1 MW JIWA SMALL HYDEL PROJECT IN KULLU, HIMACHAL PRADESH

Document Prepared by:

Chevron Hydel (P) Ltd

Project Title	1 MW Jiwa Small Hydel Project in Kullu, Himachal Pradesh
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Monitoring Period	04-January-2009 to 03-January-2017, inclusive of both start and end dates
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CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity, titled under VCS as "1 MW Jiwa Small Hydel Project in Kullu, Himachal Pradesh", is a run - of - the river development by Chevron Hydel Pvt. Ltd. for power generation on Jiwa Khad, a tributary of river Sainj in the Beas Basin. The Project located in village Siundh near Sainj town of Kullu district of Himachal Pradesh. The project envisages utilizing the available gross head of 110 meter in the lower reach of Jiwa Khad between Sharan and Jiwa village just before its confluence with Sainj River and power generated is exported to Unified Indian Grid. Project has a design parameter to generate 8.54 million kWh electricity in a 75% dependable year and will be able to export around 7.38 million KWh to the grid. This project has been contributing to mitigate climate change to some extent and lead to greenhouse gas emission reductions of 59,810 tCO_2e, during the crediting period of 10 years.

The project is an operational activity with continuous reduction of GHG, currently being applied under "Verified Carbon Standard" (VCS).

This project activity is also known as Jiwa Small Hydroelectric power Project (SHEP) a run of the river project that utilizes the flow of the river through Head Race Tunnel (H R T) and penstocks and by using one 1000 kW horizontal Fran cis turbines connected to a synchronous generator generates electricity. Th e main structure includes weir, intake forebay, De-Silting tank, chambers, Head Race Tunnel (HRT), surge s haft, penstock powerhouse and the tailrace discharging water back into the river. The voltage at the generator terminals is 3.3 kV, which is stepped up to 11 kV at the nearest substation before evacuation. The generated electricity is fed into the sub-station of HPSEB grid system for transmission & distribution. The project utilizes a gross head of about 1056 m. The project activity has already been commissioned on 29-December-2006[1] and in continuous operation since then.

The net generated electricity from the project activity is sold to state electricity board i.e. HPSEB under the Power Purchase Agreement (PPA) signed between the PP and the utility. In pre-project scenario, electricity delivered to the grid by the project activity would have otherwise been generated by the operation of fossil fuel-based grid-connected power plants and by the addition of new fossil fuel-based generation sources in the grid. As the nature of the hydro project, no fossil fuel is involved for power generation in the project activity. The electricity produced by the project is directly contributing to climate change mitigation by reducing the anthropogenic emissions of greenhouse gases into the atmosphere by displacing an equivalent amount of power

[1] (Date of commercial operation of the project as certified by HPSEB vide their letter reference no. HPSEB/PHE/Jiwa/06-2542-49, dt-29/12/2006.)

at grid. The total GHG emission reductions or removals generated in this monitoring period is 44,175 tCO_2e as a result of generation of 55,018.96 MWh of electricity.

Audit history is mentioned below:

Audit Type	Period	Program	VVB Name	Number of years
Validation	04-January-2007 to 03-January-2017	VCS	TÜV NORD JI/CDM Certification Program	10 Years
Verification	04-January-2007 to 03-January-2009	VCS	TÜV NORD JI/CDM Certification Program	02 Years
Current Verification	04-January-2009 to 03-January-2017 (Current Verification)	VCS	VKU Certification Private Limited	08 Years
Total	-	VCS	-	10 Years

1.2 Sectoral Scope and Project Types

The project activity is not a grouped project activity.

Sectoral Scope: 01 - Energy industries (renewable / non-renewable sources)

Project Type: I - Renewable Energy Project

The project is neither a grouped project nor an AFOLU project activity.

1.3 Project Proponent

Organization name	Chevron Hydel (P) Ltd. (Developer)
Contact person	Mr. Neeraj Kanwar
Title	Director
Address	285, RPS, Sheikh Sarani-1, New Delhi - 110017, India.
Telephone	+91 9810098494
Email	neerajkanwar14@gmail.com

1.4 Other Entities Involved in the Project

Organization name	NA
Role in the Project	NA

Contact person	NA
Title	NA
Address	NA
Telephone	NA
Email	NA

1.5 Project Start Date

Project start date under VCS – 29-December-2006, (Date of commercial operation of the project as certified by HPSEB vide their letter reference no. HPSEB/PHE/Jiwa/06-2542-49, dt-29/12/2006.)

1.6 Project Crediting Period

Date: 04-January-2007 to 03-Jaunary-2017, (Inclusive of both the dates).[2]

