Verification and certification report form for CDM project activities

(Version 02.1)

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	5 MW Solar PV Power Project at NTPC Faridabad UNFCCC Ref.No-9964
Version number of the verification and certification report	2.0
Completion date of the verification and certification report	11/07/2018
Monitoring period number and duration of this monitoring period	Monitoring Period: 01 Period: 01/06/2014 – 31/08/2017 (both dates are included)
Version number of the monitoring report to which this report applies	3.0
Crediting period of the project activity corresponding to this monitoring period	1st crediting period Start date: 01/06/2014 Length: 7 years (01/06/2014 to 31/05/2021)
Project participants	M/s NTPC Limited
Host Party	India
Applied methodologies and standardized baselines	Selected Methodology: AMS-I.D, "Grid connected renewable electricity generation", (Version 17) Selected standardized baseline: N/A
Mandatory sectoral scopes linked to the applied methodologies	Sectoral scope : 1- Energy industries (renewable - / non-renewable sources
Conditional sectoral scope(s) linked to the applied methodologies	NA
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	22,572 tCO_2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	21,011 tCO_2e
Name and UNFCCC reference number of the DOE	Applus certification LGAI Technological Center, S.A. (Applus+ Certification) UNFCCC Ref. No: E-0032

Name, position and signature of the approver of the verification and certification report	Name: Mr. Juan Sendin Caballero Position: Applus + Certification BU Managing Director Signature of the approver: 

SECTION A. Executive summary

>>

LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been contracted by M/s. NTPC Limited to perform the first periodical verification of "5 MW Solar PV Power Project at NTPC Faridabad" (UNFCCC Ref. No. 9964) applying the methodology AMS-I.D Version: 17.0.0. The management of M/s. NTPC Limited is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions.

A desk review and a site visit have been conducted to verify the data submitted in the monitoring report. Applus+ Certification confirms the following has been reviewed:

(a) The registered PDD /1.2/ and revised PDD /1.5/, including the monitoring plan and the corresponding validation report;
(b) Monitoring report of this monitoring period;
(c) The applied monitoring methodology;
(d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
(e) All information and references relevant to the project activity's resulting in emission reductions.

The project activity involves electricity generation by Solar Photo Voltaic plant and supplying the same to the NEWNE regional electricity grid. This is renewable energy generation which can replace the fossil fuel dominated grid connected electricity generation. The project activity involves the installation of 5 MW Solar Photo Voltaic plant at NTPC-Faridabad, India.

The generated electricity is evacuated to Haryana state grid substation. The project activity generates power by using the solar energy of sun, thus resulting in zero emissions during electricity production. The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions.

Applus+ Certification confirms that the project is implemented in accordance with the validated and registered PDD and revised PDD. The monitoring plan complies with the applied methodology AMS-I.D. Version 17 and the monitoring has been carried out in accordance with the monitoring plan. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information reviewed and evaluated Applus+ Certification confirms that the implementation of the project has resulted in 21,011 tCO_2e emission reductions during period 01/06/2014 to 31/08/2017.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader / Technical Expert	OR	Ahirwar	Vivek Kumar	GCEES	Y	Y	Y	Y

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical Reviewer	EI	Shen	Simon	Applus+ Certification
2.	Approver	IR	Sendin	Juan	Applus+ Certification

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	**Manual adjustment of otherwise automatically recorded activity levels:** This error may be due to manually recording of actual readings in-to original records.	Low	Monitoring Equipment e.g. Energy Meters have totalizer which reduce the chance of error as initial readings and final readings can be cross –check in every records /3.3/, /3.4/. The reading of plant data is being recorded in the presence of representatives of DISCOM and O&M contractor. So chances of noting down incorrect reading diminish. Monthly Data is endorsed by state utility.	100 per cent of the data and information was checked from monthly data/3.3/ and cross-checked from sold electricity invoices /3.4/
2.	**Human error in the quantification of emissions.** This error may be due to transfer of monitored data in-to Emission Reduction calculation sheet/4.2/ for calculation of actual emission reduction archived during monitoring period.	High	The monitoring data is transfer manually, so there is high potential risk of errors/errors, omissions or misstatements.	100 per cent of the data and information was checked from Monthly Data/3.3/and cross-checked from monthly invoices raised to state utility /3.4/.

C.2. Consideration of materiality in conducting the verification

>>

The project activity is small- scale project and applicable threshold for materiality in accordance with CDM VVS for PAs Version 01.0 paragraph 329(d) is 5%. All the monthly/daily/hourly reported figures for all monitoring parameter were verified with respective log book/ data Sheets and were found to be consistent. Therefore, it can be stated that the verified value is free from any potential error / omission / misstatement. Therefore, there are no additional factors which might lead to introduction of error in emission reduction estimation.

SECTION D. Means of verification

D.1. Desk/document review

>>

The Monitoring Report version 01.0 dated 26/09/2017/1.0/ submitted by the PP was made publicly available on the UNFCCC website before the verification activities started. The published MR was assessed based on all the relevant documents. The aim of the assessment in the desk review was to:

- verify the completeness of the data and the information presented in the MR;
- check the compliance of the MR with respect to the monitoring plan depicted in the registered PDD and verify that the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of the metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid;
- evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of documents reviewed or referenced is available in Appendix 3 of this report.

