

# MONITORING REPORT

<b>Project Title</b>	Ningxia Angli Lingwu Photovoltaic Grid Connected Power Plant Project
<b>Version</b>	02
<b>Report ID</b>	02
<b>Date of Issue</b>	09/10/2013
<b>Project ID</b>	
<b>Monitoring Period</b>	28/12/2011-30/11/2012
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**Table of Contents**

1	Project Details .....	3
1.1	Summary Description of Project .....	3
1.2	Sectoral Scope and Project Type .....	4
1.3	Project Proponent .....	4
1.4	Other Entities Involved in the Project .....	4
1.5	Project Start Date .....	4
1.6	Project Crediting Period .....	4
1.7	Project Location .....	4
1.8	Title and Reference of Methodology .....	5
2	Implementation Status .....	5
2.1	Implementation Status of the Project Activity .....	6
2.2	Project Description Deviations .....	6
2.3	Grouped Project .....	6
3	Data and Parameters .....	6
3.1	Data and Parameters Available at Validation .....	6
3.2	Data and Parameters Monitored .....	8
3.3	Description of the Monitoring Plan .....	11
4	Quantification of GHG Emission Reductions and Removals .....	13
4.1	Baseline Emissions .....	13
4.2	Project Emissions .....	16
4.3	Leakage .....	16
4.4	Summary of GHG Emission Reductions and Removals .....	16
5	Additional Information .....	16

## 1 PROJECT DETAILS

### 1.1 Summary Description of the Implementation Status of the Project

Ningxia Angli Lingwu Photovoltaic Grid Connected Power Plant Project (hereafter simplified as “the Project”) is a newly built grid-connected photovoltaic power plant with installed capacity of 39MWp (39.3397MWp precisely), which is located at Baitugang Country, Lingwu City, Ningxia Hui Autonomous Region. The Project is developed and operated by Datang Angli (Lingwu) New Energy Co., Ltd. (hereafter simplified as “the project owner”). During this monitoring period from 28/12/2011 to 30/11/2012, the total GHG emission reductions are 38,836 tCO<sub>2</sub>.

#### The purpose of the Project:

(a) The scenario existing prior to the implementation of the Project is that the electricity requirement is satisfied by Ningxia Power Grid which is an integral part of Northwest China Power Grid (hereafter simplified as “NWPG”).

(b) The project will generate electricity by using renewable solar photovoltaic (PV) power to the NWPG and replacing equivalent electricity generated by fossil fuel fired power plants connected to the NWPG. The installed capacity of the Project is 39MWp (15,792 pieces of solar modules with 190W of unit capacity, 150,264 pieces of solar modules with 235W of unit capacity and 4,280 pieces of solar modules with 240W of unit capacity), and therefore reducing Greenhouse Gas emissions. The expected annual grid-in electricity is 54,000MWh.

#### How the project activity reduces GHG emissions:

The annual grid-in electricity generated by the Project is about 54,000MWh. The Project will achieve greenhouse gas (GHG) emission reductions by displacing equivalent electricity supplied by NWPG, which is predominated by fossil fuel-fired power plants. The estimated annual emission reductions are 48,402tCO<sub>2</sub>e.

#### Contribution to sustainable development

The Project promotes local sustainable development through the following aspects:

- The project activity will displace the power generation of fossil fuel power plants, reducing CO<sub>2</sub>, SO<sub>x</sub> and NO<sub>x</sub> emissions significantly, thus mitigating the air pollution and its adverse impacts on human health.
- Improvement of the fossil fuel dominated fuel mix of the electricity generation in the power grid by providing clean and renewable energy source, and help to energy supply security.
- Promote application and diffusion of the innovative/creative solar PV technology in China through the demonstrative practice of the project activity.
- Create employment opportunities for the local community during the construction and operation period.

#### The relevant implementation dates

The project started construction on 26/09/2011, and the first date of commission was on 28/12/2011.

