



Verified Carbon Standard

86 MW HYDRO PROJECT IN HIMACHAL PRADESH



Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Project activity is 86 MW hydro power project located at Jari village in Malana town of Kullu district, Himachal Pradesh, India. Project activity is based on the Run-of-the river (ROR) scheme and has been developed by Malana Power Company Limited having registered office at Noida, India (herein after referred as MPCL). MPCL is a private organisation, established with an objective of developing new hydro projects across the country. The generated electricity by the project activity is being exported to PTC (Power Trading Company). The Project activity has generated 292,871 MWh of electricity thus reducing GHGs to the tune of 251,283 tCO_{2e} for the current monitoring period of one year i.e., from 01-November-2021 to 31-October-2022 (First and last date included).

The relevant implementation dates are:

The project plant has 2 units (2 x 43 MW) and Unit-1 was commissioned on 09-July-2001 & Unit-2 was commissioned on 05-July-2001 and run satisfactorily.

1.2 Sectoral Scope and Project Type

Project Type: I – Renewable Energy Projects

Sectoral Scope: 1 Energy industries (renewable/ non-renewable sources)

Methodology Used: ACM0002 “Grid-connected electricity generation from renewable sources”

Project Category: Large Scale; Version 20.0, 28th November 2019, EB 105.

Project is not grouped project activity as per VCS guidelines.

1.3 Project Proponent

Organization name	M/s. Malana Power Company Limited
Contact person	Mr. O.P. Ajmera
Title	Vice President Finance
Address	Bhilwara Towers, -12, Sector 1, Noida -201301, Uttar Pradesh, India
Telephone	91-120-2541810, 91-120-2531648

Email	opajmera@Injbhilwara.com
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1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Ankit Sethiya
Title	Deputy Manager – Operations
Address	EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010 Madhya Pradesh, India
Telephone	0731 428 9086
Email	registry@enkingint.org , ankit@enkingint.org

1.5 Project Start Date

The start date of the project is 05-July-2001, which is the commissioning date of the project activity.

1.6 Project Crediting Period

Project Crediting Period Start date: 05-July-2021

Project Crediting Period End date: 04-July-2031

Total Crediting Period: 10 Years (Renewable Crediting Period)

This is the third crediting period of this project activity. The first & second crediting period of this project activity are given below-

- 1st Crediting Period start date: 05-July-2001 – 04-July-2011
- 2nd Crediting Period start date: 05-July- 2011 – 04-July-2021

1.7 Project Location

The project is located at Jari village in district Kullu of Himachal Pradesh around 25 Km from Bhunter. The Project activity is uniquely identified as Malana Hydro Project in the region. The nearest railway station from the project site is Kiratpur Sahib, about 198 Km from Bhunter. Bhunter has airport and is well connected to Delhi.

Coordinates of the Barrage:

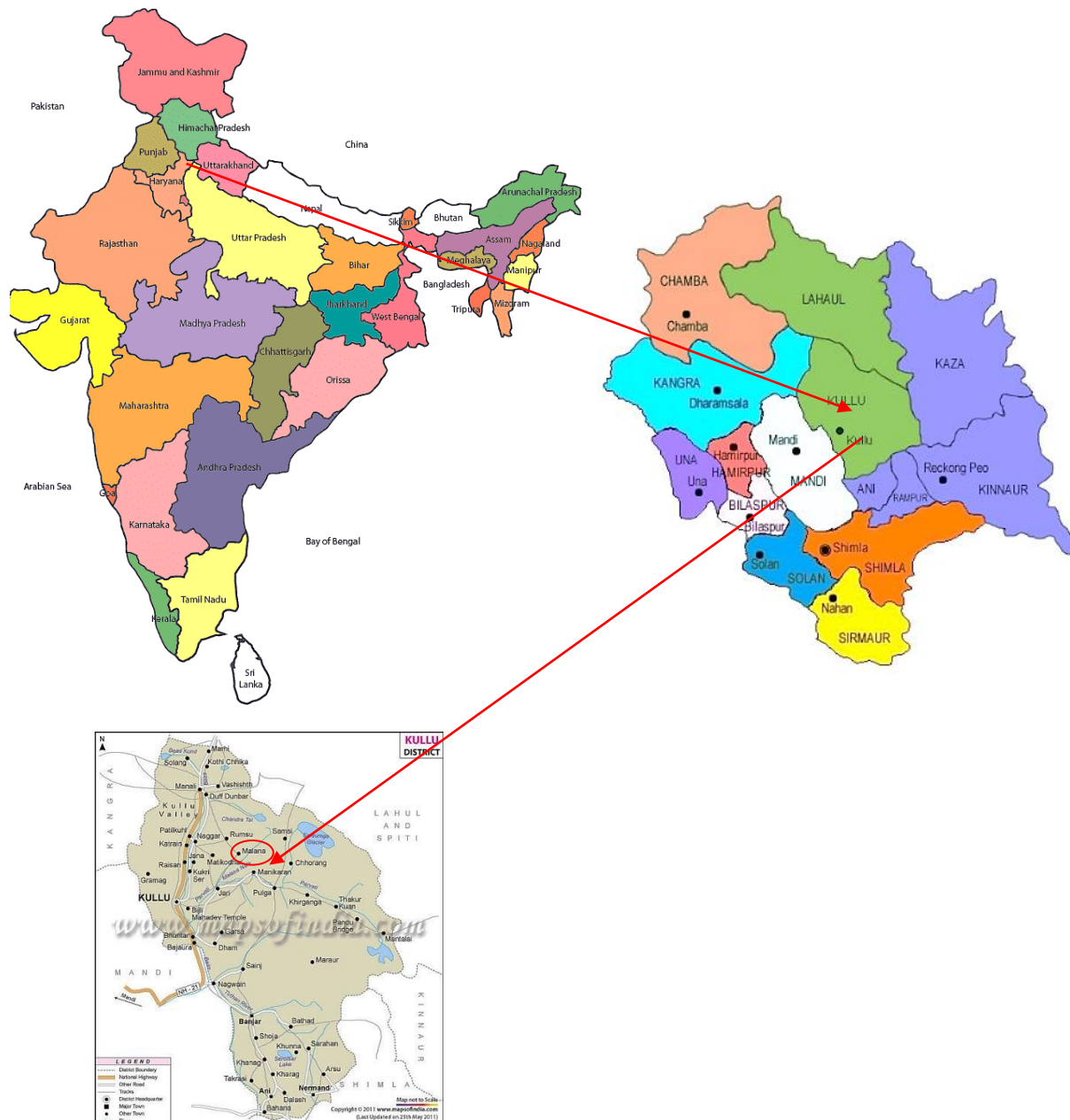
Latitude: 32°02'15.0" N; Longitude - 77°15'23.0" E

Coordinates of Power House:

Latitude - 32°00'15.0" N; Longitude - 77°14'55.0" E

For the project activity the project boundary is from the diversion site to the point of power supply to nearest substation where the project proponent has full control.





