



**Verified Carbon
Standard**

GROUPED CONNECT SOLAR PV POWER GENERATION PROJECT IN CHINA



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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status 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 Renewables (Group) Co., Ltd.¹ (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 solar PV power generation plants located in 30 provinces of China. The initial project activity instances under the Grouped Project are:

- **INSTANCE 01:** Yongchang County Dazhaitan 50MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**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 50.112 MWp, employing 172,800 pieces of 290 Wp polycrystalline silicon solar cells. The annual utilization time 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 70,650.480 MWh.
- **INSTANCE 02:** Yongchang County Heqingtian Phase II 50MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**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 50.9067 MWp, employing 92,340 pieces of 300 Wp and 78,660 pieces of 295 Wp polycrystalline silicon solar cells. The annual utilization time 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 72,791.950 MWh.

¹ The name of the project owner in the validated Project Description was China Three Gorges New Energy Corp. On 26-June-2019, the project owner changed its name to China Three Gorges Renewables (Group) Co., Ltd., according to Letter of Confirmation provided by the project owner. Refer to Section 3.2.2.

- **INSTANCE 03:** Wulan 20MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**the Wulan Project**” or “Instance 03”), located in Wulan County, Qinghai Province of China. The Wulan Project is developed, financed and managed by 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 20.139 MWp, employing 82,200 pieces of 245 Wp polycrystalline silicon solar cells. The annual utilization time 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 31,217.730 MWh.
- **INSTANCE 04:** Three Gorges New Energy Hetian Pishan Phase II 20MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**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 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 20.0 MWp, employing 80,000 pieces of 250 Wp polycrystalline silicon solar cells. The annual utilization time 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 26,003.000 MWh.
- **INSTANCE 05:** Three Gorges New Energy Hami 20MW Grid Connected PV Power Generation Project (hereafter also referred to as “**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 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 20.4 MWp, employing 81,600 pieces of 250 Wp polycrystalline silicon solar cells. The annual utilization time 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 30,935.570 MWh.
- **INSTANCE 06:** Suzhou Zhaoyang Dongdongtan Phase I 50MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**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 50 MWp, employing 200,000 pieces of 250 Wp polycrystalline silicon solar cells. The annual utilization time 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 75,235.000 MWh.

- INSTANCE 07:** Suzhou Sanyang Dongdongtan Phase II 50MW Grid Connected Solar PV Power Generation Project (hereafter also referred to as “**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 50 MWp, employing 200,000 pieces of 250 Wp polycrystalline silicon solar cells. The annual utilization time is estimated to be 1,540.74 hours. 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 77,037.000 MWh.

Their basic information is summarized in Table 1.1.

Table 1.1 Summary of the initial project activity instances

Instance ID	Instance name	Project owner	Installed capacity (MWp)	Expected annual net electricity delivery (MWh)
01	the Dazhaitan Project	Three Gorges New Energy Jinchang Wind Power Co., Ltd.	50.112	70,650.480
02	the Heqingtian Project	Three Gorges New Energy Jinchang Wind Power Co., Ltd.	50.9067	72,791.950
03	the Wulan Project	Wulan Jinfeng New Energy PV Power Co., Ltd.	20.139	31,217.730
04	the Pishan Project	Three Gorges New Energy Pishan Power Generation Co., Ltd.	20.0	26,003.000
05	the Hami Project	Three Gorges New Energy Hami Wind Power Co., Ltd.	20.4	30,935.570
06	the Zhaoyang Project	Jiuquan Zhaoyang New Energy Power Generation Co., Ltd.	50	75,235.000
07	the Sanyang Project	Jiuquan Sanyang New Energy Power Generation Co., Ltd.	50	77,037.000

The Grouped Project 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, therefore achieving GHG emission reductions. Prior to the Grouped Project implementation, equivalent amount of power output to the Grouped Project was generated and supplied by the State Grid or China Southern Power Grid. This is also the baseline scenario of the Grouped Project.

According to the registered VCS Project Description, the estimated annual average GHG emission reductions from the initial seven project activity instances are 302,628 tCO₂e and the total estimated GHG emission reductions over the first crediting period are 3,026,288 tCO₂e.

The construction start dates and the commissioning dates of the project activity instances are shown in Table 1.2. The group project started operation on 23-January-2013, which is the earliest commissioning date among all project activity instances. All project equipment and facilities as described in the registered VCS Project Description have been correctly installed and operated continuously. Please refer to Section 3.1 for details.

Table 1.2 Construction start dates and commissioning dates of the project activity instances

Instance ID	Instance name	Construction start date	Commissioning date
Instance 01	the Dazhaitan Project	25-August-2012	06-March-2013
Instance 02	the Heqingtian Project	01-September-2013	26-December-2013
Instance 03	the Wulan Project	04-November-2012	23-January-2013
Instance 04	the Pishan Project	10-October-2013	21-December-2013
Instance 05	the Hami Project	10-October-2013	26-December-2013
Instance 06	the Zhaoyang Project	30-November-2012	20-July-2013
Instance 07	the Sanyang Project	30-November-2012	30-June-2013

The first monitoring period of the Grouped Project spans from 23-January-2013 to 31-December-2018, during which the Grouped Project achieved emission reductions of 1,265,672 tCO₂e; 1,265,672 VCUs were hence issued following the first verification. Please refer to the link below for details:

<https://registry.terra.org/app/projectDetail/VCS/1461>

The reported monitoring period in this Monitoring Report spans from 01-January-2019 to 28-February-2022 (both days included). This is the second monitoring period of the Grouped Project.

The Grouped Project was operated in compliance with the registered VCS Project Description, and achieved GHG emission reductions 946,107 tCO₂e during the reported monitoring period.

1.2 Sectoral Scope and Project Type

The Project falls under Sectoral Scope 01: “Energy Industries (renewable- /non-renewable resources)”. The project type is: Grid connected solar power project.

The Project is a grouped project.

1.3 Project Proponent

The Grouping Entity of the Grouped Project is China Three Gorges Renewables (Group) Co., Ltd., as shown in the table below.

Organization name	China Three Gorges Renewables (Group) Co., Ltd.
Contact person	WANG Hongye
Title	General Manager Assistant
Address	No. 12, Lane 2, Baiguang Road, Xicheng District, Beijing, China
Telephone	+86(010)-58689628
Email	hollywang816@126.com

1.4 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the Project	Consultant
Contact person	GAO Zhiwen
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China
Telephone	+86 21 6246 2036
Email	gao.zhiwen@climatebridge.com projects@climatebridge.com

1.5 Project Start Date

Table 1.3 shows the commissioning dates of the initial seven project activity instances included in the Grouped Project, on which the project activity instances began generating GHG emission reductions. The Grouped Project started on 23-January-2013, which is the earliest commissioning date among the project activity instances.

Table 1.3 Construction start dates and commissioning dates of the project activity instances

Instance ID	Instance name	Construction start date	Commissioning date
Instance 01	the Dazhaitan Project	25-August-2012	06-March-2013
Instance 02	the Heqingtian Project	01-September-2013	26-December-2013
Instance 03	the Wulan Project	04-November-2012	23-January-2013
Instance 04	the Pishan Project	10-October-2013	21-December-2013
Instance 05	the Hami Project	10-October-2013	26-December-2013
Instance 06	the Zhaoyang Project	30-November-2012	20-July-2013
Instance 07	the Sanyang Project	30-November-2012	30-June-2013

1.6 Project Crediting Period

The Grouped Project adopts 3×10 renewable crediting period, and the first crediting period of the Grouped Project is 10 years, from 23-January-2013 to 22-January-2023.

1.7 Project Location

The geographical boundary of the Grouped Project is that of the 30 provinces in China listed in Table 1.3, as shown in Figure 1.1.

