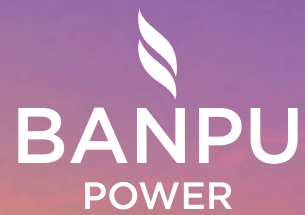


WE ARE ENERGY

affordable reliable eco-friendly

Sustainability Report
2019



Vision

- ✓ To be recognized as a pioneer Asian power company with a strong reputation for sustainable development, friendly community relations, and respect for the natural environment.

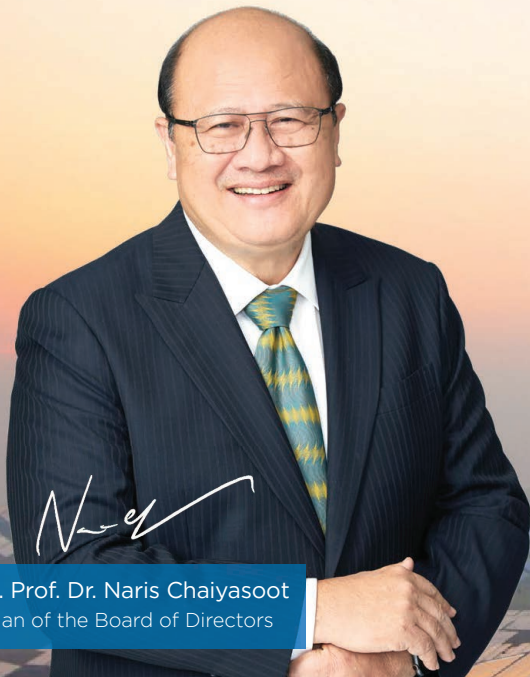
Mission

- ✓ To develop, own and promote both conventional and renewable power businesses using the most efficient technologies available for sustainable growth in pursuit of a position of leadership in Asia.
- ✓ To conduct all business in an ethically, socially and environmentally responsible manner.
- ✓ To create sustainable value for shareholders, customers, business partners, employees, and communities while being a good corporate citizen in all countries of operations.

WE
A R E
affordable reliable eco-friendly
E N E R G Y



Messages from Chairman of the Board of Directors and Chief Executive Officer



Assoc. Prof. Dr. Naris Chaayasoot
Chairman of the Board of Directors



Mr. Sutee Sukruan
Chief Executive Officer and Chairman of
the Sustainable Development Committee

2019 was the year Banpu Power Public Company Limited stepped up to the next level of leadership in the power generation sector. The Company's electricity has been produced from base-load power generation and renewable power generation in five countries in the Asia-Pacific region. This is in line with the opportunity to develop the renewable power plants and the growing energy technology projects. While maintaining energy stability for economic and social development remains important, we are committed to delivering the sustainable energy in order to drive the economy and create well-beings in all areas where the Company has operated (Affordable). We are ready to deliver power continuously (Reliable) and are friendly to society, communities and environment (Eco-friendly).

Affordable: The Company has determined to deliver electricity and energy to meet needs of each area with affordable prices by using High Efficiency, Low Emissions (HELE) technology and best practice of industrial operating standards. The Company is continuously generating power and steam, totaling 2,007 MWe from operating conventional power generation and 240 MWe from operating renewable energy. In 2019, Luannan expansion phase 3 and six additional solar power plants commenced commercial operations in China and Japan with total capacity of 102 MW increased. Additionally, we also invested in energy trading in Japan. While the continued construction of the conventional power plant project in China with a production capacity of 1,320 MW which the Company

has 30% equity share, and the wind power plant project (Phase 1) with 30 MW generating capacity in Vietnam has ongoing progress, expected to complete a construction of Phase 1 by year 2020. This has resulted in the Company's total power operation capacity of 2,901 MWe while all power plants are entrusted to operate at full capacity and 654 MWe from power projects under construction and development.

Reliable: Due to the power plant's efficient production and maintenance systems and the employee's competency development, as well as the promotion of innovation development to increase efficiency and production stability, the Company was able to maintain its capacity to produce and supply electricity to customers with the utmost efficiency according to the set targets. This means that the combined heat and power (CHP) plants in China have the availability factor at 94.07%, meeting the target set. We are delighted that in the past year, we achieved our occupational health and safety target. There were no working accidents at the power plants where the Company has operational control. Additionally, a long-term plan was developed to cultivate the safe working culture among our employees and contractors in all countries where we have operated.

Despite employing the risk management and business continuity management systems for a long time, the Company is well aware of challenges in coping with incidents arisen from changing external factors each year, such as changes

in environmental regulations, the earthquake in Hong Kong, Laos PDR., and the epidemic of a new strain of coronavirus (COVID-19), which has a wide impact on the well-being and economy, etc. Although the Company was able to handle the aforementioned incidents efficiently, such challenges made us still strive to continuously improve the risk management and business continuity management standards to cope with the changes. This will enable us to continue operating our businesses during the crisis and increase the Company's competitive advantages.

The Company's adherence to business ethics and good corporate governance as well as the transparent business conduction made the Company certified to be a member of the Collective Action Coalition Against Corruption (CAC) and received a 4-star CG Rating assessed by the Corporate Governance Report of Thai Listed Companies Project. In the past year, the Company still maintained a high standard of ethical operations. There were no complaints or incidents the Company violating business ethics.

Eco-friendly: The effects of climate change and tightening environmental policies are the great challenges. As an energy producer, the Company has continuously developed its production processes, using modern technologies and environmentally friendly innovations. As a result, all of our power plants were able to maintain the excellent environmental standards in compliance with the laws set, such as the continuous improvement of power plants' efficiency and the air quality released at chimney project in China resulting in ultra-low emissions, and the upcoming zero-water discharge project in China, etc. The target to reduce greenhouse gas emissions by 15% by 2020, however, has not yet been achieved as the impact of the trade war made customers' steam demand lower than expected. Consequently, the lower sales of steam resulted in higher the greenhouse gas (GHG) emission intensity per unit of product. Nevertheless, the Company did not refrain from actions. Together with Banpu Group of Companies, the climate change committee was established to manage climate change risks holistically. Moreover, the Luannan CHP Plant's Phase 3 project and the Shanxi Lu Guang (SLG) Power Plant project, which are under construction, will use the Ultra-Super Critical (USC) technology that is highly efficient and environmentally friendly to meet international standards. Furthermore, an increase of the renewable energy production capacity of solar power plant projects in Japan and China as well as a development of the Vinh Chau Wind Power Plant project in Vietnam will help improve the GHG emissions intensity.

Additionally, the Company announced the biodiversity policy, the sustainable supply chain policy and the corporate philanthropy policy so as to serve as guidelines

for additional sustainability management. It was also the first year the Company started certifying its sustainability report from external agencies covering data on GHG emissions, energy, and safety so as to build confidence on the Company's environmental and social information. The Company is also planning to continually expand the report certification to cover all materiality topics significant to the sustainability.

As a result of conducting environment, social and governance (ESG) operations in parallel with implementing corporate social responsibility activities as well as being a good corporate citizen, including our concerns on community engagement throughout our business operations, the Company was selected and has been listed in Thailand Sustainability Investment Index (THSI) for two consecutive years from the Stock Exchange of Thailand in 2019. This brings great pride to all of us at Banpu Power and reflecting our contribution in ESG.

In 2020, Banpu Power is ready to face the new challenges driven from changing trends in the energy business or a so-called "3Ds," consisting of the energy consumption to reduce GHG emissions (Decarbonization), the decentralization of energy production and distribution (Decentralization), and the use of digital technology (Digitalization). We, therefore, join forces to create synergy within Banpu Group in order to adapt ourselves to this change by regrouping the power operations. Consequently, Banpu Power will manage the large-scale conventional power plant projects while the renewable energy business will be operated by the newly established company-Banpu NEXT. Banpu NEXT was established by Banpu Power and Banpu Group to develop the renewable energy, expanding its scope to operate the energy technologies and clean energy-related businesses. Banpu Power holds 50% of stakes in Banpu NEXT. In addition to strengthening the renewable energy sector, this strategy will also increase a variety of related businesses corresponding to customer needs according to the Greener & Smarter strategy. In responding to the Company's growth, the power generating capacity target was adjusted to 5,300 MW, consisting of 4,500 MWe from the base-load power and 800 MW from the renewable energy by the year 2025.

On behalf of the Company, we would like to thank all stakeholders for supporting Banpu Power to take the next step to become a leading energy company. Although there are still many challenges, we believe that a strong synergy and a well-built corporate culture, the 'Banpu Heart' of all employees and executives, will finally drive the organization to grow sustainably and be able to achieve the goals set.

Operational Highlights

The availability factor (AF) of the power plants was

94.07%

Employing the risk management system, **covering** all projects and expanding to joint-venture companies

EBITDA **4,802** million THB

A total production capacity

increase of **102** MW in 2019



A total production capacity of renewable energy generation of

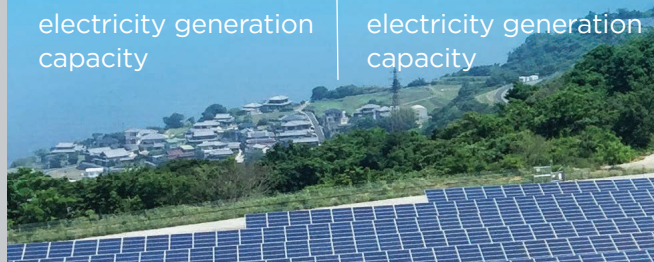
240 MW representing

11% of the total electricity generation capacity

A total production capacity of base-load energy generation of

2,007 MW representing

89% of the total electricity generation capacity



No significant environmental incident

Utilize High Efficiency, Low Emissions

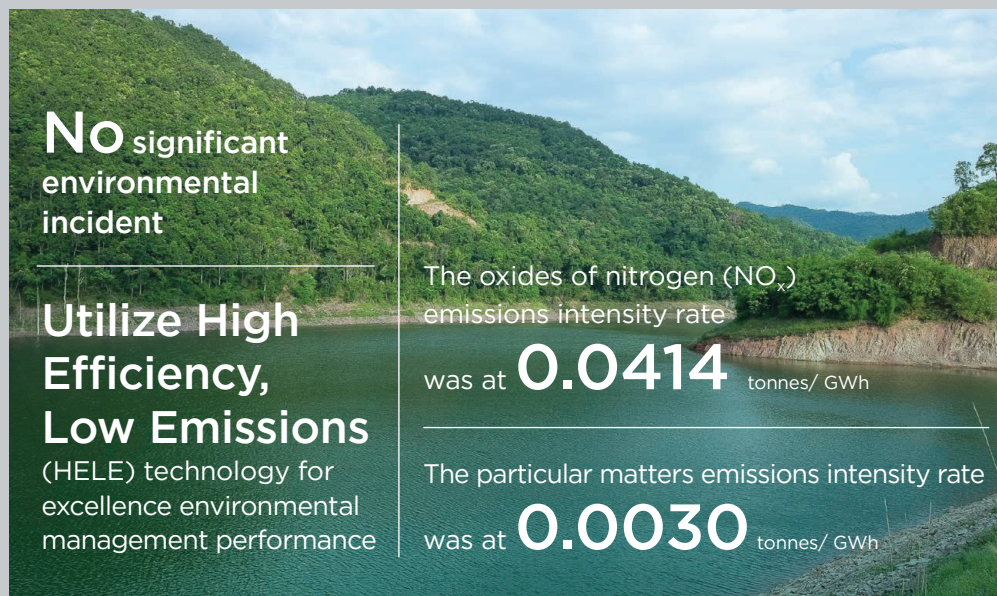
(HELE) technology for excellence environmental management performance

The oxides of nitrogen (NO_x) emissions intensity rate

was at **0.0414** tonnes/ GWh

The particular matters emissions intensity rate

was at **0.0030** tonnes/ GWh

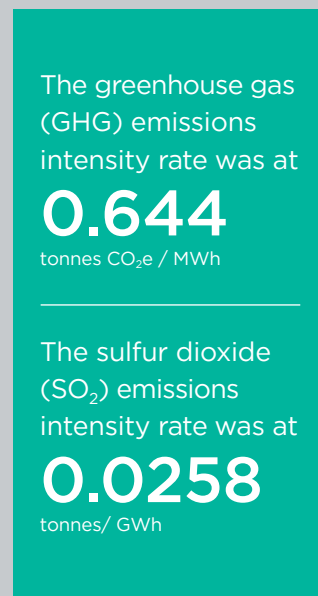


The greenhouse gas (GHG) emissions intensity rate was at

0.644 tonnes CO₂e / MWh

The sulfur dioxide (SO₂) emissions intensity rate was at

0.0258 tonnes/ GWh



No fatalities relating to working accidents (Fatality = **0**)

No lost time injury frequency rate (LTIFR = **0**)

Continually built a tailor **community engagement** and CSR project to meet each community context



Employee engagement score

Thailand **68%**
China **94%**
Japan **50%**

Competency development expense for employee

First-line management **775** USD/ person
Middle management **1,230** USD/ person

Contents

8

About
Banpu Power

32

Economic

34

Financial Performance
and Business Growth

38

Business Ethics

44

Anti-Corruption

46

Compliance

50

Risk Management

54

Business Continuity
Management

58

Availability
and Reliability

62

Process Improvement
and Innovation

66

Supplier
Management

70

Contractor
Management

72

Customer
Management

76

Environment

78

Greenhouse Gas
Emissions

86

Energy

90

Air Quality

94

Water Resource
Utilization and
Water Discharge

98

Waste

100

Biodiversity

104

Social

106

Corporate Culture

110

Competency
and Leadership
Development

114

Employee
Engagement

118

Occupational Health
and Safety (OHS)

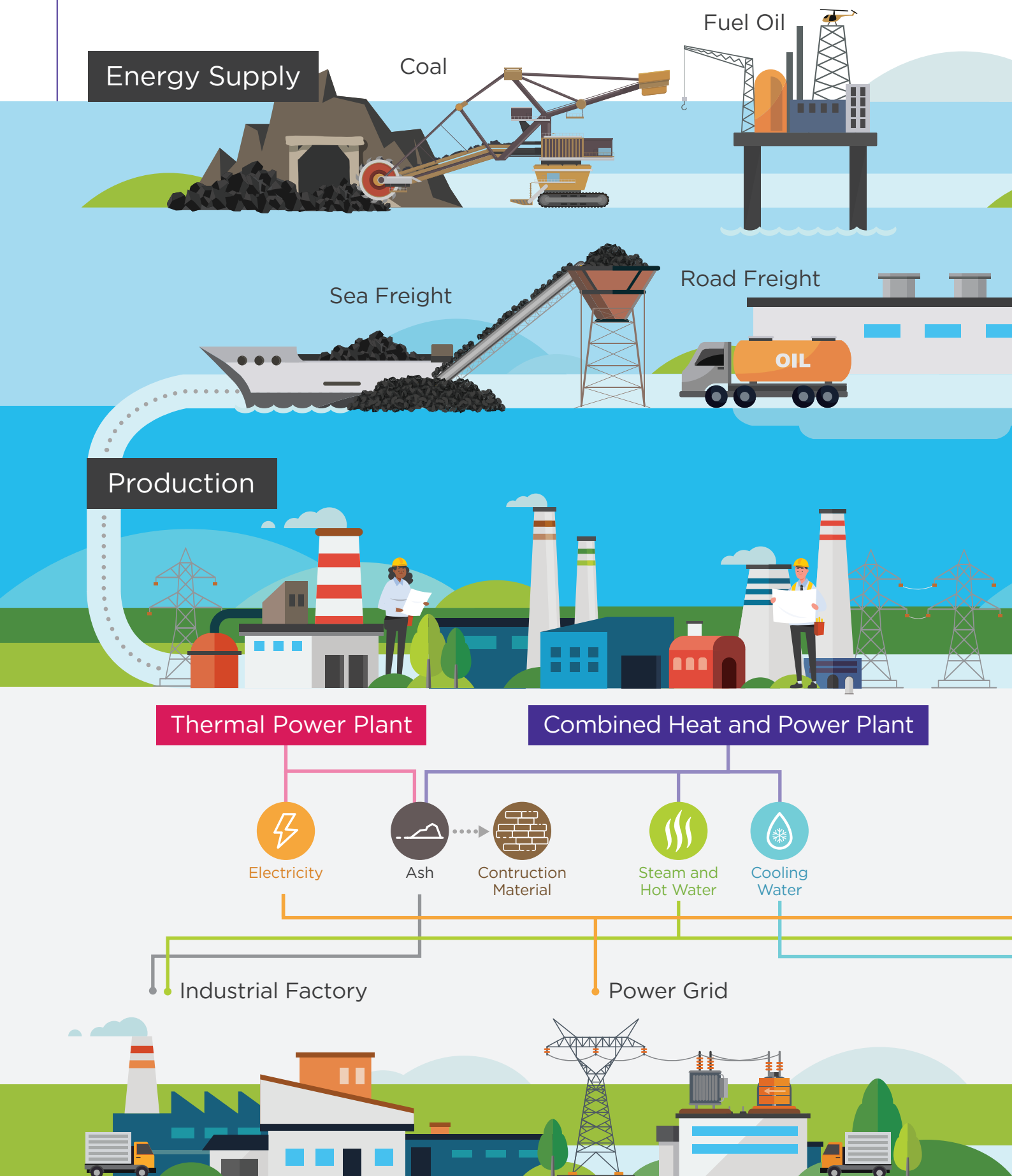
124

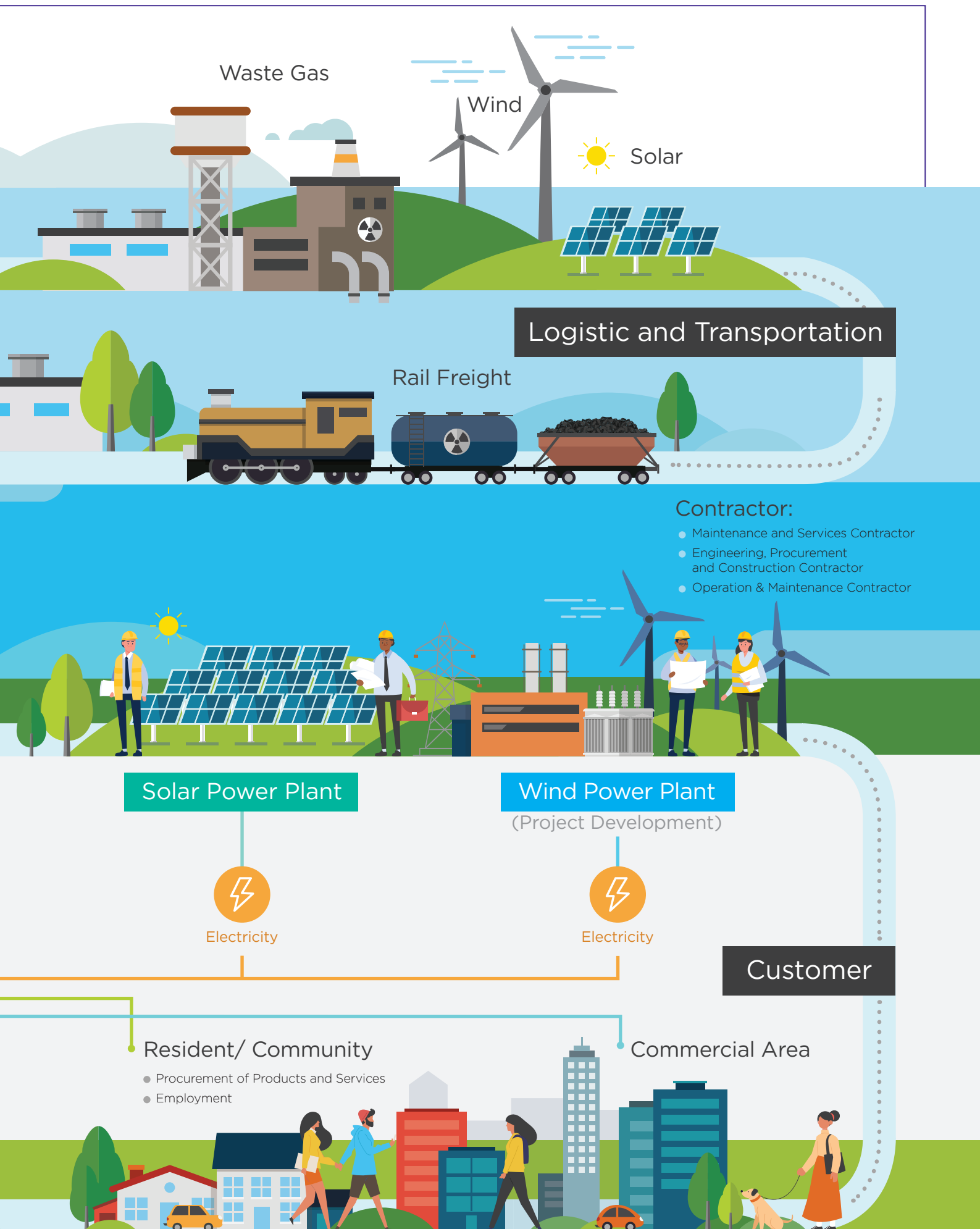
Community
Engagement

130

Additional
Information

Banpu Power Supply Chain





Banpu Power Assets

China

Luannan

Coal-fired CHP Plant
100% Ownership
 Gross: **227** MWe
 Equity: **227** MWe

Zhengding

Coal-fired CHP Plant
100% Ownership
 Gross: **139** MWe
 Equity: **139** MWe

Zouping

Coal-fired CHP Plant
70% Ownership
 Gross: **247** MWe
 Equity: **173** MWe

Shanxi Lu Guang

Coal-fired Development Project
30% Ownership
 Gross: **1,320** MW
 Equity: **396** MW

China Solar

7 Solar Power Plants
100% Ownership
 Gross: **177.3** MW
 Equity: **177.3** MW

Laos PDR

Hongsa

Coal-fired Mine-mount
 Power Plant
40% Ownership
 Gross: **1,878** MW
 Equity: **751** MW

Thailand

BLCP

Coal-fired Power Plant
50% Ownership
 Gross: **1,434** MW
 Equity: **717** MW

Vietnam

Vinh Chau

Wind Development Project
100% Ownership
 Gross: **80** MW
 Equity: **80** MW



Hongsa

BLCP

Vinh Chau

About Banpu Power

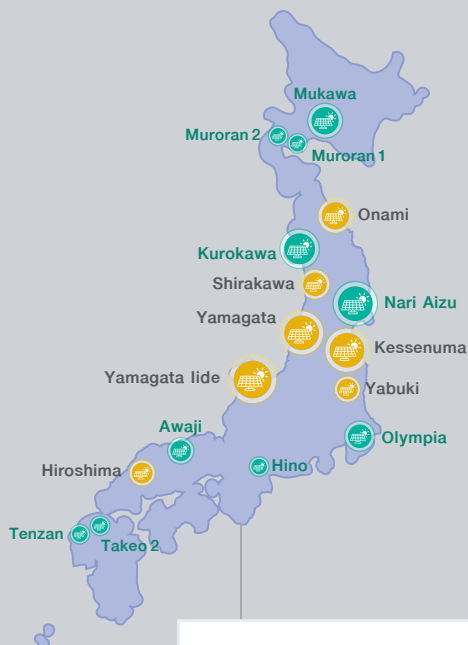
Banpu Power Public Company Limited or Banpu Power (BPP) is a subsidiary of Banpu Public Company Limited. Established in 1996, BPP was listed on the Stock Exchange of Thailand in 2016. The Company has operated the power business and supplied electricity in the Asia-Pacific region.

Presently, the Company has a power production from commercially operating power plant

2,247 MWe

and **654** MWe from power projects under construction and development. In the year 2019, the Company had total assets of THB **48,808** million THB.

In 2020, Banpu Renewable Energy Company Limited (BRE), a subsidiary company of BPP, amalgamated with Banpu Infinergy Company Limited (BPIN) so as to form Banpu NEXT Company Limited (Banpu NEXT). Banpu NEXT is focusing on investing and developing both green power and energy related technologies in Thailand and Asia. Banpu Power holds 50% stakes in Banpu NEXT.



Japan ●

Japan Solar

10 Solar Power Plants

40-100% Ownership

Gross: **84.22** MW

Equity: **62.7** MW

7 Solar Development Projects

40-100% Ownership

Gross: **281** MW

Equity: **177.3** MW



Coal-fired
Power Plant



Solar
Power Plant



Wind
Power Plant



Under Development

As of December 31, 2019

Summary of Major Changes and Development



The 3rd phase extension of Luannan Combined Heat and Power Plant, located at Hebei province, China with the capacity of **52** MWe has achieved Commercial Operation Date (COD), increasing its total capacity of **227** MWe.



July 2019



The Company received a 4-star CG Rating (Very good level) from the Corporate Governance Report of Thai Listed Companies 2019 (CGR), or CG Score, in organized by the Securities and Exchange Commission (SEC), the Stock Exchange of Thailand (SET) and the Thai Institute of Directors (IOD).



October 2019

August 2019

The Company invested in operating Jixin Solar Power Plant, located in Jiangsu province, China with the capacity of **25.22** MW. The contribution from the project recognized in 3Q 2019.



October 2019

The formation of Banpu NEXT from the amalgamation between Banpu Renewable Energy Co., Ltd. (BRE), a subsidiary of the Company, and Banpu Infinergy Co., Ltd. (BPIN) to organize and integrate clean energy technology business. The Company and Banpu each hold an equal proportion (approximately 50%).

BANPUNEXT





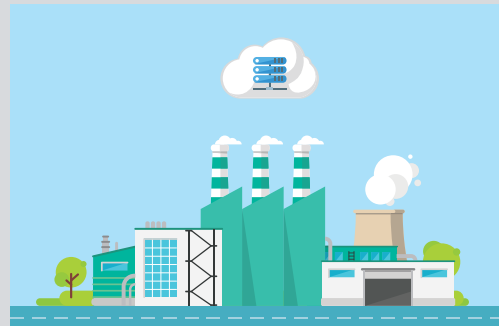
The Company has certified by IOD as a member of Thailand's Private Sector Collective Action Against Corruption (CAC).



November 2019



Banpu Renewable Singapore Pte. Ltd. (BRS), a subsidiary of Banpu Power has invested for 19.9% of Global Engineering Co., Ltd. in Virtual Power Plant and Energy Trading business through digital networks and the internet in Japan.



December 2019

December 2019

Kurokawa Solar Power Plant located in Miyagi prefecture, Japan, has achieved COD on December 13, 2019 with the capacity of **18.90** MW.



December 2019

Banpu Renewable Singapore Pte. Ltd. (BRS), a subsidiary of Banpu Power has invested under TK structure for 100% in 4 new operating solar power plants in Japan with the total capacity of **6.32** MW including:

- Tenzan Solar Power Plant
- Muroan 1 Solar Power Plant
- Muroan 2 Solar Power Plant
- Takeo 2 Solar Power Plant



Tenzan



Muroan 1



Muroan 2



Takeo 2



Corporate Governance

The Board of Directors has always adhered to the principles of Good Corporate Governance (CG), which are the fundamental of sustainable business growth. The CG has been implanted through the 'Banpu Heart' corporate value of 'Committed' covering core behaviors on 'adhering to integrity and ethics' to which the Board of Directors, executives and employees have stick as a business practice. Adhering to integrity and ethics has been also used for enhancing the Company's CG system and create confidence among our shareholders, investors, customers, business partners, communities and stakeholders. The Company has focused not only financial returns, but also environment and society and governance (ESG).

Corporate Governance Policy and Code of Conduct Booklet

The Board of Directors has continuously developed the Corporate Governance Policy and Code of Conduct so as to be comparatively with the international CG principles. In 2019, the Board developed and revised the CG policy and Code of Conduct manual by putting policies and best practices to which the Company has adhered in writing. Furthermore, the CG policy and Code of Conduct manuals were combined into one since the Company sees that CG policy is the principle while Code of Conduct is the practice guideline. To easily understand and use, the CG and Code of Conduct booklet is divided into two parts, the revised part and the additional one of which key details are as follows:

Revised Part

Corporate Culture	To reflect the Company's business reputation
Internal Control Policy	Establishing the independent Internal Audit Office to ensure that all of the Company's operating units are in compliance with the regulations set
Sustainable Development Policy	Applying international practices to develop our sustainable development strategies

Additional Part

Innovation Policy	Promoting the creation of innovation as well as strengthening the business, focusing on technology knowledge and efficient natural resources management
Information Technology Policy	Developing effective and secured information technology system complied with IT related laws
Anti-Corruption Policy	Against all forms of corruptions: "Directors" and "Employees" are prohibited from carrying out or accepting any type of wrongful money, assets, compensation, and other benefits either directly or indirectly.
Market Sensitive Information Policy	Controlling the internal information usage in order to limit the staff's information access level and prevent the internal information that may be impact on the Company's share prices, until publicly disclosed.
Whistleblowing and Protection Policy	Establishing mechanisms/ platforms for stakeholders to file CG related complaints. The Company will keep the information received from the complaint confidentially
Qualifications of the Board of Directors	Being able to devote adequate time and holding director positions not exceeding five listed companies
Qualifications of Independent Directors	In accordance with the notification of Thor Chor. 39/2016 dated 16 November 2016
Terms of Directorship	Independent directors shall serve a term of office for no more than nine years or three consecutive terms.
Board of Directors Duties	Complying with the Securities and Exchange Act 1992 Edition
Corporate Secretary	Specifying the duties of the Company Secretary
Board of Directors Meeting	Able to convene a meeting of the Board of Directors through electronic media
Board of Directors Performance Evaluation	Additional performance evaluation of sub-committees

Additionally, the Board of Directors approved another 4 additional policies in 2019 as follows:



	Sustainable Supply Chain Policy Managing impacts on environment, society and economics as well as promoting good governance practices throughout the supply chain
	Corporate Philanthropy Policy Considering a balance between sustainable business and social development through CSR activities
	Biodiversity Policy Recognizing on and responding to risks related to biodiversity
	Risk Appetite Statement Policy Determining risk appetites as the key element in risk management and effective supervision.

Corporate Governance Structure

Banpu Power Plc.'s structure of the Board of Directors is a One Tier System, consisting of nine members.

independent directors	non-executive directors	executive directors
3 persons	3 persons	3 persons

There are three sub-committees namely, the Corporate Governance and Nomination Committee, the Audit Committee, and the Compensation Committee. Independent directors shall serve a term of office no more than nine years or three consecutive terms while those nominated as the Company's directors shall be directors of listed companies not exceeding five firms.

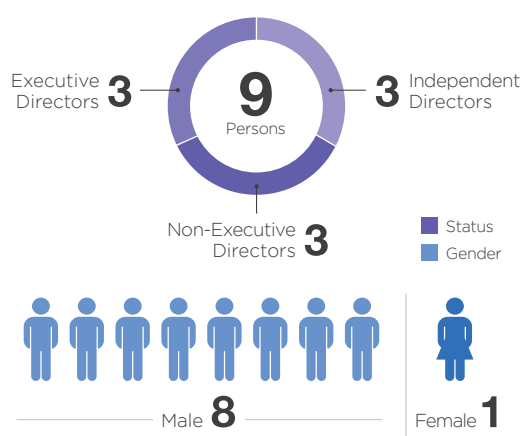
The Company has set a meeting between independent directors and non-executive directors without executive directors and management attending once a year. In 2019, the aforementioned meeting was convened on 5 October 2019 to provide an opportunity for free discussions on various issues or opinions regarding effective business management. In addition, the Board of Directors stipulates that the Chairman of the Board and the Chief Executive Officer (CEO) must not be the same person. The Company has clearly divided duties of the Board of Directors and management. The Board of Directors appoints and assigns the CEO to be responsible for business operations, development and implementation of strategies. The CEO decentralizes his/her authority to the next level executives of both domestic and international business units to ensure a balance between corporate governance and management.

	The Corporate Governance and Nomination Committee	The Audit Committee	The Compensation Committee
Board of Directors	3	3	3
• Executive Directors	-	-	1
• Non-executive Directors	2	-	1
• Independent Directors	1	3	1
Related Charters	The Charter of the Corporate Governance and Nomination Committee	The Charter of the Audit Committee	The Charter of the Compensation Committee
Major Responsibilities	• Determining the policy and practices regarding Corporate Governance and Code of Conduct. • Monitoring compliance with the policy and good governance practice framework. • Recruiting and nominating persons to be the Directors, Chief Executive Officers and Executive Officers. • Monitoring a succession plan of senior executives.	• Reviewing the financial report, internal control and risk management system as well as law and regulatory compliance. • Considering action plans and performance and the Internal Audit Office. • Considering the disclosure of Company's information in case of related party transactions and conflicts of interest. • Supervising the Company to comply with the anti-corruption policy. • Selecting and appointing the auditor, including proposing for consideration of the Company's auditor remuneration. • Considering the corporate plan, operating performance, budget, and manpower of the Internal Audit Office.	• Recommending guidelines regarding management of compensation and other benefits for the Board of Directors, sub-committees and the Chief Executive Officer. • Reviewing the overall compensation and salary structure and annual bonus.

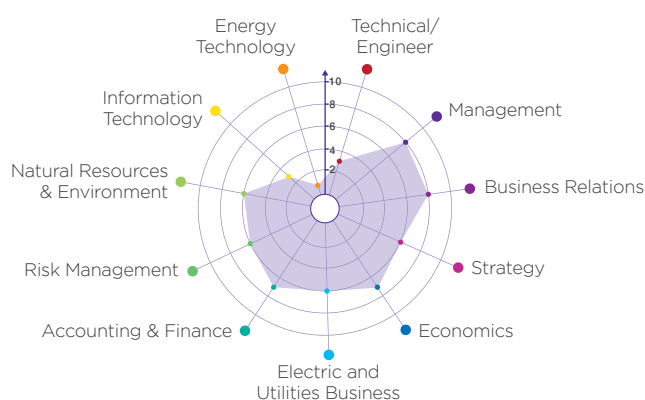
Board of Directors Nomination

The Corporate Governance and Nomination Committee has set the effective rules and procedures for the Board's nomination, taking into account the diversity of qualifications, namely, independence, knowledge, skills, experience, gender, nationality and age. Such qualifications have been assessed by the Board Skill Matrix to ensure over all appropriate composition of the Board to the oversight of the Company and the ability to respond to stakeholder's expectation. Details of current composition of the Board are as follows:

Composition of the Board of Directors



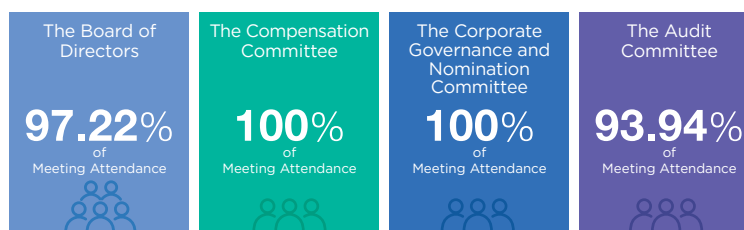
Board Skills Matrix



In addition, the Governance and Nomination Committee is responsible for the selection and appointment of the CEO prior to proposing to the Board of Directors for further approval. The consideration of CEO appointment is based on qualifications, knowledge, capabilities and energy business operations as well as various experiences, including management capabilities. Furthermore, the characteristics of various aspects have been also considered inclusion of conflicts of interest and leaderships in order to drive the organization efficiently and for the greatest benefit to the Company's business.

Board Meeting Attendance

In 2019, directors attended the Board of Directors meetings and three sub-committee meetings as follows:



Board of Directors Performance Evaluation

The Company requires the performance evaluation of the entire board, sub-committees, and individual directors. The evaluation criteria and procedures are in accordance with the standards of the Stock Exchange of Thailand. The evaluation results with recommendations will be informed at the board meeting where opinions are exchanged among the Board members for further improvement and the greatest benefits of the Company. Details of overall performance evaluation are as follows:

Board/ Committee	Entire Board of Directors	The Audit Committee	The Compensation Committee	The Corporate Governance and Nomination Committee	Individual Directors
Average Score (Full Score 5)	4.86	4.96	4.92	4.88	4.91
Result	Very Good	Very Good	Very Good	Very Good	Very Good

Board of Directors Competency Development

In the previous year, Directors attended the below competency development programs:

Program	Organizer	Number of Directors Attending
Role of the Chairman Program class 45/ 2019	Thai Institute of Directors (IOD)	1
Knowledge Sharing: Power Purchase Agreement (PPA) for Power Business	Banpu Power Public Company Limited	3
Knowledge Sharing: Human Resources Management	Banpu Power Public Company Limited	3
Knowledge Sharing: Digital Transformation	Banpu Power Public Company Limited	2
Knowledge Sharing: Energy Trading	Banpu Power Public Company Limited	9
Knowledge Sharing: Cyber Security and Digital Resilience Assessment: DRA	Banpu Power Public Company Limited	3
Knowledge Sharing: Whistleblowing and Compliant Handling	Banpu Power Public Company Limited	3
Knowledge Sharing: Digital Transformation in Energy Business and What's Next?	KPMG Phoomchai Audit Ltd.	4

Challenges and Opportunities



Conventional Power Business

Countries	Challenges and Opportunities	Banpu Power's Strategies
 Thailand	- Thailand power development plan to increase electricity purchase target from renewable energy, reduce dependence on imported energy in order to reduce the peak electricity demand and accommodate the effects of technology change and energy consumption patterns. - Highly environmental awareness resulting in an improvement of laws and standards more strictly, targeting to reduce pollution emissions from power generation by 0.46 kg CO₂e/ KWh. in accordance with the COP21 agreement.	- Studying details and effects from changes of related policy, including seeking investment opportunities and assessing competitive advantages as well as preparing to participate in various projects open for development by the government sector. - Conducting business in line with market conditions by managing costs and increasing production efficiency as well as maintaining equipment to meet the environmental standards, inclusive of monitoring and investigating the possible environmental impacts.
 Laos PDR	- The government focuses on reforming the country into an ASEAN energy source (Battery of ASEAN) and being the key electricity exporter of the region. - An urbanization development and a continuous improvement of infrastructures in the country.	- Managing the power transmission and generating systems to ensure that the power plants have the utmost availability and efficiency at all times. This is important for the electricity systems of both Thailand and Laos PDR. - Promoting community participation in the area in parallel with improving living standards of local people and supporting occupational development including employing community members to work at the power plants.
 China	- The growth of manufacturing and service sectors affecting the growth of economics and electricity demand in each locality. - Reducing government's financial support.	- A readiness to adjust sales of electricity, steam, hot water, and chilled water either in the summer season or according to market conditions, inclusion of a plan to expand the power generating capacity in preparation for the power plant's availability and security to produce and supply both power and steam. - Efficiency increasement and cost control by having a strategy to purchase and reserve coal at the right time.



Renewable Power Business

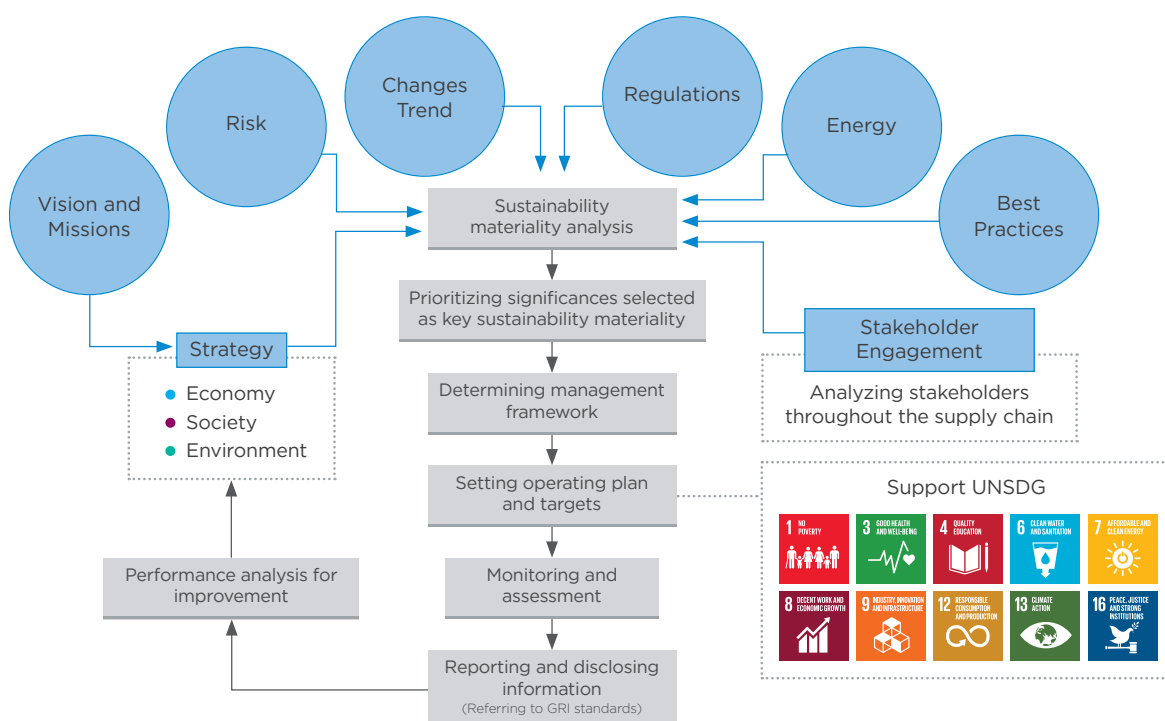
Countries	Challenges and Opportunities	Banpu Power's Strategies
 China	A policy to reduce the financial subsidies for renewable energy to support the development of projects using advanced and high-quality technology and reducing dependency on governmental subsidies.	Monitoring policies of the government and other related agencies to assess the competitive advantages and the readiness for participating in various governmental projects.
 Japan	- The country's energy development plan is clear with the target to increase the proportion of electricity generated from renewable energy by 22-24% by 2030. - Reducing the feed-in tariff (FIT) scheme and changing the solar energy's purchase prices from the FIT to the auction scheme model. - Changing regulations for the development of solar power plants, for example, a project with a production capacity of more than 40 MW is required for reporting its environmental impact assessment (EIA) result.	- Preparedness for assessing the investment opportunities and project development as well as feasibility studies on the solar rooftop installation business by focusing on customers in the business and industrial sectors, inclusion of those wanting to use renewable energy (RE100), and expanding the power production from the continued renewable energy as well as studying the opportunity to develop energy technology businesses with partners, such as the establishment of a new office in Aizu-Wakamatsu City, the information and communication technology center (ICT). - Studying details and impacts on projects that are continuously developed as a result of policy and regulatory changes by relevant government agencies, in order to commence the commercial operations as planned.
 Vietnam	- Supporting an increase of electricity production from renewable energy, targeting a production capacity of solar and wind energy accountable for 21% of total installed capacity by year 2030. - Presently, the FIT scheme offers a fixed price throughout the project's life cycle. However, such a FIT scheme will be binding on the projects operated within the specified period.	Studying primary information and thoroughly evaluating the possibility to seek opportunities for additional investment as well as following up the project development progress able to commence commercial operations as planned by hiring consultants in various fields, such as engineering and environmental experts, legal counsels, financial advisors, and accounting and tax specialists, etc.

