

GROUPED CONNECT SOLAR PV POWER GENERATION PROJECT IN CHINA

Document Prepared By

KOE Environment Consultancy, Inc.

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1. PROJECT DETAILS

1.1 Summary Description of the Project

Grouped Connect Solar PV Power Generation Project in China (hereafter referred to as “the grouped project”) is implemented by China Three Gorges New Energy Corp. (hereafter refer to as “the project owner”), and aims to generate electricity by using renewable solar PV energy to the grid.

The grouped project consists of new solar PV Power Generation plants located in 30 provinces of China. The initial project activity instances under the grouped project are included in the grouped project are:

- **INSTANCE 01:** Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project (in the following also called “the Dazhaitan Project” or instance 01) located in Yongchang County, Jinchang City, Gansu Province of China, The Dazhaitan Project is developed, financed and managed by Three Gorges New Energy Jinchang Wind Power Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 50.112MWp, employing 172,800 pieces of 290Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be circa 1,409.85 hours. The electricity generated by the Dazhaitan Project will be connected to inverters first, then will go through a boost transformer and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Dazhaitan Project is 70,650.48MWh.
- **INSTANCE 02:** Yongchang County Heqingtian Phase II 50MW Grid Connected Solar PV Power Generation Project (in the following also called “the Heqingtian Project” or instance 02) located in Yongchang County, Jinchang City, Gansu Province of China, The Heqingtian Project is developed, financed and managed by Three Gorges New Energy Jinchang Wind Power Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 50.9067MWp, employing 92,340 pieces of 300Wp and 78,660 pieces of 295Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be circa 1,429.91 hours. The electricity generated by the Heqingtian Project will be connected to inverters first, then will go through a boost transformer and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Heqingtian Project is 72,791.95MWh.
- **INSTANCE 03:** Wulan 20MW Grid Connected Solar PV Power Generation Project (in the following also called “the Wulan Project” or instance 03) located in Wulan County, Qinghai Province of China. The Wulan Project is developed, financed and managed by the Wulan Jinfeng New Energy PV Power Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 20.139MWp, employing 82,200 pieces of 245Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be circa 1,555.57 hours. The electricity generated by the project will be connected to inverters first, then will go through a boost transformer and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Wulan Project is 31,217.73MWh.
- **INSTANCE 04:** Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project (in the following also called “the Pishan Project” or instance 04) located in Pishan County, Hetian City and Xinjiang Uygur Autonomous Region of China. The Pishan Project is

developed, financed and managed by the Three Gorges New Energy Pishan Power Generation Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 20.0MWp, employing 80,000 pieces of 250Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be circa 1,300 hours. The electricity generated by the Pishan Project will be connected to inverters first, then will go through a boost transformer and then will be transferred to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Pishan Project is 26,003 MWh.

- **INSTANCE 05:** Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project (in the following also called “the Hami Project” or instance 05) located in Hami City, Xinjiang Uygur Autonomous Region of China. The Hami Project is developed, financed and managed by the Three Gorges New Energy Hami Wind Power Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 20.4MWp, employing 81,600 pieces of 250Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be circa 1,516.45 hours. The electricity generated by the project will be connected to inverters first, then will go through a boost transformer and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Hami project is 30,935.57MWh.
- **INSTANCE 06:** Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project (in the following also called “the Zhaoyang Project” or instance 06) located in Jiuquan City, Gansu Province of China. The Zhaoyang Project is developed, financed and managed by Jiuquan Zhaoyang New Energy Power Generation Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 50MWp, employing 200,000 pieces of 250Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be 1,504.70 hours. The electricity generated by the Zhaoyang Project will be connected to inverters and booster station first, then will go through a transformer substation and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Zhaoyang Project is 75,235MWh.
- **INSTANCE 07:** Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project (in the following also called “the Sanyang Project” or instance 07) located in Jiuquan City, Gansu Province of China. The Sanyang Project is developed, financed and managed by Jiuquan Sanyang New Energy Power Generation Co., Ltd. and will generate electricity by using renewable solar photovoltaic power. The installed capacity of the power plant is 50MWp, employing 200,000 pieces of 250Wp polycrystalline silicon solar cells. The annual utilization hours is estimated to be 1,540.74hours. The electricity generated by the Sanyang project will be connected to inverters and booster station first, then will go through a transformer substation and then will be transmitted to Northwest China Power Grid (NWPG). The expected annual net electricity delivered to the grid by the Sanyang Project is 77,037MWh.

GHG emission reductions will be generated through the implementation of the grouped project. Which aims to generate electricity by using renewable solar PV energy to the grid and replacing equivalent electricity generated by fossil fuel fired power plants connected to the State Grid or China Southern Power Grid.

Prior to the grouped project implementation, equivalent amount of annual power output to the grouped project will be generated and supplied by the State Grid or China Southern Power Grid. This is also the baseline scenario of the grouped project.

The estimated annual average GHG emission reductions from the initial seven project activity instances is 302,268tCO₂e and the total estimate GHG emissions reductions over the first crediting period is 3,026,288 tCO₂e.

1.2 Sectoral Scope and Project Type

The Project falls under UNFCCC CDM sectoral scope 01, “Energy Industries (renewable- /non-renewable resources)”.

The project is a grouped project.

1.3 Project Proponent

The Grouping Entity of the grouped project is China Three Gorges New Energy Corp. the contact information is:

Organization name	China Three Gorges New Energy Corp.
Contact person	Wang Hongye
Title	General Manager Assistant
Address	No. 12, Lane 2, Baiguang Road, Xicheng District, China
Telephone	+86(010)-58689628
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1.4 Other Entities Involved in the Project

Organization name	KOE Environment Consultancy, Inc.
Role in the project	The project consultant
Contact person	Daniel Cao
Title	General Manager
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Email	cy@cncdm.cn

1.5 Project Start Date

The following table showed the commission time of the initial seven project activity instances included in the grouped project, on which the project began generating GHG emission. The grouped project started on 23/01/2013, which is earliest commission date of the initial seven project activity instances

Instance	Commission time
Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project	2013/03/06
Yongchang County Heqingtian Phase II 50MW Grid Connected Solar PV Power Generation Project	2013/12/26
Wulan 20MW Grid Connected Solar PV Power Generation Project	2013/01/23
Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project	2013/12/21
Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project	2013/12/26
Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project	2013/07/20
Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project	2013/06/30

1.6 Project Crediting Period

The first crediting period of the grouped project is 10 years, from 23/01/2013 to 22/01/2023.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	✓

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2013/01/23-2013/12/31	135,593
2014	319,052
2015	319,052
2016	319,052
2017	319,052
2018	319,052
2019	319,052
2020	319,052
2021	319,052
2022	319,052
2023/01/01-2023/01/22	19,227
Total estimated ERs	3,026,288
Total number of crediting years	10

Average annual ERs	302,628
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The estimated emission reductions are based only on the initial seven project activity instances. The emission reductions will be determined precisely in the first verification period. If there are any other project activity instances to be included, the emission reductions will be higher.

1.8 Description of the Project Activity

Each Project activity instance has the same technical concept, which is described as follows:

The photovoltaic generating plant consists of PV array, inverter, boost transformer and electricity grid connecting system. The PV array converts a photovoltaic power to a direct current electricity power. The inverter system converts a direct current to an alternating current. The boost transformer sends a generated voltage to the grid. The schematic diagram of PV station is showed in Figure 1.

Main Technology to be employed by the grouped project includes following equipment:

■ PV array

PV array cells are the most important equipment in solar PV plant. PV array cells are to collect solar energy and convert it into electricity. At present, the main types of PV array cells are monocrystalline silicon cells, polycrystalline silicon and others.

■ Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC).