1.8 Title and Reference of Methodology

The following approved methodology has been applied to the project activity:

For Third Crediting Period

Title: Grid-connected electricity generation from renewable sources

Reference: Approved consolidated baseline methodology ACM0002, Version 20.0¹, 28-November-2019, EB 105.

Title and reference of tools applied to the project activity:

“Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”; Version: 03.0.1²

Tool to calculate the emission factor for an electricity system” (Version 07.0)³

1.9 Participation under other GHG Programs

The project activity is not participating in any other GHG program for the current monitoring period. The project is not registered in any other GHG program. The declaration claiming the same has also been submitted on company’s letter head.

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits:

The project activity has been registered under I-REC mechanism. The PP has claimed I-REC from the project “Malana Hydro and the registration date is 01-March-2015 on I-REC⁴”. The details for the period, during which I-REC has been claimed/issued, is provided in the table below.

Duration	Volume claimed /issued
01-January-2016 to 18-January-2016	3,100
19-January-2016 to 10-June-2016	80,000
11-June-2016 to 07-July-2016	48,385
08-July-2016 to 31-December-2016	184,082
Total 2016	315,567
01-January-2017 to 30-June-2017	119,496
01-October-2017 to 31-October-2017	21,092
01-November-2017 to 30-November-2017	11,525

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO>

² <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>

³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁴ <https://evident.app/IREC/device-register/MALANAHY>

Total 2017	152,113
01-January-2018 to 28-February-2018	11,068
01-March-2018 to 31-May-2018	38,219
Total 2018	49,287
01-January-2019 to 24-June-2019	116,601
01-July-2019 to 30-August-2019	148,465
01-September-2019 to 30-November-2019	81,716
01-December-2019 to 31-December-2019	9,087
Total 2019	355,869
01-January-2020 to 28-February-2020	14,514
01-March-2020 to 31-May-2020	51,215
01-June-2020 to 31-October-2020	256,320
Total 2020	322,049

The project activity is not claiming any REC and I-REC benefits for the current monitoring period. The declaration claiming the same has been submitted. The net GHG emission reductions or removals generated by the project activity is not claiming compliance with an emissions trading program or to meet binding limits on GHG emissions.

Other Forms of Environmental Credit:

PP is not getting any other form of environmental credit. The same has been submitted as a declaration in company's letter head.

1.11 Sustainable Development Contributions

Contribution to sustainable development:

Ministry of Environment, Forest and Climate Change (MoEF&CC), has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

Social well-being:

The project helped in generating employment opportunities during the construction and operation phases. The project activity also led to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

Economic well-being:

The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits. The project activity also helps to reduce the demand supply gap in the state.

Technological well-being:

The successful operation of project activity led to promotion of hydro based power generation and would encourage other entrepreneurs to participate in similar projects. Hence the project activity is contributing towards SDG target 7.0, by generating 292,871 MWh of green power for the present monitoring period.

Environmental well-being:

Hydro being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Since the project activity is a hydro power project, it also helps in avoiding significant amount of GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities. Hence the project activity is contributing towards SDG target 13.0 by mitigating 251,283 tCO₂e for the present monitoring period.

The project activity fulfils SDG target 7.0 and 13.0 of SDG goals.

- **SDG 7.0:** According to SDG target 7.0, indicator 7.1, the project activity must ensure, “Ensure access to affordable, reliable, sustainable and modern energy for all”. The project activity is a run-of-the-river hydroelectric power project which does not require to create additional dam for storing water. Also, it is harnessing kinetic energy of flowing water of river for the generation of electricity which otherwise would have been generated from fossil fuel-based power plant. Hence it is clearly fulfilling SDG target 7.0 by generating 292,871 MWh of electricity for the present monitoring period.
- **SDG 13.0:** According to SDG target 13.0, it states “Take urgent action to combat climate change and its impact”. By mitigating 251,283 tCO₂e which is greenhouse gas, the project activity has contributed towards SDG target 13.0. for present monitoring period.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
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1)	7.0	Affordable and Clean Energy	Implemented activities to increase affordable and clean energy	By generating 292,871 MWh of renewable electricity the project activity ensures universal access to affordable, reliable and modern energy services.	Crediting Period	Generated Electricity (MWh)
					1 st Crediting Period	
					05-July-2001 to 31-March-2007	1,793,216.29
					01-April-2007 to 31-March-2008	336,092
					01-April-2008 to 31-March-2009	355,865
					01-April-2009 to 30-September-2009	241,634
					01-October-2009 to 31-March-2010	60,988
					01-April-2010 to 30-September-2010	264,437.490
					01-October-2010 to 30-June-2011	182,349.215
					2 nd Crediting Period	

05-July-2011 to 31-August-2012	464,733.54
01-September-2012 to 28-February-2015	733,049.16
01-March-2015 to 31-December-2018 ⁵	776,771.30
01-November-2020 to 04-July-2021	31,060.78
3 rd Crediting Period	
05-July-2021 to 31-October-2021	200,831.61
01-November-2021 to 31-October-2022	292,871
Total	5,733,899.38

⁵ The 10th VCS monitoring period is from 01-March-2015 to 31-December-2018. During this monitoring period, the durations during which I-REC has been issued, has been excluded for the VCU calculations. And VCUs only issued from 01-March-2015 to 31-December-2015, 01-July-2017 to 30-September-2017, 01-December-2017 to 31-December-2017 and 01-June-2018 to 31-December-2018 during this monitoring period.