D.2. On-site inspection

Duration of on-site inspection: 13/11/2017				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Confirm the implementation and operation of the project;	Project Site at Jajru village, Faridabad District , Haryana state of India	13/11/2017	Vivek Kumar Ahirwar
2.	Review the data flow for generating, aggregating and reporting the monitoring parameters;		13/11/2017	Vivek Kumar Ahirwar
3.	Confirm the correct implementation of procedures for operations and data collection;		13/11/2017	Vivek Kumar Ahirwar
4.	Cross-check the information provided in the MR documentation with other sources;		13/11/2017	Vivek Kumar Ahirwar
5.	Check the monitoring equipment against the requirements of the PDD and the approved methodology, including calibrations, maintenance, etc.;		13/11/2017	Vivek Kumar Ahirwar
6.	Review the calculations and assumptions used to obtain the GHG data and ER;		13/11/2017	Vivek Kumar Ahirwar
7.	Indentify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.		13/11/2017	Vivek Kumar Ahirwar

D.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Kumar	Anil	NTPC Limited	13/11/2017	Project Activity Description, implementation and operation of the project	Vivek Kumar Ahirwar
2.	Gaur	Aditya	NTPC Limited	13/11/2017	Procurement Records & Consumption , Bill & Energy Bills/Records	Vivek Kumar Ahirwar
3.	Singhal	S K	NTPC Limited	13/11/2017	Monitoring Data & Records Monitoring Plan, equipment , calibrations, maintenance, data records, certificates etc.;	Vivek Kumar Ahirwar

					Calculations and assumptions used to obtain the GHG data and ER	

D.4. Sampling approach

>>
Not Applicable, as all monitoring data as reported in MR and ER were verified and checked from actual records.

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	-	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	CAR#1	-
Compliance with the calibration frequency requirements for measuring instruments	-	CAR#2	-
Assessment of data and calculation of emission reductions or net removals	-	CAR#3 & CAR#4	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	-	4	-

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	The final Monitoring Report /1.1/ is compliant with Monitoring Report form (Version 06.0) /2.4/ and guidance as provided by UNFCCC. Applus+ Certification considers that the attachment “Instructions for filling out the monitoring report form” at the end of template “Monitoring report form (Version 06.0)” /2.4/ has been followed. Relevant information was provided by the project participant in the applicable Monitoring Report sections.
Findings	No non-conformability was observed, hence finding is not raised.
Conclusion	Applus+ Certification confirms that the monitoring report is in compliance with the relevant valid form and instructions therein as accordance to “Clean Development Mechanism Validation and Verification Standard for Project Activity” (CDM- VVS for PA) v01.0 §§ 355-356.

E.2. Remaining forward action requests from validation and/or previous verifications

>>
This is first periodic verification of the project. There are no pending issues from the validation of project activity/1.3/. This was verified and confirmed from the project documents on the UNFCCC project webpage /1.4/.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	The project activity is fully implemented according to the description presented in the registered PDD /1.2/. The assessment team confirms, through the visual inspection that all physical features of the CDM project activity including data collecting systems and storage have been implemented in accordance with the registered PDD /1.2/ and revised PDD/1.5/. This project activity involves generation of electricity from Solar PV system and supplying the generated electricity to the NEWNE grid of India. The project, located at the Jajru village, Faridabad district of Haryana state in India, has an installed capacity of 5 MW (21,744 no. of 230 Wp poly crystalline silicon solar modules). The PP has signed a PPA/3.2/ with GRIDCO for the sale of electricity to the grid. The project was registered as a CDM project on 23/05/2014 and the starting date of the crediting period (Renewal) is 01/06/2014. This is the first verification of the project activity covering the period from 01/06/2014 to 31/08/2017. The project has been implemented; equipment installed and is being operated as described in the registered PDD and revised PDD. The monitoring plan implemented during the current monitoring period is in compliance with the registered monitoring plan and the applied methodology. This was verified during the site visit. The project is located between latitude 28°,17',8.3"N and longitude 77°,19',4.1"E. Location of the project was verified through Google Maps (https://www.gps-coordinates.net/) and found consistent with the same mentioned in the registered PDD and MR. The project activity in operation fully and commissioned and synchronization 31/03/2014 as mentioned in the Monitoring Report. Commissioning details of the solar plant have been verified against the commissioning certificate/3.1/ and is found to be correct. The line diagram of the metering system of the project activity showing metering points is indicated in section C of the MR/1.1/. During the site visit, the assessment team verified the technology used and the capacity of each Solar PV modules, junction boxes / combiner boxes, Power Conditioning Unit (PCU), module mounting structure, switch yard, evacuation as implemented at the project site through physical inspection and it can be confirmed that there are no changes in the project design against the registered PDD/1.2/ and revised PDD/1.5/. Actual emission reductions achieved during the current monitoring period are 6.92% less than the same estimated in the registered CDM-PDD for comparable period. This is due to fact that Solar PV power generation (or PLF) is depend up-on natural sun light availability and same was observed lesser as compared to estimated PLF during the current monitoring period (Kindly refer section E.8.6 of this report for further details). No events or situations that may impact the applicability of the methodology occurred during this monitoring period, which was confirmed by checking the operational/shut down details available at site office and interviewing the site personnel. The project was checked against the applicability criteria in the applied methodology (AMS-I.D Version: 17.0.0) and it is confirmed that the methodology are applicable to the project activity. The data and variables provided in the Monitoring Report are the same as stated in the approved monitoring plan.
Findings	No non-conformability was observed during assessment for implementation of project activity against the description presented in the registered PDD/1.2/ and revised PDD/1.5/. Therefore no finding was raised.
Conclusion	Applus+ Certification confirms that the implementation of project activity is in compliance with the CDM requirement stipulated under CDM-VVS for PA v01.0 §§ 357-359. i. The implementation and operation of the project activity has been conducted in accordance with the description contained in the registered