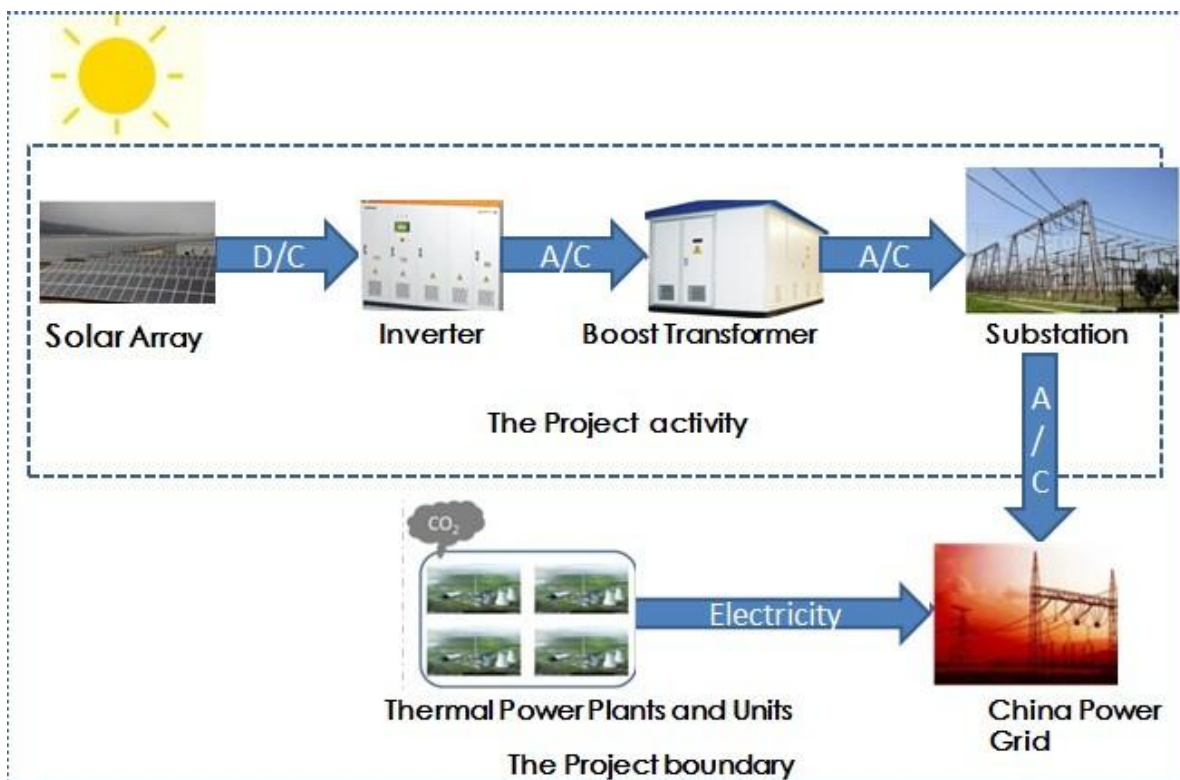


Figure-1 Schematic view of the technology to be employed by the grouped project

The initial seven activities that are included in the grouped project have the following principal technical characteristics:

INSTANCE 01: Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the instance 01 as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50.112MWp. Solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The project consists of 172,800 pieces of 290Wp polycrystalline silicon solar cells, which are supplied with total 50.112MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 1:

Table 1. The key technology parameters of 290MWp polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	JKM290P-72	Equipment purchase contract & nameplate of polycrystalline silicon solar cells
Number	-	172800	
Maximum power(Pmax)	Wp	290W±3%	
Maximum power Voltage(Vmp)	V	36.4	
Maximum power current(Imp)	A	7.97	
Open-circuit voltage(Voc)	V	44.9	
Short-circuit current(Isc)	A	8.89	
Maximum system voltage	V	1000	
Operation period	years	25	
Manufacturer		Jinko Solar Co.,Ltd.	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 100 sets of inverters with capacity 500kW will be installed in the project. The parameters of inverter are listed in Table 2:

Table 2. The key technology parameters of inverters

Parameters	Unit	Value	Value	Value	Data source
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Model	-	SSL0500	KNGI900-500HEA	SG500KTL	Equipment purchase contract & nameplate of inverters
Rated Output Power	kW	500	500	500	
Maximum DC voltage	V	900	900	1000	
Maximum input Short-circuit current	A	/	/	1450	
MPPT Voltage Range	V	500-750	450-820	450-820	
Maximum Input current	A	1200	1168	1200	
Rated output voltage	V	400	270	270	
Rated frequency	Hz	50	50	50	
Maximum Output current	A	/	1188	1176	
Operation period		25 years	25 years	25 years	
Manufacturer		Emerson Network Power Co., Ltd.	Beijing Kenuo Weiye Technology Co., Ltd.	Sungrow Power Supply Co., Ltd.	

INSTANCE 02: Yongchang County Heqingtian Phase II 50MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the instance 02 as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50.9067MWp. Solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The project consists of 78,660 pieces of 295Wp and 92,340 pieces of 300Wp polycrystalline silicon solar cells, which are supplied with total 50.9067MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 3:

Table 3. The key technology parameters of 295MWp and 300MWp polycrystalline silicon solar cells

Parameters	Unit	Value	Value	Value	Data source
Model	-	TSM-300PC14	TSM-295PC14	JC295M-24/Ab	Equipment purchase contract
Number	-	92,340	10,260	68400	
Maximum power(Pmax)	Wp	300±3%	295±3%	295W±5W	
Maximum power Voltage(Vmp)	V	36.9	36.6	36.3	
Maximum power current(Imp)	A	8.13	8.07	8.13	
Open-circuit voltage(Voc)	V	45.3	45.2	44.7	
Short-circuit	A	8.60	8.55	8.62	

current(Isc)					
Maximum system voltage	V	1000	1000	1000	
Operation period	years	25	25	25	
Manufacturer		Trina Solar Changzhou Co., Ltd.		Renesola Zhejiang Co., Ltd.	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 100 sets of inverters with capacity 500kW will be installed in the project. The parameters of inverter are listed in Table4:

Table 4. The key technology parameters of inverters

Parameters	Unit	Value	Data source
Model	-	EP-0500-A	Equipment purchase contract & nameplate of inverters
Rated Output Power	kW	500	
Maximum DC voltage	V	1000	
Maximum input Short-circuit current	A	1327	
MPPT Voltage Range	V	500-820	
Maximum Input current	A	1128	
Rated output voltage	V	315	
Rated frequency	Hz	50	
Maximum Output current	A	1008	
Operation period	25 years		
Manufacturer	Wuxi Shangneng new energy Co., Ltd.		

INSTANCE 03: Wulan 20MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the instance 03 as follows:

1. Modules

The project is solar photovoltaic based power station with full capacity of 20.139MWp. The solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The PROJECT employs 82,200 pieces of 245Wp polycrystalline silicon solar cells, which are supplied with total 20.139MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 5:

Table 5. The key technical parameters of polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	YL245P-29b	

Number	-	82200	Nameplate and Equipment purchase contract
Maximum power(Pmax)	Wp	245(0~+5W)	
Rated Voltage	V	30.2	
Rated current	A	8.11	
Open-circuit voltage(Voc)	V	37.8	
Short-circuit current(Isc)	A	8.63	
Maximum system voltage	V	1000	
Operation Lifetime	years	25	
Manufacturer	-	Yingli Energy (China) Co., Ltd.	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets of inverters with capacity 500kW will be installed in the project. The parameters of inverter are listed in Table 6:

Table 6. The key technology parameters of inverters

Parameters	Unit	Value	Data source
Model	-	DS500KTL	Nameplate and Equipment purchase contract
Rated Output Power	kW	500	
Maximum DC voltage	V	1000	
MPPT Voltage Range	V	450-880	
Maximum Input current	A	1200	
Rated output voltage	V	270	
Rated frequency	Hz	50	
Maximum Output current	A	1070	
Operation period	years	25	
Manufacturer	Anhui Jinfeng New Energy Co., Ltd.		

INSTANCE 04: Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the instance 04 as follows:

1. Modules

The project is solar photovoltaic based power station with full capacity of 20MWp. The solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The PROJECT employs 80,000 pieces of 250Wp polycrystalline silicon solar cells, which are supplied with total 20MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 7:

Table 7. Key technology parameters of 250MWp polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	EG250-P60-C	Technical Diagram
Maximum power(Pmax)	Wp	250(0+3%)	
Maximum power Voltage(Vmp)	V	30.20	
Maximum power current(Imp)	A	8.28	
Open-circuit voltage(Voc)	V	37.72	
Short-circuit current(Isc)	A	8.81	
Maximum system voltage	V	1000	
Operation Lifetime	years	25	
Manufacturer	-	ChangZhou EGing Photovoltaic Technology Co.,Ltd	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets inverters with capacity 500kW will be installed in the project. The parameters of inverter are listed in Table 8:

Table 8. The key technology parameters of inverters

Parameters	Unit	Value	Data source
Model	-	EP-0500-A	Technical Diagram
Rated Output Power	kW	500	
Maximum DC voltage	V	1000	
Maximum input Short-circuit current	A	-	
MPPT Voltage Range	V	420~850	
Maximum Input current	A	1128	
Rated output voltage	V	270	

Rated frequency	Hz	50	
Maximum Output current	A	1069	
Operation period	years	25	
Manufacturer	Wuxi Shangneng New Energy Co., Ltd.		