2)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to decrease tons of CO ₂ into the atmosphere	By generating 292,871 MWh of renewable electricity, Malana Hydro has prevented the release of 251,283 tCO ₂ e of carbon-dioxide into the atmosphere during the monitoring period.		
					Crediting Period	Tonnes of GHG removed (tCO ₂ e)
					1 st Crediting Period	
					05-July-2001 to 31-March-2007	1,344,912
					01-April-2007 to 31-March-2008	252,069
					01-April-2008 to 31-March-2009	266,898
					01-April-2009 to 30-September-2009	181,223
					01-October-2009 to 31-March-2010	45,737
					01-April-2010 to 30-September-2010	198,328
					01-October-2010 to 30-June-2011	136,762
2 nd Crediting Period						

05-July-2011 to 31-August-2012	398,735
01-September-2012 to 28-February-2015	628,938
01-March-2015 to 31-December-2018 ⁶	666,460
01-November-2020 to 04-July-2021	92,863
3 rd Crediting Period	
05-July-2021 to 31-October-2021	178,137
01-November-2021 to 31-October-2022	251,283
Total	4,642,345

Link:<https://registry.verra.org/app/projectDetail/VCS/93>

⁶ The 10th VCS monitoring period is from 01-March-2015 to 31-December-2018. During this monitoring period, the durations during which I-REC has been issued, has been excluded for the VCU calculations. And VCUs only issued from 01-March-2015 to 31-December-2015, 01-July-2017 to 30-September-2017, 01-December-2017 to 31-December-2017 and 01-June-2018 to 31-December-2018 during this monitoring period.

2 SAFEGUARDS

2.1 No Net Harm

The guidelines on Environmental Impact Assessment have been published by Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India (GOI) under Environmental Impact Assessment notification 14-September-2006. Further amendments to the notification have been done on 14-August-2018⁷.

According to the notification for hydroelectric power generation, this project comes under category A, as the capacity is 86 MW. The Public Hearing was successfully completed and as per the recommendation of the Government of Himachal Pradesh, the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, has approved the EIA on 21-June-2005, vide letter no: J -12011/21/2005-IA-I. For a hydroelectric power project, the major concern is at the point of project implementation in regard to social, economic and environmental issues. Under the regulatory frame work, Environment Impact Assessment (EIA) study is mandatory for the project activity as clarified by the Host party namely Ministry of Environment and Forests, Government of India. In this regard MPCL has addressed and resolve the key issues which are necessary part of Environment Impact Assessment. The environmental impacts associated with the project activity are as follows:

Impact on Flora and Fauna

Project activity do not involve storage of large amount of river water hence there is no issue regarding to the submergence of the forests, fertile land or of the inhabited areas. The structure of project (including reservoir, barrage and other facilities) is not very big in size to cause any significant disturbance to the eco-system. No significant deforestation is required at the weir side location. Implementation of the scheme would help in conservation of forest by replacing the firewood for cooking and heating purposes with electricity.

Socio-Economic Impact

There is no rehabilitation and resettlement has been taken place by the project activity. No relocation of the human population occurred around the project activity. Project activity acquires small pieces of land for which adequate compensation was paid to the local villages; this compensation would help the local population to start new business in the nearby area.

15% of the generated electricity is being delivered to the state grid as royalty which will improve the power scene in the nearby area.

⁷ http://environmentclearance.nic.in/report/EIA_Notifications.aspx

Environment Pollution

Since it is hydro project so there is no issue regarding air pollution. On the other hand, power generation from the project will result in air quality improvement and emission reductions caused by burning of fossil fuels and firewood.

Impact of Noise Quality

Equipment's which are being used in project activity has the ability to keep the noise level below 90 dB for an exposure time of 8 hours as enforced by OSHA (Occupational Safety and Health Administration). During the construction phase, the personnel operating and stationed near the Heavy Earth Moving Vehicles and Concrete Mixing Machines provided with adequate Personal Protective Equipment (PPEs) to avoid damage to the health. The noise generated in the construction process did not have any significant impact on the ambient noise levels. Hence there is no significant noise impact has been observed.

The project activity will not have a significant negative impact on the surrounding. On the contrary, the project activity can reduce greenhouse gas emissions and environmental pollution caused by methane release.

2.2 Local Stakeholder Consultation

The mandatory Public Hearings according to Notification No. SO-318 (E) dated 10-04-1997⁸ issued by the Ministry of Environment & Forests, Govt. of India as a requirement for the Environmental Clearance, also been granted by the Ministry of Environment & Forests, Government of India, were convened by the HP State Environmental Protection & Pollution Control Board near the dam site in Ochin area in village Malana, District Kullu, in the state of Himachal Pradesh (H.P.) on 18-May-2004. Besides the common people of the project area, the public hearing has been attended by experts and officials from Department of Science & Technology, Government of India, District Collector, Fisheries Department of Himachal Pradesh State Government, Himachal Pradesh State Electricity Board, Himachal Pradesh State Pollution Control Board, Group of Senior Citizen, Gram Panchayat (village administration).

The stakeholders are also requested to share their experiences and grievances on continuous basis. Registers is used to records the grievances and feedback. During the current monitoring period, grievances has been received regarding site operation, which has been resolved on priority basis. As a part of continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks

⁸ <https://parivesh.nic.in/writereaddata/ENV/EnvironmentalClearance-General/20.pdf>

for stakeholder comments. For the global stakeholders, the suggestion and the grievance can be submitted to info@malanapower.com.

Following grievances has been raised and resolved

Name of the Stake-Holder	Bala Ram
Date	05-September-2022
Grievances Raised: Construction of Drain Action Taken: Construction of Drain has been completed.	

Name of the Stake-Holder	Shadu Ram
Date	20-September-2022
Grievances Raised: There were pit holes formed in the backside of the road of the power house. Action taken: Road concreting was done.	

Name of the Stake-Holder	Deep Chand
Date	24-October-2022
Grievance Raised: There is a problem of travelling due to darkness in village Road during night time, hence please provide lightning system. Action Taken: Solar lights has been installed in Chowki village for the walking of local resident.	

2.3 AFOLU-Specific Safeguards

This section is for afforestation/de-forestation. As this project comes under renewable energy category hence this section is not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project is a Run-of-the-river Hydro Electric Power project, located in the Malana Nallah (a tributary of Parbati River), near Malana village of Kullu District, State of Himachal Pradesh, India. This project has helped to reduced 251,283 tCO₂e during this current monitoring period. The project plant is of 86 MW (2 x 43 MW) and Unit-1 was commissioned on 09-July-2001 & Unit-2 was commissioned on 05-July-2001. The project is currently operational and generated 292,871 MWh of electricity for this current monitoring period. The technical specification of the project activity is given below.

