



Environmental and Social Monitoring Report

Annual Report
Project Number: 45923-014
April 2014 to June 2015

THA: Provincial Solar Power Project – Phase 2A Bamnet Narong, Chaiyaphum

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Prepared by Bangchak Solar Energy Co., Ltd. for the Asian Development Bank.

Asian Development Bank

BANGCHAK SOLAR ENERGY CO., LTD.

SAFEGUARDS REPORTING AND CORRECTIVE MEASURES

Phase 2A Bamnet Narong, Chaiyaphum

6/30/2015

Reporting Period: 2nd year 6 March 2013 (COD) to 30 June 2015

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Definition

BCP	Bangchak Petroleum Public Company Limited
BOD	Biochemical Oxygen Demand
BSE	Bangchak Solar Energy Co., Ltd.
COD	Chemical Oxygen Demand
COD	Commercial Operation Date
DO	Dissolved Oxygen
EHS	Environment Health and Safety
EPC	Engineering Procurement and Construction
IEE	Initial Environmental Examination
ISO	International Organization for standardization
OHSAS	Occupational Health and Safety Management
PV Module	Photovoltaic Module
pH	A measure of Acid and Base Property
Rai	Rai is the unit of land area used in Thailand. One rai is 1,600 square meters, thus one hectare is 6.25 Rai.

I. INTRODUCTION

A. Project Location

The Project is located on an area of about 257 rai¹ (41.12 ha) in Baan Phet Sub district, Bamnet-Narong District, Chaiyaphum Province, about 340 kilometers (km) north-east of Bangkok.

B. Scope and Layout

The Project completed the construction of two adjacent solar power plants, 8 MW capacity of each solar power plant, with associated control instrument and equipment, and control buildings. The electricity output is currently fed directly into the existing 22 kV transmission lines passing the project site to an existing substation of the Provincial Electricity Authority, about 7.5 km away.

The Project as completed did not differ significantly from what had been proposed during the due diligence of the Project. Table 1 summarizes salient features of the completed facilities.

Table 1: Salient Technical Features of the Project area

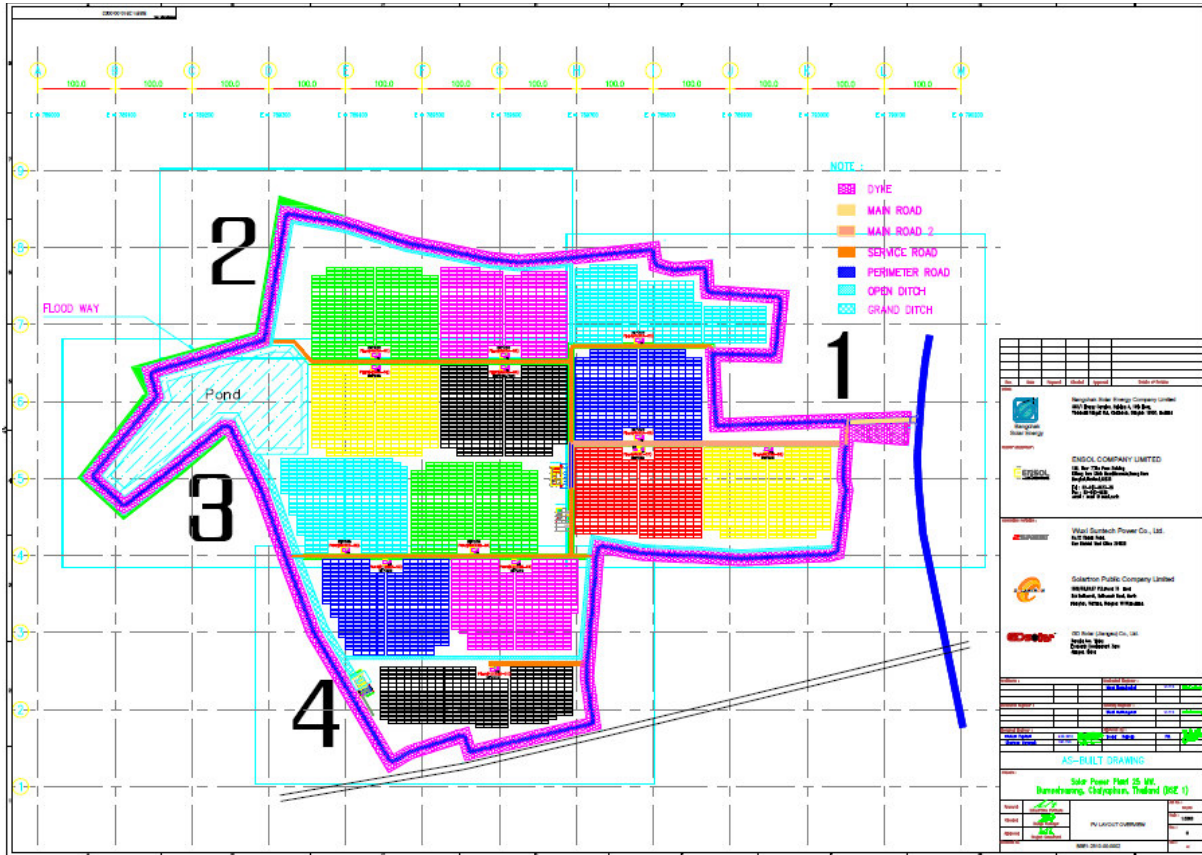
Solar panels	Features
Number of panels	Approx. 85,400 panels, poly-crystalline, photovoltaic (PV)
Dimensions of each panel	Rectangular, 2 m by 1 m
Inclination	15 degrees
Life Cycle	More than 25 years
Loading Controllers (Inverter House)	13 stations
DC-AC Inverters	900 kW, 26 units
Transformers	<ul style="list-style-type: none">● 2,000 kVA, 405V/22kV 12 sets● 1,000 kVA, 405V/22kV 2 sets● 315 kVA, 22kV /380V 1 set● 250 kVA, 22kV/380V 1set
Control building	1 building