INSTANCE 05: Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project

The key technology parameters of the instance 05 as follows as follows:

1. Modules

The project is solar photovoltaic based power station with full capacity of 20.4MWp. The solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The PROJECT employs 81,600 pieces of 250Wp polycrystalline silicon solar cells, which are supplied with total 20.4MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 9:

Table 9. The key technical parameters of polycrystalline silicon solar cells

Parameters	Unit	Value	Value	Data source
Model	-	JAP6-60-3BB-250	JC250M-24/Bb	Nameplate and Equipment purchase contract
Number	-	40800	40800	
Maximum power(Pmax)	Wp	250(0~+5W)	250(≥0)	
Maximum power Voltage(Vmp)	V	29.98	30.1	
Maximum power current(Imp)	A	8.34	8.31	
Open-circuit voltage(Voc)	V	37.54	37.4	
Short-circuit current(Isc)	A	8.84	8.83	
Maximum system voltage	V	1000	1000	
Operation Lifetime	years	25	25	
Manufacturer	-	Hefei JA Solar Technology Co., Ltd	Renesola Zhejiang Ltd	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets of inverters with capacity 500kW will be installed in the project. The parameters of inverter are listed in Table 10:

Table 10. The key technology parameters of inverters

Parameters	Unit	Value	Data source
Model	-	YLSSL-500	Nameplate and Equipment purchase contract
Rated Output Power	kW	500	
Maximum DC voltage	V	1000	
MPPT Voltage Range	V	420-850	
Maximum Input current	A	1200	
Rated output voltage	V	270	
Rated frequency	Hz	50	
Rated Output current	A	1069	
Operation period	years	25	
Manufacturer	Shenzhen WinLine Technology Co., Ltd.		

INSTANCE 06: Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the Instance 06 as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50MWp, consists of 200,000 pieces of 250Wp polycrystalline silicon solar cells. Solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The key technical parameters of polycrystalline silicon solar cells are listed in Table 11:

Table 11. Key technology parameters of polycrystalline silicon solar cells*

Parameters	Unit	Value	Value	Data source
Model	-	JAP6-60-250/3BB	JKM250P-60	Equipment nameplate
Maximum power(Pmax)	Wp	250Wp ±3%	250Wp +5%	
Maximum power Voltage(Vmp)	V	30.00	30.40	
Maximum power current(Imp)	A	8.32	8.23	
Open-circuit voltage(Voc)	V	37.79	37.60	
Short-circuit current(Isc)	A	8.67	8.81	
Maximum system voltage	V	1000	1000	
Operation Lifetime	years	25	25	
Manufacturer		JA Solar	JINKO Solar	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 50 sets of 500kW inverters and 40 sets of 630 kW inverters will be installed in the project. The parameters of inverter are listed in Table 12:

Table 12. Key technology parameters of inverters*

Parameters	Unit	Value	Value	Data source
Model	-	SG500MX	SG630KTL	Equipment nameplate
Rated Output Power	kW	500	630	
Maximum DC voltage	V	1000	1000	
MPPT Voltage Range	V	500-850	500-820	
Maximum Input current	A	1120	1400	
Rated output voltage	V	315	315	
Rated frequency	Hz	50	50	
Operation Lifetime	years	25	25	
Manufacturer		. SUNGROW POWER SUPPLY CO., LTD		

INSTANCE 07: Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project

The key technology parameters of the Instance 07 as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50MWp, consists of 200,000 pieces of 250Wp polycrystalline silicon solar cells. Solar modules are the core component of the project, whose function is to convert solar energy into electricity energy through direct current (DC). The key technical parameters of polycrystalline silicon solar cells are listed in Table 13:

Table 13. Key technology parameters of polycrystalline silicon solar cells*

Parameters	Unit	Value	Value	Data source
Model	-	JKM250P-60	CS6P-250P	Equipment nameplate
Maximum power(Pmax)	Wp	250Wp $\pm 5\%$	250Wp	
Maximum power Voltage(Vmp)	V	30.40	30.10	
Maximum power current(Imp)	A	8.23	8.30	
Open-circuit voltage(Voc)	V	37.60	37.20	
Short-circuit current(Isc)	A	8.81	8.87	
Maximum system voltage	V	1000	1000	
Operation Lifetime	years	25	25	
Manufacturer		JINKO Solar	Canadian Solar	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 50 sets of 500kW inverters and 40 sets of 630 kW inverters will be installed in the project. The parameters of inverter are listed in Table 14:

Table 14. Key technology parameters of inverters*

Parameters	Unit	Value	Value	Data source
Model	-	SG500MX	SG630KTL	Equipment nameplate
Rated Output Power	kW	500	630	
Maximum DC voltage	V	1000	1000	
MPPT Voltage Range	V	500-850	500-820	
Maximum Input current	A	1120	1400	
Rated output voltage	V	315	315	
Rated frequency	Hz	50	50	
Operation Lifetime	years	25	25	
Manufacturer		SUNGROW POWER SUPPLY CO., LTD.		

1.9 Project Location

The geographical boundary of the grouped project is that of the 30 provinces in China listed in Table 15, as shown in Figure 2.

Table-15 Geographical distribution of the grids controlled by State Grid or the Southern Power Grid

Province	Sub-Total
Liaoning Province, Jilin Province, Heilongjiang Province	3
Beijing Municipality, Tianjin Municipality, Hebei Province, Shanxi Province, Shandong Province, Inner Mongolia Autonomous Region	6
Shanghai Municipality, Jiangsu Province, Zhejiang Province, Anhui Province, Fujian Province	5
Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province, Chongqing Municipality	6
Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region, Xinjiang Uygur Autonomous Region	5
Guangdong Province, Guangxi Zhuang Autonomous Region, Yunnan Province, Guizhou Province, Hainan Province	5

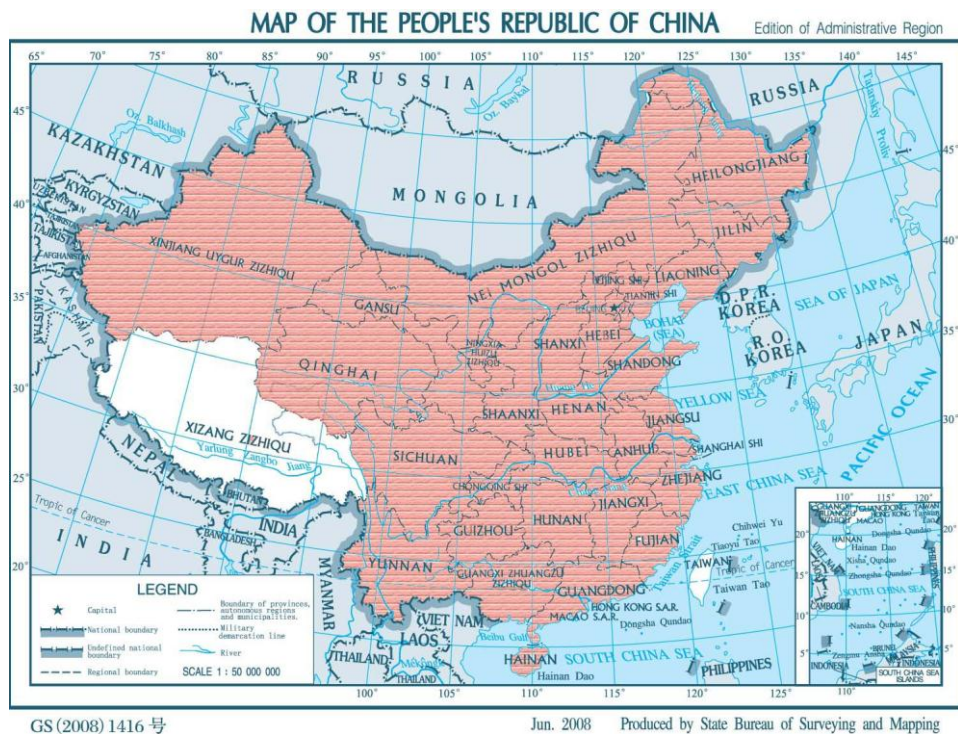


Figure-2 Geographical boundary of the grouped project

The Geographical location of the initial seven project activity instances are Gansu province, Qinghai province and Xinjiang Uygur Autonomous Region, as shown in Figure 4, The detailed geodetic coordinates are shown in Table 16 and Figure 4.