The project activity adopts a Fixed type of crediting period of 10 Years

1.7 Project Location

Country : India

State : Himachal Pradesh

District : Kullu

Town: Sainj

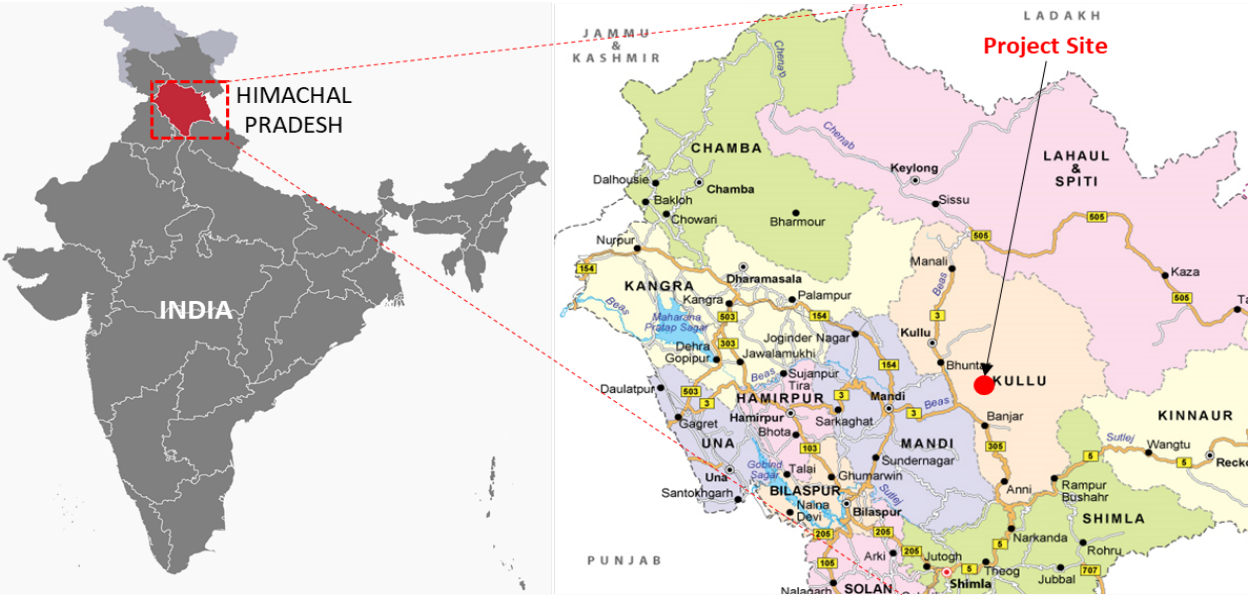
Community (Village): Siundh

This Jiwa SHEP project is located near Sainj town of District: Kullu of Himachal Pradesh that harnesses hydro power potential through weir constructed on the stream of Jiwa Khad, a tributary of river Sainj in the Beas Basin. The nearest major roadway is Chandigarh–Mandi–Aut–Sainj Road which provides connectivity to major towns. The project site is 245 kms from Chandigarh. The nearest rail head is at Kirat Pur Sahib, which is about 215 km from the project site. The nearest

[2] The date of the project start date and project crediting period is not same because of the reason that PP wanted to ease up the ER calculation, Since the billing cycle in the project-implemented region begins on the 4th of every month, the project was registered with a scope for conservative ER calculation throughout the crediting cycle. Therefore, the crediting period was set from January 4, 2007, to January 3, 2017, and the project was registered along with the first verification activity, both initiated on January 4, 2007. This approach was approved by Verra and can be accessed via the VCS project webpage. However, the start date of the project activity is 29-December-2006, (Date of commercial operation of the project as certified by HPSEB vide their letter reference no. HPSEB/PHE/Jiwa/06-2542-49, dt-29/12/2006.) the start date of crediting period & monitoring period considered during the validation & first verification under VCS was from 04-January-2007.

airport is at Bhuntur in District: Kullu at about 45 kms. The geographic co-ordinates of the project locations are Latitude: 31.786247 N Longitude: 77.329899 E

The representative location map is included below:



(Courtesy: google map and images)

1.8 Title and Reference of Methodology

Sectoral scope: 01: Energy industries (renewable / non-renewable sources)
Methodology: Grid connected renewable electricity generation"; version 13 (EB 36)
Type I: Renewable Energy Project (Small Scale)
Tools referred with above methodology are: "Tool to calculate the emission factor for an electricity system", version 01.1

1.9 Participation under other GHG Programs

As the project activity is not registered except Universal Carbon Registry (UCR ID 118)[3] for the period beyond the expiry of the crediting period under VCS. Thus, the GHG emission reductions and removals generated by the project under VCS will not be used for any compliance under any programs or mechanisms.

Further, an undertaking from PP has been submitted for avoiding double accounting via any means for current monitoring period. Also, the project is only registered in VCS mechanisms for this crediting period.

[3] UCR (ucarbonregistry.io)

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

Emission Trading Programs and Other Binding Limits: The project activity and the GHG emission reductions are not included in any emission trading program or any other mechanism that includes GHG allowance trading and include details about any such programs or mechanisms.

Other Forms of Environmental Credit: The project activity has been registered under Universal Carbon Registry (UCR ID 118) for the period beyond the expiry of the crediting period under VCS. Thus, the GHG emission reductions and removals generated by the project under VCS will not be used for any compliance under any programs or mechanisms.

The project activity under VCS shall not claim emission reductions for the same period that has been/will be covered under UCR as a part of the registered UCR ID. This can also be verified from the fact that the VCS project activity has not been renewed under VCS. Thus, there will not be any possibility of double accounting of emission reductions.

Supply Chain (Scope 3) Emissions:

The project activity is a fixed 1 MW hydro power generating unit and power generated from the project is sold to the state Discom connected to the unified Indian Grid. This included some goods & services from manufacturers, suppliers, implementers etc. (i.e. third parties). However, project was commissioned in 2006 and there have been no specific or identified/measured/disclosed Scope-3 inventory emissions in the supply chains attached to the project. Hence there is no potential risk of any double accounting or claiming of such scope-3 emissions across the projects.

1.11 Sustainable Development Contributions

Project also ensures contribution towards sustainable development through social, economic, environmental, and technological well-being as explained below:

- Kullu district is major fruit producing belt of Himachal Pradesh. Most of the orchards are perched on the hill slopes where mode of transportation is either men, mules or gravity pulled ropeways. Construction of roads will involve cutting of forests and destabilization of hill slopes causing ecological imbalance. To overcome these problems and improve the infrastructure, it is suggested to develop electrically operated ropeways. Availability of reliable electrical energy generated from the proposed project will assist in achieving this objective.
- The project will meet bulk of the local rural energy requirements to conserve kerosene, oil products, and wood used for space heating, cooking, lighting etc.
- Availability of reliable electrical energy from Jiwa project will assist the successful implementation of the objectives of ongoing World Bank Assisted project entitled “Bio – Diversity Conservation”.
- Project will help in economic and industrial development of region through development of small-scale industries which will generate employment opportunities for local people. This improved the standard of living.

- No resettlement of population is involved in project development.