Table 1.3 Geographical distribution of the grids controlled by State Grid or 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

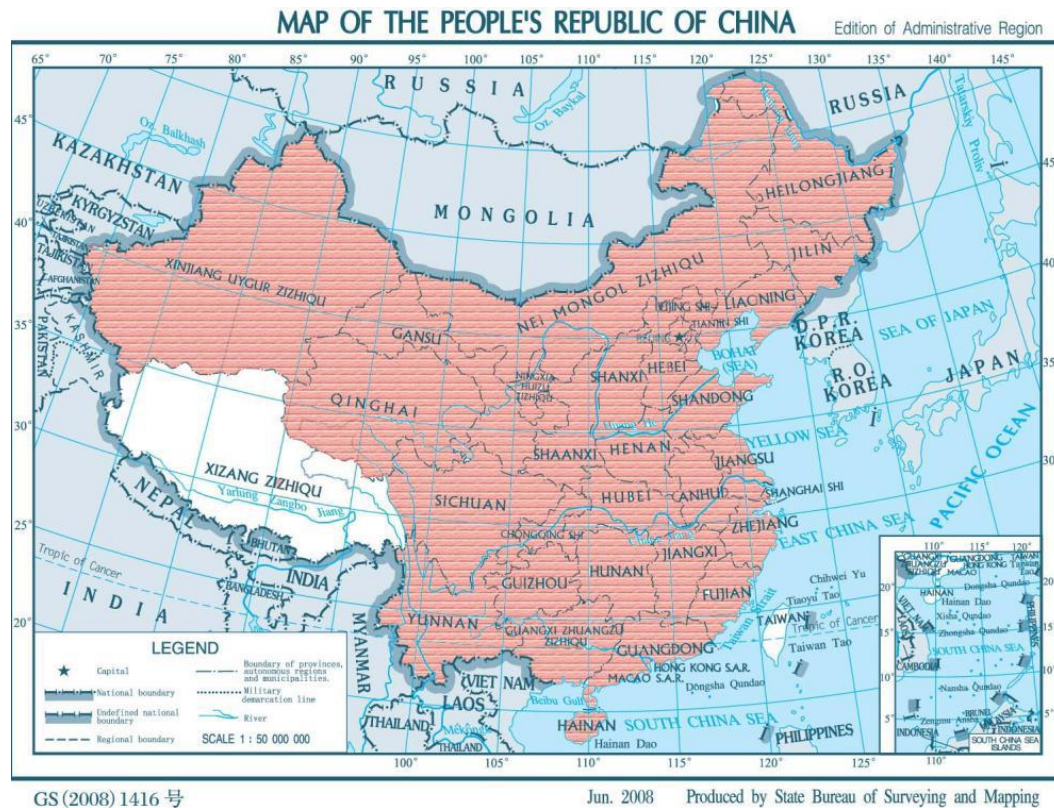


Figure 1.1 Geographical boundary of the Grouped Project

The geographical boundary of the initial seven project activity instances covers Gansu Province, Qinghai Province and Xinjiang Uygur Autonomous Region, as shown in Figure 1.2. The geographical coordinates of the seven project activity instances are shown in Table 1.4, and the site locations of these instances are shown in Figure 1.3.

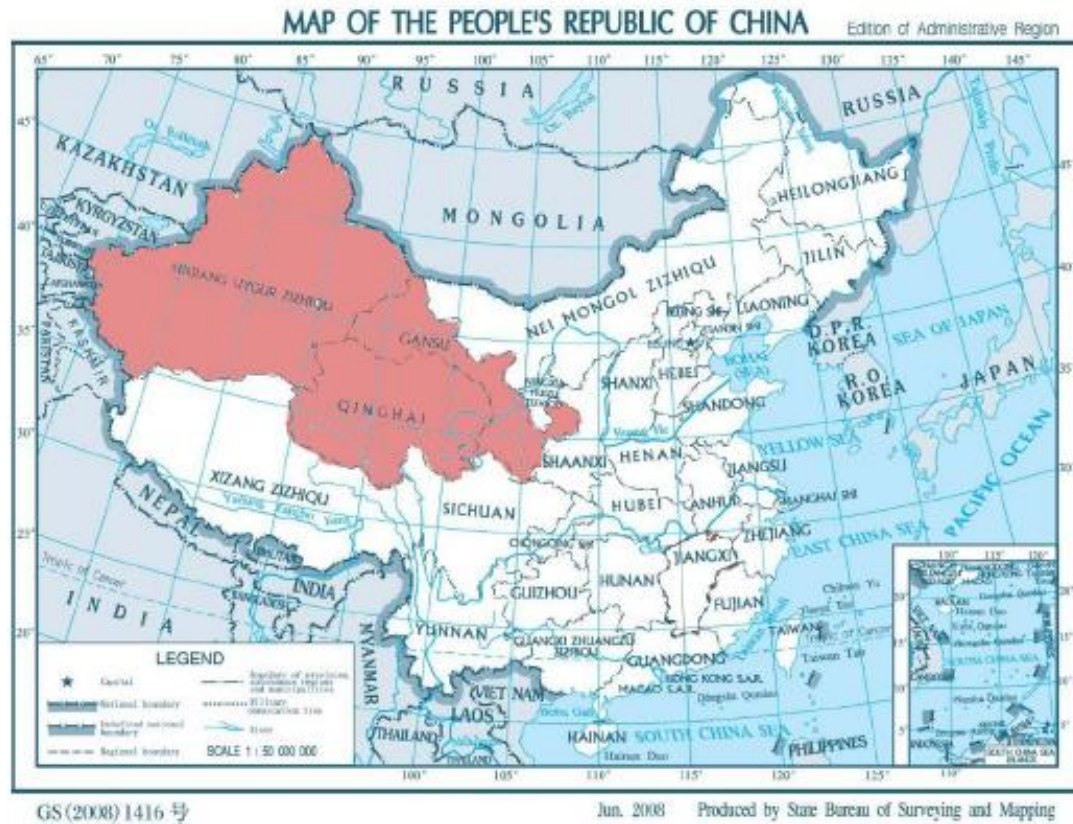


Figure 1.2 Geographical boundary of the initial seven project activity instances

Table 1.4 Geographical coordinates of the initial seven project activity instances

Instance ID	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 1.3 Site locations of the initial seven project activity instances

1.8 Title and Reference of Methodology

The Grouped Project applies the approved consolidated CDM baseline and monitoring methodology ACM0002 “Grid-connected electricity generation from renewable sources” (Version 16.0), which is accessible from the link below:

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

In addition, the Grouped Project also refers to:

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

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

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

<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf>

1.9 Participation under other GHG Programs

The Grouped Project has been registered under the CDM program as a PoA (reference: 8868).

The initial seven project instances are the CPA of Grid Connect Solar PV Power Generation Plant Program (PoA 8868)² under the CDM program, with a 7-year renewable crediting period from 18-December-2012. The corresponding relationship between the CPAs and the VCS instances is shown in Table 1.5; other CPA of the PoA 8868 (i.e., 8868-P1-0001, 8868-P1-0002, 8868-P1-0003, 8868-P1-0010 and 8868-P1-0011) are not involved within the context of the project. According to the information on the CDM website and other platforms, none of the GHG emission reductions have been issued during this monitoring period.

² https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/J7XM6V4NEI30WBO1GRYPT9HDKUA2ZL/view

Table 1.5 Corresponding relationship between the CPAs and the VCS instances

CDM programme activity (CPA) reference ³	Crediting start date of the CPA	VCS Grouped Project 1461 instance ID	Instance name
8868-P1-0004	04-Feb-2015	Instance 01	the Dazhaitan Project
8868-P1-0006	04-Feb-2015	Instance 02	the Heqingtian Project
8868-P1-0009	04-Feb-2015	Instance 03	the Wulan Project
8868-P1-0007	04-Feb-2015	Instance 04	the Pishan Project
8868-P1-0005	04-Feb-2015	Instance 05	the Hami Project
8868-P1-0012	04-Feb-2015	Instance 06	the Zhaoyang Project
8868-P1-0008	04-Feb-2015	Instance 07	the Sanyang Project

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits

The Grouped Project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. In fact, China's national emissions trading scheme (ETS) only covers emission-intensive companies in eight emission-intensive industries⁴, such as power generation companies that emit more than 26,000 tCO₂ per year. A total number of 2,225 fossil fuel-fired power plants in the power sector are included in China's ETS⁵; none of the project activity instances in the Grouped Project are included in it, and there is no emission cap enforced on any of the project owners, nor can they participate in carbon transactions in the national ETS. Therefore, the net GHG emission reductions from the Grouped Project will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions.