	PDD. ii. By means of an on-site inspection the verification team is able to confirm that all physical features (technology, project equipment, and monitoring and metering equipment) of the registered CDM project activity are in place and that the project participants have operated the project activity as per the registered PDD. iii. No information with regard to data and variables was identified that may surpass the estimated quantity of ERs in the registered PDD. iv. The emission reductions achieved during the current monitoring period are 21,011 tCO_2e within the estimated quantity (22,572 tCO_2e) in the registered PDD for the comparable period.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies or applied standardized baselines

>>

There are no temporary deviations from the monitoring plan of registered PDD/1.2/ or applied methodology /2.3/ during the current monitoring period. It was verified and confirmed from the Monitoring Report/1.1/, registered PDD/1.2/, UNFCCC project webpage /1.4/ and on-site verification/6.1/ & /6.2/.

E.4.2. Corrections

>>

There are no corrections during the current monitoring period.

E.4.3. Change to the start date of the crediting period of the project activity

>>

There are no changes to the start date of crediting period identified during the current monitoring period. It was verified and confirmed from the UNFCCC project webpage /1.4/.

E.4.4. Inclusion of a monitoring plan

>>

There is no inclusion of a monitoring plan identified during the current monitoring period.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other applied standards or tools

>>

There is permanent change from the registered monitoring plan/1.2/ as there is change in source of data for monitoring parameter $EG_{BL,y}$ as listed under section B.7.1 of the PDD. The registered PDD/1.2/ mentioned that "*Joint Energy meter reading reports (NTPC and GRIDCO will jointly read the metering system on the first day of every month and thus the joint Energy meter reading reports will be prepared)*." However, during site visit it was not practice. It was observed that the monitored value is recorded electronically as main & checks Energy meters have been installed at 33 KV Switch yard at the location of plant. The energy billing is done on monthly basis through electronically down loaded data of energy meter and monthly value in ""INTER OFFICE MEMO" prepared by (AGM-EEMG, NTPC Faridabad) at project site and submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO. So, the document "Joint Energy meter reading report" is replaced by the "INTER OFFICE MEMO" where reading on the first day of every month recorded at project site and then submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO. The same is corrected in monitoring plan of the revised PDD/1.5/.

E.4.6. Changes to the project design

>>
There is no change to project design of the registered project activity identified during the current monitoring period. It was verified and confirmed from the Monitoring Report/1.1/, registered PDD/1.2/, UNFCCC project webpage /1.4/ and on-site verification/6.1/&/6.2/.

E.4.7. Changes specific to afforestation and reforestation project activities

>>
Not Applicable.

E.5. Compliance of the registered monitoring plan with the methodology including applicable tools and standardized baselines

Means of verification	The project has been registered with the **"**AMS-I.D, "Grid connected renewable electricity generation", (Version 17) /2.3/. The assessment team verified the monitoring plan against AMS-I.D Version 17, and confirms that the registered monitoring plan is in accordance with the approved methodology applied by the project activity. The verification team is able to confirm that the monitoring plan of the registered project is in accordance with the applied methodology.
Findings	No non-conformability was observed during assessment for monitoring plan against applied monitoring methodology. Therefore, no finding was raised.
Conclusion	Applus+ Certification confirms that the monitoring plan is in accordance with the approved methodology /2.3/ and correctly applied by the registered CDM project activity and CDM-VVS for PA v01.0 §§ 360-362 have been met.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification

The following parameters are fixed ex-ante defined in registered PDD:

Data/parameter	Unit	Description	Source of data	Value(s) applied)
$EF_{grid,OM,y}$	tCO_2/MWh	Simple Operating Margin of the NEWNE Grid	CO2 Baseline Database for the Indian Power Sector Version 07.0, Dated January 2012 (Combined Margin Emission Factor for Northern Regional Grid) published by Central Electric Authority (CEA), India	0.9842
$EF_{grid,BM,y}$	tCO_2/MWh	Build Margin of the NEWNE Grid		0.8587
$EF_{grid,CO2,y}$	tCO_2/MWh	Emission factor of the NEWNE Grid		0.9528

Findings	No non-conformability was observed about data and parameters fixed ex ante in registered PDD. Therefore, no finding was raised.
Conclusion	Value of all parameters reported in the monitoring report /1.1/ and corresponding emission reduction calculations spreadsheet /4.2/ are consistent with the registered PDD. The applied values are correct and justified.

