



Report and Recommendation of the President to the Board of Directors

Project Number: 53174-001
December 2019

Proposed Loan and Administration of Loan Lomligor Company Limited Southern Thailand Wind Power and Battery Energy Storage Project (Thailand)

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Asian Development Bank

CURRENCY EQUIVALENTS

(as of 13 November 2019)

Currency unit	–	baht (B)
B1.00	=	\$0.0033
\$1.00	=	B30.50

ABBREVIATIONS

ADB	–	Asian Development Bank
BESS	–	battery energy storage system
CTF	–	Clean Technology Fund
ESCA	–	environmental and social compliance audit
ESMP	–	environmental and social management plan
IEE	–	initial environmental examination
PEA	–	Provincial Electricity Authority
PPA	–	power purchase agreement
VSPP	–	very small power producer

WEIGHTS AND MEASURES

GWh	–	gigawatt-hour
kW	–	kilowatt
kWh	–	kilowatt-hour
MW	–	megawatt
MWh	–	megawatt-hour

NOTE

In this report, "\$" refers to United States dollars.

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PROJECT AT A GLANCE

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I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed secured loan of up to B235,550,648 (or its equivalent in United States dollars) to Lomligor Company Limited for the Southern Thailand Wind Power and Battery Energy Storage Project in Thailand. The report also describes the proposed administration of a secured loan of up to \$4,750,000 to be provided by the Clean Technology Fund (CTF)¹ for the Southern Thailand Wind Power and Battery Energy Storage Project. If the Board approves the proposed loan, I, acting under the authority delegated to me by the Board, approve the administration of the CTF loan.

2. The proposed loans will support Lomligor in providing long term financing for a 10-megawatt (MW) wind power project with an integrated 1.88-megawatt-hour (MWh) pilot battery energy storage system (BESS). The project will be the first private sector project in Thailand to integrate utility-scale wind power generation with battery energy storage, and will have an important demonstration effect. As the deployment of intermittent generation from wind and solar increases, battery energy storage becomes vital in providing higher levels of renewable energy to the grid and helping ensure the stability and reliability of the overall power system.

II. THE PROJECT

A. Project Identification and Description

3. **Project identification.** Thailand's natural gas resources have long been a reliable source of low-cost energy, but growing demand, dwindling domestic reserves, and the commitment to reduce greenhouse gas emissions mean the country must find new fuels and technologies to help meet its future power needs. Power consumption has risen by an annual average of 3.5% from 2009 to 2018, and demand is expected to double from 2015 to 2036. To meet this demand, Thailand adopted the Power Development Plan, 2018–2037, which targets to install 29,358 MW of renewable energy capacity by 2037, representing about 33% of total installed electricity generation capacity.² As of December 2018, the country had installed 8,127 MW of renewable energy capacity, or about 27.7% of the overall target. As regards wind power generation, only 1,018 MW or 34.1% of the total target of 2,989 MW had been met. Major private sector investments in renewable energy, especially wind, are required to meet the government's clean energy targets. As Thailand increases the share of intermittent renewable energy sources (solar and wind), battery energy storage will become an important technology to underpin the grid, providing such services as frequency support, voltage support, ramping support, peak shaving, load shifting, and transmission deferral.³

4. By the end of 2018, global storage deployment was about 8 gigawatt-hours (GWh) in terms of energy capacity, more than double the levels in 2017.⁴ In Southeast Asia, however, the lack of pilot projects and a lag in regulatory regimes prevent widespread commercial deployment of the battery storage technology seen in other parts of the world.

5. In July 2018, the Asian Development Bank (ADB) received approval from the CTF Trust Fund Committee for a \$36.1 million private sector subprogram of integrated renewable energy

¹ Financing Partner: [Climate Investment Funds](#).

² Government of Thailand, Ministry of Energy. 2019. *Thailand Power Development Plan, 2018–2037*. Bangkok.

³ P. Jain. 2017. *Energy Storage in Grids with High Penetration of Variable Generation*. Manila: Asian Development Bank (ADB).

⁴ L. Munuera. 2019. [Tracking Clean Energy Progress: Energy Storage](#). *International Energy Agency*. 2 October.

and energy storage projects to be used and administered by ADB.⁵ CTF provides concessional financing to support the rapid deployment of low-carbon technologies with significant potential to reduce and avoid greenhouse gas emissions. Administered through multilateral development banks, including ADB, CTF is one of the largest funds helping developing countries fill financing gaps in climate change mitigation projects.

