Monitoring report form

(Version 05.1)

MONITORING REPORT		
Title of the project activity	12 MW hydropower plant in Bhandardara in Maharashtra, India.	
UNFCCC reference number of the project activity	0430	
Version number of the monitoring report	01	
Completion date of the monitoring report	28/11/2016	
Monitoring period number and duration of this monitoring period	Crediting period number: 03 Period: 27/07/2015 – 26/07/2022 (renewal) Monitoring period number: 01 Period: 27/07/2015 – 31/10/2016 (both dates are included)	
Project participant(s)	• Dodson–Lindblom Hydro Power Private Limited (DLHPPL) • Statkraft Markets GmbH	
Host Party	India	
Sectoral scope(s)	01, Energy Industries (renewable/non-renewable sources)	
Selected methodology(ies)	AMS-I.D. - Grid connected renewable electricity generation, version 18; Dated: 27/11/2014	
Selected standardized baseline(s)	Not Applicable	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	44,448[1] tCO_2	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	NA	42,996

[1] The current monitoring period is from 27/07/2015 to 31/10/2016 (i.e. 463 days) hence estimated amount of GHG emission reduction for the current monitoring period in the registered PDD has been extrapolated for 463 days i.e. = (35,042/365) x 463 = 44,448. Detailed calculation has been provided in ER sheet.

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Purpose of the 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.

Brief description of the installed technology and equipment:

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. The project activity (capacity - 12MW) is constructed at the foot of a hill adjacent to the Bhandardara dam named as BH-1. Another hydroelectric project of 34 MW was constructed later 10 kilometers downstream from BH-1, which is referred as BH-2. BH-1 is the small scale project activity.

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 BH-1. The generated electricity from the project activity after auxiliary consumption is exported to MSTCL grid.

BH-1 has exported about 63,704.20 MWh to grid during the current monitoring period. The plant and equipment facilities have been designed to comply with the applicable stipulations / guidelines of statutory authorities such as State Pollution Control Board etc.

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 Government of Maharashtra Irrigation Department (GOMID) with a single hydropower generating unit of 10 MW in 1984. In Maharashtra state, all state owned hydroelectric plants are constructed by Government of Maharashtra Water Resources Department (GOMWRD) 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 started 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 involved construction of new plant. The damaged equipment was beyond use and plant could not be used and operated anymore; and hence disposed as scrap. The accident had caused such damage that entire plant had to be reconstructed. Thus, BH1 hydro has been started as a new plant. The generated power from the project activity is connected to state electricity grid owned and operated by Maharashtra State Transmission Company Ltd (MSTCL).

Relevant dates for the project activity:

The project has been registered with UNFCCC on 30/09/2006 with renewable crediting period. The project opted for the renewable crediting period and the duration of the first crediting period is from 27/07/2001 – 26/07/2008 and second crediting period is from 27/07/2008 – 26/07/2015. This is third crediting period which is from 27/07/2015 – 26/07/2022. The amount of issued CERs from this project was 214,154 tCO_2 during the first crediting period and the amount of issued CERs from this project was 179,537 during Second crediting period.

This is the first monitoring period under the third Crediting Period. During the current monitoring period, the project has achieved total emissions reduction of 42,996 tCO_2e.