The site infrastructure consists of flood protection dykes and drainage ditches surrounding the power plant site with drainage pumps and a storm water retention basin strategically located, and inspection roads.

¹ Rai is the unit of land area used in Thailand. One rai is 1,600 square meters, thus one hectare is 6.25 rai.

Figure 1, shows the layout of project facilities.

Figure 1, shows the layout of project facilities.



C. Project Implementation

The project construction began on 18 June 2012 of both adjacent power plants. The power plant was completed and started commercial operations on 6 March 2013. The project completion was thus delayed one month. The target COD was set in 6 February 2013, the solar power plant unit has been in operations for about 12 months.

Table 2-Project Status from 18 April 2012 to present

Project Period	16 MW Unit
18 April 2012 to 18 June 2012	Public hearing
18 June 2012 to 6 Mar 2013	Construction
6 Mar 2013 until Now	Commercial operation

D. Safeguards reporting and Corrective Measures

This Safeguards reporting and Corrective Measures is the second report of the Project. It has been prepared as required in Clause 18.20 "Safeguards Reporting and Corrective Measures" of the Common Term Agreement (CTA) between lender and BSE. The Safeguards reporting and Corrective Measures covers the period from 6 March 2013 to 30 June 2015 consisting of about 39 months of project implementation, consist of 12 months of construction and 27 months of operation

II. ENVIRONMENTAL AND SOCIAL MANAGEMENT

A. Safeguards monitoring report Preparer

Report prepared by: Mr. Amnat Olankitwanit
Operation Engineer
Bangchak Solar Energy Company Limited

E-mail: bse-ano@bangchak.co.th

Report approved by: Mr. Worasak Buranasiri
Operation Engineer
Bangchak Solar Energy Company Limited

Telephone: 66-3-5-276-000

E-mail: worasak@bangchak.co.th

Signature:

Report date: 30 June 2015

B. Environmental and Social Responsibility

Figure 2 shows an organization structure of Bangchak Solar Energy Company Limited (BSE).

The operation manager, Mr. Worasak who approved this report, is responsible for environmental and social performance as well as safety of the solar energy plant under this Project.

The operation manager is assisted by one operation engineer and two operators that stand by in solar power plant.

The Environmental Health and Safety (EHS) unit reporting to the managing director provides technical advice to all solar energy projects of BSE as well as conducts compliance monitoring.

C. Environmental and Social Management Plan Implementation

Table 3 presents the mitigation measures for the construction period taken from the Initial Environmental Examination (IEE) of the Project. As the Project is environmentally friendly and the construction involved only minor civil works, only few EHS issues were relevant. Consequently, mitigation measures for the Project are few and conventional.

