



**Monitoring report form
(Version 05.1)**

MONITORING REPORT

Title of the project activity	Hydro electric power project by SJVNL in Himachal Pradesh	
UNFCCC reference number of the project activity	4568	
Version number of the monitoring report	1.0	
Completion date of the monitoring report	05/05/2015	
Monitoring period number and duration of this monitoring period	Second Monitoring Period 01/01/2015 – 31/12/2015 (First and last day included)	
Project participant(s)	Satluj Jal Vidyut Nigam Limited (SJVNL) International Bank for Reconstruction and Development as the Trustee for the Umbrella Carbon Fund Tranche2 Government of Sweden-Swedish Energy Agency	
Host Party	India (Involved indirectly)	
Sectoral scope(s)	Sectoral Scope, 01 – Energy Industries (renewable/non-renewable sources)	
Selected methodology(ies)	Methodology-ACM0002/Version 12.1.0/ EB 58, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” ¹	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	1,407,658	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	-	1,574,144

¹http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_71ZC14NVE4V5DHA3TUT3896PFLPVGG

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The Rampur Hydroelectric Project (RHEP) is a run-of-river project located near the town of Rampur in Himachal Pradesh. The purpose of the project activity is generation of electricity using the hydro energy potential available in the River Satluj. The generated power will be exported to different states under the NEWNE Grid² as per the power purchase agreement between the states and the project promoter. This will improve the electrical supply to the existing consumers, especially at peak times.

The total installed capacity is 412 MW consisting of six turbine generators, each having a rated capacity of 68.67 MW. The project is designed to divert water from the Nathpa Jhakri power project through a tunnel to a surface power station at village Bael. The power stations at Jhakri and Bael will be operated in tandem. The project does not require construction of a dam, reservoir capacity or additional land inundation.

The proposed project activity utilises the potential energy available in the flowing water into mechanical energy using hydro turbines, which drives the alternators to generate electricity. In the absence of the project activity equivalent amount of power generation would have taken place in the NEWNE grid connected power stations primarily fed by fossil fuel power generating stations having a grid emission factor of 0.8033 tCO₂/ MWh.

Relevant dates of the project activities:

The commercial production of the project activity started on 13/05/2014 with the commissioning of three units.

Detail for key events occurred in project activity are summarised in table below:

Key events	Date
Erection of Pressure Shafts	18/07/2012
Civil work completion for Penstock	12/03/2014
Boxing up of all six units	04/01/2014
Grid Synchronization of Units	
Unit-I	19/03/2014
Unit-II	21/03/2014
Unit-III	31/07/2014
Unit-IV	28/05/2014
Unit-V	23/03/2014
Unit-VI	04/12/2014
Commissioning of Units	
Commercially operation start date	13/05/2014
Commissioning of Unit-I	13/05/2014
Commissioning of Unit-II	13/05/2014
Commissioning of Unit-III	08/08/2014
Commissioning of Unit-IV	18/06/2014
Commissioning of Unit-V	13/05/2014
Commissioning of Unit-VI	16/12/2014

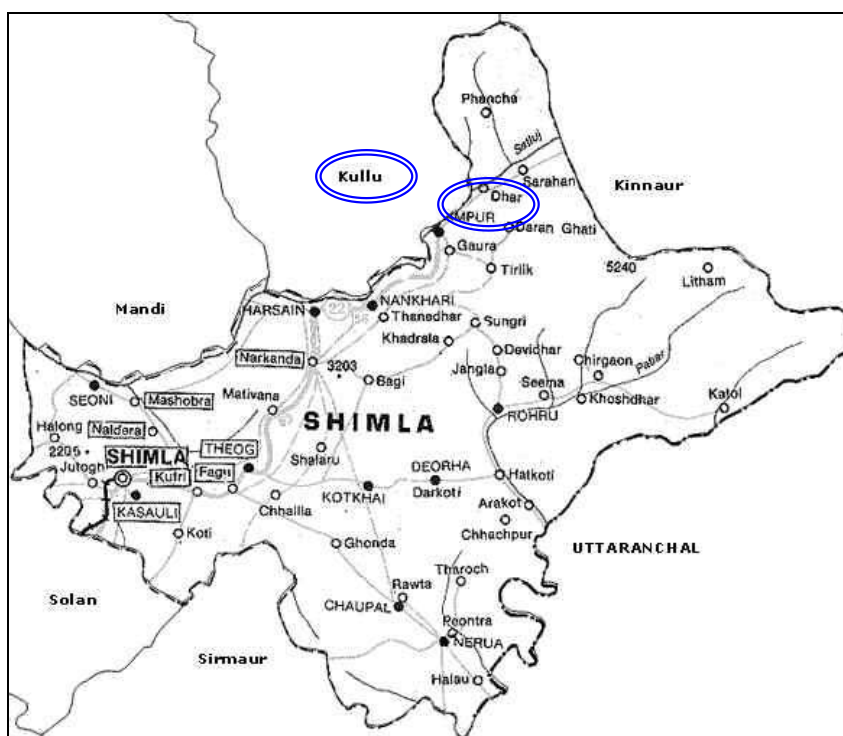
² Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE)

Total GHG emission reductions achieved during the first monitoring period (01/01/2015 – 31/12/2015) are 1,574,144 t CO₂e.