The project is contributing in sustainable development by generating electricity and reduction of CO_2 emissions due to implementation of project activity and generates employment to the local stakeholders. Through Project activity economic development has been achieved in the project location by creating opportunities of employment during the project lifetime. Project Proponent monitors the carbon emission with help of the record of electricity generated.

Note: As per the VCS Standard Version 4.5[4] Page no 79, Appendix 03: Document History and Effective dates, For V4.2, serial number 04 states that "it is required by project proponents to demonstrate contributions to a minimum of three SDGs in all monitoring reports verified after the effective date. Effective immediately for all projects that request registration on or after 20-January-2023. Projects that request registration before 20- January-2023 shall demonstrate contributions to at least three SDGs by 20-January-2025". This is project's second periodic verification for the Monitoring Period 04-January-2009 to 03- January-2017 (Inclusive of both start and end dates), Since this project is registered before 20-January-2023, so the Project Proponent (PP) must demonstrate contributions to at least three SDGs by 20-January-2025.

[4] VCS Standard, v4.5 (verra.org)

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime[5]
2)	**7.2**	7.2.1 Renewable energy share in the total final energy consumption	Implemented Renewable Energy grid connected Project to increase the RE share in total grid mix.	The project yielded a total net power generation of 55,018.96 MWh during the reporting period. The entirety of the production was consumed by the unified Indian grid system, thereby contributing to the renewable energy share in the total final energy consumption.	Total contribution over the lifetime is; the current claim which is restricted to the current monitoring period only, hence the value is 55,018.96 MWh.
8)	**8.5**	8.5.1: Employment Generation from the project Activity	Implemented Renewable Energy power generation project activity has generated direct & Indirect employment	More than 10 numbers of people got direct employment.	Project is eligible to generate this SDG benefits. However, project is not claiming this SDG benefit. Hence, not quantifying the same here.

[5] Since this is the 2nd Verification of this project and it is registered before 20-January-2023, the PP will demonstrate contribution to at least three SDGs by 20- January-2025. Also, as per point 4 of the Quarter 1 VCS Program Update released in 20-January-2022, a project activity is required to demonstrate contributions to a minimum of three SDGs by 20-January- 2025 for the projects registered with VERRA before 20-January-2023. For the present monitoring period 04-January-2009 to 03- January-2017, both days including the PP is voluntarily demonstrating contributions to 2 SDGs and SD contributions by minimum 3 SDGs for the project activity will be demonstrated by 20-January-2025.

4)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase reduction of GHG	By installation of 1 MW Jiwa Small Hydel Project in Kullu, Himachal Pradesh, project has prevented the release of 44,175 tCO_2e into the atmosphere during the current monitoring period which are as per recorded and verified data.	Overall contribution across the lifetime (as verified and reported as on the current Monitoring period is about 44,175[6] tCO_2e.

[6] Contribution to the current (2nd) monitoring period 04-January-2009 to 03-January-2017, inclusive of both start and end dates

2 SAFEGUARDS

2.1 No Net Harm

There was no harm identified form the project and hence no mitigations measures are applicable.

Rational: as per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (07/03/2016), it has been declared that hydro project activity falls under the "White category". White Category projects/industries do not require any Environmental Clearance such as 'Consent to Operate' from PCB as such project does not lead to any negative environmental impacts. Additionally, as per Indian Regulation, Environmental and Social Impact Assessment is not required for Hydro Projects.

Nevertheless, PP had done public announcement and invited comments from public on the proposed project activity. Many stakeholders like Government of Himachal Pradesh, Public Works Department, HPSEB, Fisheries Department of Himachal Pradesh, Department of Town and Country Planning Department of Irrigation public health and village Panchayat had participated to understand, discuss, record all possible concerns related to environment and socio-economic aspects of the project so that as per requirements mitigation measures can be taken. The feedback and inputs received from stakeholders confirm that no negative impact is foreseen by the stakeholders.

2.2 Local Stakeholder Consultation

The Local Stakeholders meeting for the project was held on 31-January-20

08. The local inhabitants were identified as the primary local stakeholders in the project activity. The Stakeholders were invited by giving one advertisement in one local newspaper mentioning the date, time and venue of the CDM Stakeholders meeting.

Stakeholders' Involvement:

The project proponents had involved all the stakeholders for setting up the Project and had convened a meeting to hold extensive discussions with the stakeholders. After an address by the Project Proponent regarding the project, its benefits, queries were invited from them which were answered to their satisfaction. The local population welcomed the project due to benefits like development of infrastructure in the area and additional sources of income during construction, employment etc. An attendance of the stakeholders present in the meeting was carried out and also the stakeholders were asked to present their comments in a written format in one month time duration from the meeting. Hence, the project passed through due public consultation.

Ongoing Communication:

As a part of the continual improvement process, feedback from the associated stakeholders is vital. Project Proponent is open for continuous interaction with stakeholders; therefore, a dedicated grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. The process of Local Stakeholder Consultation is continuous. It is an appropriate publicly accessible location at which stakeholders can provide their feedback on the project. The stakeholders are requested to share their experiences and grievances on a continuous basis. Registers are used to record grievances and feedback. Grievance register is placed at the main gate of site office and is accessible to everyone. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site in-charge. The project proponent has devised a system for continuous local stakeholder interaction during the operation of the project. Local stakeholders are allowed to visit the project site and raise their concern about the project. A grievance register is maintained at the project site in which the feedback and concerns are reported. There is no adverse comment recorded to be reported during the monitoring period under consideration. The copy of grievance register is submitted to the VVB.

2.3 AFOLU-Specific Safeguards

For non-AFOLU projects, this section is not required.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The applied technology is considered to be one of the most environment friendly technologies available as the operation of the hydro turbine generator does not emit any GHGs or any other harmful gases unlike the operation of conventional power plants.

The project activity involves one number hydro turbine generator of 1000 kW capacity with internal electrical lines connecting the project activity with local evacuation facility. The voltage at the generator terminals is 3.3 kV, which is stepped up to 11 kV at the nearest substation before evacuation. The project activity can operate in the frequency of 50 Hz and in the voltage range of 415kV to 11kV ± 10%. The average lifetime of the generator is around 30 years as per the equipment supplier specification.