A.2. Location of project activity

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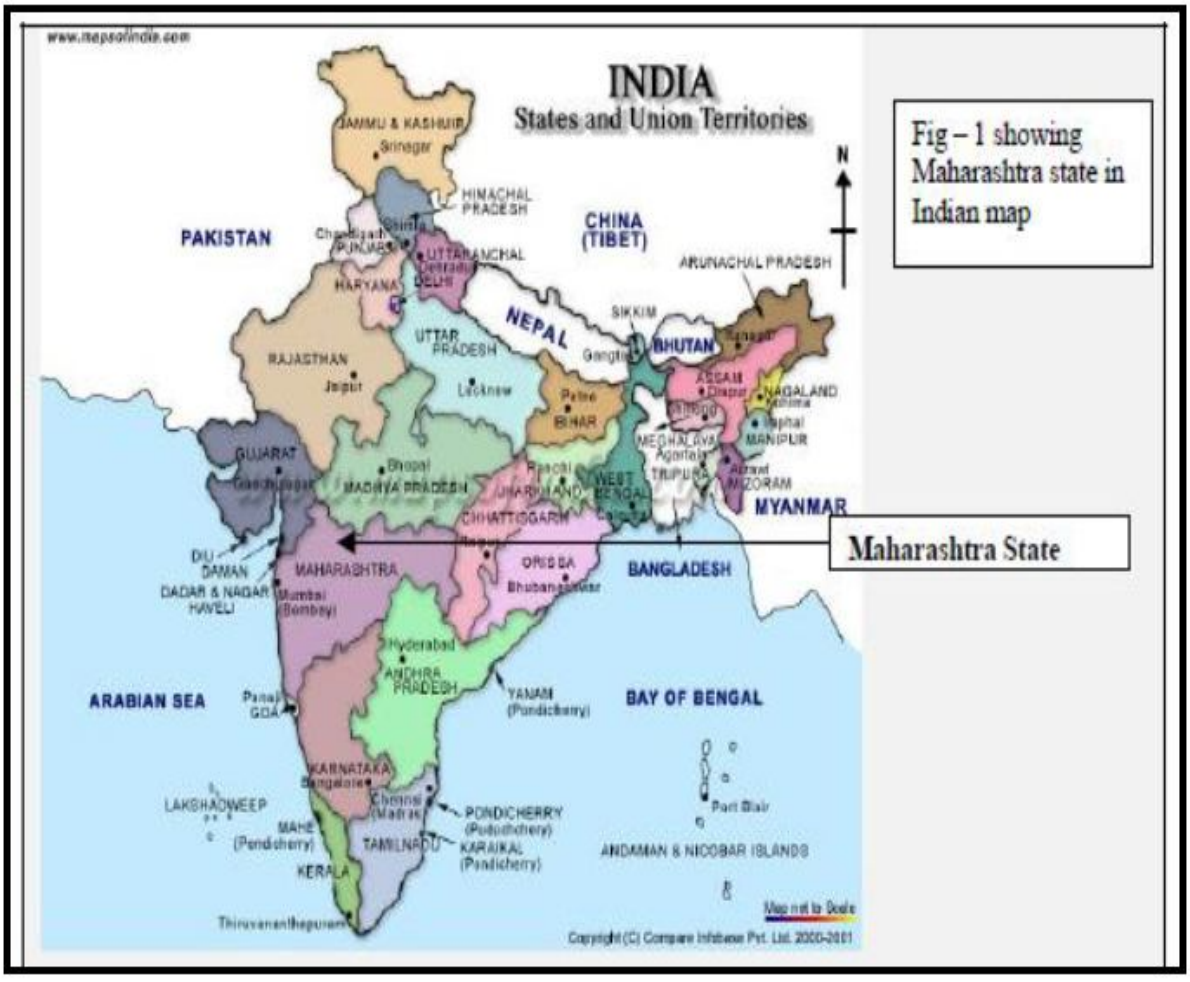
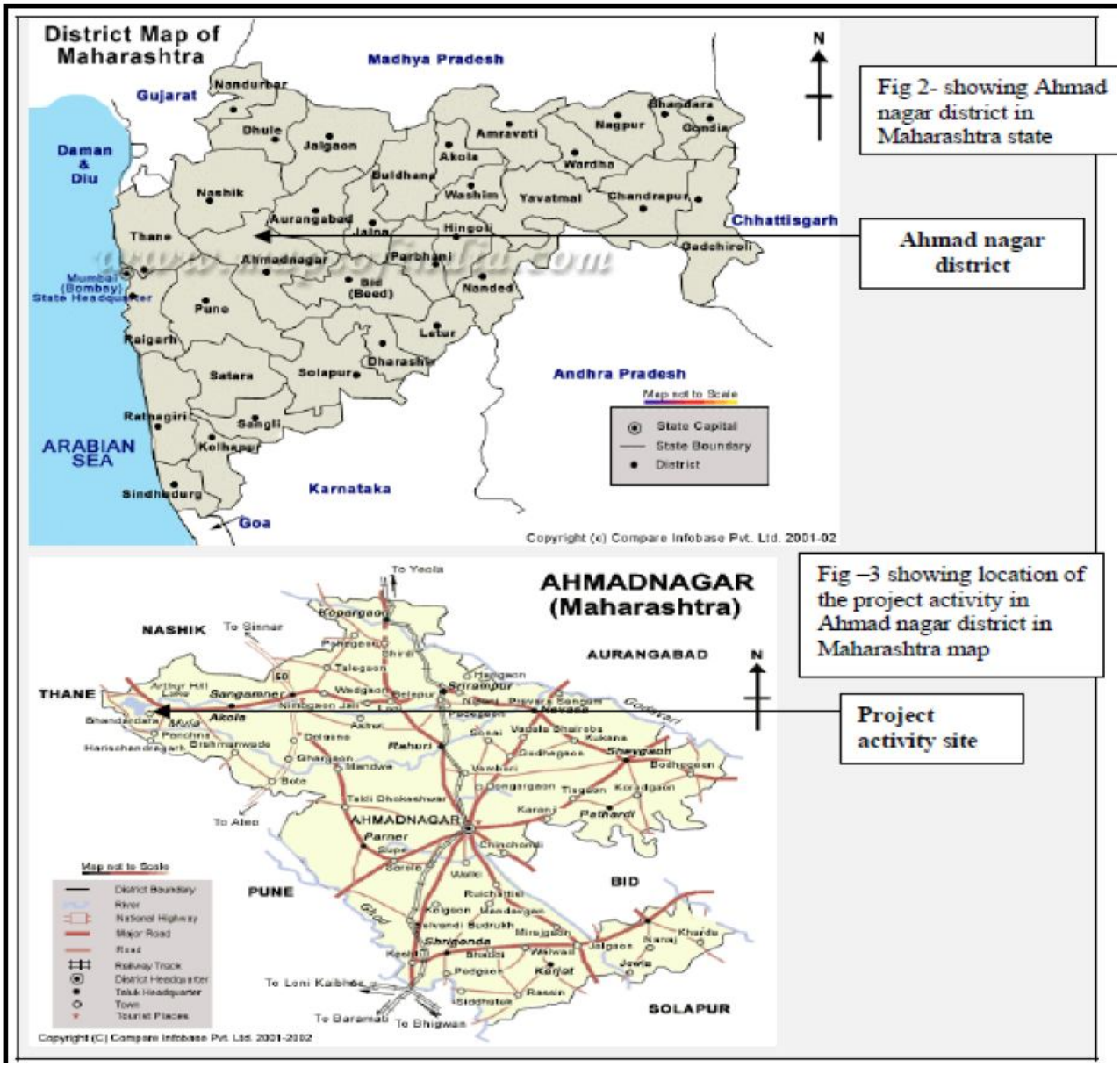
The project activity is located at a foot of a hill adjacent to the Bhandardara dam in Lake Arthur Hill reservoir in the upper Pravara river basin. Bhandardara is about 140 kilometres from Mumbai. The nearest town is Ghoti and closest railhead is at Igatpuri which is 40 kilometres away.