Other Forms of Environmental Credit

³ https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/J7XM6V4NEI30WBO1GRYPT9HDKUA2ZL/viewCPAs?s=0

⁴ http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

⁵ <http://mee.gov.cn/xxgk2018/xxgk/xxgk03/202012/W020201230736907682380.pdf>

The Grouped Project and all the seven project activity instances have not sought or received another form of GHG-related environmental credit during this monitoring period.

1.11 Sustainable Development Contributions

The Grouped Project contributes to sustainable development goals in the following aspects:



The project activities displace the power generation of fossil fuel power plants, reducing CO₂, SO_x and NO_x emissions significantly, thus mitigating the air pollution and its harm.



The project activities provide long-term job opportunities for local residents, contributing positively to local economy prosperity.



The renewable electricity generated by the project activities replace electricity generation by fossil-fuel power plants of the power grid, hence achieving GHG emission reductions.

Please refer to Table 1.6 for detailed descriptions on the Project's SDG contributions during this monitoring period and over project lifetime.

Table 1.6 Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	Renewable energy supplied to the power grid	Implemented activities to increase	1,138,326.572 MWh of net electricity from renewable sources was supplied to the power grid during this monitoring period.	1,138,326.572 MWh of net electricity from renewable sources was supplied to the power grid during this monitoring period.
2)	8.5	Number of long-term jobs provided	Implemented activities to increase	110 employees have signed long-term labour contracts and receive stable payments due to the implementation of the project activities.	The Groupe Project provided 110 long-term jobs during this monitoring period.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The Grouped Project achieved GHG emission reductions of 946,107 tCO ₂ e during this monitoring period.	The Grouped Project achieved GHG emission reductions of 946,107 tCO ₂ e during this monitoring period.

Evidence of the contributions to SDG 7.2: refer to the first Monitoring Report⁶ for the achievement during the first monitoring period; refer to this Monitoring Report for the achievement during the second monitoring period.

⁶ <https://registry.verra.org/app/projectDetail/VCS/1461>

Evidence of the contributions to SDG 8.5: the labour contacts and the pay rolls of the project activity instances, which have been provided to the VVB for verification and will not be made publicly available due to confidentiality issues.

Evidence of the contributions to SDG 13.0: refer to the first Monitoring Report for the achievement during the first monitoring period; refer to this Monitoring Report for the achievement during the second monitoring period.

2 SAFEGUARDS

2.1 No Net Harm

Prior to the project start, in line with the national law/regulations of China, an Environmental Impact Assessment (EIA) was carried out and approved by the environmental agency in charge of environmental protection.

According to the EIA Report, the environmental impacts of the project instances and associated mitigation measures during the operation period are as follows:

- The project instances will not produce gas pollution.
- The treated sewage of the project instances is used for greening. The flushing water mainly contains SS, barely contains other pollutants.
- The project instances will not produce hazardous waste. The solid waste is mainly domestic refuse from workers and its quantity is tiny; all the solid waste will be collected to the waste landfill site for disposal.
- 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.
- During the operation period of the proposed instance, plant the suitable vegetation for the vegetation restoration.

During this monitoring period, the environmental impacts of the project instances were in line with the EIA Report and the measures were fully adopted, explained as follows:

- The water from solar panel washing was used in greening.
- The solid domestic waste was collected to the waste landfill site for disposal.
- Original vegetation (i.e., the same species and the same area) was restored around the project sites during the first monitoring period, was growing normally during this monitoring period.

Therefore, the Grouped Project did not result in any negative environmental or socio-economic impacts during this monitoring period. In fact, as a clean renewable energy project, the Grouped Project aims at reducing greenhouse gas emissions and mitigating environmental pollution caused by fossil fuel consumption.

Meanwhile, the implementation of the Grouped Project also contributes to local socio-economic development by creating job opportunities and paying taxes.

In conclusion, the Grouped Project did not lead to negative environmental or socio-economic impacts during this monitoring period.

2.2 Local Stakeholder Consultation

Local stakeholder consultation during the project preparation stage

The local stakeholder consultation prior to the project implementation was conducted in October 2013. All comments received have been well addressed. Please refer to the registered Project Description⁷ for detailed information.

Local stakeholder consultation during the project implementation stage:

Communications with local stakeholders were carried out at periodic intervals. Key implementation schedules or changes of the project had been communicated to the local authority, who informed the neighborhood committee and the local residents, the comments and suggestions from residents would be collected by the local authority meanwhile. And the local government agencies and competent authorities conducted spot checks on the implementation of the project from time to time and gave some suggestions on the involved rectification problems.

During this monitoring period, two rounds of local stakeholder consultations were conducted in June 2019 and May 2021, respectively, by means of questionnaire surveys. The project owner distributed questionnaires to the local villagers and residents around the project area. The questionnaire was designed with the following sections:

- 1) Brief introduction of the project situation during the monitoring period;
- 2) Basic information of the respondents;
- 3) Major questions and issues:
 - Whether the project will cause water pollution?
 - Whether the project will cause air pollution?
 - Whether the project will cause noise pollution?
 - Whether the project will impact on soil environment?
 - Whether the project will impact on animals and plants in the surrounding area?
 - Impact on the local resident's employment opportunities and income.
 - Impact on the local economic development.
 - Impact on the local power grid and NWPG.
 - Attitude on developing the project.

⁷ <https://registry.terra.org/app/projectDetail/VCS/1461>

Following is a summary of the local survey. The survey forms are available from the project owner:

The questionnaires were sent to 70 households (10 people for 1 instance) during each round of consultation and the survey had a 100% response rate. The result of the survey indicated general support to the project activity instances.

The basic information of the respondents is shown in Table 2.1.

Table 2.1 Basic information of the respondents during the two consultations

		Consultation in June 2019	Consultation in May 2021
Total		70	70
Gender	Male	41	38
	Female	29	32
Age	18~35	28	30
	36~50	37	35
	55~65	4	5
	>65	1	0
Job	Farmer	13	18
	Worker	52	46
	Other	5	6

The respondents are representative of the public in terms of their gender, age and occupations. Therefore, it can be considered that the responses to the survey comprehensively reflected the stakeholders' attitudes towards the relevant project activity instances.

The summary of the responses is shown in Table 2.2. No negative comments were received for the project activity instances.

Table 2.2 Summary of the responses

Consultation in June 2019	Consultation in May 2021
100% of the respondents agreed with the development of the project.	100% of the respondents agreed with the development of the project.
100% of the respondents believed that the project would not do harm to the environment,	100% of the respondents believed that the project will not do harm to the environment.
97% believed that the project would do no harm to the ecosystem, 3% replied that they did not know.	96% believed that the project will do no harm to the ecosystem, 4% replied that they did not know.
97% believed that the project would have no impact to the environment of living, studying, and working, 3% replied that they did not	100% believed that the project would have no impact to the environment of living, studying, and working.

know.	
100% believed that the project would have positive impact on local economic development.	100% believed that the project would have positive impact on local economic development.
100% had no further suggestions.	100% had no further suggestions.

2.3 AFOLU-Specific Safeguards

Not applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Grouped Project started operation on 23-January-2013, the earliest commissioning date among all project activity instances. The first crediting period of the Grouped Project is from 23-January-2013 to 22-January-2023, and the reported monitoring period in this Monitoring Report is from 01-January-2019 to 28-February-2022.

The Grouped Project operated smoothly without any emergencies or special events that would impact the applicability of the applied methodology or the monitoring plan. No events that would impact the GHG emission reductions or removals and monitoring occurred during this monitoring period.

The Grouped Project generates electricity by using renewable solar photovoltaic (PV) power to the grid and replacing equivalent electricity generated by fossil fuel fired power plants connected to the grid. Main technologies employed by the Grouped Project are listed below:

- PV array

PV array cells are the most important equipment in solar PV plants. 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).

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 instance uses solar energy to generate electricity and transfer into the grid, the power connection diagram is shown in Figure 3.1.