Technical Specifications

Bharat Heavy Electricals Limited Power Sector – Northern Region Malana HEP	
Turbine Generators	1. Pelton Turbine 2. 2×43 MW TG SETS
1. Head Regulator	
Width of Head Regulator	14.25 m
No. of bays	4
Width of each bay	2.50 m
Thickness of piers	0.85 m
Orientation with respect to Barrage axis	117°
Regulation gates	2.50 m × 1.90 m vertical lift
Design discharge	26.25 cum/sec
2. DE-Silting Arrangement	
No. and Size of desilting chamber	4 no's, each of 102 m × 8.5 m

Particle size to be excluded	all particles down to 0.20 mm size
Flow through velocity	0.19 sec
Flushing velocity	6.0 m/sec.
Storage Reservoir Gross Storage	249000 cm
Full supply reservoir level	1893.60 m
Minimum reservoir level	1879.00 m
Type and height of boundary wall	Concrete gravity dam with height of 23.8 m

The project has been under operation since commissioning without any major breakdowns. Though normal breakdowns due to O&M measures are continuously being worked upon by the dedicated in-house O&M team for the project activity. The total breakdown hours are 46 hours and 31 mins, and the information has been provided in Appendix-3.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations raised during previous and current monitoring period.

3.2.2 Project Description Deviations

This deviation is related to calibration frequency of the project. At the time of registration, calibration frequency is once in a three year for parameter of EG_{Gen,Malana}. But at the time of project verification, it is observed that this meter is calibrated annually as per actual site practices. So, we have corrected the calibration frequency in section 4.2 & 4.3 of this monitoring report.

This deviation is of permanent nature and does not have any impact on the project applicability, scale, baseline scenario and additionality.

3.3 Grouped Projects

Project is not grouped project activity as per VCS guidelines.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{BM, grid, y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for Unified Indian Grid in the year y
Source of data	CO ₂ Baseline Database for the Indian Power Sector, User Guide (Version 17) ⁹ & 'Tool to calculate the emission factor for an electricity system' version 06.
Value applied	0.8120
Justification of choice of data or description of measurement methods and procedures applied	The value is taken from the database developed by Central Electricity Authority (CO ₂ Baseline database for the Indian power sector, Version 17.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system' version 06.
Purpose of Data	For the calculation of grid emission factor
Comments	CEA CO ₂ Baseline Database for most recent three years

Data / Parameter	EF _{OM, grid, y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for Unified Indian Grid in the year y
Source of data	CO ₂ Baseline Database for the Indian Power Sector, User Guide (Version 17) & version 06. (Version 17 ¹⁰) & 'Tool to calculate the emission factor for an electricity system' version 06.
Value applied	0.9940
Justification of choice of data or description of measurement methods and procedures applied	The value is taken from the database developed by Central Electricity Authority (CO ₂ Baseline database for the Indian power sector, Version 17.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system' version 06.
Purpose of Data	For the calculation of grid emission factor
Comments	CEA CO ₂ Baseline Database for most recent three years

Data / Parameter	EF _{CM, grid, y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for Unified Indian Grid in the year y

⁹ <https://cea.nic.in/cdm-co2-baseline-database/?lang=en>

¹⁰ <https://cea.nic.in/wp-content/uploads/tpecc/2022/02/UserGuidever172021.pdf>

Source of data	Grid emission factor calculation: $EF_{grid,CM,y} = 0.25 \times EF_{grid,OM,y} + 0.75 \times EF_{grid,BM,y}$ $= 0.25 \times 0.9522 + 0.75 \times 0.8120$ $= 0.8580 \text{ tCO}_2/\text{MWh}$ Values of OM and BM are taken from CEA User Guide, CO2 Baseline Database for the Indian Power Sector, Version 17 & 'Tool to calculate the emission factor for an electricity system' version 06.
Value applied	0.8580
Justification of choice of data or description of measurement methods and procedures applied	The value is taken from the database developed by Central Electricity Authority (CO2 Baseline database for the Indian power sector, Version 17.0). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'
Purpose of Data	For the calculation of grid emission factor
Comments	CEA CO ₂ Baseline Database for most recent three years

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Net Electricity supplied to the Unified Indian Grid by the project activity during the year y
Source of data	Meters installed at three locations, at generation point, plant sent out point and at Bajaura Substation, accurately monitors electricity supplied to the grid. Joint Meter readings taken at all three stations have been used to achieve the parameters EG _{PJ,y} .
Description of measurement methods and procedures to be applied	This is calculated value and formula for the same is given below under section of calculation method.
Frequency of monitoring/recording	Continuous Monitoring and Monthly Recording
Value monitored	292,871 MWh
Monitoring equipment	Calculated
QA/QC procedures to be applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department.
Purpose of the data	To calculate baseline emission.
Calculation method	$EG_y = [EG_{Malana} - EG_{Aux, Malana} - L_{Malana}]$
Comments	Data will be archived in electronic form for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter	EG _{Gen} , Malana	
Data unit	MWh	
Description	Energy generated by 86 MW Hydro Project in Himachal Pradesh at the Generation point.	
Source of data	Joint Meter Reading (JMR) by State Electricity Board (SEB)	
Description of measurement methods and procedures to be applied	Meter installed at the generation point shall be used to record this parameter. SEB take the reading on monthly basis and issue the JMR.	
Frequency of monitoring/recording	Monitoring Frequency: Continuous Recording Frequency: Monthly	
Value monitored	324,451	
Monitoring equipment	Type: Electricity Meter Accuracy Class of meters: 0.2s	
	Meter Sr No.	Meter Make Location of the Meter
	18168106	L&T Malana G-1 Main Meter
	HPU06253	Secure Malana G-1 Check Meter
	Q0333358 ¹¹	Secure Malana G-1 Check Meter
	18168111	L&T Malana G-2 Main Meter
	HPU06254	Secure Malana G-2 Check Meter
	Q0333416 ¹²	Secure Malana G-2 Check Meter
	The Calibration details of the Energy Meter has been mentioned in Appendix-I of the Monitoring Report.	
QA/QC procedures to be applied	Meters are maintained by state electricity board. These meters are calibrated once in a year and the records maintained by state electricity department.	
Purpose of the data	To calculate baseline emission.	
Calculation method	-	

¹¹ The old Check Meter with SL. No. HPU06253 was replaced with the new Check Meter with SL. No. Q0333358, which was calibrated and installed on 21-December-2021.

¹² ¹² The old Check Meter with SL. No. HPU06254 was replaced with the new Check Meter with SL. No. Q0333416, which was calibrated and installed on 21-December-2021.