The hydro turbines have already been commissioned by HPSEB and the same could be referred by the commissioning letter with Serial number HPSEB/PHE/Jiwa/06 - 2542-49, dated 29 December 2006. In the absence of the project activity the equivalent amount of electricity would have otherwise been generated by the operation of fossil fuel-based grid-connected power plants and fed into Indian grid system, hence baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario as discussed in the previous section.

The key features of the technology are mentioned below[7]:

Design Discharge	1.28 cumecs
Gross Head	105.6 m
Hydrology	
Type of Catchment Area	Rugged and Hilly
Annual Flow (In 75% dependable year)	1.23cumecs (Cubic metre per second)
Catchment Area of Stream	180 Sq. Km.
Diversion Structure	
Type of structure	Trench type weir
Size	20 m x 2.5 m
Intake Structure	
Shape and Size	Well type (3.0 m x 2.5 m x 5.10 m)
De-silting Chamber	
Type	Settling tank
Size	28 m x 5 m
Discharge	1.75 cumecs
Penstock	
Number	One
Diameter	800 mm (I.D.)
Thickness	8 mm
Length	190 m
Power House	
Type	Surfaced Power House (R.C.C structure)
Design Head	102.07 m
Design Discharge	1.28 cumecs
Installed Capacity	1 x 1000 kW
Electromechanical Equipment	
Turbine type	Francis type (horizontal axis)
Turbine number	01 Nos.
Turbine normal speed	1500 rpm
Type of generators	AC Synchronous
Generator Normal Speed	1000 rpm
Generator Rated voltage	415kV
Switchyard	
Voltage	11 KV
Power	
Installed capacity	1 x 1000 kW

[7] A detailed list of technical specifications and remarks are included under Appendix 2.

Actual project related images are shown below:

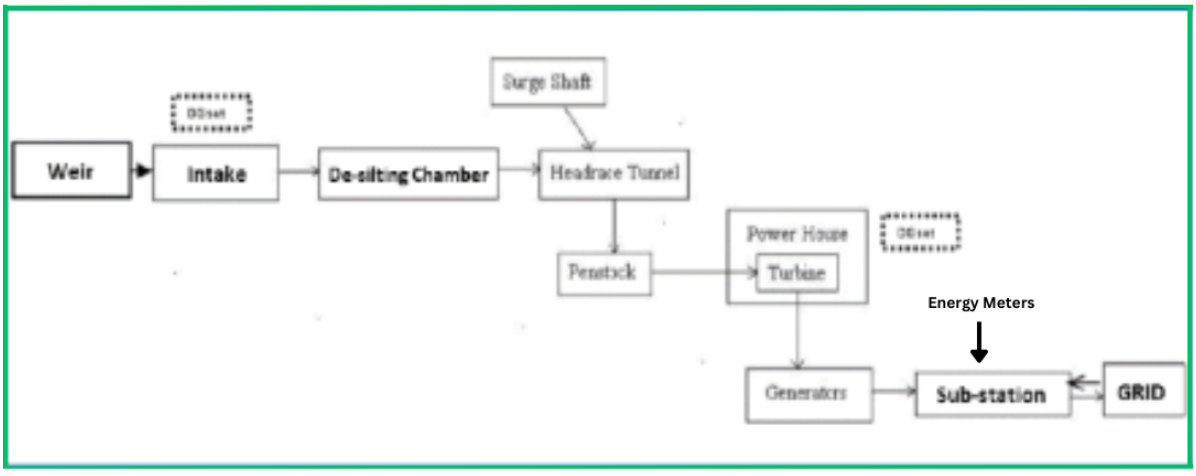
Penstock

Weir Site

Powerhouse

Switchyard

Plant Boundary



Emission Reductions from anthropogenic sources:

Since hydro power is Green House Gas (GHG) emissions free, the power generated will prevent the anthropogenic GHG emissions generated by the fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas. The estimation of GHG reductions by this project is limited to carbon dioxide (CO_2) only.

This project will help to mitigate climate change and lead to greenhouse gas emission reductions estimated value to be 59,810 tCO_2e during the crediting period of 10 years.

There are no such events during operation of the project activity that may impact the GHG emission reductions or removals in the monitoring period i.e. from 04-January-2009 to 03-January-2017, including both start and end dates. The project has generated 55,018.96 MWh of net electricity, thereby total GHG emission reductions or removals generated for this monitoring period are 44,175 tCO_2e.

3.2 Deviations

3.2.1 Methodology Deviations

This section is not applicable, as there are no deviations requested from the applied methodology for the current monitoring period and also during the last monitoring period.

3.2.2 Project Description Deviations

At the time of project registration, the calibration frequency for the meters installed at the site was confirmed to be annual. Since the calibration is under the purview of (HPSEB) Himachal Pradesh State Electricity Board, the calibration is not performed annually and is performed as per the industrial standards set by the HPSEB. Since the meter are of a better accuracy class and as per CEA order dated 17-March-2006; para 18(b) that "all the meters shall be tested once in five years." Indian government under the stated mandate allows the calibration frequency to be conducted once in five years, a deviation is requested for calibration frequency to be considered as once in five years instead of annual, to avoid any further instance of delay in energy meter calibration.

3.3 Grouped Projects

Not applicable.

4 DATA AND PARAMETERS[8]

4.1 Data and Parameters Available at Validation

Data / Parameter	Electricity Supplied to the Grid
Data unit	tCO_2 /MWh
Description	A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system.

[8] Since in the applied methodology i.e., AMS ID version 13, the parameters are not properly defined, PP has decided to refer latest version of the methodology to ensure correct depiction of the Data & Parameters taken as ex-ante & monitored onsite.

