3.5 MW MANUNI HYDRO ELECTRIC PROJECT IN HIMANCHAL PRADESH BY WINSOME TEXTILE INDUSTRIES LTD

Document Prepared by-PA Research & Consultants Pvt. Ltd.

Project Title	3.5MW Manuni Hydro Electric Project in Himanchal Pradesh by Winsome Textile Industries Ltd
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Winsome Textile Industries Ltd. (hereinafter also called as WTIL), a leading manufacturer of textile product, started its operations in 1980 in Baddi, Himanchal Pradesh, India. WTIL has given special stress to minimise contamination, both at pre-spinning and post-spinning stages by adding machines like Vision Shield in Blow Room and Schlafhorst-338 with LOEPFE - 9001 (SIRO CLEANER) Contamination Control Channel at winding stage. Further addition was to generate renewable electricity for captive consumption to minimise carbon foot print in long term.

The project activity is power generation from a 3.5 MW hydroelectric project based on Manuni Khad stream, a tributary of river Beas at village Khaniara, Dharamshala, District Kangra, Himachal Pradesh. The project activity is a run-of-river project being developed by M/s Winsome Textile Industries Ltd. The project activity comprises 2 Numbers of Pelton Turbines each with a generator output capacity of 1750 kW for generation of electricity.

The project was allotted to the M/s Winsome Textile Industries Ltd. on a Build, Own, Operate and Maintain (BOOM) basis for a period of 40 years. Wheeling and Banking Agreement (PPA) has been signed with the Himachal Pradesh State Electricity Board (HPSEB), the generated electricity is being used for captive consumption at its manufacturing unit Baddi.

The purpose of the project activity is to produce renewable energy using hydro power for captive consumption. In the absence of the project activity equivalent amount of electricity would have been generated by the operation of grid connected fossil fuel based power plants. The Project activity thus reduces the anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation from the fossil fuel based grid connected power plant.

The project activity has started construction in 2011 and commissioned both the turbine on 31/03/2017. The project activity is operational since commissioning with planned outage and maintenance. The project activity has injected 31857.22 MWh electricity to grid during current monitoring period i.e. from 31/03/2017 to 31/12/2019, which has resulted **29477** tCO_2e GHG emission reduction.

1.2 Sectoral Scope and Project Type

Sectoral scope-01, Energy Industries (Renewable -/non renewable sources)

Project Type-I Renewable Energy Project

The project activity is not a grouped project.

1.3 Project Proponent

Organization name	Winsome Textile Industries Ltd.
Contact person	Mr Sanjeev Mittal
Title	General Manager-Electrical & Electronics
Address	1, Industrial Area, Baddi, Himanchal Pradesh, India
Telephone	+91 70180 13078
Email	smittal@winsometextile.com

1.4 Other Entities Involved in the Project

Organization name	PA Research & Consultants Pvt. Ltd.
Role in the Project	Consultant
Contact person	Mr Phool Chand
Title	Director
Address	317, Vardhman Star Mall, Sector-19, Faridabad-121002, Delhi NCR, India
Telephone	+91 129 4013677
Email	pchand@pars-consultants.com

1.5 Project Start Date

The start date of the project activity is 31 March 2017, which is date of commissioning of the turbines.

1.6 Project Crediting Period

Crediting period start date: 31/03/2017

VCS Project crediting period: 10 years, this may be renewed at most twice.

First Crediting period: 31/03/2017 - 30/03/2027

1.7 Project Location

The proposed project activity is located at Village Khaniyara, Dharmashala in Kangra Dsirtict, Himanchal Pradesh, India . The Project site is connected by roads to the nearest town. The nearest airport is Dharamshala around 40 Km.

The physical address and geographic co-ordinate of project site is provided above.

Geo-coordinates are 32^0 11' 30" N 76^0 11' 30" E.

