



Monitoring report form (Version 03.2)

Monitoring report

Title of the project activity	5 MW Solar PV Power Project at NTPC-Dadri, a Business unit of NTPC limited
Reference number of the project activity	9392
Version number of the monitoring report	1.0
Completion date of the monitoring report	13/05/2014
Registration date of the project activity	29/12/2012
Monitoring period number and duration of this monitoring period	Monitoring Period No-1 Duration: From 01/01/2013 To 31/03/2014
Project participant(s)	NTPC LIMITED
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral scope 1: Energy industries (renewable - / non-renewable sources). Methodology : AMS-I.D. : Grid connected renewable electricity generation (version .17 EB 61)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	6,919 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	5839
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	NIL
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	5839

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

NTPC has commissioned 5MW solar photo voltaic (PV) power plant at NTPC Dadri, Vidyut Nagar, Taluk-Dadri, District- Gautam Budh Nagar. The project activity is generating clean and green renewable power by utilising solar radiation available at site. The electricity generated from project activity is being supplied to NEWNE grid through regional grid. The project activity is a green initiative of NTPC Dadri. The project activity installed PV solar cells (modules) made from high efficiency crystalline silicon solar cells. Modules generate direct current (DC) which will be converted to alternating current (AC) by inverter hardware. Power generated will be stepped to 220KV to supply generated electricity to the NEWNE grid through power purchase agreement signed with GRIDCO.

The purpose of the project activity is generation of electricity using the solar energy which has no associated greenhouse gas emissions. The annual electricity generation from the proposed project activity is 7,047 MWh. Electricity generation is carried out without causing any negative impact on the environment and will support climate change mitigation as it leads to emission reductions of 6,919 t CO₂ eq for this verification period.

A.2. Location of project activity

The project activity is located at NTPC Dadri, Vidyut Nagar, Taluk-Dadri, District- Gautam Budh Nagar district of Uttar Pradesh. The geographical coordinates for project activity is 28° 34' 12" N to 77° 37' 48" E. The project site is 25 KM from Ghaziabad city and 12 KM from National Highway 24. The nearest railway station is Ghaziabad and nearest airport is New Delhi which is around 25 and 70 KMs from project activity respectively.



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 if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	NTPC LIMITED (Public Entity)	No

A.4. Reference of applied methodology

The project falls under UNFCCC sectoral scope 1: Energy industries (renewable - / non-renewable sources).

Methodology Title:

AMS-I.D.: Grid connected renewable electricity generation, Version 17, EB 61, dated 03/06/2011

Tool used:

Tool to calculate the emission factor for an electricity system, Version 02.2.1, EB 63, Annex 19, dated 29/09/2011

A.5. Crediting period of project activity

Start date of crediting period is 01/01/2013 as per UNFCCC website. Further, the date of commissioning of solar project is 30/03/2013¹. Thus, the monitoring period is starting from 01/01/2013.

Crediting period of the project activity has been considered as renewable crediting period of 07 year starting from 01/01/2013 to 31/12/2019 which can be renewed twice.

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

During the monitoring period (01/01/2013 to 31/03/2014), all the equipment and metering systems worked normally. No events or situations which may impact the applicability of the methodology occurred during this monitoring period. Technology and equipment adopted in the project are consistent with the registered PDD.

The total installed capacity of project activity is 5 MWp. The PV panels convert sunlight to electrical energy. The PV generates direct current (DC) that is converted to alternating current (AC) by inverter hardware. Voltage is stepped up in stages to 220 KV for feeding to the NEWNE grid. The high efficiency crystalline silicon solar cells are used for the proposed project. Each string consisting of modules connected in series is taken to the String Combiner Box (SCB). SCBs are combined to form the input of one inverter. The plant consists of 20,856 no. of 240 Wp high efficiency crystalline silicon solar modules arranged in 869 nos. of array with 24 modules in each array. The combined capacity of all inverters taken together is 5 MWp. The respective digital outputs are taken to a supervisory controller located in the control room. Electronic surge arrestors provided at the DC input & the AC output of each inverter. Necessary HT switch gears are provided for HT isolation & protection.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