A.2. Location of project activity

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The project is located in Rampur bordering Shimla and Kullu districts of Himachal Pradesh. The Rampur Power House is located at **latitude 31.4000 (31°66'11'')N and longitude 77.5944 (75°99'11'') E**. The town of Rampur is well connected by road to Shimla which is about 140 km away on national highway NH-22A. The nearest railway station and airport are in Shimla. Various sites of the project are connected by branch roads with the reach of the National Highway-22A on the east bank of the river. In the project area, the National Highway runs parallel to the River Satluj at a distance of approximately one km as shown in the map below.



A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
India (Host Party)	Satluj Jal Vidyut Nigam Limited (SJVN Limited) (Public entity)	No
Sweden	International Bank for Reconstruction and Development as the Trustee for the Umbrella Carbon Fund Tranche2 Swedish Energy Agency	Yes

A.4. Reference of applied methodology and standardized baseline

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Methodology: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

- Reference: Approved consolidated baseline methodology ACM0002/Version12.1.0, Sectoral Scope: 01, EB 58³.
- **Tool for the demonstration and assessment of additionality**

Reference: Version 05.2, EB 39, Annex 10

- **Tool to calculate the emission factor for an electricity system**

Reference: Version 02, EB 50, Annex 14

- **Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”**

Reference: (Version 02), EB 41, Annex 11

A.5. Crediting period of project activity

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Type: Fixed

Start date of crediting period: 13/05/2014

Choice of crediting period: Fixed crediting period for 10 years

Crediting period: 13/05/2014 - 12/05/2024

A.6. Contact information of responsible persons/entities

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Mr. H.B. Sahay

General Manager, Corporate Planning

Satluj Jal Vidyut Nigam Limited (SJVNL)

Himfed Building, New Shimla

Himachal Pradesh- 171 009

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SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity has been commissioned and is operating. The project activity is undergoing verification for its first monitoring period.

The relevant date for all the projects can be referred from section A.1.

Description of the installed technology and equipment can be referred from section A.1.

Line diagram for the project activity can be referred from Appendix -2 of the monitoring report.

Outage Details:

The provided outage data is purely of planned/forced outage for plant maintenance only. This data does not include non-operational hours due to lean inflows in river during winter months for all six machines. During the period from 01/01/2015 to 31/12/2015 (First and last day included) the

³ <http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L>,

details of outages (cumulative delay for all six units) that had occurred in the power plant are as under:

Month	Total Monthly Hours for six Units	Total Outage Hour for six Units	% Outage of Plant	Reasons
Jan-15	4464:00	796:56:00	17.85%	- Annual Maintenance of Unit#4 for 12 days. - For Generator Transformer stabilization and Misc teething problems.
Feb-15	4032:00	790:17:00	19.60%	- Annual Maintenance of Unit#2 for 7 days. - Annual Maintenance of Unit#4 for 8 days. - Annual Maintenance of Unit#5 for 11 days. - Shear Pin Replacement.
Mar-15	4464:00	627:59:00	14.07%	- Annual Maintenance of Unit#1 for 14 days. - Shear Pin Replacement. - Butterfly Valve Inspection/Repair & Maintenance
Apr-15	4320:00	66:21:00	1.54%	- Shear Pin Replacement
May-15	4464:00	44:04:00	0.99%	- Shear Pin Replacement
Jun-15	4320:00	249:47:00	5.78%	- Due to High Silt in river intermittently due to which plant was stopped till silt levels recedes to Operational limits.
Jul-15	4464:00	261:45:00	5.86%	- Due to High Silt in river intermittently due to which plant was stopped till silt levels recedes to Operational limits. - Shear Pin Replacement
Aug-15	4464:00	6:39:00	0.15%	- Due to High Silt in river intermittently due to which plant was stopped till silt levels recedes to Operational limits. - Shear Pin Replacement
Sep-15	4320:00	243:28:00	5.64%	- Due to High Silt in river intermittently due to which plant was stopped till silt levels recedes to Operational limits.
Oct-15	4464:00	338:41:00	7.59%	- Runner Labyrinth Damaged - Shear Pin Replacement
Nov-15	4320:00	41:17:00	0.96%	- Shear Pin Replacement
Dec-15	4464:00	453:21:00	10.16%	- Annual Maintenance of Unit#6 for 12 days and Unit#3 for 4 days. - Testing of machines/essential equipments.

B.2. Post-registration changes

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

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This section is left blank intentionally as not applicable.

B.2.2. Corrections

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No corrections during the current monitoring period.

During the previous monitoring period, there had been some corrections to project information and parameters in the revised PDD version 1.5 dated 21/05/2015. This had been approved by the UNFCCC dated 23/06/2015.

B.2.3. Changes to start date of crediting period

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No changes to the start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.

The changes in start date were approved prior to the submission of this monitoring report:-

The start date of crediting period has been changed from “15/06/2012 - 14/06/2022” to “13/05/2014- 12/05/2024”

<https://cdm.unfccc.int/Projects/DB/BVQI1299859361.8/view>

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

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There is no change the monitoring plan of project activity.

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

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There are no changes in monitoring plan during this monitoring period.

Monitoring plan of the project activity had been revised and approved by the UNFCCC on dated 23/06/2015. Please find the below link for revised PDD which is approved by UNFCCC

<https://cdm.unfccc.int/Projects/DB/BVQI1299859361.8/view>

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

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No changes in project design of the project activity during the current monitoring period.