1.8 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied;

Title: Type-I, Renewable Energy Project

Methodology: I.D- Grid connected renewable electricity generation

Version: 18, valid from 28/11/2014. Scope: 01, EB 81 Annex-14

Reference:

http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

The tools referenced in this methodology used for the proposed project includes:

- Tool to calculate the emission factor for an electricity system Version 07.0.0, Annex 4 of EB 100
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Version 03, Annex 3, EB93.
- Tool to Demonstrate Additionality of Small-Scale Project Activities (Version 12.0);
- Investment Analysis Version-09, Annex-11 of EB101

Guidelines:

- General guidelines for SSC CDM methodologies, Version 22.1, EB 86, Annex 13. (https://cdm.unfccc.int/filestorage/6/5/K/65KI3DW9YAQ4BN82P1FTSVCHE0XMRZ/eb86_repan13.pdf?t=b0I8cTYxdzZhfDD_kjeW0gGKmpol8aT7NJlH)[1]

[1] Version 22.1 was created due to Editorial revision to correct paragraph numbering in Version 22.0, the same can be checked with Version-23 available https://cdm.unfccc.int/Reference/Guidclarif/index.html

1.9 Participation under other GHG Programs

The project activity has not been registered, or seeking registration under any other GHG programs. The project has not participated under any other GHG program.

1.10 Other Forms of Credit

PP declares that emission reductions generated from the project activity will not be double counted (i.e. issuance of other form of environmental credit like under CDM) for the particular crediting period, which is being claimed under VCS mechanism. PP has submitted an undertaking to the VVB that they shall not claim for GHG emission reduction credits for the given period under any other emission-trading program.

1.11 Sustainable Development

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines[2] for CDM projects.

1. Social well-being
2. Economic well-being
3. Environmental well-being
4. Technological well-being

1. Social well-being:

The proposed project activity leads to alleviation of poverty by establishing direct and indirect employment opportunities up to 20 numbers via improved economic activity. It also strengthens the provision of electricity to local grid of the state electricity utility. The project improves the quality, frequency and availability of electricity which is being fed into a power-deficit grid. Thus, the provision of electricity through the project activity has a direct and positive impact on the local residents of the area.

2. Economic well-being:

With the proposed project activity, employment opportunities has increased in the local area, thereby improving economic conditions of the local population. The project has created indirect employment opportunities for skilled and unskilled workers during construction, which otherwise would not happen in the absence of the project. In addition, the project also creates direct permanent employment for operation of the project. By promoting the decentralization of economic power, the project contributes in bringing economic sustainability around the plant site.

[2] Ministry of Environment and Forest web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

3. Environmental well-being:

The project utilizes hydro energy for generating electricity which otherwise would have been generated through conventional fuel based power plants, thereby contributing to the reduction of associated GHG emissions (emissions of pollutants per unit of energy generated). The hydro power projects do not have end products in the form of solid waste (ash etc.) thereby, further contributing to the environmental sustainability.

4. Technological well-being:

The project has helped achieving economies of scale for small hydro projects and will contribute to the development of an infrastructure that can support such technologies. The project activity does not involve the technology transfer from any country.

In view of the above, the PP has considered that the project activity profoundly contributes to the sustainable development.

2 SAFEGUARDS

2.1 No Net Harm

The facility does not produce any pollution in process of power generation as it utilizes renewable energy source that is hydro energy to generate electricity for captive consumption. Hence there is positive impact on the environment due to this small-scale project activity of reducing the pollution caused by fossil fuels would have been used in baseline scenario. Further this project will have no air pollution, no water pollution and no noise pollution.

The project activity has obtained the No Objection Certificate for Consent to Establish from the concern agencies

2.2 Local Stakeholder Consultation

During current monitoring period no complains raised by stakeholders, also no issues were identified in previous stakeholder meeting, which requires change in process or mitigation measures. The project participant has shared the contact details of site in-charge and as per procedure any stakeholder can interact or drop complaint related to project activity if any, which will be analyzed by PP for if any action required. No negative comments/complaint raised during current monitoring period.

2.3 AFOLU-Specific Safeguards

Not applicable as its renewable energy project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity was commissioned on 31/03/2017 and operational since then. The project activity was operational with planned operation and maintenance during current monitoring period i.e. from 31/03/2017 to 31/12/2019. There were no incidents occurred during current monitoring period, which may impact applicability of monitoring methodology and GHG emission reduction calculation. The project activity is operated as per detailed provided in registered VCS PD.