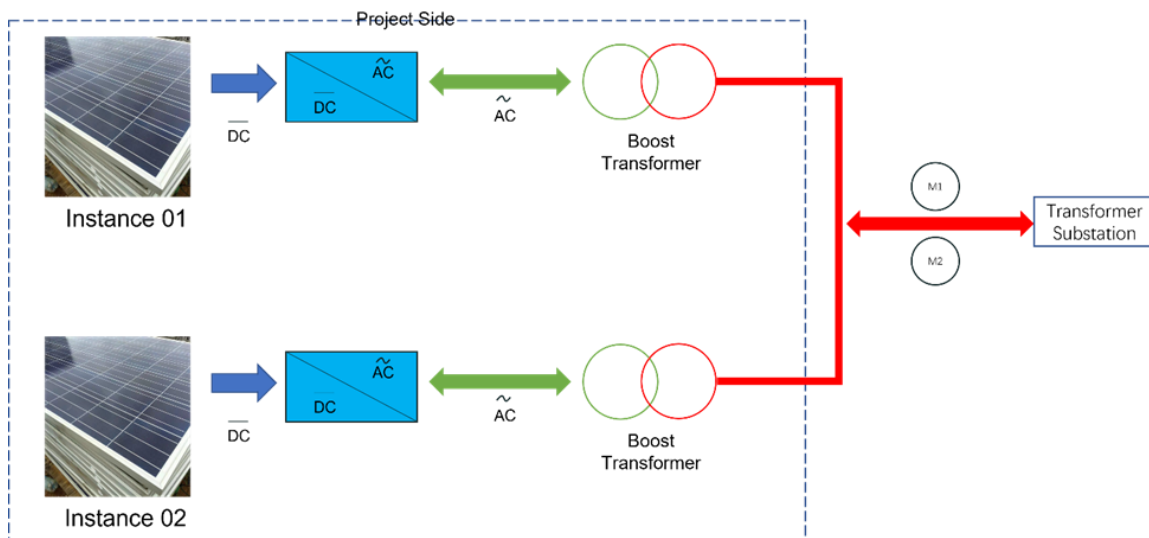


Figure 3.1 Power connection diagram of Instance 01

The key technical parameters of Instance 01 are as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50.112 MWp. 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 290 Wp polycrystalline silicon solar cells, which are supplied with total 50.112 MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 3.1.

Table 3.1 Key technical parameters of the 290 Wp polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	JKM290P-72	Equipment purchases contract & nameplate of polycrystalline silicon solar cells
Number	-	172,800	
Maximum power (Pmax)	Wp	290 (0~+3%)	
Rated voltage	V	36.4	
Rated current	A	7.97	

Open-circuit voltage (Voc)	V	44.9	
Short-circuit current (Isc)	A	8.89	
Maximum system voltage	V	1,000	
Operation period	years	25	
Manufacturer		Jinko Solar Co., Ltd.	

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 100 sets of inverters with capacity 500 kW were installed in the project. The parameters of the inverters are listed in Table 3.2.

Table 3.2 Key technical parameters of the inverters

Parameters	Unit	Value	Value	Value	Data source
Model	-	SSL0500	KNGI900-500HEA	SG500KTL	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	50/60	50	50	
Maximum output current	A	/	1188	1176	
Operation period	Year	25	25	25	
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 instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown in Figure 3.2.

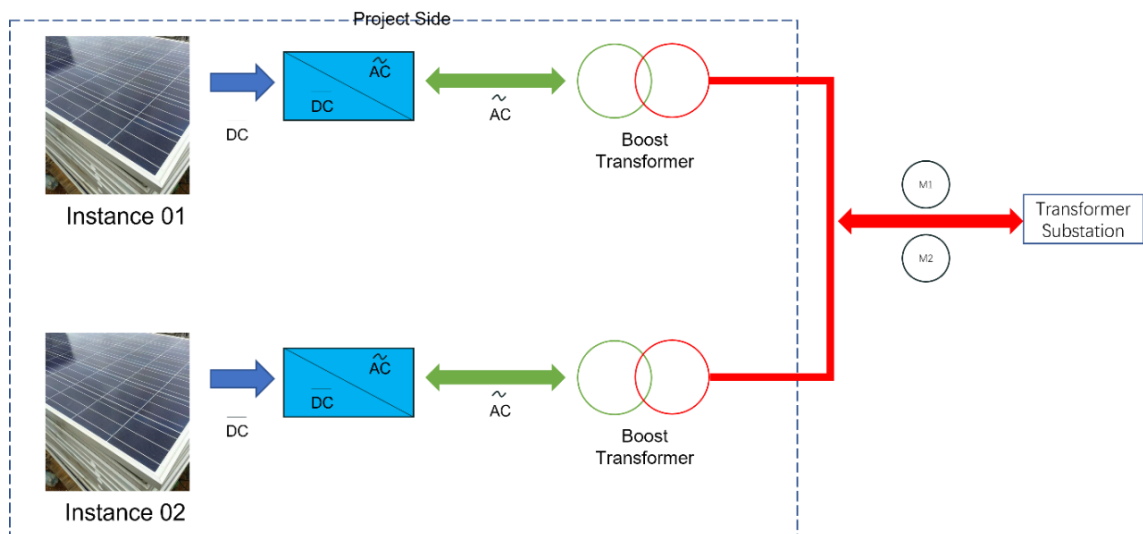


Figure 3.2 Power connection diagram of Instance 02

The key technical parameters of Instance 02 are as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50.9067 MWp. 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 consisted of 78,660 pieces of 295 Wp and 92,340 pieces of 300 Wp polycrystalline silicon solar cells, which were supplied with total 50.9067 MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 3.3.

Table 3.3 Key technical parameters of the 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	68,400	
Maximum power (Pmax)	Wp	300 (0~+3%)	295 (0~+3%)	295 (0~+5)	
Maximum power voltage	V	36.9	36.6	36.3	

(Vmp)					
Maximum power current (Imp)	A	8.13	8.07	8.13	
Open-circuit voltage (Voc)	V	45.3	45.2	44.7	
Short-circuit current (Isc)	A	8.60	8.55	8.62	
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

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 100 sets of inverters with capacity 500kW were installed in the project. The parameters of the inverter are listed in Table 3.4.

Table 3.4 Key technical parameters of the inverters

Parameters	Unit	Value	Data source
Model	-	EP-0500-A	Nameplate of inverters
Rated output power	kW	500	
Maximum DC voltage	V	1,000	
Maximum input short-circuit current	A	1,327	
MPPT voltage range	V	500-820	
Maximum input current	A	1,128	
Rated output voltage	V	315	
Rated frequency	Hz	50	
Maximum output current	A	1,008	
Operation period	Year	25	
Manufacturer	Wuxi Shangneng new energy		

	Co., Ltd.	
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INSTANCE 03: Wulan 20MW Grid Connected Solar PV Power Generation Project

The instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown in Figure 3.3.

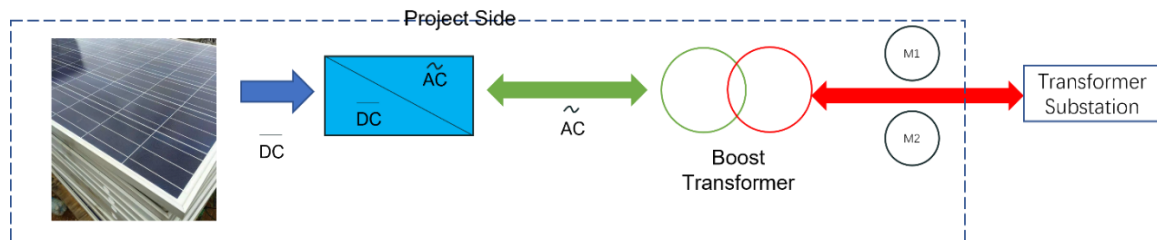


Figure 3.3 Power connection diagram of Instance 03

The key technical parameters of Instance 03 are as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 20.139 MWp. 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 245 Wp polycrystalline silicon solar cells, which are supplied with total 20.139 MWp output power. The key technical parameters of polycrystalline silicon solar cells are listed in Table 3-5:

Table 3.5 Key technical parameters of polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	YL245P-29b	Equipment purchases contract & nameplate of polycrystalline silicon solar cells
Number	-	82200	
Maximum power (Pmax)	Wp	245 (0~+5)	
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 period	years	25	
Manufacturer	Yingli Energy (China) Co., Ltd.		

