Project design document form
(Version 11)

BASIC INFORMATION	
Title of the project activity	4.5 MW Sechi grid-connected hydro electric project in Himachal Pradesh.
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	08
Completion date of the PDD	26/04/2020
Project participants	M/s Ascent Hydro Projects Limited Statkraft Markets GmbH WeAct Pty Ltd
Host Party	India
Applied methodologies and standardized baselines	AMS-I.D.: Grid connected renewable electricity generation (Version 18) Standardized Baseline: N/A
Sectoral scopes linked to the applied methodologies	1 - Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	18,742 tCO_{2eq}/annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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This is a registered CDM project activity (Ref ID: 9167). Project activity is going to complete its first crediting period on 27/12/2019. The M/s Ascent Hydro Projects Limited (AHPL) (hereafter referred as "PP") is hereby submitting request for second renewal of crediting period in line with the Project Cycle Procedure para 274.

Purpose of the project activity:

The main purpose of the project activity is to generate hydropower and export the net electricity to the grid for sale resulting in reduction of greenhouse gas emissions in atmosphere which could have occurred otherwise from the regional grid.

The project activity is run of river Small Hydroelectric Project (SHP) of 4.5 MW installed capacity developed at Sechikhad (stream) in Samej village of Himachal Pradesh. The 4.5 MW Sechi SHP comprise of two units of 2.25 MW with an annual average generation of 22.885 GWh. The connection point with the grid for Sechi SHP, is Jhakri Substation, which is at a distance of 4.5 kilometres from the project site. Technological details have been given under section A.3.

Pre-project Scenario:

This is being a Greenfield project; no power generation facility existed at the project site in the pre-project scenario. Taking in to account its impact after the project becomes operational; the pre-project scenario can be generation of equivalent amount of electricity in the Indian grid using the existing fuel mix which has fossil fuel dominancy[1].

Baseline Scenario:

Under the baseline scenario the project activity would displaces an equivalent amount of electricity from the integrated Indian grid which is predominantly generated from thermal (fossil fuel based) power plants.

Project promoter background:

The small-scale project activity is being promoted by Ascent Hydro Projects Limited (AHPL) which is a 100% subsidiary company of Dodson Lindblom International Inc (DLI), a Columbus, Ohio based company that specializes in the engineering and development of infrastructure projects with particular emphasis on hydroelectric power generation. DLI is part of DLZ Corporation, one of the foremost engineering companies in the Midwestern United States.

Project activity background:

The Sechi was originally envisaged to be of 3 MW capacities each as per the initial implementation agreement signed with the Government of Himachal Pradesh (GoHP) in August 2001. The capacities of the SHPs were enhanced subsequent to the GoHP, Department of Power, Notification dated 6th May 2000 wherein the GoHP came up with a decision that the incentives available to SHPs upto 3 MW would also be available for SHPs up to and including 5 MW.

The project proponent (PP) submitted the revised detailed project report (DPR) for the Sechi (2 x 2.25 MW) to the H.P Govt. Energy Development Agency (HIMURJA) during November 2002 and obtained Supplementary Implementation Agreement (SIA) for the enhanced/ augmented capacity.

Contribution of the project activity to sustainable development

[1] As per CEA database version 14 (released in Dec 2018), in previous years the Indian electricity system was divided into two grids, the NEWNE and Southern Grid (SR), which are now integrated as a single 'Indian Grid' covering all the states.

The Designated National Authority for India has identified the following attributes to measure the contribution of the project activity for sustainable development:

i) **Social well being**

The social well-being is assessed by contribution to improvement in living standards of the local community. The project activity is located in remote villages of industrially backward state of Himachal Pradesh. The implementation of the project activity would 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.

ii) Economic well being

Economic well-being refers to additional investment consistent with the needs of the local community. The project activity had invested nearly INR 292.219 Million. This investment is quite significant in a rural area. These activities would contribute to the economic well-being of the local community. The project activity would also provide direct and indirect job opportunities to the local community during construction and shall provide permanent job opportunities during operation. During operation of the project activity, about 40 persons would be employed directly, apart from indirect employment, which would augur well for the economic well-being of the community.

iii) Environmental well being

The following environmental benefits are derived from the project activity:
•Produces electricity without GHG emissions.
•Run of river hydro power plant with little impact on the mountain ecology,
•Produces electricity from a renewable energy source

iv) Technological well being

The project activity would improve the supply of electricity with clean, renewable hydro-electricity while contributing to the regional/local economic development. Installation of small-scale hydroelectric run-of-river plants encourages similar projects in the region.
•lower reserve margin requirements;
• Improved power quality;
• Reduced lines losses;
• Reactive power control;
• Increased system capacity with reduced T&D investment.

In light of the above, the project proponent believes that the project activity would contribute to the sustainable development.

The project activity (SHP) plant is under operation since 1st Feb 2012. CERs have been issued for the power exported to the grid during the first crediting period. Details are provided in below table:

First Crediting Period	28/12/2012 to 27/12/2019	
CER Issued	73,647	28/12/2012 to 31/12/2017
Monitoring period under Ist CP	On going	01/01/2018 to 31/03/2019

A.2. Location of project activity

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1. Host Party (ies) : India

2. Region/ State/ Province, etc. : Himachal Pradesh

3. City/ Town/ Community, etc. : Village Samej, District Kullu

4. Physical/ Geographical location :31^0 32’ 00” N latitude and 76^0 02’ 30” E longitude

The nearest big town is Rampur at a distance of 30 kms.

The projects are accessible by National Highway (NH)-22 which runs from Shimla to Tibet. The nearest town is Shimla. Kalka is the major railway station and is about 80 km from Shimla. Kalka is about 300 km from New Delhi.

The location of project activity is shown in following figures:

Fig – 1 showing Himachal state in Indian

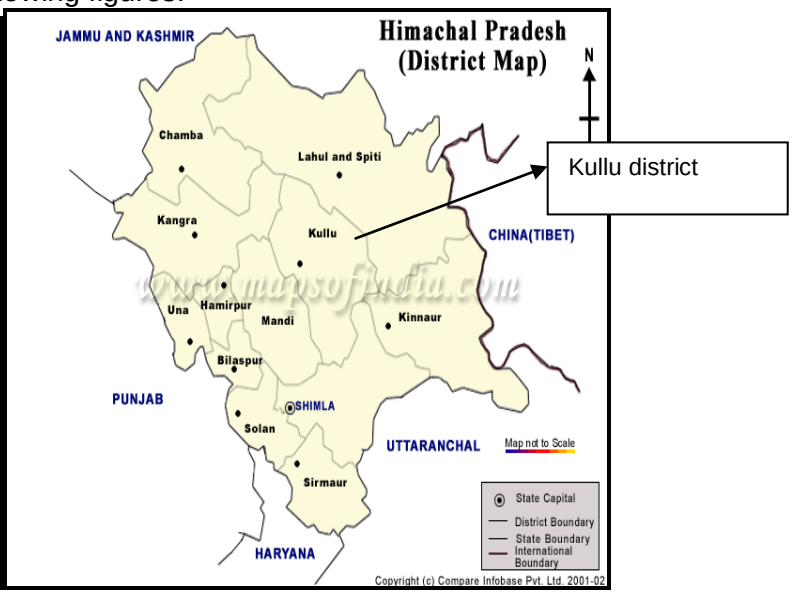

Fig- 2- showing Kullu in Himachal Pradesh state

A.3. Technologies/measures

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The project meets the applicability criteria of the small-scale CDM project activity category, Type-I: renewable energy projects (AMS-I.D. Grid connected renewable electricity generation) of the indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories. As per the applicable methodology para 2, "This methodology comprises renewable energy generation units, such as photovoltaic, **hydro**, tidal/wave, wind, geothermal and renewable biomass: Supplying electricity to a national or a regional grid.

