration then the meter shall be replaced with spare tested, calibrated meter.

DLHPPL shall archive and preserve all the JMRs pertaining to the energy generated and exported by the project activity, for at least two years after end of the crediting period. DLHPPL shall also archive the complete metering data at generation end and export data on paper and all the data would be preserved for at least two years after end of the crediting period.

Trippings due to grid failure

Number of trippings due to grid failure are recorded and verified with the allowable pre-defined number for the equipment. Monitoring plan has been established to verify and to ensure that the number of failures is less than prescribed limits.

Management structure for monitoring of parameters:

Hourly data recording of the generation and export to the grid will be made by the electrician of the shift and verified by the shift engineer of DLHPPL and these data will be there at generation end. Daily and monthly reports stating the generation and power export are prepared by the shift in-charge and verified by the plant manager of DLHPPL. Records of joint meter reading would be maintained by plant manager of DLHPPL at site. MSEDCL (MSEB) also maintains the records of joint meter readings at their office. Monthly invoices are prepared based on Joint meter readings, which will be used for cross checking the energy exported to the grid. The plant manager is a qualified engineer with considerable experience in power industry. All the shift engineers are qualified engineers and have undergone related training including plant operations, data monitoring, report generation etc.

Procedures for handling data uncertainties:

In the event when verification period dates and JMR dates in the project activity, do not coincide

For electricity exports:

In the event when the individual verification period dates and the date of JMR pertaining to the project activity do not coincide, the following procedure would be adopted to estimate the electricity supplied to the grid during the specific period/ or days where there is a mismatch. The hourly electricity export readings (HEE_{main_meter}) recorded at the main meters would be monitored by DLHPPL for the project activity in their log book. For the mismatch period, the hourly electricity export readings would be considered in order to arrive at the electricity supplied/ exported by the project activity to the grid during that period. This method would be followed in cases where the starting or ending / last dates of the verification period do not match the JMR dates of the project activity.

For electricity imports:

This is in the event when the individual verification period dates and the date of Monthly records for electricity imports (recorded by MSEDCL) pertaining to the project activity do not coincide. It is to be noted that the units imported are recorded on a monthly basis and issued by the MSEDCL. The maximum monthly electricity imports during the previous 12 month period (prior to the date of mismatch) would be

arrived at. For the mismatch period, the maximum monthly electricity import as identified above would be taken and the daily import would be worked out based on the number of days during the concerned month. This daily import as worked out would be applied for those specific days of mismatch to estimate the total import for the mismatch period. .

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

05/05/2008 (last updated)

Name of the responsible person (s)/ entity (ies):

Ecoinvest Carbon S.A.
13, rte de Florissant
PO Box 518
CH-1211 Geneva 12
Switzerland
Tel :+41 22-592-9121
Fax : +41 22-592-9105

The entity determining the baseline is not a project participant.

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:

10/04/2000

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

30 y-0m

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

The project activity will use a renewable crediting period. This period pertains to the second 7 year crediting period for the project activity.

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the crediting period:

27/07/2008. This pertains to the starting date of the second crediting period.

C.2.1.2. Length of the crediting period:

7 y-0 m.

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

C.2.2.2. Length:

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 environmental monitoring and compliance of the projects implemented in India come under the purview of Environment (Protection) Act . Ministry of Environment and Forests (MoEF), Government of India has been vested with powers to administer and ensure compliance under the Act. Under the act, a Central Pollution Control Board (CPCB) has been formed at the federal level and separate pollution control boards (PCBs) have been formed for each state for monitoring and ensuring the compliance of the environmental norms fixed by MoEF. In some cases more stringent norms have been fixed by the state pollution control board depending upon the situations and sensitivity. MoEF frames policies, guidelines and standards for environmental norms. MoEF has exempted small hydro power projects with project cost less than Rs. 500 Million (US $ 11.415 Million) from environmental clearance vide Notification dated 27 th January, 1994. http://envfor.nic.in/divisions/iass/eia/Annex1.htm. (subsequently amended to exempt projects with project cost less than Rs.1000 million (US$22.830 Million)) from environmental clearance. This notification also exempted carrying out environmental impact assessment (EIA) studies for hydro power plants with investment less than Rs.500 Million, which otherwise is mandatory for new projects.