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

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This section is left blank intentionally as not applicable.

SECTION C. Description of monitoring system

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Project Monitoring Plan

The overall planning and monitoring of the RHEP is undertaken by the Corporate Planning Department in Shimla. Personnel from various departments at Rampur are responsible for the monitoring of the project at the site. The manpower structure during operation stage is finalized one year prior to the commissioning of the project.

SJVNL follows standard industry practises for project monitoring. These are:

- It has procedures for operation and maintenance of the plant machinery & equipments. An O&M manual is maintained at the project site in Rampur. The documents for O&M and periodic calibration carried out are maintained by respective departments at the project site.

- The project entity follow the requirements of the Indian Electricity Grid Code (IEGC)⁴ which lays down the rules, guidelines and standards to be followed in the system to plan, develop, maintain and operate the power system, in the most efficient and secure manner.
- It has also obtained an ISO 9000 certification for the RHEP project and ensures that all ISO requirements are met for the project.

Formation of Team for project monitoring:

A project team has constituted and the team is trained on the CDM concept and monitoring plan. This team is responsible for data collection and archiving. The team meet periodically to review the data collected as per section B.7.1. In case of any irregularity observed by any of the team members, it is informed to the concerned person for necessary actions to be taken. The following is the team structure for project monitoring and reviewing the data:

- a. Unit Head: Overall responsibility of compliance with the CDM monitoring plan.
- b. Power Plant In-charge: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation.
- c. Shift In-charge: Responsibility of daily report generation from the SCADA system.

The electricity exported is monitored by each of the main energy meters (stand-by meters) installed by Power grid at ex-bus (420 kV GT) at the six turbine generators. These records the net energy supplied to grid. The diagram at Appendix 2 shows the different meters which are installed as a part of the monitoring of the power generation. When the main energy meters (stand-by meter) fail or found to be outside the acceptable limits of accuracy or otherwise not functioning properly, the readings from back-up energy meters installed by SJVNL shall be used for emission reduction calculation.

The electricity meter installed at the six Turbine Generators (TG sets) is used to record the total electricity (gross) produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads per annum.

The meter details are summarized below:

Meter Type	Accuracy class	No. of meters and location	Meter Installation
Main Energy meter (Stand-by meter)	0.2 s	06 Nos at ex-bus (420kV GT)	Installed by Power Grid Corporation of India Limited (PGCIL)
Back-up Energy meter	0.2s	06 Nos at ex-bus (420kV GT)	Installed by SJVNL
Generation Energy meter	0.2s	06 Nos at Turbine Generator Sets (TG Sets)	Installed by SJVNL

QA/QC Procedures

As per the CEA⁵ (Central Electricity Authority) metering regulations, the main, back-up and generation energy meter (Power grid and SJVNL meters) used for recording of energy supplied/generated is calibrated at least once in five years. Testing is carried out through any accredited test laboratory.

The monthly net electricity supplied to grid is cross-checked with the archived report generated by statutory body i.e. NRPC (Northern Regional Power Committee) which provides the scheduled and actual generation.

⁴ www.cercind.gov.in/291205/revised_grid_code_2005.pdf

⁵ http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

There are three DG sets of 1010 kVA each. Two DG sets of 1010 kVA are used at power house and another one is at TRT outfall of NJHPS. The DG set of 160 kVA is used at Surge shaft. A storage tank of diesel is installed with a calibrated level gauge/scale for each DG. A log –book is maintained at the site to record the diesel consumption by the DG sets. The diesel bill/indents receipts are used to cross-check the consumption of diesel.

Continuous online monitoring of SF₆ gas of each compartment is carried out by temperature compensated SF₆ gas monitoring unit having alarm and trip contacts.

SF₆ is stored in cylinders at the project site and are used to top up the circuit breaker compartments in event of pressure drop inside. The quantity of SF₆ thus filled into the system has been estimated based on the difference in cylinder/bottles weight before and after any such topping up. An electronic weighing balance is installed which uses to weigh the cylinders/bottles. The electronic weighing balance is calibrated annually.

Emergency preparedness: The project activity has not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized. However, the project proponents have an Emergency Preparedness Plan (EPP) in place for the project activity.

Data collection and record keeping: The generation data is collected at the plant operation site under the supervision of the shift-in-charge and records is maintained in daily logs. All data collected as part of monitoring is archived electronically and be kept at least for 2 years after the end of the last crediting period or last issuance whichever is later. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

SECTION D. Data and parameters

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

Data/parameter:	EF_{grid, CM, y}
Unit	tCO ₂ /MWh
Description	Grid Emission Factor for NEWNE grid
Source of data	CEA data, Version 04 http://cea.nic.in/reports/planning/cdm_CO2/user_guide_ver4.pdf
Value(s) applied)	0.8033
Choice of data or measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the Tool to calculate the emission factor for an electricity system
Purpose of data	Calculation of Baseline emissions
Additional comments	-

Data/parameter:	EF_{grid OM, y}
Unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ Emission Factor
Source of data	CEA data
Value(s) applied)	1.0089
Choice of data or measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the ACM0002. http://cea.nic.in/reports/planning/cdm_CO2/user_guide_ver4.pdf
Purpose of data	Calculation of Baseline emissions
Additional comments	-