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6. **Project design.** The project consists of a 10 MW wind power project with an integrated 1.88 MWh pilot BESS. The wind farm consists of four wind turbines from Xinjiang Goldwind Science and Technology with a rated capacity of 2.5 MW each. The project company entered into a power purchase agreement (PPA) with the Provincial Electricity Authority (PEA), the Thai state-owned utility handling all distribution and retail sales outside the greater Bangkok area, for up to 8.965 MW under the Ministry of Energy's very small power producer (VSPP) program. The PPA is automatically renewed every 5 years, and in addition to the wholesale tariff, the project receives a tariff incentive (the so-called "adder") of B3.5 per kilowatt-hour (kWh), applicable for 10 years from the commercial operations date. The wind turbines reached commercial operations in April 2019.

7. The 1.88 MWh BESS is a small pilot scheme comprising a lithium-ion battery with installed capacity of 731 kWh and an UltraBattery with installed capacity of 1,152 kWh.⁶ The lithium-ion battery has peak charge and discharge capacity of 731 kilowatts (kW). The UltraBattery has a peak charge capacity of 461 kW and a peak discharge capacity of 691 kW. Combining these technologies allows the project to benefit from both the high charge rate, high depth of discharge, and high durability of lithium-ion and the low energy capacity cost of the UltraBattery.

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8. The project is in southern Thailand, one of the country's least developed regions, which suffers from lack of investment, job opportunities, and access to basic services. The lack of economic activity in the region has led to underinvestment in the local power system, which continues to experience energy shortages. The project will provide additional generation capacity to the region, help make the power network more resilient, and thus support economic growth.

9. **Borrower and sponsor.** Lomligor, the borrower, was set up to own, develop, construct, and operate the project. The project is wholly owned by BCPG, a leading renewable energy company in Thailand with 1,132 MW of capacity in operation and 256 MW under development as of August 2019. BCPG focuses on investments in renewable energy, including solar, geothermal, wind, biogas, and biomass. The project is part of the long-term growth strategy of BCPG, which aims to expand investments in renewable energy generation and become one of the leading alternative energy companies in Southeast Asia.

10. BCPG is a core subsidiary of Bangchak Corporation Public Company Limited and was set up in 2015 when Bangchak consolidated its renewable energy business into one subsidiary. BCPG is listed on the Stock Exchange of Thailand with a market capitalization of B36.18 billion.⁷ Bangchak is BCPG's dominant shareholder with a 70% stake, and the Government of Thailand

⁵ The CTF Trust Fund Committee approved the proposal on 20 July 2018 (Climate Investment Funds. [DPSP III: Integrated Renewable Energy and Energy Storage](#)).

⁶ [UltraBattery](#).

⁷ As of 7 October 2019.

indirectly owns 28% of BCPG through various entities. BCPG promotes gender equality in its business: 17% of its board members (2 of 12 directors), 43% of its executive managers (3 of 7), and 46% of its senior managers (17 of 37) are women. Bangchak is rated A with a stable outlook by TRIS Rating. ADB has an existing relationship with BCPG through the Bangchak Solar Power Project approved in October 2010⁸ and the Provincial Solar Power Project approved in June 2012.⁹

11. ADB conducted integrity due diligence.¹⁰ Lomligor's founder, shareholders, managers, and major contracting entities do not appear to constitute a significant or potentially significant integrity risk—no unresolved or substantiated adverse media reports or other information related to them were found. Tax integrity due diligence was not required.¹¹

B. Development Impacts, Outcome, and Outputs

12. **Impacts.** The project is aligned with the following impacts: (i) additional renewable energy capacity developed and (ii) greenhouse gas emissions reduced from projected business-as-usual level by 2030.¹²

13. **Outcome.** The project's outcome will be the increased supply of renewable energy to Thailand's domestic grid and the pilot demonstration of an integrated BESS. **CONFIDENTIAL INFORMATION DELETED.**

14. **Output.** The project has three outputs: (i) a 10 MW wind power plant with integrated pilot BESS developed in Thailand; (ii) job opportunities for the local community, including for women, generated; and (iii) growth in the local and national economy supported.

C. Alignment with ADB Strategy and Operations

15. **Consistency with ADB strategy and country strategy.** The project is consistent with ADB's Strategy 2030 and its operational priority 3—tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability.¹³ Further, the project supports greater mobilization of private sector participation in infrastructure. ADB's support for the project is in line with its country partnership strategy, 2013–2016 and country operations business plan, 2019–2021 for Thailand, both of which support private sector development and energy infrastructure, and respond to the needs and priorities of an upper-middle-income country.¹⁴

16. **Consistency with sector strategy and ADB operations.** The project is consistent with ADB's Energy Policy, which emphasizes investments in energy efficiency, renewable energy projects, and wider access to energy.¹⁵ The project will contribute to ADB's target of providing \$80 billion in cumulative financing for climate mitigation and adaptation by 2030.