Banpu Power Sustainable Development

Banpu Power has dedicated to being a pioneer in the power business at the heart of appropriate innovation and technology. In order to deliver affordable, reliable, and eco-friendly energy, the Company has developed the sustainable development strategies by taking into account the value creation for those involved with the Company's operations, inclusion of customers, business partners, employees, communities, and shareholders throughout the supply chain, as well as the government sector. It is expected that the Company's operations will be a part of supporting sustainable development in all areas the Company has operated.

		
Affordable	Reliable	Eco-friendly
Clean and appropriate innovations and technologies	Business ethics	Implementation of the eco-friendly operational standards and high technologies
Investment structure and management properly to each project	Risk management	Occupational health and safety
Engagement of business partners throughout the supply chain	Employee management and competency development	Stakeholders and surrounding community engagement

The Company has set a framework to drive its operations and growth by using the sustainable development principles, taking into account the stakeholders and all aspects of changes. Additionally, the short-and long-term strategies have been developed including an assessment of the sustainable development performance by determining key indicators covering economics, social, and environmental dimensions. For the sake of sustainable company in a long run, all executives and employees are assigned to mutually drive these strategies to the success.



Sustainability Policy and Strategy

Creating Competitive Advantages

- ✓ **Human Resources Development:** The Company puts great emphasis on developing professionalism for its personnel as well as building their leaderships including promoting a cross-functional collaboration through a corporate culture so that they have learnt to know each other.
- ✓ **Process Development:** The Company focuses on operational excellence through innovation and continuous improvement. If a production procedure is effective, it will help reducing natural resources consumption and waste generation as well as enhancing competitive advantages. Additionally, the efficient risk management will make the management and monitoring processes as well as a decision making better.
- ✓ **Products:** The Company has delivered valuable products and services with stability, reliability, environmentally friendly and reasonable prices.

Creating Values for Stakeholders

- ✓ **Legal compliance:** The Company has operated its business with good corporate governance and business ethics. It has also complied with various laws and regulations as well as used the international best practices as standards operations.
- ✓ **Occupational Health and Safety:** A safe working environment has been created for employees and those involved.
- ✓ **Environment:** The Company is continuously looking for opportunities to develop renewable energy projects and use clean technology. It also emphasizes on reducing environmentally negative impacts with an effective environmental management system, lowering resource consumption and waste generation, as well as promoting the efficient use of resources with maximum benefits.
- ✓ **Society:** The Company has governed its business with transparency and social responsibility, respecting the stakeholders' human rights, strengthening relationships and acceptance from the communities through the effective stakeholder engagement process. Additionally, the sustainable values have been created via taxation for development, employment, and community development projects focusing on learning and self-reliance.

Sustainable Development Committee Structure

The Company set up the Sustainable Development Committee to govern and oversee the corporate sustainability. The Sustainable Development Committee consists of top management from each department and business unit with following responsibilities:



The policies and operating results were approved from the Board of Directors prior to implementing. Additionally, the Company has operated sustainability through the Banpu Heart corporate culture, consisting of 'Engage to Sustainability' the shared values related to sustainable development. All employees and executives have a duty to create sustainability doing social and environmental responsible works, making decisions based on the corporate sustainability principle and stakeholders as well as being a good corporate representative to communicate correct information to stakeholders, such as joint venture companies, business alliances, trading partners, contractors, sub-contractors, customers and communities.

Sustainability Performance Evaluation and Assessment

To operate the sustainability governance effectively, the policy must be developed with good strategies while the appropriate key performance indicators (KPI) must be set up by management, drawing employee participation to turn these policies and strategies into the tangible practices.

☑ The Board of Directors Performance Appraisal

The Company has determined to evaluate the Board of Directors performance once a year at three levels as follows:

- The individual performance appraisal
- The whole Board's performance review
- The sub-committees' performance evaluation

☑ The performance appraisal of executives and senior executives

is conducted twice a year compared to the long-term and single year targets.

☑ The employee and executive performance reviews

have been conducted twice a year via the Key Performance Indicators (KPI) in two aspects-

operating performance and behaviors relating to corporate culture promotions.

☑ The Company together with Banpu Group have analyzed the performance in comparison with the best practices or standards of the industry group

(Gap Analysis) for example, an analysis for better improvement by various sustainability assessment tools including the Dow Jones Sustainability Index (DJSI) and Carbon Disclosure Project (CDP), the environmental, social and governance (ESG) assessment, and the annual sustainability assessment by the Stock Exchange of Thailand, etc.

Sustainability Governance Activities

26-28 February, 2019



Organizing a workshop on Global Reporting Initiative Standards

The Company organized the workshop on Global Reporting Initiative Standards in China in order to make both managerial and operational employees understand the sustainability operations framework and how to collect data in accordance with the Global Reporting Initiative Standards correctly.

7-8 October, 2019



Organizing a workshop on setting-up the Sustainability Goals and key indicators.



Sustainability Recognition

In 2019, Banpu Power was selected and has been included in a list of Thailand Sustainability Investment (THSI) from the Stock Exchange of Thailand for two consecutive years. This reflects the Company's commitment to social and environmental responsibility, including managing businesses in accordance with the good governance principle in all countries where we continuously operate. It can also ensure confidence among investors and stakeholders in operating the power business sustainably following the Company's vision.



9 October, 2019



Organizing the HSEC Summit for management

The Company arranged the HSEC Summit 2019 for management of Banpu Group responsible for occupational health, safety, environment and community development as well as sustainable development.

16 October, 2019



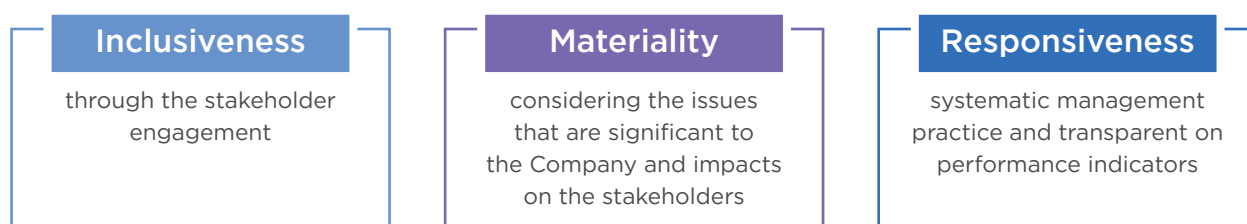
Arranging the Banpu Power SD Workshop aiming to review the sustainability materiality.

The sustainability workshop was organized at Bangkok Office by inviting the leading sustainability consultant to exchange knowledge regarding changing trends in energy business, assessing sustainability issues by engaging with stakeholders, effective sustainability management communications. The survey results from participants attending this workshop showed that executives and employees have more understanding about sustainability governance and can use knowledge gained for improving their works to be better.

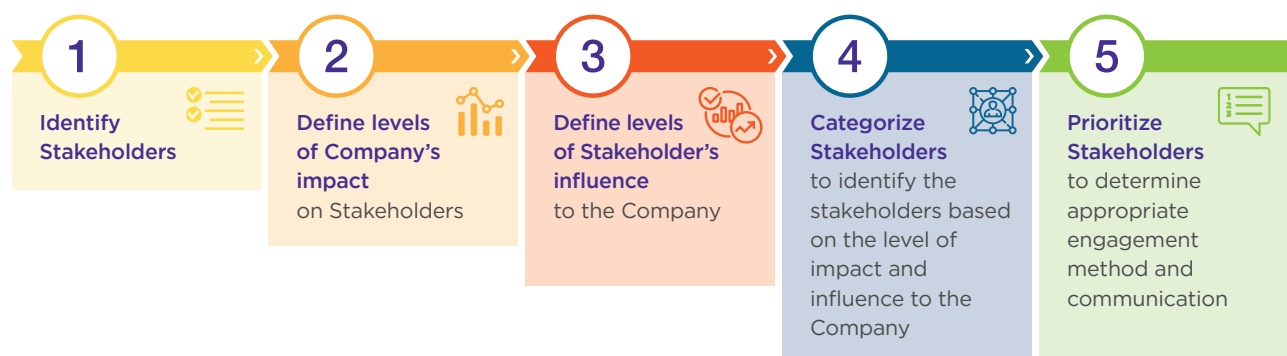
Stakeholder Engagement

The Company emphasizes on both internal and external stakeholders of the organization, who have important role for creating sustainable growth of the Company. Since the Company has invested in multiple operation in joint venture company form, therefore stakeholder engagement process is implemented through communication between stakeholders carried by employees in each business unit and then consolidated to corporate level.

The Company has developed a Management Framework: Stakeholder Analysis based on AA1000 Stakeholder Engagement Standard: AA1000SES consisting of these principles:



Steps of Stakeholder Analysis



Our Stakeholders

Stakeholder	Stakeholder's Expectation	Sustainability Topics	Engagement and Communication Channel
 Employee	Direction and sustainable growth of the organization	Challenges and Opportunities	- Employee Engagement Survey - BANPU Heart Survey - Welfare Committee - SHE Committee - Innovation Committee - CSR Activities - Whistleblowing - Performance Appraisal System - BANPU Heart Activities - Internal News via email - Sustainability Report - Annual Report
	Business ethics of the organization and responsibility to employee	Business Ethics	
	- Reasonable wages - Welfare/ Benefits - Performance evaluation - Opportunities for career advancement - Competency development - Participation in decision-making and expressing opinion - Work-life balance	- Corporate Culture - Competency and Leadership Development - Employee Engagement	
	Safe and healthy work environment	Occupational Health and Safety	

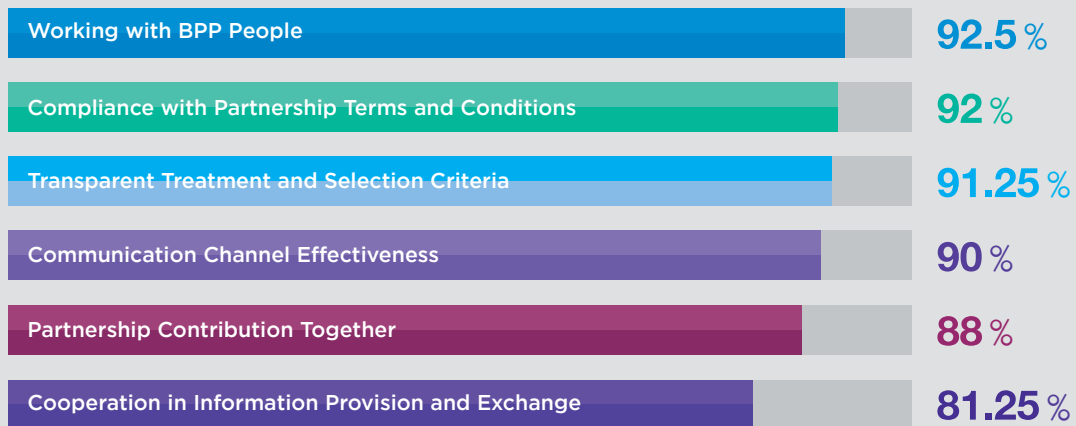
Stakeholder	Stakeholder's Expectation	Sustainability Topics	Engagement and Communication Channel
 Government	Economic, social, and environmental value creation	Sustainability Governance	- Stakeholder Satisfaction Survey - Occasional visits and meetings - Site audit - Submission of report and data in accordance with laws and regulations - Response the requests for information disclosure - Support to government initiatives and activities - Publication of annual report and sustainability report
	Corporate governance and code of business conduct	- Corporate Governance - Anti-Corruption	
	Compliance with laws and regulations	Compliance	
	Maximizing benefit of natural resources	- Process Improvement and Innovation - Energy	
	Supply chain management	- Supplier Management - Contractor Management - Customer Management	
	Economic, social, and environmental impacts management	- GHG Emissions - Air Quality - Water Resource Utilization and Water Discharge - Waste	
 Customer	- Availability and reliability - Reasonable price and quality - Business continuity management - Environmental impacts management	- Customer Management - Business Ethics - Compliance - Risk Management - Business Continuity Management - Availability and Reliability - Process Improvement and Innovation	- Joint meeting for operational approach complies with current market situation and delivered target - Employee meeting for experience sharing and contract management - Regular customer visits for reports on problem and seeks for improvement - Response the requests for information disclosure - Customer satisfaction survey - Develop variety of communication channel such as telephone or website
 Supplier	- Procurement and returns - Fair and transparent procurement process - Business opportunities	- Supplier Management - Business Ethics	- Provide procurement information through website or mobile application - Regular meeting with supplier - Partnership satisfaction survey
 Contractor	- Operation and maintenance plan - Business opportunities	- Contractor Management - Business Ethics	- Regular meeting with contractor - Training to build contractor competency and work safely - Partnership satisfaction survey
	Work safety	Occupational Health and Safety	
 Community	Environmental management	- Air Quality - Water Resource Utilization and Water Discharge - Waste	- Community satisfaction survey - Social baseline survey - Complaint channel through telephone and website - Regular meeting with community - Establish Community Consultative Committee (CCC) - Activities to improve community relation and engagement - Occasional visit to company's operations
	- Community development projects - Corporate social responsibility	Community Engagement and Development	
	Job and business opportunities	Community Engagement and Development	
	Environmental management	- GHG Emissions - Compliance - Community Engagement and Development	

Stakeholder	Stakeholder's Expectation	Sustainability Topics	Engagement and Communication Channel
 Investor, Shareholder, Business Partner, and Financial Institute	- Financial performance, progress on project development and business growth - Financial and accounting policies - Cash flow management - Payment controls - Accurate and complete financial data within time period	Financial Performance and Business Growth	- Annual General Meeting (AGM) - Board meeting at subsidiary and associated companies - Opportunity investment roadshow such as quarterly meeting and visit for presentation - Analyst meeting - Presentation on Opportunity Day organized by Stock Exchange of Thailand - Complaint channel - Website - Partnership satisfaction survey
	Risk management	- Risk Management - Business Continuity Management	
	Business transparency	- Business Ethics - Anti-Corruption	
	Innovation and operational excellence	- Availability and Reliability - Process Improvement and Innovation	
	Professional Board of Directors and Managements Remuneration	Corporate Governance	
	Social and environmental value creation	Sustainability Governance	
 Civil Society	Economic, social, and environmental value creation	Sustainability Governance	- Annual Report - Sustainability Report - Occasional visits to company's operations
	Maximizing benefit of natural resources	Process Improvement and Innovation	
	Environmental management	- GHG Emissions - Compliance - Community Engagement and Development	
 Media	Information on operational progress, project development and performance	- Financial Performance and Business Growth - Challenges and Opportunities	- Response the requests for information disclosure - Press conference - Occasional visits to company's operations - Website
	Fair, transparent and up-to-date disclosure of information	Business Ethics	
	Compliance with laws and regulations	Compliance	
	Social responsibility	Community Engagement and Development	

Stakeholder Satisfaction Survey

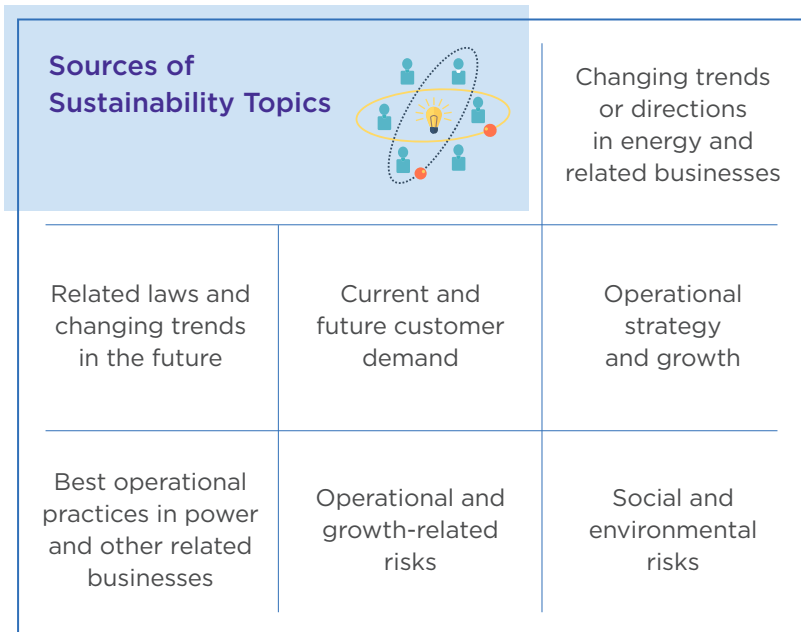


In 2019, Banpu Power conducted stakeholder satisfaction survey outside the organization with 5 groups of stakeholders, including business partner, regulator, consultant, supplier and financial institute, which are the most important part in building business growth together with the Company. The questionnaires sent through online channel in order to strengthen stakeholder relationship and improve efficiency of our operations in the future. The survey resulted that the stakeholders with high level of satisfaction was 95% and good level of satisfaction was 5% of participants.



Materiality Assessment

Banpu Power has assessed key materiality affecting the sustainable development (SD) while its SD framework has been correspondingly to the Global Reporting Initiative (GRI) and AA1000 AccountAbility Principles (AA1000AP). The Company will specify strategies, goals and clear indicators for key materiality, referring to data collection in accordance with GRI Standards covering environmental, social, and corporate governance issues (ESG). The Company's significant materiality has been annually reviewed by the Sustainable Development Committee.



Materiality Assessment Procedures

1. Identifying Sustainability Topics

The Company has identified the materiality of sustainability by studying from various sources and collecting business related issues as well as expectation from stakeholder's engagement. In 2019, stakeholder's opinions were taken for reviewing and identifying the Company's SD materiality presented in this report, for example,

- Arranging visits to clarify the project and listen to suggestions from government agencies
- Arranging visits to explain and listen to opinions from investors, regulatory agencies, consultants, business partners and financial institutions
- Conducting a satisfactory survey from co-working companies by sending online surveys to business partners, including joint venture partners, regulatory agencies, consultants, partners and financial institutions
- Conducting meetings to update the Company's progress and listening to opinions from various meeting such as the shareholder meetings and the analyst meetings, etc.
- Conducting public hearings such as the wind power plant project in Vietnam
- Surveying community opinions during the community relations staff's filed work.
- Monitoring of ESG trends that are in the international interest
- The employee engagement survey result and employee opinions

2. Identifying Significant Materials on the Organization

The Company has assessed the levels of impacts on the organization in terms of financial and operational performance, strategies, reputation, and laws compliance by considering the magnitude and likelihood. This includes a forecast of possible risks or the Company's situation when the sustainability materiality is evaluated.

3.

Identifying Significant Materiality on Stakeholders

A degree of impacts on stakeholders is identified together with a level of stakeholders' influences on the Company's performance.

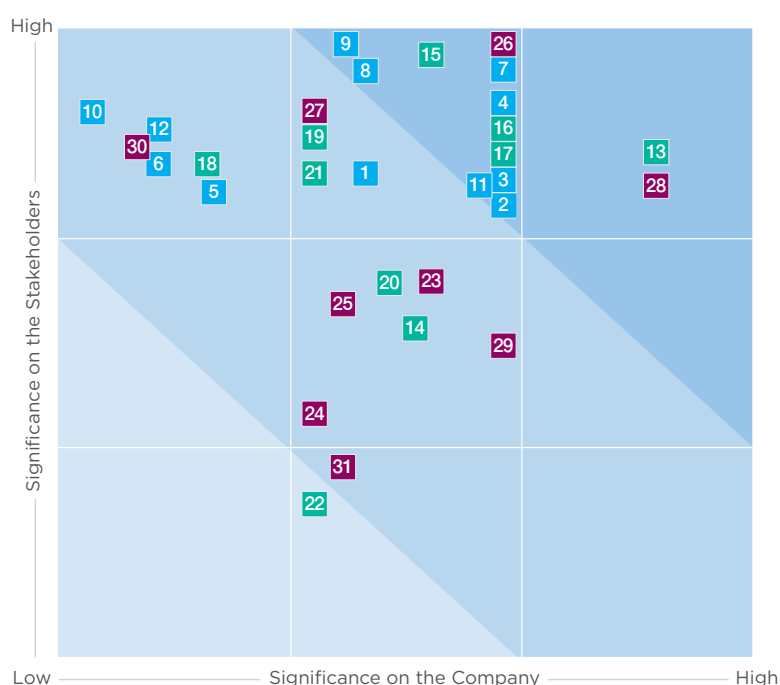
4.

Prioritizing Topics

Each material topic is screened and prioritized according to its impacts on the Company and the stakeholders in order to select the significant materiality to formulate sustainable strategies and operations approved by the Sustainable Development Committee.

Materiality Matrix

The Company used the 2019 material assessment results in determining contents of this report by raising the customer management issue to be higher last year since it is an issue to which the national and international sustainability assessment agencies pay attention. As a result, there were 13 key materiality topics from a total of 31 in 2019.



Economic Topics	Environmental Topics	Social Topics
1. Financial performance 2. Business ethics 3. Anti-Corruption 4. Risk management 5. Business continuity management 6. Access and affordability 7. Process improvement and innovation 8. Supplier management 9. Contractor management 10. Product stewardship 11. Customer management 12. Plant decommissioning	13. Greenhouse gas emissions 14. Energy 15. Air quality 16. Water resources utilization 17. Water discharge 18. Non-hazardous waste 19. Hazardous waste 20. Ash 21. Biodiversity 22. Spill	23. Employee development 24. Succession plan development 25. Employee engagement 26. Safety 27. Occupational health 28. Community engagement 29. Corporate social responsibility projects at corporate level 30. Community resettlement 31. Labor management

Significance and Boundary

Sustainability Materiality Topics in This Report	Material Topics	Material Boundary on Stakeholders										Indicators and Targets (2018 -2020)	Linkage with GRI Standards	Page
		Within the Organization		Outside the Organization										
		Employees	Banpu Group	Joint Venture Companies/ Partners	Suppliers	Contractors	Customers	Financial Institutions	Governmental and Regulatory Agencies	Shareholders/ Investors	Communities			
Economic: 7 Material Topics														
Business Ethics	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	• Zero significant corporate governance complaints • All of significant corporate governance complaints resolved by a dispute resolution mechanism	-	38	
Anti- Corruption	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	• Zero incidents relating the Company's corruption • Corruption related complaints brought up to the investigation process while preventive and corrective measures carried out at the appropriate time • Certified to be a member of Thailand's Private Sector Collective Action Coalition Against Corruption (CAC)	205-3	44	
Risk Management	4		✓		✓		✓	✓	✓	✓	• Risk Management covering all operational units	-	50	
Process Improvement and Innovation	7	✓	✓	✓	✓	✓					• An increase of production efficiency and stability • Employee participation in innovation projects	EU 10 EU 11	62	
Supplier Management	8		✓	✓	✓						• No complaints on supplier management regarding ESG • Proportion of spending on local suppliers over 50%	308-1 204-1	66	
Contractor Management	9		✓	✓		✓			✓		• No contractor fatalities and related to working accidents • No complaints on contractor's management regarding ESG • Proportion of spending on local contractor over 50%	403-9 204-1	70	
Customer Management	11		✓	✓			✓				• No complaints on business ethics and customer privacy • All of customer complaints resolved in a timely manner • No complaints regarding safety and environmental issues from the use of products	418-1	72	

Sustainability Materiality Topics in This Report	Material Topics	Material Boundary on Stakeholders										Indicators and Targets (2018 -2020)	Linkage with GRI Standards	Page
		Within the Organization		Outside the Organization										
		Employees	Banpu Group	Joint Venture Companies/ Partners	Suppliers	Contractors	Customers	Financial Institutions	Governmental and Regulatory Agencies	Shareholders/ Investors	Communities			
Environmental: 4 Material Topics														
Greenhouse Gas Emissions	13		✓	✓			✓	✓	✓			• A GHG emissions intensity decreasing by 15% compared to the year 2012 baseline • An increase of renewable power generation is no less than 0.8 Gigawatts by 2025	305-4	78
Air Quality	15	✓	✓	✓					✓		✓	• The air quality released from the stack complying with specified laws • Emission intensity decreasing according to targets set	305-7	90
Water Resources Utilization and Water Discharge	16 17		✓	✓					✓		✓	• A quality of discharged water complied with laws • A water intensity decreasing according to targets	303-4 303-3	94
Social: 2 Material Topics														
Occupational Health and Safety	26	✓	✓	✓		✓	✓		✓			• Zero Fatalities • Zero Lost Time Injury Frequency Rate (LTIFR)	403-9	118
Community Engagement	28		✓	✓					✓		✓	• No significant complaints from the community • All significant complaints from communities resolved by a dispute resolution mechanism	413-1	124



Banpu Power and Sustainable Development Goals

Banpu Power has established the performance targets aligning with the United Nations Sustainable Development Goals (SDGs) as follows:

7 AFFORDABLE AND CLEAN ENERGY



By 2030, ensure universal access to affordable, reliable and modern energy services.



By 2030, increase substantially the share of renewable energy in the global energy mix.



By 2030, double the global rate of improvement in energy efficiency.

- Achieve the power generating capacity target of 5,300 MW comprising of 4,500 MWe from the base-load power generation and 800 MW from the renewable power generation by the year 2025.
- Reduce energy consumption intensity by not more than 1.72 GJ/MWh.

Affordable

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



By 2030, achieve the sustainable management and efficient use of natural resources.

- Reduce water consumption intensity by not more than 1.103 m³/ MWh.

8 DECENT WORK AND ECONOMIC GROWTH



Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment.

- Achieve zero fatality and zero lost time injury frequency rate (LTIFR).

Reliable

The United Nations Sustainable Development Goals (SDGs)

Banpu Power's Targets

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



Substantially reduce corruption and bribery in all their forms.

- Achieve zero incident involving non-compliance, corporate governance and corruption. If there are significant complaints, they must be investigated and resolved in appropriate timeframe.
- Be certified as a member of the Collective Action Coalition Against Corruption (CAC).
- Implement a risk management system covering all business entities.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

- Reduce air emissions intensity of the conventional power plants for ultra-low emissions.
 - $\text{SO}_2 < 76.6 \text{ g/MWh}$
 - $\text{NO}_x < 118.4 \text{ g/MWh}$
 - $\text{PM} < 23.0 \text{ g/MWh}$
- Achieve 100% compliance in social and environmental laws and regulations.

Eco-friendly

13 CLIMATE ACTION



Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.



Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

- Reduce GHG emissions intensity per unit of product by 15% compared to the 2012 baseline, that is not more than 0.5062 tonnes $\text{CO}_2\text{e/MWh}$, to respond the global GHG reduction target of the United Nations Framework Convention on Climate Change (UNFCCC).
- Establish business continuity management target for crisis situation including climate change events.



WE ARE ENERGY

Economic



EBITDA
4,802 million THB

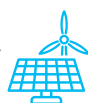
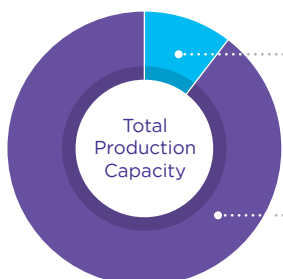
Employing the risk management system, **covering** all projects and expanding to joint-venture companies

Zero Complaint regarding CG and corruption

The availability factor of 3 CHP plants in China
94.07%

A total production capacity of base-load energy generation of
2,247 MW

A total production capacity increase of
102 MW in 2019



Renewable Energy
Generation Capacity



240 MW >>> **11%**



Base-load Energy
Generation Capacity



2,007 MW >>> **89%**

Financial Performance and Business Growth

Strategy

- Putting great importance on existing assets management in order to achieve the performance target, increasing profitability and maintaining competitive advantages.
- Focusing on seeking investment opportunities in countries with growing demand for electricity while the government has a policy to support investment, including related businesses' investments.
- Providing sufficient funding sources to support the growth targets and provide an appropriate return on the long-term investment.



Significance and Reporting Boundary

The sustainable development framework is considered as a cornerstone for the Company's business operations in order to create growth and values for the organization and stakeholders in the supply chain as well as being responsible for the environment. This is due to the company's financial performance and growth beneficial to the interested parties, including:

Stakeholders	Economic Benefits Received	Stakeholders	Economic Benefits Received
 Business Partners and Suppliers	• Operating expenses • Project development costs	 Shareholders	• Dividends
 Employees	• Salary, wages and welfares • Contributions for provident fund • Employee development expenses	 Government Sector	• Taxes such as corporate income tax and local maintenance tax, house and building tax, specific business tax and others
 Financial Institutions	• Interest paid and financial expenses	 Communities	• Community development projects in the surrounding areas of operations

The Company has established the practice guidelines for financial development and growth as follows:

- ✓ Developing a business plan to create organizational growth and maximize returns for shareholders as well as creating good relations with both public and private agencies in the areas where the Company has operated a long-term business.
- ✓ Increasing capabilities to create maximum added values by giving great importance the power generation and distribution business that needs stability with environmentally friendly as well as considering the appropriateness of using HELE (High Efficiency, Low Emissions: HELE) technology for developing new projects.

The management and performance data in this report covers the businesses of which the Company has operated and invested by the end of 2019, consisting of 31 power plants and projects in Thailand, Lao PDR., China, Japan and Vietnam. The management and operational performance data of the joint-venture companies are included as the Company has received the most profit sharing from these joint venture companies including the joint investment enterprises. Additionally, the Company's costs are from the projects under development and construction.

Indicator

- Production capacity
- The project development plan and commercial operation commencement according to the contracts

Target

- Total production capacity of **5,300** MW by 2025, divided into **4,500** MWe from base-load power plants and **800** MWe from renewable power plants.

Performance

- Total capacity of **2,247** megawatts (equity basis), increasing by **102** MW during the year, consisting of **2,007** MW from conventional power generation, accountable for **89%** and **240** MW from alternative energy generation, equivalent to **11%**, as well as another **654** MW from projects under construction and development expected to commence operations by 2023.
- Co-founding Banpu NEXT Company with an aim to increase capabilities and competitive advantages of the renewable energy business and the energy technology group.

Management Approach

The Company has a management approach to drive towards success according to the organizational key enablers as follows:



Financing in accordance with the investment plan

- Managing financing and investments to have appropriate financial ratios.
- Creating added values by focusing on creating financial returns.



Operational excellence

- Improving the equipment efficiency and maintenance as scheduled in the operational plan to increase competitive advantages.
- Developing capabilities plan relevant to the technical and engineering fields.



Risk management

- Conducting business strictly according to rules, regulations and relevant laws.
- Smooth and sustainable production operations.
- An ability to develop and manage projects to achieve returns on investment as targeted.



Business process development and organization structure

- Focusing on working process by adhering to the Banpu Heart corporate culture.
- Developing leadership skills and supporting employees to play an important role.



Readiness for adaptation

- Flexibility in enhancing the Company's potential in accordance with changing businesses, including applying technology to increase efficiency.

Performance

In the year 2019, the Company's business growth performances were as follows:





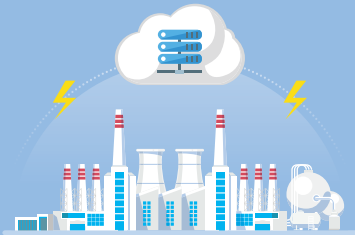
Total production capacity of **2,247** MW (equity basis), increasing in a total of **102** MW during the year.

- An investment in Jixin Solar Power Plant in China with a production capacity of **25.22** MW.
- Expanding a production capacity of **52** MW of the Luannan combined heat and power plant - Phase 3 in China.
- Commencing commercial operation of the Kurokawa Solar Power Plant in Japan, with a production capacity of **18.9** MW.
- Investing in 4 solar power plants in Japan with total production capacity of **6.32** MW.

Having Banpu Renewable Energy Company Limited (BRE), a subsidiary company, merged with Banpu Infinergy Company Limited (BPIN), a subsidiary company under the Banpu Group of Companies, to establish the Banpu NEXT Company

BANPUNEXT

to operate clean energy business, renewable energy power plants and energy technology business in order to increase the potentials of creating maximum values for investment expansion, which is in line with the energy usage patterns in the future.



Investing in a virtual power plant (VPP) business and a new energy trading business in Japan, which can sell **35** GW of electricity in an amount of THB **142** million.

Adjusting the growth target to **5,300** MW by 2025, divided into **4,500** MWe from conventional power plants and **800** MW of renewable energy, of which the latter will be from a 50% stake in Banpu NEXT focusing on clean energy and energy technology businesses.



Starting constructions under the construction service contract of the wind power plant project - Phase 1 in Vietnam with a production capacity of **30** MW.



Looking for opportunities for investment expansion in both business conduction and potential countries, including joining forces with Banpu Group

to strengthen the planning and development of the power business especially the feasibility study of conventional power plants using high level and environmentally friendly technologies in both the United States and Vietnam.



Currently, Banpu Power has 31 power plants and projects, consisting 22 commercial operation power plants and 9 under development projects. The Company's production capacity (equity basis) is **2,901** MW equivalent, consisting **2,247** MWe commercial operation production capacity.



For the year 2020, the Company expects to operate additional 4 commercial operation power plants with total production capacity of **451** MWe (equity basis), namely the Shanxi Lu Guang Power Project in China, and Vinh Chau wind power plant - Phase 1 in Vietnam, as well as the Yamagata and Yabuki Solar Power Plants in Japan.



Business Ethics

Strategy

- Managing the organization to be transparent and auditable as well as creating equality for all groups of stakeholders.

Significance and Reporting Boundary



Banpu Power aims to operate its business to the maximum benefit of shareholders, investors, customers, business partners, communities and stakeholders. The Company therefore puts utmost efforts to run its business to consistently grow with good returns in parallel with conducting business with honesty, integrity, and morals. The Company developed the Code of Conduct booklet, compiling code of best practices for clarity and convenience for the Company's Board of Directors, executives and employees. As a result, they acknowledge the practices expected by the Company and use it as a practice guideline. This, in return, will help them manage the organization transparently and auditable as well as create equality to all stakeholders. In addition, the Company is committed to respecting and complying to relevant laws, regulations, and commandment wherever the Company operates its businesses.

Management Approach

The Company commits to conducting its businesses in compliance with laws, regulations and criteria relating to domestic and international business conduction as following:

- ☑ CG ASEAN Scored Card by ASEAN Capital Market Forum



- ☑ Principles of Corporate Governance by the Organization for Economic Co-operation and Development (OECD)

- ☑ The Securities and Exchange Act

- ☑ Policy Statement on Code of Best Practices of Directors of Listed Companies

- ☑ The Principle of Good Corporate Governance by the Stock Exchange of Thailand (SET) and the Securities and Exchange Commission (SEC)



All employees including Board of Directors and senior executives adhere to the Code of Conduct booklet as a guideline to perform their duties with honesty and transparency, sticking to the rule of law, justice, and ethics, inclusion of valuing customers, having social responsibility, not involving in politics and concerning

to all group of stakeholders. These also include non-violation of human rights, anti-corruption, no gifts and bribes, no conflict of interest, no actions violating others' intellectual property or copyright, and having channels for whistleblowing.

Indicator

- A proportion of significant CG complaints resolved, compared to the materialized ones.
- Evaluation results of corporate governance from involved departments.

Target

- All significant CG complaints are solved while measures to prevent repetition are created.
- Assessment results are in a very good level, or equivalent to **80%** of the total score.

Performance

- No CG complaints in 2019
- Receiving a **4-star** CG Rating (Very good level) with a score of **87.72%** from the Corporate Governance Report of Thai Listed Companies (CGR) project organized by the Thai Institute of Directors in 2019.
- Receiving full **100** scores in the quality rating of the Annual General Meeting of Shareholders for the year 2019 from the Thai Investors Association

Performance

Banpu Power has cultivated ethical working culture and set the 'ethics' as one of the corporate core values as well as the key performance indicators for all executives and employees. The business ethics activities have been continuously promoted throughout the organization so as to ensure that all employees know well about business ethics and anti-corruptions. Activities organized were as follows:



Corporate Governance and Code of Conduct training for new staffs



The annual refreshment session on Corporate Governance and Code of Conduct (CG Day) for employees



Developing all kinds of media with interesting presentations by using key contents from the CG policy and Code of Conduct, such as "CG Switch It On Quiz" CG Tips, etc., so as to make employees understand good governance and business ethics properly



In 2019, the Company participated in the annual assessment from the Corporate Governance Report of Thai Listed Companies (CGR) project organized by the Thai Institute of Directors, receiving a 4-star CG Rating (Very good) with 87.72% score. In addition, it also received full 100 scores on the quality of organizing the Annual General Meeting of Shareholders 2019, evaluated by the Thai Investors Association.

In the year 2019, the Company developed and improved the Code of Conduct booklet by applying the practice guidelines related to business ethics management within the organization to the said manual, such as:

Market Sensitive Information Management



is one of the duties the Company's Board of Directors, executives, employees, consultants and BPP Group of companies must adhere as the practice guideline as follows:

- Setting up an internal system to prevent leakage of confidential information.
- Cultivating a corporate culture on keeping confidential information through continuous communications in order to raise awareness among relevant persons on their responsibility to keep information confidentially.
- Limiting the number of persons having the authority to access to confidential information on a need-to-know basis as well as deploying the information access control system for contract parties and other service providers who can reach the Company' system.
- Carefulness in receiving and sending information to and from the third parties, being aware of one's responsibility involved in using and controlling confidential information.
- Setting up the appropriate information technology and control system.

Using computers and information technology



in accordance with the Computer Crime Act (Version 2) B.E. 2560

Complying with the anti-corruption policy



regarding giving & accepting gifts, entertainments or other benefits

Corporate Social Responsibility



with following practice guidelines:

- Operating production activities in every step with care and responsibility to all stakeholder groups.
- Developing communities and surrounding society in response to the community's true needs.
- Promoting education and learning for children and youth.

Sustainable development



focusing on various aspects as follows

- **Adhering to CG principles**

Complying with laws and various criteria related anti-corruption, including the implementation of international standards at the Company's operations covering partners, contractors and business alliances.

- **Occupational Health and Safety**

The Company assessed and reviewed risks in the operational areas to be used as an information for managing occupational health and creating a safety working environment. Additionally, knowledge and awareness on safety was promoted to employees, trade partners, contractors and business partners.

- **Environment**

The environmental impacts were studied and assessed prior to running a project to determine appropriate measures for preventing and reducing the effects of each project. To control impacts and comply with laws, the Company focused on the integration of reducing or optimizing resources utilization, preventing impacts at its original sources, including reducing and alleviating them as well as managing the project's environment. Besides, the Company also assessed and reviewed environmental risks as well as set up the appropriate goals and indicators to encourage continuous development throughout the supply chain.

- **Stakeholders Participation**

The systematic stakeholder's hearing process and the regular review were arranged through both organizing meetings and complaints channels, as well as establishing supportive and corrective procedures when receiving complaints in order to improve the Company's operations.

- **Community Engagement**

The Company has regularly established the community's engagement procedures in order to understand their true needs. To be truly accepted by the community, the Company's operations have been appropriately improved while projects contributed to sustainable development and beneficial to communities and societies have been implemented.

- **Respectful to Human Rights**

The Company has operated its business adhering to human rights policy aligned with human rights protection principles throughout the supply chain. These include no discrimination due to differences on origins, ethnicities, genders, ages, skin colors, religions, beliefs, politics and culture, etc. For employees, the Company has set up the employment policy with fair compensation and without discrimination along with providing them the opportunity to learn, give suggestions and develop themselves to the fullest potential as well as have their career growth equally. In addition, the Company has supported trade partners to manage their labor operations, respectful to human rights as specified by laws. Meanwhile, our customers are well treated and proacted as can be seen from product and service quality. Furthermore, customer's data have also been protected while preventive and remedy measures have been set in case of products and services are harmful to customers. The customer relationship has been managed inclusion of listening to their opinions and reviewing their suggestions for our continuous improvement.

Complaint Handling Process and Corruptions within the Organization



Complaint Handling Channels

-  **Submit a letter** to Secretary of Corporate Governance and Nomination Committee
Banpu Power Public Company Limited
26th Floor, Thanapoom Tower, 1550 New Petchburi Road,
Makkasan, Ratchathewi, Bangkok 10400
-  **Website:** https://www.banpupower.com/complaints_handling
-  **Banpu Portal:** <http://portal.banpu.co.th> (BPP Whistleblower)
-  **E-mail:** GNCchairman@banpupower.co.th
and/or BPP_Comsec@banpupower.co.th

Complaints Handling Persons

- Chairman of the Governance and Nomination Committee
- Secretary to the Governance and Nomination Committee

The complaints will be brought into to the corporate fraud management process. The Investigation Committee will investigate the complaints received in accordance with the Corporate Fraud Management guidelines while the investigation result with recommendations will be presented to the Chief Executive Officer for making decision and guiding appropriate actions. Additionally, such complaints will be reported to the Corporate Governance and Nomination committee every quarter and will later be summarized and further reported to the Board of Directors. If anyone commits a breach of discipline, he/she must be responsible for compensating the damage caused by this action to the Company. He/she will be also legally liable for those who have been damaged or effected by the said action as well. In addition, the Company also reviews the procedures to find ways to prevent the repeated incidents.

Internal Control



To ensure that all business units operate in line with the policies, laws, regulations, and operational practice manuals, the Company has set up an operational performance appraisal and an internal control system within the organization on a regular basis. All of these activities have been implemented in accordance with the Committee of Sponsoring Organizations of the Treadway Commission (COSO), consisting of five components, including internal control, risk assessment, operational control, information technology and communication systems, and tracking system.

CG Switch It On

'CG Day' is the annual event organized with an aim to promote good corporate governance (CG) so as to make them understand and realize the importance of CG principles. To be aligned with an improvement and development of the CG policy and Code of Conduct manual, the CG Day 2019 was called 'CG Switch It On'. At the event, various activities related to CG, for example, CG policy and practice games, Q&As regarding the best practices in accordance to CG principles, and etc. were organized so that employees realized that CG was not distant and easy to understand.