(a) Host Part(ies): India
(b) Region /State/Province: Maharashtra
(c) City/Town/Community: Bhandardara village, Akola Taluk, Ahmednagar district.
(d) Physical/ Geographical location: Latitude 19° 3 3′ 15″ N and longitude 73° 45 ′ 0″ E.

The location of project activity is shown in following figures – Fig 1 & 2:





A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India	Dodson –Lindblom Hydro Power Private Limited (DLHPPL) (Private Entity)	NO
Switzerland	Statkraft Markets GmbH	No

A.4. Reference of applied methodology and standardized baseline

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Title of approved baseline and monitoring methodology:

Renewable electricity generation for a grid in accordance with approved small scale methodology AMS I.D.

Type I	: Renewable energy project
Sectoral Scope	: 01, Energy Industries
Category I.D	: Grid connected renewable electricity generation, version 18[2]
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 activities.

Tool reference:
"Tool to calculate the emission factor for an electricity system" Version 5
"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, Version 02".

Standardized baseline: Not applicable.

A.5. Crediting period of project activity

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Crediting Period Selected: Renewable crediting period (3*7 years).

Number of Crediting period: 3rd Crediting Period (27/07/2015 – 31/10/2016)

Start date of the 3rd Crediting Period	: 27/07/2015
End date of the 3rd Crediting Period	: 31/10/2016
Duration of the 2nd Crediting Period	: 27/07/2008 – 26/07/2015
Duration of 1st Crediting Period	: 27/07/2001 – 26/07/2008

A.6. Contact information of responsible persons/entities

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Dodson–Lindblom Hydro Power Private Limited
(DLHPPL) Mumbai (India).