⁸ ADB. [Thailand: Bangchak Solar Power Project](#).

⁹ ADB. [Thailand: Provincial Solar Power Project](#).

¹⁰ ADB. 2003. *Enhancing the Asian Development Bank's Role in Combating Money Laundering and the Financing of Terrorism*. Manila.

¹¹ ADB. 2016. *Anticorruption Policy: Enhancing the Role of the Asian Development Bank in Relation to Tax Integrity*. Manila.

¹² Government of Thailand. 2015. *Intended Nationally Determined Contribution of Thailand*. Bangkok.

¹³ ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

¹⁴ ADB. 2013. *Country Partnership Strategy: Thailand, 2013–2016*. Manila; and ADB. 2018. *Country Operations Business Plan: Thailand, 2019–2021*. Manila.

¹⁵ ADB. 2009. *Energy Policy*. Manila.

17. **Lessons from previous operations.** ADB has extensive experience in renewable energy projects throughout Asia and, in better understanding the wind resource risk and structuring this project, incorporated lessons from previous wind power projects in Thailand that used the same technology under a similar wind regime.¹⁶ The project also builds on a strong and long-standing relationship with BCPG to pilot-test innovative BESS.

D. Project Cost and Financing Plan

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19. **CONFIDENTIAL INFORMATION DELETED**

E. Implementation Arrangements

20. Table 3 summarizes the implementation arrangements.¹⁷

Table 3: Summary of Implementation Arrangements

Aspects	Arrangements
Regulatory framework	The project is regulated under Thailand's VSPP program, which allows private developers to build, own, and operate power projects of up to 10 MW of capacity and sell generated electricity to the Metropolitan Electricity Authority or PEA. The project company is seeking approval from PEA to synchronize the BESS with the grid.
Management	BCPG will manage the project and has extensive experience in developing and operating other power ventures in Thailand. It has 30 renewable energy projects in operation with a total installed capacity of 1,132 MW.
Implementation period	CONFIDENTIAL INFORMATION DELETED.
Construction arrangements	
Contractor	CONFIDENTIAL INFORMATION DELETED.
Operations arrangements	
Revenue structure	PEA will buy all electricity produced by the project under a standardized VSPP PPA with up to 8.965 MW in contracted capacity. The 5-year PPA has automatic extensions. Payment for power sold to PEA will consist of the applicable monthly wholesale tariff set by the Electricity Generating Authority of Thailand. The project will also receive a tariff incentive (the so-called "adder") of B3.5 per kilowatt-hour for the first 10 years following COD. CONFIDENTIAL INFORMATION DELETED.
O&M	CONFIDENTIAL INFORMATION DELETED.
Relevant Parties	CONFIDENTIAL INFORMATION DELETED.
Performance monitoring	Lomligor will report key performance indicators, including output and outcome indicators.

ADB = Asian Development Bank; BCPG = BCPG Public Company Limited; BESS = battery energy storage system; COD = commercial operations date; EPC = engineering, procurement, and construction; MW = megawatt; O&M = operation and maintenance; PEA = Provincial Electricity Authority; PEC = PEC Technology Thailand; PPA = power purchase agreement; VSPP = very small power producer.

¹⁶ ADB. [Thailand: Theppana Wind Power Project](#); and ADB. [Thailand: Subyai Wind Power Project](#).

¹⁷ Details of Implementation Arrangements (accessible from the list of linked documents in Appendix 2).

Source: Asian Development Bank.

F. Projected Financial and Economic Performance

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III. THE PROPOSED ADB ASSISTANCE

A. The Assistance

22. ADB's proposed assistance has two components: (i) a senior secured local currency loan of up to B235,550,648; and (ii) the administration of a concessional senior secured loan of up to \$4,750,000 to be provided by CTF. **CONFIDENTIAL INFORMATION DELETED.**

23. The participation of a concessional loan from CTF is necessary to improve the project's bankability and financial viability. Concessional financing increases risk-adjusted returns for the sponsor, considering the additional BESS-associated costs and risks. Minimum concessionality was considered with regard to the pricing, size, and structure of the CTF loan, which will rank *pari passu* with ADB's loan but at a lower interest rate. The use of concessional finance is consistent with the agreed principles of development finance institutions on the use of blended concessional finance for private sector projects.¹⁸

B. Value Added by ADB Assistance

24. ADB adds value by mobilizing a financing package that makes the project bankable on a nonrecourse basis. ADB's experience in complex technical due diligence was important given that this is the first wind power project with an integrated BESS in Thailand. ADB will offer a longer tenor than the participating commercial bank to help improve the debt service coverage ratios and thereby improve the project's financial viability.