Data/parameter:	EF_{grid BM, y}
Unit	tCO ₂ /MWh
Description	Build Margin CO ₂ Emission Factor
Source of data	CEA data
Value(s) applied)	0.5977
Choice of data or measurement methods and procedures	Central Electricity Authority (India) is a government body and data published is in line with the ACM0002. http://cea.nic.in/reports/planning/cdm_CO2/user_guide_ver4.pdf
Purpose of data	Calculation of Baseline emissions
Additional comments	-

D.2. Data and parameters monitored

Data/parameter:	EG_{facility, y}
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Measured/calculated/default	Measured
Source of data	Log books available at project activity site
Value(s) of monitored parameter	1,959,792.59
Monitoring equipment	Energy Meters – see details in Appendix 3
Measuring/reading/recording frequency:	Frequency of monitoring: Continuously Frequency of measurement: Continuously Frequency of recording: Monthly
Calculation method (if applicable):	The Main Energy meters (stand-by meters) installed by the Power grid at ex-bus (420 kV GT) for each unit are used to monitor the net electricity supplied to the grid. When the main energy meters (stand-by meter) fail or found to be outside the acceptable limits of accuracy or otherwise not functioning properly the readings from back-up energy meters installed by SJVNL used for emission reduction calculation Meter calibration details are given in Appendix 3.
QA/QC procedures:	The energy meters used are: 3 Phase, 4 wire, bi-directional of accuracy class of 0.2S. As per the CEA ⁶ (Central Electricity Authority) metering regulations, the main and back-up energy meter (installed by Power grid and SJVNL respectively) used for recording of net energy supplied need to be calibrated at least once in five years. Testing can be carried out through any accredited test laboratory The monthly recorded readings are cross-checked with the archived report generated by the statutory body i.e. NRPC (Northern Regional Power Committee) which provides the scheduled and actual injectable generation to the grid.
Purpose of data:	For calculation of baseline emissions
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for 2 years post the end the crediting period.

⁶ http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

Data/parameter:	Cap_{PJ}
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Measured/calculated/default	Default
Source of data	Project site
Value(s) of monitored parameter	412,000,000
Monitoring equipment	NA
Measuring/reading/recording frequency:	Yearly
Calculation method (if applicable):	Determine the installed capacity based on recognized standards
QA/QC procedures:	NA
Purpose of data:	NA
Additional comments:	NA

Data/parameter:	TEG_y
Unit	MWh/yr
Description	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year <i>y</i> .
Measured/calculated/default	Measured
Source of data	Logbooks available at project activity site
Value(s) of monitored parameter	1,976,521.45
Monitoring equipment	Energy meter – see details in Appendix 3
Measuring/reading/recording frequency:	Continuous measurement and monthly recording
Calculation method (if applicable):	The electricity meter installed at the six turbine generators is used to record this parameter.
QA/QC procedures:	The energy meters used are: 3 Phase, 4 wire, bi-directional energy meters with, of accuracy of class 0.2S. As per the CEA ⁷ (Central Electricity Authority) metering regulations, the energy meter (SJVNL) need to be calibrated at least once in five years. Testing can be carried out through any accredited test laboratory Meter calibration details are given in appendix 3.
Purpose of data:	For calculation of baseline emissions
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for 2 years post the end the crediting period.

Data/parameter:	FC_{diesel,i,y}
Unit	Volume unit per year <i>y</i> (m ³ /year)
Description	Quantity of diesel consumed in year <i>y</i>
Measured/calculated/default	Measured
Source of data	Log books available at Project activity site

⁷ http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf

Value(s) of monitored parameter	58.24
Monitoring equipment	Level gauge/scale
Measuring/reading/recording frequency:	Frequency of monitoring: Daily Frequency of recording: Monthly
Calculation method (if applicable):	There are three DG sets of 1010 kVA each and one DG set of 160 kVA. A storage tank of diesel is installed with a calibrated level gauge/scale for each DG set. The scale is calibrated once in a year. A dipstick chart is developed at the site which helps in determining volume of diesel in tank using height of diesel in tank as an input.
QA/QC procedures:	The bill/indents used to cross – check the diesel consumption.
Purpose of data:	For calculation of project emissions
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for two years post crediting period.

Data/parameter:	$\rho_{\text{diesel},y}$
Unit	Gg/m ³
Description	Weighted average density of Diesel in year <i>y</i>
Measured/calculated/default	Default Value
Source of data	As per “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” ⁸ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf
Value(s) of monitored parameter	8.30*10 ⁻⁴
Monitoring equipment	NA
Measuring/reading/recording frequency:	As per “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” ⁹
Calculation method (if applicable):	As per “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” ¹⁰
QA/QC procedures:	As per “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” ¹¹
Purpose of data:	For calculation of project emissions
Additional comments:	-

Data/parameter:	NCV _{diesel,y}
Unit	TJ/Gg
Description	Net calorific value of fuel type <i>diesel</i> in year <i>y</i>
Measured/calculated/default	Default

⁸ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

⁹ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

¹⁰ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

¹¹ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

Source of data	The following data sources may be used if the relevant conditions apply: 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. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value(s) of monitored parameter	43.3
Monitoring equipment	NA
Measuring/reading/recording frequency:	This value is adopted from established and authenticated source IPCC
Calculation method (if applicable):	This is default value adopted from IPCC Any future revision of IPCC default values taken into account.
QA/QC procedures:	-
Purpose of data:	For calculation of project emissions
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for till 2 years post the end the crediting period.