The project activity is a run of river small hydropower project supplying electricity to the Himachal Pradesh grid, part of Indian grid, which is being supplied by several fossil fuels generating units and having a combined margin emission factor of 0.8885 tCO2/MWh (Source: Central Electricity Authority (CEA) CO_2 emission factor database, Version 14.0, Dec 2018). Considering the above, the Type I.D. is the most appropriate category for the project activity. The project activity does not comprise any electricity generation from non-renewable energy sources.

Justification for small scale project activity

The project activity comprises of Sechi SHP with installed capacity of 4.5 MW which is lower than threshold limit of 15 MW. Therefore, the project activity qualifies as a small-scale project activity as per AMS I.D. version 18.

Description	Sechi SHP
Installed capacity	4.5 MW
Trench weir Design discharge Elevation	 5.175 m3/s 1454.8 m
Intake to desilting tank Design discharge Length	 5.175 m3/s 167 m
Desilting tank to forebay Design discharge Length	 4.14 m3/s 1225 m
Capacity of Forebay Top level of Forebay	750 m3 1454.34 m
Penstock Number Length and size	 1 234 m of 1.3 m diameter
Number of generating units	2
No of Turbine	2
Type of turbine	Horizontal Francis turbine coupled with synchronous generator
Number of generators	2
Rated Output	2.25MW
Overload capacity2	10%
Rated Voltage	6.6 KV ±10%
Frequency	50Hz
Generator floor level	1315.1 m
Gross head	129.4 m
Net head design	125.9 m
Voltage	22 kV
Connection to grid	Jhakri Substation of HPSEB at a distance of 4.5 kilometres away

The technology is well established and is available in the country and hence there is no transfer of technology. The project activity produces electricity without any 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 being employed in the project activity.

There is no change in the project capacity & technology since commissioning of the project activity.

[2] The plant will operate on continuous overload capacity only when there is abundant flow of water due to reasons like heavy rainfall.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Ascent Hydro Projects Ltd (AHPL) (Private Entity)	No
Switzerland	Statkraft Markets GmbH (Private Entity)	No
Australia	WeAct Pty Ltd. (Private Entity)	No

A.5. Public funding of project activity

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The project has not received any public funding or Official Development Assistance (ODA) from an Annex I party.

A.6. History of project activity

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This is a registered CDM project activity (Ref ID: 9167). Project activity is going to complete its first crediting period on 27th Dec 2019. The Project Participant is hereby submitting request for second renewal of crediting period in line with the Project Cycle Procedure para 274 .

A.7. Debundling

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According to para 130 of Project Standard & tool for “Assessment of debundling for small-scale project activities”;

A proposed small-scale project activity shall be deemed to be a de-bundled component ofa large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

(a) With the same project participants;
(b) In the same project category and technology/measure; and
(c) Registered within the previous 2 years; and
(d)Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

Note: As explained in section A.6 that project activity is a registered small-scale project activity and currently requesting for its second renewable of crediting period. Nevertheless, according to above-mentioned points of de-bundling, AHPL project activity is not a part of any of the above, so it should be considered as small-scale CDM project activity.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

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Methodology:"Grid connected renewable electricity generation" AMS-I.D. Version 18.

Tool:
"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"[3]

"Tool to calculate the emission factor for an electricity system, version 07"
"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 03"

Reference: https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

B.2. Applicability of methodologies and standardized baselines

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The project activity involves generation of grid connected electricity from the renewable SHPpower generation project and a Greenfield project activity. The project activity is having 4.5 MW installed capacity; therefore, falls in small-scale project activity and eligible under small-scale methodology AMS-I.D. The project status corresponding to the methodology AMS-I.D. Version 18 and applicability of methodology is discussed below:

<table>
<tr><th>S.No</th><th>Applicability Criteria for AMS-I.D. Version 18</th><th>Justification</th></tr>
<tr><td>1.</td><td>This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:
a. Supplying electricity to a national or a regional grid; or
b. Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</td><td>The project activity comprises of grid connected renewable small hydro power generation project.The generated electricity supplied to a regional grid under PPA signed with the state electricity board. Hence, project activity satisfiesthis applicability criterion 1.a.</td></tr>
<tr><td>2.</td><td>Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix.
<table>
<tr><th>S.No</th><th>Project Type</th><th>AMS-I.A.</th><th>AMS-I.D.</th><th>AMS-I.F.</th></tr>
<tr><td>1</td><td>Project supplies electricity to a national/regional grid</td><td></td><td>X</td><td></td></tr>
<tr><td>2</td><td>Project</td><td></td><td></td><td></td></tr>
</table></td><td>As per Table 1 of AMS-I.D ver 18, the proposed project activity fall under project type 1 i.e. project supplies electricity to a national/regional grid. Hence, project activity satisfies this applicability criterion</td></tr>
</table>

[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

		displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)				
	3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)				
	4	Project supplies electricity to a mini grid1 system where in the baseline all generators use exclusively fuel oil and/or diesel fuel				
	5	Project supplies electricity to household users (included in the project boundary) located in off grid areas				
3.	This methodology is applicable to project activities that: a. Install a Greenfield plant b. Involve a capacity addition in (an) existing plant(s); c. Involve a retrofit of (an) existing plant(s); d. Involve a rehabilitation of (an) existing plant(s)/unit(s); or e. Involve a replacement of (an) existing plant(s).					The project activity installs a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity. Hence, the proposed project activity is a Greenfield plant and satisfies this condition.
4.	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: a. The project activity is implemented in an existing reservoir with no change in the					The criterion is not applicable to the project activity as the proposed project is a run of river small hydro project.

	volume of reservoir; b. The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2; c. The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	
5.	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	As explained above, the project activity is a Greenfield run of river small hydro power plant having total installed capacity of 4.5MW. Therefore, this criterion is not applicable.
6.	Combined heat and power (co-generation) systems are not eligible under this category.	The project is not a combined heat and power plant and hence this criterion is not applicable.
7.	In the case of project activities that involve the capacity 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.	The project is a Greenfield project as there is no addition to the existing renewable power generation from the time of commissioning of the project activity and hence this criterion is not applicable to the project activity.
8.	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The project is a Greenfield project as there is no any retrofit or replacement to the existing renewable SHP from the time of commissioning of the project activity and hence this criterion is not applicable.
9.	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	This is not relevant to the project activity as the project involves only hydro power generation. Therefore, this criterion is not applicable.
10.	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	This is not relevant to the project activity as the project involves only hydro power generation. Therefore, this criterion is not applicable.

As the project adheres to all the applicability conditions of the methodology, the use of AMS I.D is justified.

Tool to calculate the emission factor for an electricity system - Version 07.0:

Applicability Criterion	Project Case
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project is a grid connected SHP and thus the tool is applicable.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option II.a and option II.b. If option II.a is chosen, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Steps involved in calculation of Emission Factor are included in section B.6.1 of the PDD as per the requirement of the tool.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Project is located in non-Annex I country and hence the tool is applicable.
Under this tool, the value applied to the CO_2 emission factor of bio fuels is zero.	The project is a SHP and there is no involvement of bio fuels.