During the construction period, the Engineering Procurement and Construction (EPC) contractor (Solartron Public Company Limited) was responsible for implementing the Environmental Management Plan (EMP) for the construction period as presented in the IEE. The EPC contractor appointed a safety manager, Mr.Nathapon Songsri, to be responsible for implementing the EMP under the supervision of BCP.

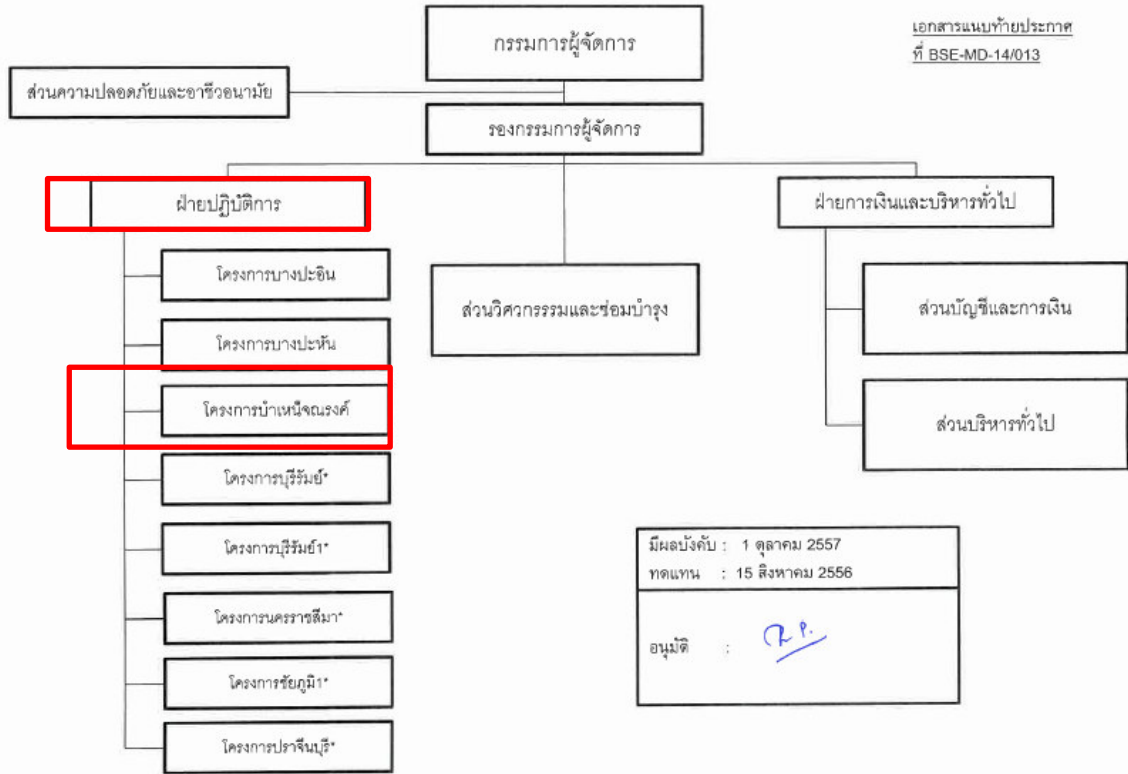
During the operation, the operation manager is responsible for the EHS function as indicated above. The current operation manager has been in charge since the commercial operation dates.

In carrying out its environmental and social management, BSE strictly follows the policies of its mother company, BCP. An EHS manual used in BCP was adopted for use by project staff in carrying the EHS functions with some modifications to suit the nature of work of the Project.

This site received Certificated of International Organization of Standardization ISO 14001:2004 (Environment Management) on 13 January 2015, and The Occupational Health and Safety Management System (TIS 18001:2011, OHSAS 18001:2007 on 30 January 2015. We plan to get the Certificated of International Organization of Standardization ISO 9001: (Management System) in end of 2015.