Comments	-
Data / Parameter	EG _{Malana}
Data unit	MWh
Description	Energy supplied by the 86 MW Hydro Project in Himachal Pradesh to the Malana transmission line at Malana Yard.
Source of data	Calculated
Description of measurement methods and procedures to be applied	This is calculated value and formula for the same is given below under section of calculation method
Frequency of monitoring/recording	Monitoring Frequency: Continuous Recording Frequency: Monthly
Value monitored	323,921
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	To calculate baseline emission.
Calculation method	$EG_{Malana} = (EG_{Gen, Malana} - EG_{Aux, Malana})$
Comments	-

Data / Parameter	EG _{Toss}
Data unit	MWh
Description	The units/ Energy supplied by the Toss Hydro Power Project to the Malana transmission line at Malana Yard.
Source of data	Monthly meter readings issued by HPSEB
Description of measurement methods and procedures to be applied	Meter installed at the Malana yard shall be used to record this parameter
Frequency of monitoring/recording	Monitoring Frequency: Continuous Recording Frequency: Monthly
Value monitored	132,599 MWh
Monitoring equipment	Type: Electricity Meter Accuracy Class of meters: 0.2s

	Meter Sr No.	Meter Make	Location of the Meter
	KAU99437	L&T	Toss Incomer Main Meter
	Q0333437 ¹³	Secure	Toss Incomer Main Meter
	KAU99438	L&T	Toss Incomer Check Meter
	Q0333467 ¹⁴	Secure	Toss Incomer Check Meter
The Calibration details of the Energy Meter has been mentioned in Appendix-I of the Monitoring Report.			
QA/QC procedures to be applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department.		
Purpose of the data	To calculate baseline emission.		
Calculation method	-		
Comments	-		

Data / Parameter	EG _{M&T}		
Data unit	MWh		
Description	Total Energy sent out both Malana and Toss hydro power project to the Malana transmission line at Malana yard.		
Source of data	Joint Meter Reading (JMR) by SEB		
Description of measurement methods and procedures to be applied	Meter installed at the Malana yard shall be used to record this parameter.		
Frequency of monitoring/recording	Monitoring Frequency: Continuous Recording Frequency: Monthly		
Value monitored	456,520 MWh		
Monitoring equipment	Type: Electricity Meter Accuracy Class of meters: 0.2s		
	Meter Sr No.	Meter Make	Location of the Meter

¹³ The old Main Meter with SL. No. KAU99437 was replaced with the new Main Meter with SL. No. Q0333437, which was calibrated and installed on 21-December-2021.

¹⁴ The old Check Meter with SL. No. KAU99438 was replaced with the new Check Meter with SL. No. Q0333467, which was calibrated and installed on 21-December-2021.

	HPU05987	Secure	Malana Line-1 Main Meter
	HPU06607	Secure	Malana Line-1 Check Meter
	HPU05988	Secure	Malana Line-2 Main Meter
	HPU06608	Secure	Malana Line-2 Check Meter
	The Calibration details of the Energy Meter has been mentioned in Appendix-I of the Monitoring Report.		
QA/QC procedures to be applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department.		
Purpose of the data	To calculate baseline emission.		
Calculation method	-		
Comments	-		

Data / Parameter	EG _{Aux, Malana}
Data unit	MWh
Description	Auxiliary consumption by 86 MW Hydro Project in Himachal Pradesh
Source of data	Calculated
Description of measurement methods and procedures to be applied	This is calculated value and formula for the same is given below under section of calculation method.
Frequency of monitoring/recording	-
Value monitored	531 MWh
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	To calculate baseline emission
Calculation method	$EG_{Aux, Malana} = [EG_{Gen, Malana} + EG_{Toss} - EG_{M\&T}]$
Comments	-

Data / Parameter	EG Bajoura, M&T		
Data unit	MWh		
Description	Energy injected at Bajoura substation by both Malana and Toss hydro power project		
Source of data	Joint Meter Reading issued by SEB		
Description of measurement methods and procedures to be applied	Meter installed at the Bajaura Substation shall be used to record this parameter.		
Frequency of monitoring/recording	Monitoring Frequency: Continuous Recording Frequency: Monthly		
Value monitored	454,624		
Monitoring equipment	Type: Electricity Meter Accuracy Class of meters: 0.2s		
	Meter Sr No.	Meter Make	Location of the Meter
	KRB09865	Secure	Bajaura Line-1 Main Meter
	HPU06609	Secure	Bajaura Line-1 Check Meter
	HPU05989	Secure	Bajaura Line-2 Main Meter
	HPU06610	Secure	Bajaura Line-2 Check Meter
	The Calibration details of the Energy Meter has been mentioned in Appendix-I of the Monitoring Report.		
QA/QC procedures to be applied	Meters are maintained by state electricity board. These meters are annually calibrated and the records maintained by state electricity department		
Purpose of the data	To calculate baseline emission		
Calculation method	-		
Comments	-		

Data / Parameter	L _{Transmission}
Data unit	MWh
Description	Total transmission losses between Malana yard and Bajoura substation
Source of data	Calculated

Description of measurement methods and procedures to be applied	This is a calculated value and formula for the same is given below under section of calculation method.
Frequency of monitoring/recording	-
Value monitored	1,896 MWh
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	To calculate baseline emission
Calculation method	$L_{\text{Transmission}} = (EG_{\text{M\&T}} - EG_{\text{Bajaura,M\&T}})$
Comments	-

Data / Parameter	L_{Malana}
Data unit	MWh
Description	Share of losses of 86 MW Hydro Project in Himachal Pradesh
Source of data	Calculated
Description of measurement methods and procedures to be applied	This is calculated value and formula for the same is given below under section of calculation method.
Frequency of monitoring/recording	-
Value monitored	1,443
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	To calculate baseline emission
Calculation method	$L_{\text{Malana}} = \frac{L_{\text{Transmission}} \times EG_{\text{Malana}}}{EG_{\text{Bajaura,M\&T}}}$
Comments	-

Data / Parameter	L _{Toss}
Data unit	MWh
Description	Share of losses of Toss hydro power project
Source of data	Calculated
Description of measurement methods and procedures to be applied	This is calculated value and formula for the same is given below under section of calculation method.
Frequency of monitoring/recording	-
Value monitored	462.65
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	To calculate baseline emission
Calculation method	$L_{Toss} = \frac{L_{Transmission} \times EG_{Toss}}{EG_{Bajaura,M\&T}}$
Comments	-

Data / Parameter	A _{PJ}
Data unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Description of measurement methods and procedures to be applied	Measured from topographical surveys, maps, satellite pictures, etc.
Frequency of monitoring/recording	Yearly
Value monitored	18,250
Monitoring equipment	-

QA/QC procedures to be applied	-
Purpose of the data	-
Calculation method	-
Comments	-

Data / Parameter	CapPJ
Data unit	W (Watt)
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Description of measurement methods and procedures to be applied	Determine the installed capacity based on recognized standards
Frequency of monitoring/recording	Yearly
Value monitored	86,000,000
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	-
Calculation method	-
Comments	-

4.3 Monitoring Plan

Project Management Plan:

A team is constituted with participation from relevant departments. People are trained on concept and monitoring plan. This team is responsible for data collection and archiving. This team meet periodically to review project activity check data collected; emissions reduced etc. On a weekly basis, the monitoring reports is checked and discussed by the seniors and team members/managers. In case of any irregularity observed, it will be informed to the concerned

person for necessary actions. On monthly basis, these reports are forwarded at the management level.