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets of inverters with capacity 500 kW were installed in the project. The parameters of the inverters are listed in Table 3.6.

Table 3.6 Key technical parameters of the inverters

Parameters	Unit	Value	Data source
Model	-	DS500KTL	Nameplate of inverters
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	50/60	
Maximum output current	A	1070	
Operation period	Year	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 instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown in Figure 3.4.

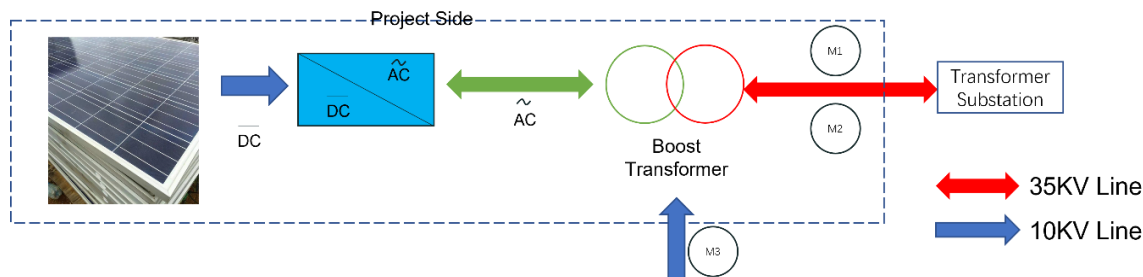


Figure 3.4 Power connection diagram of Instance 04

The key technical parameters of Instance 04 are as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 20 MWp. 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 employed 80,000 pieces of 250 Wp polycrystalline silicon solar cells, which are supplied with total 20 MWp output power. The key technical parameters of the polycrystalline silicon solar cells are listed in Table 3-7.

Table 3.7 Key technical parameters of the 250 Wp polycrystalline silicon solar cells

Parameters	Unit	Value	Data source
Model	-	EG250-P60-C	Equipment purchases contract & nameplate of inverters
Maximum power (Pmax)	Wp	250 (0~+3%)	
Rated voltage	V	30.20	
Rated current	A	8.28	
Open-circuit voltage (Voc)	V	37.72	
Short-circuit current (Isc)	A	8.81	
Maximum system voltage	V	1000	
Operation period	years	25	
Manufacturer	ChangZhou EGing Photovoltaic Technology Co., Ltd		

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets inverters with capacity 500kW were installed in the project. The parameters of the inverters are listed in Table 3.8.

Table 3.8 Key technical parameters of the inverters

Parameters	Unit	Value	Data source
Model	-	EP-0500-A	Equipment purchases contract & nameplate of inverters
Rated output power	kW	500	
Maximum DC input voltage	V	1000	
Maximum DC input current	A	1128	
MPPT voltage range	V	420-820	
Rated AC output voltage	V	270	
Rated frequency	Hz	50	
Rated AC output current	A	1069	
Operation period	Year	25	
Manufacturer	Wuxi Shangneng New Energy Co., Ltd.		

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

The instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown in Figure 3.5.

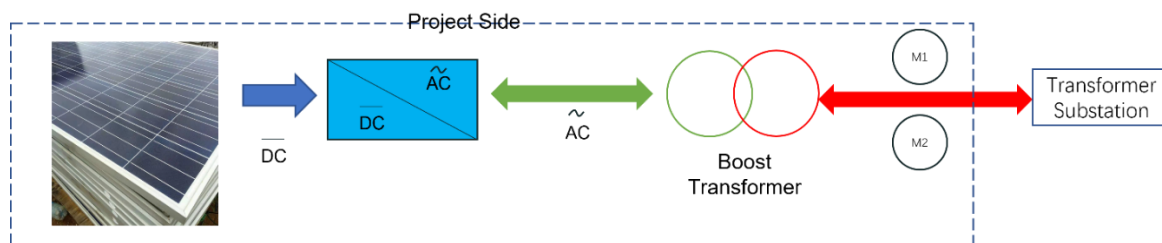


Figure 3.5 Power connection diagram of Instance 05

The key technical parameters of Instance 05 as follows as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 20.4 MWp. 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 250 Wp polycrystalline silicon solar cells, which are supplied with total 20.4 MWp output power. The key technical parameters of the polycrystalline silicon solar cells are listed in Table 3.9.

Table 3.9 Key technical parameters of the polycrystalline silicon solar cells

Parameters	Unit	Value	Value	Data source
Model	-	JAP6-60-250/3BB	JC250M-24/Bb	Nameplate
Number	-	40,800	40,800	
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 period	years	25	25	
Manufacturer		Hefei JA Solar Technology Co., Ltd.	Renesola Zhejiang Ltd.	

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 40 sets of inverters with capacity 500 kW were installed in the project. The parameters of the inverters are listed in Table 3.10.

Table 3.10 Key technical parameters of the inverters

Parameters	Unit	Value	Data source
Model	-	YLSSL-500	Nameplate
Rated output power	kW	500	
Maximum DC voltage	V	1000	
MPPT voltage range	V	420-850	
Maximum input current	A	1,250	
Rated output voltage	V	270	
Rated frequency	Hz	50	
Rated output current	A	1,070	
Operation period	Year	25	
Manufacturer	Shenzhen WinLine Technology Co., Ltd.		

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

The instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown as follows:

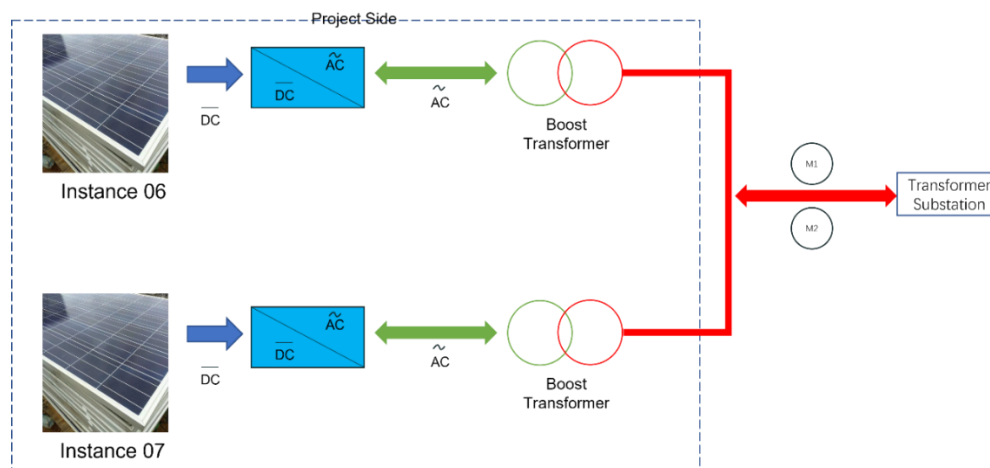


Figure 3.6 Power connection diagram of Instance 06

The key technical parameters of Instance 06 as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50 MWp, consists of 200,000 pieces of 250 Wp 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 the polycrystalline silicon solar cells are listed in Table 3.11.

Table 3.11 The key technical parameters of polycrystalline silicon solar cells

Parameters	Unit	Value	Value	Data source
Model	-	JAP6-60-3BB-250/3BB	JKM250P-60	Nameplate
Maximum power (Pmax)	Wp	250±3%	250(0~+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 period	years	25	25	
Manufacturer		JA Solar	JINKO Solar	

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 50 sets of 500 kW inverters and 40 sets of 630 kW inverters were installed in the project. The parameters of the inverters are listed in Table 3.12.