**1.2 Sectoral Scope and Project Type**

Category: Renewable electricity in grid connected application

Sectoral Scope 1: Energy Industry

**1.3 Project Proponent**

Organization name	Datang Angli (Lingwu) New Energy Co., Ltd. (Project Owner)
Contact person	Zhang Guojun
Title	Project manager
Address	Jinyuan Building, Beijing East Road, Xingqing District, Yinchuan City, Ningxia Hui Autonomous Region
Telephone	+86-189 950 15009
Email	4753163@163.com

**1.4 Other Entities Involved in the Project**

N/A.

**1.5 Project Start Date**

28/12/2011 (commissioning start date)

**1.6 Project Crediting Period**

28/12/2011-30/11/2012

**1.7 Project Location**

The Project is located at Baitugang Country, Lingwu City, Ningxia Hui Autonomous Region, the site inflection point coordinates of the project are as below:

	Longitude	Latitude
A	106°21'49.52"E	37°48'24.42"N
B	106°22'28.03"E	37°48'03.59"N
C	106°22'17.99"E	37°47'28.31"N
D	106°21'25.18"E	37°47'50.96"N

The location of the Project is shown in the map of Figure 1.

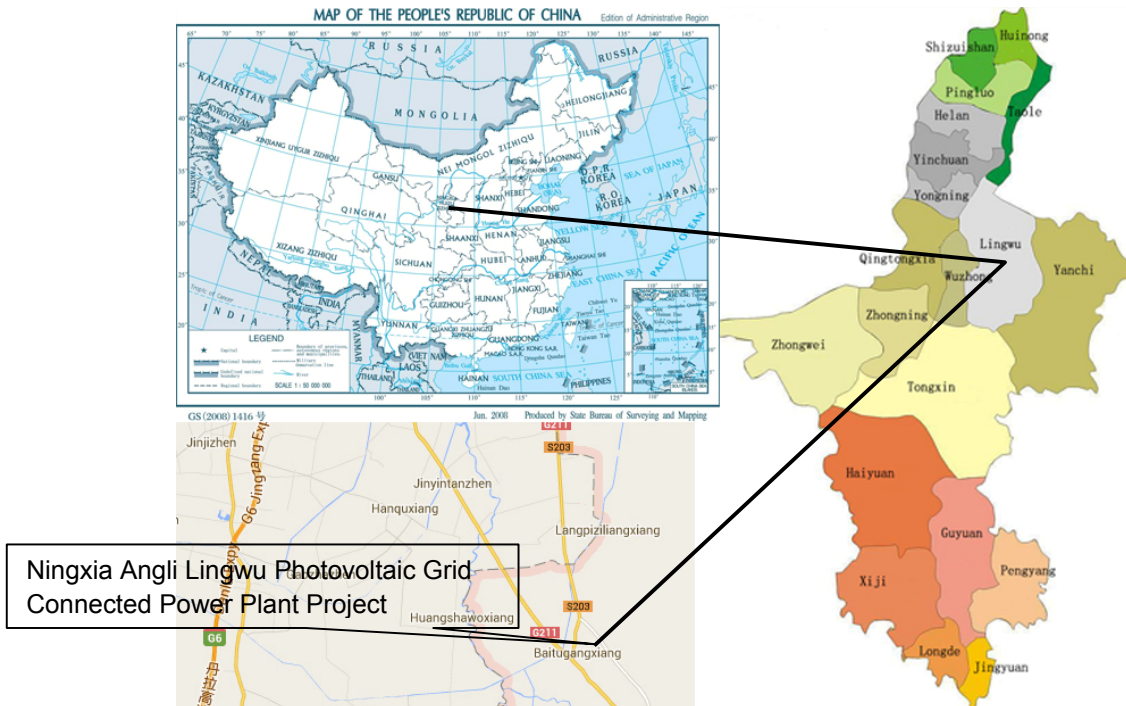


Figure 1: The location of the Project

### 1.8 Title and Reference of Methodology

ACM0002 (version 13.0.0) Consolidated baseline methodology for grid-connected electricity generation from renewable sources is used in the Project.