The Company has still paid great importance to a two-way communication with employees. Aside from communicating about the corporate best practices, all levels of operations have been encouraged to perform in accordance with business ethics via a variety of activities and other communications channels. In addition, employees are encouraged to express their opinions, submit any enquiries, or file related complaints via various channels provided, including electronic mails, telephones, or a whistleblowing system.





Anti-Corruption

Strategy

- Banpu Power has assessed corruption related risks and determined preventive measures and inspections as well as cultivated ethical working culture by determining an ethic as one of its core values and as a key performance indicator for its management and employees.



Significance and Reporting Boundary

‘Corruption’ is considered as a type of crime having a negative impact on the economy, society, and environment, as well as the international confidence, i.e. causing poverty in countries involved with corruption, human rights and democracy violations, unfair investment allocation, including being deprived of the rule of law. Corruption may be the use of power for personal interests and the abuse of position as well as the wrongful authority to take advantages for their own or others’ interests. As a result, Banpu Power has highlighted the importance of good corporate governance. The Company adheres to good governance principle and commits to conducting businesses with transparency, integrity and responsibility for shareholders, customers, employees, society and stakeholders. The Company, therefore, has continuously fought against any forms of corruption either in a direct or indirect manner or via a third party. Additionally, the anti-corruption measures have been included in its Anti-Corruption Policy used as the practice guidelines for conducting businesses with integrity and transparency, striving towards the sustainability organization.

Management Approach

The Board of Directors, management and employees mutually agreed to conduct businesses in an ethical and honesty manner in accordance with laws, good governance principle, honesty practices, corporate missions, the ‘Banpu Heart’ corporate culture and ethical standards. The Company has established the anti-corruption measures by setting up work procedures and standard practices in accordance with the Anti-Corruption Policy and the practice guidelines. Moreover, potential corruption risks have been regularly monitored and assessed inclusion of communicating these measures to board of directors, management and employees throughout the organization, including stakeholders. To conduct concrete anti-corruption actions in its joint venture companies, the Company has introduced the Anti-Corruption Policy and practice guidelines through various channels including executive directors who undertake a duty on behalf of the Company, announcement of the Anti-Corruption Policy and Practice, arrangement of workshops, as well as conducting an internal audit.

Performance

In 2019, the Company has no complaint and tolerance against corruption. Various anti-corruption activities were implemented as following:

- ✓ No incidents relating to the Company’s corruption.
- ✓ Certified to be a member of the Collective Action Against Corruption (CAC) by the Thai Institute of Directors.
- ✓ Instilling the ethical working culture by determining ‘Adhere to Integrity and Ethics’ as one of the corporate shared values.
- ✓ Continuously proceeding in accordance with the practice guidelines for offering and receiving any favor of gifts, hospitality or other similar forms of rewards consistent with Banpu Power’s Anti-Corruption Policy (No Gift Policy) as well as communicating the Anti-Corruption Policy to directors, management and employees across the organization including stakeholders, turning them into the materialized practices.

Indicator

- The number of incidents relating to the Company's corruption.

Target

- Zero incidents relating the Company's corruption.
- Continuously organizing communication activities.
- Cultivating ethical working culture by determining the value of "Adhere to Integrity and Ethics" as one of its core values.

Performance

- Zero tolerance against corruption in 2019.
- Assessing corruption risks and protection guidelines for the year 2019, covering all businesses of the country that the company invests in both subsidiaries and joint ventures.
- Organizing activities to raise awareness on anti-corruption
- The internal corporate values survey results found that 'Adhere to Integrity and Ethics' value is classified as the behavior employees express the most.
- Certified to be a member to the Collective Action Against Corruption (CAC)

- ✓ Assessing corruption related risks and measurements in 2019, covering business units in all countries where the Company has invested both in the subsidiary and joint-venture companies.
- ✓ Determining measures to prevent frauds by specifying various working processes and practice procedures in accordance with the anti-corruption policies and practices.
- ✓ Developing measures to detect any corruption as a process for investigating and reporting actions possibly constituting corruption. Moreover, communication channels have been established so that all stakeholders and involved parties, including executives and employees have the opportunity to make complaints or report frauds, or in the event of unfair treatment. The details and practice guidelines are disclosed on the company website.

- ✓ Putting top priority to keeping whistleblowing information confidentially and establishing a process to prevent and protect the whistleblowers from any subsequent attacks or threatens as well as determining measures to compensate for damage the complainant or the whistleblowers may receive.
- ✓ Communicating about anti-Corruption within the organization through trainings, educating employees via electronic mails, orientations for all employees, inclusion of having employees take a test to evaluate their understands on such subjects. This was to make employees well aware of anti-corruption.
- ✓ Disclosing the anti-corruption policies and practices in the annual report, the annual information disclosure report, the Company's website, including communicating with all stakeholder groups.
- ✓ Improving the procurement policy to be updated and meeting the international standards.

Anti-Corruption

On February 6, 2019, executive and employee representatives of Banpu group and Banpu Power, the certified members of Thailand's Private Sector Collective Action Coalition Against Corruption (CAC), participated in the Anti-Corruption Day 2019 held under the theme of 'Uniting Power... Volunteering to Fight Against Corruption'. The aim was to express the Company's determination in co-fighting all forms of corruption as well as adhering to the principles of good corporate governance and business ethics, including the anti-corruption policy and practice guidelines. The event was organized by the Anti-Corruption Organization of Thailand at the Bangkok International Trade & Exhibition Centre (BITEC) in Bangna.

No Gift Policy



'No Gift Policy' or a practice guideline for refraining from receiving gifts, is a declaration of the Company's intention to refrain from receiving any gifts, entertainments or other benefits in order to operate businesses aligned with the principle of good corporate governance, business ethics, transparency, avoiding any actions possibly leading to discrimination or any conflicts of interest, and to ensure that executives and employees perform their duties in accordance with the international standard. In 2019, the Company communicated the guidelines of offering and receiving gifts, souvenirs and other benefits to shareholders, investors, customers, business partners, all groups of stakeholder via the Company's website.

Compliance

Strategy

- Having the effective internal control system in both preventing and monitoring of operational performance categorized into several levels including self-auditing and an evaluation by the independent unit reporting directly to the Audit Committee and the Board of Director, information system development to integrate monitoring system data related to regulatory and legal compliance, risks management, and corporate governance.



Significance and Reporting Boundary

Compliance with laws is the basic principle the Company must practice in conducting businesses. Meanwhile, it is a major challenge since the Company conducts businesses in many countries with different regulations at both local and federal levels. Besides, the outcomes of international cooperation related especially to climate change are an important driving force in rushing amendment on environmental laws in the energy industry. If the Company cannot adapt itself promptly, it would affect business operations.

The Company's business operations are related to various laws and regulations that must be fully complied, such as environmental and safety laws, labor laws, trades and investment laws, securities and exchange regulations as well as various licenses. This also includes doing business by adhering to business ethics, for example, anti-corruption, unfair competition and any actions against human rights, for instance, equality. Thus, a failure to comply with these laws will affect the sustainability of business operations and credibility of the Company.

The boundary of legal and regulatory compliance in this report covers all business entities in which the Company has more than 50% of investment and management control.

Management Approach

Banpu Power significantly emphasizes on legal compliance in all business units in order to prevent risks possibly having a severe impact on business operations, and to create confidence among all stakeholders, especially the surrounding communities, employees, business partners and shareholders of the Company. This reflects the Company's responsibility on society and environment in every country where we have business operations. To create confidence among stakeholders that the Company has been operating in accordance with laws and external regulations, the Company has established the Internal Audit and Corporate Compliance as a major force to coordinate and monitor legal compliance divided into two main functions:

Corporate Compliance

responsible for promoting, monitoring and auditing operational performance in accordance with external laws and regulations

Internal Audit

responsible for assessment of internal control systems including compliance with internal policies, regulations and operational practice guidelines

Indicator

- Coverage ratio of the internal control and compliance system.
- The number of significant fines from non-compliance.

Target

- Internal audit and compliance systems covering all business entities in which the Company has over 50% of investment and management control.
- No significant incidents involving non-compliance.

Performance

- Internal audit and compliance systems covering all business units where the Company has more than 50% of investment and management control.
- Conducting the internal audit and compliance assessment among joint venture companies as well as coordinating with business partners to follow up on deficiency resolution to meet the common standards.
- No significant incidents involving non-legal compliance.

Auditing of Internal Control System and Compliance with Internal Policies and Regulations



To ensure that all departments have operated in compliance with the internal policies, laws, regulations and operation practice guidelines, the Company has regularly audited the operational performance and internal control systems based on the framework of Committee of Sponsoring Organizations of the Treadway Commission (COSO), which consists of five areas. These include internal control, risk assessment, operational control, information and communication technology system, and monitoring system. Furthermore, the Company has established the Internal Audit and Compliance Unit as an independent body, reporting directly to the Senior Vice-President of Internal Audit and Compliance and the Audit Committee to evaluate adequacy and efficiency of the internal control system as well as corporate compliance.

Operational Audit by the International Certified Body

The Company has continuously applied the international standards to operational management in order to improve operational standards and create confidence to all stakeholders. As a result, the Company's business entities in each country have been certified by the international standards, namely the ISO 9001 Quality Management System Standard, the ISO 14001 Environmental Management System Standard, the ISO 45001 Occupational Health and Safety Management System and the ISO 22301 Business Continuity Management Standard from the International Certified Body located in each country. Meanwhile, the legal compliance is part of the requirements of such systems.

Country	Business Unit	International Standards			
		ISO 9001	ISO 14001	ISO 45001	ISO 22301
China	Zouping Power Plant	✓	✓	✓	
	Zhengding Power Plant	✓	✓	✓	
	Luannan Power Plant	✓	✓	✓	
Thailand	Bangkok Office*				✓

*Bangkok Office in Thailand incorporated with Banpu Group

Quality Assurance Review (QAR)

The Company in cooperation with Banpu Group has assigned all support units under the supervision of Corporate Services Department, including Department of Occupation Health, Safety, Environment and Community Development, Information Technology Department, Legal Affairs, Procurement and General Administration as well as Business Process Management Department, to review qualities and legal compliance of operations by establishing the QAR Working Group from Bangkok Office to assess the operational performance of the subsidiaries in each country; meanwhile, the QAR working group of each subsidiary

would conduct a regular review in every business unit located in that country at least once a year.

In 2019, the Company conducted a quality review of legal compliance by improving the benchmark to be more proper for business operations, covering five dimensions, namely corporate governance, compliance related risk management, culture and education, technology and continuous improvement. The results of the evaluation will be used for further efficiency improvement in each department.

Monitoring of Environment Quality Required by Laws

The Company has a system to monitor environmental qualities required by laws and monitors the possibility of changes on laws in order to promptly adjust itself. The Company monitored environmental qualities required by laws as follows:



Internal audits with the Company's measurement systems, such as the Continuous Emission Monitoring (CEM) and the Ambient Air Quality Monitoring System (AQM) etc.



Inspections by external agencies, such as the water and air quality inspections by external agencies, the audits for certification of the ISO 14001 Environmental Management Standard etc.

Performance

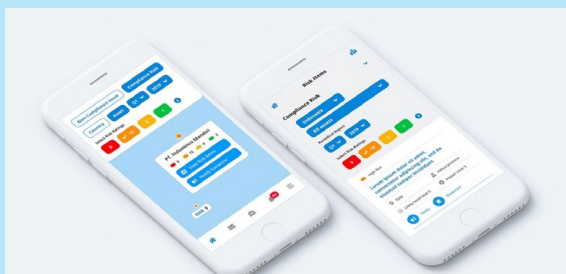
In 2019, the Company established an internal audit system and legal compliance supervision covering all business units in which the Company has more than 50% of investment and management control including the Head Office in Thailand, and the Power Business in China and Japan. There were no significant incidents involving non-compliance in all aspects including environment, labors, society, human rights violations as well as business ethics misconduct. Environmental Quality Monitoring Results, such as monitoring air quality from stacks by the Continuous Emission Monitoring (CEM), water quality, waste elimination, and environmental management at the Company's combined heat and power (CHP) plants were better

than standards required by laws. There were no complaints related to non-legal compliances at both the CHP plants in China and the thermal power plants of which the Company holds investments namely, the BLCP Power Plant and the Hongsa Power Plant. To operate our business in accordance with laws and regulations of each country in which the Company has invested, Banpu Power has proactive operations to prevent any non-legal compliance and has regularly monitored its performance as follows:

- ✓ Managing audits to comply with external laws and regulations by using monitoring and performance reporting systems adhering to the ISO 19600 Compliance Management Systems-Guidelines.

- ✓ Formulating the Compliance Obligation List (COL), compiling all activities and laws to which the departments must comply. Every department then needs to conduct the quarterly self-assessment report and submit it to the Corporate Compliance on a quarterly basis.
- ✓ Establishing a Compliance Obligation List (COL), a new business unit the Company just started developing projects such as the energy trading in Japan, and wind power plants etc.
- ✓ Annually monitoring laws and regulations compliance by the Corporate Compliance Department.
- ✓ Enhancing knowledge and raising awareness about dangers and understanding the digital world as well as the Cyber Security Act 2019 (B.E. 2562) for all employees.
- ✓ Developing internal media to raise awareness on legal compliance, including providing knowledge about changing laws and regulations for all levels of employees on a regular basis.

C-RiM Application



In the previous year, the Company applied technologies to manage corporate risks and supervise legal compliance. The C-RiM program was developed to be used as the same data source throughout the organization as well as monitor the real-time risk assessment process able to present a variety of reports according to users' needs. For example, monitoring risks related activities and risk characteristics, executive summary reports, etc. This C-RiM program is the first ever version developed together with the Digital Center of Excellence so as to inform users the current risks and the status of organization's overall legal compliance so that they can follow up and improve their operational performance efficiently.

- ✓ Developing the Compliance Risk Management Application (C-RiM) to monitor and prevent risks related to legal compliance from business operations and reporting the operational results to the management regularly. Such application is an integration of the corporate compliance system and corporate governance as well as risk management so as to reduce repetitive work.

For other businesses of which the Company has both direct and indirect investments less than 50% and has no direct management including the BLCP Power Plant in Thailand and the Hongsa Power Plant in Laos, the Company incorporated with its business partners to monitor and oversee regulatory and law compliances via the committees of each company. Last year, both BLCP and Hongsa power plants had no significant incidents related to non-legal compliance.

Being Aware of Threats and Understanding the Digital World



On 5 June 2019, Banpu Group organized a knowledge sharing training-session on the topic of "Being Aware of Threats and Understanding the Digital World" to all levels of employees. Dr. Paiboon Amornpinyokiat, an expert and a member of the National Cyber Committee, was invited as a guest speaker. The event was aimed to create fully awareness on dangers and threats of the cyber, the Cyber Security Act 2019, including the response to cyber threats and penalties. The training received high attention from participating employees.

Risk Forum & Compliance Summit

On 16-18 July 2019, the Company, together with Banpu Group, held the Annual Risk Forum & Compliance Summit with an aim to be a platform for exchanging and reviewing corporate and legal risks management, allowing relevant departments in every country to develop their operational plan having appropriate business risks control, and fully complying with laws.



Strategy

- Using risk management for decision making and implementation of risk reduction plan.
- Using key risk indicators (KRI) to manage risks within the organization.
- Improving the risk management system to meet international standards

Significance and Reporting Boundary



Since a nature of electric and utilities business is relevant both directly and indirectly to society and environment, the Company has put great emphasis on operating business in accordance with applicable laws and international standards in each country where it has invested, inclusion of stakeholders' expectations. Effective risk management is a key mechanism the Company has used as an operational collateral to gain returns as targeted. In addition, managing risks related to business changes has also enabled the Company to adapt itself corresponding to the situation as well as increased business opportunities in the future. The reporting boundary covers all businesses the Company has invested more than 50% of shares and management control.

Management Approach

The Company's risk management is under supervision of the Board of Directors through the Audit Committee. The Risk Management Committee (RMC) has been set up with the roles to manage stakeholders and improve a risk management responsibility at operational levels. The RMC consists of Chief Executive Officer and senior management whose duties are as follow:

1

Assessing and managing risks to mitigate any risk effects on the Company's operational performance.

2

Providing policy related supports to help manage risks efficiently and to create awareness on any risks related to the Company's activities.

3

Supporting internal and external resources necessary for efficient risk management.

Indicator

- Coverage Ratio of risk management system
- Proportion of business units having risk indicators

Target

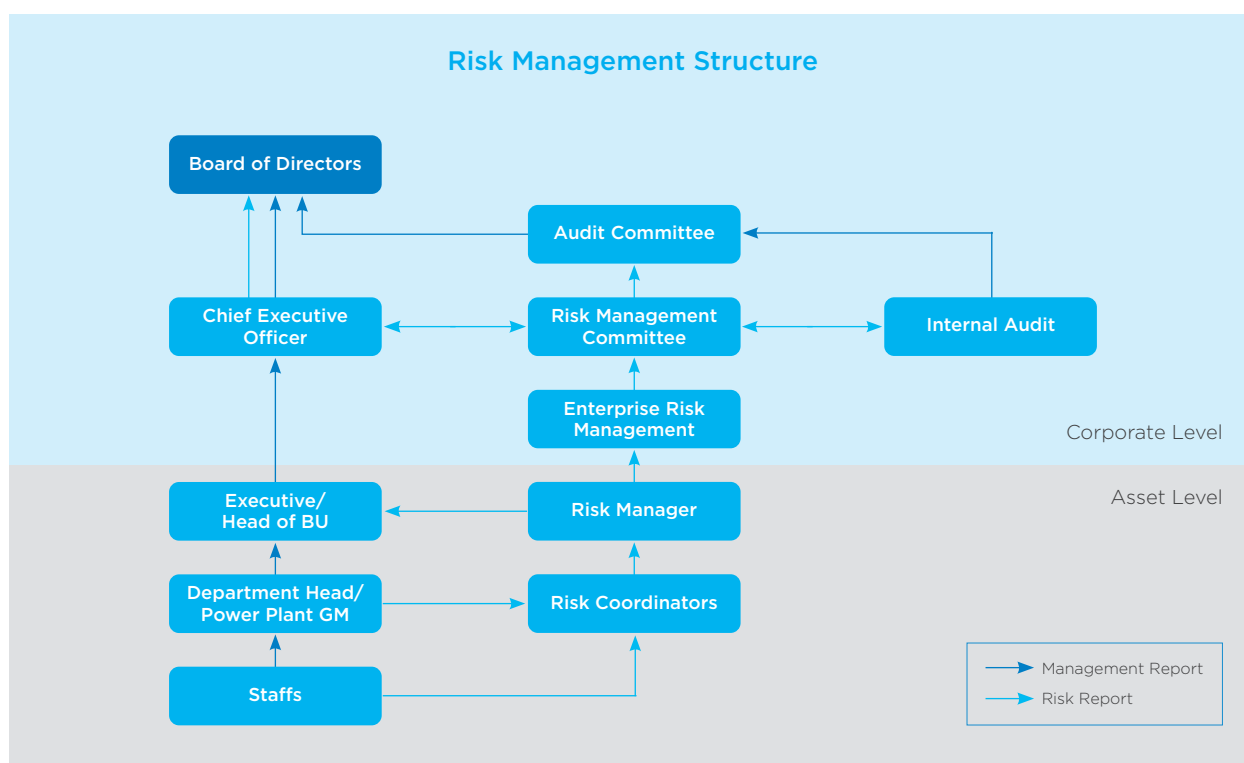
- A risk management system covering all business units.
- Setting up risk indicators for key assets the Company has invested.
- Organizing risk management trainings for employees in every country the Company has operated.

Performance

- Having risk management system covering all business entities.
- Setting up risk indicators for the Company's performance covering all business unit, inclusion of joint venture companies.
- Organizing risk management trainings for employees at the headquarters and those working overseas, namely Japan and China.
- Organizing activities in order to create awareness on risk management.

The Company has declared the Risk Management Policy with regular updates. A direct responsibility unit was established to coordinate with all departments to drive the effective risk management throughout the organization. A mechanism for finding and identifying key business risks covering the dimensions of environment, society, and corporate governance has been used in the annual corporate strategy development procedure. This is in line with the Company's strategic direction and related to the context of corporate sustainability management. The likelihoods and impacts on stakeholders have been assessed in order to consider priorities prior to defining as a list of organizational risks and assigning the responsible persons to mitigate risks at

the level accepted by the organization. Additionally, a progress of risks management has been regularly monitored while risk issues have been continuously reviewed. Moreover, the Company has integrated risk management principles to various procedures within the organization so as to raise awareness on business uncertainty and promote risk management as part of its operations in preparation for the future events. Regarding the risk management related to business interruption, the RMC meetings have been convened to monitor such risks and risks management results according to the risk mitigation plan. The risk management system review has been reported to the Internal Audit Committee and the Board of Directors on a quarterly basis.



Operation Mechanisms

For the highest efficiency of risk management, the Company has integrated risk management process into its operational plan, putting great importance on creating values for the Company and its stakeholders. The risk correlation principle is used for analyzing any risk correlations, both positive and negative aspects. The Company's risk management procedure starts from identifying risks by having operational employees who have expertise in such activities, identify risks by their own as well as evaluate possible impacts from such risks, to developing a risk mitigation plan in order to alleviate possible risks. Furthermore, the risk management procedure also includes a preparation of report submitted to supervisors for acknowledgement and continuous progress monitoring.



In the past several years, the combination of risk management with the Company's business plan can help promote the company's operational strategy. In addition, there are other committees involved such as the Financial Management Committee organizes a monthly meeting to monitor financial risks, etc.

Performance

Presently, the Risk Management System covers all of the Company's business entities including developing projects. Each business unit has used Key Risk Indicators (KRIs) and Risk Appetize principles to assess risks and report the results to the Risk Management Committee quarterly. Moreover, the Company continued improving its risk management system throughout the year 2019, inclusion of organizing the risk management workshops for employees in Thailand, Japan and China to continuously create awareness on significance of risk management.

Risk Categories	Risks
1. Strategic Risk	- Risks on strategic planning and implementation - Risks on human resources (HR) management and competency development to facilitate future growth - Risks on corporate reputation - Risks on new business investment
2. Financial Risk	- Currency exchange rate risks resulted from investments in many countries - Risks on financial loan supports by financial institutions for fossil power plants
3. Operational Risk	- Risks on changes in a power business - Risks on occupation, health and environment
4. Compliance Risk	Risks from regulatory and policy changes in countries where the Company has operated
5. Emerging Risk	- Technology risks - Climate Change risks - Cyber security risks - Epidemics risks
6. Other Risks	Human rights risks

Emerging Risks

According to the Company's risk assessment, four major emerging risks were found as follows:



Climate Change Risks

Climate change is a risk directly affecting Banpu Power both as an energy producer and a power consumer. The Company manages the climate change risks by two main approaches:

1. Reducing GHG emissions per power production unit by 15 percent in 2020 compared to that of 2012
2. Developing an investment plan and seeking opportunities in alternative energy targeting to generate renewable energy in a proportion of more than 20 percent in 2025.



Epidemics Risks

The first ever outbreak of a new strain of the corona virus (COVID-19) began in late 2019, affecting the whole world in terms of health and the supply chain in every business. As operating the energy business, it is necessary for the Company to continue operating during the epidemic period in order to generate electricity which is the main factor in carrying out people's well-being in the society. It is, therefore, a big challenge for the Company to seriously take measures to prevent the epidemic affecting the health of employees and society as a whole. The business continuity system is used with maximum capacity to enable the Company to operate its business continuously such as the information system facilitating employees to work from homes etc.



New Technology Risks

Emerging energy technology trends have driven changes in consumer behaviors as well as relevant laws and regulations focusing on clean energy and not relying on the central grid system. This has resulted in changes in power demand in various countries. In coping with such risks, the Company has collaborated with Banpu Group of companies to conduct a pilot project using micro grid technology in 2019. This pilot project was aimed at researching information for future products development in addition to existing projects



Cyber Security Risks

The development of information technology and communication systems has resulted in rapid economic and social development. If users use information in a creative way It will be useful for the development and enhancement of economy, society and environment in various dimensions. On the other hand, technology can also cause a lot of damage. If the malicious person has developed modern tools to attack the system, steal, destroy, distort information or deception, it will result in interference and destruction of securities at all levels whether on the personal level or the departmental, national and global levels. The energy business is one of the main attacking targets. The Company, therefore, has set up a cyber security protection system, including countermeasures and action plans if attacked. This is under the supervision of the Risk Management Committee and the information security experts who have been hired as advisors with responsibilities to suggest how to lay down the integrated system, inclusion of following up the progress of the cyber security operations in the joint-venture power plants.

Using the KRI and Risk Appetize Systems in the Organization

The Company has initiated the KRI system used as a key risk indicator, beginning with asset management to examine the operational risks of the Hongsa Power Plant since 2018. Since 2019, the KRI and Risk Appetize have been applied to the overall risk indicators of key power plants in which the Company has management control so as to assess risk appetizes systematically and effectively.

Creating Risk Management and Legal Compliance Culture Across the Organization

- **Risk Forum & Compliance Summit:** The Company, together with Banpu Group, has organized the Annual Risk Forum & Compliance Summit. The objective is to be a platform for presenting, exchanging, and reviewing the corporate and legal risks management, allowing relevant departments in every country to develop their operational plans with appropriate operational risk control and ensuring a complete compliance with laws.
- **Risk and Compliance Day:** Arranging activities to raise awareness and educate employees about risks and relevant laws.

Business Continuity Management

Strategy

- Preparing a business continuity management plan and arranging necessary resources including sufficient and appropriate communication, covering possible crisis and in line with the Company's risk management.



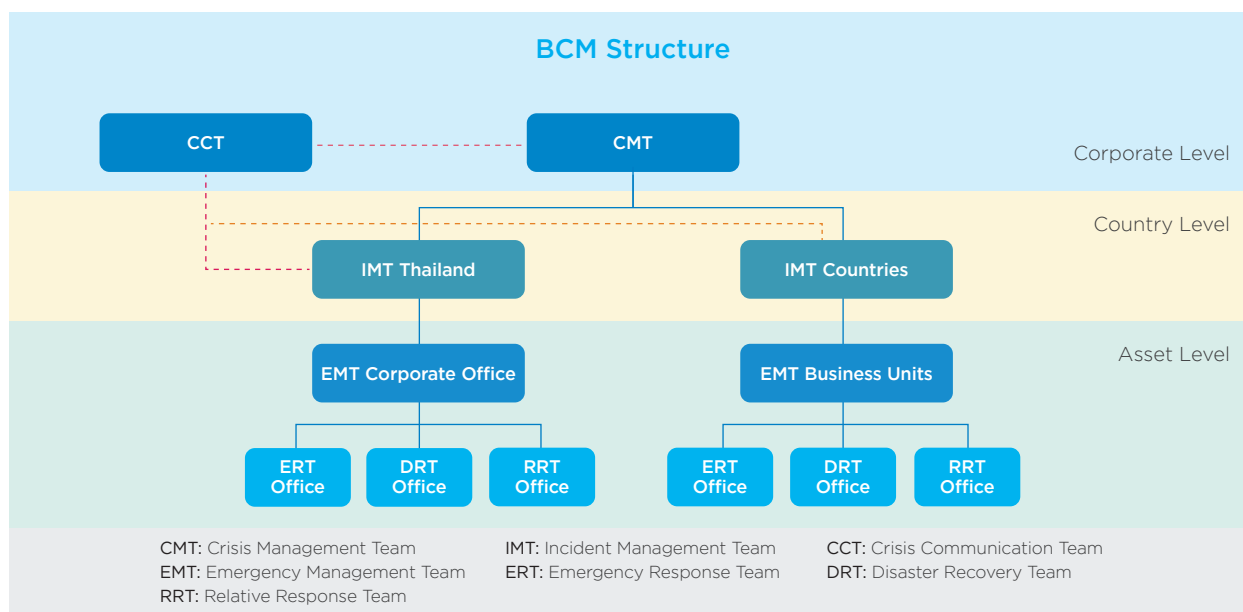
Significance and Reporting Boundary

The electricity business disruption from natural disasters, terrorists, cyber-attacks, protests or any incidents (e.g. fires and chemical leakage, etc.) is a risk affecting lives and various industrial production. Preparation for the rapidly operational rehabilitation during the crisis together with appropriate and adequate communication, will help minimize any impacts on the Company as well build confidence from power and steam buyers and other products' purchasers. The business continuity management (BCM) is, therefore, receiving high attention from the Company and stakeholders, especially customers, partners, and contractors. This reporting boundary covers all business entities in which the Company holds over 50% of shares and has management control.

Management Approach

The Company announced its business continuity policy in 2018 with reference to the principles and requirements of the ISO 22301:2012 business continuity management standard, covering from the process of identifying key work procedures, business impact analysis and risk assessment, as well as creating business continuity plans and conducting BCP drills. The Company's BCM has been integrated with the

supervision and management of Banpu Group where CEO of Banpu Power is one of the Crisis Management Team, assigned to be the event commander and provide information to the public in the crisis related to power business. This integrated BCM reflects a harmonious way of working, helping save operational resources with maximum effectiveness.



Indicator

- Conducting a risk assessment likely to affect business continuity throughout the organization.
- An ability to restore all necessary activities during the crisis in order to deliver products and services in the period expected by stakeholders.
- An ability to communicate appropriate and adequate information to the public in times of crisis.

Target

- Business continuity management covering all business units as well as new businesses in the future.

Performance

- Conducting a risk assessment possibly affecting business continuity across the entire organization.
- Conducting a business continuity management (BCM) drill for testing an ability to restore all necessary activities during the crisis in order to deliver products and services in the period expected by stakeholders.
- Reviewing risks to cover business expansion, prioritizing significant incidents, and improving the BCM manual and communication procedures.

Key targets of business continuity management



Response

- Effectively responding to the incidents and preventing extended damages.
- Appropriately and adequately communicating to the public in the time acceptable by stakeholders.

Recover

- Able to restore key necessary activities to rapidly deliver products and services in the time acceptable by stakeholders.
 - Preparedness of information technology system and supportive information for operations.
 - Preparation for alternative workplace and necessary equipment.

Restore

- Rapidly restoring all company's activities in the time accepted by stakeholders.

A significant challenge for the continuity of power business is a damage at large power plants where activity recovery takes time. The Company, therefore, has given priority to invest in preventing, controlling and reducing the incident severity, including appropriate and timely communications to external parties. For solar power plants, the Company has preliminary surveillance and verification by the remote information systems. An inspection has also been done when there is sufficient security. The focus is on closely communicating with the contractors to inspect the damages while the power buyers are informed so that they can procure electricity from other sources instantly.

Performance

In the previous year, the Company conducted a BCM drill to ensure that its business continuity management was operated effectively as follows:

- ☑ In cooperation with Banpu Group in conducting the BCP Drill at headquarters and passing the ISO 22301:2012 certification audit for four consecutive years.
- ☑ Organizing a workshop to review risks and developing a crisis communication manual to cover additional power businesses by considering the severe and high risks as the most priority. The Company's crisis communication team (CCT) participated in the CCT drill together with the Corporate Communications team of Banpu Group to ensure consistent operations.
- ☑ Assessing and setting up an additional business continuity development plan in Beijing Office
- ☑ Conducting the BCM drills in cooperation with contractors in all business units having an operational risk.
- ☑ Developing information technology systems within the organization by gradually uploading information into the Cloud Computing system, which could restore the system and necessary information more quickly. The system and information restoration drill has been conducted annually.
- ☑ Organizing a workshop to exchange experiences in preparation for emergency communications between joint venture companies, such as BLCP Power Plant and Hongsa Power Plant.

Crisis Management at Hongsa Power Plant Due to Earthquake

The 6.4 magnitude earthquake occurring close to Hongsa City of Laos PDR on 21 November 2019, inevitably affected the Hongsa Power Plant, causing its three power production units to cease operations. In response to the earthquake, the plant managed this crisis in accordance with the crisis management plan by promptly sending an engineer team to inspect damages and assess safety of the plant. It was found that the earthquake only caused minor damage to buildings and structures. In addition, all groups of

stakeholders were continuously communicated about the corrective actions taken by the plant. The readiness to efficiently response to any emergencies together with the understanding of roles and responsibilities of all executives and employees helped the power plant to restore its operations to normal condition within the specified time. The Hongsa Power Plant's Unit 2 and 3 were able to resume operations on 5 and 9 December 2019, respectively. Meanwhile, Unit 1, expanded its operational plan for detailed equipment inspections and was able to resume production on January 9, 2020. This has assured its stakeholders that the plant can recover its power production process quickly and safely in the long run. In addition, Hongsa Power Plant also provided assistance to surrounding communities fully affected by this earthquake.



Fire Evacuation Drill and Fire Suppression Training at Bangkok Office

On 18 October 2019, Banpu Power together with Thanapoom Building – a place where headquarters of Thailand's Banpu Group is located, organized the annual fire evacuation drill. Basic firefighting training both in theory and practice was conducted for employees in accordance with safety regulation so that they are ready to handle any emergency situations. At that day, more than 40% of staff participated in the fire suppression training, corresponding to laws.



The Annual BCP Drill 2019



On 3 October, 2019, Banpu Group conducted a business continuity plan (BCP) drill at the corporate level. CEO of Banpu Power is one of the members of crisis management team. The incidents simulated for this exercise were the cyber-attack, environmental protest and boiler explosion at the power plant, which are risks possibly arising in countries where Banpu Group has operational bases. The results from this BCP drill was taken into consideration by the Company in order to find ways to develop the more effective business continuity management plan for the power business.

Floods Management at Zouping Power Plant

After Shandong Province was hard hit by typhoon Lekima on August 11, 2019, Zouping District was inevitably facing with heavy downpours. Although the Zouping Power Plant had prepared emergency measures to fully handle the typhoon, it was unable to control the tides breaking through the power plant's barriers on 12 August 2019. As a result, the factory's tools and equipment as well as weighing machine room and the grid lines were flooded and damaged. The plant, therefore, urgently closed its gates to prevent the mass of water from inundating the power plant area, including speeding up the drainage from risky areas. To prevent damages to tools and production equipment, machineries and materials were transported to a safe place while water barriers were heightened. The Zouping Power Plant, though, was flooded and had to cease its operation on 12 August 2019, it was successfully recovery in less than a week. The plant was able to resume its operations on 17 August 2019 and deliver steams and electricity to industrial groups that were also affected by this flood.





Availability and Reliability

Strategy

- Maintaining the power plants according to quality plans and sustainable supply chain management to ensure that the power plants have a high level of availability, able to continuously respond to customer needs.



Significance and Reporting Boundary

The Company has generated most of its electricity from the CHP plants in China and supplied to the public through the government transmission system. Meanwhile, the steam and hot water are sold to factories and residences. The Company has paid high attention to provide electricity to the government sector as well as continuously supply steam for all groups of customers, especially retail customers who use steam to keep their residences warm. They have high demand for steam in the winter during November to March. Maintaining the highest availability of power plants in response to steam demand is, therefore, significant since it affects the well-being of people in the area. The impact of economic

fluctuations in the past year such as the trade war, however, has decreased demand for steam in the industrial sector in some areas. Therefore, the Company had to adjust itself to cope with changes on customer demand of steam. It also maintained a high level of availability and reliability.

The boundary of this report covers the three CHP plants in China, namely Luannan Power Plant, Zhengding Power Plant and Zouping Power Plant. The power plants, which are the joint venture companies, are separately reported since they are the Company's main source of income and stakeholders are highly interested in their information.

Management Approach

The Company has communicated with customers to create understandings with them in advance in preparation for the effective production and maintenance plan as it is the key factor to maintain the system's availability and reliability. The annual maintenance outage is one of the important activities to keep the machines in good conditions and last as targeted. As a result, the power plants are in the best condition ready to operate continuously and meet the availability hours as stated in the contract each year.

The CHP plants in China will have a maintenance outage during summer until November as customers have maximum demand for steam and hot water during the winter. As a result, maintenance of each power unit is scheduled for such a period to ensure that the power plants will have the highest availability throughout the winter. The maintenance outages for CHP plants will be based on a 3-year medium-term plan and an annual operational plan in order to prepare in advance for preparedness of major equipment requiring a long period of maintenance. Maintenance activities are varied according to the life-cycle of each production unit. The annual planned maintenance outage will include equipment improvements in order to enhance efficiency and availability of the power plants. The maintenance for each unit will not be operated at the same time since these power units have to produce

and distribute steam to industrial customers even during the off-winter season.

The CHP plants in China are scheduled for minor maintenances every year, taking 10-20 days per time while major maintenance is operated every two years with 30-45 days each time. The power plants' maintenance period is varied depending mainly on the items determined by the manufacturers. However, some maintenance outages will be based on equipment working-conditions which have been deteriorated. Each maintenance must be completed before entering the winter season to ensure that the power plants will be able to continuously produce steam throughout the winter when customer's demand for steam is high.

Indicator

- The Availability Factor (AF) of the power plants

Target

- The power plants' AF rate is no less than **91.66%**.

Performance

- The three combined heat and power (CHP) plants in China were able to maintain their availability, stability, and reliability in accordance to customers' demand while their AF rate was **94.07%**.

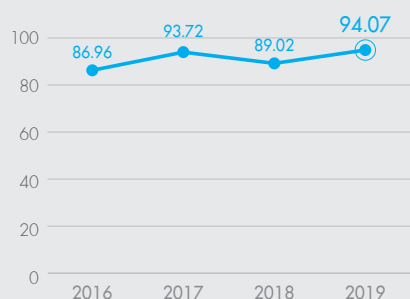
Performance

In 2019, the Company was able to maintain the availability and reliability of the three CHP plants in China with the AF rate of 94.07%, higher than the annual plan set at 91.66%

All CHP plants has achieved the target of Availability Factor (AF), Planned Outage Factor (POF) and Unplanned Outage Factor (UOF) and was able to continual supply electricity and steam to customers.

* Availability Factor (AF) is the amount of time that it is able to produce electricity over a certain period, divided by the amount of the time in the period. Occasions where only partial capacity is available may or may not be deducted.

The Availability Factor of 3 CHP Plants in China (%)

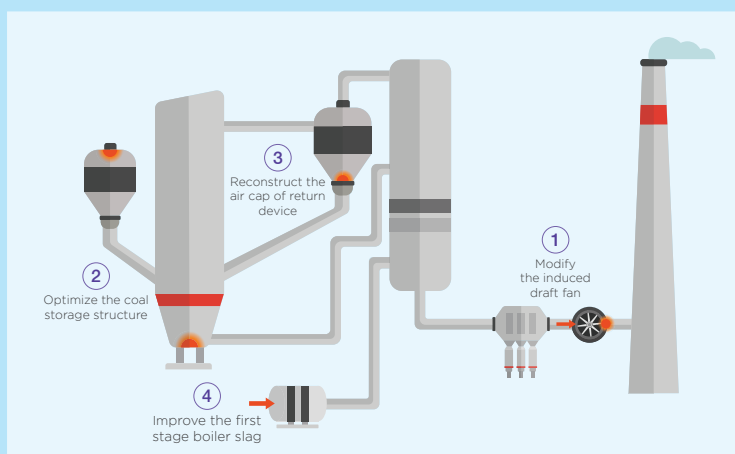


Expanding Steam Boiler Capacity to Increase Heat Production Capacity Zhengding Power Plant

Although Zhengding Power Plant can continuously operate its steam boilers at the highest capacity in order to deliver heat and electricity to communities and industrial factories, especially during the winter season when the weather is very cold. 2019 was the year the temperature was 1-5 degrees lower than usual, resulting in a higher than usual demand of steam in certain times. Thus, it was the opportunity for Zhengding Power Plant to conduct a feasibility study and expand its steam boiler production capacity as following:

- 1 Transforming the induced draft fan
- 2 Optimizing the coal storage structure
- 3 Reconstructing the air cap of return device
- 4 Improving the first stage boiler slag

The aforementioned improvement allowed Zhengding Power Plant to increase its heat production capacity at the level required by customers in the area and satisfied by the local government.



Operations of Joint-Venture Power Plants

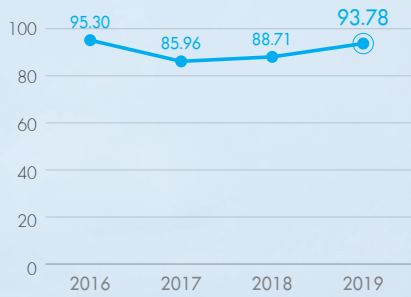
The Company has jointly invested in the thermal power plants in Thailand and Laos PDR, namely BLCP Power Plant and Hongsa Power Plant, respectively. The major customer of BLCP and Hongsa Power Plant is the Electricity Generating Authority of Thailand (EGAT) which requires high security of power generation. BLCP and Hongsa Power Plant are categorized as the power plants that generate power 24 hours a day at a high-power supply rate or a so called 'base load plant' because they have competitive costs. Therefore, the level of availability and reliability of the power plants must be under the agreements between the power plants and EGAT in order to maintain stabilities of the power transmission system and the nation's electricity costs.

The number of availability hours and the annual maintenance outages of Hongsa Power Plant and BLCP Power Plant are specified in the Power Purchase Agreement throughout the 25-year contracts. Generally, the power plants must submit their maintenance outages divided into a 5-year planned maintenance and an annual maintenance outage plan. Additionally, the power plants must coordinate with EGAT to plan for the country's electricity production each year. The goal of an annual maintenance outage is to complete maintenance within the specified period as stated to EGAT.

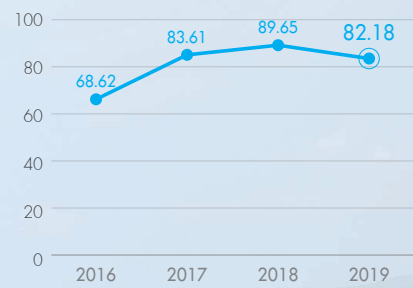
In the previous year, BLCP Power Plant was able to maintain its availability as planned, completing the availability hours faster than the target set. This made it possible to support the transmission system by generating additional electricity from the power trading hours specified in the power purchase agreement. In 2019, BLCP's AF rate was 93.87% while that of Hongsa Power Plant affected by the earthquake in late November was 82.81%.



The Availability Factor of
BLCP Power Plant
(%)



The Availability Factor of
Hongsa Power Plant
(%)



Process Improvement and Innovation

Strategy

- Managing operational process under the continuous improvement concept with cooperation of employees in all levels. The employees are encouraged to create and apply new innovations to their working procedures.