Figure 2-Organization Structure of BSE

โครงสร้างการบริหารระดับฝ่าย/ส่วนขึ้นไป บริษัท บางจาก โซลาร์เอ็นเนอร์จี้ จำกัด



*หมายเหตุ : ดำเนินการโดยบริษัทย่อยทั้ง 5 แห่ง

กิตติคุณ

Table 3: Mitigation Measures during Project Construction

Impacts	Proposed mitigating measures	Approximate location	Time frame	In situational responsibility	
				Implementation	Supervision
Air Quality : - No gas emission	-	-	-	-	-
Noise : - Truck and Crane no issue	Not required due to working in remote area Machine noise level not more than 85 dB(A) at avg. 8 hr.	In project site Front main road	During land filling 4 months.	EPC Contractor & BCP	BCP
Dust : - No dust emission	-	-	-	-	-
Water Quality : - No emission	-	-	-	-	-
Soil Contamination : - No waste	-	-	-	-	-
Solid wastes : - No solid wastes	-	-	-	-	-
Risk and Hazards : - No risk or hazard in construction if implemented per safety plan	-	-	-	-	-
Occupational Health and Safety : - Working with truck and pilling cranes - Building Construction maximum 2 stored - High voltage work	Provide Safety Manual Provide safety Plan Supervision and Inspection Protection gears	In project site	land filling and Civil work 4 months Building construction 4 months Commissioning 1 month	EPC contractor	BCP
Transportation of equipment and construction Materials : - Falling earths from land filling truck	Truck wheels cleaning Road cleaning	Transport routes	During land filling 4 months	EPC contractor	BCP

III. COMPLIANCE WITH THE ENVIRONMENTAL AND SOCIAL REQUIREMENTS AS SPECIFIED IN THE FACILITY AGREEMENT

A. Compliance with Country Requirements

The Project fully complied with all relevant national EHS requirements during the construction. As the project construction involved minor civil works, EHS issues during construction were limited.

Before the project implementation, the Project conducted public engagement on 11 and 18 April 2012. Public participate held on 18 April 2012 as part of the IEE process to inform the public of the scope and nature of construction. The excerpt on the public hearing taken from the IEE is presented below for ready reference.

BSE in collaboration with the Baan Phet sub-district Municipality organized a public consultation meeting on 18 April 2012. The meeting was participating by 229 persons, excluding 9 BCP staff. The participants consisted of: (i) 19 community leaders from villages located within a 2 km radius of the project site; (ii) 184 villagers; (iii) 13 representatives of central and local government offices; and (iv) 13 representatives from independent entity. All the participants have no objection to the Project. The villagers and their leaders only enquired about project benefits to the local communities

All permits required for the construction were obtained such as permits for land filling, construction, connection with the public road, groundwater extraction, factory operation, electricity generation, and generation of regulated energy. There were no public complaints and the construction passed all inspections by authorities concerned.

During operations, EHS issues are also limited. The Project has been fully complied with relevant EHS requirements. Table 4 summarizes all national requirements applicable to the Project.

Table 4-Status of Compliance with National EHS Requirements

Applicable National Requirements	Regulating Agency	Compliance Status
Groundwater consumption monitoring and reporting	Dept. of Ground water Resources	Complied with
Prepare regulations and manuals related to work safety	Office of Workers' Welfare and protection	Complied with the regulations and manuals used by BCP are adopted for the project
Reports on performance of safety professionals	Office of Workers' Welfare and protection	Complied with this task was done by BCP for all affiliated companies.
Install fire protection system and periodically conduct fire drills	Office of Workers' Welfare and protection	Complied with under the supervision of BCP
Reporting on environment conditions of work places	Office of Workers' Welfare and protection	Complied with
Conduct train on ESH	Office of Workers' Welfare and protection	Complied with
Conduct safety assessment and impact assessment of work environment, and prepare safety plan	Office of Workers' Welfare and protection	Being carried out Not critical issues for solar power plants using solar panels.

B. New or Emerging Environmental Issues

There are no new or emerging environmental issues or pending regulations that could affect environmental performance of project operations. Power plants using solar panels are still considered clean and safe energy in Thailand. Environmental impact assessment is not required for this type of energy projects.

C. Compliance with ADB's Safeguards Requirements

ADB's Safeguard Requirements : Environment is the only safeguard requirements relevant to the Project. As the Project generates electricity from solar energy using solar cells, the Project is environmentally friendly. Its construction involved only minor civil works and it has no wastewater and gaseous emissions, the Project's EHS issues are very few. Consequently, mitigation measures and monitoring activities for the Project are minimal.