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

Other tools that will be used for the Project activity:

Tool for demonstration and assessment of additionality (version 06.1.0)

<http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v6.1.0.pdf>

Tool to calculate the emission factor for an electricity system (version 02.2.1)

<http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.2.1.pdf>

### 1.9 Other Programs

N/A

## 2 IMPLEMENTATION STATUS

## 2.1 Implementation Status of the Project Activity

The project started construction on 26/09/2011, and the first date of commission was on 28/12/2011. During this monitoring period, the project has a good running, smooth data transfer and grid connection, and no special events happened. No events or situations occurred during the monitoring period, which may impact the applicability of the methodology.

## 2.2 Deviations

### 2.2.1 Methodology Deviations

N.A.

### 2.2.2 Project Description Deviations

N.A.

## 2.3 Grouped Project

N.A.

## 3 DATA AND PARAMETERS

### 3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	Power Generation
Data unit:	MWh
Description:	The total power generation and power generated by low-cost/must run power plants for NWPG in year 2007, 2008 and 2009.
Source of data:	China electric power yearbook (2008 to 2010)
Value applied:	See Annex 3 in PD for details
Justification of choice of data or description of measurement methods and procedures applied	NWPG is defined as the project boundary of the Project. According to the <i>Tool to calculate the emission factor for an electricity system</i> , the option of simple OM can only be used where low-cost/must run resources constitute less than 50% of the total grid generation.
Purpose of the data:	Baseline emission calculations
Comments:	Official data

Data Unit / Parameter:	EG <sub>y</sub>
Data unit:	MWh
Description:	Net electricity generated and delivered to NWPG by all power sources serving the system in year 2007, 2008 and 2009, excluding low-cost/must-run power plants/units.
Source of data:	China electric power yearbook (2008 to 2010)
Value applied:	See Annex 3 in PD for details
Justification of choice of data or	NWPG is defined as the project boundary for the Project. According to the <i>Tool to calculate the</i>

description of measurement methods and procedures applied	<i>emission factor for an electricity system</i> , the generation by low-operating cost and must-run power plants within NWPG are excluded from calculation of simple OM emission factor.
Purpose of the data:	Baseline emission calculations
Comments:	Official data

Data Unit / Parameter:	FC <sub>i,y</sub>
Data unit:	Mass (10 <sup>4</sup> t) or volume (10 <sup>8</sup> m <sup>3</sup> ) unit
Description:	Amount of different type of fossil fuel consumed for power generation within NWPG
Source of data:	China electric power yearbook (2008 to 2010)
Value applied:	See Annex 3 in PD for details
Justification of choice of data or description of measurement methods and procedures applied	NWPG is selected as the project boundary for the Project.
Purpose of the data:	Baseline emission calculations
Comments:	Official data

Data Unit / Parameter:	EF <sub>co2,i,y</sub>
Data unit:	kg CO <sub>2</sub> /TJ
Description:	Emission factors of fuels for electricity generation
Source of data:	2006 IPCC default values
Value applied:	See Annex 3 in PD for details
Justification of choice of data or description of measurement methods and procedures applied	IPCC world-wide default values at the lower limit of the uncertainty at a 95% confidence interval are adopted.
Purpose of the data:	Baseline emission calculations
Comments:	Official data

Data Unit / Parameter:	Best electricity supply efficiency of thermal power
Data unit:	%
Description:	The efficiency level of the best coal-based, oil-based and gas-based power generation technology available in China.
Source of data:	<i>2011 Baseline emission factors for regional power grids in China</i>
Value applied:	See Annex 3 in PD for details
Justification of choice of data or description of measurement methods and procedures applied	According to the deviation accepted by EB, the efficiency level of the best technology commercially available in the national grid of China is used as a conservative value for the calculation of BM

	emission factor.
Purpose of the data:	Baseline emission calculations
Comments:	Official data