B.3. Project boundary, sources and greenhouse gases (GHGs)

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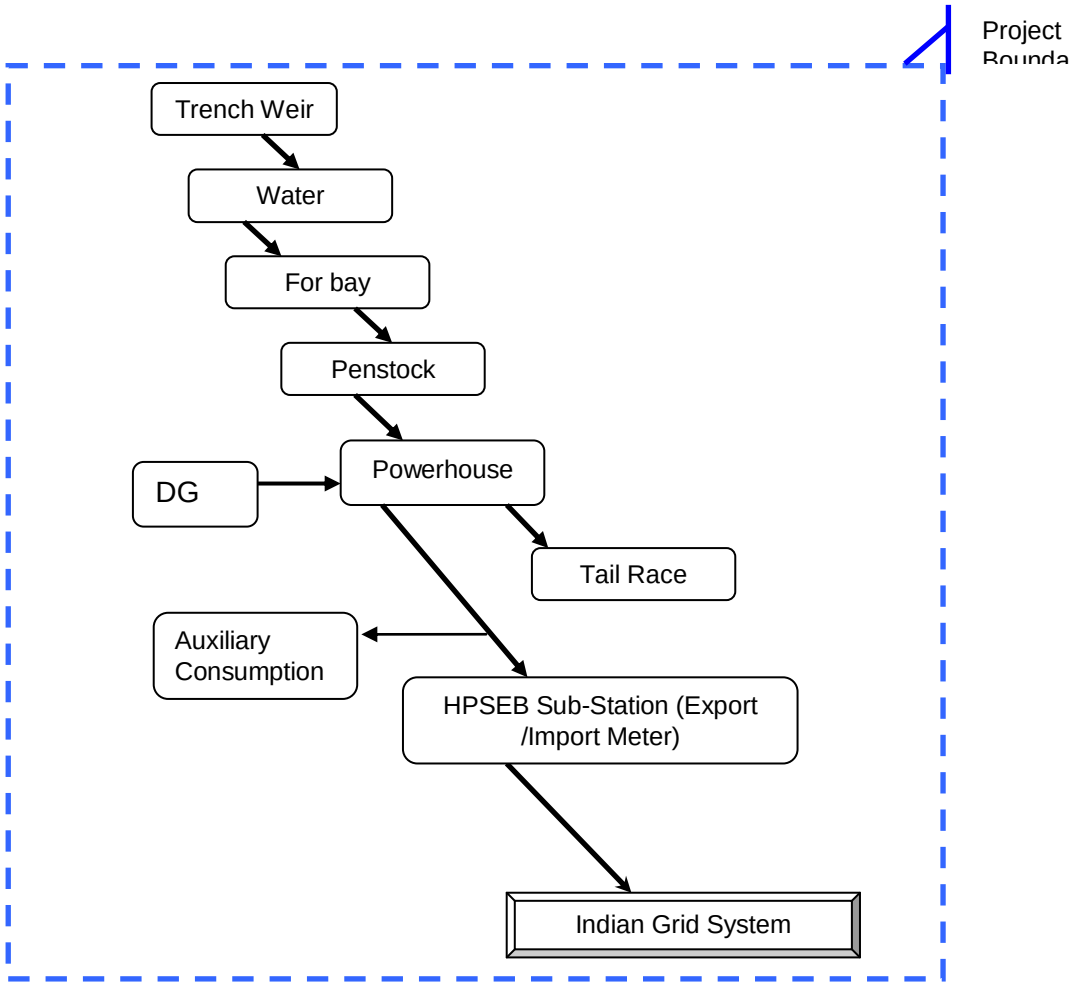
As per AMS-I.D. version 18 para 18, "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to."

For the project activity, the project boundary is from the point of water tapping to the point of electricity supply to the grid interconnection point. Thus, the project boundary is as follows:

- Trench weir
- Water conductor
- Fore bay
- Penstock
- Powerhouse
- Tail race canal
- Transmission line to grid connection
- Grid interface

The project boundary also includes a stand-by diesel generator (DG) set which will be operated only as a failsafe option or stand by power requirements in case the power plant is not operating and there is also no supply from the grid. However, for calculation of baseline emission factor, the Indian grid is included in the project boundary. Following table indicates the sources and gases included in the project boundary:

Source		GHG	Included ?	Justification/Explanation
Baseline	Grid connected electricity generation	CO_2	Yes	In the baseline scenario the electricity would have been sourced from the Indian grid which in turn would be connected to fossil fuel fired power plants which emit CO_2.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.
Project activity	Greenfield SHP based power generation project activity	CO_2	Yes	The project activity may emit any emissions due to diesel consumption. Hence, will consider the same if there is any on actuals.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.



B.4. Establishment and description of baseline scenario

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The project activity is feeding power to HPSEB, the baseline for this project activity is a function of the generation mix of Indian regional grid. Using the methodology available for small scale project activities, the average of operating and build margin (in $kgCO_2/kWh$) of current generation mix of Indian region is used for the calculation of baseline. Actual CO_2 emission factors are used for the purpose.

The project activity comprises of Sechi SHP with installed capacity of 4.5 MW and the generated electricity is then supplied to the grid. This generated electricity would otherwise have been supplied by at least one fossil fuel fired unit connected to the grid.

The project activities meet the conditions of paragraph 18, of the applied methodology which states that —The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

Baseline scenario for the second crediting period has been assessed in line with the methodological tool **"Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period."**Version 03.0.1.

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 279 & 280 of Project Standard & 49 (a) of the modalities and procedures of the Clean Development Mechanism.

The tool stipulates the following steps to be carried out.

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies
There is no legal and regulatory requirement that mandates the production of energy by the chosen technology. Government of India has one national Act, India Electricity Act 2003 which is an **Act** to consolidate the laws relating to generation, transmission, distribution, trading and use of **electricity** and generally for taking measures conducive to development of **electricity** industry, promoting competition therein, protecting interest of consumers and supply of **electricity** to all areas. The act does provide any binding laws or regulations with respect to the use of choice of fuel in renewable and non-renewable based power generation projects and also does not provide any mandate for PP to install any particular technology type of power plant.

Thus, investment in run of river SHP renewable energy projects in the State of Himachal Pradesh and the regional electricity grid is not mandatory. The setting up of small hydro power generation projects is a voluntary activity. Baseline for the project activity is in compliance with relevant mandatory national and sectoral policies.

Hence, it remains unchanged in the current situation also, i.e. in the next crediting period.

Step 1.2: Assess the impact of circumstances
The baseline scenario identified at the validation of the project activity was grid i.e. the electricity delivered to the grid by the project activity which would have otherwise been taken directly from grid where power is generated predominantly by the operation of fossil fuel based power (which was also evident from the Combined Margin Emission factor calculated and detailed in the registered PDD). The baseline scenario for the project activity in the current context remains same i.e. grid and the grid still supplies primarily fossil fuel-based electricity as reflected in the Combined Margin emission factor.

Hence, circumstances and the externalities for determining the baseline for the project activity are same. **Therefore, there is no change in baseline scenario for the last crediting period.**

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) **or an investment is the most likely scenario for the crediting period for which renewal is requested**

This sub-step has to be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment. The project activity is a Greenfield activity. Since this is not the case with the project activity under consideration, hence this condition is not applicable.

Step 1.4: Assessment of the validity of the data and parameters
This step stipulates that "Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the project activity."