However, DLHPPL had carried out an environmental review of the project activity and other new proposed projects. A brief of the same applicable for the project activity is discussed below; complete environmental social review shall be made available during validation.

The following potential environment, health and safety and social aspect of the project were analyzed:

- land acquisition, compensation and physical and/or economic resettlement;
- national and local government permitting requirements;
- potential impacts on downstream users; and
- provision of housing, hygiene facilities, water, and power (including fuel storage) during construction and operation;
- Impact on air, water and ecology due to project activity
- Social and economy issues

Land acquisition, compensation and physical and/or economic resettlement

There has been no land acquisition due to the project activity. Since the project activity does not increase the reservoir size and does not cause any land inundation, there are no land submerging issues and hence no resettlement and rehabilitation was involved.

National and local government permitting requirements

As per a communication[10] from Government of Maharashtra (GOM), the project activity has been exempted from clearance from pollution control authorities.

Potential impacts on downstream users

The water discharge levels are controlled by the GOM irrigation authorities who release water at Bhandardara dam in accordance with agricultural demands downstream. Therefore, the potential impacts on downstream users is not in the control of the project activity owing to the pattern of irrigation releases followed by GOM.

Provision of housing, hygiene facilities

DLHPPL has constructed a housing facility for its staff with adequate water, sanitary facilities. Good potable water is available in the power house for drinking purposes and good water for washing and cleaning purposes.

Impact on Air, water and ecology

There is no impact on the air quality due to the project activity. No effluents are produced from the project activity and hence no impact on water. This is a foot of a dam hydropower project where size of the reservoir was not increased and hence there was no inundation of land due to the project activity. There are no known endangered species in the vicinity of the project activity. Hence, there are no significant impacts on the ecology due to the project activity.

Social and economy issues

The installation of the project activity has given job opportunities to the local community during construction and operation of the project activity. The project activity has contributed for improving the standard of living of the local community.

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[10] *Letter no. PVT-1096/(130/96)LB 5/HP dated 18 th April, 1998*

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:

As per the host party requirements, it is not required to carry out EIA studies for the project activity. However, it is to be noted that as detailed in section D.1 of the PDD, there would be no significant impacts due to the project

SECTION E. Stakeholders' comments:

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

Since the project activity was a rehabilitation of the damaged project, formal comments from stakeholders were not invited.

An advertisement was given in local newspaper in vernacular language (Marathi) in Dainik Lokmat of Ahmednagar on 20th June 2005 informing about the availability of environmental social review (ERS) report and inviting public and local stakeholders to avail a copy of the document. ERS was kept for public inspection at BH-1.

A register was maintained to make the entries of the issue of ERS. A scanned version of the newspaper advertisement and its translation in English is attached as Annex 4.

E.2. Summary of the comments received:

There was no request from the stakeholders to review the environmental social review till the prescribed period of availability (20 July 2005) and there was no comment from anybody and no entry was made in the register maintained at BH-1.

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

Since there were no comments, no action taken report is available.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Participant – 1

Organization:	Dodson-Lindblom Hydro Power Private Limited
Street/P.O.Box:	Ro.No.5
Building:	6, Shiv-Watsu, Tejpal Scheme
City:	Vile Parle (East), Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400057
Country:	India
Telephone:	+91 22 2682 6819/ 2682 6718 / 2682 6594
FAX:	+91 22 2683 4658
E-Mail:	dlhppl@dlz.com
URL:	
Represented by:	
Title:	Director (Maharashtra Projects)
Salutation:	Mr.
Last Name:	Paunikar
Middle Name:	S.
First Name:	Prem
Department:	
Mobile:	+91 98206 11688
Direct FAX:	
Direct tel:	
Personal E-Mail:	premsp@vsnl.net