Data Unit / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t or MJ/km <sup>3</sup>
Description:	Net calorific value of fossil fuel type i in year y
Source of data:	<i>China energy statistical yearbook (2008 to 2010)</i>
Value applied:	See Annex 3 in PD for details
Justification of choice of data or description of measurement methods and procedures applied	Official statistic, publicly accessible and reliable data source.
Purpose of the data:	Baseline emission calculations
Comments:	-

Data Unit / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO <sub>2</sub> /MWh
Description:	Emission factor which is ex-anted according to the applied methodology
Source of data:	2011 Baseline emission factors for regional power grids in China issued by the National Development and Reform Commission of the Government of China (China DNA)
Value applied:	0.89635
Justification of choice of data or description of measurement methods and procedures applied	NWPG is selected as the project boundary for the Project.
Purpose of the data:	Baseline emission calculations
Comments:	-

### 3.2 Data and Parameters Monitored

Data Unit / Parameter:	$EG_{PJ\ to\ grid,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied by the Project to the grid in year y
Source of data:	Measured by meters installed at the output of the on-site booster station
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording
Frequency of monitoring/recording:	Continuous measurement and at least monthly

	recording																					
Value monitored:	43643.00																					
Monitoring equipment:	<p>Information of monitoring equipment as follow tables:</p> <table border="1"> <thead> <tr> <th></th> <th>Main meter</th> <th>Backup meter</th> </tr> </thead> <tbody> <tr> <td>Meter Type</td> <td colspan="2">DSZ331</td> </tr> <tr> <td>Accuracy class</td> <td colspan="2">0.2s</td> </tr> <tr> <td>Serial No.</td> <td>0001468380</td> <td>0001468381</td> </tr> <tr> <td>Calibration frequency</td> <td colspan="2">Annually</td> </tr> <tr> <td>The last calibration date</td> <td colspan="2">14/12/2011</td> </tr> <tr> <td>Validity</td> <td colspan="2">14/12/2011 to 13/12/2012</td> </tr> </tbody> </table> <p>Calibration was carried by Ningxia electric energy metering and Testing Center. The accreditation certificate number is 3-4-00101-2011.</p>		Main meter	Backup meter	Meter Type	DSZ331		Accuracy class	0.2s		Serial No.	0001468380	0001468381	Calibration frequency	Annually		The last calibration date	14/12/2011		Validity	14/12/2011 to 13/12/2012	
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Serial No.	0001468380	0001468381																				
Calibration frequency	Annually																					
The last calibration date	14/12/2011																					
Validity	14/12/2011 to 13/12/2012																					
QA/QC procedures to be applied:	Measurement results should be cross-checked by records for sold electricity.																					
Purpose of the data	Baseline emission calculations																					
Calculation method:	-																					
Comments:	-																					

Data Unit / Parameter:	EG <sub>grid to PJ,y</sub>												
Data unit:	MWh												
Description:	Quantity of electricity imported from the grid by the Project in year y.												
Source of data:	Measured by meters installed at the output of the on-site booster station and meter installed at 10kV backup line												
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording												
Frequency of monitoring/recording:	Continuous measurement and at least monthly recording												
Value monitored:	315.08												
Monitoring equipment:	<p>Information of monitoring equipment as follow tables:</p> <table border="1"> <thead> <tr> <th></th> <th>Main meter</th> <th>Backup meter</th> </tr> </thead> <tbody> <tr> <td>Meter Type</td> <td colspan="2">DSZ331</td> </tr> <tr> <td>Accuracy class</td> <td colspan="2">0.2s</td> </tr> <tr> <td>Serial No.</td> <td>0001468380</td> <td>0001468381</td> </tr> </tbody> </table>		Main meter	Backup meter	Meter Type	DSZ331		Accuracy class	0.2s		Serial No.	0001468380	0001468381
	Main meter	Backup meter											
Meter Type	DSZ331												
Accuracy class	0.2s												
Serial No.	0001468380	0001468381											