Significance and Reporting Boundary

'Innovation', in the context of Banpu Power, is the design and selection of high-efficiency and clean technologies suitable for each project, and the initiation to improve working processes to be more efficient. This can be proceeded through learning how to improve the procedures, probably including applying advanced technologies to current tasks such as digital technologies, electricity trading technologies, and a virtual power plant etc. The process and innovation development will be a significant platform to increase competitive advantages and create steady and sustainable growth amid the fast-changing industry during the disruptive technology era.

Management Approach

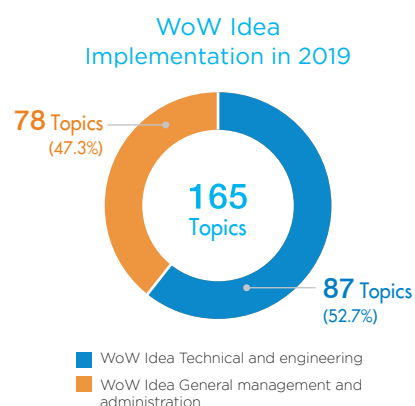
The Company has improved the production efficiency based on the principles of 'Operational Excellence' together with innovations. Employees at all levels collaborate to identify problems possibly occurring during working including its root causes through a systematic process and continuous improvement in order to increase working efficiency and process reliability as well as to reduce costs and losses in production procedures. The process starts with training employees to enable them to identify the problems that may arise during their working processes. With the support from corporate team, the annual seminar on operational excellence has been organized to provide

opportunities for employees to present their initiative projects to improve the production efficiencies.

The Company drives innovation through the creation of corporate culture via the 'Innovative' value, one of the three corporate shared values. Innovation has been promoted through various activities in order to help all employees understand the importance of applying innovation to their works. The Company has created a system for employees to propose the ideas called 'WoW Idea' so that they can present ideas and innovations leading to the concretely tangible practices.

Performance

The Company together with Banpu Group has managed and promoted innovations as well as motivated its employees to present ideas for improvement, turning them into true actions via the online 'Wow Idea' presentation system. Prior to implementing, the 'WoW Idea' concepts will be considered on their appropriateness by the 'WoW Committee' consisting of employee representatives. In the year 2019, there were 267 WoW ideas presented by the employees, 165 of which were completely implemented.



Indicator

- A number of 'WoW Idea' and innovations presented and applied to operations with tangible results
- The progress of the 'Digital Transformation' projects in line with the roadmap

Target

- Employee participation from all departments in presenting the 'WoW Idea' and innovations
- Assessing the current status of power plants in China to create a digital transformation roadmap.

Performance

- Staff at Bangkok Office presenting 267 WoW Ideas.
- Three outstanding innovation projects received from the 7th Banpu Innovation Convention.
- Completing the assessment of Luannan Power Plant's current status, the digital transformation pilot project and operational plan development
- The Deyuan Solar Power Plant received the 3rd prize for the excellent design of renewable energy power plants.

7th BANPU Innovation Convention 2019: The Dynamic of Innovation

The Company held the '7th BANPU Innovation Convention 2019: The Dynamic of Innovation', a project Banpu Power and Banpu Group of companies co-organize every year at the headquarters in Thailand. The aim is to encourage employees in various countries including those of joint-venture companies to continually present innovative projects, promoting them to develop creative ideas and create opportunities to learn new things as well as share knowledge within the organization. It is also a platform for employees to show their capabilities and share the innovation success stories helping improve the organization's processes and performance, inclusion of inspiring attendees.

In the final round, there were 11 outstanding projects presented by four operating countries of Banpu Group, including Australia, China, Indonesia and Thailand. The '7th BANPU Innovation Convention 2019' was also live broadcasting via live streaming covering all countries where Banpu has operated its businesses in order to give all employees a chance to participate in unison watching so that they can learn concepts possibly applicable to their own departments. In 2019, there were three projects winning the outstanding awards, including:

Innovation Project	By
1. Retrofit CFB Boilers to Meet New NO _x Emission Standard	Zhengding Power Plant
2. Innovate Work Method Successfully Apply for Tax Refund and Fee Free	Zouping Power Plant
3. Coal Conveyor System Efficiency and Reliability Improvement	Hongsa Power Plant



Digital Transformation

“

Digital Journey has begun. It is time that we disrupt ourselves before we get disrupted. I will lead everyone in Banpu family to adopt and apply the new ways of working. Banpu's future is in our hands, let's keep the pride of Banpu, continue the legacy and do it together.



Somruedee Chaimongkol
Director of Banpu Power

”

Even though most power plants' operational systems are digitally controlled, the Company realizes the opportunity to use digital technologies in driving towards excellence so as to become the powerhouse of future with maximum management and efficiency, completely transforming into the true digital era. Three major transformation strategies have been focused, namely business, technology, and people.

Business



To help prepare its personnel enter into the digital age, Banpu Power established a center specializing in digital technology that works closely with other departments. This center gives support through analyzing working procedures and searching for improvements by using technologies or developing applications able to quickly solve problems. The first phase was started with projects potentially using digital technologies for improving and yielding sound benefits, such as an application for power plant's operations and maintenances, an application for analyzing the power plant efficiency and energy management, and etc.

The Digital Capability Center (DCC) was established as a digital technology learning center and a tool for employees. The aim was to encourage our employees to develop creative ideas, learn more about new technologies, and jointly work so as to develop the digital technology quickly as well as build collaborative networks with leading technology companies.

Technology



People



The Banpu Digital Academy was set up in order to enhance skills and capabilities of our employees. The new working framework and digital technology training courses have been organized through various training programs, including the online training so that our employees can learn at all times.



Power of
Digital



Agile 101



Intro to Design
Thinking



Defining MVP



The Company has established the Digital Center of Excellence (DCOE) Unit in China as the main coordinator to drive the digital transformation in accordance with the strategic plan. In the past year, the Company conducted the current status assessment of Luannan Power Plant, a pilot power plant to search for ways to use digital technology for the power plant's operational improvement. Based on the survey result, the Company has planned to develop four projects related to efficient and safe production operations, power consumption, and maintenance, expected to be completed in 2021.



We are fortunate to live in the digital age in which new technologies such as Big Data, Internet of Things (IOT), Robotic Process Automation (RPA) and Machine Learning allow us to work faster and more efficiently. We will create values from innovations and making the right decision. We will bring new things, including new ways of working for operational management. Let's help create changes within the organization so that we can take the next step to work in the digital era.



Chen Lin
Head of DCOE China



IRIS Application System

Coal is a major raw material for the production of CHP plants in China, but its price is changing all times. Controlling a coal purchase cost by choosing to buy coal at the right time is, therefore, significantly

helping reduce the production costs. As such, Banpu Investment (China) began using the digital technology to collect and analyze data for making better decisions.

IRIS is an application using a digital technology procedure to create the Digitalization of Market Intelligence system so as to analyze and purchase coal for feeding the power plants. The IRIS will collect coal market information in China, including prices, water transportation costs, coal volumes in the storage at each distribution point, coal industry information, and macro-economic news. Users can check the aforementioned information at real time. This application allows the Company to make right decisions on coal purchase and keep up as well as fast respond to the market news. By this way, employees have not to waste times searching and verifying information, allowing them to spend more times to meticulously analyze and review the information received.

Presently, the IRIS is assisting the CHP plants in China regarding domestic coal prices adjustment and transportation costs. Zhengding Power Plant has used the IRIS to choose coal for the power plant during the time when coal prices and transportation costs are reasonable.



Warehouse Elf Application



Warehouse Elf is a mobile application initiated by the Zouping Power Plant's employee who wanted to manage the power plant's material, equipment, and machinery part inventories more efficiently. The Warehouse Elf Application helps reducing times for verifying the inventory quantity by scanning the QR Code able to review and bring data into the system directly from the sites as well as examine the remaining materials quickly.



Supplier Management

Strategy

- Driving the sustainable supplier management in production units through the integration of quality management system standards (ISO9001), occupational health and safety management system standards (ISO45001) and environmental management system standards (ISO14001).
- Integrating supplier management with business ethics, environmental and social policies.
- Establishing the Supplier Code of Conduct covering business ethics, environment and society.

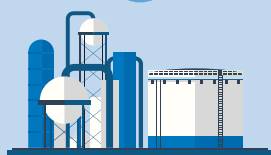


Significance and Reporting Boundary

Banpu Power has operated its business concerning on the sustainable supply chain management since it will help in procuring raw materials and resources for business operations efficiently. This, in turn, will reduce costs and risks possibly arising in the supply chain, such as lacks of production's raw materials, raw material quality, including environmental, social and governance (ESG) risks in the supply chain, which may affect the Company's operations and reputation.

The Company's supply chain is classified into two main groups as follow:

1



Fuel Supply Chain

The key raw material for generating electricity in the Company's combined heat and power (CHP) plants is coal. Supplier management, to reduce the risk of procuring coal with quality, price and quantity according to the production plan in each production period, is an important factor for the management of production availability and reliability. Additionally, coal is categorized as a commodity product volatile with the world market price. Coal production and transportation from production sources may be affected by the severe natural disasters caused by climate change, etc.

2



Machinery Supply Chain

Manufacturers of machinery parts specific for the power plant's maintenances, which cannot be purchased in the general market, are considered the important suppliers to business operations. Hence, having suppliers with good production, environmental and social management would make the Company be assured of smooth production.

The Company recognizes that supplier operations are directly and indirectly affect the Company's performance. It is, therefore, strongly intends to supporting suppliers to sustainably operate in accordance with the Company. That is to expand the Company's sustainable governance framework to surrounding societies, creating sustainable values throughout the supplier chain. The boundary of this report covers every business entity the Company has more than 50% of investments with management control.

Indicator

- Proportion of new suppliers selected under the environmental and social criteria.

Target

- No complaints related to supplier management on business ethics, environment, and society.
- Using the supplier code of conduct, covering all business units by 2020.
- No less than **50%** of local procurement

Performance

- No complaints relating to supplier management in 2019.
- Announced the sustainable supply chain policy and the Supplier Code of Conduct.
- Proportion of local procurement accounting for **87%**
- Conducted a satisfactory survey among the supplier group on co-working with the Company with **95%** of suppliers satisfied with the Company while the rest **5%** quite satisfied.

Management Approach

The Company has operating guidelines to achieve its goal to create sustainable values throughout the supply chain as follows:

- ✓ Conducting procurement with transparency and fairness in accordance with the Company's business ethics principle.



- ✓ Integrating goals on safety, occupational health, environment, society and good corporate governance with supply chain management strategies and other associated policies to enhance opportunities to improve and reduce risks that may occur in the supply chain.

- ✓  Sustainably driving supplier management in production units through the integration of management system standards (ISO 9001), occupational health and safety management standards (ISO 45001) and environmental management system standards (ISO 14001).

- ✓ Verifying supplier's qualifications regarding environment, society and corporate governance in order to be able to properly identify and manage supply chain related risks.

- ✓ Promoting business operations with suppliers by adhering to ethical principles with social and environmental responsibility, respecting human rights, and complying with the ethical principles of conducting business with suppliers and any associated policies.



- ✓ Implementing any procedures to ensure that suppliers comply with laws and local regulations as well as international labor standards.

- ✓ Supporting local procurement in order to create economic contributions in areas where the Company has operated.



- ✓ Developing the supplier code of conduct, applying it to supplier management by starting with the critical supplier.

- ✓ Encouraging suppliers to expand the sustainable practice guidelines throughout the supply chain in order to continually improvement.

- ✓ Establishing key performance indicators and regularly monitor operations to ensure that the operations truly achieve the policy targets.

- ✓ Regularly disclosing the supply chain's sustainable performance to stakeholders.

Performance

In the past year, the Company had no complaints related to suppliers. Furthermore, it also announced the 'Sustainable Supply Chain Policy' across the organization, including its subsidiary companies so as to use this policy as the principle for supply chain management associated with business ethics, environmental and social management, including promoting suppliers in the areas of sustainability management and good corporate governance. In addition, the Company operated its supplier management with Banpu Group. The Company also announced the 'Supplier Code of Conduct' in order to set the environmental and social criteria for suppliers to be more comprehensive, and to improve the criteria for ranking critical suppliers.



In the past year, the Company managed key suppliers as follows:

- ☒ Establishing clear criteria and qualifications for selecting suppliers consistent with the Company's sustainability policy and business ethics, for example, specifying clear criteria and qualifications for selecting suppliers for the power plants' construction, covering supplier's quality, environmental, social and governance operations.
- ☒ Conducting procurement with transparency through bidding processes, clearly determining the evaluation criteria at all steps by communicating information thoroughly and notifying suppliers via online systems, such as coal specifications, quantity, and delivery deadlines.
- ☒ Planning to coordinate with suppliers appropriately and managing product delivery periods as planned and in accordance with the procurement criteria, such as delivering of coal and machinery parts for maintenance to reduce supply chain's risks possibly affecting the Company's operations.
- ☒ Promoting operations with suppliers by adhering to ethics with social and environmental responsibility, respecting to human rights, and in line with the ethical principles to conduct business with suppliers as well as associated policies, such as the renewable power generation. The Company's major suppliers are manufacturers and distributors of solar cell panels, on which the Company must pay attention to their quality, safety and reliability. Since solar cells have a lifespan of 20-25 years, their qualifications must be truly effective and safe as specified. Moreover, there must be the appropriate methods to dispose these solar panels when expired in order to prevent any environmental impacts.
- ☒ The combined heat and power (CHP) plants in China employed the quality management systems (ISO 9001), the occupational health and safety management systems (ISO 45001) and the environmental management systems (ISO 14001) for their operations, covering supplier procurement. Currently, all three CHP plants have been certified in all three systems.
- ☒ Checking supplier's qualifications relating to operational histories, reputations, and legal compliance to reduce operational risks before proceeding for procurement as well as visiting supplier's operations in the areas, such as key manufactures for the power plant's parts, etc.
- ☒ Conducting a feasibility study on long-term coal purchase contract for Zhengding Power Plant. The plant explored additional coal mines to search for coal sources able to deliver quality coal as required in order to reduce price fluctuations, control coal quality, and decrease the power plant's coal reserves, as well as to mitigate risks related to coal shortages during high demand for coal in winter. Moreover, using consistent quality coal will make the production more stable and higher efficiency.
- ☒ The business partner's satisfactory surveys, including suppliers were conducted. The survey found that 95% of suppliers were satisfied with the Company's operations, while the other 5% were at a fairly satisfactory level.

Supplier Management of Joint-Venture Power Plants

- Organizing activities to communicate the sustainability policies and practices, such as BLCP Power Plant held the 'Suppliers Day' activity under the theme of 'Go Green, Go Together' to meet and discuss as well as exchange information with suppliers, inclusion of conducting the environmental protection activities together.
- Making long- term purchase contracts with major suppliers permitted to distribute coal to power plants, and having been evaluated on operating standards and legal compliance in the countries of operations.
- Conducting trainings for local suppliers such as enhancing productivity and quality, processing, marketing, and safety and environmental concerns, etc.
- Supporting local procurement such as Hongsa Power Plant promoted the sustainable operations with suppliers by surveying supplier's demand for consumer goods so as to plan for production of agricultural products and other community outputs in order to sell to the power plant's suppliers and contractors.



Contractor Management

Strategy

- Driving contractor management at operational units through an integration of the ISO 9001 Quality Management System Standard, the ISO 45001 Occupational and Safety Management System Standard, and the ISO 14001 Environmental Management System Standard.
- Integrating contractor management to business ethics, environmental, and social policies.
- Determining the Supplier Code of Conduct, covering business ethics, environment, and society as well as supporting and participating in sustainable development together with trade partners.

Significance and Reporting Boundary



Banpu Power has paid serious attention to contractor management since the contractor is one of the Company's trade partners in the supply chain. Additionally, contractors are the major force in creating stability for power generation process, providing quality and safety work, including constructing the projects in accordance with standards. In return, they help the Company in achieving the targets set for economics, society, and environment.

The Company's major contractors are as follows:

1. Operation & Maintenance Contractor
2. Maintenance and Service Contractor
3. Engineering and Procurement and Construction Contractor

These contractors are the key drivers for the Company to achieve its operational goals. As contractors must have extensive knowledge and expertise, the contractor selection criteria should assure that those selected have potential to operate. Since most of the Company's contractors are working at the operational sites, risks related to contractor's works have been assessed and managed properly, equally to the Company's operational employees. Having sound contractor management has helped increase the Company's operation efficiency, create safety workplace, and promote the corporate social responsibility image. Besides, it has also helped in reducing risks as well as preventing possible accidents occurred from the production processes within the organization. The boundary of this report covers all business units the Company has investments greater than 50% and management control.

Management Approach

The Company's contractor management practice is similar to the trade partner management following the sustainable supply chain policy, of which details are as follows:



- ✓ Selecting contractors with a transparent manner in accordance with the Code of Conduct principle

- ✓ Identifying clear contractor selection criteria; in addition to having professionalism and expertise, key contractors must have operation management equivalently the international principle and laws, for example, safety and environmental management, labors and human rights standards, passing the environmental, social and good governance assessment, etc.
- ✓ Regularly monitoring contractors during operations for continuous improvement.

Indicator

- The number of contractor fatalities relating to working accidents.
- The events involved with laws, human rights and labors violations

Target

- No contractor fatalities involved with working accidents.
- No ESG-related complaints regarding contractor management
- No incidents relating to contractors violating laws and regulations as well as human rights and labors.
- No less than **50%** of local procurement

Performance

- No contractor fatalities related with operational accidents
- The contractors fully complying with laws and regulations and no incidents related to human rights and labor violations.
- Proportion of local procurement accounting for **87%**
- Announced the Sustainable Supply Chain policy and the Supplier Code of Conduct.

- ☑ Enhancing contractors' efficiency and operational performance through an integration of the ISO 9001 quality management system standard, the ISO 45001 safety and occupational management standard and the ISO 14001 environmental management standard at the operation sites having significant risks.

- ☑ Arranging appropriate working environment, organizing trainings to provide knowledge on safety and working environment, and assessing contractors' capacity before starting working.



- ☑ Promoting local contractors who have sound capacity to run business with the Company.

- ☑ Seeking opportunities for sustainable operations with contractors such as building working capacity and jointly running CSR projects, etc.

Performance

In the past year, the operating power plants had no contractor fatalities. The three combined heat and power (CHP) plants in China operated the contractor's quality, safety, occupational, and environmental works through the ISO 9001 quality management system, the ISO 45001 safety and occupational management system, and the ISO 14001 environmental management system. By this way, contractors were part of operating these management systems to achieve the targets set.

In 2019, the Company recorded no incidents or complaints related to environment, society and governance (ESG). Furthermore, the Company had fair and transparent procurement process, providing appropriate working environment for contractors, including arranging the rest area during free time, organizing recreation activities, so as to make contractors relax when out of work. In addition, other activities creating good relationships and communication, cooperation, caring for safety of each other, were also organized.

The Company announced the Sustainable Supply Chain Policy and the Supplier Code of Conduct which to be implement in 2019 onwards. The contractor prioritization criteria were also developed. In response to these criteria, the critical tier-1 suppliers, the new vendors and the existing ones must comply with the Company's Supplier Code of Conduct. In addition, they must fully pass the ESG criteria by the year 2025.



Customer Management

Strategy

- Managing customers sustainably in production units through the integration of quality management system standards (ISO 9001), occupational health and safety management system standards (ISO 45001) and environmental management system standards (ISO 14001).
- Integrating customer management to business ethics, environmental and social policies.
- Regularly checking customer satisfaction and expectation for continuous improvement.



Significance and Reporting Boundary

The Company has five main types of customers, namely:

1. Government agencies, electric state enterprises, or legal entities of which the government is a major shareholder, primary buyers under the power purchase agreement.
2. The industrial sector buying steam.
3. The trade sector buying cold water used for cooling system in commercial areas.
4. Retail customers in the residential areas and communities who buy steam during the winter.
5. Companies buying fly ashes.

The primary customers mainly generating revenues are the government agencies / state enterprises, the primary electricity buyers under the power purchase agreement,

as well as the industrial sectors buying steam. Realizing that the Company's operations have contributed to the stability of the country's electrical system, and is the important part in the industrial sector's production process affecting the well-being of the communities, the Company has a policy to produce and sell products with quality and quantity, as exactly agreed with the customers. Therefore, it is a responsibility of the Company in delivering products to meet or exceed customer expectations with flexibility and readiness in adaptation to the needs of customers. Conducting business in good faith will be an important foundation in building the long-term business success together.

The boundary of this report covers all businesses in which the Company has investments more than 50% and management control.

Management Approach

The Company has applied the Quality Management System Standard (ISO 9001) to the production units that require contact with variety of customers, namely, the three combined heat and power plants in China. One of the quality management approaches is 'Customer Focus' of which process is as follows:

1. Understanding needs and expectations of producers and customers



2. Setting operational goals in accordance with customers' needs and expectations.

3. Communicating on customer's needs and expectations throughout the organization to create understanding among employees.



4. Measuring customer satisfaction.



5. Establishing a systematic customer relationship.



6. Taking into account the balance in responding to the needs of customers and other stakeholders.

Indicator

- Customer complaints are resolved in a timely manner
- A number of customer complaints related to customer's privacy information protection.
- A number of customer complaints related to safety and environment regarding the use of products.

Target

- Proportion of customer complaints resolved in a timely manner accountable for **100%**
- No customer complaints related to keeping customer privacy information.
- No customer complaints related to safety and environment regarding the use of products.

Performance

- The three combined heat and power (CHP) plants in China were able to maintain the availability and reliability according to the needs of customers and correct the complaints in a timely manner.
- No customer complaints related to keeping customer's privacy information.
- No customer complaints related to safety and environment of using products.

The Company has focused on building relationship with customers as partners of achievement as well as giving priority to deliver the sustainable values to all customers by taking into account of four values as follows:

1



Product values

by using technology with High Efficiency Low Emission (HELE) having ability to control the air quality, water and environmental management to meet international standards.

2



Service values

by improving production efficiency having availability and reliability in accordance with the customers' needs, as well as flexibility to meet the needs of customers and control product quality meeting standards and agreements made with customers.

3



People values

by developing knowledgeable staff and build the sound corporate culture as the qualified human resource with ability to accurately solve the customers' problems in timely manner.

4



Reputation values

by operating businesses professionally based on business ethics and good corporate governance.

Performance

In the past year, the combined heat and power (CHP) plants in China were able to maintain availability and reliability according to customer demand from both public and private sectors. During the outbreak of a new strain of coronavirus (COVID-19), all three CHP plants are still able to continue their production continuously. This has done by strictly using measures to prevent epidemics in the power plants in order to deliver electricity and other energy to surrounding communities during the epidemic period.

From the customer satisfactory survey, it was found that the level of satisfaction was higher than 90%; besides, there were no complaints related to keeping customer's privacy information, safety and environment involved with using products. Additionally, the power plants also had flexibility to prepare for steam supply before the deadline to accommodate the customers' needs during the winter that came earlier than usual. Moreover, the Company has expanded the production capacity of Zhengding Power Plant in response to higher demand of steam in 2019.



Electricity generated by solar power plants in both China and Japan was sold to the government sector under the power purchase agreement without indicating the quantity of electricity supply because it is the renewable energy, of which the production volume varies according to intensity of natural lights. Only the electricity quality would be determined, such as the characteristics of voltages, frequencies, etc. With this regard, the Company was able to generate power according the international quality standards and the power purchase agreements.

BLCP Power Plant, a Thai joint-venture company, was able to maintain its availability factor meeting the availability hours as stated in the power purchase agreements. Moreover, the power plant could complete a maintenance faster than the target set enabling it to generate additional electricity from the power trading hours specified in the power purchase agreement.

Meanwhile Hongsa Power Plant, a joint-venture company, was affected by the earthquake in late November, causing the plant to cease operations for structure and safety inspection. The plant halted its operations longer than the plan set in order to inspect operations safety in the long term.

Safeguarding Customer Personal Information



The Company has put great attention to the significance of safeguarding information receiving from customers in order to prevent damages and build trusts among customers. Policy and guidelines are as follows:

A use of Information

- The Company uses database on expectation, suggestion and complaints to better improve services, develop operational and production process, as well as create products to respond customers' needs.

Disclosure of Information to the Third Party

- The Company will disclose customers' personal information to the third party only with consents from the customers.
- The Company will disclose customers' personal information only when the Company honestly believes that there are necessity and appropriate reasons for the disclosure and in compliance with related laws.

Information Security Maintenance

- The Company protects its customers' personal information from unauthorized access by restricting to authorized staff, employee and representatives who need to use that information for customer service or data processing. As such, those people must strictly comply with regulations of securing confidential data.

Customer Complaint Handling Procedures



The Company has offered various channels for receiving complaints from customers such as:

- Consultations with customers in the governmental and industrial sectors within time period upon mutual agreements.
- Providing hotlines allowing customers to call for changing the power purchase, requesting for product consultation, including reporting any complaints directly to the production unit.
- Emails
- The Company and subsidiaries websites.

The Company has established a complaint recording system, tracking and amending system, as well as responding to customers' complaints in a timely manner. Designating the process of receiving and handling complaints is in correspondence to the context of each area. The combined heat and power plants in China, have handled their customers based on the Quality Management System Standard (ISO 9001).

Customer Satisfaction Survey



The Company has conducted the customer satisfaction surveys through various channels, for example:

- An in-depth interview to evaluate customers' satisfaction to assess particular problems, needs and expectations of customers so as to use the information obtained to improve work processes and production as well as enhancing good relationships with them.
- Sending questionnaires to customers for satisfaction scoring.

The CHP plants in China have managed customers' satisfaction by using the Quality Management System Standard (ISO 9001), having frequency to conduct customer satisfaction surveys varying from quarterly to yearly.

Policy and Customer Care According to Business Ethics Manual



The Company realizes the significance of customer satisfaction towards business success of the Company. Therefore, the Company has intention to find any methods in responding to the customers' needs more efficiently and effectively at all time. The policies and guidelines have been formulated as follows:

- 1) Delivering products and providing quality services to meet or exceed the customers' expectations at fair prices.
- 2) Providing accurate and adequate as well as up-to-date information to customers about products and services without any exaggeration possibly causing customers misunderstanding about quality, quantity or any conditions of certain products or services.
- 3) Strictly complying with conditions towards the customers and if in any events that any conditions cannot be met, customers must be notified to find means of solutions to problems together.
- 4) Contacting with customers with politeness, effectiveness and reliability.
- 5) Providing the system and process for customers to complain about quality, quantity, safety of products and services including timely responding, delivering and executing to the utmost for a quick response to customers.
- 6) Securing customers' confidentiality and do not use the data for self-benefit or any wrongful related persons.
- 7) Providing advices on user manual regarding the Company's products and services effectively with the utmost benefit to the customers.

Crimson Sunbird (*Aethopyga Siparaja*) near Hongsa Power Plant,
photo taken by Mr. Peeraphol Nontakaew.



WE ARE ENERGY

Environment



No significant
environmental
incident

The greenhouse gas (GHG)
intensity

0.644 tonnes CO₂e / MWh

The sulfur dioxide (SO₂)
intensity

0.0258 tonnes/ GWh

The oxides of nitrogen (NO_x)
intensity

0.0414 tonnes/ GWh

The particulate matters
intensity

0.0030 tonnes/ GWh

Water consumption
intensity

0.827 cubic meters/ MWh

↑465%
from 2017

Growth of
Renewable Energy
during 2017-2019



46 MW



190 MW



260 MW

• 2017 •

• 2018 •

• 2019 •

Greenhouse Gas Emissions

Strategy

- Reducing greenhouse gas (GHG) emissions intensity by increasing the power plant efficiency
- Investing in clean energy such as renewable energy to be part of a low-carbon society in the future
- Enhancing ability to adapt itself to climate change



Significance and Reporting Boundary

Climate change is an issue affecting the sustainability and the human's well-being. It has become the global concern pulling collaborations across the world to reduce the GHG emissions and alleviate its impacts. This can be seen from the Paris Agreement of which many countries jointly set up the GHG emissions target to keep an increase of the global temperatures well below two degrees Celsius. As such, the policies and laws regarding climate change have been issued such as the emission trading scheme (ETS), an increase in the supporting scheme for renewable energy investment, etc.

A summary of the Company's activities causing GHG emissions



Direct GHG Emissions (Scope 1)

- A utilization of coal and waste gas from industrial factories as the fuels to generate electricity, steam and heat.
- Using diesels for igniting the boiler's combustion, heavy equipment, substitute power generators, transport vehicles, etc.
- Using minimum gasoline for vehicles.
- Using calcium carbonate (CaCO_3) for the air quality control systems.
- Using SF_6 and HFCs gases.

Indirect GHG Emissions (Scope 2)

- A purchase of electricity from external sources.

The boundary of this report covers all business entities in which the Company has invested more than 50% and has management control according to the principles The GHG Protocol Corporate Accounting and Reporting Standard. The GHG emissions data of the two joint-venture power plants in Thailand and Lao PDR. Laos, including BLCP Power Plant (50%) and Hongsa Power Plant (40%), however, is separately reported from the Company's GHG emissions database according to the GHG emissions reporting guidelines of Banpu Group as described above.

Indicator

- GHG emissions intensity
- Investing in renewable power generation projects

Target

- The GHG emissions intensity reduction of **15%** against the 2012 baseline by 2020
- A production capacity of renewable energy is no less than **20%** by 2025

Performance

- The GHG emissions intensity per unit of product was **0.644** tonnes CO₂e / MWh
- The production capacity of renewable energy was **240** MW, representing **11%** of the total electricity generation

Management Approach

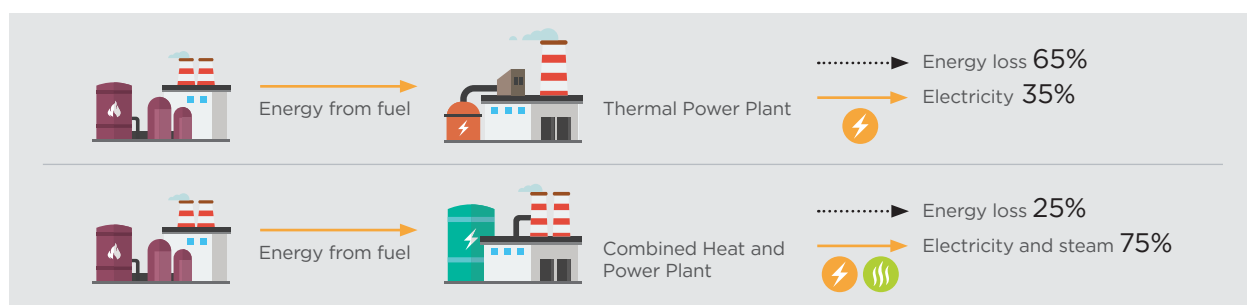
Climate change is a key factor to promote the use of clean technology for power generation and a support scheme to increase a proportion of renewable power production projects especially, in countries announcing their intentions to reduce greenhouse gas emissions in the Paris Agreement. The Company has a management approach to reduce greenhouse gases as follows.

Base-load power plants under operations

✓ **The combined heat and power (CHP) plants in China** are able to consume energies efficiently, having 25% energy loss during a full production capacity of steam and electricity. Meanwhile the conventional power plants solely generating electricity will lose about 65% of production energy. This has led the combined heat and power plants to have low energy consumption rate and greenhouse gas emissions intensity. Customer's demand to purchase steam at different times, however, will directly affect the efficiency of energy consumption and greenhouse gas emissions. The Company therefore, focuses on using innovation to improve the power plant efficiency. Additionally, the Company together with Banpu Group have monitored and verified the accuracy of the greenhouse gas emissions database. The three combined heat and power plants were inspected and certified for greenhouse gas emissions in 2018.

✓ **The thermal power plants which are the joint venture companies**, namely BLCP Power Plant and Hongsa Power Plant, focus on the quality management and annual maintenance. This also includes the implementation of an information technology to predict a machinery maintenance before the machine is broken (Predictive Maintenance). It will have an effect on the power plants' efficiency reducing the fuel consumption per unit of product and equivalent availability factor (EAF) as designed. They are the important performance indicators reflecting the readiness and efficiency of the power plants, and directly affecting the reduction of greenhouse gas emissions. Respectively, the Company has the Asset Management Unit in collaboration with its business partners who jointly invest in the power plants, monitor the GHG emissions of our power plants.

In addition, the Company is also looking for opportunities to use a variety of fuels in response to the stakeholders, being able to get fuel supplied in the area such as natural gas, biomass and industrial waste gas, etc.



Base-load power plant projects that are under development and expanding production capacity

The Company has chosen the clean and high efficiency technology to develop the thermal power plants and combined heat and power plant projects in the future. For example, using the ultra- supercritical technology, the latest technology for thermal power plants, to design and construct the Shanxi Lu Guang (SLG) Power Project which is under construction.

Renewable power plant projects

The Company has set its targets to invest more in renewable power plant projects, no less than 20% by 2025. The investment in renewable power plants will help reduce the Company's GHG emissions intensity. At present, the Company has the solar power plant and wind power plant projects which are under development. We are also seeking opportunities to generate more renewable electricity to achieve the goals.

The Company emphasizes the greenhouse gas emitted by its own operations by paying top priority to directly reduce GHG emissions (Scope 1) through using various fuels, and indirectly lower GHG emissions (Scope 2) from the purchase of electricity and other energies. Since our operations are the upstream business in producing electricity and other energies for use in the industrial area and households, the Company sees opportunities and capabilities to reduce the GHGs by improving competencies and investments of renewable energy by itself in order to achieve the greenhouse gas reduction targets. Furthermore, the GHG Emissions Trading Scheme (ETS) and Carbon Tax have not yet been permitted for use in the areas where the Company has currently invested in the thermal power plants in China. The Company, however, has closely monitored the progress of changes and prepared for such movements. For example, in the past year, a study on the carbon pricing was conducted for internal use as part of investment consideration, including a calculation of return on investment of various projects in the future. It is likely that China will begin an enforcement of the ETS in some areas in 2020.

Performance

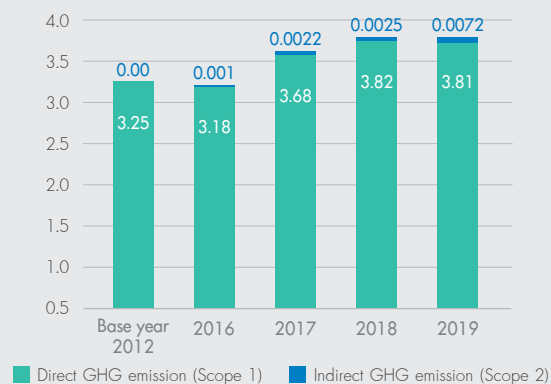
Greenhouse Gas Emission Intensity

The Company's GHG emissions intensity was 0.644 tonnes CO₂e/ MWh, increasing 8% compared with the 2012 baseline due to the trade war effects, resulting in major customers' demand for steam lower than expected. The Company, therefore, had to adjust its production process by producing the same amount of electricity but able to sell less steam. As a result, the GHG emissions intensity was higher. The three combined heat and power plants in China, however, were able to maintain their capabilities to operate energy management with a GHG emissions intensity better than the average of similar power plants in the northern areas of China.

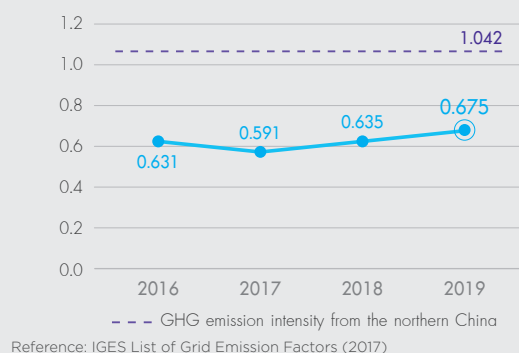
Greenhouse Gas Emissions Intensity
(tonnes of CO₂e / megawatt-hour)



The Amount of Direct and Indirect GHG Emissions
(million tonnes)



The GHG Emissions Intensity
from the Combined Heat and Power Plants in China
(tonnes of CO₂e / megawatt-hour)

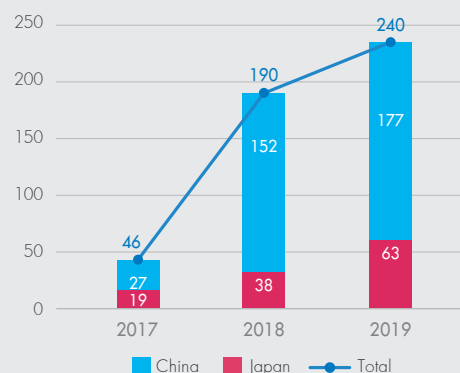


The Company together with Banpu Group has established the Climate Change Committee to be responsible for managing the climate change risk holistically, leading to a reduction of GHG emissions in the future.

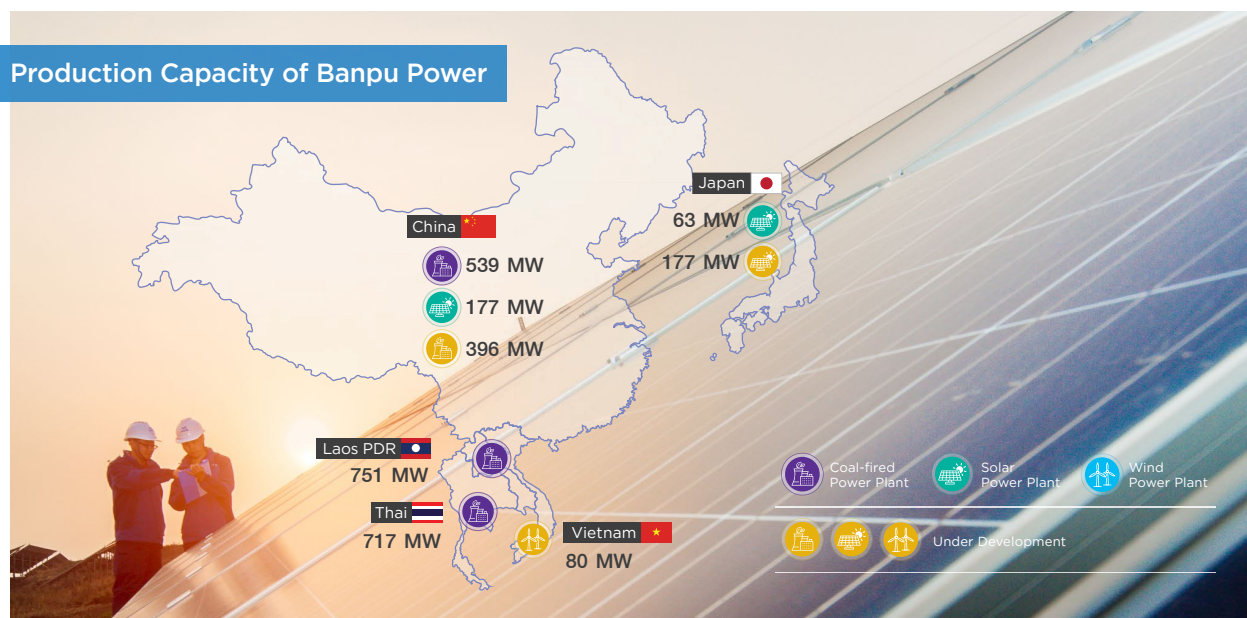
Looking for investment opportunities in clean energy such as renewable energy as part of a low-carbon society in the future

Following our target to invest in renewable energy no less than 20% by 2025, the Company is looking for opportunities to invest in solar power plants in countries with clear supporting policies. In the past year, the Company had a power production capacity from solar energy accountable for 11% of the total production, consisting of 240 MW from China and Japan, 177 MW from the under development solar power plants in Japan and 80 MW from the wind energy in Vietnam, respectively.

Renewable Energy Generation Capacity from
Commercially Operating Power Plants
(MWe)



Production Capacity of Banpu Power



*Information as of December 31, 2019

The Company has invested in related businesses continued from its existing power generation business in order to create added values. This includes the power trading business operated through the central platform and retail electricity or a so - called 'Energy Trading and Retail Electricity' in Japan by expanding the opportunity to do business with retail customers and rooftop solar energy producers. The aim is to respond to customers' demand in the business and industrial sectors as well as a group of customers who want to use electricity from the renewable energy.

BANPUNEXT

The Company in collaboration with Banpu Group established Banpu NEXT Company to invest and develop the renewable energy business, expanding our scope to energy technology development and energy related businesses. The Company holds 50% of shares. Aside from creating a strong position in the renewable energy sector, Banpu NEXT will also help increase the variety of our related businesses such as renewable energy power plant, renewable energy power plant microgeneration system, energy storage system, electric vehicle, energy trading and virtual power plant.

For more information, please visit www.banpunext.com



Increasing the potential for adaptation to risks relating to climate change

✓ **Production Risk Management:** The Company has adopted the Business Continuity Management System (BCMS) in preparation for events interrupting business operations such as natural disasters. Consequently, the Company will be able to deliver products and services to customers and various stakeholders immediately.

✓ **Changes in policies and regulations regarding energies and GHG emissions:** The Company has a responsible unit to monitor and anticipate changes in regulations in all areas open for operations at the local and central governments in order to be able to adapt itself to the changing environmental quality standards that are more concentrated. It is also looking for opportunities to invest in the renewable energy business receiving more supports from the government



BLCP Power Plant Using Biodiesel (B20) to Replace Diesel

BLCP Power Plant conducted a feasibility study to improve and develop its boiler igniting process suitable for the use of biodiesel 20 (B20) instead of diesels. The aim was to reduce the GHG emissions and support the oil palm growers. BLCP Power Plant officially started using the B20 in late 2019.