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters
As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version of CEA database available at the time of PDD submission for renewal.

The approved consolidated baseline methodology, AMS-I.D, (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "Tool to calculate the emission factor for an electricity system" (version 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

The details of CM Emission Factor calculation are reported under the Section B.6.1 of this PDD.

It is evident from below table that the installed capacity in the Indian Grid is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

Source: CEA Database Version 14

Table 1: Sector- wise installed capacity (MW) as on 31.03.2018

Sector	Thermal				Nuclear	Hydro	RES	Total
	Coal	Gas	Diesel	Total				
State	64670.50	7078.95	363.93	72113.38	0.00	29858.00	2003.37	103974.75
Central	56955.00	7237.91	0.00	64192.91	6780.00	12041.42	1502.30	84516.63
Private	75546.00	10580.60	473.70	86600.30	0.00	3394.00	65516.72	155511.02
All India	197171.50	24897.46	837.63	222906.59	6780.00	45293.42	69022.39	344002.39

In line with the "Tool to calculate the emission factor for an electricity system" - The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 25%) and build margin (BM) (having weightage 75%). Calculations for this combined margin must be based on data from an

official source (where available) and made publically available. Therefore, latest CEA database version 14[4] is used to evaluate the emission factor for the project activity.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.88854 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted-average of the operating margin (0.75) & build margin (0.25) values, sourced from BaselineCO_2 Emission Database, Version 14 published by Central Electricity Authority (CEA), Government of India. http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
$EF_{grid,OM,y}$	0.9610 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3-year (2015-16, 2016-17& 2017-18,)generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 14, published by Central Electricity Authority (CEA), Government of India http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
$EF_{grid,BM,y}$	0.8644 tCO2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 14, published by Central Electricity Authority (CEA), Government of India. http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

B.5. Demonstration of additionality

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As explained in section A.1 of the PDD, project participant is requesting for the renewal of second crediting period.

In accordance with the CDM Project Standard para 280, ***"For renewal of crediting period of a registered CDM project activity, the project participants are not required to reassess the additionality of the project activity nor update the section of the PDD relating to additionality."***

[4] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

The project additionality has been demonstrated and established under the registered PDD. The section B.5 of the registered PDD version 05, dated 12thDec 2012, has demonstrated additionality using the relevant guidelines which confirms that project activity is additional.

However, regulatory surplus shall be demonstrated, and the project description shall be updated accordingly".

"The project shall not be mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. For UNFCCC non-Annex I countries, laws, statutes, regulatory frameworks or policies implemented since 11 November 2001that give comparative advantage to less emissions intensive technologies or activities relative to more emissions-intensive technologies or activities need not be taken into account. For all countries, laws, statutes, regulatory frameworks or policies implemented since 11 December 1997 that give comparative advantage to more emissions-intensive technologies or activities relative to less emissions-intensive technologies or activities shall not be taken into account."

As per the registered PDD, section B.5,"There is no legal or regulatory requirement for the project activity considered. Hence any enforced law, statute or other regulatory framework, cannot mandate the project. "At current scenario also the project activity is not a legal or regulatory requirement. Thus, project activity is additional.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

>>

Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \ldots\ldots. (1)$$

Where:

BE_y = Baseline emissions in year *y* (t CO2)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

The methodology provides following approaches for emission factor calculations:

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

OR

(b) The weighted average emissions (in tCO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' since data is available from an official source.

CO_2 Baseline Database for the Indian Power Sector, Version 14[5], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per *Methodological tool: Tool to calculate the emission factor for an electricity system* (Version 07), following six steps have been followed:

Step 1: Identify the relevant electricity systems;
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
Step 3: Select a method to determine the operating margin (OM);
Step 4: Calculate the operating margin emission factor according to the selected method;
Step 5: Calculate the build margin (BM) emission factor;
Step 6: Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

As described in tool "For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity systems." It also states that "If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used." Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern. However, all the 5 zones have now been synchronized and called as Indian Grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I:
Only grid power plants are included in the calculation.

Option II:
Both grid power plants and off-grid power plants are included in the calculation.

The Project Participant has chosen only grid power plants in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.

The data required to calculate Simple adjusted OM and Dispatch data analysis OM is not possible due to lack of availability of data to project developers. The choice of other two options for calculating operating margin emission factor depends on generation of electricity from low-cost/ must-run sources. In the context of the methodology low cost/must-run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

[5] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

The CEA database 2018 clearly shows that the percentage of total grid generation by low-cost/ must-run plants (on the basis of average of five most recent years) for the Indian grid is less than 50% of the total generation. Thus, the Average OM method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The simple OM emission factor is calculated as the generation-weighted average CO_2emissionsper unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

a. **Exante option:** if the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.

OR

b. **Ex post option:** if the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex-ante option for calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PDD for renewal of Crediting period.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the crediting period.

Step 4: Calculate the operating margin emission factor ($EF_{grid,OMSimple,y}$) according to the selected method

The operating margin emission factor has been calculated using a 3-year data vintage:

Net Generation in Operating Margin (GWH) (incl. Imports)			
	2015-16	**2016-17**	**2017-18**
Indian Grid	8,71,753.243	9,16,277.834	9,60,692.882

Simple Operating Margin (tCO2/MWh) (incl. Imports) (1) (2)			
	2015-16	**2016-17**	**2017-18**
Indian Grid	0.97	0.96	0.95

Weighted Generation Operating Margin (tCO2/MWh)	
Indian Grid	0.9610

Step 5: Calculate the build margin (BM) emission factor ($EF_{grid,BM,y}$)

As per Methodological tool: “Tool to calculate the emission factor for an electricity system” (Version 07.0):

In terms of vintage of data, project participants can choose between one of the following two options:

(a) ***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-PD submission to the DOE for validation (here it’s the VCS-PD submitted for listing). 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. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

(b) ***Option 2****- For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*

Option 1 as described above is chosen by PP to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2017-18
Indian Grid	**0.8644**

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)
As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version - 7)

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:
(a) Weighted average CM; or
(b) Simplified CM.

PP has chosen option (a) i.e., weighted average CM to calculate the combined margin emission factor for the project activity.

The combined margin emissions factor is calculated as follows:

$EF_{grid,CM,y}= EF_{grid,OM,y}* w_{OM} +EF_{grid,BM,y}* w_{BM}$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)
w_{BM}	=	Weighting of build margin emissions factor (per cent)

The following default values should be used for W_{OM} and W_{BM}:

a. Wind and solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

b. All other projects: W_{OM}= 0.5 and W_{BM}= 0.5 for the first crediting period, and W_{OM} = 0.25 and W_{BM} = 0.75 for the **second** and third **crediting period**, unless otherwise specified in the approved methodology which refers to this tool.

Project activity satisfies the **option b** (W_{OM} = 0.25 and W_{BM} =0.75 for the **second** and third **crediting period**.)

Therefore, $EF_{grid,CM,y}$ = 0.9610*0.25 + 0.8644*0.75
= **0.88854** t CO_2/MWh

Project Emission:
As per paragraph 39 of AMS-I.D. (version 18), *for most renewable energy project activities, PE_y = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.*[6]

- *Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption);*
- *Emissions from water reservoirs of hydro power plants.*

Since the project is only a run of river SHP, there would be no emissions due to the implementation of the project; the project emissions are estimated to be zero.

Thus,

$PE_y = 0$

However, as per paragraph40 of AMS-I.D. (version 18)CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion[7]".