	Calibration frequency	Annually
	The last calibration date	14/12/2011
	Validity	14/12/2011 to 13/12/2012
		10kV meter
	Meter Type	DSZ535
	Accuracy class	0.5s
	Serial No.	0001350093
	Calibration frequency	Annually
	The last calibration date	14/12/2011
	Validity	14/12/2011 to 13/12/2012
	Calibration was carried by Ningxia electric energy metering and Testing Center. The accreditation certificate number is 3-4-00101-2011.	
	QA/QC procedures to be applied:	Measurement results should be cross-checked by records for bought electricity.
	Purpose of the data	Baseline emission calculations
	Calculation method:	--
Comments:	-	

Data Unit / Parameter:	EG <sub>facility,y</sub>
Data unit:	MWh
Description:	Net electricity supplied by the project activity to the grid in year y
Source of data:	Measured by meters installed at the output of the on-site booster station and meter installed at 10kV backup line of the project
Description of measurement methods and procedures to be applied:	Calculated from the above measured parameters and recorded on a monthly basis
Frequency of monitoring/recording:	-
Value monitored:	43327.92
Monitoring equipment:	-
QA/QC procedures to be applied:	Measurement results should be cross-checked by records for sold electricity.
Purpose of the data	Baseline emission calculations

Calculation method:	It is calculated by using the Equation ( $EG_{PJ \text{ to grid},y} - EG_{\text{grid to PJ},y}$ )
Comments:	-

**3.3 Monitoring Plan**

**3.3.1. Data to be monitored**

Emission factor of the Project has been determined ex-ante. And the quantity of electricity supplied by the Project to the grid in year y ( $EG_{PJ \text{ to grid},y}$ ) and the quantity of electricity imported from the grid by the Project in year y ( $EG_{\text{grid to PJ},y}$ ) which is used to calculate emission reductions will be monitored by electricity meters. Net electricity supplied to the grid ( $EG_{\text{facility}, y}$ ) will be calculated by following equation:  $EG_{\text{facility}, y} = EG_{PJ \text{ to grid},y} - EG_{\text{grid to PJ},y}$ .

**3.3.2. Implementation of the monitoring plan**

The Emission technical staff and Emission statistic staff are appointed by the project owner, who supervise and verify metering and recording, collect data (the data on the meter, sales/purchasing invoice or the balance bill), calculate emission reductions and prepare monitoring report.

The Emission manager takes the responsibility for the monitoring plan implementation. A Emission team is established and consists of project manager, Emission manager, technical staff, and statistic staff. Organizing structure of the Emission team is shown as Figure 2.