The Project fully complies with all ADB's safeguard requirements applicable to the Project. Table 5 is the Environmental Monitoring Plan for the Project. During the construction, the EPC contractor implemented all necessary measures to mitigate environmental impacts, albeit their small magnitudes. No significant impacts were found during the construction period. This situation would be expected because the construction was minor civil works.

Table 5 Environmental Monitoring Plan for BCP Solar Power Project (Construction Phase)

Issues	Project stage	Parameters	Standard	Location	Frequency	Institutional responsibility	
						Implementation	Supervision
Noise	Construction	Noise levels in dB(A)	National/World Bank/IFC standards	- Project site - Front main road	3 times total	EPC Contractor & BCP	BCP
Other issue related to physical works	Construction	e.g. As specified in contractors' plan	e.g. As specified in contractors' plan	Project site	Monthly	EPC Contractor	BCP
Occupational Health and safety	Construction	e.g. As specified in Occupation Health and Safety (OHS) plan	Applicable standard	Project site	Weekly	EPC Contractor	BCP
	Operation	e.g. As specified in OHS plan	Applicable standard	Project site	Weekly	EPC Contractor	BCP

During operation phase, we monitor the environment parameter follow as the Environment Monitoring Plan for the operation phase (table 6). We implemented all necessary measures to mitigate environmental impacts, albeit their small magnitudes. No significant impacts were found during the construction period

Table 6 Environmental Monitoring Plan for BSE Solar Power Project (Operation Phase)

Monitoring Parameter	venue	Frequency	Responsibility
Monitoring Parameters of wash PV panel - pH - Temperature - Total Suspended Solid - BOD - COD	Concrete tank for water storage (Pond in project area)	Monthly	BSE
Surface water quality - pH - Temperature - Total Suspended Solid - BOD - COD - DO	Canal (Nearby South of project area)	Monthly	BSE
Transportation Record the car in project area for use in planning and traffic safety.	Project area	Daily	BSE
Medical check up	New staff	Before working on the project	BSE coordinate with local care unit in the community
Annual medical checkup	All staffs	Annually	BSE coordinate with local care unit in the community
Record the accidents clearly such as cause, effect, loss and corrective action.	Project are	Every time an accident	BSE

IV. SUMMARY OF SAFETY PERFORMANCE AND ANY CORRECTIVE ACTIONS

A. Worker's Health and Occupational Safety

During the construction, the Project strictly supervised the EPC contractor in implementing all measures to ensure health and occupational safety of workers. All construction workers had received training on the process for safety and occupation health management in the construction. The workers were provided with protective equipment such as safety helmets and boots. Consequently, throughout the construction period, including the rehabilitation period, there were no major construction accidents which caused the work stoppage or damages to properties.

By its nature, operations in a solar energy plant using solar panels are clean and safe. Nevertheless, the Project strictly enforces all relevant ESH rules in operations. To date, the Project has no major accidents related to the power plant operations.

B. Accidents, Fires and Other Emergencies

There have been no accidents, fires and other emergencies related to the project construction and operations. There have been no accidents, fires and other emergencies related to the project construction and operations. The company installed fire protection system as smoke detector, push button and alarm unit at the control building (RMU, SWG and Server room), Service building at the Pump room and generator building. For the fire fighter, The Company install the fire extinguisher type CO₂ at all of inverter building, control room, SWG, RMU, Guard house and Generator room. The company setup fire drill plant for emergency case which will be exercise yearly. Basic fire fight training was trained on 25 June 2014.

V. SUSTAINABLE DEVELOPMENT INITIATIVES AND COMMUNITY RELATIONS

Since its operation, the Project has participated in events organized by the nearby communities and has launched some community development activities, such as

Year 2013,

- Plant visit by Chaiyaphum provincial administrative organization (August - September 2013)
- Scholarship to Baan Phet School (October 2013)
- Plant visit by government officers, Community leaders in opening ceremony date (November 2013)
- Baan Phet school field trip at Bangchak solar energy, Bang Pa-in (December 2013)

Year 2014,

- Children day gift (January 2014)
- Exhibit the solar power plant in Chaiyaphum red cross activity (January 2014)
- Donation of the drinking water in CSR activity (February 2014)

Year 2015,

- Children day gift (January 2015)
- To be sponsor football team
- CSR Activities