Data/parameter:	EF _{CO₂,diesel,y}
Unit	tCO ₂ /GJ
Description	CO ₂ emission factor of <i>diesel</i> in year <i>y</i>
Measured/calculated/default	Default
Source of data	The following data sources may be used if the relevant conditions apply: IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.3. of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG inventories. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value(s) of monitored parameter	74,800
Monitoring equipment	NA
Measuring/reading/recording frequency:	This value is adopted from established and authenticated source IPCC
Calculation method (if applicable):	This is default value adopted from IPCC Any future revision of IPCC default values taken into account
QA/QC procedures:	-
Purpose of data:	For calculation of project emissions
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for till 2 years post the end the crediting period.

Data/parameter:	Q _{SF₆}
Unit	tonne
Description	Quantity of SF ₆ loss during the year <i>y</i>
Measured/calculated/default	Measured

Source of data	Log books available at Project activity site						
Value(s) of monitored parameter	0						
Monitoring equipment							
Measuring/reading/recording frequency:	Frequency of measurement: Continuously Frequency of recording: Monthly						
Calculation method (if applicable):	Continuous online monitoring of SF ₆ gas of each compartment carried out by temperature compensated SF ₆ gas monitoring unit and having alarm and trip contacts. SF6 is stored in cylinders/bottles at the project site and are used to top up the SF6 gas compartments in event of pressure drop inside. The quantity of SF ₆ thus filled into the system has been estimated based on the difference in cylinder weight before and after any such topping up. An electronic weighing balance installed which used to weigh the cylinders.						
QA/QC procedures:	The electronic weighing balance will be calibrated annually. <table border="1" data-bbox="520 779 1442 875"> <thead> <tr> <th>Meter Sr. No.</th><th>Date of Calibration</th><th>Due Date of Calibration</th></tr> </thead> <tbody> <tr> <td>4811156B</td><td>04/11/2015</td><td>03/11/2016</td></tr> </tbody> </table> Least Count – 0.010 kg Make – Delmer	Meter Sr. No.	Date of Calibration	Due Date of Calibration	4811156B	04/11/2015	03/11/2016
Meter Sr. No.	Date of Calibration	Due Date of Calibration					
4811156B	04/11/2015	03/11/2016					
Purpose of data:	Calculation of Project Emissions						
Additional comments:	All the records used for the purpose of emission reduction calculation shall be archived and preserved in soft or hard form for till 2 years post the end the crediting period.						

D.3. Implementation of sampling plan

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No sampling is required for the parameters listed in Section D 2.

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

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

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Baseline Emission calculation:

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

Where

BE_y: Baseline emissions due to displacement of electricity during the year y in tCO₂e

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

EF_{grid,CM,y}: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)

Calculation of EG_{PJ,y}

Since the present project under consideration is green field plant, $EG_{PJ,y}$ is calculated as follows:

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

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Sample calculation for the month of June 2015

$$EG_{facility,y} = 290,638.49 \text{ MWh}$$

$$\begin{aligned} BE_y &= EF_{facility,y} * EF_{grid,CM,y} \\ &= 290,638.49 * 0.8033 \\ &= 233,470 \text{ t CO}_2\text{e} \end{aligned}$$

Baseline Emissions for the monitoring period

Month	Energy Generation Based on DGRs (MWh)	Energy Generation Based on unit wise energy meters (MWh)	$EG_{facility,y}$	Baseline Emissions (tCO ₂ e)
	C	D	Min (C,D)	
01/01/2015 - 31/01/2015	51,216.03	51,216.22	51,216.03	41,142
01/02/2015 - 28/02/2015	45,886.12	45,886.06	45,886.06	36,860
01/03/2015 - 31/03/2015	63,779.45	63,779.32	63,779.32	51,234
01/04/2015 - 30/04/2015	121,000.10	121,000.10	121,000.10	97,199
01/05/2015 - 31/05/2015	299,142.19	299,142.19	299,142.19	240,301
01/06/2015 - 30/06/2015	290,638.49	290,638.49	290,638.49	233,470
01/07/2015 - 31/07/2015	287,208.00	287,208.00	287,208.00	230,714
01/08/2015 - 31/08/2015	289,165.13	289,165.13	289,165.13	232,286
01/09/2015 - 30/09/2015	232,979.43	232,979.43	232,979.43	187,152
01/10/2015 - 31/10/2015	124,213.71	124,213.71	124,213.71	99,781
01/11/2015 - 30/11/2015	87,389.33	87,389.33	87,389.33	70,200
01/12/2015 - 31/12/2015	67,174.80	67,174.80	67,174.80	53,962
Total	1,959,792.77	1,959,792.78	1,959,792.59	1,574,301¹²

Emission Reduction

The project activity reduces carbon dioxide through displacement of grid electricity generation with fossil fuel based power plants by renewable-hydro energy based electricity. The emission reduction ER_y due to the project activity during a given year y is calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows:

$$ER_y = BE_y - PE_y - L_y$$

Where:

ER_y : Emissions reductions of the project activity during the year y in tCO₂e

BE_y : Baseline emissions due to displacement of electricity during the year y in tCO₂e

PE_y : The project emissions associated with the project activity (diesel consumption in the DG sets for the project activity and SF₆ emissions (if any))