Other Indirect GHG Emissions (Scope 3)

The Company conducted a preliminary assessment of indirect GHG emissions (Scope 3) which involved operational activities as follows:

Activities	Association	Description
1. A purchase of goods and services.	✓	A production and transportation, coal, (exclusion of the Hongsa Power Plant, which is a mine mouth power plant) oils, electricity, several chemical substances, constructional materials, contractors' services, etc.
2. Capital Goods	✓	The Company's capital goods mostly include machineries, spare parts, vehicles, project's constructional materials.
3. Fuel and energy consumption related activities, exclusive of direct GHG emissions (Scope 1) and indirect GHG emissions (Scope 2) reports	○	The energy consumption in offices having no production activities.
4. Upstream transportation and distribution	✓	The oil consumption for materials delivered by sellers or sub-contractors via key transportation channels including ships, trains and roads.
5. Waste generated from operations	✓	Affluent treatments or disposals by external persons/ parties such as hazardous waste treatments and disposals, water treatment, as well as a utilization of fly ash and bottom ash, etc.
6. Business travels	○	The Company's business trips have been conducted via airplanes, trains and cars, etc. The amount of GHG emitted from traveling is minimal when compared with the ones generated by other activities.
7. Employee commuting	○	The employees commute from their residences to the workplaces via their own cars or other public transportations. The amount of GHGs emitted from this activity is little when compared with those generated by other activities.
8. Upstream leased assets	✗	The Company has no leased assets for production, but only for leasing offices.
9. Downstream transportation and distribution	○	A loss from the transmission grid, steam, hot and chilled water pipelines which are not owned by the Company.
10. Processing of sold products	○	Electricity, steam, hot and chilled water can be used immediately without being processed. The voltages, however, may be changed a little before being used or sold to customers. This may lose little energy.
11. Use of sold products	✓	The consumer's consumption of electricity, steam, hot and cold water.
12. End-of-life products treatment of sold products	○	The electricity consumption doesn't need for treatment. The steam, hot and cold water, on the other hand, are used for other purposes or further recycled.
13. Downstream leased assets	✗	There is no associated operation in providing leasing assets for production.
14. Franchises	✗	There is no associated operation.
15. Investments	✓	Investments in joint-venture companies including the conventional power plants and renewable power plants.

Notes:

✓ Associated with the Company's operations

○ Associated with the Company's operations but without significance

✗ Not associated with the Company's operations

The thermal power plants, which are the joint-venture companies namely BLCP Power Plant and Hongsa Power Plant, on the other hand, have different operational scopes though they are the conventional power plants. The Hongsa Power Plant's direct GHG emissions intensity was higher because it is a mine-mouth power plant. Therefore, the greenhouse gas was emitted from electricity generation activities, coal mining and limestone. Meanwhile, the BLCP Power Plant purchased coal from external sources so that its GHGs were directly emitted only from power generation. However, the GHG emissions intensity of the two power plants was higher than that of Chinese power plants. As the electricity generated by BLCP and Hongsa Power Plants was for sales only, their energy loss and GHG emission intensity were higher than those of the combined heat and power plants which generate power and steam for sales.



Deyuan Solar Power Plant Won the 3rd Prize of Excellent Design



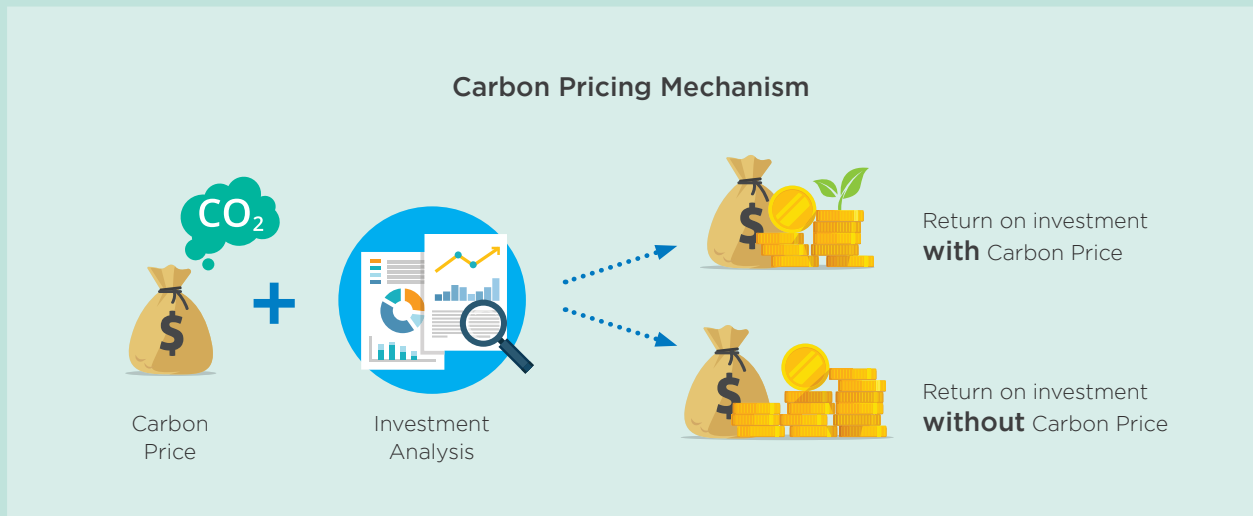
On 14 May 2019, Deyuan Solar Power Plant won the 3rd prize of “Excellent Design of Renewable Energy Plants” of the year 2018 awarded by China Electric Power Planning & Engineering Association from evaluating 271 power and power transmission plants all over the country.

Deyuan Solar Power Plant was located in Jiashan county of Zhejiang Province. The plant with a total installed capacity of 51.64 MW, designed by Hainan Electric Power Design and Research Institute, provide electricity around 55 million KWh per year.

Deyuan Solar Power Plant located in a wetland, the community could maximize area utilization for fish/ crab farm and the cool air from water surface could increase solar panel efficiency. Deyuan is one of our pride that the Company could supply clean energy to the community with appropriate design and technology.

Carbon Pricing

In the past year, the Company used the internal carbon price which would determine the GHG cost in various areas used as part of the cost to analyze the investment value and possibility of new projects in the future. The Company focused on low carbon emission projects and factors to reduce the Company's GHG emissions reduction in order to achieve the goal set and to well prepare for adaption to the possibility of legal changes and enforcement to reduce GHG emissions in the near future.





Energy

Strategy

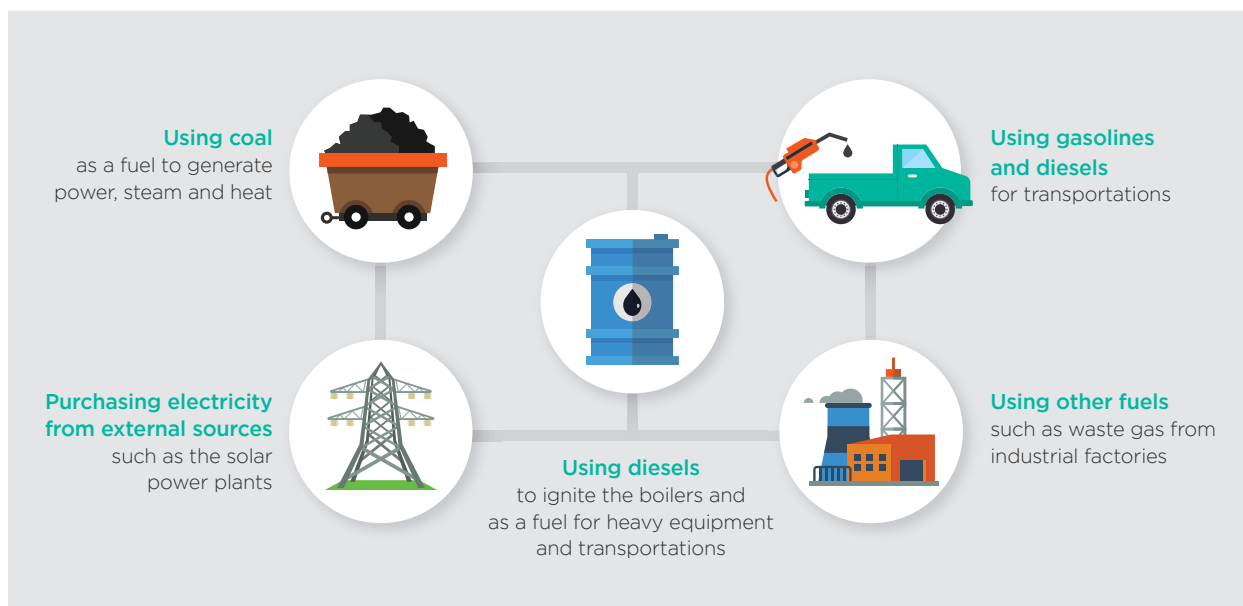
- Controlling the use of fuels at the highest efficiency
- Deploying the high efficiency, low emission (HELE) technology.
- Supporting projects and innovations related to energy saving.



Significance and Reporting Boundary

The major costs of thermal power plants and combined heat and power (CHP) plants are from fossil fuels which are used for generating power, steam and other energies. The energy consumption efficiency, therefore, directly affects costs and competitive advantages as well as greenhouse gas emissions. Meanwhile, regulations setting the fuel consumption intensity per unit of product standards by the local government, such as those in China, are considered as the challenges the power producers must adapt themselves to keep up with such changes. This includes the improvement of energy consumption of existing power plants and projects under development in response to clean energy demand in the future and the power plants' lower energy consumption intensity per unit of product as well as be part of alleviating climate change.

Activities related to energy consumption in producing electricity, steam and heat are as follows:



The scope of reporting the energy consumption data is in accordance with the greenhouse gas (GHG) report covering all business entities where the Company has invested greater than 50% and has management control in line with Banpu Group. The two joint-venture power plants in Thailand and Lao PDR., namely BLCP Power Plant (50%) and Hongsa Power Plant (40%), of which their energy consumption data is separately reported from the Company's energy consumption database. This is in accordance with the energy consumption reporting guidelines of Banpu Group as previously described.

Indicator

- The energy consumption intensity per unit of product.

Target

- The energy consumption intensity per unit of product decreases when compared with that of 2018.

Performance

- The energy consumption intensity was **1.87 GJ/ MWh**, increasing **8.7%** compared to 2018.

Management Approach

As a producer of power, steam, hot water and others, the Company's energy consumption is mainly from the boiler's fuel combustion activities of thermal power plants. The electricity production from solar power plants consumes minimal energy, only using electricity purchased from external sources to operate the office during a night time. The Company, therefore, focuses on power management in its power plants as follows.



Existing Thermal Power Plants	Future Thermal Power Plants	Renewable Power Plants
• Improving the boiler efficiency in order to achieve the most combustible efficiency. • Reducing heat and energy leakages in the pipe system. • Planning for effective maintenances to increase the availability factor (AF) of power plants, reducing the planned outage factor and the unplanned outage factor as well as decreasing the energy loss from stoppages and starting operating the power plant. • Looking for opportunities to reduce heat loss and reusing such heats. • Improving other supporting systems, such as enhancing the boiler's water quality for longer use, reducing water discharge and refilling new water to the system. • Looking for opportunities to use other fuels available in the area, such as waste gas from neighboring industrial plants, natural gas, biomass fuels, etc. • Reducing energy consumption in the power plants and other supporting works. • Planning for purchasing fuels and seeking various vendors to supply quality fuels with reasonable prices. • Studying the possibility to reduce the transportation's fuel consumption.	• Using the high-efficiency technology with low fuel consumption and environmental-friendly. • Arranging the fuel transportation system and others appropriately to reduce the transportation's energy consumption.	• Increasing electricity production from renewable energy with no less than 20% by 2025. • Reducing energy consumptions and losses from operating the system and other parts. • Conducting a study to reduce electricity consumption of solar power plants during the nighttime. • Conducting a study for a maintenance plan to increase efficiency.

Performance

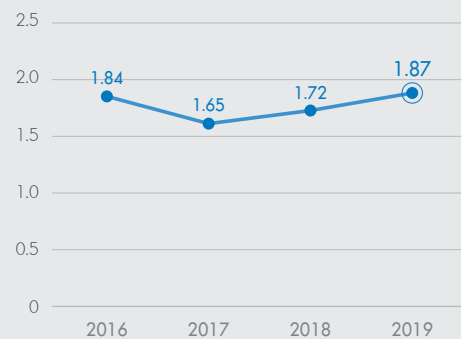
In the past year, the Company's power consumption intensity was 1.87 gigajoules per megawatt-hour, increasing by 8.7% compared to 2018 due to the trade war effects, resulting in major customers' demand for steam lower than expected.

The Company, therefore, had to adjust its production process by producing the same amount of electricity but able to sell less steam. As a result, the energy consumption intensity per unit of product was higher.

- ☑ Studying on modification of fuels available in each area, such as natural gas, biomass, etc.
- ☑ Improving the techniques to spray fuels into the boilers to increase energy efficiency.
- ☑ Seeking for production opportunities and using more clean energy to replace fossil energy, such as installing solar cells on coal storage plants, the streets, and parking lots, etc.
- ☑ Sales of other products related to electricity production according to market demand such as steam and cold water can reduce energy loss and energy consumption rate per unit of product.

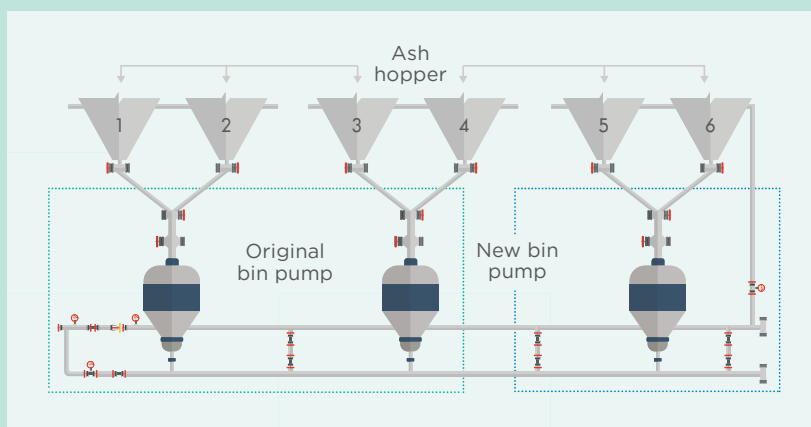
In the previous year, the Company assessed a current status of the CHP plants in China in order to use digital technology in the power plants to be more integrated and efficient. The company is developing applications for the power plant's integrated power management, expected to be finished in 2020.

The Energy Consumption Intensity per Unit of Product (GJ/ MWh)



Reduction of Power Consumption at Zouping Power Plant

Since the machinery of Zouping Power Plant has long been used while many of its parts were replaced in order to reduce pollutant emissions or a so called “Ultra – Low Emissions”, it has less efficiency and consumed more electricity. As a result, the power plant’s efficiency has decreased as a whole. In addition, Zouping Power Plant has to generate power and steam of which production procedures are different from its initially operational commencement.



The Zouping Power Plant, therefore, developed a plan to improve its efficiency and reduce the power consumption ratio of its machinery so as to increase the power plant efficiency. Zouping Power Plant conducted the engineering study and designing the fly-ash transportation system by installing one more bin pump at the ash hopper No. 5 and No. 6. As a result, there are three bin pumps in the system. Moreover, the existing bin pumps installed at the ash hopper No.1, 2, 3 and at the ash hopper No.4, 5, 6 were moved and installed at the bin pump No. 1, 2 and No.3, 4, respectively, so as to make a balance in the system.

As a result, the bin pumps were able to reduce their energy consumption to **1,421,400 KWh** per annum, equivalent to CNY **640,000** per annum.

Moreover, Zouping Power Plant also installed the rotational speed control equipment of the forced draft fan at the boiler No.4 and No.6 as well as the induced draft fan at the boiler No.6 in order to reduce the rotational speed. Meanwhile, the power plant has been operated at the low operation mode, which can help reduce energy consumption approximately 50% or **9,290,000 KWh** per annum, equivalent to CNY **4,200,000** per annum.

Air Quality

Strategy

- Improving a pollutant treatment system effectively.
- Appropriate fuel selection.
- Improving the combustion system efficiency.

Significance and Reporting Boundary



Sulfur dioxide (SO₂) and oxides of Nitrogen (NO_x) and particulate matters (PM) are the indicators of air quality released at stacks of the thermal as well as combined heat and power plants. Since these gases and dusts may have the effects to air quality, agricultural ecology, and human and animal health, possibly causing irritation of the respiratory system both acute and chronic, they are a major concern of communities around the power plants. In addition, the need to improve air quality in large cities with high air pollution, such as cities in China, has pushed the government to set standards and measures more strictly to improve the environment and health of

local people in the area. The Company, therefore, has to adjust itself by implementing the effective control systems and reliable preventive measures for its operations. As such, the Company will be able to operate as required by laws and receive recognition as well as relieve concerns from the communities.

The boundary of this report covers the CHP plants in which the Company holds greater than 50% of investments and management control including the three CHP plants in China. The solar power plants in China and Japan, however, haven't released any of SO₂, NO_x, and PM.

Management Approach

The Company has set up measures to control air quality in the safe level for employees and communities living surrounding the project's areas. Furthermore, technologies properly for each area have been used as follows:



The Company has always improved its high standard pollutant treatment system before releasing any contaminations from stacks

For example a SO₂ precipitator called the 'Flue Gas Desulfurization (FDG)', a particular matter capturing system – the Electrostatic Precipitator, and a dust filter-the 'Bagfilter', etc.



The Company has opted to use coal with low sulfur contents

To reduce the amount of sulfur dioxide at the original point. It has established a long-term purchase agreement for the quality coal resources as specified. The online trading system has been open for coal traders to offer the coal quality meeting the Company's requirement.



The clean technology has been employed to help the boiler igniting completely

Such as using the effective production and environmental friendly technology called 'High Efficiency, Low Emissions (HELE)', the clean technology for boiler combustion namely, the 'Pulverized Fuel Combustion' and 'Fluidized Bed Combustion' to reduce SO₂ and NO_x as well as dusts during the boiler's combustion, etc.

Indicator

- Air emissions intensity
- Sulfur dioxide (SO₂) emission rate per unit of product
- Oxide of nitrogen (NO_x) emission rate per unit of product
- Particular matters (PM) emission rate per unit of product

Target

- The air quality released at stack comply with the regulations
- SO₂ intensity is not exceeding **0.0766** tonnes/ GWh
- NO_x intensity is not exceeding **1.184** tonnes/ GWh
- PM is not exceeding **0.0230** tonnes/ GWh

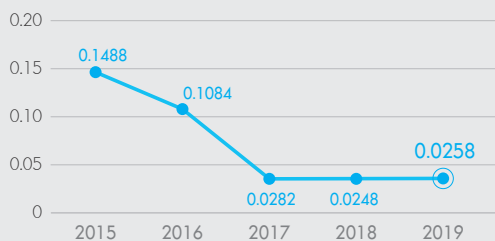
Performance

- The air quality released at stack from all power plants comply with the regulations.
- SO₂ intensity **0.0258** tonnes/ GWh
- NO_x intensity **0.0414** tonnes/ GWh
- PM intensity **0.0030** tonnes/ GWh

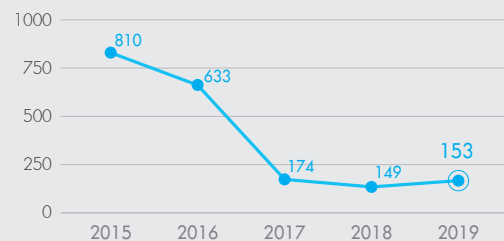
Performance

The amount of emissions from stacks depends on the coal quality used for combustion, the boiler's combustion efficiency, and the efficiency of trapping pollutant gases before releasing. The three combined heat and power (CHP) plants in China have continuously improved the air quality at stacks before releasing since 2013. This has resulted in a significantly higher air quality released at stacks. In the previous year, the air quality of all three power plants in China was released above the standards specified by laws while the amount of emissions decreased as the target set.

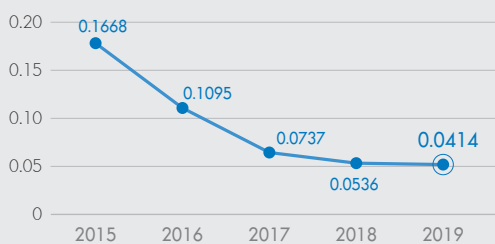
Sulfur Dioxide (SO₂) Emissions Intensity Rate (Tonnes/ GWh)



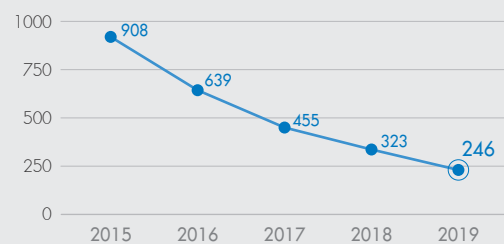
Total Sulfur Dioxide (SO₂) Emissions (Tonnes)



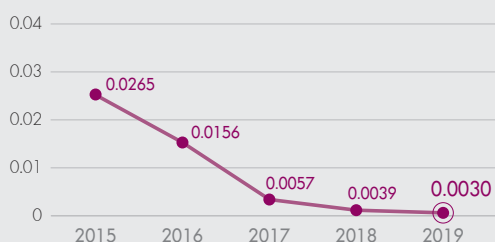
Oxide of Nitrogen (NO_x) Emissions Intensity Rate (Tonnes/ GWh)



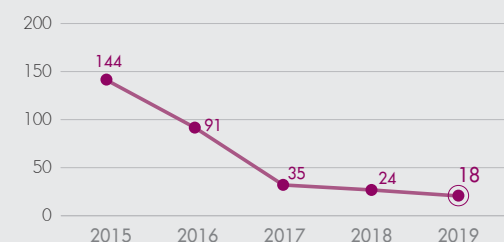
Total Oxide of Nitrogen (NO_x) Emissions (Tonnes)



Particular Matters Emissions Intensity Rate (Tonnes/ GWh)



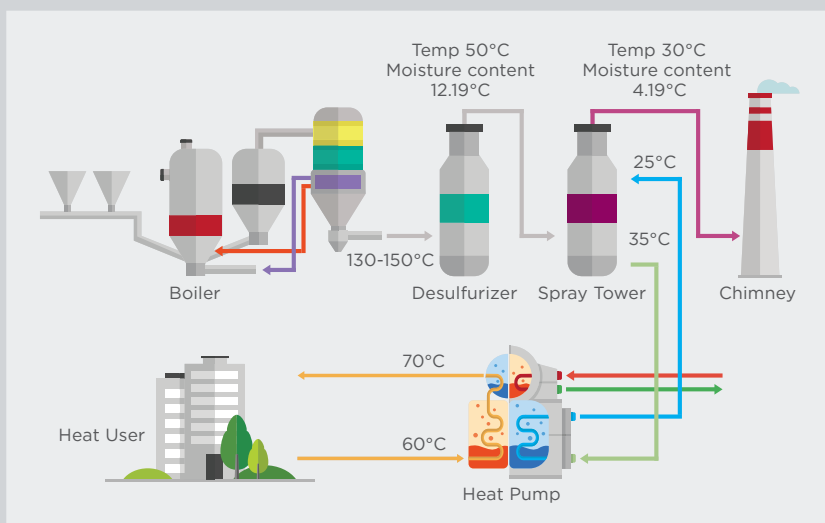
Total Particular Matters Emissions (Tonnes)



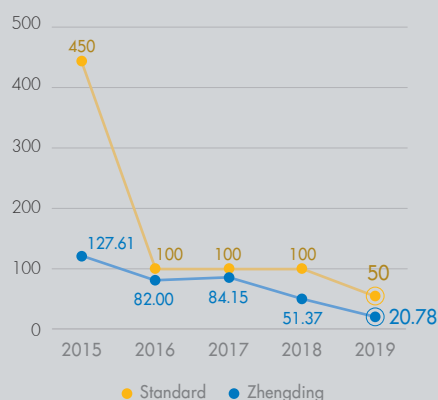
Improving the Air Quality Released into the Atmosphere at Zhengding Power Plant

Zhengding Power Plant needs to improve its air quality before releasing into the atmosphere in order to reduce sulfur dioxide (SO₂) and particular matters (PM) by improving the Flue Gas Desulfurization system to be more efficient.

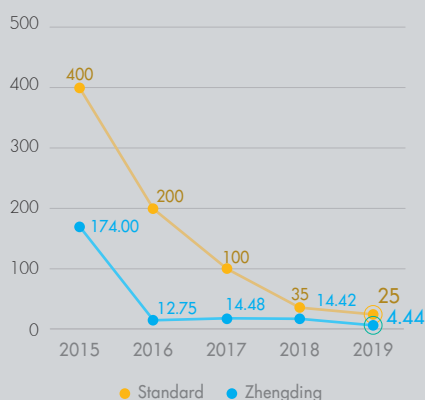
The improvement of the Flue Gas Desulfurization system was done through replacing the heat exchanging source, from using a cooling tower to a heat pump. In addition, a spray tower was installed to control the flue gas temperatures. As a result, the SO₂ quality and the particular matters intensity was down by 30%, making the air quality released from stacks at Zhengding Power Plant reduced to minimal or 'Near Zero Emissions.' Furthermore, by-products from the installation of hot and cold-water generators are the sales of hot water to customers, which helped generate around CNY 10.56 million per annum to Zhengding Power Plant.



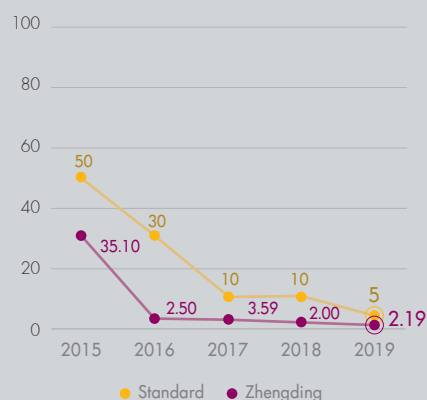
Oxide of Nitrogen Concentration (mg/ m³)



Sulfur Dioxide Concentration (mg/ m³)



Particular Matter (PM) Concentration (mg/ m³)



Environmental Quality Measurement and Monitoring System at Hongsa Power Plant

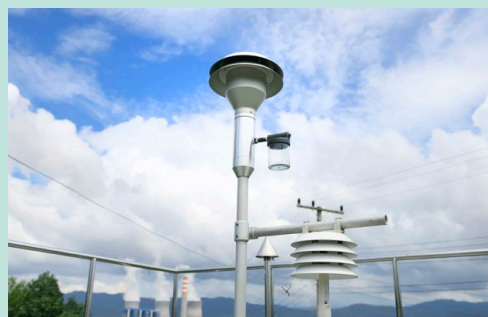
Hongsa Power Plant, a joint venture company of Banpu Power, has established an environmental quality monitoring plan in accordance with a complete environmental impact assessment (EIA) approved by the Laos PDR government. This is to ensure that environmental impact mitigation measures have been implemented completely. Presently, the environmental quality monitoring stations have been permanently installed, including the Ambient Air Quality Monitoring Station (AQMS), the Continuous Emission Monitoring Systems (CEMS), the Real Time Noise Monitoring and the water discharge measurement stations as specified in the Operational Phase Environmental Management and Monitoring Plan (OPEMMP)

Air quality monitoring: Hongsa Power Plant has installed the CEMs and AQMS to continuously monitor its air quality while the air quality measurement results have been sent to the involved Laos government agencies. In addition, reporting notification criteria called the 'Alert Thresholds Limit' have been determined and reported to the Laos government agencies when the parameters reaching the specified criteria. This is to create transparency and to ensure that the air quality monitoring has been carried out for surrounding communities promptly.

Noise level monitoring: The noise level measurement reporting system has been continuously improved, for example, measuring the noise levels daily and recording such noises if found exceeding the standards set in order to investigate the root causes. The noise level monitoring system will send the measurement results to administrators' emails daily so that they can get information quickly, able to find the causes and solve them correctly and in a timely manner when the communities have sound volumes exceeding the standards.

Discharge water quality monitoring: Hongsa Power Plant has installed the online water quality monitoring system for measuring water discharges continuously since 2017. Currently, the reporting and notification system of discharge water measurement results, has been developed to be more efficient through applying digital technology connecting with 'LINE' application so as to get information quickly and able to take corrective actions immediately in case something goes wrong.

In addition, Hongsa Power Plant has measured the environmental quality, such as air quality, noise and surface water quality in Nan Province since 2008. The measurement points are specified by external agencies who do not have any conflict of interests while the environment measuring results have been submitted to the involved parties. Besides, the power plant's air model simulation study was conducted in a radius of 50 km, covering the areas of Nan Province, so as to make stakeholders confident in the air quality and to prevent cross-border pollution problems throughout the project's life cycle.





Water Resource Utilization and Water Discharge

Strategy

- Improving a production process, reducing loss, and consuming water with maximum benefits.
- Managing water holistically including raw water entering the system and water discharged to the outside in order to reduce the impact of water usage in the area.
- Promoting stakeholder's participation in water management in the area.

Significance and Reporting Boundary



Water resources are essential to the human life, agriculture, and industry. It is one of the major raw materials for electricity generation of conventional power plants. Additionally, climate change and increasing populations are the key factors causing the water shortages more severely. The Company has put great emphasis on water resources management, allowing stakeholders able to access to clean and adequate water. Treating and inspecting water quality to meet the standards required by laws before discharging has also been our top priority. The water resources management is essential for sustainable

development to prevent any conflicts arising from water quality and shortages in the area possibly affecting stakeholders and surrounding communities.

The framework of this Report covers all business units in which the Company has greater than 50% of shares and has management control, inclusion of the three combined heat and power (CHP) plants, the solar power plants in Japan and China. The information of water consumption for thermal power plants, which are the joint-venture companies, however, is separately disclosed on the operating result section.

Management Approach

The Company announced the Water Policy so as to use for managing water resources and discharged water in accordance with good operating standards as follows:

1

Managing water usage for maximum benefit and looking for opportunities to reduce water consumption, and reuse or recycle the water

2

Improving the discharge water quality in accordance with the standards specified by laws and developing measures to prevent chemical leakages and contamination at its original sources

3

Implementing a holistic water management to ensure that the use of water resources for operations is in accordance with the righteousness and effectiveness with no effects on stakeholders in the area

4

Assessing the water resources related risks and determining measures and practices in the event of an emergency in order to reduce the impact and recovery of the area

5

Developing a surveillance system for both quality and quantity to ensure that water is well managed while the discharge water is compiled with the standards required by laws

6

Promoting stakeholder's participation especially the local communities and the research sector in order to conserve water resources, improve water quality and management in the area

Indicator

- The quality of discharged water compared to the standards prescribed by laws.
- A water consumption intensity.

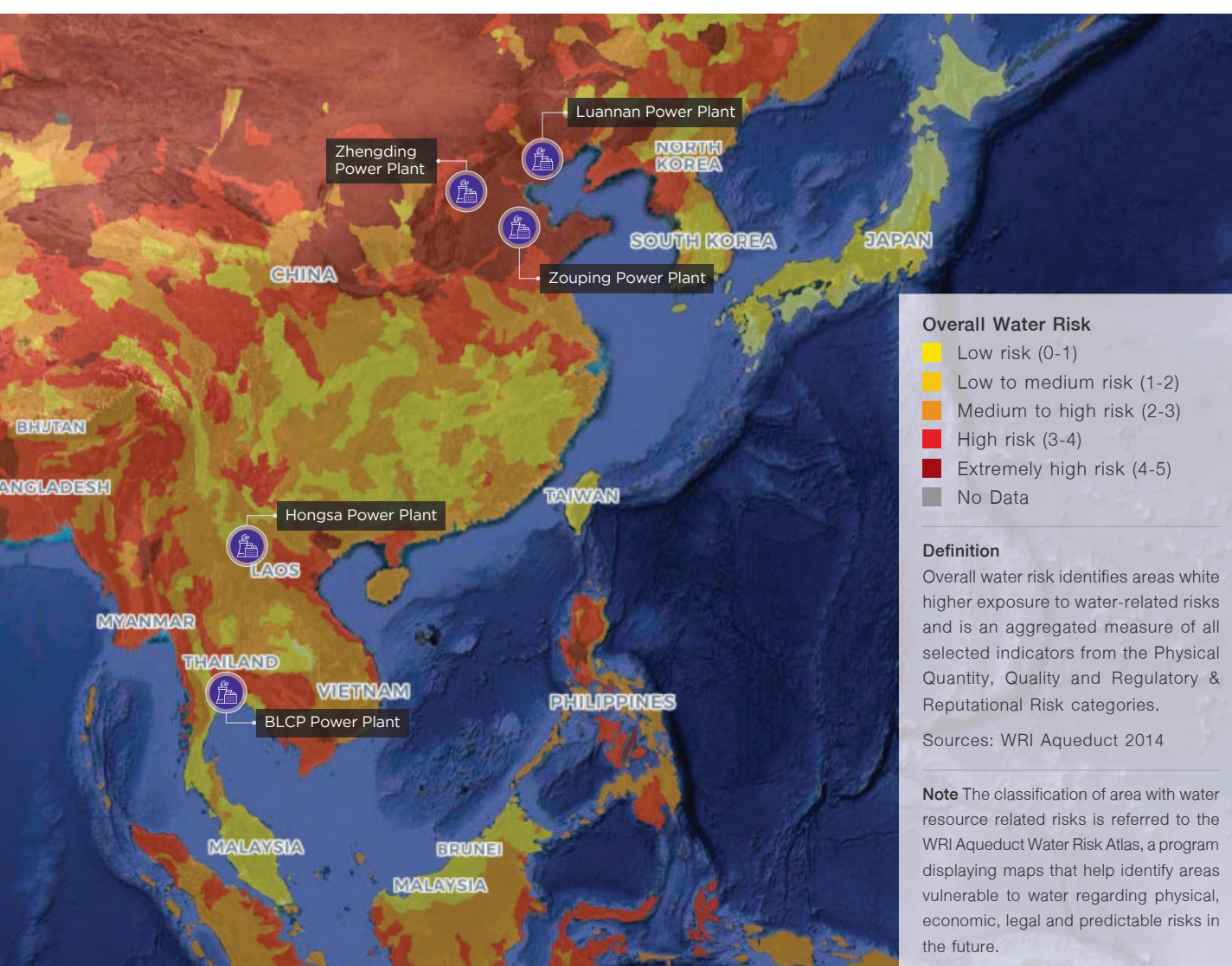
Target

- A discharged-water quality is complied with the standards set by laws.
- A water consumption intensity is lower than **1.103** cubic meters/MWh.

Performance

- A released water quality is in accordance with the standards required by laws.
- A water consumption intensity is **0.827** cubic meters/MWh.
- Assessing the locations of new business units vulnerable to water shortages in China and Japan.
- Developing a conceptual framework for water accounting and water balance in the production process.

Water Resource Risks Forecast



In the past year, the Company assessed the water shortage-related risks from our business locations. It was found that the three CHP plants in China are at high risk for water resources, which may cause water shortages in the future. The thermal power plants, which are the joint venture companies namely, BLCP in Thailand and Hongsa Power Plant in Laos were at medium risks. Since water is one of the major raw materials for thermal power plants, the Company therefore recognizes the importance of water resource management.

Power Plant	Country	River Basin	Water Resources Risk	Current Flooding	Current Drought	Prediction of future water demand	Prediction of the severity of future water shortages
Luannan	China	LUAN HE	High	Medium-High	Low-Medium	Increasing around 1.2 times	The same
Zhengding	China	YONGDING HE	High	Medium-High	Medium-High	Increasing around 1.2 times	The same
Zouping	China	-	Very High	Medium-High	Medium-High	Increasing around 1.2 times	The same
Hongsa	Lao PDR	MEKONG	Medium-High	High	Low	Increasing around 1.2 times	The same
BLCP	Thailand	-	Medium-High	Medium-High	Low	Increasing around 1.2 times	Increasing approximately 1.4 times

Performance

Last year, China introduced the water consumption reduction measures, one of which was a request for a private sector to reduce waste water to a minimum. As a result, the Luannan Power Plant has improved its water treatment system from the production process, being able to reuse all effluents (Zero Discharge). The water from a production process consists of two major parts—coal washing water and chemical contaminated one. According to the plan, it is expected that the new water treatment system will be commenced around the middle of 2020. As a pilot project, it will be extended to other power plants following the tendency of government regulations to reduce water resource consumption in the future.

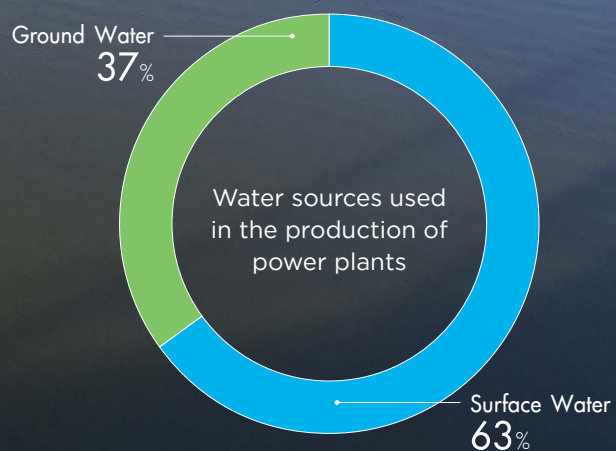
The Company's water consumption intensity was 0.827 cubic meters/megawatt-hour, decreasing by 25% compared to the previous year and updated data collection standards to be align with GRI 303 (2018) in 2019. The water consumption was mainly from a production of the three CHP plants in China, withdraw 6.8 million cubic meters of natural water sources, of which 63% was the surface of freshwater while the rest was the groundwater. The reduction of water consumption was due to an improvement of the boiler's water quality to be higher. This made it possible to extend the period for water discharge and keep the boiler's water stay longer.

Most of the effluents were from the CHP plants. The effluents were carried to the authorized external parties for treatment. The water quality discharged was in accordance with the standards set by laws while there was no incident regarding chemical leakage into the water source.

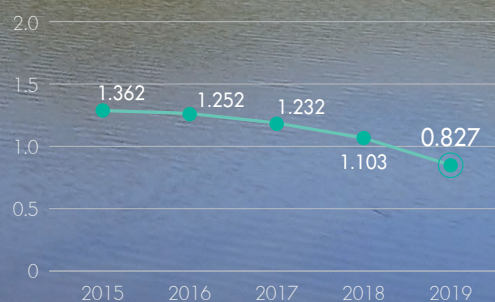


Water Consumption Intensity Rate

0.827 Cubic Meters/ MWh



Water Consumption Intensity Rate* (Cubic Meters/ MWh)



Water Withdrawal* (Million Cubic Meter)



*Standardize data collection standards to be align with GRI 303 (2018) since 2019



Strategy

- Reducing the use of wastes generated at its sources
- Promoting a reuse and recycling of wastes.
- Developing measures to prevent and solve the leakages of hazardous wastes.



Significance and Reporting Boundary

The Company has placed top priority on waste management since it is the best practice for natural resources conservation in order to reduce wastes arisen from our operations to a minimal and able to lessen waste disposal costs. For the power business, aside from non-hazardous and hazardous wastes, there are also by-products generated from fuel combustion and air quality treatment procedures, such as ashes and gypsums, which can be used for creating added values from selling them to mix with construction materials.

The boundary of this report covers the businesses of which the Company has more than 50% of shares and management control including the three combined heat and power (CHP) plants in China and the solar power plants in Japan and China. The information of the joint-venture power plants, however, is separately disclosed in the 'Performance Data' section.

Management Approach

Under the environmental policy, the Company has wastes management guidelines summarized as follows:

Waste Categories	Examples	Management Approach
Non-hazardous wastes	• Papers and office equipment • Metal scraps materials and equipment as well as packaging. • Household wastes • Organic wastes generated from tree trimmings and mowing in the area.	• Reducing consumption • Storing and classifying for reuse and recycling.
Hazardous wastes	• Used oils, lubricants • Chemicals used to improve water quality and other chemicals including packaging. • Electronic wastes such as solar cells that will be existing in the future.	• Consumption reduction • Looking for opportunities to transforming the hazardous wastes to those being able to treat and reuse better. • Reducing packaging usages by transporting and installing hazardous wastes in the chemical storage tanks. • Storing and classifying wastes for reuse and recycling. • Developing measures to prevent and handle waste leakages and in the event of emergency. • Transportation, disposals and sales for recycling must meet the standards set by laws. • Conducting a study on material parts separation for recycling and eliminating the expired solar cells in the future at the project's beginning stage. • Delivering wastes for disposal by the certified external parties.
Ashes and gypsums	• Fly-ashes • Bottom ashes • Synthetic gypsums	• Fly-ash sizes separation corresponding to the customers' needs and the market demand. • Exploring the market to sell fly ashes, bottom ashes and gypsums as materials for construction. • Arranging the areas to instore ashes and gypsums appropriately and adequately. • Transporting ashes and gypsums for disposals by the certified external parties.

Indicator

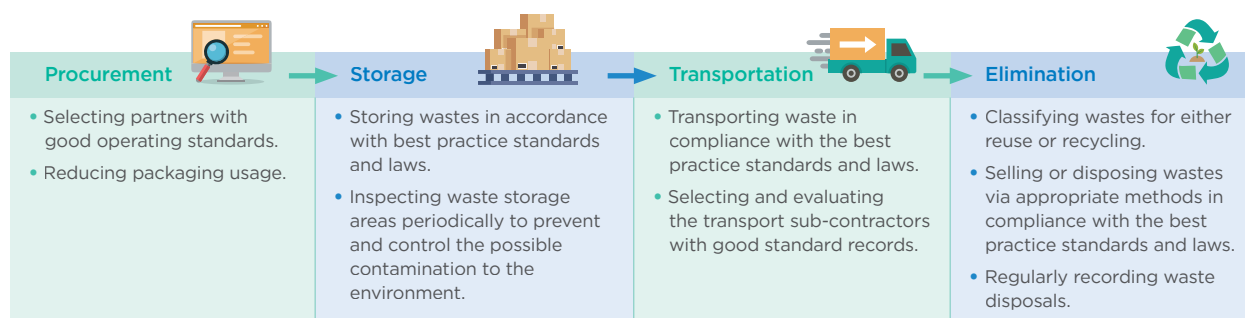
- Proportion of hazardous wastes eliminated by landfills.
- Proportion of reused and recycled non-hazardous wastes.
- Proportion of reused and recycled fly-ashes.

Target

- None of hazardous wastes eliminated by landfills.
- The amount of hazardous waste is reused and recycled not less than **10%** per annum.
- Proportion of fly ash eliminated by reusing and recycling is no less than **100%** per year.
- Synthetic gypsums eliminated through reuse or recycling are not less than **100%** per year

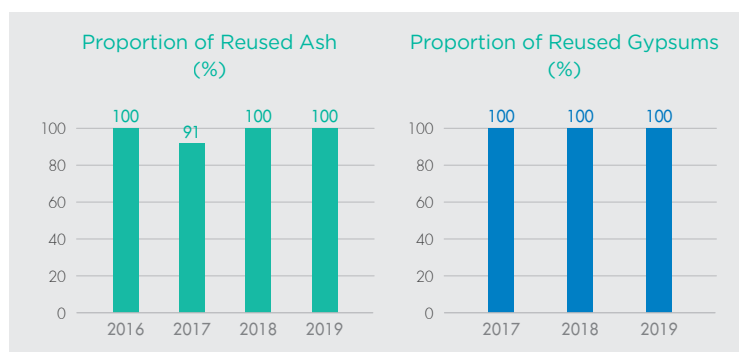
Performance

- None of hazardous wastes disposed by landfills.
- Hazardous wastes eliminated by reuse or recycling accountable for **59%** per annum.
- Fly ashes eliminated by reuse or recycling representing **100%** per year.
- Synthetic gypsums eliminated through reuse or recycling accountable for **100%** yearly.