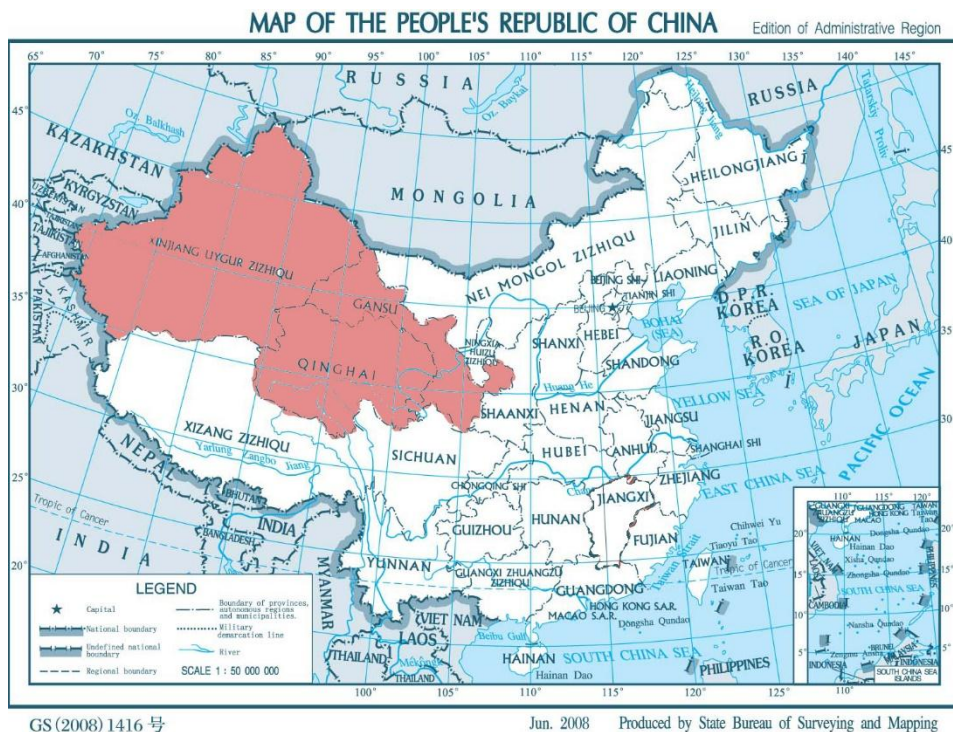


Figure-3 Geographical boundary of the initial seven project activity instances

Table 16. The Geographical coordinates of the initial seven project activity instances

No.	Geographical coordinates
Instance 01	102°17'49"E, 38°16'29"N
Instance 02	102°16'40"E, 38°16'58"N
Instance 03	98°23'50"E, 37°00'42"N
Instance 04	78°14'51"E, 37°32'21"N
Instance 05	93°37'07"E, 43°02'44"N
Instance 06	98°34'30"E, 39°35'06"N
Instance 07	98°34'20"E, 39°35'27"N

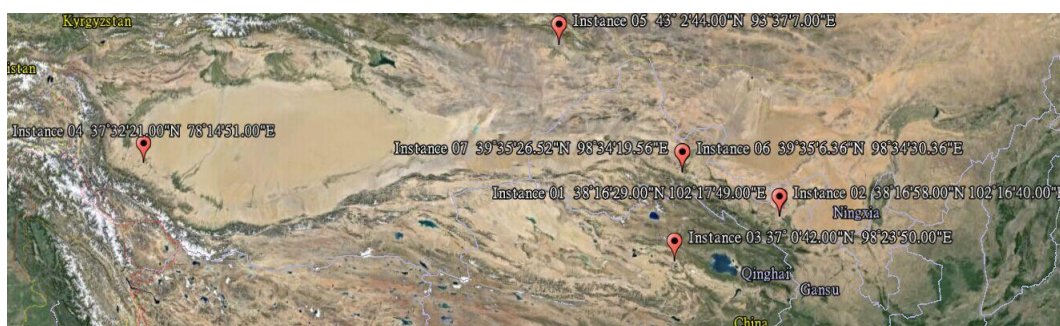


Figure-4 The location of the initial seven project activity instances

1.10 Conditions Prior to Project Initiation

Purpose of the grouped project is to generate electricity by using solar PV technology, and to deliver the electricity to the grid. The condition prior to project initiation is that the equivalent electricity service would be provided by the power grid. And the baseline scenario is the same as the conditions prior to project initiation, please refer to **Section 2.4** for details.

The grouped project is a power generation project by using renewable solar photovoltaic (PV) power without GHG emissions during operation period. Therefore, it was confirmed that the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

ALL The project activity instances comply with all Chinese relevant laws and regulations. It has obtained the approval letters from governmental authorities: Development and Reform Commission (DRC), as well as Environment Protection Agency (EPA). The two approvals well demonstrate that local government permits the construction of the project. Consequently, the project is compliance with laws, status and other regulatory frameworks.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The Grouping Entity of the grouped project, China Three Gorges New Energy Corp, hold the Right of Use of the Project Activity as evidenced in accordance with item (3) of Section 3.11.1 of the VCS Standard v3.4: China Three Gorges New Energy Corp has full ownership of the plant, equipment and process that generates the GHG emission reductions and have not divested of such ownership.

1.12.2 Emissions Trading Programs and Other Binding Limits

The grouped project and any of its project activity instances do not reduce GHG emissions from activities that are included in an emission trading program or any other mechanism that includes GHG allowance trading.

1.12.3 Other Forms of Environmental Credit

The grouped project and any of its project activity instances have no intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

1.12.4 Participation under Other GHG Programs

The Grouped Project has not been registered, or is seeking registration under any other GHG programs.

The initial seven project instances are the CPA of the Grid Connect Solar PV Power Generation Plant Programme (PoA 8868) under CDM. Which were included in the PoA on 2015/02/04. The project owner confirmed there is no double counting.

1.12.5 Projects Rejected by Other GHG Programs

The grouped project and any of its project activity instances have not been rejected by any other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

In the following all eligibility criteria are given:

1. Each project activity instance under the grouped project is in accordance with the approved consolidated CDM baseline and monitoring methodology ACM0002 (Version 16.0) "Grid-connected electricity generation from renewable sources".

All The project activity instances under the grouped project are in accordance with the approved consolidated CDM baseline and monitoring methodology ACM0002 (Version 16.0) "Grid-connected electricity generation from renewable sources", details showed in the section 2.2.

2. Only grid connect solar PV power generation instance project is involved by the grouped project and no solar thermal project is included;

All the project activity instances under the grouped project are the Greenfield grid connect solar PV power plants and no solar thermal project involved.

3. The geographic boundary of each instance lies within the geographic boundary set of the grouped project, that 30 provinces in China, which showed in the following table;

All the project activity instances under the grouped project lies within the geographic boundary set of the grouped project, that 30 provinces in China.

Project Name	Province
Instance 01: Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 02: Yongchang County Heqingtang Phase II 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 03: Wulan 20MW Grid Connected Solar PV Power Generation Project	Qinghai Province
Instance 04: Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project	Xinjiang Uygur Autonomous Region
Instance 05: Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project	Xinjiang Uygur Autonomous Region
Instance 06: Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 07: Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project	Gansu Province

4) If the project activity instance under the grouped project is compliance with the following criteria according to ACM0002 Version 16.0 at the time of PD submission, the simplified procedure to demonstrate additionality is applicable:

- *Grid Solar photovoltaic technologies*
- *The percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity in the host country is equal to or less than two per cent*

If the above condition is not applicable, the additionality of the project activity instance shall be demonstrated and assessed using “Tool for the demonstration and assessment of additionality” (version 07.0.0) through i) Identification of alternatives to the project activity consistent with current laws and regulations; ii) Investment analysis (benchmark analysis); and iii) Common practice analysis.

The initial seven instances all apply solar photovoltaic technology, and the percentage share of total installed capacity of the solar photovoltaic technology in the total installed grid connected power generation capacity in China is about 1.95%¹, which is less than 2%. Therefore, according to ACM0002 version 16, the initial seven instances are automatically additional.

5) The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project (2015/01/23). The start date of each project activity instance is

¹ According to the newest statistic data from the government of China: http://www.nea.gov.cn/2015-01/16/c_133923477.htm

determined as the date on which the project began generating GHG emission. The start date of each project activity instance will be determined through documentary evidence.

The start date of all the project activity instances under the grouped project should not be prior to the start date of the grouped project (2015/01/23).

6) Each project activity instance under the grouped project is subject to the baseline scenario determined in the section 2.4

All the project activity instances under the grouped project are subject to the baseline scenario determined in the section 2.4; details please refer to section 2.4.

Leakage Management

According to applied CDM methodology ACM0002 (Version 16.0.0), leakage is not considered.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

No further information is required.

2. APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The grouped project activity is developed in accordance with the approved consolidated CDM baseline and monitoring methodology ACM0002 (Version 16.0) “Grid-connected electricity generation from renewable sources”.

The methodology also refers to:

“Tool for the demonstration and assessment of additionality” (Version 7.0.0);

“Tool to calculate the emission factor for an electricity system” (Version 04.0).

More information concerning the above methodology and tools can be referred to:

<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

2.2 Applicability of Methodology

ACM0002 (Version 16.0) defines the applicability of this methodology. The following Table-17 explains the reason why the methodology applies to the grouped project:

Table17. Comparison of extraction components of the grouped project with applicability of ACM0002

No.	As per the methodology	As per the grouped project
-----	------------------------	----------------------------

1	This methodology is applicable to grid-connected renewable energy power generation project activities that (a) install a Greenfield power plant; (b) involve a capacity addition to (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s)/unit(s); (d) involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plant(s)/unit(s).	YES. All of the project activity instances (including the initial project activity instances and new instances will be added to the grouped project) are Greenfield solar PV power plants.
2	The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	YES. (a) All of the project activity instances include solar power plant/unit; (b) All of the project activity instances under the grouped project are Greenfield solar PV power plants, and no capacity additions, retrofits, rehabilitations and replacements are involved in the project.
3	In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m ² ; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m ² ; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m ² , all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m ² ; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m ² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	N/A. The grouped project is not hydro power plants.
4	In the case of integrated hydro power projects, project proponent shall: - Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir	N/A. The grouped project is not hydro power plants.

	and that collectively constitute to the generation capacity of the integrated hydro power project; or - Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	
5	The methodology is not applicable to the following: - Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; - Biomass fired power plants/units.	N/A. All of the project activity instances are green field solar PV power plants and do not involve switching from fossil fuels to renewable energy sources at the sites of the projects. Biomass fired power plants/units are also not involved in the project.
6	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	N/A. No capacity additions, retrofits, rehabilitations and replacements are involved in the project.

It can be concluded from the above analysis that the proposed grouped project complies with the methodology of ACM0002 (Version 16.0).

2.3 Project Boundary

The geographical areas of the grouped project are that of the 30 provinces in China listed in Table 18.

Table18. Geographical distribution of the grids controlled by State Grid or the Southern Power Grid

Province	Sub-Total
Liaoning Province, Jilin Province, Heilongjiang Province	3
Beijing Municipality, Tianjin Municipality, Hebei Province, Shanxi Province, Shandong Province, Inner Mongolia Autonomous Region	6
Shanghai Municipality, Jiangsu Province, Zhejiang Province, Anhui Province, Fujian Province	5
Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province, Chongqing Municipality	6

Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region, Xinjiang Uygur Autonomous Region	5
Guangdong Province, Guangxi Zhuang Autonomous Region, Yunnan Province, Guizhou Province, Hainan Province	5

There are 7 initial project activity instances include in this document. The geographic areas of these initial project activity instances are listed in Table 19.

Table 19. The geographic areas of these initial project activity instances

Project Name	Province
Instance 1: Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 2: Yongchang County Heqingtian Phase II 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 3: Wulan 20MW Grid Connected Solar PV Power Generation Project	Qinghai Province
Instance 4: Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project	Xinjiang Uygur Autonomous Region
Instance 5: Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project	Xinjiang Uygur Autonomous Region
Instance 6: Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project	Gansu Province
Instance 7: Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project	Gansu Province

The 7 initial project activity instances are located in Gansu Province, Qinghai Province and Xinjiang Uygur Autonomous Region. And the remaining 27 provinces with no initial project activity instances have the same baseline scenario and rationale for the demonstration of additionality for the following reasons:

-According to Section 2.4 of this document, all of the project activity instances (including the initial project activity instances and new instances will be added to the grouped project) has the same baseline scenario: Electricity delivered to the grid by the project activity instances would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in *Tool to calculate the emission factor for an electricity system*.

-According to Section 2.5 of this document, the steps for the demonstration of additionality are the same for all of the project activity instances (including the initial project activity instances and new instances will be added to the grouped project). Firstly, if the percentage share of total installed capacity of the grid-connected solar photovoltaic technology in the total installed grid connected power generation capacity in China is equal to or less than two per cent, the simplified procedure to demonstrate additionality is applicable according to the methodology ACM0002 (Version 16.0), and the grid-connected projects using solar photovoltaic technology is automatically additional. Secondly, if the above condition cannot be met, the additionality of the project activity instance shall be demonstrated and assessed using “Tool for the demonstration and assessment of additionality” (version 07.0.0). The benchmark adopted by all of the project activity instances under the grouped project is the same, which is 8% for power sector. Therefore, the rationale for the demonstration of additionality are the same for all of the project activity instances, including the initial project activity instances and new instances will be added to the grouped project.

In conclusion, the geographical areas of the grouped project including of the 30 provinces are reasonable.

According to ACM0002 (Version 16.0) the spatial extent of the project activity instance under the grouped project includes the project power plant and all power plants connected physically to the electricity system² that the project activity instance power plant is connected to. The boundary of each project activity instance will be within the boundary of the grouped project as a whole.

The greenhouse gases and emission sources included in or excluded from the project activity instance boundary shown in Table-20, the project boundary of the project activity instance shown in figure-5.

Table 20. Overview on emissions sources included in or excluded from the project activity instance boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity instance	CO ₂	Yes	Main emission sources.
		CH ₄	No	Minor emission source.
		N ₂ O	No	Minor emission source.
Project activity	CO ₂ emissions of the project activity instance	CO ₂	No	Minor emission source. It is excluded because the project activity instances will all be solar plants and the project emission is zero according to the methodology ACM0002.
		CH ₄	No	Minor emission source. It is excluded because the project activity instances will all be solar plants and the project emission is zero according to the methodology ACM0002.
		N ₂ O	No	Minor emission source. It is excluded because the project activity instances will all be solar plants and the project emission is zero according to the methodology ACM0002.

² Based on the definition by China's DNA:

<http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150204155537627092.pdf>

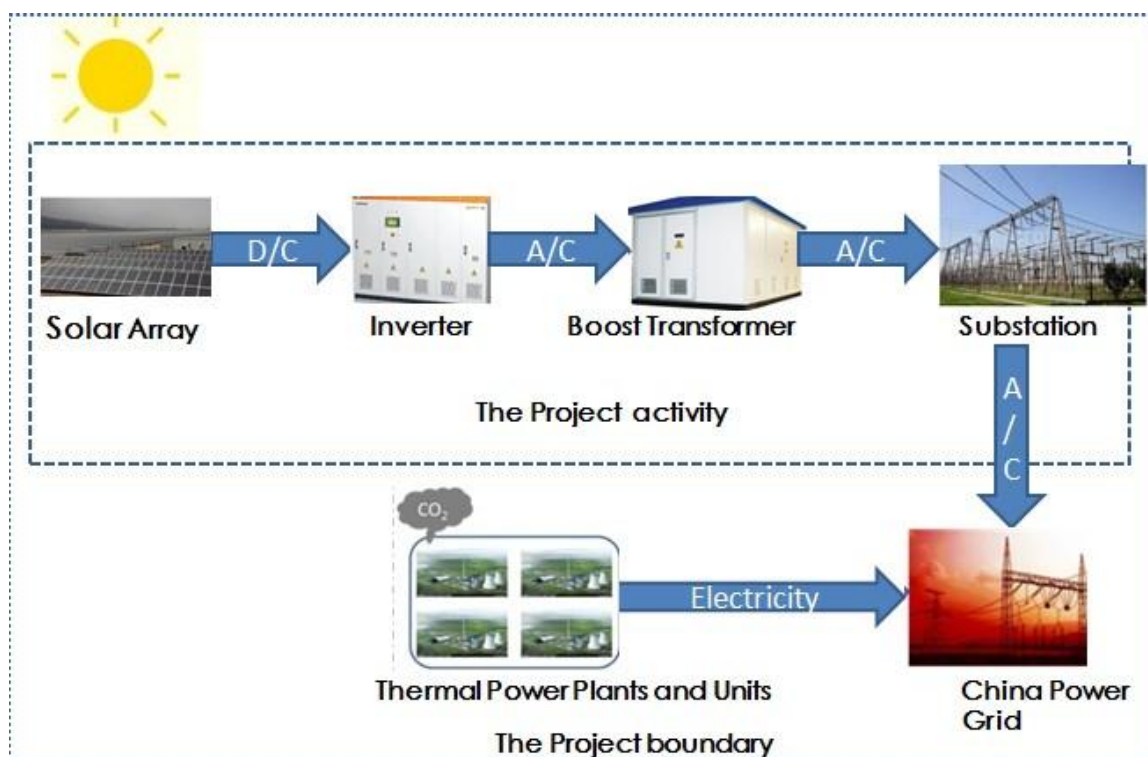


Figure-5 the project boundary of the project activity instance

2.4 Baseline Scenario

According to the methodology ACM0002 (Version 16.0), if the project is the installation of a Greenfield power plant, the baseline scenario is the following:

Electricity delivered to the grid by the project activity instances would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in *Tool to calculate the emission factor for an electricity system*.