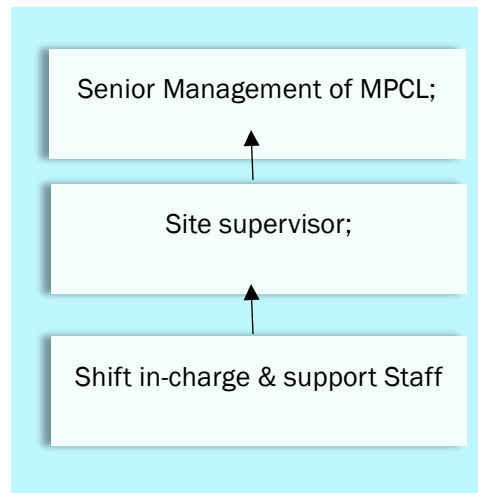


Figure 1 – Project Management Plan

Senior Management of MPCL/Technical Head: Overall responsibility of compliance with the monitoring plan.

Site Supervisor: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation.

Shift In-charge: Responsibility of daily report generation

Data Monitoring:

The methodology requires monitoring of the following:

- Electricity generation from the project activity

Energy supplied to Grid

The energy supplied to grid is measured using electricity meters located at Bajaura substation.

The net electricity supplied is measured as

$$EG_y = \text{Total Generation} - \text{Auxiliary Consumption} - \text{Transmission Losses}$$

In the current practice another hydroelectric power project (Toss) was allowed to utilize the Malana –Bus for sending out the generated electricity. A common meter is now being used to measure the electricity being sent out by Malana and Toss collectively at Malana Yard. Since there is a common meter for measuring the electricity sent out from Malana Bus Bar hence now the calculation of auxiliary consumption and transmission losses are based on combined energy sent out & combined energy injected at Bajaura Sub Station. The calculation for auxiliary

consumption and transmission losses for Malana HEP is described in the section 4.1 & data and parameters is described in section 5.2 of the VCS Joint PD&MR. Calculation is based on the authenticated Letter issued by HPSEB, 12-October-2009.

Gross generation at Malana is being measured by meter at generation point. The source of values taken for this parameter is the Joint Meter Reading (JMR). Energy sent out by Toss is measured by meter at the Toss incoming line, the meter readings are recorded and maintained by HPSEB.

The total energy sent out by Malana and Toss combined is measured by meter at Malana Bus, the source for these values is the JMR. The total energy injected at Bajoura substation by Malana and Toss combined is measured by meter at Bajoura substation. Auxiliary consumption and the share of transmission loss by Malana are calculated as per formula given in section 4.1. The total energy injected by Malana at Bajoura substation is calculated by subtracting the auxiliary consumption and Malana's share of transmission loss from the Gross generation by Malana.

Completeness-

For Electricity generation data: The project activity has installed the latest state-of-art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Real time data has been collected using these control systems. An hourly log of data is also maintained by the shift in-charge. A daily report of aggregation of these data were also being prepared. Parameters monitored are the total power generated, power exported to the grid and auxiliary power consumed (other parameters like head availability, grid issues, frequency etc is being maintained hourly in the log).

Reliability-

For electricity generation data: automatic control meters for power generation and exports are regularly maintained. The regular plant operating & maintenance procedures will also include process of regular meter testing, calibration & maintenance. All these meters are calibrated & tested before installation and the calibration of meters is done once in a year at Government of India Lab Actual power generation data were also metered using power output meter at the substation. The billing invoices for the power sold and meter readings were used to validate the data accuracy.

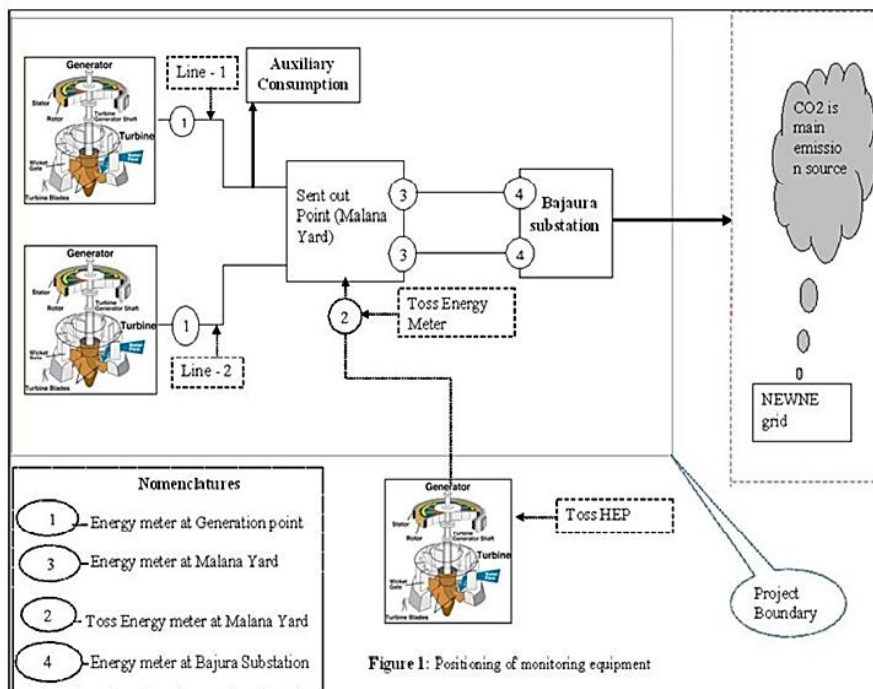
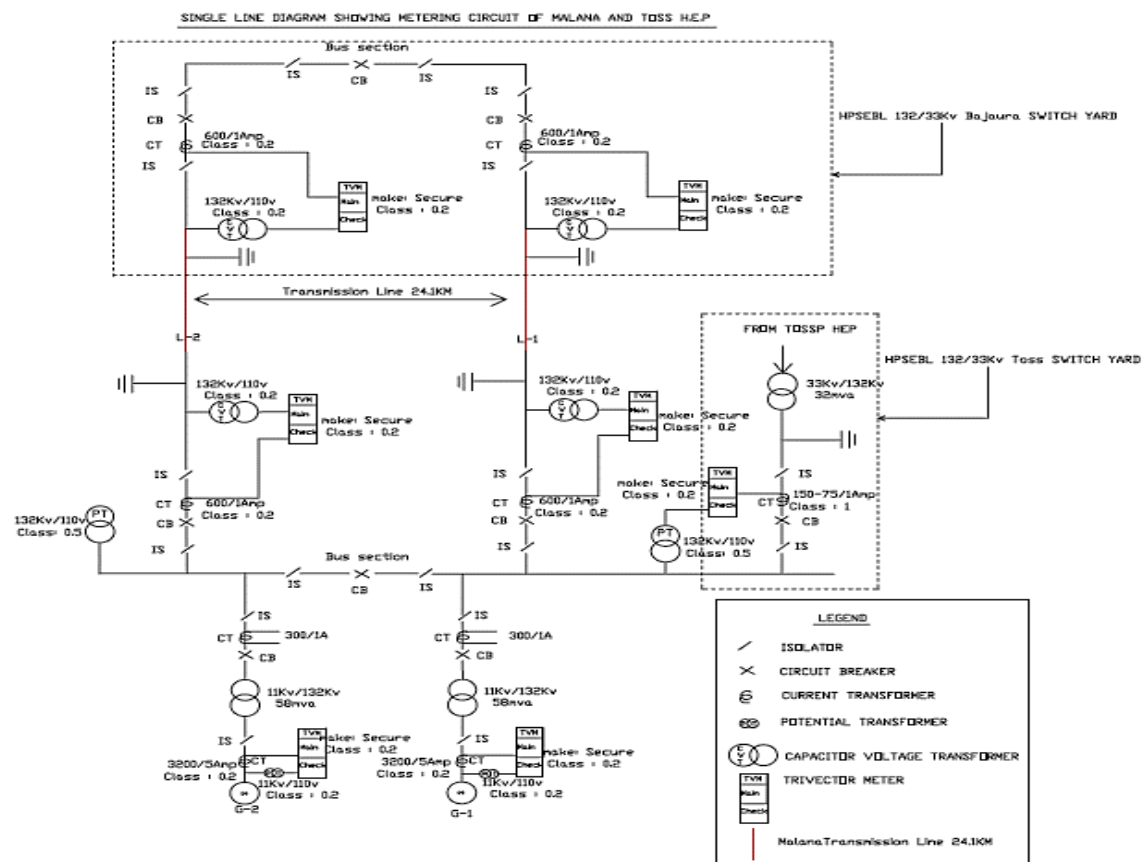