Therefore, if it is not possible to import electricity from the grid, a DG set may be used as a fail safe option at project site. Thus, emission due to combustion of fossil fuels (diesel) usage at the plant site will be calculated by the equation provided below:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$ - Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,j,y}$ - Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$ - Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
I - Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{Diesel,y}$ will be calculated based on net calorific value and CO_2 emission factor of Diesel, as mentioned in option B of Tool to calculate project or leakage CO2 emissions from fossil fuel combustion.

Leakage:
As it is mentioned in above sections that project is a greenfield run of river SHP. Hence, there is no leakage envisaged by the applicable methodology. Therefore, the leakage from the project activity is considered as zero.

[6] ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

[7] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

Thus,

$LE_y = 0$

Emission Reduction Calculation:
As per paragraph 43 of AMS-I.D. (version 18), emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	Emission reductions in year *y* (t CO_2/y)
BE_y	Baseline Emissions in year *y* (t CO_2/y)
PE_y	Project emissions in year *y* (t CO_2/y)
LE_y	Leakage emissions in year *y* (t CO_2/y)

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for the project electricity system in year *y*
Source of data	Central Electricity Authority (CEA), CO_2 baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.88854
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data	Baseline emissions calculations
Additional comment	This has been fixed ex-ante for second crediting period.

Data/Parameter	**$EF_{grid,BM,y}$**
Data unit	tCO_2/MWh
Description	Build Margin for the Indian grid
Source of data	Central Electricity Authority (CEA), CO_2baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.8644
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data	Baseline emissions calculations
Additional comment	This has been fixed ex-ante for second crediting period.

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin for the Indian grid
Source of data	Central Electricity Authority (CEA), CO_2baseline database, Version 14.0, Dec 2018 http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf
Value(s) applied	0.9610
Choice of data or measurement methods and procedures	Tool to calculate emission factor has been used to calculate the Operating Margin emission factor based on the data published by Indian power Sector, Central Electricity Authority, India.
Purpose of data	Baseline emissions calculations
Additional comment	This has been fixed ex-ante for second crediting period.

Data/Parameter	P
Data unit	kg/ltr
Description	Density of diesel
Source of data	http://www.fast-tek.com/TM104.pdf http://www.iocl.com/Products/DieselSpecifications.pdf
Value(s) applied	0.860
Choice of data or measurement methods and procedures	Fixed Value has been taken from the publicly available data source.
Purpose of data	Calculation of project emission
Additional comment	This has been fixed ex-ante for second crediting period.

B.6.3. Ex ante calculation of emission reductions

>>

As explained in sectionthe baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where:

BE_y	Baseline Emissions in year *y* (t CO_2)
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
$EF_{CO2,grid,y}$	CO_2 emission factor of the grid in year y (t CO_2/MWh)
$EF_{CO2,grid,y}$	$EF_{grid,CM,y}$

For ex-ante estimation of net electricity supplied to the grid the values have been considered from the DPR and the addendum report. However, during the monitoring period actual net exported

electricity will be monitored at the substation main & check meter and will be used for the baseline emission calculation.

Annual Generation	22885	MWh/year
Losses:		
5% Outages	21741	MWh/Year
1% Auxiliary Consumption	21523	MWh/Year
2% Transmission Losses	21093	MWh/Year
Total Electricity Export (MWh/Year)	21093	MWh/Year

Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y*($EG_{BL,y}$)

= **Total Electricity Exported to the grid -Total Electricity Import from the grid**

= 21093 – 0

= 21093MWh

Import of Electricity
For ex-ante calculation, the import of electricity for the project is assumed as zero.

In the project scenario, the electricity imported would be monitored through the meter installed at the plant site and will be deducted as explained above for the calculation of Net electricity exported to the grid.

The total power exported to the grid per annum by the project activity is estimated to be about 21,090 MWh/year.

The baseline emissions for each year of the crediting period, is estimated to be as follows:

$BE_y = EG_{BL,y} * EF_{, grid,,CM, y}$

BE_y = 21,093 MWh/year * 0.8885 tCO_2eq/ MWh = 18,742 tonnes $CO_{2\ eq}$/year

Project Emissions

As explained in above section B.6.1,*for most renewable energy project activities, $PE_y = 0$.*

The project activity is a run of the river small hydroelectric plant and does not result in new reservoirs or increase of existing reservoirs. As there would be no emissions due to the implementation of the project, the project emissions are estimated to be zero.

However, as explained in section B.6.1, the emission due to diesel usage will be accounted as a project emission and shall be calculated as per the latest version of "Tool to calculate project or leakage CO_2 emission from fossil fuel combustion". For proper monitoring separate log book will be maintained at the plant for recording annual diesel consumption by the DG set (monitoring parameters are tabulated in the section B.7 of the PDD). The emission calculations will be done on actual basis, as follows.

Calculation for the estimation of emission due to diesel consumption

- ✓ Capacity of DG Set = X kVA
- ✓ Quantity of diesel consumption (Q_d)= Y Lit (based on actual plant records)
- ✓ Density of diesel (ρ) = 0.860kg/ltr[8] (Publicly available source; IOCL)
- ✓ Quantity of diesel combusted in DG set during the year y ($FC_{diesel,DGset,y}$)= Y * 0.860/1000
  = ' Z' MT
- ✓ Net Calorific value of diesel (NCV_{diesel}) = 43.3 GJ/Tonne (Reference: 2006 IPCC Guidelines for National Greenhouse Gas Inventories)
- ✓ Emission factor of diesel (EF_{diesel}) = 0.0748 tCO2/GJ (Reference: 2006 IPCC Guidelines for National Greenhouse Gas Inventories)
- ✓ The CO_2 emission coefficient of diesel in the year y ($COEF_{diesel,y}$) = 43.3 X 0.0748
  = 3.2388 tCO2/Tonne

Emission from Diesel Consumption = 'Z' X 3.2388

= 'γ' tCO_2/year

For ex ante estimation, the diesel consumption are assumed to be zero.

Thus,

$PE_y = 0$

Leakage

As explained in section, 'If the energy generating equipment is transferred from 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:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y	Emission reductions in year *y* (t CO_2/y)
BE_y	Baseline Emissions in year *y* (t CO_2/y)
PE_y	Project emissions in year *y* (t CO_2/y)
LE_y	Leakage emissions in year *y* (t CO_2/y)

ER_y = 18,742 - 0- 0

= 18,742 tCO_2 e/year

[8] http://www.fast-tek.com/TM104.pdf

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	18,742	0	0	18,742
Year 2	18,742	0	0	18,742
Year 3	18,742	0	0	18,742
Year 4	18,742	0	0	18,742
Year 5	18,742	0	0	18,742
Year 6	18,742	0	0	18,742
Year 7	18,742	0	0	18,742
Total	131,194	0	0	131,194
Total number of crediting years	7			
Annual average over the crediting period	18,742	0	0	18,742

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	**$EG_{BL,y}$**
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Source of data	Calculated (Monthly Joint Meter Reading)
Value(s) applied	**21,093**
Measurement methods and procedures	Data Type: Calculated: **$EG_{BL,y}$** = $EG_{Export} - EG_{Import}$ The calculated value of this parameter is indicated in the JMR which is prepared by HPERC as per PPA. Quantity of net electricity supplied to the grid in year y is the difference between the measured quantities of the grid export and the import.
Monitoring frequency	Monthly
QA/QC procedures	This figure can be cross verified using the Invoices raised by the company and also from the payment received by the company from HPSEB for the month.
Purpose of data	Calculation of baseline emission
Additional comment	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the crediting period.