There were no major shutdown during current monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

No deviation in the methodology has been applied to the project activity during the monitoring period.

2.3.2 Project Description Deviations

The project activity is implemented and operated as per registered VCS PD and no deviation taken during current monitoring period.

3.3 Grouped Projects

The project activity is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor for the Indian Grid in year y

Source of data	CEA's "Baseline Carbon Dioxide Emission Database Version 13.0"
Value applied	0.97839
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with "Tool to calculate the emission factor for an electricity system (Version 07.0.0)" using data from Central Electricity Authority of India's (CEA) "Baseline Carbon Dioxide Emission Database Version 13.0". The value used is calculated ex-ante as generation based weighted average of last three years of the operating margin provided in the CEA database. Weighted average $= \sum_{i=1 \text{ to } n}$ (Net generation in operating margin in year i * Simple operating margin in year i)/$\sum_{i=1 \text{ to } n}$ (Net generation in operating margin of year i).
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor for the India Grid in year y
Source of data	CEA's "Baseline Carbon Dioxide Emission Database Version 13.0"
Value applied	0.870
Justification of choice of data or description of measurement methods and procedures applied	Calculated in line with "Tool to calculate the emission factor for an electricity system (Version 07.0.0)" using data from Central Electricity Authority of India's (CEA) "Baseline Carbon Dioxide Emission Database Version 13.0". The value is calculated ex-ante as most recent build margin provided by the CEA.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor for the India Grid in year y
Source of data	Central Electricity Authority(CEA) of India Database Version 13.0
Value applied	0.9254

Justification of choice of data or description of measurement methods and procedures applied	This has been calculated based on Operating Margin (OM) and Build Margin (BM) published by Central Electricity Authority (CEA) of India.
Purpose of Data	Calculation of baseline emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$NCV_{diesel, y}$
Data unit	GJ per mass or volume unit
Description	Net calorific value of diesel
Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	43.3 GJ/Ton
Justification of choice of data or description of measurement methods and procedures applied	Fuel supplier does not provide emission factor in their invoices and also this parameter value is not available top through measurement. Also Regional or national default values are not available. Hence IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. This is in line with Methodological tool "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 3.0). In case of density is required, the same is considered as 0.83 Kg/Lit as per CEA database version 12.
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante.

Data / Parameter	$EF_{CO2,diesel, y}$
Data unit	tCO_2/TJ
Description	CO_2 Emission Factor of Diesel
Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	74.8

Justification of choice of data or description of measurement methods and procedures applied	Fuel supplier does not provide emission factor in their invoices and also this parameter value is not available top through measurement. Also Regional or national default values are not available. Hence IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. This is in line with Methodological tool "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 3.0).
Purpose of Data	Calculation of project emissions
Comments	The value is fixed ex-ante.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,Y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data	ABT Meter Report by MRI
Description of measurement methods and procedures to be applied	The value of net electricity generation supplied to the grid as per ABT Meter Report by MRI forms the basis for calculation of the emission reductions. Monthly meter readings are taken from the main and check meter installed at metering point and certified by the representatives of SEB Officials and the representatives of the project proponent.
Frequency of monitoring/recording	Continuous monitoring, Monthly recording
Value monitored	31857.22
Monitoring equipment	Previous meter-Tri-vector

	Main Meter	Check Meter
Make	L&T	L&T
Type	ER300P	ER300P
Serial Number	10281860	13192191
Accuracy class	0.2s	0.2s
Date of Calibration	20/02/2017	20/02/2017

<table>
<tr><td></td><td>
<table>
<tr><td>Validity</td><td>1 year</td><td>1 year</td></tr>
</table>