Source of data	CO_2 Baseline Database for the Indian Power Sector' Ministry of Power: Central Electricity Authority (CEA) Version 4.0, Dated: 01-September-2008, This database is prepared as per "Tool to calculate the emission factor for an electricity system" Version 1.1.
Value applied	0.803
Justification of choice of data or description of measurement methods and procedures applied	Calculated value as per registered PD
Purpose of Data	Ex-ante fixed parameter
Comments	For the calculation of Emission Factor of the grid

Data / Parameter	P
Data unit	kg/lit
Description	Density of diesel
Source of data	http://www.fast-tek.com/TM104.pdf http://www.iocl.com/Products/DieselSpecifications.pdf
Value applied	0.860
Justification of choice of data or description of measurement methods and procedures applied	Fixed Value has been taken from the publicly available data source.
Purpose of Data	Calculation of project emission
Comments	This parameter is fixed ex-ante for the entire 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", latest version applied.
Value applied	43.30

Measurement methods and procedures	IPCC Default Value is considered.
Purpose of Data	Calculation of project emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF $CO_{2,diesel,y}$
Data unit	tCO_2e/TJ
Description	CO_2 emission factor of diesel in year y
Source of data	IPCC default value
Value applied	74.8
Measurement methods and procedures	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 CO_2 emissions from fossil fuel combustion" latest version applied.
Purpose of Data	Calculation of project emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG $_{PJ, y}$
Data unit	MWh / year
Description	Net electricity supplied to the grid by the project activity
Source of data	Monthly Joint Meter Readings (JMRs)
Description of measurement methods and procedures to be applied	Data Type: Measured Recording Frequency Archiving Policy: Paper & Electronic Calibration frequency: 5 years (considered as per CEA provision)[9] Generally, the calculation is done by the Authority/DISCOM and the project proponent has no control over the authority for the calculation.

[9] **Please refer Deviation in section 3.2.2 of this monitoring report.**

	Therefore, based on the joint meter reading certificates/credit notes, the project shall raise the invoice for monthly payments.
Frequency of monitoring/recording:	Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually
Value monitored:	55,018.96 MWh
Monitoring Equipment	Energy Meters are used for monitoring (refer Appendix)
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Calculation method	In case the monthly JMR provides net export quantity, the same will be directly considered for calculation. However, if the JMR does not directly provide "net electricity" units, then quantity of net electricity supplied to the grid shall be calculated using the parameters reflected in the JMR. For example, if the JMR considers the difference between the measured quantities of the grid export and the import, then net electricity to be consider for emission reduction calculation as: $EG_{PJ,y} = EG_{Export} - EG_{Import}$
Comments:	All the data will be archived till a period of two years from the end of the crediting period.

Data / Parameter	DC_y
Data unit	Liters
Description	Diesel consumption by the standby DG set in year y
Source of data	Plant Records
Description of measurement methods and procedures to be applied	The diesel quantity available in the diesel storage tanks is recorded daily by PP in the plant logbook. The diesel consumption has been recorded in the logbook in litres. However, based on the density of diesel of about 0.86 kg/litre, the diesel consumption in tons is calculated.

Frequency of monitoring/recording	Recorded monthly and aggregated annually.
Value monitored	To be monitored as per actuals, Since there was no consumption so the value is 0, Refer ER Sheet for Calculations.
Monitoring equipment	Calculated
QA/QC procedures to be applied	The measured data will be cross checked with total diesel procurement using payment receipts.
Purpose of the data	Calculation of project emissions.
Calculation method	Data Type: Measured & Calculated Data Archiving: Paper/ Electronic.
Comments	The data would be archived up to two years after the end of crediting period.

4.3 Monitoring Plan

Aim of monitoring:

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of monitoring of quantity of net electricity supplied to the grid in the year y. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required.

The general principles for monitoring above parameters are based on:

- Frequency
- Data recording
- Reliability
- Experience and training

Frequency:

Monthly Joint Meter Reading (JMR) of main meters installed at the substation are taken and signed by authorized officials of PP and HPSEB. Daily data recording by the shift in-charge of PP are available at the generation end and interconnection point. JMR are 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 are maintained by PP and HPSEB. Daily and monthly reports stating the generation, auxiliary consumption, Total electricity export and import, diesel consumption are prepared by the shift in-charge in PP.

The electricity will be monitored through state-of-the-art sealed and tested meters. The metering system comprise of Main meter installed at the sub-station recording net electricity generation. The net metered electricity generation data will be used to calculate and monitor the greenhouse gas emission reductions from the project. Main meter reading installed at substation is the basis of billing and emission reduction calculations, which can be cross-checked in the JMRs.

During this monitoring period the energy meters are found to be within prescribed limits of accuracy. These are tri-vector meters of Secure make with digital display and are of 0.5s accuracy class. Also, prescribed meter calibration is as per industrial standards in the project implemented area. Once in five years is considered (Please refer requested deviation in section 3.3 of this report). All the main meters are tested by PGCIL (Power Grid Corporation of India Limited) on a periodic basis under the purview/sole discretion of state electricity authority i.e., HPSEB. In case of any faulty readings observed appropriate corrective action will be taken. If the error is found beyond the permissible limits, the PP will inform the respective agency so as to immediately rectify the error in the instrument. PGCIL, being a government owned company, is deemed to be a competent authority. The energy meters used during the current monitoring period are deemed to be working satisfactorily if the errors are within the meter specifications of accuracy class, and if any meter found with error beyond permissible limits of error, the defective meter will be replaced with new meter. All meter data will be stored in electronic and paper formats.

Energy meter identification, calibration and accuracy details

Measures to ensure the Results / uncertainty analysis of the monitoring procedure:

• As per the **Power Purchase Agreement (PPA),** for measuring the delivery/import of Energy by the company at the interconnection point, one set of Main Meter (part of Interconnection facilities) and Check Meter shall be provided by the Company and the Board respectively at the interconnection point.

The calibration of monitoring equipment is being maintained as per the requirement of HPSEB.