Data/Parameter	EG_{Export}
Data unit	MWh
Description	Total Electricity Export to the Grid by the Project Activity in year *y* (MWh)
Source of data	Monthly Joint Meter Reading (JMR)
Value(s) applied	21,093

Measurement methods and procedures	Data Type: Measured; The units exported will be measured at the main meter and check meter at the substation interconnection point. Monthly joint meter reading of main meters installed at the substation shall be taken and signed by authorised officials of AHPL and HPSEB. Joint meter reading shall be the basis for monthly invoice of net energy exported to the grid. Data Archiving: Paper/ Electronic; Records of the joint meter reading of net energy exported to the grid shall be maintained by AHPL. Daily and monthly reports stating the net power export shall be prepared by the shift in-charge and verified by the plant manager of AHPL. Calibration Frequency: Once in every 6 months.
Monitoring frequency	The parameter will be monitored continuously on a real time basis[9] and recorded on monthly basis.
QA/QC procedures	For measuring the net energy exported to the grid, one main meter and one check meter, of accuracy class 0.2s, will be maintained. Main meter reading is the basis of billing and emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during half yearly check. As per the PPA, the calibration of meters shall be done in every six months. Both main and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.
Purpose of data	Calculation of baseline emission
Additional comment	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the crediting period

Data/Parameter	EG_{Import}
Data unit	MWh
Description	Total Electricity Importfrom the Grid by the Project Activity in year *y* (MWh)
Source of data	Joint Meter Reading (JMR)
Value(s) applied	Nil

[9]Electricity export and import values are monitored on a continuous basis through dedicated energy meter of 0.2s accuracy class installed at grid substation. The export and import values are measured automatically on a real time basis which ensures hourly measurement as per methodology requirement of the methodology.

Measurement methods and procedures	Assumed. Data Type: Measured, The units Imported will be measured at the main meter and check meter at the interconnection point at the substation. Monthly joint meter reading of main meters installed at the substation shall be taken and signed by authorised officials of AHPL and HPSEB. Joint meter reading shall be the basis for monthly invoice of net energy exported to the grid. Monitoring & Recording Frequency: The parameter will be monitored continuously on a real time basis[10]and recorded monthly basis Data Archiving: Paper/ Electronic; Records of the joint meter reading of net energy exported to the grid shall be maintained by AHPL. Daily and monthly reports stating the net power export shall be prepared by the shift in-charge and verified by the plant manager of AHPL. Calibration Frequency: Once in every 6 months.
Monitoring frequency	The parameter will be monitored continuously on a real time basis[11] and recorded on monthly basis.
QA/QC procedures	For measuring the net energy exported to the grid, one main meter and one check meter, of accuracy class 0.2s, will be maintained. Main meter reading is the basis of billing and emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during half yearly check. As per the PPA, the calibration of meters shall be done in every six months. Both main and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.
Purpose of data	Calculation of baseline emission
Additional comment	AHPL shall archive all the JMRs and plant record books pertaining to the electricity exported for at least two years after the end of the second crediting period.

Data/Parameter	**DC_y**
Data unit	Liters
Description	Diesel consumption by the standby DG set in year *y* (MWh)
Source of data	Plant log book.
Value(s) applied	Nil

[10]Electricity export and import values are monitored on a continuous basis through dedicated energy meter installed at grid substation. The export and import values are measured automatically on a real time basis which ensures hourly measurement as per methodology requirement of the methodology.

[11]Electricity export and import values are monitored on a continuous basis through dedicated energy meter of 0.2s accuracy class installed at grid substation. The export and import values are measured automatically on a real time basis which ensures hourly measurement as per methodology requirement of the methodology.

Measurement methods and procedures	Data Type: Measured & Calculated 1) The diesel quantity available in the diesel storage tanks is recorded as initial and final reading as and when used on the basis of level gauge by AHPL in the plant log book. 2) AHPL also maintain the record of DG set running hours and the kWh generated by the DG set. 3) The level gauge has marking of 10 lit (Least Count) up to the 300 Lit (Total Capacity of diesel tank) which is calibrated manually every year. 2) The diesel consumption would be recorded in the plant logbook in liters. The values will be converted to tons using a factor 0.86 kg/liters (density of diesel), for the purpose of calculation. 3) The diesel will be consumed only in the rare situation only when the power plant is not operational. 4) This value is used for project emission calculation. Data Archiving: Paper/ Electronic;
Monitoring frequency	Monthly
QA/QC procedures	The measured data will be cross checked with total diesel procurement using payment receipts.
Purpose of data	Calculation of Project Emission
Additional comment	The data would be archived upto two years after the end of second crediting period.

Data/Parameter	$NCV_{diesel,y}$
Data unit	GJ/ton
Description	Net calorific value of the Diesel in year y
Source of data	As options a,b& c are not available, the project proponent chooses option d i.e IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories and is fixed Ex-ante. This is in accordance to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 02,
Value(s) applied	43.3
Measurement methods and procedures	Data Type: IPCC Default Value As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", any future revision of the IPCC Guidelines should be taken into account.
Monitoring frequency	Default IPCC
QA/QC procedures	IPCC Latest guideline
Purpose of data	Calculation of project emission

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

Data/Parameter	EFCO2,diesel,y
Data unit	tCO_2/TJ
Description	CO2 emission factor of Diesel in year y
Source of data	As options a,b& c are not available, the project proponent chooses option d i.e IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories and is fixed Ex-ante. This is in accordance to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 02.
Value(s) applied	74.8
Measurement methods and procedures	Data Type: IPCC Default Value As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", any future revision of the IPCC Guidelines should be taken into account.
Monitoring frequency	Default IPCC
QA/QC procedures	IPCC Latest guideline
Purpose of data	Calculation of project emission
Additional comment	The data would be archived upto two years after the end of second crediting period.

B.7.2. Sampling plan

>>
The project is located in one site and hence there is no sampling plan for the project activity.

B.7.3. Other elements of monitoring plan

>>
The project revenue is based on the net units exported by AHPL's Sechi SHP

The general principles for monitoring above parameters are based on:

- Frequency
- Data recording
- Reliability
- Experience and training

Frequency

Monthly joint meter reading of main meters installed at the substation shall be taken and signed by authorised officials of AHPL and HPSEB. Daily data recording by the shift in-charge of AHPL shall be available at the generation end and interconnection point. Joint meter reading shall be the basis for monthly invoice of net energy exported to the grid.

Data recording

Records of the monthly joint meter reading of net energy exported to the grid shall be maintained by AHPL and HPSEB. Daily and monthly reports stating the generation, auxiliary consumption,

Total electricity export and import, diesel consumption would be prepared by the shift in-charge and verified by the plant manager of AHPL.

Reliability

For measuring the net energy exported to the grid, one main meter and one check meter is maintained. Main meter reading is the basis of billing and emission reduction calculations, so long as the meter is found to be within prescribed limits of accuracy during half yearly check.

Monthly joint meter reading of main meters are taken and signed by authorised officials of AHPL and HPSEB once in every month. Records of this joint meter reading will be maintained by AHPL and HPSEB.

Procedure for data uncertainity:

The main and check meter shall be test checked for accuracy every six months and sealed by HPSEB in presence of representative of AHPL. The calibration of meters is as per IS standards. Both billing and check meters have separate set of CT/PT units to avoid chances of both going out of order simultaneously.