25. Successful project financing will help set a precedent in Thailand for wind power projects with an integrated BESS. The demonstration value of the pilot will be instrumental in lowering the perception of risk associated with a BESS, both in the Thai power industry and among the regulators. ADB's involvement and due diligence will ensure that the project is operated to international best practice standards and will perform to expectations over the project life. ADB's participation will also ensure compliance with its environmental and social safeguard standards.

C. Risks

26. **CONFIDENTIAL INFORMATION DELETED**

¹⁸ African Development Bank, ADB, Asian Infrastructure Investment Bank, European Bank for Reconstruction and Development, European Development Finance Institutions, European Investment Bank, Inter-American Development Bank Group, International Finance Corporation, and Islamic Corporation for the Development of the Private Sector. 2018. [DFI Working Group on Blended Concessional Finance for Private Sector Projects: Joint Report, October 2018 Update](#) (DFI refers to development finance institution).

IV. POLICY COMPLIANCE

A. Safeguards and Social Dimensions

27. ADB categorized the investment in compliance with ADB's Safeguard Policy Statement (2009) as follows: environment (category B), involuntary resettlement (category C), and indigenous peoples (category C).¹⁹

28. ADB undertook due diligence and reviewed the potential environmental and social impacts of the project, as well as measures set out in the safeguard reports and plans to avoid, minimize, mitigate, and compensate for the adverse impacts. It also assessed Lomligor's (i) compliance with local regulations; and environmental, health, safety, and social policies and procedures; and (ii) past and current performance against the objectives, principles, and requirements of the Safeguard Policy Statement. It found the environmental and social measures and the institutional capacity and commitment of the borrower to manage the project's social and environmental impacts to be adequate.

29. An independent and qualified consultant conducted an environmental and social compliance audit (ESCA) of the operating wind farm project and its associated facilities. The audit confirmed that the site is not in any eco-sensitive zone or area. It did not identify any sensitive receptors with significant environmental value in the project impact area.

30. An initial environmental evaluation (IEE) of the project, conducted in 2015 before it was built,²⁰ assessed the potential environmental impacts from its construction and operation and proposed corresponding mitigation measures. The ESCA (i) reviewed the IEE, (ii) assessed in detail the ongoing and past activities at the project site, and (iii) identified gaps in environmental and social performance. It produced a corrective action plan to close these gaps and ensure compliance with Safeguard Policy Statement requirements, such as upgrading the environmental management plan in the IEE to an operational environmental and social management plan (ESMP). The ESMP will include a policy, a risk assessment process, environmental and social controls, monitoring and reporting procedures, stakeholder engagement, social development, and a grievance redress mechanism that align with the Safeguard Policy Statement. Additionally, the borrower will align its labor and gender policies with the applicable regulatory requirements, ADB's Social Protection Strategy (2001), and internationally recognized core labor standards.²¹ These actions will be detailed in the project corrective action plan.

31. The project will not result in physical or economic displacement. The land for the wind turbines and associated facilities was privately owned and purchased from 2016 to 2018 through a willing buyer, willing seller arrangement. The ESCA confirmed that no legacy or current issues, nor dependencies associated with the project land exist. PEA's 33-kilovolt transmission line is 2.6 kilometers long, lies within PEA's right-of-way and along the public road, and connects the project to the PEA grid. Hence, no involuntary resettlement issues arising from the project were found. The project and its associated facilities are not in an area owned or used by indigenous people, so impacts on indigenous people are not envisaged.

¹⁹ ADB. [Safeguard Categories](#).

²⁰ The IEE was prepared at the initiative of the project company (an impact assessment of the project is not required by law) to show compliance with local environmental regulations.

²¹ ADB. 2003. *Social Protection*. Manila (adopted in 2001).

32. **Some gender elements.** Lomligor commits to implement measures to promote gender equality and women's empowerment in its business activities following ADB's Policy on Gender and Development (1998), including (i) women's employment targets for both construction and operation, and (ii) development of an anti-sexual harassment policy and implementation plan. Lomligor will submit periodic reports on the implementation of gender measures to ADB.