Current scenario for Check Meter:

The Check meter was not installed by the Board at the time of commissioning of the project and neither has it been installed till now & despite of reminders[10] from the project proponent the

[10] The Evidences of the reminder to the Board for installing the Check meter is being submitted to the DOE along with this MR as follows:

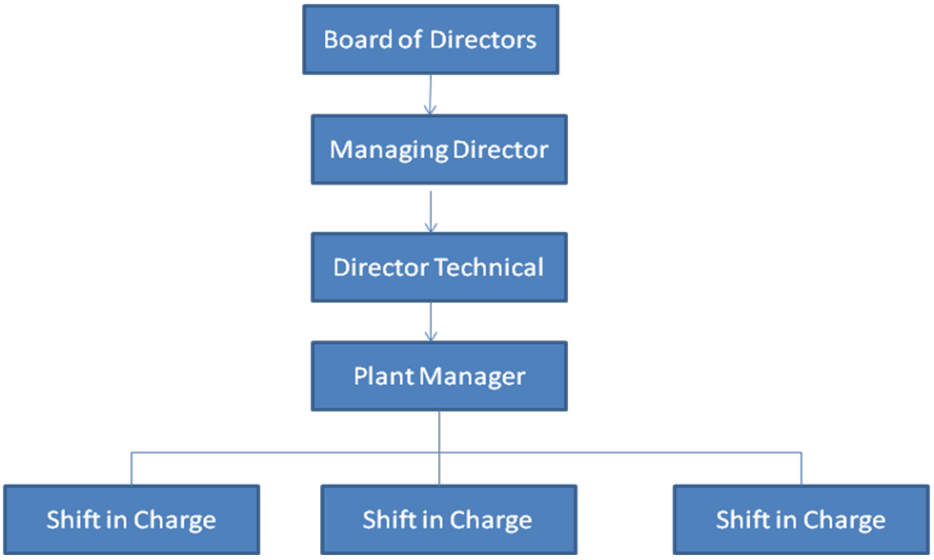
check meter has not been re- installed by the Board till now. The reading of main meter is being used for billing.

Details of Reminder to HPSEB for Check Meter:

The responsibility of installing Check meter solely lies upon the HPSEB. Therefore the PP is continuously reminding HPSEB with a note contained in every month's Joint Meter Reading Report[11], which is jointly signed with the concerned HPSEB officials and sent along with the monthly bill(s) raised on HPSEB, the payment of which is released by HPSEB every month. Apart from these monthly reminders, the PP has reminded HPSEB for the installation of the Check Meter on dated – 4th Jun 2008[12] & 4th May 2009[13]. (All the necessary evidences are being submitted to the DOE along with this MR).

- **Monitoring roles and responsibilities.**

Operational & Management Structure- The proposed operational and management structure for the project activity for the purpose of monitoring of emission reductions, leakage effects etc. is shown below:



[11] A sample of JMR is being submitted herewith which clearly displays the 'note reminder' for check meter.
12 Letter to the Chief Engineer, HPSEB from Project proponent, where there was a clear reminder request for Check meter installation (being submitted along with)
13 Letter to the Chief Engineer, HPSEB from Project proponent, there was again a clearly reminder request to the Board for Check meter installation. (being submitted along with)

Institutional arrangement and roles and responsibilities

Personnel /authority	Responsibility
Operational/Shift In charge	Generation/electricity - Collection of meter reading for electricity generation, export by the project activity. Report is sent to the Plant Manager on daily basis.
Plant Manager/Chief Project Officer	Review of the monitored parameters for correctness, corrective measures in case of minor errors in the monitored data and preparation of a daily summary on project operation and electricity generation to the Director – Technical on monthly basis.
Director - Technical	Review of the monthly reports submitted by Plant Manager and also compilation of the data on electricity export to the grid system on a monthly basis for submission to the board of directors. The responsibility of Director – Technical also include modification of the structure of monitoring reports and data recording formats as and when required
Managing Director	Review of the reports submitted by Director – Technical and preparing the brief summary of information on important aspects, such as, plant operational conditions, total electricity export before submitting to the Board of Directors.
Board of Directors	Review of the reports submitted by Managing Director, guidance for necessary corrective actions to the concerned person.

The monthly JMRs are taken and signed by authorised officials of PP and HPSEB once in every month. Records of the JMR are maintained by PP and HPSEB. The authority and responsibility for monitoring, measurement, reporting and reviewing of the data rests with the Chief Project Officer/Plant Manager He is the in-charge of the GHG monitoring activities within project's functioning. The Chief Project Officer is assisted by a team of experienced personnel for the project. The primary responsibility of the team is to measure, monitor, and record and report

The information on various data items to the Chief Project Officer, in accordance with the applicable standards. Periodic calibration of various instruments used in the monitoring of GHG related data and record keeping of the same also will be the responsibility of the team.

The responsibility of review, storage and archiving of information in good condition lies with the Chief Project Officer. The Chief project Officer will undertake periodic verifications and onsite

inspections to ensure the quality of the data collected by the team and initiate steps in case of any abnormal conditions. The Chief Project Officer will review the data collected by the team and suggest corrective actions wherever required. An internal audit report will be prepared for review and will be examined by the Director-Technical & further reviewed by the Managing Director & Board of Directors.

Internal Audit:

PP has carried out the internal audit annually and whenever necessary to verify that the monitoring plan satisfies the VCS Standards, or the standards provided by other laws and regulations to be conformed to and abides by the procedures specified in the registered VCS PD.

Procedures for handling non-conformances with the monitoring plan:

If any non-conformity is observed in the proposed monitoring plan, then the same shall be reported to the VCS board at the time of the VCS verification along with the corrective actions taken by the PP.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff are trained. The plant helpers are been trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures like declare emergency, sound alert, evacuate danger zone, Close main shutoffs, call for external aid, internal inspection, etc. in compliance with the monitoring plan.