And,

Statkarft Markets GmbH
Switzerland

(Contact details are provided in Appendix 1)

[2] http://cdm.unfccc.int/filestorage/2/P/7/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC/EB81_repan24_AMS-I.D_ver18.pdf?t=QlB8bzlxdmx6fDAkc8q3AmLb-E6crYbSSR3o

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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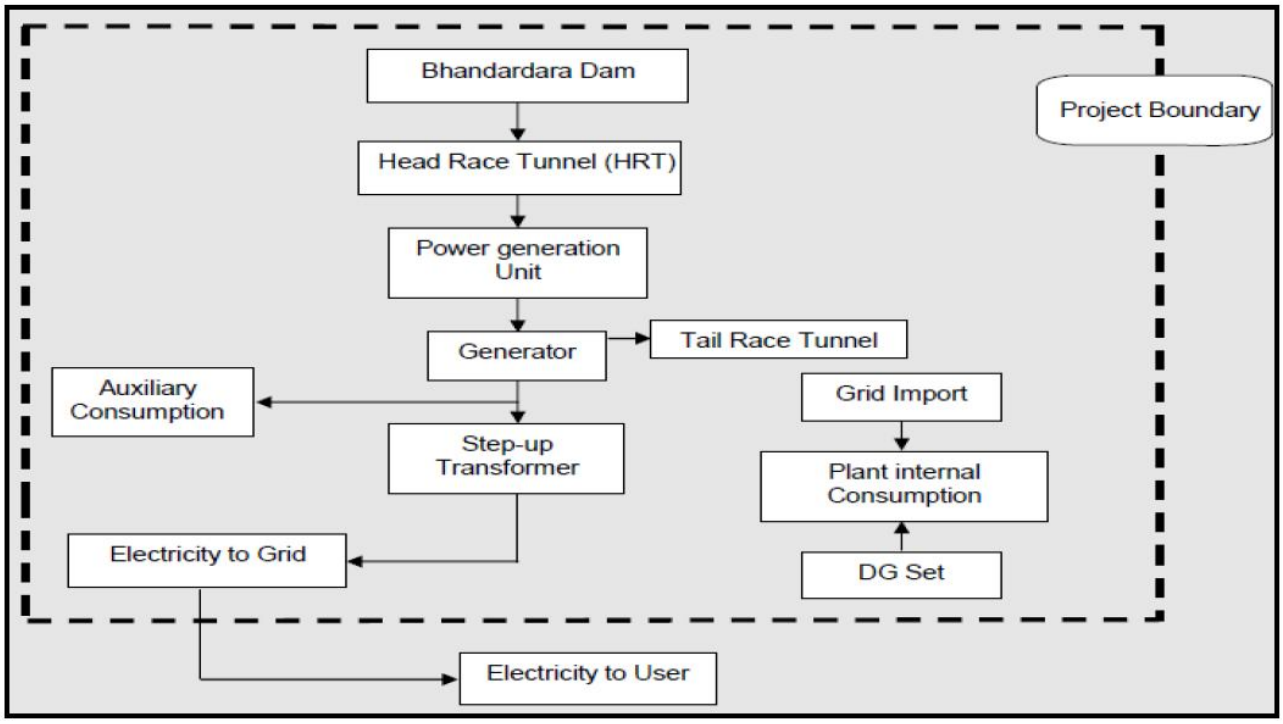
There is one Francis turbine is employed in the project activity. The flowing water is guided through a head race tunnel and penstock gate and jetted on to a turbine. This action rotates the turbine, which is connected to a synchronous generator. The rotation of turbine causes the rotation of the generator thereby producing electricity. The generated electricity is stepped up to 132 kV and exported to MSTCL grid, which is part of regional grid. The technical specifications of the employed technology are provided in Annex 1.

Schematic Diagram of the Project Activity:



The capacities of the project equipments are not changed during this monitoring period and no emergency incidents occurred during this period which may change the applicability of the methodology or change the emission reductions.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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Not Applicable

B.2.2. Corrections

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Not Applicable

B.2.3. Changes to start date of crediting period

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Not Applicable

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

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Not Applicable

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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Not Applicable

B.2.6. Changes to project design of registered project activity

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Not Applicable

B.2.7. Types of changes specific to afforestation or reforestation project activity

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Not Applicable

SECTION C. Description of monitoring system

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The monitoring system has been considered in line with Monitoring Plan prescribed in the renewal PDD, version 9, under the section B.7.3. The details are discussed below:

Electricity generated by the project activity: The power exported by the project activity would be monitored to the best accuracy and as per section D.2.