E.6.2. Data and parameters monitored

Means of verification

Monitoring Report, / Onsite checks / Revised Monitoring Plan & Approved Methodology	Requirement in the approved monitoring plan/1.6/	Implementation of the project	Conclusion on the compliance of the implementation with the monitoring plan
Data/Parameter	EG_y	$EG_{BL\ y}$	In compliance

	Description	Net electricity supplied to the grid by the Project	Quantity of net electricity supplied to the grid by power plant in year y	In compliance
	Measured/Calculated /Default	Measured	Measured	In compliance
	Source of data	From "INTER OFFICE MEMO" prepared by (AGM-EEMG, NTPC Faridabad) at project site and submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO.	From "INTER OFFICE MEMO" prepared by (AGM-EEMG, NTPC Faridabad) at project site and submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO.	In compliance
	Monitoring equipment	ABT compliant Meters	ABT compliant Meters	In compliance
	Measuring/Reading/ Recording frequency	Recording Frequency: Monthly	Recording Frequency: Monthly	In compliance
	Calculation method (if applicable)	Not Applciable as A set of ABT (Availability Based Tariff) compliant Main meter, Check meter and Standby meter with 0.2s accuracy used to monitor the parameter	Not Applciable as A set of ABT (Availability Based Tariff) compliant Main meter, Check meter and Standby meter with 0.2s accuracy used to monitor the parameter	In compliance
	QA/QC procedures	Net electricity supplied to the grid shall be cross checked with records for sold / purchased electricity (e.g. invoices / receipts)	The readings of main meter are cross-checked against the readings of check meter. Also verified from sold / purchased electricity bills.	In compliance
	The PP has correctly reported the monthly values from the invoices in the emission reduction spread sheet/4.1/. Monthly values of parameter $EG_{BL,y}$ recorded through maim meters are cross-checked against the readings of the check meters at each of the metering points and found comparable. The value of $EG_{BL,y}$ for the current monitoring period is 22,052.69 MWh. This parameter is directly used for the emission reduction calculations. Wherever applicable the readings of main meter are cross-checked against the readings of check meter and found comparable. It is to be noted source documents (The INTER OFFICE MEMOs and sales invoices) for the monitoring parameter, are endorsed by an external government agency i.e. the State Electricity Board and the PP has no influence in the entire procedure, hence considered to be authentic.			
Findings	CAR#1 was raised and resolved.			
Conclusion	Applus+ Certification confirms that the actual monitoring activities observed on site are in compliance with the approved monitoring plan and as described in the registered PDD/1.2/ and revised PDD /1.2/, the same is in line with the monitoring methodology /2.3/. The applicable parameters stated in the registered PDD/1.2/ and revised PDD /1.5/ monitoring plan and the applied methodology/2.3/ have been sufficiently monitored. The responsibilities and authorities for monitoring and reporting are in accordance with what is stated in the registered PDD monitoring plan/1.2/ and revised PDD /1.5/. The information flow (data generation, aggregation, recording, calculation and reporting) for the parameters to be			

	monitored including its values in the final version of the MR/1.1/ have been correctly reported and confirmed. Hence, the requirements of CDM-VVS for v01.0 §§ 363-367 have been met.

E.6.3. Implementation of sampling plan

Means of verification	No sampling plan is defined in the registered approved monitoring plan. All the data and information has been checked during verification assessment, thus no sampling plan has been applied in the Project.
Findings	Not Applicable
Conclusion	Not Applicable

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification

As per the monitoring plan in the registered PDD/1.2/ and revised PDD/1.5/ the energy meters are to be tested and calibrated annually. The project activity metering has been physically inspected during the site visit. The details of monitoring equipment is involved in the project activity and their calibration dates are mentioned in Section C of the final MR and found to be consistent with calibration certificates. The installation and working condition of all measuring equipments are checked during the on-site inspection and it was found to be satisfactory.

Energy Meter	Meter Serial Number	Make	Accuracy Class	Date of Calibration	Calibration Agency	Calibration Frequency	Next Calibration due date	Calibration Delay
Main Meter	05288110	Elster	0.2s	08/04/2014	Yadav Measurements Pvt. Ltd. (NABL accredited)	Once in 5 years	07/04/2019	No Delay in calibration
Check Meter	05288111	Elster	0.2s	08/04/2014	Yadav Measurements Pvt. Ltd. (NABL accredited)	Once in 5 years	07/04/2019	No Delay in calibration
Back-up Meter	05288112	Elster	0.2s	08/04/2014	Yadav Measurements Pvt. Ltd. (NABL accredited)	Once in 5 years	07/04/2019	No Delay in calibration

The assessment team has also checked the latest calibration certificates of measuring equipments and confirmed that meter was working satisfactorily and error within the permissible limits. Based on review of calibration certificate of respective equipment, the assessment team able to confirm that energy meters calibrated as per frequency defined in registered PDD monitoring plan.

Findings	CAR #2 was raised and resolved.
Conclusion	Applus+ Certification confirms that the calibration is conducted at the frequency following the relevant industry standard as specified by the methodology /2.3/ and the monitoring plan contained in the registered PDD /1.2/ and revised PDD/1.5/. Therefore, the requirement of CDM-VVS for PA v01.0 §§ 374 have been met.