Emergency preparedness:

In case Main energy meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter will not be in service as a result of maintenance, repairs or testing, the stand by calibrated meter is installed & will be used for readings. In case the meters are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, the meters will be calibrated immediately, and the error percentage found in the main meter during its calibration will be applied to its metered energy data for the entire period since its last calibration to obtain the corrected value of net electricity exported to the grid.

Data Adjustment in case of monitoring period different from billing period:

The net electricity supplied to the grid would be reported as the difference between the net export and import from the solar plant. The electricity export and import data are monitored via main, check meter connected to the sub-station.

In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated as follows:

D = (A/B) *C Where:

A = Difference of number of days which are not matching of billing period and monitoring period.
B = Number of days of the billing period/ month which was not matched with the monitoring period.
C = Net Electricity supplied to the grid for that given billing period/ month
The calculated value after apportioning would be used for calculation of emission reductions during that period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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:

$$BE_y = EG_{PJ,y} \times EF_{grid,y}$$

Where:

BE_y	=	Baseline emissions in year y (tCO_2e)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of this project activity in year y (MWh)
$EF_{grid,y}$	=	Emission factor of 0.803 tCO_2/MWh has been considered.

Year	Unit	Net Electricity	Baseline Emission Factor (tCO_2e/MWh) $EF_{CO2,grid,y}$	Net GHG emission reductions or removals	Roundown Value of Net VCUs
2009	tCO_2e	7507.25	0.8030	6,028.32	6,028
2010	tCO_2e	7501.22	0.8030	6,023.48	6,023
2011	tCO_2e	5938.60	0.8030	4,768.70	4,768
2012	tCO_2e	7704.05	0.8030	6,186.35	6,186
2013	tCO_2e	5518.68	0.8030	4,431.50	4,431

2014	tCO_2e	7073.20	0.8030	5,679.78	5,679
2015	tCO_2e	5542.40	0.8030	4,450.55	4,450
2016	tCO2e	8170.53	0.8030	6,560.93	6,560
2017	tCO2e	63.04	0.8030	50.62	50
Overall Emission Reduction	**tCO_2e**	**55018.96**	**0.8030**	**44,180.22**	**ROUNDOWN VALUE (44,175)**

5.2 Project Emissions

As per applied methodology of AMS-I. D, version 13, for most renewable energy project activities emission is zero.
As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of DG Set, would be accounted for the project emission on actuals. Therefore, following project emission type has been considered for the project activity:

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

$PE_{Diesel} = \Sigma DC_y \times P \times NCV_{Diesel} \times EF_{CO2Diesel}$

Where:

PE_{Diesel} = Project Emission due to Diesel consumed during monitoring period in DG set
DC_y = Diesel Consumption in liters (lit)
P = Density of Diesel (0.86 kg/lit)
NCV_{Diesel} = Net Calorific Value of Diesel
$EF_{CO2Diesel}$ = IPCC 2006 Emission factor for Diesel

Hence, PE_y = PE_{Diesel}

5.3 Leakage

As per applied methodology of AMS-I.D. version-13, '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.

Hence, LE_y= 0

5.4 Net GHG Emission Reductions and Removals

Thus, $ER_y = BE_y - PE_y - LE_y$

Where:

ER_y = Emission reductions in year y (tCO_2/y)

BE_y = Baseline Emissions in year y (t CO_2/y)

PE_y = Project emissions in year y (tCO_2/y)

LE_y = Leakage emissions in year y (tCO_2/y)

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2009[14]	6,028	0	0	6,028
2010	6,023	0	0	6,023
2011	4,768	0	0	4,768
2012	6,186	0	0	6,186
2013	4,431	0	0	4,431
2014	5,679	0	0	5,679
2015	4,450	0	0	4,450
2016	6,560	0	0	6,560
2017	50	0	0	50
Total	44,175	0	0	44,175

Ex-ante emissions reductions/removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
47,880.77 tCO_2e	44,175 tCO_2e	- 7.74%	There is a decrease of -7.74% ER as compared to the ex-ante estimations. This 7.74 % decrease in ER is mainly due to the lower PLF achieved during the current MP which is mainly due to the lower water availability/flows through the region for power generation. This is a natural phenomenon and not under the control of project developer. Hence, the variation in generation is obvious due to the less water availability. Calculations are referred in the ER sheet.

[14] For 2009, from 3rd January has been considered to coincide with the date of monthly statement.

APPENDIX 1: PROJECT PHOTOGRAPHS:

Photo of the Weir Site

Photo of the Penstock

Photo of the powerhouse

Photo of the switchyard

APPENDIX 2: TECHNICAL SPECIFICATION SHEET FOR THE ENTIRE PROJECT:

DETAILS OF EQUIPMENT AT JIWA SHP, KULLU DISTT, H.P.

S.No.	Name of Equipment	Description / Specifications	Qty	Remarks
	Powerhouse Equipment			
1.	Main Inlet Valve	Butterfly Valve, Working Pressure 9.0 Bar	One	Complete with Housing, Valve Disc, Sealing elements & Actuator
2.	Turbine	Francis Horizontal Turbine, 1658 kW, 1000 RPM, Runner Outlet Diameter 535 mm	One	Complete with Guide vanes, Spiral Casing, Draft Tube & Dewatering arrangement
3.	Generator	Brushless 3 Phase Synchronous Generator, 2000 kVA, 415 V, 50 Hz., 0.8 Pf, 1000 RPM	One	Complete with AVR as per IS
4.	Hydraulic Power Unit	Complete with Gear Pump, Oil Tank, Valves, Thermostat etc.	One Lot	
5.	Cooling Unit	Oil Tank with Gear Pump, filter elements Max. Working Pressure 10 Bar	One Lot	Complete Set.
6.	Control Panels	Governor Panel, Generator LV Panel, Synchronising Panel with ACB & Relay Panel.	One Lot	
7.	Battery Charger / Ventilation & Earthing Eqpt. / Fire Extinguishers / Power & Control Cables & accessories etc.	Complete working unit as per IS	One Lot	
	Switchyard Equipment			
1.	Generator Transformer	Outdoor Type, 2000 kVA, Three Phase, 33-11 kV / 415 V Copper Wound, as per IS 2026, YN d11, Insulation Class A, ONAN		Complete with accessories as per IS
2.	Outdoor Circuit Breaker	Outdoor OHB, SF6, 36 kV, 50 Hz., 2000A, 31.5 kA		Complete with accessories as per IS
3.	Auxiliary Transformer	11 / .0433 kV, 100 kVA, ONAN, 3 Phase, 50 HZ.,		Complete with accessories as per IS
4.	Isolators	33 kV, 400 Amps, Horizontal Mounted, Double Break, manually operated	Two Nos	Complete with Operating mechanism as per IS.
5.	CT's / PT's	Outdoor Oil Cooled Type CT's: 11-33 kV, Ratio 50 – 150A & PT's 11 -33 kV / √3; 110V / √3; 110V / √3	3 Nos each	Complete with accessories as per IS
6.	Lightening Arrestors	9 kV, 10 kA, Class 1	3 Nos	
7.	Interconnection Bay Eqpt.	As per IS		