Performance

In the previous year, hazardous wastes generated by the Company's operations amounted to 22 tonnes, 59% of which was reused and recycled reaching the target set. This was above the set target of having no less than 10% of hazardous wastes. Meanwhile, the amount of non-hazardous wastes was 928 tonnes, of which 90% was landfilled.



The amount of ashes and gypsums generated from the Company's CHP plants in China was 664,199 tonnes and 85,097 tonnes, respectively, and all of which were reused. The size of fly ashes was classified prior to selling as construction materials. Classifying fly ash sizes to meet customer's needs is a method to add values to fly ashes generated from the Chinese power plants since the price is higher due to their qualifications meeting the market's demand. However, the Company has not been able to reuse all fly ashes. This is due to the fly ash generated during the beginning stage of operations possibly having contaminated substances while their qualifications haven't met the customer's expectation. The power plants which are joint-venture companies have sold fly ashes as well. Additionally, some fly ashes have been used for bricks production of the community's occupational promotion projects.

The solar power plants in China and Japan, on other hand, haven't significantly generated any wastes. They are remotely controlled with no staff operating in the area.

Moreover, they have no wastes generated from the obsoleted solar cell panels since they have just started commercial operations and are in the manufacturer's warranty period. There is only a small amount of organic wastes caused by mowing and twigs for maintenance of the area. The solar power plants will generate wastes from the deteriorated solar cell panels at the end of the project, taking about 25 years in the future. Hence, the Company has studied on recycling and disposal of wastes at a beginning stage of environmental impacts before starting operations.

In 2019, the Company in collaboration with Banpu Group improved the standards and best practices of waste management covering wastes generated by the conventional fuel and renewable energy power plants announced in December 2019. Formats of data collection for classifying wastes according to the Global Reporting Initiative (GRI) 306 (2016) have been improved and communicated to involved persons in affiliated companies for their acknowledge and proper application.



Strategy

- Avoiding operating in areas with high biodiversity value
- Conducting a biodiversity study in the areas prior to project operations so as to use the study results to design the project before construction.



Significance and Reporting Boundary

Humans and living creatures rely on and depend on the ecosystem for their livelihoods. Biodiversity is a natural product able to be used for sustaining life. Currently, biodiversity is threatened for many reasons, such as habitat loss, a beyond balance utilization of the biological ecology resources, climate change, threats from invasive alien species and pollutions from human activities, etc., especially those in the areas where high biodiversity is existing. The Company is well aware of the importance of biodiversity and has commitment to conducting the power business with cautions and taking into account the project's potential impacts in order to prevent and reduce the effects to a minimum, The boundary of this report covers the power plants where the Company has invested more than 50% and has management control.

Management Approach

The Company has the biodiversity management guidelines by avoiding any impacts as the first priority since the beginning of selecting operating areas that do not affect the high biodiversity areas. We are committed to conduct biodiversity operations as follows:



Assessing risks
related to biodiversity in all
business units



**No business units operated
in the areas of world heritages**
and in the protected areas of the International for
Conservation of Nature (IUCN), Category I-IV



Conducting a biodiversity study
in the project areas possibly having high
biodiversity so as to collect data and
develop the operational plan to reduce
impacts prior to commencing operations



**Taking into account the biodiversity
impacts in all periods of project
operations**
ranging from exploration, construction,
operation, and closure stages of the
project life cycle

Indicator

- Proportion of business units assessed for high potential to have biodiversity impacts
- Proportion of business units located in the areas identified as high potential of biodiversity impacts are assessed for biodiversity value.

Target

- All business units assessed for high potential to have biodiversity impacts by 2020.
- All business units located in the areas identified as high potential of biodiversity impacts (if any) are assessed for biodiversity value by 2020.

Performance

- A complete biodiversity assessment for high potential to have biodiversity impacts in all areas of business units.
- No business unit operated in the areas of high biodiversity.
- Complete a biodiversity study in the areas of Vinh Chau Wind Power Plant in Vietnam.



Committing to operating projects promoting the net positive impact on biodiversity through following guidelines:

- **Avoidance:** Avoiding conduction activities possibly causing negative impacts on biodiversity.
- **Reducing:** Reducing unavoidable impacts by identifying operational plan and clear measurements.
- **Rehabilitation:** Rehabilitating the affected areas.
- **Offset:** Operating projects in compensation of biodiversity effects.



Establishing stakeholders' engagement

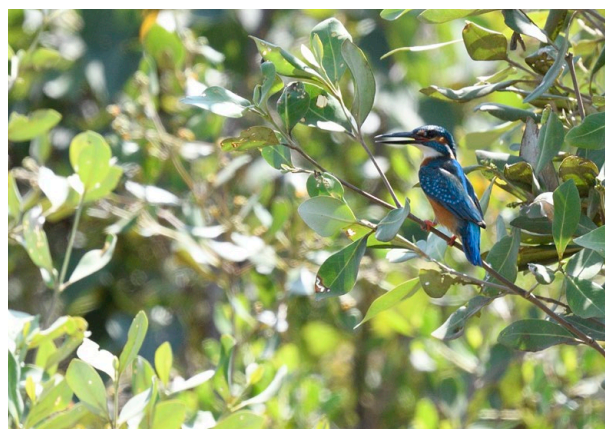
especially the local communities and academic institutions in order to implement the biodiversity conservation projects



Supporting in biodiversity research initiatives

Performance

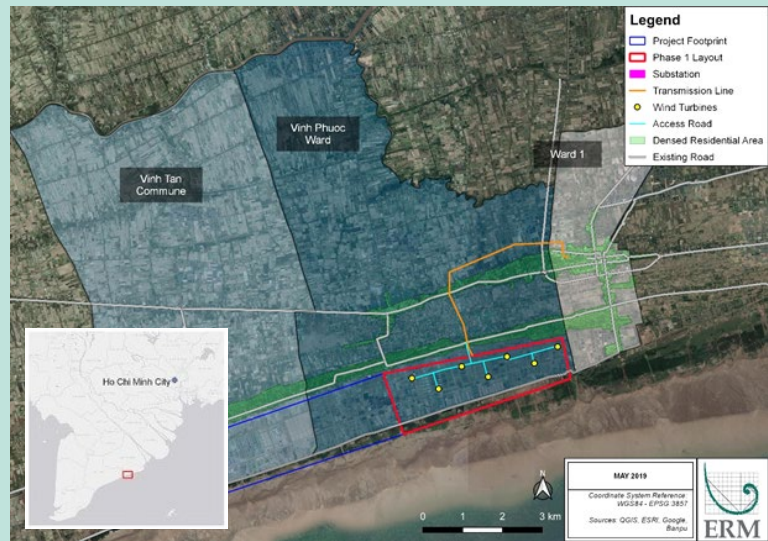
The Company has conducted a preliminary risk assessment on biodiversity in all areas the Company has operated its businesses. On the other hand, we will not operate the power plants in areas having high potentials of biodiversity, such as the World Heritage Area, the protected areas by the International Union for Conservation of Nature (IUCN) Category 1-4. This means we will not operate in the strict natural reverberation area, the national parks, the natural monument, and the habitats/ species management areas.



In the past year, the Company conducted a biodiversity study in the areas of Vinh Chau Wind Power Plant Project in Vietnam in order to use the data obtained from the study to design the project and set up measures to prevent the impacts before the project construction.

A Study on Biodiversity at the Vinh Chau Wind Power Plant Project in Vietnam

Wind power plants may have an impact on the ecology and natural habitats of birds and bats. The Company is well aware of the importance of preserving the ecosystem in the area. It is, therefore, conducting a biodiversity study in the surrounding area of the Vinh Chau Wind Power Plant Project in Vietnam to collect biodiversity data before the commencement of project construction. The assessment of potential impacts and preventive and corrective measures were also implemented before the project's construction. The research methods and specimen collection were in accordance with the academic standards with reference to the International Finance Corporation (IFC) Performance Standard 6. The biodiversity study are consisted of:

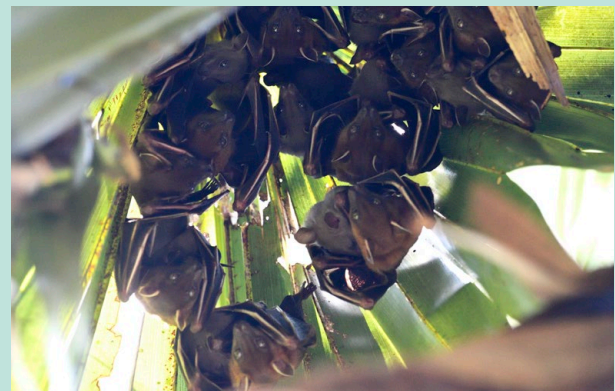


✓ **Flora Diversity Study:** A study on plant diversities was conducted by using secondary data, satellite image and a survey in the area. It was found that most of the project areas are used for shrimp and other aquaculture farming. As the surrounding areas are the mangrove forests encroached on fishery, only 40 species of plants are found, most of which are shrubs while 19 species are in the mangrove forest group.



Yellow-vented bulbul (*Pycnonotus goiavier*) was found in the study area.

✓ **Bird Diversity and Flying Route Survey:** A study on bird diversity and flying routes in the area was conducted during both the dry and rainy seasons to cover local species and migratory birds, their flying routes and heights as well as species differences in the seasons. From the study of 52 bird species, it was found the most of them flew below 35 meters, which is the minimum height of the wind power plant's turbines.



Greater Short-nosed Fruit Bat (*Cynopterus sphinx*) was found in the study area.

✓ **Bat Diversity Survey:** Since bats are nocturnal animals and are harder to see than birds, it is necessary to use various methods for this study, such as a secondary data research, an expert review, a use of a sound wave called "mobile acoustic transects and stationary acoustic point count," net trapping, temperatures observation, and community interviews on bats' nesting in the area, etc. It was found that bat species can be classified as approximately six species from sound wave identification, two species from net trapping, three species from surveying their habitats during the daytime. From surveying in the area, a number of bats are less than that of the secondary data. This might be caused by unavailable fruit and food sources for bats in the project area.

The Company is confident that this study will be beneficial to the biodiversity conservation in the future.

Biodiversity Conservation Activities at BLCP Power Plant

BLCP Power Plant, a joint-venture company, has put great emphasis on environmental and biodiversity preservation. In the previous year, BLCP implemented projects relating to natural resources in the surrounding areas and promoted biodiversity conservation as follows:

- The 'Marine Ecosystem Restoration and Coral Reefs Reproduction' project at Saket Island and Gai Tia Island, conducted with the Royal Thai Marine Corps, Rayong Province.
- The 17th 'San Sang Suk' (Engagement, Encouragement, Happiness) to release aquatic species with BLCP project, the activity to release over 2 million of black - tiger shrimp species and blue swimming crabs to the Saket Island, inclusion of collecting trash around the island, both at the beach and underwater.
- The 9th 'Check-dam Construction in Celebration of Queen Sirikit' project, the volunteering project carried out in collaboration with the power plant group.
- The reforestation project at Ban Madue Community Forest, Khao Chamao District, Chanthaburi Province, organized with the Royal Forest Department
- The 'Mangrove Forest Learning Center' at the Floating Pagoda.
- The 'Global Coastal Waste Collection' project, run in collaboration with factories in Map Ta Phut Industrial Estate.





WE ARE ENERGY

Social



Continually built a tailor **community engagement** and CSR project to meet each community context

Zero human rights violation incident and significant community complaint

No fatalities relating to working accidents
(Fatality = 0)

No lost time injury frequency rate
(LTIFR = 0)

'Banpu Heart'
driving force of our people

5 courses
Leadership Development

15 courses
People Capability Development

Average Training Expense for Management



Junior Management

» **775** USD/ person

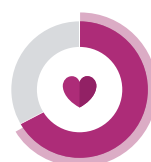


Middle Management

» **1,230** USD/ person

2019 Engagement Survey Result

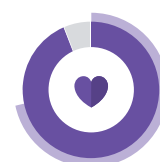
Thailand



68%

Average score in labor market 66%

China



94%

Average score in labor market 71%

Japan



50%

Average score in labor market 21%



Corporate Culture

Strategy

- Driving the 'Banpu Heart' corporate culture program by Banpu Change Leaders (BCL) who are the employee representatives.



Significance and Reporting Boundary

The Company has operated our businesses in various areas in the Asia-Pacific region, hiring around 1,000 people to work together. The Company believes that a strong corporate culture will help drive executives and employees in all areas not only in working harmoniously, but also performing their responsible duties as well as consolidating differences into the organizational strengths to achieve its goals without differences on genders, ethnicities and religions, languages, ages, affiliations, etc. The boundary of this report covers the business entities in which the Company has direct management control namely, Thailand, China, Japan, and Vietnam.

Management Approach

To cultivate the 'Banpu Heart' corporate culture, the Company has implemented activities relating to the three core values, including 'Passionate', 'Innovative', and 'Committed', as follows:



Passionate

Passionate Value includes:

1. **Pursue for success:** Banpu people leverage full potential and professionalism for continuous growth and success.
2. **Can do more:** Banpu people value different ideas and support each other to make things beyond expectation.
3. **Be agile and change:** Banpu people collaborate to strengthen teamwork that enhance positive change in responsive and effective ways.
4. **Express care and share:** Banpu people humble and embrace differences and sincerely value one another.



Indicator

- The Banpu Heart Score survey result reflecting employees' behaviors in accordance with the corporate core values

Target

- The Banpu Heart survey score in Thailand was higher than **74%**

Performance

- The Banpu Heart Score in Thailand was **65%** while those of China and Japan which were surveyed for the first time were **95%** and **79%**, respectively.
- Improving the key performance indicator (KPI) scoring criteria by dividing into two parts, consisting of work related KPIs, accounting for **70%** and behavior base KPIs, accounting for **30%**. The behavioral KPI is assessed from behaviors expressed through the corporate shared values.
- Promoting the 'Banpu Heart' corporate value under the theme of 'Strongly build a complete understanding of Banpu Heart and 10 behaviors' in order to create understandings among employees, turning into tangible practices.

Innovative

Innovative Value includes:

1. **Transcend the trend:** Banpu people maximize results by thinking ahead of the game and working smarter.
2. **Ideate and get real:** Banpu people make a difference, experiment prototypes, and make it happen for continuous improvement of process, products, and services
3. **Learn fast, do first:** Banpu people are empowered to take risks, do, learn, and grow.



Committed

Committed Value includes:



1. **Adhere to Integrity and Ethics:** Banpu people do the right things, always.
2. **Synergize and network:** Banpu people build strong connection to all stakeholders for win-win outcomes.
3. **Engage to sustainability:** Banpu people are responsible for the well-being of social and environment sustainability.

The definitions of these core values have been clearly defined. Additionally, behaviors expressing such core values have been determined. A long-term 'Banpu Heart' strategy roadmap for years 2018-2025 have been also developed so as to strengthen the corporate culture consolidating differences into the organizational strengths to achieve its goals. Furthermore, employees have common values for working together efficiently and happily.



Performance

In 2019, the Company promoted the 'Banpu Heart' value under the concept of 'Strongly build a complete understanding of Banpu Heart and 10 behaviors' with an aim to create understandings among employees in all countries, turning the single 'Banpu Heart' into true actions. Activities implemented were as follows:



- ✓ Conducting the 'Banpu Heart Experience Workshop' participated by executives and employees in order to design the 'Banpu Heart' behaviors, applying them to their daily life.
- ✓ Setting up the Banpu Change Leader (BCL) working group to create and implement corporate culture activities reaching all levels of employees. The BCLs are employee volunteers from various departments who have caring minds and commitment to the 'Banpu Heart' value.
- ✓ Designing the 'Inner View Test' to recruit employees in order to know characters and behaviors of all applicants whether they embrace the corporate values or not. After obtaining candidate's test results, the result accuracy will be verified through the 'Behavioral-Based Interview' before making decisions to employ candidates who behave in accordance with the Company's corporate culture.
- ✓ Organizing the 'Banpu Heart' shared value orientation including a participation in the 'Banpu Heart in Action' activity for new employees. The aim is to help the new comers understand backgrounds and rationales for using the 'Banpu Heart' as a corporate culture, know how to apply the 'Banpu Heart' to working and daily lives as well as learn about the 'Banpu Heart' experiences from other employees who have worked with the Company for several years.
- ✓ Conducting a behavioral based performance assessment which is accountable for 30% from the whole KPI (100%). It is expected that the desired behaviors aligned with each of the 'Banpu Heart' values, will be continuously applied to operational practices.
- ✓ Organizing varieties of 'Banpu Heart' promotional activities for every level of employees to participate and take into actions, such as a special talk titled 'Fast and Furious: Furious Innovation, Fast Results' by Banpu CEO – Ms. Somruedee Chaimongkol, and the 'From Passion To Success' activity to create inspiration for working, etc.
- ✓ Organizing the 'Banpu Heart outing 2019' activity to reflect the three core values of 'Banpu Heart', including Passionate, Innovative, and Committed so that employees understand them more through activities allowing them to do activities together as well as providing them opportunities to present their creative ideas.
- ✓ Developing a communication tool set called the 'Call-to-Action' consisting of 10 behaviors in order to create changes and strengthen the employees of all company groups by the way of "Banpu Heart" through various activities such as chatbot game, organizing activities to create inspirations, online media for communications such as the 'Hato Jump' game application, Banpu Heart 'Do' Behaviors e-booklet, etc.

Activities promoting 'Banpu Heart' corporate culture in year 2019: Passionate | Innovative | Committed From Passion To Success



On August 9, 2019, Banpu Group organized the 'From Passion To Success' activity to promote understandings on 'Banpu Heart' corporate culture and provide points of views as well as create inspirations to work for its employees. At the event, a fun-filled special talk by Luk Golf – Mr. Kanathip Sunthornrak, an actor, host and owner of the Angkriz English Language Institute, was conducted. Luk Golf compared the 'passion' as oil driving ourselves. Each person must search for their own 'fuel' and regularly fill it up in order to have energy to move forward to the set goals. He also suggested participants the ways to find their own personality, which will help each person happier with both personal and working life.

In addition, three speakers who were representatives of coaches and athletes from the corporate social responsibility (CSR) projects Banpu has continuously supported namely, 'Tom' – Mr. Asanah Amornratsuchart, a table tennis coach, 'Mark' – Mr. Supakorn Wattanasirichai, a table tennis athlete, and 'Chew' – Mr. Songrit, David, Chanbubpha, a national tennis player, joined this session. They talked on the topic of 'Achieve Our Dreams with Passion', sharing the sports paths they hunt for their dreams with loves.

"Passion is not just infatuation at the initial stage, but still a nourishment, a powerful force that leads us to our dreams. In addition, it is also a source of encouragement for us to overcome obstacles effectively", they said.



Banpu Heart Experience



Bangkok Office organized the 'Banpu Heart Experience' workshop for executives and employees in order to design the 'Banpu Heart' behaviors, turning them into true actions in their daily life. This workshop will be organized in China in 2020.

Competency and Leadership Development



Strategy

- Developing leadership competency and strength as well as managing a succession plan for key positions to support business strategies.
- Developing leaders and employees equipped with new necessary skills and roles in accordance with business directions by establishing the Individual Development Plan.



Significance and Reporting Boundary

Competencies and leaderships of human resources are the key success factor for achieving the business expansion and growth targets in the era of technology disruption. The Company has continuously emphasized and supported its employee's competency development as it is essential for building their career expertises, management and leaderships corresponding to business expansions and competitive advantages. The competency development is therefore one of the human resources management strategies. Consequently, the Company has prepared the comprehensive competency

development plans for both executives and employees to heighten their learning ability and work efficiency. Moreover, the leadership development program applicable to future desired skills and in line with changes in businesses will finally lead the Company towards successes as targeted and stated in the corporate missions.

The boundary of this report covers the business entities of which the Company has management control, including Thailand, China, Japan, and Vietnam.

Management Approach

Various factors have been continuously considered and reviewed by the Company in order to develop employee's competency and leadership strengths as well as succession management with an aim to support business strategies, build newly desired skills inclusion of new roles, and establish the individual development plan. The Company has created the training roadmap consisting of a short-term employee development curriculum (annual basis) and a long-term one in line with business strategies, the concepts of which are as follows:

The development of short-term training courses



will focus on the ones appropriated with each employee's needs by taking following criteria into consideration.

- 1) The annual individual development plan by comparing the employee's competency assessment results with job positions.
- 2) The employee's competency development guideline specified for each department which is different from job characteristics.
- 3) The current knowledge receiving high interest from employees or necessary upskills/ reskills, inclusion of learning new technologies or building necessary skills and able to use these skills for improving their works to be more efficient.

Indicator

- Proportion of employees attending the leadership development trainings.

Target

- Employees attending the 'Global Leadership Program and Engaging Leader' training.

Performance

Employees selected to attend the 'Global Leadership Program and Engaging Leader' training include:

- Vice Presidents and higher **79%**
- Division Managers and higher **70%**
- Section Managers **46%**

The long- term training development



will emphasize on designing the courses in line with the Company's strategies and responding to the trend of business needs, as well as the demand for new skills in the global market. This is to prepare our employees to be able to be ahead of changes in the business trends and to link diversities of each country where the Company has operated.

Designing the employee development model differently from a level of job positions



in accordance with the most efficient learning process. The Company has supported the employee performance in each level as follows:

- 1) Developing the 'Banpu Group Learning and Development Road Map' by taking into consideration necessary knowledge required for the working system, the people system and the managerial skills. The Banpu Power employee development focuses on leaderships and functional competencies so that our personnel, ranging from the employee level to the managerial level, can increase their working skills in parallel with leaderships.
- 2) Improving the leadership competency to be in line with business strategies for year 2016-2020.
- 3) Assessing the competency development plan and using the assessment results for regularly improving the employee's development plans.

In addition, the Company has also encouraged employees to learn in various ways such as:

- ☑ A training by internal staff (Internal trainer): This training is the development of employee's working capabilities through being a trainer to transfer and share his/ her knowledge and experiences.
- ☑ Providing opportunities for employees to gain direct working experiences, e.g. transferring to work in other functions that have work characteristics close to such employee's functions, attending the cross-function projects, and working in overseas affiliates, etc.
- ☑ e-learning Program: Employees are able to learn by themselves at all times through the e-learning system, which is part of the internal knowledge management.

Performance

In 2019, the Company organized the competency and leadership development trainings for employees as follows:

Leadership Development Programs	Main Objectives/ Benefits Gained	Target Groups
1. Banpu Engaging Leader & Great Coach: Helping Others Succeed	To develop and train managements as the leaders who encourage employee engagement, and as the persons with whom employees are close and feel comfortable to learn at all times. Various managerial skills development programs were also provided to these management in the areas of coaching, motivations, and inspirations etc. The purpose is to help management understand and know how to build a unified teamwork as well as promote effective management. In addition, the continued course called 'Great Coach' was provided for them to learn about coaching skills, and how to apply this skill to coach his/ her team members properly, as well as to encourage their subordinates to achieve their works.	Vice Presidents Division Managers and higher
2. BGLP: Strategic Leader	Developing strategically managerial competency for sustainable business performance in the globalization world.	Senior Vice Presidents
3. BGLP: Business Leader	Developing managerial competency for sustainable performance in accordance with corporate strategies.	Senior Division Managers and higher
4. BGLP: First Line Leader	Developing various competencies regarding team management to drive the action plan into practices, including promoting a sharing of actual work experiences.	Division Managers
5. BLP: Future Leader	Preparing the employee's readiness for taking executive positions in the future.	Section Managers

Note: *BGLP: BANPU Global Leadership Program
BLP: BANPU Leadership Program

In 2019, the Company arranged the employee's competency development courses internally organized at Bangkok Office and provided opportunities for employees interested in attending these training courses equally such as:

Courses	Objectives	Duration (Days)	Trainers	Target Groups	Maximum Number of Attendees
1. Basic fire- fighting and evacuation during emergencies	Complying with labor laws and providing basic knowledge on fire fighting	1	External Agencies	All levels of employees	40
2. Safety for supervisors	Complying with laws and providing safety knowledge to supervisors	2	External Agencies	Division Managers	20
3. Safety for executives	Complying with laws and providing safety knowledge to executive management	2	External Agencies	Vice Presidents and higher	20
4. Safety for new employees	Complying with laws and providing safety knowledge to new employees	1	Occupational health, safety, environment, and community development Department	All levels of employees	25
5. Project Management	Efficient project management in accordance with the Company's business operations.	2	Technical and Project Development	Section Managers Division Managers	24
6. Basic Contract Knowledge	Basic law knowledge for contract execution	2	Legal Department	Supervisors Section Managers	24
7. Hands-on Financial Modelling	A development of practical business model regarding operational improvement and a cash- flow forecast.	2.5	Strategic Planning and Business Development Department	Section Managers Division Managers	24

Courses	Objectives	Duration (Days)	Trainers	Target Groups	Maximum Number of Attendees
8. Sustainable Development	The principles of Banpu Group's Sustainable Development.	0.5	Occupational health, safety, environment, and community development Department	Section Managers Division Managers	24
9. HR tools for new employees	HR management principles, and HR tools for new employees	0.5	Human Resources Department	Supervisors Section Managers	25
10. HR Management tools for new managers	The human resources management principles and tools for managers to develop the functional works.	0.5	Human Resources Department	Division Managers	30
11. The 7 Habits of Highly Effective People	The self-development principle, interpersonal relationships, leaderships, and increasing efficiencies.	3.5	External Agencies	Section Managers Division Managers	24
12. Getting Things Done	The art of increasing productivity without stress.	2.5	External Agencies	Supervisors	24
13. Understanding Global Perspective	Learning working perspectives in the different cultures for success.	2.5	External Agencies	Section Managers Division Managers	28
14. Building Global Mindset Fundamental	Learning working perspectives in different cultures for success.	2.5	External Agencies	Supervisors	28
15. Transcend Change Leader	Learning the principles of working with agility leading to changes.	1.5	External Agencies	Division Managers	24
16. Boost Your Agility	Learning to work with agility for applying to daily working	1.5	External Agencies	Section Managers Supervisors	24

Employees attending the leadership development trainings of Banpu Group of Companies

Levels	Total Numbers	Training Hours (Hours)	The Number of Training Hours per Person (Hours)
Vice President and higher	28	368	13.14
Division Managers and higher	43	1,192	27.72
Section Managers	74	1,665	22.5

Management of Key Positions' Succession Plan

- ☑ Establishing the Succession Plan Committee to develop and manage the succession plan for significant positions. The Committee is obligated to prescribe a policy and determine the key and critical positions.
- ☑ Setting the key and critical profile and developing criteria for further nomination and selection.
- ☑ Nominating and selecting persons who will succeed such positions. Accordingly, the human resources department will work together with the succession plan committee.
- ☑ Developing, monitoring, and evaluating the individual development plan (IDP) of selected persons. In this regard, the Human Resources Department will work together with the Succession Plan Committee.
- ☑ Reviewing the key position succession plan in accordance with the Company's strategies as well as identifying critical roles for further developing a guideline for selecting the persons to succeed these positions including a development plan for critical positions. In addition, the succession plan committee meeting has been convened quarterly in order to monitor a progress of such a development plan.
- ☑ Initiating an assessment for a group of employees identified as high potential human resources according to the international standards.

August 22, 23, 2019

Employee Engagement

Strategy

- Building corporate engagement through drawing participation from leaders of each department.
- Developing a communication channel and listening to employee's opinions for further improvement.

Significance and Reporting Boundary

The Company has attached importance to employee engagement. Based on surveys and researches conducted by many human resource consulting firms, it clearly indicates and is in the same direction that the level of employee engagement is significantly related to the competitive advantage, growth, stability, and sustainability, as well as shareholders' returns. The Company believes that taking good care and maintaining employees as well as making them feel satisfied with their works, inclusive of providing a fair opportunity for their career growth and listening to

their opinions for further improvement, will finally create happiness among employees. This will also drive them to continuously improve their works. As a result, the Company has regularly surveyed a level of employee engagement in order to evaluate the achievement of employee engagement.

The boundary of this report covers the business entities of which the Company has management control, including Thailand, China, Japan, and Vietnam.

Management Approach

The Company has formulated the Employee Relation Policy as a practice guideline for strengthening good relationships with employees. The employee engagement is fostered with 'Say Stay Strive' concept.

Say

Employees say positively about the Company with other people both inside and outside the Company

Stay

Employees work happily and are willing to stay with the organization

Strive

Employees have deep bond and strive to improve the performance of the Company

The key drivers in persuading employees to engage with the Company are as follows:

- 1. Agility** consists of cooperation and coordination, customer focus, decision making, differences and unity, inclusion of infrastructure and resources.
- 2. Engaging Leadership** consists of the leaderships of senior management and supervisors.
- 3. Talent Focus** consists of a corporate reputation, opportunities for career advancement, learning and development, performance management, compensation/ remuneration management system, welfares, rewards and prides, as well as human resources management.
- 4. The Work** consists of work characteristics and the balance of life and work.
- 5. The Basics** consist of working safety.

The Company has conducted the employee engagement survey every year. The survey analysis result and suggestions from employees will be later used for developing the engagement action plan for both the organizational and departmental levels. In addition, the reporting system was created so as to update management the progress of employee engagement every quarter as well as continually strengthen the employee engagement.

Indicator

- A level of employee engagement

Target

- A level of employee engagement is over **70%** in 2020.

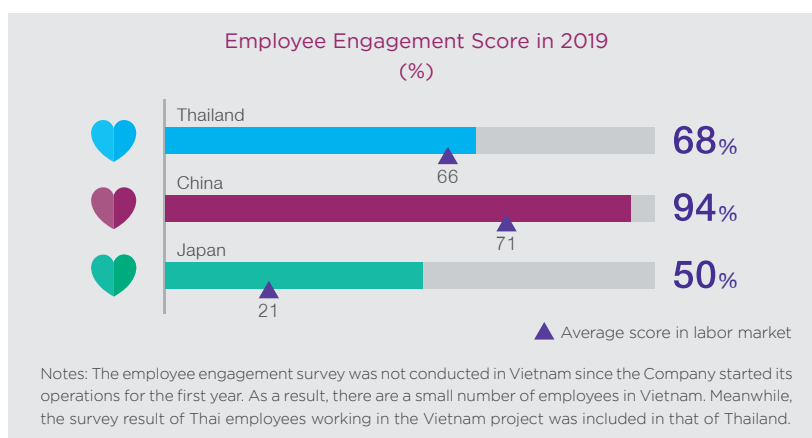
Performance

The employee engagement survey results for year 2019 are as following:

- **68%** for Head Office in Thailand where **86%** of respondents participating in this survey.
- **94%** for Head Office and power plants in China where **98%** of respondents participating in the survey.
- **50%** for Head Office and power plants in Japan where **93%** of respondents participating in the survey.

Performance

The Company had engaged a consultant to conduct employee engagement survey in 2019. As a result, engagement score was above average score in labor market in Thailand, China and Japan.



Enhancing Employee Engagement

In 2019, the Company used the employee engagement survey for analyzing and improving employee engagement to be tangible. Management of employee engagement is divided into three dimensions, the scores of which have significantly increased as follows:

1 Work-Life Balance



The Company has put top priority on and encouraged employees to achieve work-life balance or a balanced life in both work and healthy living. Various methods were promoted as follows:

- ✓ Providing a flexible working hours system to encourage employees to have a balance between working and personal life. The 'Work Anywhere' is a system designed to help employees in working everywhere through various communication devices such as email and video conferencing systems provided by the Company. As such, the employees are able to manage their work and personal life very well. Accordingly, the Company has allowed its employees to choose the flexible working hours provided, including 7:30 am., 8:00 am., 8:30 am., 9:00 am., and 9:30 am., respectively.
- ✓ Improving the flexible remuneration to be more diverse so as to meet the needs of employees at all levels.
- ✓ To help employees have healthy minds and strong bodies, the Company has provided a fitness room for staff at the Bangkok Office. They can also choose to participate in sports clubs such as a golf club, a walking club, a badminton club, a tennis club, and a futsal club.
- ✓ Annually providing the 'Relation Flip' program allowing employees to consult with psychologists on both working and personal related matters.
- ✓ Organizing the 'Money Delight' session on July 9, 2020 to promote financial knowledge for employees especially those close to retirement so that they knew how to manage their finances. The session was conducted by investment and wealth creation experts from UOB Bank.

2 Career Opportunity



The Company has organized a course to develop employees' capabilities in preparation for their career growth as well as strengthen the engagement and understanding between executives and employees. For example, the 'Engaging Leader & Great Coach' program has been continuously organized in order to develop executives to be the leaders who enhance the employee engagement. This program provides supervisors the opportunity to practice listening to suggestions on both work and personal life from their subordinates with whom they are close and able to learn at all times. This includes an emphasis on coaching, creating motivations so as to understand how to develop a unified teamwork. In addition, the Company has communicated the promotion criteria for employees at all levels to understand and prepare themselves for further growth.

3 Communication Effectiveness



The Company has improved the communication efficiency of various information related to employees to be more clearly by using the communication channels easily accessible by employees in diverse ways, such as organizing the Investor Relation Quarterly Communication and producing Banpu Insight newsletters. Moreover, the 'Banpu Heart Experience' workshop was organized by the Human Resources Department with an aim to draw employee's participation in giving suggestions while the corporate culture survey was also conducted. An implementation of the aforementioned activities helped make employees understand more about the Company's policies and management framework. This resulted in higher scores on communication effectiveness when compared with that of the year 2018.

Compliance with Laws and International Labor Management Principle

The Company has announced the Human Rights Policy since 2018, covering subsidiary companies in which the Company has management control by adhering to the principles of liberty and rights, equality, and human dignity without discriminations on genders, races, religions or skin colors. The Company has also placed great importance on labor laws and respecting to human rights according to the Universal Declaration of Human Rights (UDHR), the International Labor Organization (ILO), the United Nations Global Compact (UNGC), the UN Guiding Principles on Business and Human Rights (UNGPs), and the labor laws of all countries where the Company has operated its businesses. This is to confirm that the employees and stakeholders, such as business partners, suppliers, communities, joint venture partners and external contractors are treated equally.

In addition, the Quality Assurance Review (QAR) system has been employed while key indicators have been identified, inclusion of following up and reviewing the performance regularly. To promote labor and human rights policies, the Company has hired visually impaired people from the Department of Empowerment of Persons with Disabilities to provide healing hands service for its employees every Tuesday and Thursday so as to reduce their office syndromes and relieve stresses from their daily works.

According to the legal requirements, the Company doesn't have to set up a welfare committee. Nevertheless, it allows the employee representatives to participate and express their opinions in the welfare committee

meeting with Banpu Group on a quarterly basis. In the past year, several remunerations related activities were improved such as:

- Flexible Benefits
- Organizing the 'Relation Flip' program, a consulting program with psychologists, for employees.

- Providing the annual vaccination service for employees.
- Arranging a room for breast pumping for staff preparing to breastfeed and providing a phone booth.



Performance Management

The Company has adhered to three principles of human resource management, consisting of the employee's equality (Equitability), the performance-based management (Performance Base), and the competency management (Competency Base). We have long been supporting collaborative works under diversities of races, languages, cultures, ages, and countries in which the Company has operated in order to strengthen the collaborative works and drive the Company's innovations towards the sustainable business growth.



Performance management is an important process driving the organization to achieve its established business goals. It is a linkage between the organizational needs and each employee's individual working target. It is also an administrative tool allowing supervisors to know their subordinates' performances and his/her competency in addition to promoting collaborations among them on setting goals and KPIs together. This has led to the partnership and good relationships between supervisors and subordinates, ultimately escorting to the organizational success.

Defining a clear and tangible performance appraisal system able to measure and evaluate the success of each person is therefore essential. Messages on performance management have been also communicated to all employees for acknowledgement and using it as a practice guideline as following:

- Defining a fair key performance indicator (KPI) system in order to manage performance in the same direction/ in accordance with the Company's targets. In addition, the Company has revised the KPI scoring criteria divided into two sets, consisting of work-related KPIs accountable for 70% of the overall performance, and corporate cultural behavior-based KPIs representing the remaining 30%.
- Improving the performance appraisal standards as the single practice guidance across the organization. This guideline determined that each indicator must have at least one (1) performance evaluation criteria from four (4) criteria, including: 1. Quantity criteria 2. Progress and Time criteria 3. Budget Utilization criteria (Cost) 4. Accuracy and Quality criteria. The improved performance appraisal standards have been communicated to employees for their clear acknowledgement and understanding of the improvement of performance assessment.
- Identifying the key performance indicators beyond their own responsibilities, such as those relating to subordinate management skills. The Company has determined the leadership KPIs for department's managers and up so that they are aware that in addition to managing his/her department's works, paying high attention and caring for subordinates is also part of helping improve the department's performance better.

Prevention of Hiring Child and Forced Labors

The Company has no policy to hire child and forced labors. As a result, the minimum age of hiring employees is complied with that of stated clearly in the labor laws of each country. To prevent risks relating to child labor employment, the transparent employee's selection procedures have been established while the employment contracts have been made every time when hiring new employees.



Occupational Health and Safety (OHS)

Strategy

- Cultivating the working safety culture in all operational areas.
- Conducting the OHS risk assessments and mitigations in all production activities as well as developing measures to control the OHS related risks within the acceptable level.



Significance and Reporting Boundary

The Company has considered the workplace safety as the utmost target for operations since unsafe working may cause losses of life and assets as well as have an effect on the environment and employee's health. The Company, therefore, has placed great importance on building a safety workplace environment, providing knowledge, creating awareness and participation from all parties involved.

The safe workplace environment is counted as the human rights of which employees, contractors and those working in the area should get sufficiently and equally. In addition, promoting employee participation

in expressing their opinions to improve their workplace environment will finally help in creating their contribution, encouragement, and engagement with the Company.

The reporting boundary of safety data in this report covers all business entities in China where the Company holds greater than 50% of investments and has management control, exclusion of the solar power plants in Japan which are operated from a remote control by contractors. Meanwhile, the safety data of joint-venture companies, namely BLC Power Plant and Hongsa Power Plant, are separately reported in a statistic format in performance data section.

Management Approach

The Company focuses on cultivating a safety culture within the organization with the '3 ZEROs' target as follows:



1. Zero Incident

There is no incident by preventing and correcting unsafe behaviors and working conditions



2. Zero Repeat

There is no recurrence by investigating for the real cause and correcting a mistake at its root cause as well as informing employees to prevent a recurrence of such an incident.



3. Zero Compromise

Do not ignore compliance with rules, regulations, and safety practice standards

Indicator

- The number of fatalities relating to working accidents
- Lost Time Injury Frequency Rate (LTIFR)

Target

- Zero fatalities of employees, contractors, and others involved with the Company's operations.
- Zero fatality relating to working accidents
- The LTIFR for employees and contractors is reduced to zero by year 2024.

Performance

- Zero fatality and LTIFR of employees and contractors as well as others involved with the Company's operations.

To achieve the above targets, the Company has managed safety in the following areas:



Taking full responsibility and accountability on OHS

Management ranging from the top to operational levels has a commitment and responsibility to create a safety workplace environment. The process starts with construction designs to operations as well as a collection of unsafe working environment and behaviors. The determination of short-and long-term safety goals demonstrates the Company's leadership in safety.



Complying with Laws and Regulations as well as Company's Safety Standards

The Company is committed to strictly complying with laws and best practices on safety as well as regularly reviewing the legal compliance.



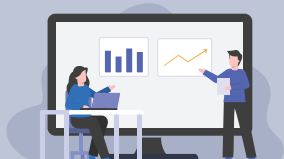
Safety Related Risks Management

The Company has assessed OHS risks in all areas where it has operations. Hence, all business units have measures to prevent and reduce safety related risks appropriately. The high possibility and severe risks are promptly mitigated within the acceptable level.



Creating Safety Culture

The Company has given great values on promoting and cultivating safety culture in all areas where its employees and contractors are working. The safety concerned behavior has been valued by integrating into 'Care' corporate culture. Additionally, the employees and contractors are encouraged to give warning to each other if seeing unsafe working behaviors.



Ensuring Employees Have Adequate OHS Knowledge and Skills

Providing knowledge on occupational health and safety to ensure the employees and contractors, are knowledgeable and capable enough to work safely. In addition a review and inspection of safety knowledge is regularly conducted.

Performance



Occupational Injuries

All operation units of the power plants in which the Company has management control, had no severe accidents resulting in injuries or fatalities. The LTIFR was zero while there were no fatalities relating to working illnesses. The Company also surveyed a safety working culture within the organization to measure the level of safety awareness of its employees and executives. The aim was to be the guidelines for improving and cultivating the safety working culture in the future.

However, there was one contractor's fatality in the joint-venture power plant. Hence, the Company closely monitored and investigated the root cause, collected, as well as prevented the recurrence of this accident. Remedies were provided to the directly affected contractors in order to ensure that all operations will be improved immediately according to the safety operation standards.



Work-related Risk Assessment

The Company has assessed work-related risks as well as the dangers that may occur by applying various tools to assess each job's risks throughout the organization. For example, the job safety analysis (JSA), checklists, and risk assessments by the experienced operational officers by using the event's opportunities and severities for risk appraisal, etc.

The Company has implemented the 'permit to work' practice to control and prevent high-risk works possibly causing severe accidents. This process starts with analyzing risks and their dangers, identifying types of permit licenses, specifying preventive and controlling measures, monitoring operating practices in accordance

with the measures set, and closing the permit to work when finishing working. The process is used in conjunction the Energy Isolation or the Lock out/ Tag out. Jobs assessed as having high risks and must request for permission before getting started, including high voltage electrical work, mechanical work, heavy lifting equipment, scaffolding work higher than 8 meters (according to the laws in each country), work in difficult access areas, hazardous chemicals work, radiation work, drilling work, cold room work, confined spaces work, work in high places, fire sparking work, and diving work, etc. In addition, if the high level risk is found, the immediate mitigation must be undertaken to lower such a risk into the acceptable level.