The above meters being replaced dated 01/02/2018 by ABT meters as per details below
<table>
<tr><td></td><td>Main Meter</td><td>Check Meter</td></tr>
<tr><td>Make</td><td>Secure</td><td>Secure</td></tr>
<tr><td>Type</td><td>3 phase 4W</td><td>3 phase 4W</td></tr>
<tr><td>Serial Number</td><td>HPU06489</td><td>HPU06490</td></tr>
<tr><td>Accuracy class</td><td>0.2s</td><td>0.2s</td></tr>
<tr><td>Date of Calibration</td><td>23/12/2017</td><td>23/12/2017</td></tr>
<tr><td>Validity</td><td>5 years</td><td>5 years</td></tr>
</table>
</td></tr>
<tr><td>QA/QC procedures to be applied</td><td>The calibration of all the meters is being undertaken at required intervals specified by DISCOM/CEA and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2. The meter accuracy class and calibration interval is under purview of state electricity board and PP do not have any control on it.</td></tr>
<tr><td>Purpose of the data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Calculation method</td><td>Monitored</td></tr>
<tr><td>Comments</td><td>Data will be archived for crediting period +2 years</td></tr>
</table>

Data / Parameter	$QC_{diesel,y}$
Data unit	Liters
Description	Volume of diesel used in year y
Source of data	Plant log book
Description of measurement methods and procedures to be applied	The volume of diesel used is monitored based on each filling using gallon of fixed volume. The same is cross-checked with purchase invoice and stock.
Frequency of monitoring/recording	Each filling and monthly aggregation
Value monitored	647
Monitoring equipment	Volume gallon
QA/QC procedures to be applied	NA
Purpose of the data	*Calculation of project emissions*

Calculation method	Monitored
Comments	Data will be archived for crediting period +2 years

4.3 Monitoring Plan

This monitoring plan is developed in accordance with the modalities and procedures for small-scale VCS project activities and in line with the guidance provided in the applied methodology. The monitoring plan, which will be implemented by the project proponents, describes about overall monitoring organization, Internal reporting procedure for data collection and archiving, Calibration of measurement equipment's, Training procedures and internal audit procedures.

Data and parameters, which will be monitored under this monitoring plan as sited in 4.2 will be measured and strictly monitored at the project site by means of accurately calibrated instruments.

The monitoring plan structure and the roles of the different member in the monitoring plan are explained below.

Internal reporting procedure: Technicians and operators are responsible for the recording of the relevant data in plant log books. Shift in-charges are also responsible of QA/QC of data recorded and maintenance of log-books and other records.

These records in plant log books will consolidate in the form of monthly GHG report by plant supervisor and will be submitted to plant manager for review. The Management, who represents the overall responsibility on the project activity, will be able, with this operational structure, to monitor the development of the project activity and make the relevant amendments to the process.

The VCS monitoring team will compose the following staff:

Position	Report to:
Operators	Site Engineer
Site Engineer	Site In-charge
Site In-charge	General Manager
Plant head	Director

Monitoring Provisions

Training and Maintenance:

All persons that form the part of the VCS Project Management Team shall receive appropriate training which shall provide an overview of the VCS and cover all elements of monitoring plan in detail. Training for operating and maintaining the plant shall also be provided.

Emergency Preparedness:
Being a small hydro plant intensive emergency preparation is not needed, however, the following may be highlighted:

- There are no critical loads that may require emergency power supply in case of total outage.
- A fire extinguisher has been installed in case of small fires
- Information regarding any safety earthing systems in place

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{CO2,grid,y}$

Where,

$EG_{PJ,y} = EG_{PJ,facility,y}$

$EG_{PJ,y}$ =31857.22 MWh/year

$EF_{CO2,grid,y} = EF_{CM,y}$ =0.9254 tCO_2e/MWh

Monthly electricity supplied to grid during current monitoring period i.e. from 31/03/2017 to 31/12/2019 is give below

	$EG_{PJ,y}$ in MWh		
Month	2017	2018	2019
January	--	170.400	290.355
February	--	248.526	1031.585
March	11.800	419.729	1334.783
April	778.400	535.977	1722.492
May	710.200	639.999	1230.822
June	1178.800	700.916	993.380

July	1682.800	1548.164	1723.314
Aug	1678.600	1549.144	2125.383
September	1512.000	1439.461	1255.090
October	838.800	1108.947	931.652
November	296.000	505.089	430.631
December	328.400	296.331	609.251
Total	**9015.800**	**9162.683**	**13678.738**