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification

The verification team verified that

a) A complete set of data for the monitoring period was available for the monitoring period and the verification of each monitoring parameter is elaborated under Section E.6.2 of this report. The complete monitoring data is also presented in the corresponding ER sheet /4.2/ of final Monitoring Report /1.1/.

b) The information provided in the monitoring report was cross checked with other sources, wherever appropriate and available, and such information is also included under Section E.6.2 of this report.

	c) The calculations of baseline emissions as presented in the corresponding ER sheet/4.2/ of final Monitoring Report/1.1/ were checked and found to be consistent with the formulae and methods described in the registered monitoring plan and the applied methodology. d) All assumptions used in the emission calculations were found appropriate and therefore justified e) Appropriate emission factors and other reference values have been correctly applied. This has also been elaborated under Section E.6.1 of this report. f) No standardized baseline was prescribed in the registered PDD/1.2/ (also revised PDD/1.5/) and therefore it has not been applied. g) There is no pro-rate approach was applied in the current monitoring period as entire monitoring period falls into period that is after the end of first commitment period of Kyoto Protocol. As a result of verification of emission reduction sheet against emission reduction calculation mentioned in registered PDD /1.2/ and revised PDD/1.5/, the assessment team able to confirm the following final result : Baseline Emission = BEy = 21,011 tCO_2 e Project Emission =PE_y= 0 tCO_2e Leakage emissions = Ly = 0 tCO_2e Therefore = ERy = 21,011 tCO_2 e - 0 tCO_2e - 0 tCO_2e = 21,011 tCO_2e
Findings	CAR #4 was raised and resolved.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-VVS for v01.0 §§ 377 have been meet as: • A complete set of data for the monitoring period is available. • Information on the baseline GHG emission calculation provided in the monitoring report /1.1/ has been cross-checked with other sources. • Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document. • Appropriate emission factor of the power grid has been correctly applied.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	As per registered PDD/1.2/ and revised PDD /1.5/ and applied monitoring methodology/2.3/ the project emissions is considered zero as correctly. The onsite visit and project design also did not reveal any additional potential source to be considered in this regard.
Findings	No non-conformability was observed during assessment for this section. Therefore, no finding was raised.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-VVS for v01.0 §§ 377 have been meet as: • A complete set of data for the monitoring period is available. • Information on the baseline GHG emission calculation provided in the monitoring report /1.1/ has been cross-checked with other sources. • Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document. • Appropriate emission factor of the power grid has been correctly applied.

E.8.3. Calculation of leakage GHG emissions

Means of verification	The registered PDD/1.2/ and revised PDD /1.5/ and applied monitoring methodology/2.3/ does not prescribe any leakage emissions to be considered. The onsite visit and project design also did not reveal any potential source to be considered in this regard.
Findings	No non-conformability was observed during assessment for this section. Therefore, no finding was raised.
Conclusion	No leakage emissions were required to be calculated.

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	As elaborated above, the entire emission reductions from the project activity were based on baseline emissions. The calculations presented in this regard in the final monitoring report and corresponding ER calculation sheet/4.2/ were found appropriate and complying with the provisions prescribed in the registered monitoring plan of registered PDD/1.2/, revised PDD/1.5/ and applied methodology/2.3/. The verification team confirms that an audit trail that contains the evidence and records that validated the stated figures were checked and found acceptable.
Findings	No non-conformability was observed during assessment for this section. Therefore, no finding was raised.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-VVS for PA v01.0§§ 377 have been meet as: • A complete set of data for the monitoring period is available. • Information provided in the monitoring report /1.1/ has been cross-checked with other sources; • Calculations of baseline emissions, and project activity emissions and leakage, as appropriate, been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document. • There are no assumptions in emission reductions calculation. • Appropriate emission factor of the power grid has been correctly applied.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	As verified and evident from the final Monitoring Report /1.1/ and corresponding ER sheet /4.2/, the actual emission reductions achieved by the project activity in the current monitoring period were found lower than the estimated quantity in the registered PDD/1.2/ (also revised PDD/1.5/) for the comparable period. This is due to fact that Solar PV power generation (or PLF) is depending up-on natural sun light availability and same was observed lesser as compared to estimated PLF.

Annual CERs estimated in the registered PDD (tCO_2e)	Estimated CERs for current monitoring period (1188 days), tCO_2e	Actual CERs achieved in the current monitoring period, tCO_2e	Difference
6,844	22,572	21,011	- 6.92 %

Considering, there is decrease in ERs than the estimated amount; it was found acceptable.