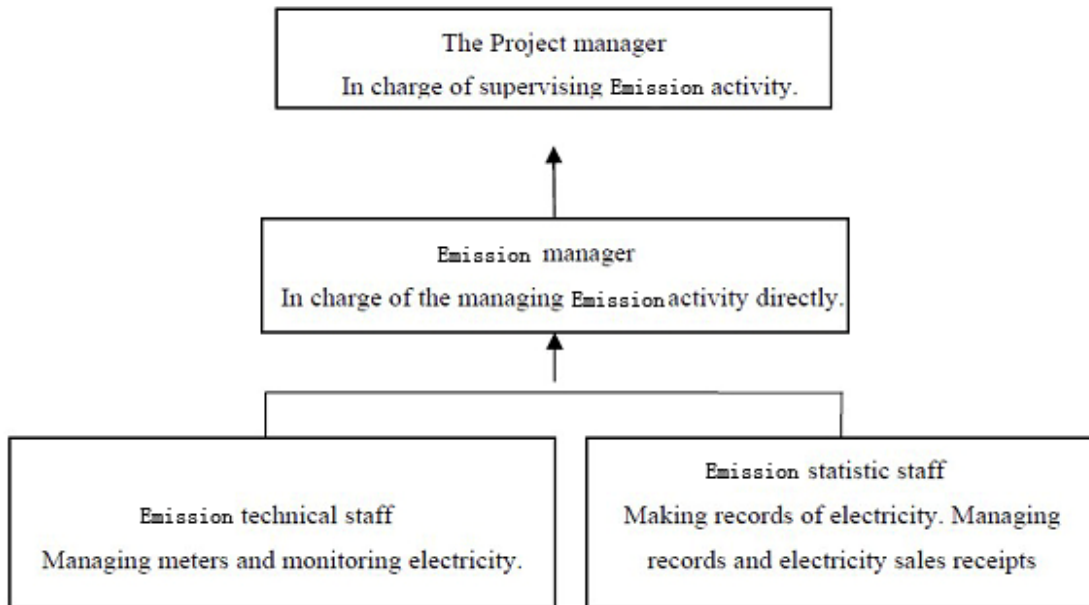


Figure 2: Structure of the Emission team

Training activity has been organized by the project owner which mainly include about the CDM basic knowledge, the monitoring requirement, the validation and verification.

### 3.3.3. Monitoring Equipment and program

The electric energy metering equipments were properly configured and the metering equipments were checked by both the project owner and the grid company before the project starts Operating according to relevant standard in China.

Main meter (M1) and backup meter (M2), which measure the electricity supplied to the grid and electricity supplied by the grid, are installed at the output of the on-site booster station of the project. Meter (M3), which measures the electricity use of power plant supplied by the grid, is installed at 10kV backup line.

The power connection diagram is as follows:

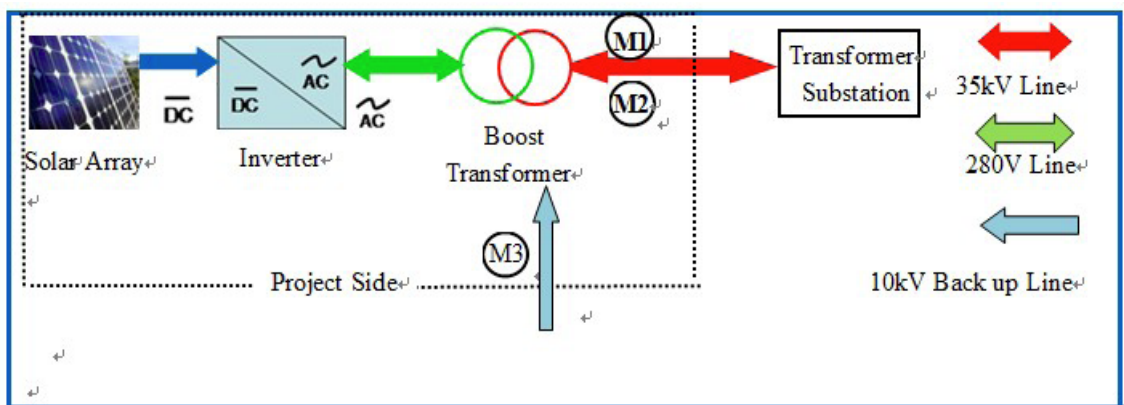


Fig 3 Power Connection Diagram

### 3.3.4. Data Collection

On-duty staff monitored the operation status of metering equipments on site. Furthermore, designated staff collected the measured electricity and completed the corresponding records on a monthly basis. Before being archived, these records checked by other staffs to ensure the correctness. The data from these records were digested and analyzed and the results were reported to company administrator or supervisor.

All the relevant data records will be kept by the project owner during the crediting period and at least for two years after the end of the last crediting period.

### 3.3.5. Quality assurance and quality control

The quality assurance and quality control procedures involves of data monitoring, recording, maintaining and archiving, and monitoring equipment calibration.

The monitoring data would be cross checked by the sold and bought records of the project for the purpose of quality control.

Calibration of meters & metering should be implemented according to national standards and rules, and all the records should be documented and maintained by the project owner for verification.

**3.3.6. Procedures of exception handling and reporting**

The Emission technical staffs take real-time monitoring on the operation status of meters to ensure that any abnormality could be detected and the corresponding measures of processing, reporting and recording were taken in time. The abnormal meter will be repaired immediately and must be calibrated by a qualified third-party before being put into use again.

Problem occurred in monitoring and measurement process will be recorded and reported to company administrator or supervisor. Consequently, the corrective resolution will be adopted to deal with that problem and to avoid it occur again in future.