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 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 whichever 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:

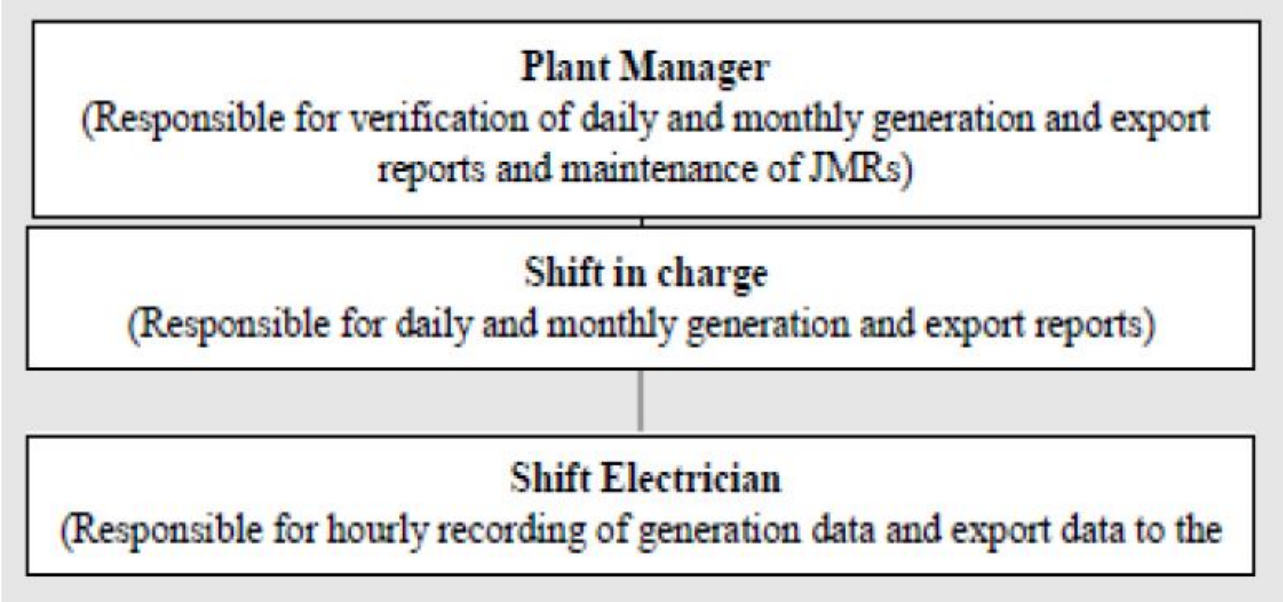
In the event when verification period dates and JMR dates in the project activity, do not coincide

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.

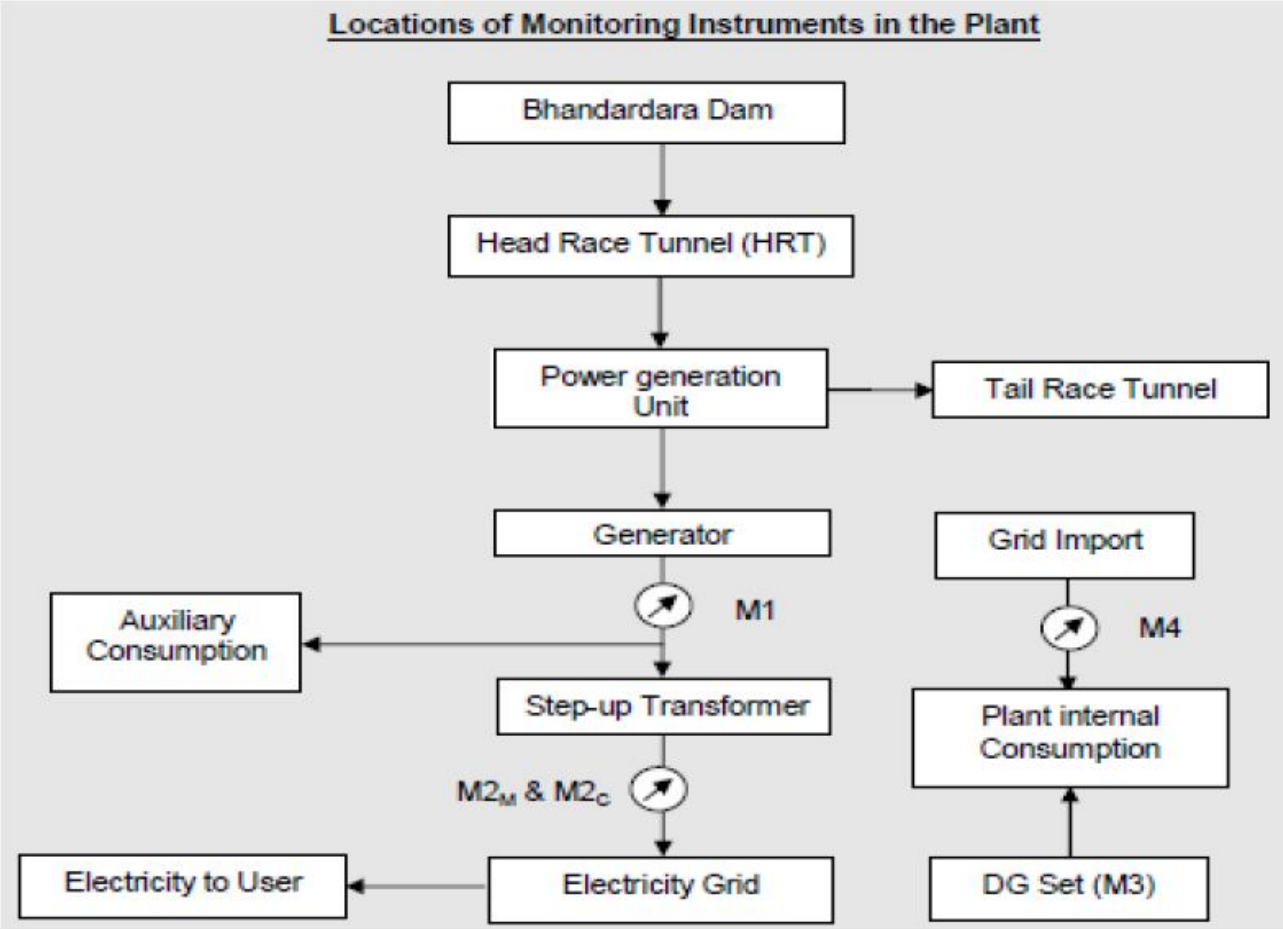
For electricity imports:

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.

Schematic diagram for the monitoring data flow at plant



Schematic diagram for monitoring system involved in the project activity is provided below-



M1 : Gross Energy Meter
$M2_M$: Main Export meter
$M2_C$: Check Meter
M3 : Measuring scale to monitor diesel consumption in DG set
M4 : Electricity Import Meter

In this current monitoring period, there was no generation at the plant for the period 27th July 2015 to 31st July 2015. Hence data apportioning method has not been applied for the month of July as total generation falls under July month for the current monitoring period is zero. Nevertheless, PP has applied the above prescribed procedure for import & Diesel consumption for the month of July 2015 such that there is no project and leakage emission from the project, hence conservative in approach. The ER calculation sheet contains the apportioned values, same has been available for verification.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	CO_2 Emission factor of grid (EFy) = $EF_{CO2,grid, y}$
Unit	tCO2/MWh
Description	Combined Margin CO2 Emission Factor of the NEWNE grid
Source of data	Central Electricity Authority (CEA), CO2 baseline database for the Indian Power Sector, , Version 10 ,Dated 16 December 2014 (Combined Margin Emission Factor for Northern Regional Grid) published by Central Electric Authority (CEA), India http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf3.0, dated 15 December 2007
Value(s) applied)	0.6890
Choice of data or measurement methods and procedures	CEA has estimated the simple operating margin and build margin emission factors for the Western regional grid. For calculating the CO_2 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 05.0). As per tool, the operating margin has been calculated as weight average value; whereas being the third crediting period, the value of build margin emission factor calculated during the second crediting period has been used.
Purpose of data	Calculation of baseline emission.
Additional comments	The emission factor has been fixed for the third crediting period.

Data/parameter:	Net Calorific values of diesel (NCV_{diesel})
Unit	GJ/Ton
Description	Net calorific value of diesel
Source of data	IPCC default data
Value(s) applied)	43.3
Choice of data or measurement methods and procedures	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
Purpose of data	Calculation of project emission
Additional comments	-

Data/parameter:	CO_2 emission factor of diesel (EF_{CO2_diesel})
Unit	tCO2e / GJ
Description	CO_2 emission factor of diesel
Source of data	IPCC
Value(s) applied)	0.0748
Choice of data or measurement methods and procedures	IPCC default values
Purpose of data	Calculation of project emission
Additional comments	-

D.2. Data and parameters monitored

Data/parameter:	EGy
Unit	MWh
Description	Quantity of electricity exported to the grid by the project activity
Measured/calculated/default	Measured
Source of data	Joint Meter Readings (JMRs) taken and signed by authorized officials of MSEDCL
Value(s) of monitored parameter	62,478
Monitoring equipment	Main Energy Meter and Check Energy Meters are used for net energy export[3]
Measuring/reading/recording frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Calculation method (if applicable):	Not applicable as the data is directly monitored.
QA/QC procedures:	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 authorized 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.
Purpose of data:	Calculation of baseline emission
Additional comments:	The data would be archived upto two years after the end of crediting period.