Each project activity instance under the grouped project is the installation of a new Greenfield grid-connected renewable solar power plant that connects with and delivers electricity to the grid. According to *Tool to calculate the emission factor for an electricity system* and the methodology ACM0002, the delineation of grid boundaries of each project activity instance is the grid which the project is connected to, the baseline scenario of each project activity instance is "Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM)". For detailed analysis please refer to Section 2.5.

2.5 Additionality

According to the methodology ACM0002 (Version 16.0), if the percentage share of total installed capacity of the grid-connected solar photovoltaic technology in the total installed grid connected power generation capacity in the host country is equal to or less than two per cent, the simplified procedure to demonstrate additionality is applicable to the grid-connected projects using the specific technology. In regard to the

initial project activity instances, according to the latest statistical data³, the installed capacity of the solar photovoltaic technology is 26,520MW, about 1.95% of total installed grid connected power generation capacity in China. Therefore it's could be demonstrated that the grid-connected projects using solar photovoltaic technology in China is automatically additional according to the simplified procedure stated in the methodology ACM0002 (Version 16.0).

In conclusion, the initial seven project activity instances are additional.

Additionality of future project activity instances

According to the eligibility criteria of this grouped project, if the project activity instance under the grouped project is compliance with the following criteria according to ACM0002 Version 16.0, the simplified procedure to demonstrate additionality is applicable:

- Solar photovoltaic technologies
- The percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity in the host country is equal to or less than two per cent

If the above condition is not applicable, the additionality of the project activity instance shall be demonstrated and assessed using “*Tool for the demonstration and assessment of additionality* (Version 07.0.0)” as the following steps.

Step 0. Demonstration whether the proposed project activity is the first-of-its-kind

N/A. The project activity instances are not the first-of-its-kind.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations:

The objective of Step 1 is to define realistic and credible baseline alternatives to the project activity instances through the following sub-steps:

Sub-step 1a. Define alternatives to the project activity:

Since the methodology ACM0002 (version16.0) prescribes the baseline scenario, the plausible baseline alternatives include:

Baseline alternative I: The project activity instances in the grouped project are not implemented as a VCS project activity;

Baseline alternative II: The continuation of the current situation - Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin(CM) calculations described in the “Tool to calculate the emission factor for an electricity system”

Sub-step 1b. Consistency with mandatory laws and regulations:

The alternatives are realistic and feasible and comply with applicable laws and regulations.

Step 2. Investment analysis:

³ : http://www.nea.gov.cn/2015-01/16/c_133923477.htm

The procedure to carry out investment analysis of the grouped project is in accordance with “*Tool for the demonstration assessment of additionality*”(Version 07.0).

Sub-step 2a. Determine appropriate analysis method

Tool for the demonstration and assessment of additionality suggests three analysis methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). The grouped project will earn revenues not only from the VCUs but also from electricity sales, so the simple cost analysis method is not appropriate. Investment comparative analysis is only applicable to the case that alternative baseline scenario is similar to the proposed projects, so investment comparison analysis (Option II) is not appropriate to the proposed grouped project. Benchmark analysis (Option III) will be employed as the baseline scenario of the grouped project is the provision of electricity by the grid.

Sub-step 2b: (Option III)Apply Benchmark Analysis

According to *Interim Rules on Economic Assessment of Electric Power Engineering Retrofit Projects*(published on September 10th, 2002), The financial benchmark project IRR (after tax) on total investment of Chinese power industry is 8%, the project activity instances belong to power industry, so the benchmark of project IRR(after tax)adopted by the project activity instances is 8%. On the basis of this benchmark, calculation and comparison of IRR are carried out in sub-step 2c.

Sub-step 2c. Calculation and comparison of IRR

(1) Basic parameters and assumptions

The benchmark analysis will be carried out in accordance with the *Tool for the demonstration and assessment of additionality (V.07.0.0)* and *Guidelines on the assessment of investment (Version 05.0)* on investment analysis.

The financial analysis in each project activity instance is derived from the Feasibility Study Report (FSR) which is approved by the national authorities. And the FSR was carried out by an independent design institute, and is based on the national regulation and the material and equipment price level.

The investment decision was made based on the FSR of each project activity instance. And the gap between the completion date of the FSR and the investment decision is sufficiently short that it is unlikely in the context of the underlying project activity that the input values would have materially changed. Therefore it is a reliable data source for the proposed project activity instances investment analysis.

(2) Comparison of IRR for the proposed project activity instances and the financial benchmark

In accordance with the benchmark analysis (Option III) of the *Tool for the demonstration and assessment of additionality (Version 07.0.0)*, if the project IRR of a project is lower than that of the benchmark, the project is not considered as financially attractive.

Sub-step 2d – Sensitivity analysis

A sensitivity analysis should be carried out to estimate whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variation in the critical assumptions. According to CDM guidelines, only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variations. For the project activity instances, the key variables analyzed, which constitute more than 20% of costs or revenues, are:

- Total static investment
- Tariff (including VAT)
- O&M cost

➤ Annual Supplied Electricity

In line with CDM guidelines, the range of variations in the sensitivity analysis covers a range of +10% and -10%, which is also in line with the regulations in China.

The instances should prove that when the four uncertain factors stated above fluctuate within the range from -10% to +10 % (Without VCU revenue), the IRR of the proposed project activity instances is still lower than the benchmark 8%.

Step 3. Barrier analysis:

According to the tool, barrier analysis could be skipped for the additionality assessment.

Step 4. Common practice analysis:

In line with the tool, if the proposed project activity instances are one of four types of measures listed in paragraph 6 of the tool, the common practice analysis is carried out in four steps identified in paragraph 47 of the tool:

As a newly-built solar PV power project, the proposed project activity instances are not a first-of-its kind project and belongs to type (b) of measures mentioned in the tool (Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies)).

Therefore, the existing common practice is identified and discussed through the following 5 steps:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .

Step 5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/ technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3.

Therefore, since **step 2** (investment analysis) and **step 4** (common practice analysis) are satisfied, i.e., the proposed project activity instances are financially not attractive and are not a common practice, then the proposed project activity instances are additional.

2.6 Methodology Deviations

Not applicable. No methodology deviations are made.

3. QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

As per the methodology ACM0002, baseline emissions include only CO₂ emissions from electricity generation in the grid that the grouped project is connected to. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (1)$$

Where:

BE_y is the baseline emissions in year y (tCO₂e);

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh);

$EF_{grid,CM,y}$ is the combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of *Tool to Calculate the Emission Factor for an Electricity System* (tCO₂e/MWh).

Calculation of $EG_{PJ,y}$

If the instance is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where

$EG_{PJ,y} =$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh)
$EG_{facility,y} =$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

Calculation of the CO₂ emission factor for the electricity of the China Power Grid ($EF_{grid,CM,y}$)

The emission factor is determined by the tool "Tool to calculate emission factor for an electricity system (Version 04.0)".

Step 1: Identify the relevant electricity systems

For determining the electricity emission factors, identify the relevant project electricity system

The host country (China) has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. The electricity system identification will be carried out at the instance inclusion level and showed in the PD. The spatial extent of the each instance power

grid comprises all the power plants connected physically to the instance, referring to *2014 Baseline Emission Factors for Regional Power Grids in China* (issued by China's DNA on October 20, 2014).⁴

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

For the grouped project, **Option I** is chosen: Only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

- (a) Simple OM; or
- (b) Simple adjusted OM; or
- (c) Dispatch data analysis OM; or
- (d) Average OM.

The simple OM method (Option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The dispatch data analysis (Option c) cannot be used if off-grid power plants are included in the project electricity system as per Step 2 above.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the VCS-PD to the DOE for validation. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the VCS-PD for validation.
- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y , alternatively the emission factor of the previous year $y-1$ may be used. If the data is usually only available 18 months after the end of year y , the emission factor of the year proceeding the previous year $y-2$ may be used. The same data vintage (y , $y-1$ or $y-2$) should be used throughout all crediting periods.