Figure 1: Positioning of monitoring equipment



Frequency-

The measurement is recorded and monitored on a continuous basis. An hourly log is prepared by the shift in-charge. At the end of the day, hourly data is aggregated in a daily report. The meters to be provided shall be of 0.2 accuracy class.

Training-

Training needs have been identified in registered Joint PD&MR; however, the group is already operating a plant in Manikaran valley & experienced staff will be available for plant O&M.

Internal audits of project compliance-

Audits are carried out to check the correctness of procedures and data monitored by the internal auditing team entrusted for the work.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to para 5.5. Baseline emissions of ACM0002, Version 20.0¹⁵,

Baseline Emission from 01-November-2021 to 31-October-2022,

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

Where,

BE_y = Baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$ = Net Electricity supplied to the Unified Indian Grid by the project activity during the year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid factor for grid connected power generation in year y calculated using TOOL 07 (tCO₂/MWh)

$$= 292,871 * 0.858 \text{ tCO}_2\text{e/MWh}$$

$$= 251,283 \text{ tCO}_2\text{e (Rounded Down Value)}$$

¹⁵ <https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO>

5.2 Project Emissions

According to sub-section (c) of para 38 of ACM0002, Ver-20.0

The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation $\left(PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}\right)$, is greater than 10 W/m²

$$\frac{86000000 \text{ W}}{18250 \text{ m}^2}$$

$$= 4,712.32 \text{ W/m}^2$$

As the calculated value from the given equation is 4,712.32 W/m² which is greater than 10m², so as per applied methodology for the project activity, there would not be any project emission.

5.3 Leakage Emissions

No leakage emissions are considered for the proposed project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity. Therefore, as specified in ACM0002, Version 20.0, project participants do not need to consider leakage.

Hence, LE_y=0.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01-November-2021 to 31-December-2021	15,038	0	0	15,038
01-January-2022 to 31-	236,245	0	0	236,245

October-2022				
Total	251,283	0	0	251,283

Monitoring Period	From	To
No. of days of current monitoring period	01-November-2021	31-October-2022
	365 days	
Net CO ₂ reduce	251,283 tCO ₂ e	
Annual estimated emission reduction as per as PDD	284,269 tCO ₂ e	
Change in emission reduction	-13.13%	

APPENDIX 1: METER CALIBRATION DETAILS

S.No.	Meter No	Make	Accuracy	Check/ Main	Location	Purpose	Date of Calibration	Due date of Calibration
1	Q0333358	Secure	0.2s	Check	Generating Point (Malana G-1 Check Meter)	To Measure EG _{Gen,Malana}	28-April-2022	27-April-2023
2	Q0333416	Secure	0.2s	Check	Generating Point (Malana G-2 Check Meter)	To Measure EG _{Gen,Malana}	28-April-2022	27-April-2023
3	18168106	L&T	0.2s	Main	Generating Point (Malana G-1 Main Meter)	To Measure EG _{Gen,Malana}	28-April-2022	27-April-2023
4	HPU06253	Secure	0.2s	Check	Generating Point (Malana G-1 Check Meter)	To Measure EG _{Gen,Malana}	04-August-2021	03-August-2022
5	18168111	L&T	0.2s	Main	Generating Point (Malana G-2 Main Meter)	To Measure EG _{Gen,Malana}	28-April-2022	27-April-2023
6	HPU06254	Secure	0.2s	Check	Generating Point (Malana G-2 Check Meter)	To Measure EG _{Gen,Malana}	04-August-2021	03-August-2022
7	HPU05987	Secure	0.2s	Main	Sarabai Transmission Line at Jari (Malana Line-1 Main Meter)	To Measure EG _{M&T}	28-April-2022	27-April-2023
8	HPU06608	Secure	0.2s	Check	Sarabai Transmission Line at Jari (Malana Line-2 Check Meter)	To Measure EG _{M&T}	28-April-2022	27-April-2023