¹ As per letter dated 28/03/2013 from ED, Commercial, NTPC Limited

Not Applicable

B.2.2. Corrections

Not Applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

Not Applicable

B.2.4. Changes to project design of registered project activity

Not Applicable

B.2.5. Changes to start date of crediting period

Not Applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

Not Applicable

SECTION C. Description of monitoring system

In the registered PDD, emission factor of the project is determined ex-ante. Therefore, the electricity supplied to the grid by the project is defined as the key data to be monitored.

Electricity supplied to the grid will be monitored & measured continuously using Main meter & Check meter of 0.2S accuracy class, installed at the HV side of 1.1 KV/33 KV transformer & also through a standby meter of 0.2S accuracy class, installed at the HV side of 33 KV/220 KV transformer. There will be 15 minute blockwise measurement of the generated energy which will be recorded daily in DAT format (non-tamperable), which then will be sent to Northern Region Load Dispatch Centre (NRLDC) on weekly basis. NRLDC compiles the data & send it to Northern Regional Power Committee (NRPC) who then publishes Regional Energy Account (REA) data on NRPC website on weekly basis. At PP end these REA data are downloaded from NRPC website & compared with station end data & if any discrepancy is found in the REA data, then the same is intimated to NRLDC for resolving the issue.

Then, REA data is uploaded at PP SAP. On the basis of SAP data, monthly invoices will be prepared by the commercial department & sent to the concerned consumer.

Net electricity supplied to the grid shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts) & saved in SAP system.

Operational and management structure

General Manager i.e. Station Head will have complete control over all activities. DGM (Electrical Maintenance-Gas) have been assigned responsibility as Head of Solar Plant. He will be assisted by operation, energy efficiency management and maintenance personnel and will have overall responsibility of monitoring of power generation and measurement of power generated in 15 minutes blocks and consolidating daily, weekly, monthly & yearly and archiving the same. The day-to-day operation control will

be performed by the Shift-in-charge engineers who will monitor solar power generation continuously. Energy efficiency management engineer will be responsible for archiving and reporting of energy generated as measured by online special energy meter

Designation	Responsibility
Head of the Station	<ul style="list-style-type: none"> Holds complete control over monitoring aspects pertaining to the project Review of Monitoring Report
AGM (O&M Gas)	<ul style="list-style-type: none"> Oversees the collection, recording and storage of data Entire power plant operation & maintenance
Head of Solar Plant DGM (EM GP)	<ul style="list-style-type: none"> Maintenance of all equipment Coordination with other maintenance groups Training of the staff
Operation Personnel (AGM (OPN))	<ul style="list-style-type: none"> Day to Day operation Data collection and storage
Energy and Efficiency Monitoring Group	<ul style="list-style-type: none"> Archiving and reporting of energy generated as measured by online special energy meter Monitoring of power generation and measurement of power generated in 15 minutes blocks Periodic checking of recorded & stored data Responsible for carrying out periodical testing and calibration of equipment and meters Emission reduction calculation & monitoring report preparation

SECTION D. Data and parameters

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

Data / Parameter:	EF_{grid OM,y}
Unit:	t CO ₂ / MWh
Description:	Operational Margin of the NEWNE Grid
Source of data:	CEA of India Database as given in User Guide version 7, Jan 2012
Value(s) applied):	0.9842
Choice of Data or Measurement methods & procedures	Calculated by CEA for all the regional grids in India, specifically meant for use in CDM project activities.
Purpose of data:	Calculation of baseline emission
Additional comment:	CO ₂ Baseline Database for the Indian Power Sector, Version 7.0, January 2012 published by Central Electricity Authority is used to determine the value of this parameter.