If during half yearly test checks, the main meter and check meter are both found to be beyond permissible limits of error, then both meters shall be replaced with calibrated meters by PP under the supervision of HPSEB. All the tests on the main and check meters shall be conducted by the electricity authority in presence of the representatives of project proponents. In this case when both the meter found faulty simultaneously, which is very unlikely, then as per the PPA Clause 7.11 Energy exported will be computed on a mutually agreeable basis between the Company and the Board for that period.

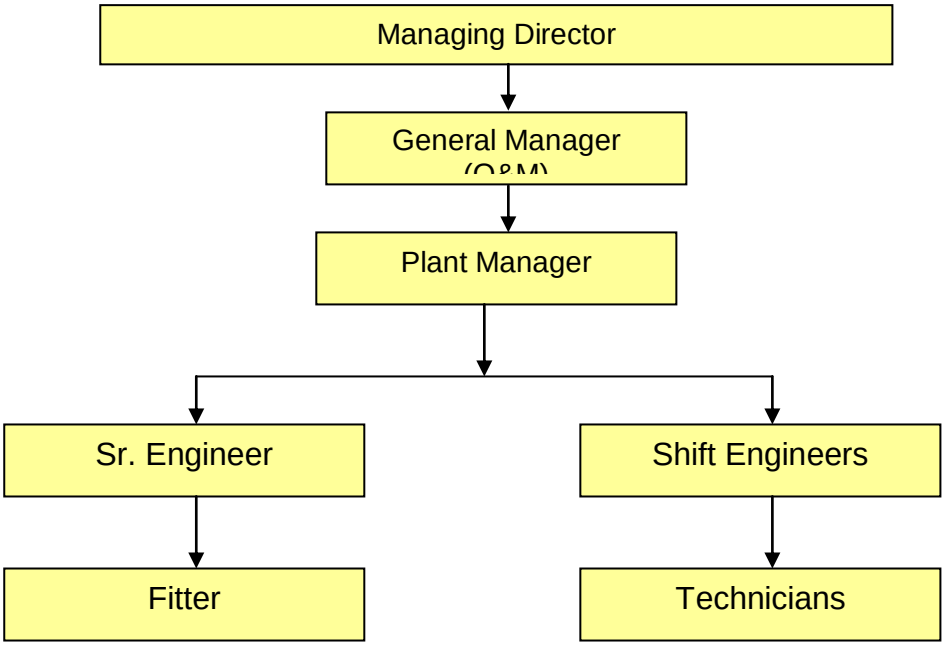
Data archiving and safe storage responsibility

AHPL shall archive and preserve all the monthly invoices raised against net saleable energy parameters stated in section B.7.1, on paper for at least two years after end of the crediting period. Managing director and Plant Manager shall be responsible for the safe storage of the archived data.

Interruptions

Number of trippings due to grid failure shall be recorded.

The operational and management structure of the project activity is given below:



Managing Director of AHPL is based in head office in Pune, Maharashtra state, India and periodically visits the plant. A Shift engineer shall be available in each shift. Shift engineers are involved in operation and maintenance of hydroelectric plants and are assisted by technicians. Senior Engineer shall be assisted by a fitter who shall be responsible for on-site maintenance of the equipment, preventive maintenance etc.

Monitoring measurements and reporting:

The shift engineer will record the readings from main meter and check meter daily and these readings will be counter-checked by the Plant Manager. Apart from these, the readings of gross generation meter in the panel will be recorded hourly. All the above data are archived in paper form. Daily reports are sent to respective head office electronically and Monthly reports are generated and maintained at the plant and head office.

Records of joint meter reading shall be maintained by plant manager. Monthly invoices are prepared based on Joint meter readings which will crosschecked from the payment received against the invoice.

Procedures for maintenance of monitoring equipment and installations:

In the context of the identified project activity, energy meter is the only equipment which is required to track the monitoring parameters as mentioned in section B.7.1 of this document. As per the power purchase agreement (PPA) with HPSEB, the energy meters and the meter boxes shall be owned and kept sealed by the HPSEB and hence shall be maintained by HPSEB.

Procedure for internal audits & project performance review:

The internal audit team will comprise Managing Director, General Manager (OM), Plant Manager and Engineer of AHPL. The internal audit will be conducted once in a year. The internal audit team will also be responsible for the review and follow-up of corrective actions.

Procedure for data apportioning:

In the event when verification period dates and billing cycle dates in the project activity, do not coincide:

In the event when the verification period dates and billing cycle dates (JMR dates) do not coincide, daily export and import reading from main and check meter would form the source of emission reduction calculation for that period. The daily export and import readings are taken manually from the main and check meter on the daily basis in the presence of representative of AHPL and HPSEB. The method of calculation is as explained below:

For example, if the JMR date is 30th of a month whereas the crediting period starts on 25th of that month. The net energy supplied to the grid will be calculated as below:

Export reading on 30th	X
Export reading on 25th	Y
Total export between 25th to 30th	Z = X - Y
Import reading on 30th	A
Import reading on 25th	B
Total import between 25th to30th	C = A - B
Total net electricity between 25th to 30th	E = Z - C

All the monitored data will be archived for at least two years after end of the crediting period.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

>>
20-02-2007. (Letter of Intent issued to Kirloskar Brothers Ltd towards electro mechanical works)

C.2. Expected operational lifetime of project activity

>>
35 y-0m

C.3. Crediting period of project activity

C.3.1. Type of crediting period

>>
The project activity will use a renewable crediting period.

C.3.2. Start date of crediting period

>>
Starting date of the first crediting period: 28/12/2012
Starting date of second crediting period: 28/12/2019

Current PDD is applied for second crediting period.

C.3.3. Duration of crediting period

>>
7 y-0 m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

As per the EIA Notification[12] by the Ministry of Environment and Forests (MoEF), Government of India (MoEF) the project activity does not fall under the list of projects that require prior environmental clearance and therefore need not conduct Environmental Impact Assessment (EIA) studies. The project has obtained consent to establish the project activity from the state environmental authorities i.e. the state pollution control boards.

However, AHPL had carried out an environmental review summary (ERS) of the project activity. A brief of the same applicable for the project activity is discussed below;

The following potential environment, health and safety and social aspects of the project were analysed:

- land acquisition, compensation and physical and/or economic resettlement;
- national and local government permitting requirements;
- potential impacts on downstream users; and
- Impact on air, water and ecology due to project activity
- Social and economy issues

Land acquisition, compensation and physical and/or economic resettlement

Land for the project activity is allotted by the government and there have been no resettlement or rehabilitation issues due to the land. Additionally, as the project activity is a run of river hydroelectric project and has no separate reservoir, it does not cause any land inundation. Hence, there are no land submergence due to the project activity and therefore no resettlement or rehabilitation issues.

Potential impacts on downstream users

Keeping in mind the irrigation and drinking water requirements of the downstream users, Himachal Pradesh government had specified that certain quantity of water has to be discharged from the diversion structure. Since this will be followed as per direction, there would be no impact on the downstream users of the water.

Impact on Air, water and ecology during construction and operation

The construction activities of the project's activity will not have much impact on the environment. There would be no impact on the air quality due to the project activity during operational phase. No effluents are produced from the project activity and hence no impact on water quality is envisaged. Hence, there would be no significant impacts on the ecology due to the project activity.