**3.3.7. Verification**

It is expected that the verification of emission reductions generated from the Project will be carried out annually.

**4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS**

**4.1 Baseline Emissions**

According to 2011 Baseline emission factors for regional power grids in China issued by the National Development and Reform Commission of the Government of China (China DNA), the OM emission factor ( $EF_{grid,OM,y}$ ) of NWPG is calculated as 1.0001 tCO<sub>2</sub>/MWh, and the build margin emission factor ( $EF_{grid,BM,y}$ ) of NWPG is calculated as 0.5851 tCO<sub>2</sub>/MWh.

Based on formula  $EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y}$ , the baseline emissions factor ( $EF_{grid,CM,y}$ ) of NWPG is calculated as 0.89635 tCO<sub>2</sub>/MWh.

Baseline emissions are:

$$EG_{facility,y} = EG_{PJ \text{ to grid},y} - EG_{grid \text{ to PJ},y} = 43643.00 - 315.08 \text{ (MWh)} = 43327.92 \text{ MWh}$$

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 43327.92 \text{ (MWh)} \times 0.89635 \text{ (tCO}_2\text{/MWh)} = 38,836 \text{ tCO}_2$$

Detailed information listed in below tables.

Table 1 Electricity exported to grid

Date	Electricity exported to grid					
	Meter Reading				Value on sales receipt (MWh) <sup>1</sup>	Value used for ERs calculation (MWh)
	Start	End	Magnification	Value (MWh)		
-	A	B	C	D=(B-A)*C/1000	E	F=MIN(D,E)

<sup>1</sup> According to the registered PDD, main meter and backup meter are installed at project side which is the source of meter reading. However, as per the agreement between grid company and project owner, the billing meter of exported electricity is the meter installed at the substation of grid side, which is the basis of issued sales receipt. Therefore the only reason about the different value between the meter reading and sales receipts is the line loss when transfer the electricity from the project side to grid site.

28/12/2011 - 31/12/2011	0.00	3.56	42,000	149.52	148.00	148.00
<b>Total in 2011 (MWh)</b>	-	-	-	-	-	<b>148.00</b>
01/01/2012 - 31/01/2012	3.56	50.68	42,000	1,979.04	1,959.00	1,959.00
01/02/2012 - 28/02/2012	50.68	104.32	42,000	2,252.88	2,234.00	2,234.00
01/03/2012 - 31/03/2012	104.32	166.26	42,000	2,601.48	2,575.00	2,575.00
01/04/2012 - 30/04/2012	166.26	241.69	42,000	3,168.06	3,136.00	3,136.00
01/05/2012 - 31/05/2012	241.69	336.27	42,000	3,972.36	3,932.00	3,932.00
01/06/2012 - 30/06/2012	336.27	438.37	42,000	4,288.20	4,245.00	4,245.00
01/07/2012 - 31/07/2012	438.37	565.01	42,000	5,318.88	5,265.00	5,265.00
01/08/2012 - 31/08/2012	565.01	683.84	42,000	4,990.86	4,941.00	4,941.00
01/09/2012 - 30/09/2012	683.84	811.15	42,000	5,347.02	5,170.00	5,170.00
01/10/2012 - 31/10/2012	811.15	943.54	42,000	5,560.38	5,370.00	5,370.00
01/11/2012 - 30/11/2012	943.54	1,058.45	42,000	4,826.22	4,668.00	4,668.00
<b>Total in 2012 (MWh)</b>	-	-	-	-	-	<b>43495.00</b>
<b>Total(MWh)</b>	-	-	-	-	-	<b>43,643.00</b>

