



Annual Environmental and Social Monitoring Report

Project Number: LN2875/7356
6 March 2013 to 5 March 2014

THA: Provincial Solar Power Project - Phase 2A (Chaiyaphum, Bamnet Narong)

Prepared by
Bangchak Solar Energy Co., Ltd.

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Asian Development Bank

SAFEGUARDS REPORTING AND CORRECTIVE MEASURES

BANGCHAK SOLAR ENERGY

Phase 2A

Chaiyaphum, Bamnet Narong

Reporting Period: 6 March 2013 (COD) to 5 March 2014

Report Completion Date: 5 March 2014

I. INTRODUCTION

A. Project Location

The Project is located on an area of about 257 rais¹ (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.

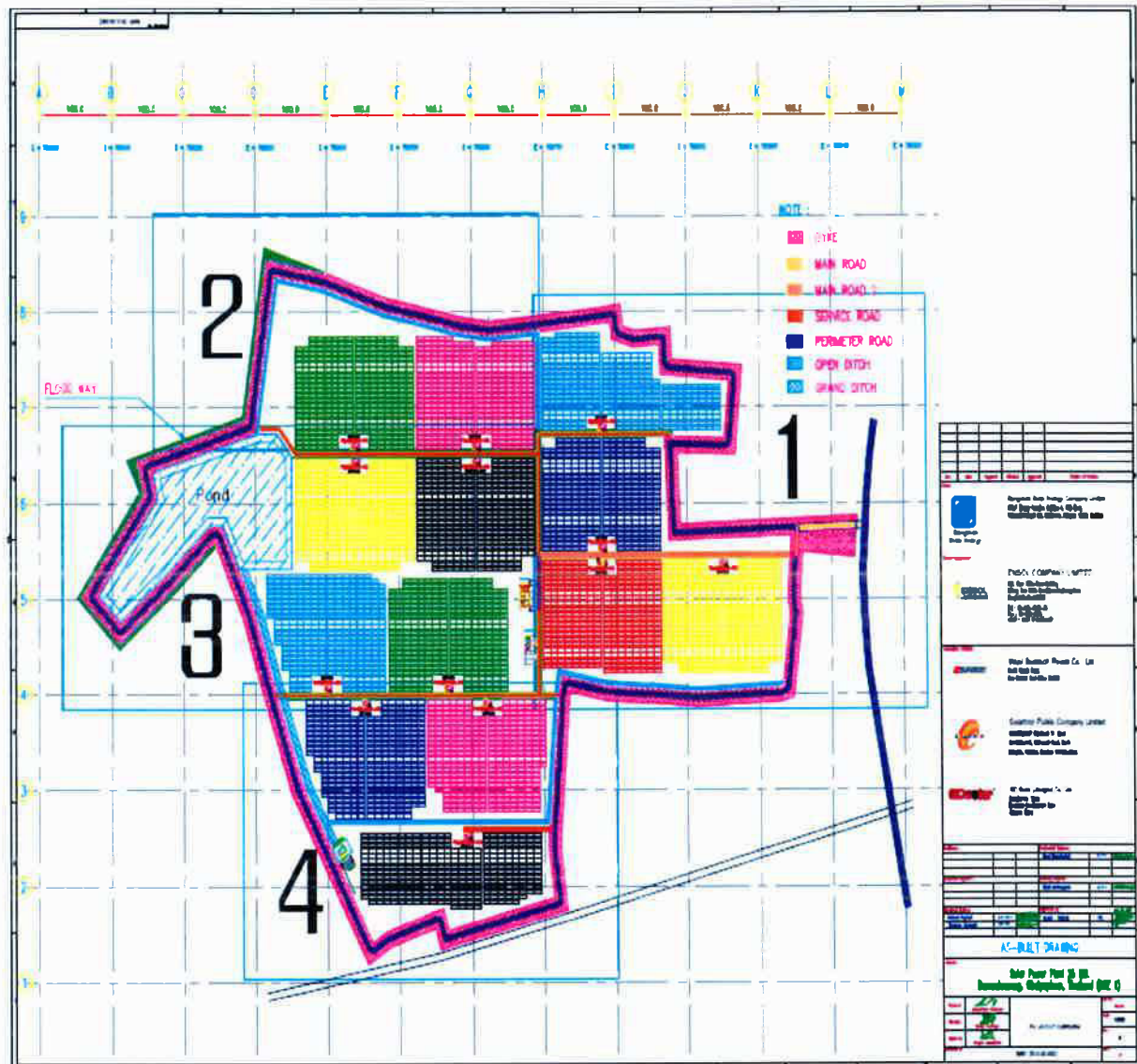
Table 1: Salient Technical Features of the Project area

| 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 | 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 dikes and drainage ditches surrounding the power plant site with drainage pumps and a storm water retention basin strategically located, and inspection roads. Figure 1 shows the layout of project facilities.

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

Figure 1-Layout of Completed 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 | 8 MW Unit |
|-------------------------------|----------------------|
| 18 April 2012 to 18 June 2012 | Public hearing |
| 18 June 2012 to 6 Mar 2013 | Construction |
| 6 Mar 2013 to 5 Mar 2014 | Commercial operation |

D. Safeguards reporting and Corrective Measures

This Safeguards reporting and Corrective Measures is the first 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 5 March 2014 consisting of about 12 months of project implementation.

II. ENVIRONMENTAL AND SOCIAL MANAGEMENT

A. Preparer of Safeguards reporting and Corrective Measures

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Report date: 5 March 2014

B. Environmental and Social Responsibility

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.

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.

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 Safeguards Requirements

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 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

| 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 |

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.