Project Participant – 2

Organization:	The Netherlands represented by its Ministry for Housing, Spatial Planning and the Environment acting through the IFC-Netherlands Carbon Facility ("INCaF") and INCaF's Trustee
Street/P.O.Box:	2121 Pennsylvania Avenue NW
Building:	
City:	Washington,
State/Region:	DC
Postfix/ZIP:	20433
Country:	United States of America
Telephone:	+1 202 473-4194

FAX:	+1 202 974-4404
E-Mail:	carbonfinance@ifc.org; mparaan@ifc.org
URL:	www.ifc.org/carbonfinance
Represented by:	
Title:	Program Manager
Salutation:	Mr.
Last Name:	Widge
Middle Name:	
First Name:	Vikram
Department:	Carbon Finance, Environment Finance Group, Environment and Social Development Department
Mobile:	
Direct FAX:	+1-202-974-4404
Direct tel:	+1-202-473-1368
Personal E-Mail:	vwidge@ifc.org

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding of the project activity from Annex 1 Parties.

ANNEX 3

BASELINE INFORMATION

(Source: Central Electricity Authority)
(Source: Central Electricity Authority, CO2 baseline database, Ver 3.0, 15 December 2007)

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.72	0.73	0.74
East	1.06	1.03	1.09	1.08	1.05	1.05	1.00
South	0.74	0.75	0.82	0.84	0.79	0.74	0.72
West	0.90	0.92	0.90	0.90	0.92	0.89	0.86
North-East	0.42	0.41	0.40	0.43	0.52	0.33	0.40
India	0.82	0.83	0.85	0.85	0.84	0.81	0.80

Simple Operating Margin (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1.00	0.99	0.98	1.00	1.00
East	1.22	1.19	1.17	1.20	1.17	1.13	1.09
South	1.02	1.00	1.01	1.00	1.00	1.01	1.00
West	0.98	1.01	0.99	0.99	1.01	1.00	**0.99**
North-East	0.74	0.71	0.74	0.74	0.90	0.70	0.70
India	1.01	1.02	1.02	1.02	1.02	1.02	1.01

Build Margin (tCO2/MWh) (not adjusted for imports)

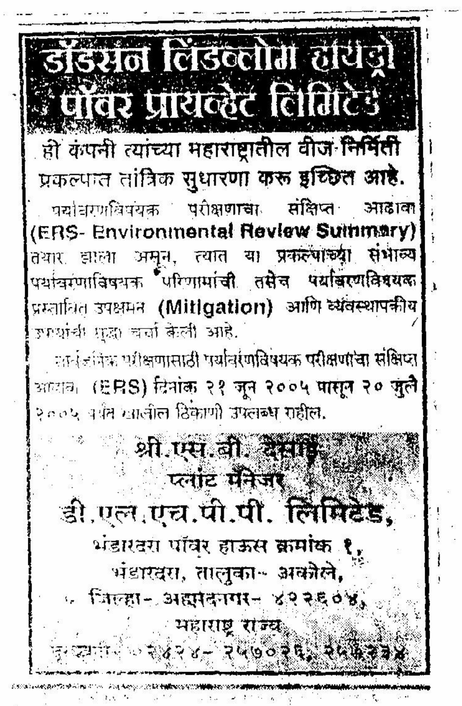
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.60	0.63
East					0.90	0.97	0.93
South					0.70	0.71	0.71
West					0.77	0.63	**0.59**
North-East					0.15	0.15	0.23
India					0.69	0.68	0.68

Annex 4

Monitoring Information

Monitoring plan shall be as per Section B. 7.1 and B.7.2 of the PDD.

Appendix 1
Image of newspaper advertisement (Marathi -local language)



डॉडसन लिंडब्लोम हायड्रो पॉवर प्रायव्हेट लिमिटेड

ही कंपनी त्यांच्या महाराष्ट्रातील वीज निर्मिती प्रकल्पात तांत्रिक सुधारणा करू इच्छित आहे.