Data / Parameter:	EF_{grid BM,y}
Unit:	t CO ₂ /MWh
Description:	Build Margin of the NEWNE Grid
Source of data:	CEA of India Database as given in User Guide version 7, Jan2012
Value(s) applied):	0.8587
Choice of Data or	Calculated by CEA for all the regional grids in India, specifically meant for

Measurement methods & procedures	use in CDM project activities.
Purpose of data:	Calculation of baseline emission
Additional comment:	CO ₂ Baseline Database for the Indian Power Sector, Version 7.0, January 2012 published by Central Electricity Authority is used to determine the value of this parameter.
Data / Parameter:	EF_{grid} CO_{2,y}
Unit:	t CO ₂ /MWh
Description:	Emission Factor of the NEWNE Grid
Source of data:	CEA of India Database as given in User Guide version 7, Jan2012
Value(s) applied:	0.9528
Choice of Data or Measurement methods & procedures	Calculated by CEA for all the regional grids in India, specifically meant for use in CDM project activities.
Purpose of data:	Calculation of baseline emission
Additional comment:	CO ₂ Baseline Database for the Indian Power Sector, Version 7.0, January 2012 published by Central Electricity Authority is used to determine the value of this parameter.
D.2. Data and parameters monitored	
Data / Parameter:	EG_{BL,y}
Unit:	MWh/y
Description:	Quantity of net electricity supplied to the grid in year y
Measured/ Calculated / Default:	Measured Energy = 6130.764 Calculated Energy = 7946.000
Source of data:	Main meter installed at the HV side of 1.1 /33 KV transformer
Value(s) of monitored parameter:	6.130764 MUs
Monitoring equipment:	Main meter
Measuring/ Reading/ Recording frequency:	- Continuous monitoring of power generated from control room - 15 minute block wise measurement - Daily recording of energy - Reporting data of energy exported to regional load despatch centre weekly
Calculation method (if applicable):	Calculated by CEA for all the regional grids in India, specifically meant for use in CDM project activities.

QA/QC procedures:	<p>Main and check meters of 0.2S accuracy class are installed in upstream of 1.1/33 KV transformer and standby meter of 0.2S accuracy class is installed in upstream of 33/220KV step-up transformer.</p> <p>The main and check meters shall be checked jointly at the installation as per the CEA (Installation & operation of meters) regulations 2006 as amended from time to time.</p> <p>Data shall be downloaded from the meters at regular intervals as decided by SLDC/RLDC for preparation of the REA account</p> <p>Regular cross checking and analysis of meter readings and meter failure or discrepancies shall be reckoned as per CEA (Installation & operation of meters) regulations 2006 as amended from time to time. If the main meter or check meter is found to be not working at the time of meter reading or at any other time, NTPC shall inform the SLDC/RLDC of the same.</p> <p>In case of failure of meters, energy accounting for the period shall be as per procedure laid down by CERC or as per the mutually agreed procedure. In case of absence of any such procedure, the following procedure shall be followed:</p> <p>In case of failure of main meter, reading of check meter for the corresponding period shall be considered for energy accounting. If both the main and check meter(s) fail to record or if any of the PT fuses is blown out, energy shall be computed based on standby meters. In case of disputes, resolution shall be mutually discussed and amicably resolved within 90 days.</p> <p>Testing and Calibration: All meters shall be calibrated and tested as per procedure laid out in CEA (Installation & operation of meters) regulations 2006. The meters shall be tested once in five years by NABL accredited agency engaged by M/s PGCIL in the presence of representative of NTPC and M/s GRIDCO as per procedure laid out in CEA (Installation & operation of meters) regulations 2006. These meters shall also be tested whenever the energy and other quantities recorded by the meter are inconsistent with electrically adjacent meter or regional load dispatch centre reports abnormality in reading. After testing, the meter will be recalibrated if required at manufacturer's works or replaced.</p> <p>Quality assurance system elaborating the roles and responsibilities will be implemented once the project is registered to ensure consistency and accuracy of monitoring.</p>
Purpose of data: Additional comment:	Calculation of baseline emissions - Data will be kept for two years after the last issuance of CERs for this project activity. - Data will be aggregated daily, monthly and yearly
D.3. Implementation of sampling plan	
Since data and parameters monitored in this project activity is being "generated energy" which will be measured continuously and totalised using energy meter, therefore, sampling approach is not required	