33. Lomligor will establish and maintain a project-specific ESMP satisfactory to ADB before any disbursement. The ESMP will set out requirements for compliance with national labor laws and, pursuant to ADB's Social Protection Strategy, internationally recognized core labor standards. The ESMP will also contain requirements for information disclosure, consultation with affected people, and a grievance redress mechanism in line with ADB requirements. The borrower will report regularly to ADB on (i) its and its contractors' compliance with such laws, and (ii) the measures taken. Project-related reporting and disclosure will follow ADB requirements.²²

B. Anticorruption Policy

34. Lomligor and the project sponsor were advised of ADB's policy of implementing best international practice relating to combating corruption, money laundering, and the financing of terrorism. ADB will ensure that the investment documentation includes appropriate provisions prohibiting corruption, money laundering, and the financing of terrorism; and remedies for ADB in the event of noncompliance.

C. Investment Limitations

35. The proposed loan is within the medium-term, country, industry, group, and single exposure limits for nonsovereign operations.

D. Assurances

36. Consistent with the Agreement Establishing the Asian Development Bank (the Charter),²³ ADB will proceed with the proposed assistance upon establishing that the Government of Thailand has no objection to the proposed assistance to Lomligor. ADB will enter into suitable finance documentation, in form and substance satisfactory to ADB, following approval of the proposed assistance by the Board of Directors.

V. RECOMMENDATION

37. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of up to B235,550,648 (or its equivalent in United States dollars) from ADB's ordinary capital resources to Lomligor Company Limited for the Southern Thailand Wind Power and Battery Energy Storage Project in Thailand, with such terms and conditions as are substantially in accordance with those set forth in this report, and as may be reported to the Board.

Takehiko Nakao
President

[●] December 2019

²² Summary Poverty Reduction and Social Strategy (accessible from the list of linked documents in Appendix 2).

²³ ADB. 1966. *Agreement Establishing the Asian Development Bank*. Manila.

DESIGN AND MONITORING FRAMEWORK

Impacts the Project is Aligned with Additional renewable energy capacity developed (Thailand Power Development Plan, 2018–2037) ^a Greenhouse gas emissions reduced from projected business-as-usual level by 2030 (Intended Nationally Determined Contribution of Thailand) ^b			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Supply of renewable energy to Thailand's domestic grid increased and pilot use of integrated battery energy storage system demonstrated	By 2020 CONFIDENTIAL INFORMATION DELETED c. At least 7 jobs provided during operation, of which 43% went to women (2018 baseline: 0 jobs, 0% women) CONFIDENTIAL INFORMATION DELETED	a–f. Company's annual development effectiveness monitoring reports	Changes in regulatory environment or power purchase agreement Climate and weather risk Technology risk relating to the battery energy storage system CONFIDENTIAL INFORMATION DELETED
Output 1. Wind power plant with integrated pilot battery energy storage system is operational 2. Local employment generated	By 2020 1a. Total installed electricity generation capacity of project reached 10 MW (2018 baseline: 0 MW) 1b. Total installed battery energy storage capacity of project reached 1.88 MWh (2018 baseline: 0 MWh) 2a. At least 694 jobs provided during construction (2018 baseline: 0) 2b. At least 103 jobs provided to women during construction, or 15% of total (2018 baseline: 0) 2c. Anti-sexual harassment policy and implementation plan developed by Q4 2021 (2018 baseline: not applicable)	1–3. Company's annual development effectiveness monitoring reports	Inflation and other unexpected market changes leading to cost overruns CONFIDENTIAL INFORMATION DELETED Weak power demand as a result of adverse macroeconomic shock

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
3. Growth of local and national economy supported	CONFIDENTIAL INFORMATION DELETED		
Key Activities with Milestones			
Outputs 1–3: Wind power plant with integrated pilot battery energy storage system constructed; local employment generated; growth of local and national economy supported.			
CONFIDENTIAL INFORMATION DELETED			
Inputs			
CONFIDENTIAL INFORMATION DELETED			
Assumptions for Partner Financing			
Not applicable			

ADB = Asian Development Bank, CO₂ = carbon dioxide, MW = megawatt, MWh = megawatt-hour, Q = quarter.

^a Government of Thailand, Ministry of Energy. 2019. *Thailand Power Development Plan, 2018–2037*. Bangkok.

^b Government of Thailand. 2015. *Intended Nationally Determined Contribution of Thailand*. Bangkok.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS

<http://www.adb.org/Documents/RRPs/?id=53174-001-4>

1. Sector Overview
2. Client Information
3. Details of Implementation Arrangements
4. Contribution to the ADB Results Framework
5. Financial Analysis
6. Economic Analysis
7. Country Economic Indicators
8. Summary Poverty Reduction and Social Strategy