Table 3.12 Key technical parameters of the inverters

Parameters	Unit	Value	Value	Data source
Model	-	SG500MX	SG630KTL	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 period	Year	25	25	
Manufacturer	SUNGROW POWER SUPPLY CO., LTD			

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

The instance is using the solar to generate the electricity and transfer into the grid, the power connection diagram is shown as follows:

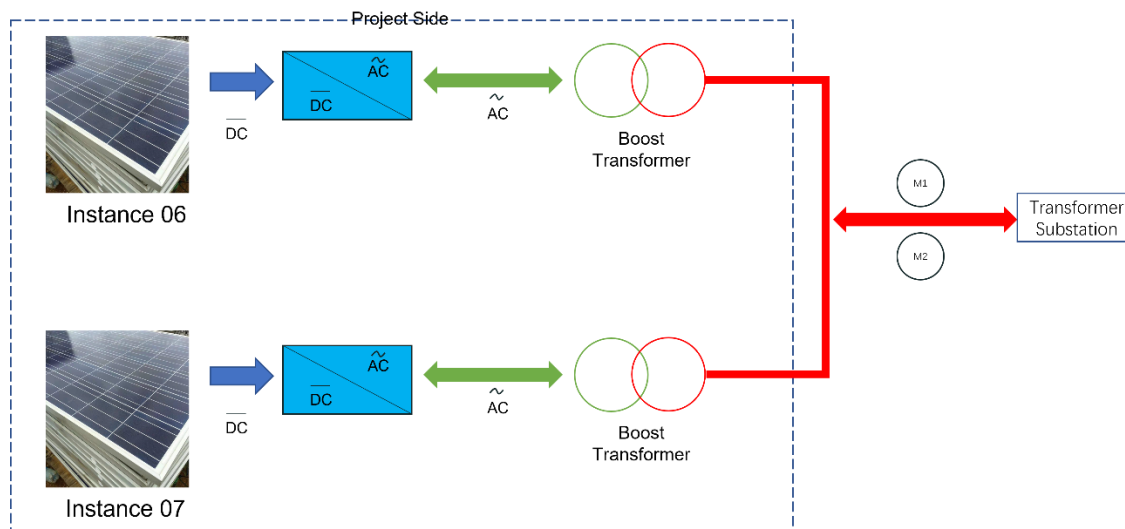


Figure 3.7 Power connection diagram of Instance 07

The key technical parameters of Instance 07 are as follows:

1. Modules

The project is a solar photovoltaic based power station with full capacity of 50 MWp, consists of 200,000 pieces of 250 Wp 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 3.13.

Table 3.13 Key technical parameters of the polycrystalline silicon solar cells

Parameters	Unit	Value	Value	Data source
Model	-	CS6P-250P	JKM250P-60	Nameplate
Maximum power (Pmax)	Wp	250	250(0~+5%)	
Rated Voltage	V	30.10	30.40	
Rated current	A	8.30	8.23	
Open-circuit voltage (Voc)	V	37.20	37.60	
Short-circuit current (Isc)	A	8.87	8.81	

Maximum system voltage	V	1000	1000	
Operation period	years	25	25	
Manufacturer		Canadian Solar	JINKO Solar	

2. Inverters

The inverter is an electrical device that converts direct current (DC) to alternating current (AC). 50 sets of 500 kW inverters and 40 sets of 630 kW inverters were installed in the project. The parameters of the inverters are listed in Table 3.14.

Table 3.14 Key technical parameters of the inverters

Parameters	Unit	Value	Value	Data source
Model	-	SG500MX	SG630KTL	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 period	Year	25	25	
Manufacturer	SUNGROW POWER SUPPLY CO., LTD			

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation applied during this monitoring period.

3.2.2 Project Description Deviations

According to the validated project description, the name of the Grouping Entity of the Grouped Project was China Three Gorges New Energy Corp. at the time of the project validation, which changed its name to China Three Gorges Renewables (Group) Co., Ltd. on 26-June-2019 according to Letter of Confirmation provided by the project owner.

This name change does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

Except the name change, there is no project description deviation applied during this monitoring period.

3.3 Grouped Projects

All the seven instances involved in this Monitoring Report have been validated, and they are in line with the eligibility criteria set out in the Project Description. Please refer to the registered Project Description for details.

No new instance is involved in this monitoring period

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{OM,y}$
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 04-February-2015
Value applied	Northwest Power Grid: 0.9578
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and National Development and Reform Commission</i>

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 04-February-2015
Value applied	Northwest Power Grid: 0.4512
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ e/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 <i>National Coordination Committee on Climate Change</i> .
Value applied	Northwest Power Grid: 0.83115
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and 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 <i>National Coordination Committee on Climate Change</i> .

Data / Parameter	$EF_{CO2,i,y}$
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 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 choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and 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>i</i> in year <i>y</i>
Source of data	China Energy Statistical Yearbook
Value applied	Depends on the grid connected by each instance
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and National Development and Reform Commission</i>
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EM_{m,y} / EG_y$
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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	China Electric Power Yearbook
Value applied	Depends on the grid connected by each instance
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and 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	China Electric Power Yearbook
Value applied	Depends on the grid connected by each instance
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and 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	China's DNA: Baseline Emission Factors for Regional Power Grids in China
Value applied	Depends on the grid connected by each instance
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of <i>National Bureau of Statistics of China and 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 bidirectional and monitor the input electricity and output electricity simultaneously. 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 each instance is at least 0.5 s. The net electricity supplied to the grid by the project is calculated through electricity supplied by the project to the grid ($EG_{output,y}$) minus electricity purchased from the Grid ($EG_{input,y}$).
Frequency of monitoring/recording	Continuously monitored and monthly recorded
Value monitored	1,134,293.628 the aggregated value for all the instances during this monitoring period). Refer to the ER spreadsheet for monthly values of each instance.
Monitoring equipment	Calculated
QA/QC procedures to be applied	The meters are periodically checked and maintained. And receipts are used for crosscheck.
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{facility,y} = EG_{output,y} - EG_{input,y}$
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	Actual data is obtained through on-site measurement with meter(s).
Description of measurement methods	The meters are bidirectional and monitor the input electricity and output electricity simultaneously.

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 each instance is at least 0.5 s.
Frequency of monitoring/recording	Continuously monitored and monthly recorded.
Value monitored	1,151,935.422 (the aggregated value for all the instances during this monitoring period). Refer to the ER spreadsheet for monthly values of each instance.
Monitoring equipment	Electric meters (please refer to Section 4.3 for the details of the meters and the calibrations)
QA/QC procedures to be applied	The meters are periodically checked and maintained. And receipts are used for crosscheck.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$EG_{input,y}$
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
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 each instance is at least 0.5 s.
Frequency of monitoring/recording	Continuously monitored and monthly recorded.
Value monitored	17,641.794 (the aggregated value for all the instances during this monitoring period). Refer to the ER spreadsheet for monthly values of each instance.
Monitoring equipment	Electric meters (please refer to Section 4.3 for the details of the meters and the calibrations)
QA/QC procedures to be applied	The meters are periodically checked and maintained. And receipts are used for crosscheck.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

4.3 Monitoring Plan

Monitoring Plan Objective and Organization



Figure 4.1 The monitoring system of the instances in the Grouped Project

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

The staff would record the electricity in real time and submit the data to the data processing and reporting staff monthly.

The data processing and reporting staff and QA&QC staff are appointed by the project owners, who supervise and verify metering and recording, collect data (the data on the meters, sales/purchasing invoices or the balance bills), calculate emission reductions and prepare monitoring reports.

The project manager takes the responsibility for the monitoring plan implementation.

An emission team is established and consists of project manager, data processing and reporting staff, QA&QC staff, and staff. The organizational structure of the Emission team is shown in Figure 4.1.

Monitored Data

Data to be monitored is the input and output electricity monthly in different instances; the monitoring points and methods may be different according to the real condition of the plant. All instances under the Grouped Project shall provide a monitoring point chart to demonstrate where the meters are installed and how to monitor the quantity of electricity delivered to the grid and electricity purchased from the grid, i.e., $EG_{input,y}$ and $EG_{output,y}$.