L_y : The emissions sources as leakage (none for the project activity)

¹² Rounded Down Value

Sample calculation for month of June 2015:

$$\begin{aligned} ER_y &= 233,469.90 - 1.45 \\ &= 233,468.44 \text{ tCO}_2\text{e} \end{aligned}$$

Emission Reduction for the monitoring period

Month	Baseline Emission (tCO ₂ e)	Project Emission (tCO ₂ e)	Emission Reductions (tCO ₂ e)
01/01/2015 - 31/01/2015	41,141.83	80.50	41,061.33
01/02/2015 - 28/02/2015	36,860.27	3.59	36,856.69
01/03/2015 - 31/03/2015	51,233.93	32.29	51,201.64
01/04/2015 - 30/04/2015	97,199.38	1.28	97,198.10
01/05/2015 - 31/05/2015	240,300.92	0.17	240,300.75
01/06/2015 - 30/06/2015	233,469.90	1.45	233,468.44
01/07/2015 - 31/07/2015	230,714.19	2.77	230,711.42
01/08/2015 - 31/08/2015	232,286.35	1.94	232,284.41
01/09/2015 - 30/09/2015	187,152.38	0.43	187,151.95
01/10/2015 - 31/10/2015	99,780.87	6.10	99,774.77
01/11/2015 - 30/11/2015	70,199.85	0.87	70,198.97
01/12/2015 - 31/12/2015	53,961.52	25.16	53,936.36
Total	1,574,301¹³	157¹⁴	1,574,144¹⁵

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

>>

For most renewable power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{HP,y} + PE_{GP,y} + PE_{FF,y} + PE_{y,3}$$

Where:

PE_y = Project emissions in year y (tCO₂e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO₂e/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO₂e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of Hydro power plants in year y (tCO₂e/yr),

$PE_{y,3}$ = Project emissions due to leakage of SF₆

Since there are no hydrological emissions ($PD > 10$), hence $PE_{HP,y} = 0$

Since the project activity is a hydro power project, hence, $PE_{GP,y}$ is not applicable.

Fossil Fuel Combustion ($PE_{FF,y}$)

$PE_{FF,y}$ is calculated as per the latest version of the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion".

¹³ Rounded Down value

¹⁴ Rounded up value

¹⁵ Rounded down value

Parameter	Unit of Measurement	Value	Source
NCV of diesel	TJ/Gg	43.3	IPCC data, from 2006 guidelines, volume 2, Table 1.2 ¹⁶
Density of diesel	kg/m ³	830	CEA Database ¹⁷
Emission factor of diesel	kgCO ₂ e/TJ	74,800	IPCC data, from 2006 guidelines, volume 2, Table 1.4 (Upper value of emission factor at 95 % confidence interval) ¹⁸
Oxidation factor of diesel	%	1	IPCC data, 2006 guidelines

$PE_{FF,y} = (\text{Quantity of Diesel consumption (m}^3\text{)} * \text{NCV of diesel (TJ/Gg)} * \text{Density of diesel (Kg/m}^3\text{)} * \text{Emission factor of Diesel (Kg/TJ)} * \text{Oxidation factor of Diesel (\%)} / 10^9 \text{ tCO}_2\text{e}$

Sample calculation for the month of June 2015

$$PE_{FF} = \{0.54 \text{ (m}^3\text{)} * 43.3 \text{ (TJ/Gg)} * 830 \text{ (Kg/m}^3\text{)} * 74,800 \text{ (Kg/TJ)} * 1\} / 10^9$$

$$= 1.45 \text{ tCO}_2\text{e}$$

Project Emissions for the monitoring period

Month	Quantity of Diesel Consumption (m ³)	Project Emissions tCO ₂ e
01/01/2015 - 31/01/2015	29.95	80.50
01/02/2015 - 28/02/2015	1.34	3.59
01/03/2015 - 31/03/2015	12.01	32.29
01/04/2015 - 30/04/2015	0.48	1.28
01/05/2015 - 31/05/2015	0.06	0.17
01/06/2015 - 30/06/2015	0.54	1.45
01/07/2015 - 31/07/2015	1.03	2.77
01/08/2015 - 31/08/2015	0.72	1.94
01/09/2015 - 30/09/2015	0.16	0.43
01/10/2015 - 31/10/2015	2.27	6.10
01/11/2015 - 30/11/2015	0.33	0.87
01/12/2015 - 31/12/2015	9.36	25.16
Total	58.24	157¹⁹

Emissions of SF₆

RHEP involves installation of Gas insulated transmissions lines from step up transformer to Switch yard. At the project site the SF₆ stored in the gas handling machine is used to top up the circuit breaker compartments in case of any pressure drop. PP would monitor the quantity of SF₆ filled into the circuit breaker compartments from the gas handling machine during monitoring period and would account for project emissions.

¹⁶ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

¹⁷ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver10.pdf

¹⁸ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

¹⁹ Rounded up value

$$PE_{y3} = Q_{SF6} \times GWP_{SF6}$$

Where

Q_{SF6} = Quantity of SF_6 topped up from gas handling machine into circuit breaker compartments; tones

GWP_{SF6} = Global Warming Potential of SF_6 (23,900)

PE_{y3} = Project Emissions due to SF_6

Since, there is no leakage of SF_6 during the current monitoring period, Hence $PE_{y3} = 0$

Total Project Emissions (PE_y)

$$\begin{aligned} PE_y &= PE_{FF,j,y} + PE_{y3} \\ &= 157 + 0 \\ &= 157 \text{ tCO}_2\text{e} \end{aligned}$$

E.3. Calculation of leakage

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The methodology accounts that the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects). Thus project participants do not need to consider these emission sources as leakage in applying this methodology.