Security Management System

The Company has placed great emphasis on working safety of its employees and contractors. The ISO 45001 system has been integrated with the ISO 9001 and ISO 14001 for implementation at the three combined heat and power plants in China. Additionally, the Company has assessed safety risks for activities conducted by the solar power plants, which have less safety risks, set up safety operational procedures, and monitored the improvement by the safety department regularly.



Creating Safety Culture

The Company is committed to establishing a safety working culture in order to achieve its goal to reduce accidents to zero. In 2019, the Company conducted a safety culture assessment at Luannan Power Plant and Zouping Power Plant, accountable for 2:3 of combined heat and power (CHP) plants in China. The assessment was not only a safety inspection in the power plant, but also helped the Company know employees' opinions for better safety improvement.

The Company has set the target to assess the level of safety culture covering all operating business units within the year 2022. The safety assessment will be conducted every two years to measure the workplace safety culture performance.



Employee Health Promotion

The Company has provided the employee health promotion such as

- Conducting an annual health checkup and a physical fitness measurement based on risks arising from a nature of work.
- Measuring the working environment both in offices and production units and continually improving and standardizing working conditions regularly.
- Promoting exercising and maintaining good health, such as setting up sports clubs, providing health related knowledge.
- Reducing the office syndrome symptoms by educating employees and stretching during working as well as providing relaxing massages by the visually impaired persons for employees.
- Providing a psychological consultation project called 'Relation Flip' for employees.
- Organizing the 'Flexible Benefit' project, supporting THB 12,000 per annum for employees to utilize various benefits for health such as the membership fees for fitness and spas, and other membership fees, etc.
- Organizing the cholesterol reduction program for high-risk employees through exercising courses conducted by the experts and seeing a doctor for a periodic follow-up.



Promoting safety for employees and contractors

Safely working of employees and contractors is considered as one of the organization's success indicators. The contractors can be divided into two categories: 1. The Company and contractors running routine work in the area, such as contractors, etc. 2. The Company and contractors performing occasional tasks such as maintenance contractors, construction contractors, etc. Most of the contractors who occasionally work will perform their duties during the power plants' annual maintenance.

The Company has promoted safety for employees and contractors as follows:

- The working area must have an adequate safety working environment.
- Determining criteria for selecting contractors equipped with OHS such as having a professional safety officer and personal protective equipment according to work characteristics, as well as requiring the contractors to have an annual health check-up, etc.
- Conducting trainings and tests on safety and environment as well as safety regulation and risks in the area before starting operations. The safety review should be strictly conducted according to a specified period.
- Conducting safety inspection by management.
- Setting up a safety committee together with contractors.
- Establishing the power plant safety improvement working team.
- Conducting a 'safety moment' conversation before organizing a meeting or a seminar.
- Communicating to create safety awareness via emails and posters etc.
- Using a permit to work system for jobs related to risks possibly causing severe incidents.
- Conducting safety inspections by employees, supervisors and safety officers during working-hours.
- Evaluating contractors on safety and developing a plan to improve safety regularly.
- Conducting the emergency stimulation exercise with contractors such as fire extinguishing, chemical spills, transportation and landslides, etc.
- Providing incentives to create safe working, such as special awards for contractors with outstanding safety practices, celebrating the success together, etc.



Excellent Occupational Health and Safety Operations at Zhengding Power Plant

Zhengding Power Plant located in the north of China, which has started its production since 2000. The plant has supplied electricity to the government and heat in the form of steam and hot water for factories and communities in the areas. As it has operated for almost 20 years old, the power plant is faced with challenges regarding maintaining efficiency, stability, and machinery readiness as well as more tightening safety regulations.

The power plant, however, has still maintained a high level of stability, efficiency and machinery readiness. It also has excellent safety management driven through following movements such as:

- ☑ **Safety management leadership:** A role model of executives.
- ☑ **Implementation of the occupational health and safety standards:** Having integrated to governmental regulations since 2008 to reduce repetitions and having intensively prevented and investigated the near-miss in order to prevent them before actually happening.
- ☑ **Cultivating a safety culture and providing proper working environment:** ‘Safety Always Come First,’ such as announcing the Company’s safety intention, organizing the safety meetings mandatory for all employees as well as conducting safety inspections by management, etc.
- ☑ **Employee Engagement:** Raising awareness and competency development for employees at all levels has been implemented through various activities, such as organizing a safety seminar every quarter, developing ‘My Zone My Rules’ project, presenting the ‘Safety Star Award’, and assigning senior employees to be the one-on-one mentor for the new comers.

In the past year, Zhengding Power Plant received the ‘Advanced Safety Production Enterprise Award’ from the government. Jia Yuchang, the plant manager, was also bestowed the ‘Outstanding Employee Award’ from Hebei Province for his excellent safety operation without accidents for five consecutive years.



“

Safety management is the foundation of power plant management. We are unable to consistently generate power without work safety. The safety operations are endless. We must take actions continuously, driven by the “Banpu Heart” corporate shared value in order to create the excellent safety culture to protect all of our employees from any harm and for the organization’s sustainable development.



Jia Yuchang
Zhengding Power Plant Manager

”

RelationFlip Psychological Counseling Project

Working and personal stress has a profound effect on happiness and balance in life. The Company has initiated the 'RelationFlip' project or psychological counseling for employees for two consecutive years. A process to help employees understand the problem condition facing more clearly in terms of both work and personal matters was initiated. An expert called 'RF Analytical Counselor', has been employed with a responsibility to help employees see the solution of such a problem. A decision to solve the problem, however, is made by the staff himself/herself. The consultation takes about 45-60 minutes each time and might not end just only one time. More appointments will be later made continuously depending on severity of the problems brought by each employee. According to the psychologist's ethics, all information consulted will be kept confidentially.

Employees in Thailand and those working overseas can join this program by making appointments in advance by themselves via website applications. Moreover, the employees who see the others facing the problems, they can recommend the psychologists to contact those back. All information will be kept confidentially as well.



Coping with the COVID-19 Epidemic

The outbreak of COVID-19, which started at the end of 2019, has an impact on health and the economy across the globe. To maintain the health and safety of employees and their families and to reduce the spread of disease in the area as well as a responsibility to all groups of stakeholders in operating our business smoothly amid the epidemic situation, the Company has implemented various measures such as:

- Travel restriction measures to reduce risks to a minimum, such as prohibiting traveling to risky countries, health surveillance at home, working from home, avoiding the rush hour commuting for working, limiting the number of employees working in the office, arranging accommodations for employees working in the power plants to reduce traveling, etc.
- Preparation for business continuity systems, such as preparedness for work procedures and information technology systems to support working from residences.
- Measures to screen employees and visitors before assessing in the office, such as temperature checking and travelling clarification.
- Measures to reduce risk in the workplace, such as wearing masks, hand wash gels and communicating about preventive measures regularly.



Note: Data provided as of 31 March, 2020



Community Engagement

Strategy

- Building community engagement and development through the joint consultative committee between the Company, the community and the government sector
- A regular two- way communication
- Complaint channels and grievance mechanism

Significance and Reporting Boundary



Communities surrounding the power plants are the important stakeholders for the Company's operations because they have received both positive and negative impacts throughout the project's life cycle. Consequently, the community's acceptance is a significant factor to consider whether the project will be successful and able to operate or not.

Establishing the community engagement's procedures and community's opinion acceptance since the beginning of the project can therefore create information communication, understandings and good relationships between the project and communities. In addition, all

information receiving from community engagement at the project's beginning stage is collected and used for a project design, a decision making and possible impacts monitoring during the project's operation.

The Company has collected all comments receiving from the community engagement and opinion hearing throughout the project's life cycle, to improve its operations and to seek opportunities to work with the local community for a sustainable development. This is a key success factor for establishing acceptance and good relationships throughout the project's life cycle.

The reporting boundary covers the power plant business of which the Company has direct management control in Thailand, Laos, China, Japan, inclusive of the under development wind power plant in Vietnam.

Management Approach

Since the Company has business operations in various countries which differ on economics, infrastructures, local needs on community development as well as project characteristics that have different levels of impacts. Consequently, the Company has distinctive procedures on community engagement based on local's needs and project characteristics which affect the communities.

The Company has established the community engagement through the stakeholder analysis procedures, dividing into directly and indirectly affected groups as well as beneficiaries since conducting a study. The procedures start from receiving comments and concerns, designing a project, and establishing proper measures to decrease social and environmental impacts for each area. Generally, the program will identify stakeholders based on impact levels. The identification may differ from locations and regulations of each country.



Indicator

- Number of significant complaints from the community.
- Business disruption Incidents resulted from the community's complaints.

Target

- No significant complaints from the community.
- All complaints have been analyzed and corrected at the right time.
- No business disruption incidents resulted from the community's complaints.

Performance

- No significant complaints from the community
- No business disruption incidents resulted from the community's complaints.

1

Communities living in the project area

are the most affected people who have to be relocated at the beginning stage of the project. Since the relocation has an impact on the community's traditional living and possibly affects their occupations, cultures, and traditions, etc., the Company has to understand and well plan for relocation as well as support the communities for their best benefits with minimal effects. The unwilling relocation is avoidable and challenging for the project accomplishment.

2

Communities located closest to the project

are those living adjacent to the project or over 5 km. away from the project (radius may vary upon each area). These communities are directly affected and in proximity to the project. The Company considered them as the most affected stakeholders during its operation. Consequently, these communities together with the communities located in the project area will have the most opportunity from the project such as job recruitment and occupational support.

3

Communities located in the moderate vicinity of the project

are communities living over 5 km. from the project but not exceed 10 km. (radius may vary upon each area) or the communities that the Company purchases lands for operating, but do not have to relocate. These communities are directly affected by the project, but less than the first group. Hence, the Company considered them as the moderate affected stakeholders.

4

Communities with indirect effects

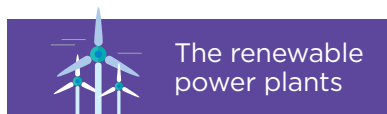
are the communities located far away from the project or the communities supporting the relocation which may be indirectly affected, for instance, increasing density of population and transportation. The Company considered these communities as the least affected stakeholders, compared to the first two groups.

Afterwards, the Company will assign a direct responsible function to create community engagement in order to develop an appropriate and sufficient operational plan for each community, covering a vulnerable group such as persons unable to protect their rights or have no freedom to make a decision like children, the elderly, refugees, and native people.



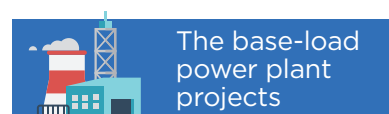
The combined heat and power (CHP) plants

namely Luannan Power Plant, Zhengding Power Plant and Zouping Power Plant in China are small size power plants located in the industrial and city areas for generating power, steam, and cold water to factories and local communities. The Company, therefore, has collaborated with customers, trading partners, government agencies and nearby companies to build community engagement through various activities for each location.



The renewable power plants

are mostly situated in a rural or remote area. Therefore, they have an effect on the communities during the construction period but, have less impacts during the production period. The Company has established a community engagement since the feasibility study and construction period in order to listen to community opinions and properly design the projects accepted by the communities. During the operational period, the project staffs have been assigned to conduct the community relations.



The base-load power plant projects

including BLCP Power Plant and Hongsa Power Plant, which are joint venture companies, have established community engagement by offering an opportunity for communities to participate in the power plant's development and monitoring activities as a tripartite committee. The tripartite committee comprises representatives from the Company, communities and the government sector, aiming to communicate a progress of the Company's operations, environmental quality, and community development projects. Apart from receiving comments and requests from the communities, the committees will consider community development projects, based on their true demand.



Project Life	Establishment of Community Engagement
Feasibility Study and Project Development	- Identifying stakeholders who are directly and indirectly affected. - Developing a thorough community database - Analyzing significance of stakeholders, community's needs and concerns for further project design. - Complying with preventive measures and mitigating impacts when constructing the project as well as regularly communicating with the communities.
Project Operation	- Establishing a tripartite committee to provide opinions and examine the project efficiency. - Having a complaint procedure analyzed and corrected the complaints as well as prevented recurrences. - Conducting community development activities responding to the local's true needs and allowing community members to participate in running activities to level up their living. For instance, a participation in infrastructure and utilities development, traditional and occupational promotion and educational development, etc. - Establishing a communication channel to receive the community complaints such as community relations activities, community visits, websites and other social media. - Collaborating with business partners, traders and customers to build community engagement such as co-organizing the corporate social responsibility (CSR) activities.

Performance

In 2019, the Company received no significant complaints from surrounding communities and there were no incidents related to production halts or disruptive operations, resulting from community's complaints in both the project areas where the Company has management control and the joint venture projects. However, after receiving all suggestions and concerns, the Company has analyzed the root cause and regularly communicated with local communities.

Social Data Study at Vinh Chau Wind Power Plant Project in Vietnam

The Vinh Chau Wind Power Plant project is considered as Banpu Power's first step in conducting the power business in Vietnam. The community living surrounding the project is an important stakeholder for its operation as they have been affected both positively and negatively throughout the project period.

The Company, therefore, places great attention to social data studies in the project area. Moreover, a community engagement process and a community's opinion hearing have been carried out prior to project construction, including gathering data received from the community engagement. All data collected will be brought up and lead to the project design, decision making. Furthermore, all dimensions of possible impacts will be monitored during both the project construction and operation.

In the previous year, the Company conducted a study on social data with key activities such as:

- Gathering secondary social data and related laws.
- Surveying and collecting of basic socio-economic data such as a number of populations per household, ethnicity, religion, local culture, education, occupations, unemployment, incomes and expenditures per household compared to the poverty line, infrastructure, public health, land use, including vulnerable groups in the area.
- Arranging meetings for small community groups and stakeholders living surrounding the project and government officials to clarify project details, listening to their opinions, answering their questions and providing relevant information. There were 159 people selected via a sampling method with statistical principles participating in the meetings, divided into nine small-group meetings. A survey of 90 households was also organized.
- Drafting the grievance procedure and correction process.
- Drafting a community engagement plan.



The Company is able to use data from the local social studies to create community engagement and look for opportunities to be a part in promoting the sustainable development in the future.

Establishment of a Community Cooperative near the Hongsa Power Plant

Hongsa Power Plant is one of the projects the Company has invested in Laos PDR. It commenced commercial operations in 2016 until now. Hongsa Power Plant has created community engagement since the project's feasibility study. With an aim to sustain a better living of the community, such as promoting animal husbandry, agriculture, handicrafts, etc., the Company has continually implemented the community development activities as well as career promotion up to date.



In 2014, Hongsa Power Plant promoted the establishment of cooperative groups so that communities can manage their business and marketing on their own, able to create opportunities for developing agriculture from traditional production to derivatives cultivation. Currently, the cooperative has been progressing well with following activities implemented.

- Surveying and collecting agricultural production data for distribution to the power plant projects' contractors and entrepreneurs in the Hongsa market.
- Supporting the affected people in agricultural production planning in line with consumer products demand of the project's contractors and communities in Hongsa City.
- Signing the technical assistance agreement with Ministry of Agriculture and Forestry (Department of Cooperative Promotion) to provide academic support relating to producer management and cooperative model creation.
- Academic support regarding management of agricultural product producers and buyer groups.
- Officially establishing a group of agricultural producers and buyers.
- Strengthening the agricultural producers and buyers in the fields of commercial farming and cooperative operating models.
- Officially establishing the Hongsa Agricultural Cooperative in late 2018.
- Developing the academic support plan and monitoring programs for the Hongsa Agriculture Cooperative during the year 2019-2022.

Indigenous People Engagement

The Company has placed great importance on respecting human rights and indigenous people engagement. Although the company's operational sites are located in town and no native people are living nearby, there is the only power plant in Lao PRD which is a joint venture company, surrounded by some indigenous people who have different cultures, beliefs and ways of life. Hence, the Company has to study and gain better understanding at the feasibility study stage so that the project can operate smoothly and will not affect ways of life and cultures of these native people. The Company has also put emphasis on cultural conservation, fair quality of life promotion such as public health and education, promotion of native products, and providing more job opportunities compared to people from other regions. In 2019, there are no indigenous peoples' right violation at all business units.

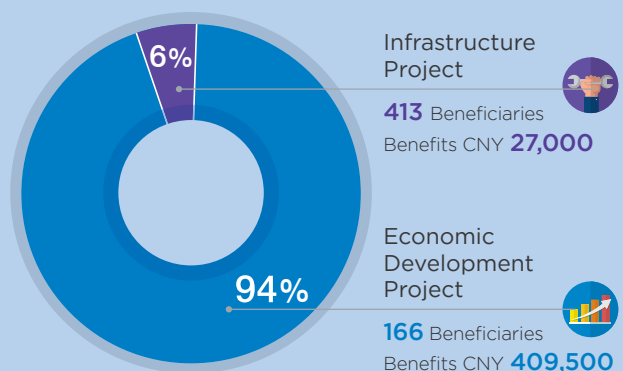


The Community Engagement Project at Haoyuan Solar Power Plant

Haoyuan Solar Power Plant located in an area of approximately 410,000 square meters in Taian City, Shandong Province, approximate 500 km from Beijing, Haoyuan Solar Power Plant has a production capacity of 20 MW. The plant generates electricity of approximately 25,000 MWh each year. Haoyuan Solar Power Plant is located next to Ma Ziyu Village, a rural village faced with severe droughts during the winter season. The majority of Ma Ziyu population is elderly and works in the agriculture field. Approximately 60% of them are 60-90 years old while 30% are 50-60 years old. The Ma Ziyu Village has limited infrastructures, such as illuminations and water supply.



Community Engagement Project for year 2018-2019



The Haoyuan Power Plant Project has implemented community engagement activities through surveying the needs in the area to improve their life quality. The survey found that this area still needs to improve the quality of life such as basic infrastructures, skills development and employment so as to increase their household incomes. Consequently, Haoyuan Power Plant has implemented various projects related to community engagement and social responsibility focusing on improving the quality of life and occupational creation in addition to treating the Ma Ziyu community members likening the employees' elderly cousins. The community engagement and social responsibility projects implemented are as follows:

Organizing the mechanic-skill trainings for maintenance works at the power plants for community members, such as

- Solar panel maintenance, cable routing construction, and power plants cleaning
- Hiring contractors to work at the solar power plants such as construction, fence installation, solar panel maintenance, mowing, cable routing construction and road maintenance, etc.
- Installing solar illuminations in the village roadways.
- Home maintenance for the elderly, lifting their living conditions
- Organizing activities to build relationships with the elderly in the area, such as cooking food for the elderly during festive seasons, providing items necessary for the elderly to earn lives during the winter, and participating in cultural activities.

List of Business

Country	Project Name	Business Type	Ownership	Gross Capacity (MWe)	Equity Capacity (MWe)	Current Status
Base-Load Power Business						
China	Zhengding	Coal-fired CHP Plant	100%	139	139	Operating
	Luannan ^(a)	Coal-fired CHP Plant	100%	227	227	Operating
	Zouping	Coal-fired CHP Plant	70%	247	173	Operating
	Shanxi Lu Guang	Coal-fired Development Project	30%	1,320	396	Under Construction
Laos PDR	Hongsa	Coal-fired Power Plant	40%	1,878	751	Operating
Thailand	BLCP	Coal-fired Power Plant	50%	1,434	717	Operating
Renewable Power Business						
China	Jinshan	Solar Power Plant	100%	28.95	28.95	Operating
	Huineng	Solar Power Plant	100%	21.50	21.50	Operating
	Haoyuan	Solar Power Plant	100%	20.00	20.00	Operating
	Huien	Solar Power Plant	100%	19.70	19.70	Operating
	Deyuan	Solar Power Plant	100%	51.64	51.64	Operating
	Xingyu	Solar Power Plant	100%	10.30	10.30	Operating
	Jixin ^(b)	Solar Power Plant	100%	25.22	25.22	Operating
Japan	Olympia	Solar Power Plant	40%	10.0	4.0	Operating
	Hino	Solar Power Plant	75%	3.5	2.6	Operating
	Awaji	Solar Power Plant	75%	8.0	6.0	Operating
	Nari Aizu	Solar Power Plant	75%	20.5	15.4	Operating
	Mukawa	Solar Power Plant	56%	17.0	9.5	Operating
	Kurokawa ^(c)	Solar Power Plant	100%	18.9	18.9	Operating
	Tenzan ^(c)	Solar Power Plant	100%	1.96	1.96	Operating
	Muroran 1 ^(c)	Solar Power Plant	100%	1.73	1.73	Operating
	Muroran 2 ^(c)	Solar Power Plant	100%	1.63	1.63	Operating
	Takeo 2 ^(c)	Solar Power Plant	100%	1.00	1.00	Operating
	Yamagata	Solar Development Project	100%	20.0	20.0	Under Construction
	Shirakawa	Solar Development Project	100%	10.0	10.0	Project Development
	Yabuki	Solar Development Project	75%	7.0	5.3	Under Construction
	Onami	Solar Development Project	75%	16.0	12.0	Project Development
	Kesennuma	Solar Development Project	100%	20.0	20.0	Project Development
	Hiroshima	Solar Development Project	100%	8.0	8.0	Project Development
	Yamagata Iide	Solar Development Project	51%	200.0	102.0	Project Development
Vietnam	Vinh Chau	Wind Development Project	100%	80.0	80.0	Project Development

^(a) Phase 3 with capacity of 52 MWe, Commercial Operation Date (COD) in 2019

^(b) COD in July 2019

^(c) COD in December 2019

Awards & Recognitions

Banpu Power

Awards/ Recognitions	Host Institute
Thailand Sustainability Investment 2019	The Stock Exchange of Thailand

Banpu Power's Subsidiaries

Business Unit	Awards/ Recognitions	Host Institute
Luannan Power Plant	Excellent unit of grassroot labour union in Luannan County in 2018 - Labour union committee of Tangshan Banpu Heat & Power Co., Ltd.	Labour Unions of Luannan County
	Excellent research report on the research work of grassroot labour union in Luannan county in 2018 - Employee innovation work report of Tangshan Banpu Heat & Power Co., Ltd.	Labour Unions of Luannan County
	Zhang Xiaojian, an employee of Luannan Power Plant was awarded Model worker of Hebei province	Hebei Provincial Party Committee of the Communist Party of China and People's Government of Hebei Province
	Hebei Enterprise Safety Production Integrity B Level Certificate (2018.12 - 2020.12)	Emergency Management Bureau of Luannan County
	Luannan county table tennis center	Tangshan table tennis association
	Honor certificate of obeying the contract and paying attention to credit	Jointly issued by Tangshan Federation of Industry and Commerce, Tangshan Enterprise Credit Management Association, and Tangshan Private Economy Association
	Zhou Guoqiang, an employee of Luannan Power Plant was awarded the honorary title of Tangshan Safety Production Management Post Model - The communist youth league of Tangshan municipal party committee honor	Tangshan Emergency Management Bureau
	Integrity Enterprise of Tangshan city in 2019	Tangshan Social Credit System Construction Leading Group Office and Tangshan Spiritual Civilization Construction Committee Office
Zhengding Power Plant	Labor Security Law-abiding and Excellent Integrity Enterprise in Hebei Province	Hebei Provincial Department of Human Resources & Social Security
	Labor Security Law-abiding and Excellent Integrity Enterprise in Shijiazhuang City	Shijiazhuang Municipal Human Resources & Social Security Bureau
	Jia Yuchang, an employee of Zhengding Power Plant was awarded the honorary title of Model Worker of Hebei Province	CPC Hebei Provincial Committee; The People's Government of Hebei Province
Zouping Power Plant	Keeping Contracts and Paying Attention to Credit Enterprises in 2018	Binzhou Municipal Market Supervision and Administration Bureau
	Advanced Environmental Protection Units in 2018	Zouping Municipal Environmental Protection Bureau
Deyuan Power Plant	The 3 rd prize of Excellent Design of Renewable Energy Plants of the year 2018	China Electric Power Planning & Engineering Association

Participation and Membership

Banpu Power

Organization	Status	Role
Thai Listed Companies Association (TLCA)	Vice Chairman	Be a representative consultant on the rules and regulations of the Stock Exchange of Thailand and the Securities and Exchange Commission or other relevant consultation.
The Securities and Exchange Commission	Expert Board members of The Securities and Exchange Commission	Set policy, promote the development of Thai capital market and establish rules and regulations according to Securities and Exchange Act B.E.2535 (1992) and Thailand's capital market-related laws
Thailand's Private Sector Collective Action Coalition Against Corruption (CAC)	Committee Member	Support and promote anti-corruption in Thailand

Banpu Power's Subsidiaries

Business Unit	Organization	Status
Zhengding Power Plant	Committee on Urban and Rural Construction and Environmental Resources of the 14 th Shijiazhuang People's Congress	Committee member
	The 14 th Shijiazhuang People's Congress	Deputy
Zouping Power Plant	Shandong Overseas Chinese Entrepreneurs Association	Member
	Binzhou Overseas Chinese Entrepreneurs Association	Member
	Shandong Electric Power Enterprises Association	Member

Data Boundary

Sustainability Topic	Thailand Head Office	Subsidiary (Direct Operational Control)				Joint-Venture	
		China		Japan	Vietnam	Thailand	Laos PDR
		Combined Heat and Power Plant	Solar Power Plant	Solar Power Plant	Wind Power Plant	BLCP	Hongsa
Economic							
Financial Performance and Business Growth	●	●	●	●	●	●	●
Business Ethics*	●	●	●	●	●	✕	✕
Anti-Corruption*	●	●	●	●	●	✕	✕
Compliance	●	●	●	●	●	✕	✕
Risk Management*	●	●	●	●	●	✕	✕
Business Continuity Management	●	●	○	○	○	✕	+
Availability and Reliability	NR	●	●	●	○	+	+
Process Improvement and Innovation*	●	●	●	●	○	+	+
Supplier Management*	●	●	●	●	○	+	+
Contractor Management*	NR	●	●	●	○	+	+
Customer Management*	●	●	●	●	○	+	+
Environment							
Greenhouse Gas Emissions*	NR	●	●	●	○	+	+
Energy	NR	●	●	●	○	+	+
Air Quality*	NR	●	NR	NR	○	+	+
Water Resource Utilization and Water Discharge*	NR	●	NR	NR	○	+	+
Waste	NR	●	NR	NR	○	+	+
Biodiversity	NR	●	●	●	●	+	+
Social							
Corporate Culture	●	●	●	●	●	✕	✕
Competency and Leadership Development	●	●	●	●	●	+	+
Employee Engagement	●	●	●	●	●	✕	✕
Occupational Health and Safety*	●	●	●	●	○	+	+
Community Engagement*	NR	●	●	○	●	+	+

* Material topic in this report.

● Management approach and performance data cover all parts of such business.

○ Management approach and performance data cover some parts of such business and in process of data standardization due to i.e. new operation/ requisition/ merger less than 3 years.

×

Management approach and performance data do not cover such business due to the Company has no direct operational control or ownership not over 50%.

+

Management approach and performance data do not cover such business due to the Company has no direct operational control or ownership not over 50%.

However, there are some sustainability performance interested by stakeholders, the partial of sustainability performance are report separately.

NR No relevant to the business

Performance Data

Economic Performance

Data	Unit	2016	2017	2018	2019
Revenue	THB Million	5,542	6,419	6,322	5,687
EBITDA ^(a)	THB Million	5,557	5,410	5,913	4,802
Net profit	THB Million	4,273	4,242	3,852	3,003
Gross profit margin	%	35%	24%	20%	19%
Interest coverage ratio	-	4.5	10.1	NA	NA
Net debt to equity ratio	-	0.03	0.10	0.13	0.01

^(a) Earning before interest, taxes, depreciation and amortization.

Tax Payment

Data	Unit	2016	2017	2018	2019
Banpu Power					
• Profit before tax	THB Thousand	4,667,282	4,604,026	4,144,797	3,206,924
• Tax expense ^(a)	THB Thousand	(394,507)	(361,815)	(292,729)	(204,083)
• Corporate income tax paid	THB Thousand	(533,035)	(288,596)	(249,920)	(192,913)
• Income tax rate	%	10-25%	10-25%	10-25%	20-25%
China					
• Profit before tax	CNY Thousand	384,801	256,520	126,269	161,788
• Tax expense ^(a)	CNY Thousand	(96,295)	(67,088)	(31,375)	(45,821)
• Corporate income tax paid	CNY Thousand	(107,100)	(51,576)	(50,146)	(41,322)
• Income tax rate	%	25%	25%	25%	25%

^(a) Consisting of corporate income tax, withholding tax and deferred tax.

Economic Distributions

Data	Unit	2016	2017	2018	2019
Economic value generated					
• Sales	USD Thousand	155,555	188,465	192,903	178,015
• Other revenues	USD Thousand	116,206	128,779	159,111	135,921
Economic value distributed					
• Shareholder	USD Thousand	46,834	49,376	56,986	63,444
• Supplier and contractor ^(a)	USD Thousand	28,059	44,200	50,618	53,135
• Employee ^(b)	USD Thousand	17,141	20,879	23,309	21,333
• Financial institution ^(c)	USD Thousand	8,093	1,921	6,115	6,855
• Government ^(d)	USD Thousand	25,820	13,014	9,375	7,672
• Community ^(e)	USD Thousand	617	574	708	652
• Environment ^(f)	USD Thousand	2,180	2,264	2,245	1,829

^(a) Includes expenses for suppliers and contractors.

^(b) Includes salary, wage, welfare, provident fund and employee development expense.

^(c) Includes interest expense, financial expense.

^(d) Includes corporate income tax, local tax, property tax, specific business tax, other tax.

^(e) Includes expenses for community engagement, development and CSR activities.

^(f) Includes expenses for environmental management.

Contribution to External Organization and Association

Data	Unit	2016	2017	2018	2019
Political party or political interest	THB	-	-	-	0
Trade association or non-governmental organization	THB	-	-	-	305,378

Business Ethics

Data	Unit	2016	2017	2018	2019
Number of significant complaints relating to good governance	Case	0	0	0	0
Number of significant business ethics breaches					
• Corruption	Case	0	0	0	0
• Use of information	Case	0	0	0	0
• Bribery	Case	0	0	0	0
• Human rights	Case	0	0	0	0
• Tax	Case	0	0	0	0

Risk Management

Data	Unit	2016	2017	2018	2019
Coverage of risk management system	%	100%	100%	100%	100%
Coverage of risk indicator development	%	100%	100%	100%	100%

Product Stewardship

Data	Unit	2016	2017	2018	2019
Percentage of solved complaint within determined timeframe	%	-	-	100%	100%
Number of complaints					
• Customer privacy information	Case	-	-	0	0
• Safety and environmental impact from using products	Case	-	-	0	0

Operation

Data	Unit	2016	2017	2018	2019
Current installed capacity ^(a)					
• Total current installed capacity	MW	350.1	462.7	512.6	588.0
• Capacity (conventional)	MW	273	298	323	348
• Capacity (renewable)	MW	77.1	164.7	189.6	240.0
Capacity under construction (conventional) ^(a)					
• Total capacity under construction	MW	50	119.5	45	55
• Capacity (conventional)	MW	50	75	25	0
• Capacity (renewable)	MW	0	44.5	20	55
System efficiency ^(b)					
• Efficiency rate for electricity generation	g/ KWh	272.55	261.33	270.02	279.00
• Efficiency rate for steam production	Kg/ GJ	37.89	37.53	37.58	37.94
• Availability factor	%	86.96%	93.72%	89.02%	94.07%
• Overall efficiency	%	67.79%	69.70%	66.69%	65.07%
Solar power plant capacity factor					
• China	%	13.7%	14.9%	14.9%	14.8%
• Japan	%	13.9%	14.2%	11.3%	13.1%
Planned outage ^(b)					
• Planned outage frequency	Case/ Year	18	23	22	25
• Planned outage hour	Hours	8,961	9,534	13,851	6,023
• Average planned outage duration	Hours/ Case	1,488	1,302	1,867	241
Unplanned outage ^(b)					
• Unplanned outage frequency	Case/ Year	0	7	4	1
• Unplanned outage hour	Hours	0	381	1,928	457
• Average unplanned outage duration	Hours/ Case	0	48.98	1,913.70	457
Total outage ^(b)					
• Total outage frequency	Case/ Year	18	30	26	26
• Total outage hour	Hours	8,961	9,915	15,780	6,480
• Average total outage duration	Hours/ Case	1,488.31	1,078.18	1,869.69	249.21

^(a) Estimate from 100% electricity capacity, consisting of power plants which the Company has directed operational control i.e. three combined heat and power plants and solar power plants in China and solar power plants in Japan.

^(b) Consist of three combined heat and power plant in China.

Supplier Management

Data	Unit	2016	2017	2018	2019
Total supplier	Number	-	-	-	509
Supplier (by type)					
• Critical supplier	Number	-	-	-	147
• Non-critical supplier	Number	-	-	-	362

Data	Unit	2016	2017	2018	2019
Percentage of total procurement spent					
• Critical supplier	%	-	-	-	94%
• Non-critical supplier	%	-	-	-	6%
Number of supplier assessed for ESG risk					
• Total supplier (critical & non-critical)	Number	-	-	-	209
• Critical supplier	Number	-	-	-	92
• Non-critical supplier	Number	-	-	-	117
Number of supplier classified as high risk					
• Total supplier (critical & non-critical)	Number	-	-	-	0
• Critical supplier	Number	-	-	-	0
• Non-critical supplier	Number	-	-	-	0
New supplier (by type)					
• Total new supplier (critical & non-critical)	Number	-	-	-	161
• Critical supplier	Number	-	-	-	41
• Non-critical supplier	Number	-	-	-	120
Percentage of new supplier screened using ESG criteria					
• Total new supplier	%	-	-	-	63%
• Critical supplier	%	-	-	-	88%
• Non-critical supplier	%	-	-	-	55%
Percentage of local procurement	%	-	-	-	87%

Socioeconomic Compliance

Data	Unit	2016	2017	2018	2019
Significant socioeconomic non-compliance					
• Number of non-monetary sanctions	Case	-	-	0	0
• Number of cases brought through dispute mechanisms	Case	-	-	0	0
Significant fines from socioeconomic non-compliance					
• Number of significant fines ^(a)	Case	-	-	0	0
• Total amount of significant fines	USD	-	-	0	0

^(a) Significant Socioeconomic non-compliance case is referred to minimum criteria of the Company standards such as significant fine are greater than 10,000 USD or scale of the impact.

Product

Data	Unit	2016	2017	2018	2019
Energy sold (conventional power business)					
• Total energy sold	MWh	5,891,042	6,371,807	6,238,273	5,648,619
• Electricity (renewable fuel) sold	MWh	-	-	-	112
• Electricity (non-renewable fuel) sold	MWh	1,531,993 ^(a)	1,691,107 ^(a)	1,715,684 ^(a)	1,495,640
• Steam sold	MWh	4,017,692	4,236,338	3,975,903	3,328,603
• Heat sold	MWh	341,357	444,362	546,686	824,264
Energy sold (renewable power business)					
• Electricity sold	MWh	-	-	-	286,723

^(a) Include renewable & non-renewable fuel in conventional and renewable power business.

Greenhouse Gas Emissions

Data	Unit	2016	2017	2018	2019
GHG emissions					
• Total GHG emissions (Scope 1 & 2)	Tonnes CO ₂ e	3,681,906	3,650,542	3,824,124	3,822,073
• Direct GHG emissions - Scope 1	Tonnes CO ₂ e	3,681,214	3,648,340	3,821,632	3,814,884
• Direct GHG emissions - Scope 1 (biogenic)	Tonnes CO ₂ e	0	0	0	0
• Indirect GHG emissions - Scope 2	Tonnes CO ₂ e	692	2,202	2,392	7,189
• Other indirect GHG emissions - Scope 3	Tonnes CO ₂ e	0	0	0	0
GHG (Scope 1 & 2) emissions intensity					
• Total energy generation	Tonnes CO ₂ e/ MWh	0.625	0.573	0.613	0.644
• Electricity generation	Tonnes CO ₂ e/ MWh	1.067	0.954	0.991	0.575
• Steam & heat generation	Tonnes CO ₂ e/ MWh	0.470	0.435	0.470	0.673

Data	Unit	2016	2017	2018	2019
GHG (Scope 1) emissions intensity - China					
• for all generation capacity	Tonnes CO ₂ e/ MWh	0.625	0.574	0.615	0.651
• for fossil fuel generation capacity	Tonnes CO ₂ e/ MWh	0.631	0.591	0.635	0.675
GHG (Scope 1) emissions intensity - Japan ^(a)					
• for all generation capacity	Tonnes CO ₂ e/ MWh	-	0	0	0
• for fossil fuel generation capacity	Tonnes CO ₂ e/ MWh	-	NA	NA	NA
SF ₆ emissions	Tonnes CO ₂ e	-	-	110	1,086

^(a) Negligible purchased electricity for solar power plant during nighttime.

Energy

Data	Unit	2016	2017	2018	2019
Total energy consumption	TJ	10,866	10,545	10,721	11,113
Renewable energy consumption					
• Renewable fuel ^(a)	TJ	0	0	0	0
• Electricity purchased ^(b)	TJ	0	0	0	0
• Electricity self-generated	TJ	197	718	815	1,040.13
Non-renewable energy consumption					
• Non-renewable fuel ^(c)	TJ	31,874	32,756	32,354	31,410
• Electricity purchased	TJ	2.82	9.01	10.36	29.73
• Steam, heating & cooling	TJ	0	0	0	0
Renewable energy sold					
• Electricity	TJ	195	701	809	1,033
Non-renewable energy sold					
• Electricity	TJ	5,320	5,387	5,368	5,384
• Steam	TJ	14,464	15,251	14,313	11,983
• Heat	TJ	1,229	1,600	1,968	2,967
Energy intensity	GJ/ MWh	1.84	1.65	1.72	1.87

^(a) Renewable fuel for production such as biomass and ethanol.

^(b) Negligible purchased electricity for solar power plant during nighttime.

^(c) Non-renewable fuel such as coal, diesel, benzene, methane, other petroleum oil and natural gas.

Air Quality

Data	Unit	2016	2017	2018	2019
Air emissions load					
• NO _x	Tonnes	639	455	323	246
• SO ₂	Tonnes	633	174	149	153
• PM	Tonnes	91	35	24	18
• Mercury	Tonnes	-	-	-	0
Air emissions intensity for all generation capacity					
• NO _x	Kg/ MWh	0.1085	0.0714	0.0517	0.0414
• SO ₂	Kg/ MWh	0.1075	0.0273	0.0239	0.0258
• PM	Kg/ MWh	0.0154	0.0055	0.0038	0.0030
• Mercury	Kg/ MWh	-	-	-	0
Air emissions intensity for fossil fuel generation capacity					
• NO _x	Kg/ MWh	0.1095	0.0737	0.0536	0.0435
• SO ₂	Kg/ MWh	0.1084	0.0282	0.0248	0.0271
• PM	Kg/MWh	0.0156	0.0057	0.0039	0.0031
• Mercury	Kg/MWh	-	-	-	0

Data	Unit	2016	2017	2018	2019
Ozone-depleting substances (ODS)					
• ODS consumption	Kg CFC-11e	0	0	0	1
• ODS imported	Kg CFC-11e	-	-	-	0
• ODS exported	Kg CFC-11e	-	-	-	0

Water Resource Utilization and Water Discharge ^(a)

Data	Unit	2016	2017	2018	2019
Water withdrawal (from all areas)					
• Total water withdrawal	Mega Liter	8,121	8,563	7,838	6,761
• Surface water	Mega Liter	5,330	6,056	5,076	0
• Groundwater	Mega Liter	2,790	2,508	2,761	2,497
• Seawater	Mega Liter	0	0	0	0
• Produced water	Mega Liter	0	0	0	0
• Third-party water	Mega Liter	0	0.5	1	4,265
Water withdrawal (from water stress areas)					
• Total water withdrawal	Mega Liter	-	-	7,838	6,761
• Surface water	Mega Liter	-	-	5,076	0
• Groundwater	Mega Liter	-	-	2,761	2,497
• Seawater	Mega Liter	-	-	0	0
• Produced water	Mega Liter	-	-	0	0
• Third-party water	Mega Liter	-	-	1	4,265
Third-party water withdrawal					
• Total water withdrawal	Mega Liter	-	-	1	3,897
• Surface water	Mega Liter	-	-	1	3,897
• Groundwater	Mega Liter	-	-	0	0
• Seawater	Mega Liter	-	-	0	0
• Produced water	Mega Liter	-	-	0	0
Water discharge (to all areas)					
• Total water discharge	Mega Liter	744	712	960	1,855
• Surface water	Mega Liter	0	0	0	0
• Groundwater	Mega Liter	0	0	0	0
• Seawater	Mega Liter	0	0	0	0
• Third-party water	Mega Liter	744	712	960	1,855
Water discharge (to water stress areas)	Mega Liter	-	-	960	1,855
Water consumption					
• All areas	Mega Liter	7,377	7,851	6,878	4,906
• Water stress areas	Mega Liter	-	-	6,878	4,906
Water consumption intensity	m ³ / MWh	1.252	1.232	1.103	0.827
Water recycled/ reused	Mega Liter	602	602	494	42,760
Change in water storage	Mega Liter	-	-	NA	NA

^(a) Standardize data collection standards to be align with GRI 303 (2018) since 2019.