For the dispatch data analysis OM, use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring.

⁴<http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150204155537627092.pdf>

The data vintage chosen should be documented in the VCS-PD and should not be changed during the crediting period. Power plants registered as the grouped project should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

- (a) The necessary data for Option A is not available; and
- (b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- (c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

However, due to the necessary data, including the fuel consumption and net electricity generation of each power plant, is not available in China, and the other two requirements (b and c) are also satisfied, Option B will be adopted for each instance.

As per Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

Data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system can be identified; thus, Option B is employed to calculate OM.

$$EF_{grid,OM,simple,y} = \frac{\sum_i FC_{i,y} \cdot NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (3)$$

$EF_{grid,OM,simple,y}$ is Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)

$FC_{i,y}$ is the amount of fossil fuel type i (in a mass or volume unit) consumed by project electricity system in year(s) y,

$NCV_{i,y}$ is Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)is CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)

$EF_{CO2,i,y}$

EG_y is Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)

$\bar{z}$

is All fossil fuel types combusted in power sources in the project electricity system in year y

y

is the relevant year as per the data vintage chosen in Setp 3

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant m.

Referring to *2014 Baseline Emission Factors for Regional Power Grids in China*, the simple operating margin emission factors ($EF_{grid,OM,y}$) of the relevant grid are listed in Table-21 below:

Table-21 the operating margin emission factors of each grid involved of the grouped project.

Power Grid	$EF_{grid,OM,y}$ (tCO ₂ /MWh)
North China Power Grid	1.0580
Northeast Power Grid	1.1281
East China Power Grid	0.8095
Central China Power Grid	0.9724
Northwest Power Grid	0.9578
China Southern Power Grid	0.9183

Step 5. Calculate the Build Margin(BM) emission factor

According to *Tool to Calculate the Emission Factor for an Electricity System*(version 04.0), project participants shall choose between one of the following two options to calculate the build margin emission factor ($EF_{grid,BM,y}$).

Option 1. For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group m at the time of PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the Project or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emission factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 is adopted by the grouped project.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

- Identify the set of five power units, excluding power units registered as VCS project activities, that started to supply electricity to the grid most recently ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET-5-units}$, in MWh);

- (b) Determine the annual electricity generation of the project electricity system, excluding power units registered as VCS project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as VCS project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET_{\geq 20\%}}$, in MWh);
- (c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Otherwise:

- (d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as VCS project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample-vcs}$) the annual electricity generation ($AEG_{SET_{sample-vcs}}$, in MWh) ;

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET_{sample-vcs}} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample-vcs}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

- (e) Include in the sample group $SET_{sample-vcs}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);
- (f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-vcs->10yrs}$).

It is suggested the set of power units that comprises the larger annual generation should be used.

Considering data availability, CDM EB accepts the following way in application of methodology⁵:

- 1) Use of capacity additions during the last several years for estimating the build margin emission factor for grid electricity.
- 2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the

⁵http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ.

provincial/regional or national grid of China, as a conservative proxy.

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor using the efficiency level of the best technology commercially available in China.

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO ₂ emission factor of power unit m in year y (tCO ₂ /MWh)
m	Power units included in the build margin
y	Most recent historical year for which electricity generation data is available

Due to data availability in China, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance of options A2 to calculate the simple OM, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

As the data of installed capacity cannot be separated into coal fired, oil fired and gas fired currently, the build margin emission factor is calculated by the following steps and formulae:

Step a. Calculate the power generation emissions of solid fuel, liquid fuel and gas fuel and each share in the total emissions based on *Energy Balance Table* of the most recent year.

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad (5)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad (6)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad (7)$$

Where:

$F_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by province j in year(s) y ;

$NCV_{i,y}$ is the net calorific value (energy content) of fuel i in year y (GJ/mass or volume unit);

$EF_{CO2,i,j,y}$ is the emission factor of fuel i in year y (tCO₂e/GJ);

COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

Step b. Calculate the emission factor for thermal power of the grid based on the result of Step a and the efficiency level of the best technology commercially available in China.

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (8)$$

$$EF_{Coal,Adv,y} = FC_{adv,coal} \times NCV_{coal,y} \times EF_{CO2,coal,y} \quad (8-a)$$

$$EF_{oil,Adv,y} = FC_{adv,oil} \times NCV_{oil,y} \times EF_{CO2,oil,y} \quad (8-b)$$

$$EF_{gas,Adv,y} = FC_{adv,gas} \times NCV_{gas,y} \times EF_{CO2,gas,y} \quad (8-c)$$

Where $EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factor proxies of efficiency level of the best coal fired, oil fired and gas fired power generation technology commercially available in China.

Step c. Calculate the build margin emission factor of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (9)$$

Where:

$CAP_{Total,y}$ is total capacity additions that are close to and exceed 20% of existing capacity;

$CAP_{Thermal,y}$ is capacity additions of thermal power.

The data on installed capacity for calculating the build margin emission factor ($EF_{grid,BM,y}$) are obtained from *China Electric Power Yearbook 2011/2012/2013*. The data on different fuel consumptions for power generation and the net calorific values of the fuels are obtained from *China Energy Statistical Yearbook 2013*. The emission factors of the fuels employed and carbon oxidation rate are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of Chapter 1, Volume 2 of *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The lower values of the 95% confidence intervals in Table 1.4 are used for the emission factors of the fuels employed.

Referring to *2014 Baseline Emission Factors for Regional Power Grids in China*, the build margin emission factor ($EF_{grid,BM,y}$) of the relevant grid are listed in Table-22 below:

Table 22. The build margin emission factors of each grid involved of the grouped project

Power Grid	$EF_{grid,BM,y}$ (tCO ₂ /MWh)
North China Power Grid	0.5410
Northeast Power Grid	0.5537
East China Power Grid	0.6861
Central China Power Grid	0.4737
Northwest Power Grid	0.4512
China Southern Power Grid	0.4367

Step6. Calculate the combined margin emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

- (a) Weighted average CM; or
- (b) Simplified CM.

The weighted average CM method (option A) should be used as the preferred option. The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

(a) Weighted average CM

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y} \quad (10)$$

Where:

$EF_{grid,BM,y}$ Build margin CO₂ emission factor in year y (tCO₂/MWh)

$EF_{grid,OM,y}$ Operating margin CO₂ emission factor in year y (tCO₂/MWh)

w_{OM} Weighting of operating margin emissions factor (%)

w_{BM} Weighting of build margin emissions factor (%)

According to the “Tool to calculate the emission factor for an electricity system”, the default weights for solar power generation projects are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$. Therefore the combined margin emission factors, i.e. the baseline emission factors of each relevant grid are calculated as follows:

Table 23. The combined margin emission factors

Power Grid	$EF_{grid,CM,y}$ (tCO ₂ /MWh)
North China Power Grid	0.92875
Northeast Power Grid	0.9845
East China Power Grid	0.77865
Central China Power Grid	0.847725
Northwest Power Grid	0.83115
China Southern Power Grid	0.7979

3.2 Project Emissions

In accordance with the applied CDM methodology ACM0002, the project emission $PE_y = 0$ tCO₂e.

3.3 Leakage

According to the methodology ACM0002, the leakage is not considered.

3.4 Net GHG Emission Reductions and Removals

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions (BE_y) and project emissions (PE_y), as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	Emissions reductions of the project activity during the year y (tCO ₂ e)
BE_y	Baseline emissions during the year y (tCO ₂ e)
PE_y	Project emissions during the year y (tCO ₂ e)

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2013/01/23-2013/12/31	135,593	0	0	135,593
2014	319,052	0	0	319,052
2015	319,052	0	0	319,052
2016	319,052	0	0	319,052
2017	319,052	0	0	319,052
2018	319,052	0	0	319,052
2019	319,052	0	0	319,052
2020	319,052	0	0	319,052
2021	319,052	0	0	319,052
2022	319,052	0	0	319,052
2023/01/01-2023/01/22	19,227	0	0	19,227
Total	3,026,288	0	0	3,026,288

4. MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{OM,v}
Data unit	tCO ₂ e/MWh
Description	Operating margin emission factor of the grid connected by each instance
Source of data	"2014 Baseline Emission Factors for Regional Power Grids in China" issued by China's DNA on February. 4, 2015
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or	China Official Data of National Bureau of Statistics of China and National Development and Reform Commission

description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$EF_{BM,y}$
Data unit	tCO ₂ e/MWh
Description	Build margin emission factor of the grid connected by each instance
Source of data	"2014 Baseline Emission Factors for Regional Power Grids in China" issued by China's DNA on February. 4, 2015
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected by each instance
Source of data	The calculation is conducted based on data calculated by the Office of National Coordination Committee on Climate Change.
Value applied	Depends on the grid concerned
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	The calculation was conducted based on data calculated by the Office of National Coordination Committee on Climate Change.