Hence, baseline emission for year 2017

BE_y(2017)= 9015.800 x0.9254 = 8343.22 tCO_2e

BE_y(2017)= 8343 tCO_2e (rounded down)

Baseline emission for year 2018

BE_y(2018)= 9162.683 x0.9254 = 8479.15 tCO_2e

BE_y(2018)= 8479.15 tCO_2e (rounded down)

Hence, baseline emission for year 2019

BE_y(2019)= 13678.738 x0.9254 = 12658.30 tCO_2e

BE_y(2019)= = 12658 tCO_2e (rounded down)

Total baseline emission during current monitoring period i.e. 31/03/2017 to 31/12/2019

BE_y= 29480 tCO_2e

5.2 Project Emissions

The diesel consumption during current monitoring period was 647 litres, which results around 1.5 tCO_2e, the project emissions during current monitoring period are calculated as per tool referred in registered PDD using equation below

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times CO_{EFi,y\,i}$$

Where,

$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)

$FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)

$CO_{EFi,y,i}$= Is the CO2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)

i = Are the fuel types combusted in process j during the year y (diesel in project case)

Where,

$CO_{EFi,y,i}$= $NCV_{i,y}$ x $EF_{CO2,I,y}$

$NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

$EF_{CO2,I,y}$ = Is the weighted average CO2 emission factor of fuel type i in year y (tCO_2/GJ)

Where,

$NCV_{i,y}$ = 43.3 GJ/Ton (IPCC default values)

$EF_{CO2,diesel,y}$ = 74.8 tCO_2/TJ (IPCC default values)

Density of diesel =0.84 Kg/liter

$PE_{FC,diesel,y}$= $FC_{diesel,j,y}$ x $NCV_{diesel,y}$ x $EF_{CO2,diesel,y}$

Quantity of diesel used during current monitoring period i.e. from 31 March 2017 to 31 Dec 2019.

Year	2017	2018	2019
Diesel consumption (Liters)	251	201	195

Project emission in year 2017:

$PE_{FC,diesel,2017}$= 251 x 43.3 x 74.8 x 0.84 x 10^-6

$PE_{FC,diesel,2017}$= 0.682 tCO_2e

$PE_{FC,diesel,2017}$= 1.0 tCO_2e (rounded up)

Project emission in year 2018:

$PE_{FC,diesel,2018}$= 201 x 43.3 x 74.8 x 0.84 x 10^-6

$PE_{FC,diesel,2018}$= 0.546 tCO_2e

$PE_{FC,diesel,2018}$= 1.0 tCO_2e (rounded up)

Project emission in year 2019:

$PE_{FC,diesel,2019}$= 195 x 43.3 x 74.8 x 0.84 x 10^-6

$PE_{FC,diesel,2019}$= 0.530 tCO_2e

$PE_{FC,diesel,2019}$= 1.0 tCO_2e (rounded up)

PE_y = 3 tCO_2e

5.3 Leakage

In line with applied methodology, since the energy generating equipment is not transferred from another activity, leakage is not to be considered. Hence,

LE_y = 0 tCO_2e

5.4 Net GHG Emission Reductions and Removals

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)
2017	8343	1	0	8342
2018	8479	1	0	8478
2019	12658	1	0	12657
Total	29480	3	0	29477

The emission reduction during current monitoring period is lower than ex-ante estimation in registered PD for current monitoring period (1006 days) i.e. 48,561 tCO_2e. The actual emission reduction achieved i.e. 29477 tCO_2e is 39.30% lower than ex-ante estimation for same period due to lower PLF achieved.

APPENDIX-I: MONTHLY ELECTRICITY INJECTION DETAILS

	Energy supplied to grid in kWh from 31/03/2017 to 31/12/2019		
Month/year	2017	2018	2019
January	--	170400	290355
February	--	248526	1031585
March	11800	419729	1334783
April	778400	535977	1722492
May	710200	639999	1230822
June	1178800	700916	993380
July	1682800	1548164	1723314
Aug	1678600	1549144	2125383
September	1512000	1439461	1255090
October	838800	1108947	931652
November	296000	505089	430631
December	328400	296331	609251
Total	**9015800**	**9162683**	**13678738**