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	1,574,301	157 ²⁰	0	0	1,574,144 ²¹	1,574,144

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO ₂ e)	1,407,658 ²²	1,574,144

E.6. Remarks on difference from estimated value in registered PDD

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Emission reductions for the considered period (365 days) as per estimates in the	Actual Emission Reduction for the monitoring period (t CO ₂ e)	Variation
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²⁰ Rounded up value

²¹ Rounded down value

²² Estimated amount of emission reductions corresponding to the current monitoring period (233 days) based on the estimated amount of annual average GHG emission reductions in the registered PDD.

PDD (t CO ₂ e)		
1,407,658	1,574,144	11.83 %

Actual emission reductions are 11.83% higher than the emission reductions for the considered monitoring period as per estimates in the revised and approved PDD. The major reason for the higher emission reductions is higher power generation during the monitoring period. The power generation for the current monitoring period is 1,976.52 GWh and this is 11.67 % higher to the base energy of 1,770 GWh, estimated in approved PDD.

There are following reasons for higher generations as mentioned below:

- The parent generating Plant i.e. 1500 MW Nathpa Jhakri Hydro Power Station (NJHPS), is feeding water to Rampur HPS and both stations operate in Tandem. Design energy of 1770 GWh for RHEP is estimated considering a provision of 16 days shutdown for flushing and de-silting activities of silts being accumulated in its dams during the high flow seasons at upstream NJPHS. During the current monitoring period there were hardly any flash floods in the River and silt levels remained low in comparison to past years. Due to this, NJHPS has to resort to dam flushing only for three (3) days gaining 13 days of additional generation in Rampur HPS as well. Also there was 68 outage days for annual maintenance instead of planned 108 days, thus gaining additional 40 days of generation.
- Project's Design Data is based on 90% dependable year river flows. During the period under review, the inflows during peak season (April-September) observed had remained better in comparison to the river inflows of 90% dependable year data. This also contributed to increase in generation from Rampur HPS.
- As per system requirements set-forth by National Grid, NJHPS operates in FGMO (Free Governing Mode Operation) i.e. it takes extra load whenever frequency of the National Grid goes down. Resultantly, Rampur HPS being operating in Tandem with NJHPS, took additional load proportionately to absorb the additional outflows emanating from NJHPS. This has also contributed for additional generation.

The project IRR elevates to 11.60 % from 10.14% due to this increased power generation. Since, the increased IRR is still below the benchmark of 12% hence does not impact the additionality of the project activity.

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

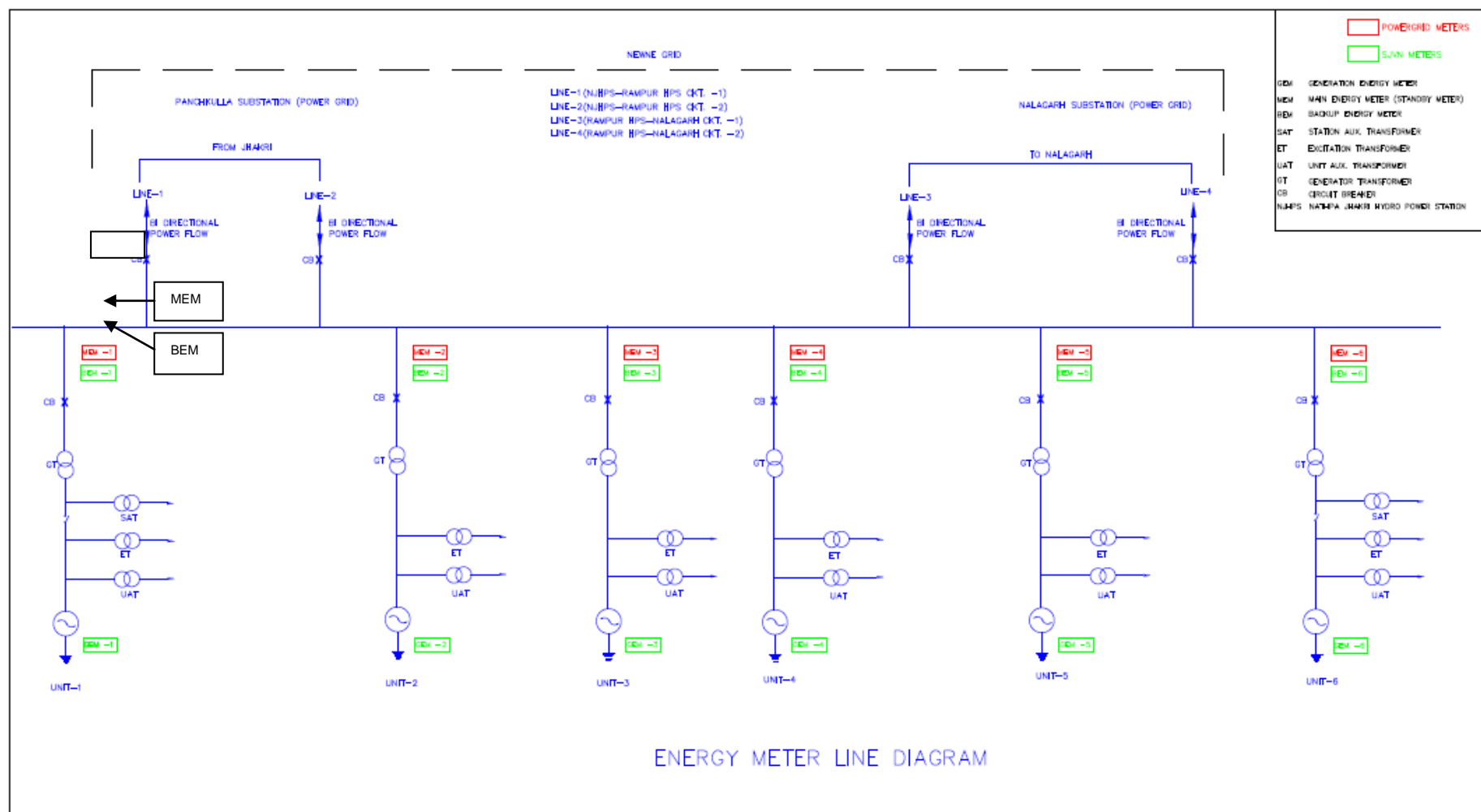
Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Satluj Jal Vidyut Nigam Limited (SJVNL)
Street/P.O. Box	-
Building	Himfed Building
City	New Shimla
State/region	Himachal Pradesh
Postcode	171 009
Country	India
Telephone	0177-2670390
Fax	0177-2670180
E-mail	hb.sahay@sjvn.nic.in , svncp@yahoo.co.in
Website	www.sjvn.nic.in
Contact person	Ravi Uppal
Title	Mr.
Salutation	General Manager
Last name	Uppal
Middle name	
First name	Ravi
Department	Corporate Planning
Mobile	
Direct fax	0177-2670180
Direct tel.	0177-2670390
Personal e-mail	svncp@yahoo.co.in