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit	kgCO ₂ /TJ
Description	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	IPCC's official data
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$FC_{i,y} / F_{i,j,y}$
Data unit	mass or volume unit
Description	Amount of fossil fuel type <i>i</i> consumed by the instance electricity system in year <i>y</i>

Source of data	China Energy Statistical Yearbook
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$NCV_{i,y}$
Data unit	KJ/ mass or volume unit
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	China Energy Statistical Yearbook
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$EG_{m,y} / EG_y$
Data unit	MWh
Description	Net electricity generated by power plant/unit m (or in the project electricity system in case of EG_y) in year y
Source of data	<i>China Electric Power Yearbook</i>
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$CAP_{j,y}$
Data unit	MW
Description	Installed capacity of source j in year y in the grid the instance connected to
Source of data	<i>China Electric Power Yearbook</i>
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter:	$EF_{coal,adv,y}$, $EF_{oil,adv,y}$ and $EF_{gas,adv,y}$
Data unit	%

Description	Efficiency level of best technologies commercially available in China
Source of data	<i>China's DNA : Baseline Emission Factors for Regional Power Grids in China</i>
Value applied	Depends on the grid connected by each instance
Justification of the choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China</i> and <i>National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Net quantity of electricity delivered to the grid by a typical instance in year y
Source of data	Meter(s) installed at the Project site of each instance
Description of measurement methods and procedures to be applied	The meters are calibrated annually and checked for accuracy by a qualified third party in accordance with industry standards. The measurement precision of the meters employed by the each instance will be at least 0.5s.
Frequency of monitoring/recording	Continuously monitored and monthly recorded.
Value applied	Calculated. Refer to the ER sheet.
Monitoring equipment	-
QA/QC procedures to be applied:	The meter(s) is periodically checked and maintained. And receipt(s) is used for crosscheck.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter:	$EG_{output,y}$
Data unit:	MWh
Description:	Electricity delivered by a typical instance to the grid in year y
Source of data	The data used are obtained from the FSR of the Project. Actual data will be obtained through on-site measurement with meter(s).
Description of measurement methods and procedures to be applied	The meters are calibrated annually and checked for accuracy by a qualified third party in accordance with industry standards. The measurement precision of the meters employed by the each instance will be at least 0.5s.
Frequency of monitoring/recording	Continuously monitored and monthly recorded.
Value applied	Depends on each instance. Refer to the ER sheet
Monitoring equipment	Electric meters
QA/QC procedures to be applied:	The meter(s) is periodically checked and maintained. And receipt(s) is used for crosscheck.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter:	$EG_{input,y}$
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Data unit:	MWh
Description:	Electricity imported by a typical instance from the grid in year y
Source of data	Meter(s) installed at the Project site of each instance
Value applied	Calculated
Description of measurement methods and procedures to be applied	The meters are calibrated annually and checked for accuracy by a qualified third party in accordance with industry standards. The measurement precision of the meters employed by the each instance will be at least 0.5s.
Frequency of monitoring/recording	Continuously monitored and monthly recorded.
Value applied	Depends on each instance. Refer to the ER sheet
Monitoring equipment	Electric meters
QA/QC procedures to be applied:	The meter(s) is periodically checked and maintained. And receipt(s) is used for crosscheck.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

4.3 Monitoring Plan

Monitoring Plan Objective and Organization

The project participant, as defined in each instance will monitor the electricity delivered to the grid. The monitoring data and operation condition of each instance shall be reported to the grouping entity. The data will be archived electronically and be stored for 2 years after the end of the crediting period of each instance.



Figure-6.The monitoring system of the instance in the grouped project

Monitoring data

Data to be monitored is the net quantity of electricity delivered to the grid by each instance in year y. In different instances, the monitoring points and methods may be different according to the real condition of the plant. All instance s under the grouped project shall provide a monitoring point chart to demonstrate where the meters installed and how to monitor quantity of electricity delivered to the grid, i.e. $EG_{facility,y}$.

Precision of Meter(s)

The meter(s) of the Project will be equipped in line with *Technical Administrative Code of Electric Energy Metering* (DL/T 448-2000)..The measurement precision of the meter(s) employed by the instance will be at least 0.5s.

Calibration of Meter(s)

The meter(s) of the Project will be calibrated once per year.

Data Management System

- Particular staff will be appointed by the instance implementer to take the overall responsibility for monitoring emission reductions and keeping all the data collected as part of monitoring archived electronically.
- Electronic data and documents will be regularly copied and archived, and kept at least for two years after the end of the last crediting period or two years after the last issuance of VCUs, whichever is later.
- Written data and documents will be copied and archived, and kept for at least two years after the end of the last crediting period or two years after the last issuance of VCUs, whichever is later.

Quality Assurance and Quality Control Procedure

Particular QC staff will be appointed by the Project Owner to take the overall responsibility of calibrating monitoring equipment, managing and processing the monitored data according to QA/QC procedure provided in Section E.7.1. If something unusual, the Project Manager should be immediately reported.

Training

All staff involved in the instance will receive relevant training and ensure that only trained staffs are involved in the operation of the monitoring system.

Emergency

In case of emergencies, the instance operator will not claim emission reductions due to the instance for the duration of the emergency. The instance operator will follow the procedure for declaring the emergency period to be over:

- 1) The instance operator will ensure that all requirements for monitoring of emission reductions have been re-established;
- 2) The chief person who responsible for the plant and the operator will both sign a statement to declare the emergency situation has been ended and normal operation has been resumed;

5. ENVIRONMENTAL IMPACT

In line with the national law/regulations of China, an Environmental Impact Assessment (EIA) has been carried out and approved by the environmental agency in charge of environmental protection of City or County before the instance would start. The EIA has been carried out for the following Environmental impact:

- Expected Environmental impacts during construction, on such as atmosphere, noise, and solid waste;
- Expected Environmental impacts during operation, on such as atmosphere, noise, waste water and solid waste.

According to the Environmental Impact Assessment Report, environmental impacts possibly caused by the proposed instance and treatment measures adopted by the project owner are analyzed as follows:

During the construction period

1. Air

The dust emission during construction period mainly caused by the transport vehicles and the open piled of the building materials which will be greatly mitigated through the following measures:

- A. Watering will be implemented timely on the construction site and transport roads.
- B. Prohibit construction during the strong wind days and reduce the open piled of the building materials

By the above measures, will minimize dust emissions and secondary dust, the dust emission meet the standard "Atmospheric Pollution Integrated emission standard".

2. Noise

The noise during construction will originate from operating equipment and transportation vehicles. To reduce the impacts of noise, the construction time and interval will be controlled strictly. Moreover, there are no residents around the project site. Thus, the construction noise will cause no effects on the surrounding environment as long as the construction is implemented reasonably.

3. Solid waste

During the construction period, the soil waste mainly results from construction rubbish and domestic refuse from workers. All the solid waste will be collected by the sanitation department for disposal.

During the operation period

1. Air quality

During the operation period, the proposed instance will not produce exhaust gas pollution.

2. Water quality

The treated sewage of the proposed instance is used for virescence. The flushing water mainly contains SS, barely contains other pollutants, uses on virescence in station and solar plane areas. It will not pollute the environment.

3. Solid waste

During the operation period of the proposed instance, as there are few workers, the soil waste mainly results from domestic refuse from workers is tiny; all the solid waste will be collected to the waste landfill site for disposal.

4. Noise

All the equipment employs the low noise technology, and there are no residents around the project site. Thus, the operation noise will cause no effects on the surrounding environment.

5. Ecological environment

During the operation period of the proposed instance, plant the suitable vegetation for the vegetation restoration. Thus, there are no effects on the ecological environment.

6. STAKEHOLDER COMMENTS

For the solar PV power generation projects, environmental impact assessments were carried out. Comments by local stakeholders were collected as part of the environmental impact assessment process, mostly through direct interviews with neighboring stakeholders. This process is standardized in the provinces where the instances are placed. Stakeholders have the right to bring up concerns to the local environmental agency, which is in charge of accepting the environmental assessments. As the projects are to a large extent driven by initiative from the local communities and/or do not affect any people directly, it is not surprising that no negative comments were received.