Findings	No non-conformability was observed during assessment for this section. Therefore, no finding was raised.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-PS for PA v01.0 §§ 268 have been meet as: • A comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the registered PDD /1.2/ (also revised PDD/1.5/) has been provided in the Monitoring Report /1.1/. • The verification team confirms that the calculation of the comparison is correct.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	The verification team has assessed the cause of any variation in the actual GHG emission reductions achieved during the current monitoring period. There is decrease of around 6.92% in the actual emission reductions achieved during the current monitoring period from that stated in the registered CDM-PDD/1.2/ (also revised PDD/1.5/). This is due to fact that Solar PV power generation (or PLF) is depending up-on natural sun light availability and same was observed lesser as compared to

	estimated PLF.
Findings	CAR #3 was raised and resolved.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-PS for PA v01.0 §§ 269 and CDM-VVS for PA v01.0 §§ 359 (d) have been meet as: • The verified emission reductions are lower than the estimated value in the monitoring period. The project participants have explained the cause of any increase in the actual GHG emission reductions achieved during the current monitoring period, and including all information (i.e. data and/or parameters) that is different from that stated in the registered PDD /1.2/ (also revised PDD/1.5/). • The variation is deemed to be reasonable.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	Based on the assessment done in section E.8.1 to E.8.6, the verification team is able to certify that the emission reductions from the CDM project activity 9964 "5 MW Solar PV Power Project at NTPC Faridabad" in India during the period 01/06/2014 – 31/08/2017 (including both days) is 21,011 tCO_2e.
Findings	No non-conformability was observed during assessment for this section. Therefore, no finding was raised.
Conclusion	Applus+ Certification confirms that the requirement outlined under CDM-PS for PA v01.0 §§ 266 as the project participants has calculated GHG emission reductions.

E.9. Assessment of reported sustainable development co-benefits

Means of verification	Not applicable
Findings	Not applicable
Conclusion	Not applicable

E.10. Global stakeholder consultation

Means of verification	Not applicable
Findings	Not applicable
Conclusion	Not applicable

SECTION F. Internal quality control

>>

As a final step of verification, the final documentation including the verification report has to undergo an internal quality control by the Technical Reviewer. Each report has to be finally approved either by the DOE's Technical Manager or the Deputy. In case one of these two persons is part of the assessment team, the approval can only be given by the person who is not a part of the assessment team. If the documents have been satisfactorily approved, the Request for Issuance is submitted to the CDM-EB along with the relevant documents.

SECTION G. Verification opinion

>>

Applus+ Certification has been contracted by M/s. NTPC Limited to perform the verification of the emission reductions reported for the CDM project "5 MW Solar PV Power Project at NTPC Faridabad" in the period 01/06/2014 – 31/08/2017.

Applus+ Certification concludes that the CDM Project "5 MW Solar PV Power Project at NTPC Faridabad", as described in the monitoring plan contained in the registered PDD /1.2/ (Version 3.0, 15/04/2014), revised PDD /1.5/ (Version 4.0, 09/04/2018) and Monitoring Report /1.1/ (Version 03, 09/07/2018), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification is conducted in line with the (CDM-VVS for PA) Version 01.0 /2.1/ requirements. The Project is implemented according to selected monitoring methodology /2.3/ and the monitoring plan contained in the registered PDD /1.2/ and revised PDD/1.5/. The monitoring equipment was installed, calibrated and maintained in a proper manner. The monitoring system is in place and the Project is generating GHG emission reductions as a CDM project.

Applus+ Certification confirms that the project is implemented in accordance with the validated and registered Project Design Document/1.2/ (also revised PDD/1.5/). The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 21,011 tCO_2e emission reductions during the period 01/06/2014 – 31/08/2017 (both days included).

Applus+ Certification therefore issues the positive verification opinion expressed in the Certification statement in Section H.

SECTION H. Certification statement

>>

Applus+ Certification has been engaged by M/s. NTPC Limited to perform the first periodical verification of the '5 MW Solar PV Power Project at NTPC Faridabad' (UNFCCC Ref. No. 9964).

The management of M/s. NTPC Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered PDD version 3.0/1.2/, completed on 15/04/2014, revised PDD version 4.0/1.5/, completed on 09/04/2018 and the applied methodology AMS-I.D Version 17.0.0 /2.3/.

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is operated as planned and described in the project design document approved by the EB;
- the monitoring plan is as per the applied methodology;
- the monitoring in Monitoring Report is as per the PDD and the monitoring plan approved by the EB;
- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In our opinion, the GHG emission reductions for '5 MW Solar PV Power Project at NTPC Faridabad' for the monitoring period 01/06/2014 – 31/08/2017 as reported in Monitoring Report, prepared on the basis of the project's Monitoring Plan are fairly stated.

Based on the information we have seen and evaluated, we confirm the following statement:

Reporting period:	From 01/06/2014 – 31/08/2017
Verified emissions in the above reporting period:	
Leakage emissions	00,000 tCO_2 equivalents
Project emissions	00,000 tCO_2 equivalents
Baseline emissions	21,011 tCO_2 equivalents
Emission reductions in this monitoring period (i.e. 01/06/2014 – 31/08/2017)	21,011 tCO_2 equivalents
Emission reductions achieved during the period up to 31 December 2012	Nil
Emission reductions achieved during the period from 1 January 2013 onwards. (i.e. 01/06/2014 – 31/08/2017)	21,011 tCO_2 equivalents