Data/parameter:	Electricity Import (E_{Import})
Unit	MWh
Description	Electricity Imported from the grid by the project activity
Measured/calculated/default	Measured
Source of data	Monthly billing records of MSEDCL
Value(s) of monitored parameter	72.16 (monthly details are provided in the emission reduction spread sheet)
Monitoring equipment	The energy is imported at 33 kV feeder and a separate independent energy meter is installed by MSEDCL to measure the units imported by DLHPPL. The units are recorded monthly and bills are issued by MSEDCL. Bills of MSEDCL shall be the source of data electricity imported
Measuring/reading/recording frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Calculation method (if applicable):	Not applicable as the data is directly monitored.

[3] Meter details are provided in Annex 1.

QA/QC procedures:	Import meter is under the custody of MSEDCL, and DLHPPL has no access to meter and the calibration details pertaining to the same. Hence, calibration records are not maintained by DLHPPL for the import meter.
Purpose of data:	Calculation of Project emission
Additional comments:	The data would be archived upto two years after the end of crediting period.

Data/parameter:	**Gross Electricity Generation (E_{Gen})**
Unit	MWh
Description	Gross Electricity generated by the project activity
Measured/calculated/default	Measured
Source of data	Joint Meter Readings (JMR) taken & signed by authorized officials of MSEDCL.
Value(s) of monitored parameter	63704.20
Monitoring equipment	Gross energy meter is used to measure gross energy generation by the plant
Measuring/reading/recording frequency:	Continuous monitoring, hourly measurement and at least monthly recording
Calculation method (if applicable):	Not Applicable as the data is directly monitored
QA/QC procedures:	The data are directly measured and monitored at the project site. The meter installed at the generator end shall 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 than the meter replaced with spare tested, calibrated meter. DLHPPL shall archive all the JMRs and the compete 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.
Purpose of data:	Calculation of baseline emission.
Additional comments:	The data would be archived upto two years after the end of crediting period.

Data/parameter:	**Auxiliary Consumption**
Unit	MWh
Description	Unit consumed by the project activity
Measured/calculated/default	Calculated
Source of data	Joint Meter Readings (JMRs) taken and signed by authorized officials of MSEDCL and the gross electricity generation readings.
Value(s) of monitored parameter	1226.20
Monitoring equipment	NA. Data is calculated once in month
Measuring/reading/recording frequency:	NA. Data is calculated once in month .
Calculation method (if applicable):	The data is calculated using the gross electricity generation (E_{Gen}) and electricity exported to the grid (EGy) as per the JMR. The difference between the gross electricity generation (E**Gen**) and electricity exported to the grid (EGy) as per the JMR gives the total Auxiliary Consumption 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:	The data is calculated using the gross electricity generation (E_{Gen}) and electricity exported to the grid (EGy) as per the JMR. This data are also used in calculating electricity export in the event of simultaneous failure and/or defect in accuracy of both the main meter & check meter.
Purpose of data:	Calculation of baseline emission.

Additional comments:	The data would be archived upto two years after the end of crediting period.

Data/parameter:	**Hourly Electricity Export (HEE_{main_Meter})**
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
Measured/calculated/default	This data is recorded on an hourly basis by DLHPPL based on data recorded at the main meter.
Source of data	Log Book Records for the main meter
Value(s) of monitored parameter	This parameter is used only for apportioning only. Details are provided in the emission reduction spread sheet
Monitoring equipment	Main Energy Meter and Check Energy Meters are used for net energy export
Measuring/reading/recording frequency:	Continuous monitoring, hourly measurement and at least monthly recording. 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.
Calculation method (if applicable):	Not applicable as the data is directly monitored.
QA/QC procedures:	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. The Main Energy Meter and Check Energy Meters accuracy is 0.2s. 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.
Purpose of data:	Calculation of Project emission
Additional comments:	The data would be archived upto two years after the end of crediting period.

Data/parameter:	Diesel Consumption (DC)
Unit	Litre
Description	Diesel consumption by the standby DG set
Measured/calculated/default	Measured
Source of data	Log book
Value(s) of monitored parameter	277

Monitoring equipment	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[4] kg/litre, the diesel consumption in tons would be calculated.
Measuring/reading/recording frequency:	Continuously and recorded monthly basis.
Calculation method (if applicable):	Not Applicable
QA/QC procedures:	Not Required
Purpose of data:	Calculation of project emission
Additional comments:	Project emissions due to diesel consumption will be calculated as below: $PE_{DC,y} = \_DC_y \times NCV_{diesel} \times EF_{CO2\_diesel}$ The data would be archived upto two years after the end of crediting period.