Monitoring Equipment

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

Each of the instances has been equipped with a main meter (M1) and a backup meter (M2), which measure the electricity supplied to the grid and the electricity supplied by the grid, respectively. They are installed at the output of the on-site booster station of the project. For the Pishan Project (Instance 04), besides the main meter (M1) and the backup meter (M2), a third meter (M3) has been installed at a 10 kV back line to measure the electricity use of the power plant supplied from the 10 kV backup line by the grid. The meters' locations have been illustrated in Figure 3.1 ~ Figure 3.7 of Section 3.1.

Accuracy of the Meters

The meters of the project have been installed in line with *Technical Administrative Code of Electric Energy Metering* (DL/T 448-2016). The measurement accuracy of the meters employed by the instances is at least 0.5 s.

Calibration of the Meters

The meters of the project were calibrated once per year. The details of the meters are listed in from Table 4.1 to Table 4.5.

Table 4.1 Technical information and calibrations of the meters for Instance 01 and Instance 02

Instance	Instance 01 (the Dazhaitan Project)			
	Instance 02 (the Heqingtian Project)			
Meter name	M1		M2	
Meter Type	WU.TE.432q		WU.TE.432q	
Accuracy class	0.2 S		0.2 S	
Serial No.	41600068		41600067	
Calibration frequency	Annually		Annually	
Calibration date and validity	Date	Validity	Date	Validity

	21-Apr-2018	21-Apr-2018 to 20-Apr-2019	21-Apr-2018	21-Apr-2018 to 20-Apr-2019
	20-Apr-2019	20-Apr-2019 to 19-Apr-2020	20-Apr-2019	20-Apr-2019 to 19-Apr-2020
	19-Apr-2020	19-Apr-2020 to 18-Apr-2021	19-Apr-2020	19-Apr-2020 to 18-Apr-2021
	18-Apr-2021	18-Apr-2021 to 17-Apr-2022	18-Apr-2021	18-Apr-2021 to 17-Apr-2022

Table 4.2 Technical information and calibrations of the meters for Instance 03

Instance	Instance 03 (the Wulan Project)			
Meter name	M1		M2	
Meter Type	DTSD341		DTSD341	
Accuracy class	0.2 S		0.2 S	
Serial No.	01200309		01200310	
Calibration frequency	Annually		Annually	
Calibration date and validity	Date	Validity	Date	Validity
	29-Nov-2018	29-Nov-2018 to 28-Nov-2019	29-Nov-2018	29-Nov-2018 to 28-Nov-2019
	28-Nov-2019	28-Nov-2019 to 27-Nov-2020	28-Nov-2019	28-Nov-2019 to 27-Nov-2020
	27-Nov-2020	27-Nov-2020 to 26-Nov-2021	27-Nov-2020	27-Nov-2020 to 26-Nov-2021
	26-Nov-2021	26-Nov-2021 to 25-Nov-2022	26-Nov-2021	26-Nov-2021 to 25-Nov-2022

Table 4.3 Technical information and calibrations of the meters for Instance 04

Instance	Instance 04 (the Pishan Project)		
Meter name	M1	M2	M3
Meter Type	DTSD341	DTSD341	DSZ311
Accuracy class	0.2 S	0.2 S	0.2 S

Serial No.	7000018		7000017		3383644	
Calibration frequency	Annually		Annually		Annually	
Calibration date and validity	Date	Validity	Date	Validity	Date	Validity
	04-Apr-2018	04-Apr-2018 to 03-Apr-2019	04-Apr-2018	04-Apr-2018 to 03-Apr-2019	04-Apr-2018	04-Apr-2018 to 03-Apr-2019
	03-Apr-2019	03-Apr-2019 to 02-Apr-2020	03-Apr-2019	03-Apr-2019 to 02-Apr-2020	03-Apr-2019	03-Apr-2019 to 02-Apr-2020
	02-Apr-2020	02-Apr-2020 to 01-Apr-2021	02-Apr-2020	02-Apr-2020 to 01-Apr-2021	02-Apr-2020	02-Apr-2020 to 01-Apr-2021
	01-Apr-2021	01-Apr-2021 to 30-Mar-2022	01-Apr-2021	01-Apr-2021 to 30-Mar-2022	01-Apr-2021	01-Apr-2021 to 30-Mar-2022

Table 4.4 Technical information and calibrations of the meters for Instance 05

Instance	Instance 05 (the Hami Project)			
Meter name	M1		M2	
Meter Type	DTSD341		DTSD341	
Accuracy class	0.2S		0.2S	
Serial No.	9787408		9787409	
Calibration frequency	Annually		Annually	
Calibration date and validity	Date	Validity	Date	Validity
	12-Jan-2018	12-Jan-2018 to 11-Jan-2019	12-Jan-2018	12-Jan-2018 to 11-Jan-2019
	11-Jan-2019	11-Jan-2019 to 10-Jan-2020	11-Jan-2019	11-Jan-2019 to 10-Jan-2020
	10-Jan-2020	10-Jan-2020 to 09-Jan-2021	10-Jan-2020	10-Jan-2020 to 09-Jan-2021
	09-Jan-2021	09-Jan-2021 to 08-Jan-2022	09-Jan-2021	09-Jan-2021 to 08-Jan-2022
	08-Jan-2022	08-Jan-2022 to 07-Jan-2023	08-Jan-2022	08-Jan-2022 to 07-Jan-2023

Table 4.5 Technical information and calibrations of the meters for Instance 06 and Instance 07

Instance	Instance 06 (the Zhaoyang Project) Instance 07 (the Sanyang Project)			
Meter name	M1		M2	
Meter Type	MK6E		MK6E	
Accuracy class	0.2S		0.2S	
Serial No.	211650965		211650966	
Calibration frequency	Annually		Annually	
Calibration date and validity	Date	Validity	Date	Validity
	18-Mar-2018	18-Mar-2018 to 17-Mar-2019	18-Mar-2018	18-Mar-2018 to 17-Mar-2019
	17-Mar-2019	17-Mar-2019 to 16-Mar-2020	17-Mar-2019	17-Mar-2019 to 16-Mar-2020
	16-Mar-2020	16-Mar-2020 to 15-Mar-2021	16-Mar-2020	16-Mar-2020 to 15-Mar-2021
	15-Mar-2021	15-Mar-2021 to 14-Mar-2022	15-Mar-2021	15-Mar-2021 to 14-Mar-2022

Data Management System

- Particular staff were 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 were 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 were 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 QA/QC staff were appointed by the project owners to take the overall responsibility of calibrating monitoring equipment, managing and processing the monitored data according to QA/QC procedure provided in the registered Project Description. The QA/QC staff are also in charge of performing internal auditing on a regular basis by inspecting the data monitored and

files archived by the data processing and reporting staff, to ensure that monitoring activities conform with the monitoring plan. Any unusual condition or non-conformity (such as loss of any file, incorrect file archiving, etc.) should be immediately reported by the QA/QC staff to the Project Manager, who will then conduct corresponding corrective actions to address the issue. If the non-conformity impacts the ER calculation, the ER for the associated period will be calculated conservatively.

During this monitoring period, all monitoring activities were conducted in conformance with the monitoring plan; no unusual condition or non-conformity was identified.

Training

All staff involved in the instance received relevant training, and it was ensured that only trained staff were 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 responsible for the plant and the operator will both sign a statement to declare the emergency situation has been ended and the normal operation has been resumed.

No emergency occurred during this monitoring period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions (BE_y) of an instance is determined by multiplying the net quantity of electricity delivered to the grid by a typical instance during the monitoring period ($EG_{facility,y}$) by the combined margin emission factor for grid connected by the instance ($EF_{grid,CM,y}$), shown in Equation (2). As stated in Section 4.1, $EF_{grid,CM,y}$ of all the instances during this monitoring period is 0.83115 tCO₂e/MWh.