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology for SSC Projects
BE	Baseline Emission
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CH_4	Methane
CL	Clarification Request
CM	Combined Margin
CME	Coordinating/Managing Entity
CO_2	Carbon di oxide
CP	Crediting Period
CPA DD	Component Project Activity Design Document
DNA	Designated National Authority
DR	Desk Review
DOE	Designated Operational Entity
EB	Executive Board
FAR	Forward Action Request
GHG	Green House Gas
GSC/GSP	Global Stakeholder Consultation Process
GW	Giga Watt
GWh	Giga Watt hour
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
kWh	kilo Watt hour
LoA	Letter of Approval/Authorization
LSC	Local Stakeholder Consultation Process
MoC	Modalities of Communication
MoV	Means of Validation
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
N2O	Nitrous Oxide
NTPC	National Thermal Power Cooperation
OM	Operating Margin
PCP	Project Cycle Procedure
PDD	Project Design Document
PE	Project Emission
PLF	Plant Load Factor
PoA DD	Programme of Activities Design Document
PP	Project Participant
PS	Project Standard
PV	Photo Voltaic
RFR	Request for Registration
Tco_2e	Tonnes of Carbon di oxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
V	Version
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ Certification has composed a project validation team in accordance with the appointment rules in Applus+ Certification. The composition of assessment team has to be approved by the Applus+ Certification ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)
- Technical Experts (E)
- Technical Reviewer (TR)

It is required that the sectoral scope / technical area related to the methodology has to be covered by the assessment team.

Name	Qualification	Coverage of scope	Coverage of technical Area	Financial aspect	Host country Experience	Attendance to the On-Site Assessment
Vivek Kumar Ahirwar	LA/E	Yes (1)	Yes (1.2)	N/A	Yes	Yes
Simon Shen	TR	Yes (1)	Yes (1.2)	N/A	N/A	N/A

The curricula vitae of the DOE's team members are provided below:

Vivek Kumar Ahirwar is a BEE-Certified Energy Auditor by Govt of India with over eight years of relevant experience in energy efficiency, energy audit, thermal and electrical energy generation technology from renewable source and energy conservation in energy intensive industries, designated consumers and commercial buildings, implementation of energy conservation building codes, research, process and green building projects. He is a certified lead auditor for ISO 14001 EMS and 14064. He has experience under various categories of projects stating from renewable to waste to supercritical projects and WCD. He has successfully audited more than 100 GHG (CDM/VCS/GS) projects in different states across the India. He has done Mater in Technology (Energy Management) from a premier institute, School of Energy & Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from Govt. Engineering college, Rewa, RGPV, India.

Simon Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Verifier and ISO 9001/14001 Lead Auditor for 3.5years

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1.	**Basic Documents (Monitoring Report, Project Design Documents, Previous Verification Reports)**			
1.0	NTPC	MR , version 01 (Published)	Dated 26/09/2017	PP
1.1	NTPC	MR, version 03(Final)	Dated 09/07/2018	PP
1.2	NTPC	Registered PDD Version 3.0,	Dated 15/04/2014	PP
1.3	URS	Validation Report of the registered CDM project activity (Validation Report No.: CCMS/000140)	-	Other: UNFCCC
1.4	UNFCCC	CDM Project activity view page "5 MW Solar PV Power Project at NTPC Faridabad" https://cdm.unfccc.int/Projects/DB/URSCert1400838548.0/view	-	Other: UNFCCC
1.5	NTPC	Revised PDD Version 4.0,	Dated 09/04/2018	PP
1.6	Applus+ Certification	Validation Report of the revised PDD	Dated 12/04/2018	Other: DOE
1.7	NTPC	MR, version 02(Intermediate)	Dated 09/04/2018	PP
2.	**References and requirements at UNFCCC/IPCC/etc.**			
2.1	UNFCCC website	Clean Development Mechanism Validation and Verification Standard for Project Activity (CDM-VVS for PA), version 01.0 as per EB 93, Annex 5	Dated 03/03/2017	Other: UNFCCC
2.2	UNFCCC website	CDM Project Standard for Project Activity (CDM-PS for PA), version 01.0 as per EB 93, Annex 4	Dated 03/03/2017	Other: UNFCCC
2.3	UNFCCC website	Applied Methodology: AMS-I.D, "Grid connected renewable electricity generation", (Version 17)	-	Other: UNFCCC
2.4	UNFCCC website	Guidance to Complete "Monitoring Report Form (CDM-MR-FORM), Version 06.0" as accordance with the Attachment "Instructions for filling out the monitoring report form"	Dated 07/06/2017	Other: UNFCCC
3.	**Project implementation information**			
3.1	NTPC	Commissioning certificate of the project activity	Dated 31/03/2014	PP
3.2	NTPC	NTPC internal monitoring records 1. Electricity Log book records 2. ""INTER OFFICE MEMO" prepared by (AGM-EEMG, NTPC Faridabad) at project site and submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO	For the period 01/06/2014 – 31/08/2017	PP
3.3	NTPC	Net electricity supplied to the grid records for sold / purchased electricity (e.g. invoices / receipts)	For the period 01/06/2014 – 31/08/2017	PP
4.	**ER calculation and cross checking issue**			
4.1	NTPC	Emission reduction calculation sheet , Version 01	Dated 26/09/2017	PP
4.2	NTPC	Emission reduction calculation sheet, Version 03	Dated 09/07/2018	PP
4.3	NTPC	Emission reduction calculation sheet, Version 02	Dated 09/04/2018	PP
5.	**Calibration issues**			