D.3. Implementation of sampling plan

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Not Applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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The procedures and formulas used for estimation of the baseline emission factor and the assumptions made have been detailed below. The emission reduction of the small scale project activity is the net electricity exported to the grid (EG_y) in MWh multiplied by the baseline emission factor in tCO_2/MWh.

Baseline emission factor
The Baseline emission factor (EF) is 0.6890 tCO2 /MWh has been estimated and validated for Western regional grid of India, the applicable grid for the project activity.

This is fixed ex-ante for the crediting period as per the registered PDD. DLHPPL has exported 62478.00 MWh from the plant in this monitoring period.

Hence, the Baseline Emission is calculated as below;

Baseline Emissions = (0.689 tCO2e/MWh x 62,478 MWh)
= 43,047 tCO_{2e}. (rounded down value has been considered)

E.2. Calculation of project emissions or actual net GHG removals by sinks

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The project emissions[5] for this project activity have occurred due to the following reasons:

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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

5

Detailed Calculation is provided in emission reduction calculation sheet.

Project Emissions on account of Electricity Imported Project Emissions on account of Electricity Imported are calculated as per the equation below:

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

Where,
$PE_{Import,\,y}$ - Project emissions from import of electricity from the grid during the year y

$E_{Import,y}$ - Electricity imported from the grid by the project activity during the year y

$EF_y = EF_{Western\ grid,\ CM,\ y}$ - Baseline Emission Factor for the Western regional grid (Combined Margin Approach) whose value is fixed for the crediting period at 0.689 tCO2e/MWh

Diesel consumption The project also involved consumption of minor quantity of Diesel in standby DG Set. The formula used to calculate the project emissions due to diesel consumption is provided below:

$$PE_{Diesel} = \sum DC_y \times Density_{Diesel} \times NCV_{Diesel} \times EF_{CO2Diesel}$$

Where,
PE_{Diesel} = Project Emission due to use of Diesel consumed during this monitoring period in DG set
DCy = Diesel Consumption in Liters (L)
$Density_{Diesel}$ = Density of Diesel (0.88Kg/Lit)
NCV_{Diesel} = Net Calorific Value of Diesel
$EF_{CO2Diesel}$ = IPCC 2006 Emission factor for Diesel

PE_{Diesel} = 277 L x (0.88 X 10^-3) tonne/L x 43.3 GJ/tonne x 0.0748 tCO2 /GJ
= 0.789 tCO_{2e}

Thus, total Project Emission,
PEy = $PE_{Import,y}$ + $PE_{Diesel,y}$
= 49.72 + 0.789 = 51 tCO_{2e} (Rounded up value has been considered)

E.3. Calculation of leakage

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As per category I.D of Appendix B of the simplified M&P for small-scale CDM project activities, leakage is to be considered only if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. Since this does not apply for the project activity **hence there is no leakage issues associated with the project activity and no formula is used to estimate leakage due to the project activity.**

Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	43,047	51	0	0		42,996

E.4. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	44,448	42,996

E.5. Remarks on difference from estimated value in registered PDD

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There is no increase in the emission reductions during the current monitoring period relative to the estimation in the registered CDM-PDD. However, **there is around 3.27% lesser emission reduction** relative to estimation in the registered CDM- PDD for the equivalent duration of the monitoring period. This is envisaged mainly due to the lower PLF because of no-generation months during the monitoring period.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Dodson-Lindblom Hydro Power Private Limited
Street/P.O. Box	Tejpal Scheme Road 5, Vile Parle
Building	6, Shiv Vastu
City	Mumbai
State/region	Maharashtra
Postcode	400 057
Country	India
Telephone	+91 Ph: 022 26826819
Fax	+91 20 25885234
E-mail	dlhppl@dlz.com
Website	
Contact person	
Title	Director
Salutation	Mr.
Last name	Samant
Middle name	
First name	Aniket
Department	
Mobile	+91 98206 11688
Direct fax	
Direct tel.	
Personal e-mail	

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Statkarft Markets GmbH
Street/P.O. Box	Derendorfer Allee 2a,
Building	-
City	Dusseldorf
State/region	Germany
Postcode	40476
Country	Switzerland
Telephone	-
Fax	-
E-mail	-
Website	-
Contact person	-

Title	-
Salutation	Mr.
Last name	Peters
Middle name	-
First name	Stef
Department	-
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	-

Annex 1

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 meter (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 / sec
Type of generating unit	Vertical, Francis, top mounted thrust bearing
Number	1
Installed capacity	12.564 MW
Excitation	Static
Serial No.	V – 0037/1
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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Document information

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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