Table 2 Electricity imported from grid and through 10 kV line

Date	Electricity imported from grid						Electricity imported from grid through 10 kV line					
	Meter Reading				Value on sales receipt (MWh)	Value used for ERs calculation (MWh)	Meter Reading				Value on sales receipt (MWh)	Value used for ERs calculation (MWh)
	Start	End	Magnification	Value (MWh)			Start	End	Magnification	Value (MWh)		
-	A	B	C	$D=(B-A)*C/1000$	E	$F=MAX(D,E)$	A	B	C	$D=(B-A)*C/1000$	E	$F=MAX(D,E)$
28/12/2011 - 31/12/2011	0.00	0.03	42,000	1.26	1.26	1.26	0.00	3.05	400	1.22	1.22	1.22
<b>Total in 2011 (MWh)</b>	-	-	-	-	-	<b>1.26</b>	-	-	-	-	-	<b>1.22</b>
01/01/2012 - 31/01/2012	0.03	0.38	42,000	14.70	14.70	14.70	3.05	9.27	400	2.49	2.49	2.49
01/02/2012 - 28/02/2012	0.38	0.65	42,000	11.34	11.34	11.34	9.27	19.39	400	4.05	4.05	4.05
01/03/2012 - 31/03/2012	0.65	0.90	42,000	10.50	10.50	10.50	19.39	30.10	400	4.28	4.28	4.28
01/04/2012 - 30/04/2012	0.90	1.16	42,000	10.92	10.92	10.92	30.10	49.21	400	7.64	7.64	7.64
01/05/2012 - 31/05/2012	1.16	1.53	42,000	15.54	15.54	15.54	49.21	90.58	400	16.55	16.55	16.55
01/06/2012 - 30/06/2012	1.53	1.85	42,000	13.44	13.44	13.44	90.58	122.34	400	12.70	12.70	12.70
01/07/2012 - 31/07/2012	1.85	2.40	42,000	23.10	23.10	23.10	122.34	157.36	400	14.01	14.01	14.01
01/08/2012 - 31/08/2012	2.40	2.86	42,000	19.32	19.32	19.32	157.36	193.24	400	14.35	14.35	14.35
01/09/2012 - 30/09/2012	2.86	3.46	42,000	25.20	25.20	25.20	193.24	228.19	400	13.98	13.98	13.98
01/10/2012 - 31/10/2012	3.46	4.18	42,000	30.24	30.24	30.24	228.19	253.18	400	10.00	10.00	10.00
01/11/2012 - 30/11/2012	4.18	4.87	42,000	28.98	28.98	28.98	253.18	276.32	400	9.26	9.26	9.26
<b>Total in 2012 (MWh)</b>	-	-	-	-	-	<b>203.28</b>	-	-	-	-	-	<b>109.32</b>
<b>Total (MWh)</b>	-	-	-	-	-	<b>204.54</b>	-	-	-	-	-	<b>110.54</b>

#### 4.2 Project Emissions

The project emission (PE<sub>y</sub>) is zero as the project activity is a photovoltaic power generation project without any fossil fuel consumption. Thus no project emissions are envisaged from the project activity.

#### 4.3 Leakage

According to the methodology ACM0002 version 13.0.0, there is leakage caused by the project activity. Thus LE<sub>y</sub> = 0

#### 4.4 Net GHG Emission Reductions and Removals

As per the table 4, the CO<sub>2</sub> emission reductions in 2011 are 130 tCO<sub>2</sub>, and in 2012 are 38,706 tCO<sub>2</sub>.

Table 4 CO<sub>2</sub> emission reductions

Period	Net electricity supplied to the grid by the project--EG <sub>facility,y</sub> (MWh)	EF <sub>grid,CM,y</sub> (tCO <sub>2</sub> /MWh)	Baseline Emission (tCO <sub>2</sub> )	Project Emission (tCO <sub>2</sub> )	Leakage (tCO <sub>2</sub> )	Emission Reductions (tCO <sub>2</sub> )
-	A	B	C=A*B	D	E	F=C-D
28/12/2011- 31/12/2011	145.52	0.8964	130	0	N/A	130
01/01/2012- 30/11/2012	43,182.40	0.8964	38,706	0	N/A	38,706
<b>Total</b>	<b>43,327.92</b>	<b>0.8964</b>	<b>38,836</b>	<b>0</b>	<b>N/A</b>	<b>38,836</b>

#### 5 ADDITIONAL INFORMATION

N.A.