SECTION E. Calculation of emission reductions or GHG removals by sinks**E.1. Calculation of baseline emissions or baseline net GHG removals by sinks**

Baseline emissions (BE_y in tCO₂e) are the product of the baseline emissions factor (EF_y in tCO₂e/MWh) multiplied by the electricity supplied by the Project to the grid (EG_y in MWh):

$$BE_y = EG_{BL,y} * EF_{CO_2, grid, y}$$

Where:

BE_y Baseline Emissions in year y (t CO₂)

$EG_{BL,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO_2, grid, y}$ CO₂ emission factor of the grid in year y (t CO₂/MWh) (0.9528 t CO₂/MWh, as calculated ex-ante in the registered PDD and will not be updated during the crediting period).

Net Electricity supplied by the project to the grid and corresponding baseline emission is listed below:

Table : Electricity exported to the grid by the project activity				
From	To	Meter Record (MWh) A	Sales receipt/Invoices (MWh) B	Data used for CER calculation (Mwh) C=MIN(A,B)
01/01/2013	31/01/2013	0	0	0
01/02/2013	28/02/2013	0	0	0
01/03/2013	31/03/2014	0	0	0
01/04/2013	30/04/2013	551	554	551
01/05/2013	31/05/2013	556	556	556
01/06/2013	30/06/2013	454	454	454
01/07/2013	31/07/2013	401	401	401
01/08/2013	31/08/2013	437	437	437
01/09/2013	30/09/2013	585	585	585
01/10/2013	31/10/2013	565	565	565
01/11/2013	30/11/2013	561	561	561
01/12/2013	31/12/2013	466	466	466
01/01/2014	31/01/2014	370	370	370
01/02/2014	28/02/2014	480	480	480
01/02/2014	31/03/2014	701	701	701

Table : Electricity Imported from the grid by the project activity

From	To	Meter Record (MWh) A	Sales receipt/invoices (MWh) B	Data used for CER calculation (Mwh) C=MIN(A,B)
01/01/2013	31/01/2013	0	0	0
01/02/2013	28/02/2013	0	0	0
01/03/2013	31/03/2014	0	0	0
01/04/2013	30/04/2013	0	0	0
01/05/2013	31/05/2013	0	0	0
01/06/2013	30/06/2013	0	0	0
01/07/2013	31/07/2013	0	0	0
01/08/2013	31/08/2013	0	0	0
01/09/2013	30/09/2013	0	0	0
01/10/2013	31/10/2013	0	0	0
01/11/2013	30/11/2013	0	0	0
01/12/2013	31/12/2013	0	0	0
01/01/2014	31/01/2014	0	0	0
01/02/2014	28/02/2014	0	0	0
01/02/2014	31/03/2014	0	0	0

The net electricity supplied to the grid $EG_y = 6128 \text{ MWh} - 0000 \text{ MWh} = 6128 \text{ MWh}$

The baseline emission (BE_y) can be calculated by the formula below:

$$BE_y = EG_y \times EF_y = 6128 \text{ MWh} \times 0.9528 \text{ tCO}_2\text{e/MWh} = 5839 \text{ tCO}_2\text{e}$$

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

According to the registered PDD, the GHG emission of the project is zero, thus $PE_y = 0 \text{ tCO}_2\text{e}$.

E.3. Calculation of leakage

According to the registered PDD, no leakage is considered in the project, thus $L_y = 0 \text{ tCO}_2\text{e}$.

E.4. Summary of calculation of emission reductions or net anthropogenic 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)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	5839	0	0	5839

E.5. Comparison of actual emission reductions or net anthropogenic 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 (t CO₂e)	6714	5839

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

Less generation due to less solar radiation.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO₂e)	-	5839

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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 anthropogenic 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.
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