पर्यावरणविषयक परीक्षणाचा संक्षिप्त आढावा (ERS- Environmental Review Summary) तयार झाला असून, त्यात या प्रकल्पाच्या संभाव्य पर्यावरणविषयक परिणामांची तसेच पर्यावरणविषयक प्रस्तावित उपशमन (Mitigation) आणि व्यवस्थापकीय उपायांची सुद्धा चर्चा केली आहे.

सार्वजनिक परीक्षणासाठी पर्यावरणविषयक परीक्षणाचा संक्षिप्त आढावा (ERS) दिनांक २१ जून २००५ पासून २० जुलै २००५ पर्यंत खालील ठिकाणी उपलब्ध राहील.

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दूरध्वनी ०२४२४- २५७०२६, २५७२३४

Translation of the newspaper advertisement

This company wishes to technically upgrade their power generation project in Maharashtra.
ERS – Environmental Review Summary has been prepared and it covers the probable environmental issues arising out of this project as well as environmental mitigations and management solutions have also been discussed.

The ERS is open for public inspection from 21st June 2005 to 20th July 2005 at the following address :

Shri S. B. Desai
Plant Manager
D. L. H. P. P. Limited
Bhandardara Power House No. 1
Bhandardara, Taluka: Aloka
District – Ahmednagar – 422604
State : Maharashtra
Tel : 02424 – 257026, 257234

Appendix 2 –Abbreviations

AMS	Approved small scale methodology
BH-1	Bhandardara power house –1
BM	Built Margin
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CPCB	Central Pollution Control Board
cusec	cubic feet per second
DLHPPL	Dodson –Lindblom Hydro Power Private Limited
DLI	Dodson –Lindblom International
ERS	Environmental social review
GHG	Green house gases
GOM	Government of Maharashtra
GOMID	Government of Maharashtra Irrigation Department
GOMWRD	Government of Maharashtra Water Resources Department
GWh	Giga watt hour
HT	High tension
IPCC	Inter Governmental Panel on Climate Change
IREDA	Indian Renewable Energy Development Agency
$kgC0_2$ eq/kWh	Kilogram carbon di oxide equivalent per kilowatt hour
KV	Kilo Volt
kW	Kilo Watt
kWh	Kilo Watt hour
m	Meter
M&P	Modalities and Procedures
m^3	Cubic meter
m^3 /s	Cubic meter per second
MCM	Million cubic meter
MNES	Ministry of Non conventional Energy Sources, Government of India
MoEF	Ministry of Environment &Forests, Government of India

MSEDCL	Maharashtra State Electricity Distribution Company Limited
MSTCL	Maharashtra State Transmission Corporation Limited
MSEB	Maharashtra State Electricity Board
MSPGCL	Maharashtra State Power Generation Company Ltd
MU	Million kilowatt hour
MW	Megawatt
MWh	Mega Watt hour
NHPC	National Hydroelectric Power Corporation Limited
NPC	Nuclear Power Corporation Limited
NTPC	National Thermal Power Corporation Limited
OH	Overhead
OM	Operating margin
PCB	Pollution Control Board
RCC	Reinforced cement concrete
Rs.	Indian Rupees
tCO_2e	tonnes carbon di oxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States Dollars

Appendix 3- 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 03
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. AMS ID, Version 13 dated 14th December 2007
5.	Tool to calculate the emission factor for an electricity system (Version 01), EB35, Annex 12
6.	Revised 1996 IPPC guidelines for National Greenhouse Gas Inventories: Workbook and Reference Manual
7.	Ministry of Power (MoP), Govt. of India, www.powermin.nic.in
8.	Ministry of Non conventional Energy Sources www.mnes.nic.in
9.	Maharashtra State Transmission Company Limited www.mahatransco.in
10.	Maharashtra State Electricity Board www.msebindia.com
11.	Maharashtra State Power Generation Company Ltd www.mahagenco.in
12.	Central Electricity Authority (CEA), Govt. of India, www.cea.nic.in
13.	Ministry of Environment and Forest, http://envfor.nic.in/cdm/host_approval_criteria.htm
14.	Detailed Project Report for Bhandardara Powerhouse
15.	Power Purchase Agreement with MSEB/MSETCL