5.1	NTPC	NTPC, calibration certificate of all equipments	-	PP
6.	**Others**			
6.1	Applus+ Certification	Site Visit Attendance Sheet	13/11/2017	-
6.2	Applus+ Certification	Site Visit Photograph	13/11/2017	-

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	N/A	**Section no.**	N/A	**Date:**N/A
Description of FAR				
N/A				
Project participant response				**Date:**N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** N/A
N/A				

Table 2. CL from this verification

CL ID	N/A	**Section no.**	N/A	**Date:**DD/MM/YYYY
Description of CL				
N/A				
Project participant response				**Date:**DD/MM/YYYY
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** DD/MM/YYYY
N/A				

Table 3. CAR from this verification

CAR ID	01	**Section no.**	D.2	**Date:** 12/01/2018
Description of CAR				

Please clarify followings

1. The registered PDD and MR monitoring plan mentioned that "Joint Energy Meter reading reports NTPC and GRIDCO will jointly read the metering system on the first day of every month and thus the joint energy meter reading reports will be prepared", however during site visit observation and interview with the PP , it was observed the no such procedure followed by the PP. The PP is requested to clarify how this in line with monitoring requirement situated under the PDD.
2. The value of parameter "EG_{Bly} "was taken from the document name as "INTER OFFICE MEMO" by Project site (AGM-EEMG, NTPC Faridabad and submitted to AGM-Commercial Office of NTPC for issuance of invoice to GRIDCO. The value is not consistent after decimal point, the PP is requested please clarify the inconsistency?
3. The monitoring plan of the registered PDD and MR mentioned that "Net electricity supplied to the grid shall be cross checked with records for sold / purchased electricity (e.g. invoices / receipts", thus the PP is requested to provide sold and purchase record s for verification.

Project participant response	**Date:** 09/04/2018
The MR and PDD are revised and submitted.	
Documentation provided by project participant	
MR version 02 and PDD version 04	
DOE assessment	**Date:** 12/04/2018
The PP has submitted the revised set of PDD and MR, the assessment team has been review the response and corrections in the PDD and MR. The PP has corrected the source of information in section B.7.1 of PDD for parameter "EG_{Bly} ", the same been found to correct and consistent with information verified during site visit, hence modification in the PDD is found to be appropriate, hence accepted. The value of parameter "EG_{Bly}"has been corrected in MR and ER sheet. The PP has submitted the invoice records; same has been verified and found to be correct, hence accepted. Therefore, the CAR#01 has been satisfactorily closed.	

CAR ID	02	**Section no.**	D.2	**Date:** 12/01/2018
Description of CAR				
The PP is requested to provide calibration details of energy meters in MR.				
Project participant response				**Date:** 09/04/2018
Calibration Certificate is submitted and calibration details is provided in revised MR version 02				
Documentation provided by project participant				
Calibration Certificate and MR version 02				
DOE assessment				**Date:** 12/04/2018
The PP has submitted the revised MR and the calibration details of energy meters, the same has been verified and found to be correct with information provide in revised MR, hence accepted. Therefore, the CAR#02 has been closed satisfactorily.				

CAR ID	03	**Section no.**	E.8.6	**Date:** 12/01/2018
Description of CAR				
The PP is requested to clarify the section B.1 mentioned that "no breakdown of operational activity" , where as the section E.6 explain the reason for deceasing actual emission reduction as compared to registered PDD because of breakdown and outage of the plant. The PP is requested to further demonstrate the comparison of estimate value of emission reduction with actual achieved value during current monitoring period in section E.6?				
Project participant response				**Date:** 09/04/2018
The section E.6 is corrected in MR.				
Documentation provided by project participant				
MR version 02				
DOE assessment				**Date:** 12/04/2018
The PP has submitted the revised MR with corrections in section E.6 of the MR, the same has been made consistent throughout the entire section of the MR. Hence, CAR#03 has been closed out satisfactorily.				

CAR ID	04	**Section no.**	E.8.1	**Date:** 09/07/2018
Description of CAR				

1. The PP is requested to justify why the aggregated power generation for this monitoring period start from May 2015, rather than start date of the monitoring period, as indicated in Cell C46 of ER spreadsheet. 2. The Page 19 of revised PDD shows the grid emission factor is 0.9528 tCO_2e /MWh, However, the page 13 of monitoring report and Cell E46 of ER spreadsheet indicates grid emission factor as 0.9586 tCO_2e /MWh and has been applied to calculate the emission reductions. The PP is requested to clarify the inconsistency.
Project participant response **Date:** 09/07/2018
The MR and ER are revised accordingly to comment and submitted.
Documentation provided by project participant
MR version 03 and ER version 03
DOE assessment **Date:** 11/09/2018
The PP has submitted the revised MR and ER with corrections in aggregated power generation and emission factor, the same has been made consistent throughout the entire section of the MR. Hence, CAR#04 has been closed out satisfactorily.

Table 4. FAR from this verification

FAR ID	N/A	**Section No.**	N/A	**Date:**N/A
Description of FAR				
N/A				
Project participant response				**Date:**N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** N/A
N/A				

- - - - -

Document information

Version	*Date*	*Description*
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: project activities, verifying and certifying