Chevron Hydel Pvt.
Director

APPENDIX 3: METER CALIBRATION DETAILS

- Energy Meter Details: 3 Phase 03 wire Trivector Meter
- Year of Manufacture: 2008
- Calibration Frequency: Once in Five years as per CEA Database[15] *(Refer Deviation in section 3)*

Period of Usage	Meter	Meter Serial No	Meter Make	Type of meter	Accuracy Class	Date of Installation	Date of Subsequent Calibration	Validity of Calibration as per CEA
04-January-2009 to 03-January-2010	Main Meter	0803022	L&T	ER300P	0.5s	04-06-2008	03-06-2008	02-06-2013
		06606097[16]				04-05-2009	29-01-2009	28-01-2014
04-January-2010 to 03-January-2011	Main Meter	06606097	L&T	ER300P	0.5s	04-05-2009	21-01-2010	20-01-2015
		08030221[17]				04-12-2010	01-12-2010	30-11-2015
04-January-2011 to 03-January-2012	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	01-12-2010	30-11-2015
04-January-2012 to 03-January-2013	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	01-12-2010	30-11-2015
04-January-2013 to 03-January-2014	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	Latest calibration Date: 06-05-2013	05-05-2018
04-January-2014 to 03-January-2015	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	Latest calibration Date: 22-07-2014	21-07-2019
04-January-2015 to 03-January-2016	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	Last date of calibration applicable to this Year as per CEA:	21-07-2019

[15] https://cea.nic.in/wp-content/uploads/2020/02/meter_reg.pdf

[16] The last meter with serial number 0803022 installed was replaced with new meter with serial number 06606097

17 The last meter with serial number 06606097 installed was replaced with new meter with serial number 08030221

							22-07-2014[18]	
04-January-2016 to 03-January-2017	Main Meter	08030221	L&T	ER300P	0.5s	04-12-2010	Latest calibration Date: 28-03-2016	27-03-2021

[18] It is to note that there is no regular practice followed by HPSEB for calibration. It is at the sole discretion of the state electricity board that the calibration of meters is conducted. Which is why the PP is requesting the calibration frequency for once in five years as per nationally approved and mandated standard stated in CEA order dated 17-March-2006; para 18(b) that "all the meters shall be tested once in five years."

APPENDIX 4: FROM PROJECT PROPONENT ON SOCIAL WORKS:

Annexure – VI

Chevron Hydel (P) Ltd. (Developer)

PROJECT SOCIAL WORK

Project social Work is undertaken on an ongoing basis leading to transformation and change in the lives of people in the project and its vicinity. Several activities undertaken by the project have had a significant impact on social and economic life of the rural populace.

The project area had little or no supply of power. The power supply even if available was at very poor voltage which could barely light up the household. After the commissioning of the project, the project has been providing quality power (proper voltage and frequency) to almost 10,000 households. This has had a significant socio – economic impact in the area. Proper voltage and availability has resulted in power reliability leading to increasing economic activity in the area. With the passage of time power reliability has given a major boost to micro industries in rural households who have now resorted to mechanisation in a big way. This has led to increase in rural incomes leading to enhanced demand for various domestic appliances transforming lives of the people. Power is utilised by the people for meeting their "heating" needs especially during the harsh winter months. Gone are the days when predominantly people were using wood to tide over the winter months.

The project has also undertaken several initiatives to mitigate their inconveniences in daily life. These are enumerated below:

AREA INFRASTRUCTURE:

Building of approach Roads and Bridges in the project area has significantly improved transportability in difficult mountainous terrain saving time and money in all local economic activities. The Photographs have been separately appended.

DOOR STEP EMPLOYMENT:

The project has provided "door Step" employment to every member living close to the project area. The project has provided jobs to 15 people bringing prosperity to almost 80 – 90 family members directly.

SKILL DEVELOPMENT:

We impart job skills to family members of employees as well as interested rural folks living nearby the site. The nature of skills imparted have resulted in successfully taking up assignments as electricians, welders, mechanics, linesmen etc. Family members of our employees after training have successfully employed in constructions firms in Dubai, Saudi Arabia & Singapore.

SOIL CONSERVATION:

The project undertakes plantation drives on an ongoing basis to conserve and preserve the environment. This has resulted in fewer "landslides" in area which was prone to frequent land slips especially in the monsoon months.

DEVELOPMENT OF LOCAL CONTRACTORS:

We actively train interested local population to acquire skills in civil / mechanical / electrical work such as Masonry work, Painters, Electricians, Pipe Fitters, Mechanics, Welders etc. Such persons after receiving on the job training at the project have been gainfully employed or have been able to start their own Contracting businesses. Some have also successfully registered with NHPC Project for undertaking periodic contracts. In fact we offer works contract to them as and when any Civil Repair Works are to be undertaken at the project site.