Social and economy issues

The installation of the project activity would provide for job opportunities to the local community during construction and operation of the project activity. The project activity would contribute towards improvement in the standard of living.

D.2. Environmental impact assessment

>>

As explained in above section D.1 and registered PDD Section D.1, all the necessary consents relevant to the project operation has been received and PP is adhered to all the compliance of the consents.

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.

[12] http://envfor.nic.in/legis/eia/so1533.pdf

SECTION E. Local stakeholder consultation

Modalities for local stakeholder consultation>>

An environmental review summary (ERS) was prepared by AHPL and this ERS was given for public scrutiny. An advertisement was given in newspaper 'Amar Ujala' in vernacular language (Hindi) on 21 June 2005 which informed about the project activity and about the availability of ERS report and inviting public and local stakeholders to avail a copy of the document and offer their comments. ERS was kept for public inspection. A register was maintained to make the entries.

In addition, local stake holders meeting was organized as part of CDM project activity at the project site.

The following are the local stakeholders for the project activity:

Local community

Local village administration

Participants:

From AHPL

1.	Mr. S.K. Mukherjee	-	Resident Manager
2.	Mr. V.S.V.A Rao	-	Manager Commercial
3.	Mr. Manoj Kumar Sah	-	Project Engineer

From Samej Village (Sechi SHP)

1.	Mr. Mohar Singh	-	Pradhan
2.	Mr. Satish-	Villager	
3.	Mr. Om Prakesh-	Villager	
4.	Mr. Gulab Singh-	Villager	
5.	Mr. Raj Varma-	Villager	

Representatives from local villages and local village administration were invited for the stakeholder meeting. All the stakeholders have been invited through public notice dated 24th April 2008 at Sechi SHP.

A stakeholder consultation meet for Sechi SHP was organized on 30th April, 2008 at the administrative office of AHPL at Samej village in Kullu district.

E.1. Summary of comments received

>>

There were no comments received on ERS from the local stakeholders till the prescribed period of availability (20 July 2005`).

The minutes of the meeting were recorded in local vernacular language and the English translation and the excerpts from the stakeholder consultation process are detailed below (the original stakeholder consultation details pertaining to each project site have been provided to the DOE) during the validation of project registration for first crediting period.

i) Sechi Hydro Electric Project:

1.AHPL representative asked villagers as to what information they have about the Sechi Project.

- Villagers replied that Sechi Hydro Project is being constructed in their village where water from SechiKhad shall be taken to forebay tank and then to power house by which 4.5 MW electricity shall be generated, which shall be sold to Himachal Government.

2.On asking about the benefits which villagers shall get on completion of the project.

- Villagers replied that the Company has given employment to 7 personnel (one member from each private land holder) as well compensation towards cost of land purchased for the project. Employment provided to other local villagers including local contractor has provided with work in the project. Also that the Company has provided computer set, furniture etc. to Govt. school at Sumej for the development of local children. Sumej school play ground was developed by removing stones and boulders. Also, concreting done at Prayer Ground. This facilitates children to study in ground during winter season. Company also encourages sports by paying donation to the local villagers. The Local Area Development Fund, which Company is going to deposit, shall be used for drinking water facility, roads, temple etc.

3. AHPL asked about the impact due to construction of the project.

- Villagers replied that few houses may get develop cracks due to blasting. AHPL assured villagers that if any houses get cracks, the Company shall pay compensation and get it set right. Also, Company assured that due to excavation work, if debris fall on any private land causing damage to their crops, the company will pay compensation towards the cost of crops.

4. AHPL asked what type of difficulties are faced by the villagers due to construction of project.

- Villagers informed that some times the road going to village gets blocked while excavating the water conductor system but company provides their vehicles to drop them at there respective houses/places.

It was also assured by AHPL representative in the meeting that after commissioning of the project, the Company will pay more attention towards further development of the village.
At the end of the meeting, Company representatives thanked all the villagers for coming and sharing their views.

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.

E.2. Consideration of comments received

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

There were no negative comments received during the local and global stakeholders' consultation. Hence, no action was required to be taken. Please refer section D.1 of the registered PDD.

SECTION F. Approval and authorization

>>

As explained in above section D.1 and registered PDD Section D.1, all the necessary consents relevant to the project operation has been received and PP is adhered to all the compliance of the consents.

The links of approval and authorization of the MoEF and all the Parties involved in the project activity are as below:

Parties Involved	Reference number	Date
India (Host)[13]	4/13/2012-CCC	21st Dec 2012

[13] https://cdm.unfccc.int/filestorage/t/a/NSQIX0V5EMFB2637ALRGYP4O19JCDU.pdf/HCA%20-%20Sechi%20Hydro%20SHP.pdf?t=Sm58cHJkcjhxfDAq3NdlszXzAMfLrA442GV7

Appendix 1. Contact information of project participants

Organization name	Ascent Hydro Projects Limited
Country	India
Address	6, Shiv Wastu, Tejpal Scheme Road No 5, Vile Parle, Mumbai– 400 057, Maharashtra, India.
Telephone	+91 020-25890733
Fax	+91 20 25885234
E-mail	ascentpune@dlzcorp.com
Website	-
Contact person	Shyam Vaidya

Organization name	Statkraft Markets GmbH
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Address	DerendorferAllee 2a, 40476 Düsseldorf
Telephone	+31 207957800
Fax	-
E-mail	Stef.Peters@statkraft.com
Website	-
Contact person	Stef Peters

Organization name	WeAct Pty Ltd.
Country	Australia
Address	1/115 Chapel Street, Windsor, Victoria-3181
Telephone	+61 3 9819 0460
Fax	+61 409135580
E-mail	satish@weact.com.au
Website	www.weact.com.au
Contact person	Satish Duvurru

Appendix 2. Affirmation regarding public funding

There is no public funding for the project activity.

Appendix 3. Applicability of methodologies and standardized baselines

Applicability and eligibility of selected methodology (AMS I. D) has already been mentioned in section B.2 of the PDD.

Appendix 4. Further background information on ex ante calculation of emission reductions

http://www.cea.nic.in/tpeandce.html			
CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE			
VERSION	14		
DATE	Dec 18		
BASELINE METHODOLOGY	ACM0002 / Ver 17.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 6.0		
http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf			
Net Generation in Operating Margin (GWH) (incl. Imports)			
	2015-16	**2016-17**	**2017-18**
Indian Grid	8,71,753.243	9,16,277.834	9,60,692.882
Simple Operating Margin (tCO_2/MWh) (incl. Imports) (1) (2)			
	2015-16	**2016-17**	**2017-18**
Indian Grid	0.97	0.96	0.95
Build Margin (tCO_2/MWh) (not adjusted for imports)			
	2015-16	**2016-17**	**2017-18**
Indian Grid	0.9083	0.8723	0.8644
Weighted Generation Operating Margin (tCO_2/MWh)			
Indian Grid			0.9610
Combined Margin Emission Factor			
Indian Grid(tCO_2/MWh)			0.88854

Appendix 5. Further background information on monitoring plan

Please refer section B.7.

Appendix 6. Summary report of comments received from local stakeholders

Please refer to section E.

Appendix 7. Summary of post-registration changes

Not applicable, as there were no post registration changes has happened in the project activity.

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Document information

Version	*Date*	*Description*
11	31 May 2019	Revision to: • Ensureconsistency with version 02.0 of the "CDM project standard for project activities"(CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
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Business Function: Registration
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