$EG_{facility,y}$ is calculated from monitored data $EG_{output,y}$ and $EG_{input,y}$ based on Equation (1).

$$EG_{facility,y} = EG_{output,y} - EG_{input,y} \quad \text{Equation (1)}$$

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} \quad \text{Equation (2)}$$

Table 5.1 Monitored data and baseline emissions of Instance 01

Instance 01 (the Dazhaitan Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	63,618.949	1,610.928	62,008.021	51,537
01-Jan-2020 to 31-Dec-2020	73,683.803	1,755.400	71,928.403	59,783
01-Jan-2021 to 31-Dec-2021	71,102.217	1,611.300	69,490.917	57,749
01-Jan-2022 to 28-Feb-2022	11,443.886	306.168	11,137.718	9,257
Total (01-Jan-2019 to 28-Feb-2022)	219,848.855	5,283.796	214,565.059	178,326

Table 5.2 Monitored data and baseline emissions of Instance 02

Instance 02 (the Heqingtian Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	64,760.991	0.000	64,760.991	53,826
01-Jan-2020 to 31-Dec-2020	76,070.001	0.000	76,070.001	63,225
01-Jan-2021 to 31-Dec-2021	73,932.628	0.000	73,932.628	61,449

01-Jan-2022 to 28-Feb-2022	12,170.635	0.000	12,170.635	10,115
Total (01-Jan-2019 to 28-Feb-2022)	226,934.255	0.000	226,934.255	188,615

Table 5.3 Monitored data and baseline emissions of Instance 03

Instance 03 (the Wulan Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	26,549.913	663.736	25,886.177	21,515
01-Jan-2020 to 31-Dec-2020	25,870.560	698.164	25,172.396	20,922
01-Jan-2021 to 31-Dec-2021	27,938.780	629.853	27,308.927	22,697
01-Jan-2022 to 28-Feb-2022	4,772.540	130.576	4,641.964	3,858
Total (01-Jan-2019 to 28-Feb-2022)	85,131.793	2,122.329	83,009.464	68,992

Table 5.4 Monitored data and baseline emissions of Instance 04

Instance 04 (the Pishan Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	22,462.856	606.136	21,856.720	18,166
01-Jan-2020 to 31-Dec-2020	23,448.135	613.752	22,834.383	18,978
01-Jan-2021 to 31-Dec-2021	27,653.236	766.864	26,886.372	22,346
01-Jan-2022 to	4,115.483	126.536	3,988.947	3,315

28-Feb-2022				
Total (01-Jan-2019 to 28-Feb-2022)	77,679.710	2,113.288	75,566.422	62,805

Table 5.5 Monitored data and baseline emissions of Instance 05

Instance 05 (the Hami Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	32,590.589	487.200	32,103.389	26,682
01-Jan-2020 to 31-Dec-2020	35,415.862	487.200	34,928.662	29,030
01-Jan-2021 to 31-Dec-2021	33,000.632	435.400	32,565.232	27,066
01-Jan-2022 to 28-Feb-2022	5,340.942	77.000	5,263.942	4,375
Total (01-Jan-2019 to 28-Feb-2022)	106,348.025	1,486.800	104,861.225	87,153

Table 5.6 Monitored data and baseline emissions of Instance 06

Instance 06 (the Zhaoyang Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	65,587.444	1,040.766	64,546.678	53,647
01-Jan-2020 to 31-Dec-2020	74,166.784	1,149.334	73,017.450	60,688
01-Jan-2021 to 31-Dec-2021	71,315.906	955.756	70,360.150	58,479
01-Jan-2022 to	10,448.496	167.382	10,281.114	8,545

28-Feb-2022				
Total (01-Jan-2019 to 28-Feb-2022)	221,518.630	3,313.237	218,205.393	181,359

Table 5.7 Monitored data and baseline emissions of Instance 07

Instance 07 (the Sanyang Project)				
Period	$EG_{output,y}$ (MWh)	$EG_{input,y}$ (MWh)	$EG_{facility,y}$ (MWh)	BE_y (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	64,677.339	1,032.202	63,645.137	52,898
01-Jan-2020 to 31-Dec-2020	73,156.289	1,146.300	72,009.989	59,851
01-Jan-2021 to 31-Dec-2021	70,355.381	955.757	69,399.624	57,681
01-Jan-2022 to 28-Feb-2022	10,305.573	166.569	10,139.004	8,427
Total (01-Jan-2019 to 28-Feb-2022)	218,494.582	3,300.828	215,193.754	178,857

Table 5.8 Baseline emissions of the Grouped Project

	Baseline emissions BE_y (tCO _{2e})							
Period	Instance 01	Instance 02	Instance 03	Instance 04	Instance 05	Instance 06	Instance 07	The Grouped Project
01-Jan-2019 to 31-Dec-2019	51,537	53,826	21,515	18,166	26,682	53,647	52,898	278,271
01-Jan-2020 to 31-Dec-2020	59,783	63,225	20,922	18,978	29,030	60,688	59,851	312,477
01-Jan-2021 to 31-Dec-2021	57,749	61,449	22,697	22,346	27,066	58,479	57,681	307,467
01-Jan-2022 to 28-Feb-2022	9,257	10,115	3,858	3,315	4,375	8,545	8,427	47,892
Total (01-Jan-2019 to 28-Feb-2022)	178,326	188,615	68,992	62,805	87,153	181,359	178,857	946,107

5.2 Project Emissions

The project is a renewable energy project. According to applied methodology ACM0002 (Version 16.0), there is no emission for the project, i.e., $PE_y = 0$.

5.3 Leakage

According to applied methodology ACM0002 (Version 16.0), the leakage is not considered.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01-Jan-2019 to 31-Dec-2019	278,271	0	0	278,271
01-Jan-2020 to 31-Dec-2020	312,477	0	0	312,477
01-Jan-2021 to 31-Dec-2021	307,467	0	0	307,467
01-Jan-2022 to 28-Feb-2022	47,892	0	0	47,892
Total	946,107	0	0	946,107

Comparison between the actual emission reductions with ex ante estimates:

According to the registered Project Description, the ex ante annual emission reductions from 2019 to 2022 was 319,052 tCO₂e⁸, and the expected emission reductions during this monitoring period would have been 1,009,603 tCO₂e. The Grouped Project achieved total emission reductions of 946,107 tCO₂e during this monitoring period (01-Jan-2019 to 28-Feb-

⁸ 319,052 tCO₂e / 365 days × 1,155 days = 1,009,603 tCO₂e (this monitoring period, 01-Jan-2019 to 28-Feb-2022, covers 1,155 days)

2022), 6.3% lower⁹ than the ex ante estimated value, which is within a reasonable range due to the natural variation of the luminous intensity.

The comparison has also been made for each of the instances, as shown in Table 5.9. Instance 05 achieved 7.1% higher emission reductions than ex ante estimates due to better solar radiance during this monitoring period than estimated; considering that this instance achieved 21.2% lower emission reductions than ex ante estimates¹⁰, the overall emission reductions during the first and second monitoring periods were still lower than ex ante values. The other instances achieved slightly lower emission reductions due to lower solar radiance than estimated. All the differences could be considered within a reasonable range.

Table 5.9 Comparison between the actual emission reductions with ex ante estimates for each instance

Parameter	Unit	Instance 01	Instance 02	Instance 03	Instance 04	Instance 05	Instance 06	Instance 07
Estimated ex ante annual net electricity delivered	MWh	70,650.48	72,791.95	31,217.73	26,003.00	30,935.57	75,235.00	77,037.00
Estimated ex ante annual emission reductions	tCO ₂ e	58,721	60,501	25,946	21,612	25,712	62,531	64,029
Estimated ex ante emission reductions during this monitoring period ¹¹	tCO ₂ e	185,816	191,448	82,103	68,389	81,363	197,872	202,613
Actual emission reductions achieved during this monitoring period	tCO ₂ e	178,326	188,615	68,992	62,805	87,153	181,359	178,857

⁹ 946,107 tCO₂e / 1,009,603 tCO₂e - 1 = - 6.3%

¹⁰ <https://registry.verra.org/app/projectDetail/VCS/1461>

¹¹ Estimated ex ante emission reductions during this monitoring period = Estimated ex ante annual emission reductions / 365 days × 1,155 days

Difference ¹²		-4.0%	-1.5%	-16.0%	-8.2%	7.1%	-8.3%	-11.7%
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¹² Difference = Actual emission reductions achieved during this monitoring period / Estimated ex ante emission reductions during this monitoring period – 1

APPENDIX

Not applicable.