9	HPU06607	Secure	0.2s	Check	Sarabai Transmission Line at Jari (Malana Line-1 Check Meter)	To Measure EG _{M&T}	28-April-2022	27-April-2023
10	HPU05988	Secure	0.2s	Main	Sarabai Transmission Line at Jari (Malana Line-2 Main Meter)	To Measure EG _{M&T}	28-April-2022	27-April-2023
11	HPU06609	Secure	0.2s	Check	Sarabai Transmission Line at Sarabai (Bajaura Line-1 Check Meter)	To Measure EG _{Bajoura,M&T}	04-August-2021	03-August-2022
12	KRB09865	Secure	0.2s	Main	Sarabai Transmission Line at Sarabai (Bajaura Line-1 Main Meter)	To Measure EG _{Bajoura,M&T}	04-August-2021	03-August-2022
13	HPU05989	Secure	0.2s	Main	Sarabai Transmission Line at Sarabai (Bajaura Line-2 Main Meter)	To Measure EG _{Bajoura,M&T}	04-August-2021	03-August-2022
14	HPU06610	Secure	0.2s	Check	Sarabai Transmission Line at Sarabai (Bajaura Line-2 Check Meter)	To Measure EG _{Bajoura,M&T}	04-August-2021	03-August-2022
15	Q0333437	Secure	0.2s	Main	Toss	To Measure EG _{Toss}	21-December-2021	20-December-2022

16	Q0333467	Secure	0.2s	Check	Toss	To Measure EG _{Toss}	21- December- 2021	20- December- 2022
17	KAU99437	L&T	0.2s	Main	Toss	To Measure EG _{Toss}	15-January- 2021	14- January- 2022
18	KAU99438	L&T	0.2s	Check	Toss	To Measure EG _{Toss}	15-January- 2021	14- January- 2022

APPENDIX 2: METER CHANGE

Removed				Installed				Location
Make	Meter Serial Number	Accuracy Class	Date of removal	Make	Meter Serial Number	Accuracy Class	Date of installation	
Secure	HPU06253	0.2s	21-December-2021	Secure	Q0333358	0.2s	21-December-2021	Generating Point Malana G-1 Check Meter
Secure	HPU06254	0.2s	21-December-2021	Secure	Q0333416	0.2s	21-December-2021	Generating Point Malana G-2 Check Meter
L&T	KAU99437	0.2s	21-December-2021	Secure	Q0333437	0.2s	21-December-2021	Toss Incomer Main Meter
L&T	KAU99438	0.2s	21-December-2021	Secure	Q0333467	0.2s	21-December-2021.	Toss Incomer Check Meter

APPENDIX 3: BREAKEDOWN DETAILS

Month	Date	Unit No.	Planned /Forced	E/M/ OTH	Duration in hrs.			Reason
					From	To	Total	
Nov-21	-	-	-	-	-	-	-	-
Dec-21	-	-	-	-	-	-	-	-
Jan-22	-	-	-	-	-	-	-	-
Feb-22	-	-	-	-	-	-	-	-
March-22	-	-	-	-	-	-	-	-
April-22	-	-	-	-	-	-	-	-
May-22	13	1	P	M	07:15	13:00	5:45	Planned S/D for Unit - 1 Runner replacement work
	26	1	P	M	10:30	10:50	0:20	Planned shutdown for PPV Operation Check.
		2			10:30	10:50	0:20	
							6:25	
Jun-22	8	2	P	M	7:00	14:45	7:45	Planned S/D for Unit - 2 Runner replacement work
	11	2	F	O	18:03	18:31	0:28	Grid failure
							8:13	
Jul-22	1	1	F	O	13:28	13:38	0:10	Grid failure

		2	F	O	13:28	13:39	0:11	
							0:21	
Aug-22	19	1	F	O	22:24	22:43	0:19	Grid failure
		2	F	O	22:24	22:44	0:20	
							0:39	
Sep-22	7	1	P	M	08:30	14:00	5:30	Planned S/D for Unit - 1 Runner replacement work
	16	2	P	M	09:00	12:05	3:05	Planned S/D for Unit - 2 Spear & Liner replacement work
	21	1	F	O	14:00	14:26	0:26	Grid failure
		2			14:00	14:31	0:31	
	23	1	P	M	09:10	12:00	2:50	Planned S/D for Unit - 1 Spear & Liner replacement work
	28	2	P	M	09:05	14:30	5:25	Planned S/D for Unit - 2 Runner replacement work
							17:47	
Oct-22	10	1	F	O	20:55	21:18	0:23	Grid failure
		2	F	O	20:55	21:20	0:25	
							0:48	
Total Hours							46:31	

APPENDIX 4: CALCULATION LETTER

The methodology is illustrated as under,

1. Let the Generation at Malana be (EG)= A (as per JMR)
2. Transformation + Auxiliary Consumption at Malana HEP= (not available, computed from back calculation) $B = (A + C) - D$ (Reading)
3. Toss energy at Malana end,= available at Malana end) C (As per reading of meter)
4. Energy Sent out from Malana HEP= I.e Ex. Bus (ET+EM) (ET=Energy Toss, EM=Energy Malana) D (As per JMR)
5. Energy received at Bajaura,= Including Toss Energy. E (As per JMR)
6. Combined Line losses at 132 Kv = D/C Malana to Bajaura Line in respect of both Malana & Toss HEPs. $D - E$
7. Share of Malana HEP being transmitted through 132 kv D/C line (ES) = $A - B = F$
8. Share of Toss HEP being transmitted through 132 kv D/C line = C
9. Line loss from Malana to Bajaura will be shared in the ratio of energy being sent out from Malana HEP. = $(A - B) : C = F : C$
10. Line losses upto Bajaura in respect of Malana = $F / (F + C) * (D - E) = G$
11. Energy received at Bajaura of Malana HEP (EI) = $(F - G)$

Thus using the parameters derived at Sr. No. 1, 7, 11 further calculations for deliverable energy, Free Power, remaining energy for computation of Wheeling charges shall be carried out as per the methodology of the existing Agreement. However, C. E. (Comm.) shall supply a copy of JMR of Toss energy every month to Director (I/S) office to facilitate further computation of Malana Power in line with the methodology as per existing agreement.

The same methodology and principle shall also be adopted for working out the UI transactions in 15 minute time block for underdrawl and overdrawl by M/S MPCL from HPSEB's system.

3. The transmission Charges for wheeling Toss power on 132kV D/C Malana- Bajaura and sharing of O&M Charges for new 33/132kV HPSEB Sub-Station at Malana, shall be finalized by Chief Engineer (Comm) in view of the existing agreement and in consultation with Director (IS) and Chief Engineer (T).

The meeting ended with vote of thanks to Chair.