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	International Bank for Reconstruction and Development as the Trustee for the Umbrella Carbon Fund Tranche2
Street/P.O. Box	1818 H Street, NW, District of Columbia
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City	Washington, DC
State/region	
Postcode	20433
Country	USA
Telephone	1202 473 9189
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E-mail	IBRD-carbonfinance@worldbank.org
Website	www.carbonfinance.org
Contact person	Mr. Jose Andreu
Title	Operations Team Leader
Salutation	Mr.
Last name	Jose
Middle name	--
First name	Andreu
Department	Climate and Carbon Finance Unit
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Direct fax	+1-202-522 7432
Direct tel.	+1-202-458-1873
Personal e-mail	Jchassard@worldbank.org

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Government of Sweden - Swedish Energy Agency
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City	Eskilstuna
State/region	
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Website	
Contact person	Ms. Bengt Bostrom
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Appendix 2. Installation and Operation of Metering System



Metering System Key	
MEM	Main Energy Meter (Stand-by meter)
BEM	Back-up Energy Meter
UAT	Unit Auxiliary Transformer
ET	Excitation Transformer
SAT	Station Auxiliary meters
GT	Generator Transformer
CB	Circuit Breaker
GEM	Generation Energy Meter

Appendix 3. Meter Calibration Details

Meter Location	Unit	Accuracy Class	Serial No	Date of Calibration	Validity until (Due Date of Calibration)	Calibration Agency
Ex Bus Energy Meter (Power Grid)	Unit 1	0.2S	NP-8521 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
	Unit 2	0.2S	NP-8522 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
	Unit 3	0.2S	NP-8506 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
	Unit 4	0.2S	NP-8507 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
	Unit 5	0.2S	NP-8508 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
	Unit 6	0.2S	NP-8509 A	31/05/2013	30/05/2018	Larsen & Toubro Limited
Ex Bus Energy Meter (SJVNL)	Unit 1	0.2S	12527007	24/12/2012	23/12/2017	Larsen & Toubro Limited
	Unit 2	0.2S	12527013	24/12/2012	23/12/2017	Larsen & Toubro Limited
	Unit 3	0.2S	12527034	25/12/2012	24/12/2017	Larsen & Toubro Limited
	Unit 4	0.2S	12526934	24/12/2012	23/12/2017	Larsen & Toubro Limited
	Unit 5	0.2S	12527060	25/12/2012	24/12/2017	Larsen & Toubro Limited
	Unit 6	0.2S	12527021	24/12/2012	23/12/2017	Larsen & Toubro Limited
Gross Energy Meter	Unit 1	0.2S	12526253	04/01/2013	03/01/2018	Larsen & Toubro Limited
	Unit 2	0.2S	12526264	04/01/2013	03/01/2018	Larsen & Toubro Limited
	Unit 3	0.2S	12526248	04/01/2013	03/01/2018	Larsen & Toubro Limited
	Unit 4	0.2S	12526265	04/01/2013	03/01/2018	Larsen & Toubro Limited
	Unit 5	0.2S	12526256	04/01/2013	03/01/2018	Larsen & Toubro Limited
	Unit 6	0.2S	12526263	04/01/2013	03/01/2018	Larsen & Toubro Limited

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		