Waste

Data	Unit	2016	2017	2018	2019
Hazardous waste disposal ^(a)					
• Total hazardous waste	Tonnes	2	60	113	22
• Reuse	Tonnes	-	-	0	0
• Recycling	Tonnes	2 ^(b)	5 ^(b)	10	13
• Composting	Tonnes	-	-	-	0
• Recovery (including for fuel sources)	Tonnes	0	0	101	3
• Incineration	Tonnes	0	0	3	6
• Deep well injection	Tonnes	-	-	-	0
• Landfill	Tonnes	0	0	0	0
• On-site storage	Tonnes	-	-	-	0
• Other	Tonnes	0	55	0	0

Data	Unit	2016	2017	2018	2019
Non-hazardous waste disposal ^(a)					
• Total non-hazardous waste	Tonnes	383	130	2,589	928
• Reuse	Tonnes	0	0	0	0
• Recycling	Tonnes	383	130	808	0
• Composting	Tonnes	-	-	1	0
• Recovery (including for fuel sources)	Tonnes	-	-	236	0
• Incineration	Tonnes	-	0	0	0
• Deep well injection	Tonnes	-	-	-	0
• Landfill	Tonnes	-	0	1,517	844
• On-site storage	Tonnes	-	-	-	0
• Other	Tonnes	-	0	27	84
Hazardous waste transportation ^(a)					
• Hazardous waste transported	Tonnes	-	-	113	22
• Hazardous waste imported	Tonnes	-	-	0	0
• Hazardous waste exported	Tonnes	-	-	0	0
• Hazardous waste treated	Tonnes	-	-	113	22
Waste transported across international borders	%	-	-	0%	0%
Ash					
• Total	Tonnes	617,405	627,167	619,138	664,199
• Reuse	Tonnes	617,405	571,402	619,138	664,199
• Recycling	Tonnes	0	0	0	0
• Landfill	Tonnes	0	0	0	0
• Onsite storage	Tonnes	0	0	0	0
• Other	Tonnes	0	55,765	0	0
Percentage of reused/ recycled ash	%	100%	91%	100%	100%
Gypsum					
• Total	Tonnes	-	53,306	90,346	85,097
• Reuse	Tonnes	-	53,306	90,346	85,097
• Recycling	Tonnes	-	0	0	0
• Landfill	Tonnes	-	0	0	0
• Onsite storage	Tonnes	-	0	0	0
• Other	Tonnes	-	0	0	0
Percentage of reused/ recycled gypsum	%	-	100%	100%	100%

^(a) Excludes ash and gypsum from power plant.

^(b) Includes recovery hazardous waste.

Biodiversity

Data	Unit	2016	2017	2018	2019
Business units in relation to protected area ^(a)					
• Total operations	Number	-	-	-	0
• In the area	Number	-	-	-	0
• Adjacent to	Number	-	-	-	0
Business units in relation to high biodiversity wilderness area outside protected area ^(a)					
• Total operations	Number	-	-	-	0
• In the area	Number	-	-	-	0
• Adjacent to	Number	-	-	-	1 ^(c)
Number of business units ^(a)					
• Assessed for potential biodiversity impact	Number	-	-	-	22
• Identified as high potential of biodiversity impact	Number	-	-	-	1 ^(c)
• Assessed for biodiversity value ^(b)	Number	-	-	-	0
• Required biodiversity management plan ^(b)	Number	-	-	-	0
• Implemented biodiversity management plan ^(b)	Number	-	-	-	0
Biodiversity management plan ^(a)					
• Proportion of operations assessed for potential biodiversity impact	%	-	-	-	100%

Data	Unit	2016	2017	2018	2019
• Proportion of operations assessed for biodiversity value ^(b)	%	-	-	-	NA
• Proportion of operations with biodiversity management plan ^(b)	%	-	-	-	NA

^(a) Include 7 projects under development.

^(b) For operations identified as high potential of biodiversity impact.

^(c) There was 1 developing project assessed that might lead to potential biodiversity impact.

Environmental Compliance

Data	Unit	2016	2017	2018	2019
Number of environmental non-compliance					
• Effluent discharge limits	Case	0	0	0	0
• Air emissions standards	Case	0	0	0	0
• Non-monetary Sanctions	Case	0	0	0	0
• Cases brought through dispute mechanisms	Case	0	0	0	0
Significant fines from environmental non-compliance					
• Number of significant fines	Case	0	1	0	0
• Total amount of significant fines	USD	0	14,757	0	0
Significant spills					
• Number of significant spills ^(a)	Case	0	0	0	0
• Total amount of significant spills	Liter	0	0	0	0
Number of significant environmental incidents ^(a)	Case	0	0	0	0
Environmental liability accrued at year end	USD	0	0	0	0

^(a) Significant environmental non-compliance case is referred to minimum criteria of the Company standards such as significant fine are greater than 10,000 USD or scale of the impact.

Community Engagement

Data	Unit	2016	2017	2018	2019
Significant community complaints	Case	0	0	0	0
Significant community complaints handled	Case	NA ^(a)	NA ^(a)	NA ^(a)	NA ^(a)

^(a) No significant complaint.

Community Development

Data	Unit	2016	2017	2018	2019
Total expense of community projects	USD	-	-	-	38,239
Expense of community project (by type)					
• Economic development and revenue generation	USD	-	-	-	30,880
• Education development	USD	-	-	-	0
• Basic infrastructure development	USD	-	-	-	5,715
• Health and sanitation development	USD	-	-	-	0
• Environmental conservation	USD	-	-	-	0
• Social, culture and community relations promotion	USD	-	-	-	1,644

Local Employment

Data	Unit	2016	2017	2018	2019
Total number of employees	Person	-	-	-	19
Number of local employees ^(a)	Person	-	-	-	15
Proportion of local employment ^(a)	%	-	-	-	79%

^(a) Local refers to people that live locally in the same geographic region and does not include people that have moved to the area after obtaining employment.

Community Resettlement

Data	Unit	2016	2017	2018	2019
Significant community resettlement	Case	-	-	0	0
Complaints related to community resettlement	Case	-	-	0	0

Human Rights

Data	Unit	2016	2017	2018	2019
Significant human rights complaints	Case	-	-	0	0

Employee

Data	Unit	2016	2017	2018	2019
Total employee	Person	934	952	968	966
Employee (by gender)					
• Male	%	74.95%	76.37%	76.96%	77.43%
• Female	%	25.05%	23.63%	23.04%	22.57%
Employee (by country)					
• Thailand	%	4.71%	4.41%	4.44%	4.35%
• China	%	95.07%	95.17%	94.63%	93.58%
• Japan	%	0.21%	0.42%	0.83%	1.76%
• Vietnam	%	0%	0%	0.10%	0.31%
• Other	%	0%	0%	0%	0%
Employee (by nationality)					
• Thai	%	4.93%	4.41%	4.55%	5.38%
• Chinese	%	95.07%	95.17%	94.42%	92.55%
• Japanese	%	0.21%	0.42%	0.62%	1.04%
• Vietnamese	%	0%	0%	0.10%	0.31%
• American	%	0%	0%	0.31%	0.21%
• Other	%	-	-	-	0.52%
Employee (by age)					
• Under 30 years	%	26.66%	26.37%	23.76%	20.70%
• 30-39 years	%	39.94%	39.39%	39.05%	37.68%
• 40-49 years	%	28.16%	27.94%	30.58%	32.40%
• Over 50 years	%	5.25%	6.30%	6.61%	9.21%
Employee (by type)					
• Permanent	%	97.97%	97.16%	96.90%	74.02%
• Temporary/ contract	%	2.03%	2.84%	3.10%	25.98%
Employee (by level)					
• Senior management	%	1.39%	1.47%	1.45%	0.31%
• Middle management	%	4.07%	4.20%	4.96%	7.04%
• Junior management	%	20.24%	21.64%	22.00%	6.94%
• Supervisor & staff	%	74.30%	72.69%	71.59%	85.71%
Management (by gender)					
• Male	%	75.42%	75.38%	73.82%	71.74%
• Female	%	24.17%	24.62%	26.18%	28.26%

New Employee

Data	Unit	2016	2017	2018	2019
Total new employee	Person	61	75	65	56
New employee (by gender)					
• Male	Person	50	65	56	41
• Female	Person	11	10	9	15
New employee (by country)					
• Thailand	Person	4	3	3	5
• China	Person	57	70	57	50
• Japan	Person	0	2	4	1
• Vietnam	Person	0	0	1	0
• Other	Person	0	0	0	0

Employee Engagement

Data	Unit	2016	2017	2018	2019
Level of employee engagement (by country)					
• Thailand	%	50%	57%	68%	68%
• China	%	97%	95%	94%	94%
• Japan	%	-	-	-	50%
Level of alignment between employee behavior and the corporate culture (by country)					
• Thailand	%	73.67%	77.10%	74%	65%
• China	%	94.5%	98.94%	-	95%
• Japan	%	-	-	-	79%

Training

Data	Unit	2016	2017	2018	2019
Average training cost per employee (by country)					
• Thailand	USD/ Person	1,150	1,300	1,540	2,320
• China	USD/ Person	323	211	244	275
• Japan	USD/ Person	-	685	1,020	1,730
• Other	USD/ Person	-	1,500	2,000	7,140
Average training cost per employee (by level)					
• Senior management	USD/ Person	410	389	370	5,100
• Middle management	USD/ Person	1,189	742	883	1,230
• Junior management	USD/ Person	924	910	834	775
• Supervisor & staff	USD/ Person	167	139	167	195
Average training hour per employee (by country)					
• Thailand	Hour/ Person	-	30	27.5	35.2
• China	Hour/ Person	-	26	20.5	29
• Japan	Hour/ Person	-	24	18	27
• Other	Hour/ Person	-	56	40	27
Average training hour per employee (by level)					
• Senior management	Hour/ Person	-	15	21	37
• Middle management	Hour/ Person	-	22	44	62
• Junior management	Hour/ Person	-	41	38	53
• Supervisor & staff	Hour/ Person	-	19	25	25

Succession Plan & Leadership Development

Data	Unit	2016	2017	2018	2019
Critical positions having a succession plan	%	-	100%	100%	100%
Critical positions having a succession plan (by level)					
• Senior management	%	-	100%	100%	100%
• Middle management	%	-	100%	100%	100%
Succession of leadership development program	%	56%	70%	72%	80%
Succession of leadership development program (by course)					
• Strategic Leader	%	100%	100%	100%	100%
• Business Leader	%	-	41%	77%	82%
• First Line Leader	%	39%	50%	52%	66%
• Future Leader	%	-	-	39%	56%
• Engaging Leader	%	30%	88%	90%	94%

Turnover

Data	Unit	2016	2017	2018	2019
Total turnover rate	%	3.03%	3.03%	6.25%	5.69%
Voluntary turnover rate	%	3.03%	3.03%	3.13%	4.87%
Turnover rate (by country)					
• Thailand	%	3.03%	3.03%	6.25%	2.38%
• China	%	0%	0%	0%	5.97%
• Japan	%	0%	0%	0%	0%
• Other	%	0%	0%	0%	0%

Parental Leave

Data	Unit	2016	2017	2018	2019
Employee taking parental leave (by country)					
• Thailand	Person	0	0	0	0
• China	Person	0	0	0	7
• Japan	Person	0	0	0	0
• Other	Person	0	0	0	0
Employee returning to work after parental leave (by country)					
• Thailand	%	0%	0%	0%	0%
• China	%	0%	0%	0%	2% ^(a)
• Japan	%	0%	0%	0%	0%
• Other	%	0%	0%	0%	0%

^(a) Parental leaves have continued to 2020.

Collective Bargaining Agreement

Data	Unit	2016	2017	2018	2019
Employee covered by collective bargaining agreement					
• Thailand	%	0%	0%	0%	0%
• China	%	0%	0%	0%	0%
• Japan	%	0%	0%	0%	0%
• Other	%	0%	0%	0%	0%

Occupational Health and Safety

Data	Unit	2016	2017	2018	2019
Work-related fatalities					
• Total employee & contractor	Person	0	0	0	0
• Employee	Person	0	0	0	0
• Contractor	Person	0	0	0	0
• 3 rd Party	Person	0	0	0	0
Fatality rate					
• Total employee & contractor	Person/ Million man hour	0	0	0	0
• Employee	Person/ Million man hour	0	0	0	0
• Contractor	Person/ Million man hour	0	0	0	0
Number of injuries ^{(c)(d)(e)}					
• Employee	Case	1	0	0	0
• Contractor	Case	-	-	-	-
Total recordable injury frequency rate (TRIFR) ^{(b)(c)(d)(e)}					
• Employee	Person/ Million man hour	3.93	0	0	0
• Contractor	Person/ Million man hour	-	-	-	-
Lost time injury frequency rate (LTIFR) ^{(b)(e)(f)}					
• Employee	Person/ Million man hour	3.36	0	0	0
• Contractor	Person/ Million man hour	-	-	-	-
Injury severity rate (ISR) ^{(b)(e)(g)}					
• Employee	Day/ Million man hour	177.77	0	0	0
• Contractor	Day/ Million man hour	-	-	-	-
High consequence work related injuries ^{(b)(c)(e)}					
• Employee	Case	-	-	0	0
• Contractor	Case	-	-	0	0
High consequence work related injuries rate ^{(b)(c)(e)}					
• Employee	Person/ Million man hour	-	-	0	0
• Contractor	Person/ Million man hour	-	-	0	0
Major incident (by country) ^(h)					
• Thailand	Case	0	0	0	0
• China	Case	1	0	0	0
• Japan	Case	0	0	0	0

^(a) Not include data of 3rd party in calculation of TRIFR, LTIFR and ISR.

^(b) Cover only operations in China.

^(c) Refer to GRI 403-9 (2018)

^(d) Exclude first aid but include work-related fatalities.

^(e) Exclude employee in Beijing office and contractors in China due to reporting system is under standardization. This data is expected to disclose in Sustainability Report 2020.

^(f) LTIFR calculation is included work-related fatalities and number of actual lost day and calculated lost day which the lost day count begins the day after accident happened until injured person can return to work.

^(g) ISR is calculated from actual lost day and reference lost day. The actual lost day count from the day that accident happened until injured person can return to work. The calculated lost day refers to American National Standards Institute (ANSI) standard, for example 6,000 days for fatality.

^(h) Major Incident includes fatality and/or property damage with cost exceeding USD 100,000.

BLCP Power Plant

Data	Unit	2016	2017	2018	2019
Installation Capacity					
Electricity	MW	1,434	1,434	1,434	1,434
Capacity under construction	MW	0	0	0	0
Planned future investment	THB	0	0	0	0
Production					
Electricity sold	MWh	10,932,315	10,091,687	10,383,584	10,912,012
	GJ	39,356,334	36,330,073	37,380,902	39,283,243
Electricity generated	MWh	11,460,567	10,572,880	10,877,823	11,436,600
System Efficiency					
Production efficiency					
• Efficiency rate (power production)	g/ KWh	353.64	348.66	355.66	357.45
• Efficiency rate (steam production)	Kg/ GJ	0	0	0	0
• Availability factor ^(a)	%	91.0%	84.2%	86.6%	89.69%
• Overall efficiency	%	38.2%	38.3%	38.7%	38.75%
Planned outage					
• Planned outage frequency	Case/ Year	2	2	2	2
• Total outage hours	Hour	792	2,208	1,968	1,054
• Average power outage duration	Hour/ Case	396	1,104	984	527
Unplanned outage					
• Planned outage frequency	Case/ Year	2	2	1	1
• Total outage hours	Hour	59	257	14	7
• Average power outage duration	Hour/ Case	29.50	128.50	14.00	7.00
Total outage					
• Planned outage frequency	Case/ Year	4	4	3	3
• Total outage hours	Hour	851	2,465	1,982	1,061
• Average power outage duration	Hour/ Case	212.75	616.25	660.67	353.67
Transmission					
• Length of transmission line	Km	47	47	47	47
Energy					
Direct fuel consumption					
• Total	GJ	104,821,754	96,781,462	99,917,245	104,652,927
• Coal	GJ	104,799,626	96,731,871	99,894,682	104,633,968
• Diesel	GJ	22,128	49,591	22,563	18,959
Indirect energy consumption					
• Electricity purchased	GJ	0	0	0	0
	MWh	0	0	0	0
Energy intensity	MJ/ MWh	9,588	9,590	9,620	9,590.62
Greenhouse Gas (GHG)					
GHG emissions					
• Total GHG (Scope 1 & 2)	Ton CO ₂ e	9,266,649	8,849,960	9,111,041	9,589,975
• Direct GHG (Scope 1)	Ton CO ₂ e	9,264,594	8,846,181	9,109,143	9,588,300
• Indirect GHG (Scope 2)	Ton CO ₂ e	2,055	3,779	1,898	1,675
• GHG intensity (Scope 1 & 2)	Kg CO ₂ / KWh	0.833	0.837	0.838	0.839
Air					
NO _x					
• Average concentration	mg/ m ³	247.40	237.30	228.6	228.1
• Degree of compliance	%	100%	100%	100%	100%

^(a) Calculated from actual operation.

Data	Unit	2016	2017	2018	2019
SO _x					
• Average concentration	mg/ m ³	253.40	279.40	258.10	360.60
• Degree of compliance	%	100%	100%	100%	100%
Particulate matter (PM)					
• Average concentration	mg/ m ³	18.90	16.60	32.4	10.6
• Degree of compliance	%	100%	100%	100%	100%
Biodiversity					
Total operation area	KM ²	0.96	0.96	0.96	0.96
Operation area related to protected area					
• Located inside protected area	KM ²	0	0	0	0
• Adjacent to protected area	KM ²	0	0	0	0
• Contain portion in protected area	KM ²	0	0	0	0
IUCN red list species in operation area					
• Critically endangered	Number	0	0	0	0
• Endangered	Number	0	0	0	0
• Vulnerable	Number	0	0	0	0
• Near threatened	Number	0	0	0	0
• Least concern	Number	0	0	0	0
Water					
Water withdrawal					
• Total water withdrawal	ML	688	765	518	492
• Surface water (river, lake, and ocean)	ML	688	765	518	492
• Groundwater	ML	-	-	-	-
• Municipal water supply	ML	-	-	-	-
Water recycled	ML	264	147	291	354
Effluent					
Water discharged					
• Total water discharged	ML	302	447	181	159
• Surface water	ML	0	0	0	0
• Groundwater	ML	0	0	0	0
• Seawater	ML	0	0	0	0
• Third-party water (total)	ML	302	447	181	159
• Third-party water sent for use to other organization	ML	0	0	0	0
Effluent quality					
• BOD	mg/ L	< 2.0-3.2	< 2.0-2.5	< 2.0-4.3	< 2.0-2.6
• COD	mg/ L	< 25.0	< 25.0	< 25.0	< 25.0
• pH	-	7.50	7.83	7.61	7.66
• Average temperature	°C	34.23	34.26	34.45	35.30
Oil and chemical spill					
• Total number of significant spill	Case	-	-	0	0
• Total volume of significant spill	Liter	-	-	0	0
Waste					
Hazardous waste disposed					
• Total hazardous waste	Ton	178	345	231	303
• Landfill	Ton	63	150	43	155
• Recycle	Ton	59	116	105	50
• Recovery	Ton	56	79	83	98
• Other disposal	Ton	0	0	0	0

Data	Unit	2016	2017	2018	2019
Non-hazardous waste disposed					
• Total non-hazardous waste	Ton	614,157	543,927	580,697	604,365
• Landfill	Ton	822	823	1,269	726
• Recycle	Ton	378	455	348	289
• Recovery	Ton	612,957	542,648	579,081	603,350
• Other disposal	Ton	-	-	-	-
Total waste disposed (hazardous & non-hazardous)	Ton	614,335	544,272	580,928	604,668
Production of ash & gypsum					
• Total production of ash	Ton	612,540	543,467	592,708	608,594
• Fly ash	Ton	542,514	473,077	532,713	535,818
• Bottom ash	Ton	70,026	70,390	59,995	73,776
• Gypsum	Ton	0	0	0	0
Recycled ash & gypsum					
• Fly ash recycled	Ton	542,514	472,922	532,474	535,529
• Bottom ash recycled	Ton	70,026	70,390	59,995	73,776
• Gypsum recycled	Ton	0	0	0	0
Environmental Compliance					
Total monetary value of significant fines	Case	-	-	0	0
	THB	-	-	0	0
Total monetary sanctions	Case	-	-	-	-
Case brought through dispute resolution mechanism	Case	-	-	-	-
Environmental Grievance Mechanism					
Complaints from related stakeholders on environment					
• Significant environmental complaint	Number	0	0	0	0
• Significant complaint resolved	Number	0	0	0	0
Safety Performance					
Employee					
Man hour	Hour	614,608	627,848	642,712	622,640
Number of fatality					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of injuries					
• Male	Person	2	1	0	1
• Female	Person	0	0	0	0
Number of high consequence work related Injuries					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of day lost (excluding fatality and permanent disability)					
• Male	Day	0	0	0	0
• Female	Day	0	0	0	0
Fatality rate	Person/ Million Man hour	0	0	0	0
Injury frequency rate (IFR)	Person/ Million Man hour	3.25	1.59	0	0
Lost time injury frequency rate (LTIFR)	Person/ Million Man hour	0	0	0	0
Injury severity rate (ISR)	Person/ Million Man hour	0	1.59	0	0

Data	Unit	2016	2017	2018	2019
Total recordable injury rate (TRIR)	Day/ Million Man hour	0	1.59	0	0
Contractor					
Man hour	Hour	982,393	1,656,177	1,783,171	1,295,363
Number of fatality					
• Male	Male	0	1	0	0
• Female	Female	0	0	0	0
Number of injuries					
• Male	Person	3	7	3	3
• Female	Person	0	1	1	2
Number of high consequence work related Injuries					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of day lost (excluding fatality and permanent disability)					
• Male	Day	0	0	0	0
• Female	Day	0	0	0	0
Fatality rate	Person/ Million Man hour	0	0.6	0	0
Injury frequency rate (IFR)	Person/ Million Man hour	0	3.62	0.56	3.09
Lost time injury frequency rate (LTIFR)	Person/ Million Man hour	0	0	0	0
Injury severity rate (ISR)	Day/ Million Man hour	0	3.02	0.56	0
Total recordable injury rate (TRIR)	Day/ Million Man hour	0	3.02	0.56	3.09
OHS Training/ Communication					
OHS training hour					
• Employee	Hour	-	-	18,173	18,189
• Contractor	Hour	-	-	21,033	18,984
Expense and Investment for Safety					
Expense for safety operation					
• Operation expense	THB	-	-	24,300,000	24,013,750
• Capex	THB	-	-	0	0
Expense for safety improvement project					
• Operation expense	THB	-	-	0	0
• Capex	THB	-	-	550,000	1,400,000
Employee					
Total employee	Person	292	278	278	280
Number of employee (by gender)					
• Male	Person	245	232	229	234
• Female	Person	47	46	49	46
Number of employee (by type)					
• Permanent	Person	272	268	265	263
• Temporary/ contract	Person	20	10	13	17
Number of employee (by level)					
• Senior management	Person	8	7	7	6
• Middle management	Person	31	32	31	33
• Junior management	Person	50	47	46	47
• Supervisor & staff	Person	183	182	181	180

Data	Unit	2016	2017	2018	2019
New employee					
• Total new employee	Person	27	15	16	9
• Male	Person	24	11	12	8
• Female	Person	3	4	4	1
Turnover					
• Turnover of permanent employee	Person	19	17	14	8
• Turnover rate	%	6.51%	6.12%	5.04%	2.86%
Gender Diversity					
Senior management					
• Male	Person	7	6	6	5
• Female	Person	1	1	1	1
Middle management					
• Male	Person	24	25	25	25
• Female	Person	7	7	6	8
Junior management					
• Male	Person	41	39	39	41
• Female	Person	9	8	7	6
Supervisor & staff					
• Male	Person	159	158	155	156
• Female	Person	24	24	26	24
Employee Development					
Training hour					
• Total training hour	Hour	13,084	8,084	18,173	18,189
• Senior management	Hour	535	186	512	648
• Middle management	Hour	2,480	1,537	3,297	3,393
• Junior management	Hour	2,829	2,014	3,010	3,780
• Supervisor & staff	Hour	7,240	4,347	11,354	10,368
Average training hour	Hour/ Person	44.81	29.08	65.37	64.96
Parental Leave					
Employee take parental leave	Person	11	6	6	2
	%	3.77%	2.16%	2.16%	0.71%
Number of employee return to work after parental leave	Person	11	5	6	2
	%	100%	83%	100%	100%

Hongsa Power Plant

Data	Unit	2016	2017	2018	2019
Installation Capacity					
Electricity	MW	1,878	1,878	1,878	1,878
Capacity under construction	MW	0	0	0	0
Planned future investment	THB	0	0	0	0
Production					
Electricity sold	MWh	9,062	11,391	12,512	11,406
	GJ	32,622	41,007	45,042	41,062
Electricity generated	MWh	10,061	12,655	13,780	13,087
System Efficiency					
Production efficiency					
• Efficiency rate (power production)	g/ KWh	1,116	1,140	1,113	1,099
• Efficiency rate (steam production)	Kg/ GJ	0	0	0	0
• Availability factor	%	68.62%	83.61%	89.65%	82.18%
• Overall efficiency	%	31.62%	31.51%	32.06%	32.49%
Planned outage					
• Planned outage frequency	Case/ Year	1	2	3	3
• Total outage hours	Hour	420	1,940	1,225	1,143
• Average power outage duration	Hour/ Case	420.00	969.96	408.32	381.00
Unplanned outage					
• Planned outage frequency	Case/ Year	36	20	20	17
• Total outage hours	Hour	7,171	2,126	1,275	3,530
• Average power outage duration	Hour/ Case	199.19	106.30	63.76	207.65
Total outage					
• Planned outage frequency	Case/ Year	37	22	23	20
• Total outage hours	Hour	7,591	3,096	1,683	3,911
• Average power outage duration	Hour/ Case	205.16	140.72	73.19	195.55
Transmission					
• Length of transmission line	Km	167	167	167	167
• Transmission loss	%	0.95%	0.20%	0.21%	0.20%
• Length of distribution line	Km	6	6	6	6
Energy					
Direct fuel consumption					
• Total	GJ	115,420,586	144,980,196	154,938,500	145,217,278
• Coal	GJ	114,606,170	144,469,158	154,604,073	144,917,349
• Diesel	GJ	814,416	511,039	334,427	299,930
Indirect energy consumption					
• Electricity purchased	GJ	0	0	0	0
	MWh	0	0	0	8,590
Greenhouse Gas (GHG)					
GHG emissions (Power Plant)					
• Total GHG (Scope 1 & 2)	Ton CO ₂ e	11,850,565	16,920,258	16,185,216	15,539,000
• Direct GHG (Scope 1)	Ton CO ₂ e	11,850,235	16,920,207	16,185,164	15,538,951
• Indirect GHG (Scope 2)	Ton CO ₂ e	330	51	52	48
• Other indirect GHG (Scope 3)	Ton CO ₂ e	1,379	1,488	1,714	1,461
• GHG intensity (Scope 1 & 2)	Kg CO ₂ /KWh	1,545	1,600	1,384	1,403
GHG emissions (Mine)					
• Total GHG (Scope 1 & 2)	Ton CO ₂ e	344,851	457,751	444,439	459,669
• Direct GHG (Scope 1)	Ton CO ₂ e	344,166	455,065	443,680	459,005
• Indirect GHG (Scope 2)	Ton CO ₂ e	685	2,686	759	665

Data	Unit	2016	2017	2018	2019			
Air								
NO _x - Average concentration - Standard - Degree of compliance	mg/ Nm ³ mg/ Nm ³ %	339.05-405.27 510 100%	313.05-338.00 510 100%	158.70-214.68 510 100%	162.74-198.10 510 100%			
SO _x - Average concentration - Standard - Degree of compliance	mg/Nm ³ mg/Nm ³ %	101.00-135.72 230 100%	99.95-117.66 230 100%	128.74-142.23 230 100%	128.35-129.61 230 100%			
Particulate matter (PM) - Average concentration - Standard - Degree of compliance	mg/ Nm ³ mg/ Nm ³ %	20.73-42.41 50 100%	24.16-31.41 50 100%	5.18-7.87 50 100%	4.92-7.99 50 100%			
Biodiversity								
Total operation area	KM ²	86.7	86.7	86.7	86.7			
Operation area related to protected area - Located inside protected area - Adjacent to protected area - Contain portion in protected area	KM ² KM ² KM ²	- - -	- - -	- - -	- - -			
IUCN red list species in operation area - Critically endangered - Endangered - Vulnerable - Near threatened - Least concern	Number Number Number Number Number	0 0 3 2 230	0 0 2 4 201	Conduct every 5 years	Conduct every 5 years			
Effluent								
Water discharged - Total water discharged - Surface water - Groundwater - Seawater - Third-party water (total) - Third-party water sent for use to other organization	ML ML ML ML ML ML	8,669,370 8,669,370 - - - -	8,100,154 8,100,154 - - - -			During installation of flow meter	8,277,573 8,277,573 - - - -	
Effluent quality (Power Plant) - TSS - Standard - Degree of compliance	mg/ L mg/ L %	12.0-94.0 ≤50 99.1%	13.0-160.0 ≤50 99.1%				8.0-42.0 ≤50 100%	5.0-36 ≤50 100%
- BOD - Standard - Degree of compliance	mg/ L mg/ L %	1.8-7.3 ≤40 100%	0.5-7.4 ≤40 100%				0 -1.4 ≤40 100%	0.1-2.4 ≤40 100%
- COD - Standard - Degree of compliance	mg/ L mg/ L %	≤40 ≤120 100%	≤40 ≤120 100%	≤40 ≤120 100%	<40-51 ≤120 100%			
- pH - Standard - Degree of compliance	- - %	7.74-8.87 6-9 100%	8.27-8.85 6-9 100%	8.54-9.6 6-9 99.1%	8.5-9.2 6-9 91.7%			
- Temperature - Standard - Degree of compliance	°C differential °C differential %	0-1 <3 100%	0-1 <3 100%	0-1 <3 100%	0-1 <3 100%			

Data	Unit	2016	2017	2018	2019
Effluent quality (Mine)					
• TSS	mg/ L	3.1-124	<10.0-64.2	10.2-276	5.0-66
Standard	mg/ L	≤50	≤50	≤50	≤50
Degree of compliance	%	99.1%	99.1%	100%	100%
• BOD	mg/ L	0.3-13.5	2.0-12.3	0.3-2.4	0.0-2.5
Standard	mg/ L	≤50	≤50	≤50	≤50
Degree of compliance	%	100%	100%	100%	100%
• COD	mg/ L	<40.0-78.7	<40.0-52.7	≤40	<40-47
Standard	mg/ L	≤150	≤150	≤150	≤150
Degree of compliance	%	100%	100%	100%	100%
• pH	-	6.8-8.3	6.8-8.4	6.4-10.3	6.1-8.3
Standard	-	6-9	6-9	6-9	6-9
Degree of compliance	%	100%	100%	99.1%	100%
• Temperature	°C differential	0-1	0-1	0-1	0-1
Standard	°C differential	<3	<3	<3	<3
Degree of compliance	%	100%	100%	100%	100%
Oil and chemical spill					
• Total number of significant spill	Case	3	5	0	0
• Total volume of significant spill	Liter	35	120	0	0
Waste					
Hazardous waste disposed					
• Total hazardous waste	Ton	286,613	528,714	870,302	261,622
• Reuse	Ton	0	0	0	122
• Recycle (liquid)	Liter	286,450	528,406	864,802	259,237
• Recycle (solid)	Ton	163	308	-	2,045
• Recovery (including energy recovery)	Ton	-	-	-	-
• Incineration	Ton	-	-	-	5
• Deep well injection	Ton	-	-	-	-
• Landfill	Ton	-	-	-	-
• On-site storage	Ton	-	-	5,500	213
• Other disposal	Ton	-	-	-	-
Non-hazardous waste disposed					
• Total non-hazardous waste	Ton	6,584	4,867	9,316	5,755
• Reuse	Ton	-	-	-	-
• Recycle (solid)	Ton	0.60	42.96	3,736	5.15
• Compositing	Ton	-	-	-	0.846
• Recovery (including energy recovery)	Ton	-	-	-	-
• Incineration	Ton	-	-	-	-
• Deep well injection	Ton	-	-	-	-
• Landfill	Ton	6,477.8	4,688.7	5,580	5,749
• On-site storage	Ton	60	65	-	-
• Other disposal	Ton	46	71	-	-
Total waste disposed (hazardous & non-hazardous)	Ton	293,197	533,581	879,618	267,377
Production of ash & gypsum					
• Total production of ash	Ton	2,079,546	2,250,012	3,027,776	3,402,781
• Fly ash	Ton	2,079,546	2,250,012	3,027,776	3,402,781
• Bottom ash	Ton	-	-	-	-
• Gypsum	Ton	125,221	451,001	687,376	740,373
Recycled ash & gypsum					
• Fly ash recycled	Ton	668	123,615.21	320,481	355,795
• Bottom ash recycled	Ton	-	-	-	-
• Gypsum recycled	Ton	-	-	30	0

Data	Unit	2016	2017	2018	2019
Environmental Compliance					
Total monetary value of significant fines	Case	0	0	0	0
	THB	0	0	0	0
Total monetary sanctions	Case	0	0	0	0
Case brought through dispute resolution mechanism	Case	0	0	0	0
Return on Environmental Investment					
Environmental expenditure and cost					
• Capital investment expense	THB	3,636,852	2,904,798	5,891,397	146,100
• Operating expense	THB	11,048,258	15,330,592	10,935,231	22,397,424
Environmental improvement project					
• Operating expense	THB	-	-	-	-
• Capex	THB	-	12,823,021	48,574,584	-
Environmental Grievance Mechanism					
Complaints from related stakeholders on environment					
• Significant environmental complaint	Number	8	3	5	1
• Significant complaint resolved	Number	8	3	5	1
Safety Performance					
Employee					
Man hour	Hour	1,687,506	1,664,701	1,727,688	1,757,550
Number of fatality					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of high consequence work related Injuries (excluding fatality)					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of lost time injury					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of recordable work-related injuries					
• Male	Person	4	6	5	4
• Female	Person	0	0	0	0
Number of day lost (excluding fatality and permanent disability)					
• Male	Day	0	0	0	0
• Female	Day	0	0	0	0
Fatality rate	Person/ Million Man hour	0	0	0	0
Lost time injury frequency rate (LTIFR)	Person/ Million Man hour	0	0	0	0
High consequence work related injury rate	Person/ Million Man hour	0	0	0	0
Total recordable injury rate (TRIR)	Day/ Million Man hour	2.37	3.60	2.89	2.28
Main type of work-related injury					
• Amputation	Person	0	0	0	0
• Burn	Person	0	0	0	0
• Chemical	Person	0	0	0	0
• Contamination	Person	0	0	0	0
• Contusion	Person	4	4	2	1
• Dry heat friction	Person	0	0	0	0

Data	Unit	2016	2017	2018	2019
• Fracture	Person	0	0	0	0
• Hernia	Person	0	0	0	0
• Irritation	Person	0	0	0	0
• Laceration	Person	0	2	3	2
• Puncture	Person	0	0	0	1
• Rash	Person	0	0	0	0
• Strain& Sprain	Person	0	0	0	0
• Other	Person	0	0	0	0
Number of occupational disease					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Contractor					
Man hour	Hour	9,659,052	12,939,159	15,389,796	15,393,461
Number of fatality					
• Male	Person	0	0	1	1
• Female	Person	0	0	0	0
Number of high consequence work related Injuries (excluding fatality)					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
Number of lost time injury					
• Male	Person	4	4	3	5
• Female	Person	0	0	0	0
Number of recordable work-related injuries					
• Male	Person	12	21	21	25
• Female	Person	0	2	0	0
Number of day lost (excluding fatality and permanent disability)					
• Male	Day	3,030	27	189	1,865
• Female	Day	0	0	0	0
Fatality rate	Person/ Million Man hour	0	0	0.06	0.06
Lost time injury frequency rate (LTIFR)	Person/ Million Man hour	0.41	0.31	0.26	0.39
High consequence work related injury rate	Person/ Million Man hour	0	0	0	0
Total recordable injury rate (TRIR)	Day/ Million Man hour	1.24	1.62	1.36	1.62
Main type of work-related injury					
• Amputation	Person	1	0	0	1
• Burn	Person	0	2	1	1
• Chemical	Person	0	0	0	1
• Contamination	Person	0	0	0	0
• Contusion	Person	3	10	10	11
• Dry heat friction	Person	0	0	0	0
• Fracture	Person	1	0	0	2
• Hernia	Person	0	0	0	0
• Irritation	Person	0	2	1	0
• Laceration	Person	4	7	5	8
• Puncture	Person	0	1	4	0
• Rash	Person	0	0	0	0
• Strain& Sprain	Person	3	1	1	1
• Other	Person	0	0	0	0

Data	Unit	2016	2017	2018	2019
Number of occupational disease					
• Male	Person	0	0	0	0
• Female	Person	0	0	0	0
OHS Training/ Communication					
Employee					
• OHS training program	Number	55	42	38	42
• OHS training hour	Hour	3,210	1,102	1,024	5,571
Contractor					
• OHS training program	Number	750	780	539	802
• OHS training hour	Hour	28,457	17,571	17,579	29,989
Expense and Investment for Safety					
Expense for safety operation					
• Operation expense	THB	16,677,903	23,892,511	24,701,400	27,232,209
• Capex	THB	39,920,256	29,384,720	2,045,800	1,200,000
Expense for safety improvement project					
• Operation expense	THB	-	-	-	-
• Capex	THB	270,000	36,016,260	20,500,000	18,120,000
Employee					
Total employee	Person	736	722	734	732
Number of employee (by gender)					
• Male	Person	548	559	568	564
• Female	Person	188	163	166	168
Number of employee (by nationality)					
• Thai	Person	258	270	275	268
• Laos PDR	Person	477	451	458	463
• China	Person	0	0	0	0
• Japan	Person	0	0	0	0
• Philippine	Person	1	1	1	1
Number of employee (by age)					
• Under 30 years	Person	373	345	325	292
• 30-39 years	Person	222	238	251	279
• 40-49 years	Person	91	90	101	101
• Over 50 years	Person	50	49	57	60
Number of employee (by type)					
• Permanent	Person	632	712	692	685
• Temporary/ contract	Person	104	10	42	47
Number of employee (by level)					
• Senior management	Person	17	19	19	19
• Middle management	Person	80	80	90	94
• Junior management	Person	179	191	187	179
• Supervisor & staff	Person	377	394	403	406
• Other (worker)	Person	83	38	35	34
New employee					
• Total new employee	Person	129	91	44	29
• Male	Person	86	66	27	17
• Female	Person	43	25	17	12
Retainment of employee					
• Average length of service years	Year	2.88	3.52	4.33	5.17

Data	Unit	2016	2017	2018	2019
Estimated total employee eligible to retired in the next 5 years					
• Total employee	Person	25	21	26	27
• Senior management	Person	8	9	9	7
• Middle management	Person	6	4	5	4
• Junior management	Person	5	6	8	9
• Supervisor & staff	Person	4	1	2	6
• Other (worker)	Person	2	1	2	1
Estimated total employee eligible to retired in the next 10 years					
• Total employee	Person	32	48	54	60
• Senior management	Person	4	12	13	12
• Middle management	Person	8	12	13	14
• Junior management	Person	9	14	17	18
• Supervisor & staff	Person	8	8	11	12
• Other (worker)	Person	3	2	0	4
Turnover					
• Total number of turnover	Person	79	104	36	33
• Reassignment	Person	45	22	29	22
• Retirement	Person	0	3	0	2
• End contract/ termination	Person	34	79	7	9
• Turnover rate	%	10.73%	13.57%	4.09%	4.51%
• Volunteer turnover rate	%	6.11%	3.05%	3.95%	3.01%
Gender Distribution by Professional Category					
Senior management					
• Male	Person	15	15	14	15
• Female	Person	2	4	5	4
Middle management					
• Male	Person	55	56	64	68
• Female	Person	25	24	26	26
Junior management					
• Male	Person	122	130	128	119
• Female	Person	57	61	59	60
Supervisor & staff					
• Male	Person	308	328	334	334
• Female	Person	69	66	69	72
Professional and advisor					
• Male	Person	7	9	7	6
• Female	Person	0	0	0	0
Salary/ Expense					
Remuneration cost	THB	457,492,801	477,717,230	520,566,680	532,526,721
Retirement benefit cost	THB	17,120,160	6,462,618	3,565,901	10,896,977
Employee development cost	THB	3,504,051	4,415,843	4,862,361	24,528,028
Employee Development					
Training hour					
• Total training hour	Hour	12,883	16,642	18,004	20,397
• Senior management	Hour	228	341	164	637
• Middle management	Hour	2,107	3,675	3,523	5,523
• Junior management	Hour	4,442	6,530	7,828	9,828
• Supervisor & staff	Hour	6,106	6,096	6,489	4,409
• Average training hour per employee	Hour/ Person	20.00	24.00	25.89	29.39

Data	Unit	2016	2017	2018	2019
Training expense					
• Total training hour	THB/ Person	3,504,051	4,415,843	4,862,361	35,343
• Senior management	THB/ Person	12,000	12,000	12,000	37,055
• Middle management	THB/ Person	14,000	15,000	15,000	32,522
• Junior management	THB/ Person	13,000	15,000	16,000	22,030
• Supervisor & staff	THB/ Person	8,000	10,000	11,000	36,488
• Average training expense per employee	THB/ Person	5,366	6,456	6,963	29,984
Parental Leave					
Employee take parental leave	Person	5	9	11	8
	%	3%	6%	7%	5%
Number of employee return to work after parental leave	Person	5	9	11	8
	%	3%	6%	7%	5%
Absenteeism Rate					
Absenteeism rate due to common illness	%	0.58%	0.59%	0.55%	0.65%
Impacted Community					
Plant area					
• Impacted household	Household	-	-	2,588	2,588
• Impacted people	Person	-	-	12,335	12,335
• Compensated household	Household	-	-	975	975
• Compensated people	Person	-	-	5,265	5,265
Transmission line					
• Impacted household	Household	-	-	249	249
• Impacted people	Person	-	-	1,345	1,345
• Compensated household	Household	-	-	249	249
• Compensated people	Person	-	-	1,345	1,345
Community Investment					
Promotion of supplementary occupations and related techniques	Number of program	-	-	13	13
	Number of direct beneficiaries	-	-	13,681	15,049
Education	Number of program	-	-	14	14
	Number of direct beneficiaries	-	-	3,810	4,191
Public health, safety and wellness	Number of program	-	-	4	5
	Number of direct beneficiaries	-	-	12,818	13,328
Environment and climate change	Number of program	-	-	1	2
	Number of direct beneficiaries	-	-	130	170
Art and culture	Number of program	-	-	0	0
	Number of direct beneficiaries	-	-	0	0
Others/ donate for charitable and other purpose	Number of program	-	-	0	0
	Number of direct beneficiaries	-	-	0	0
Job opportunity	Person	5,606	5,632	8,100	10,994
Community Complaint					
Total formal/ significant complaint case	Case	10	3	2	1
Solved complaint	Case	10	3	2	1

GRI Content Index

Disclosure	Description	Page		Omission	External Assurance
		SR	AR		
GRI 101: Foundation 2016					
GRI 102: General Disclosures 2016					
Organizational profile					
102-1	Name of the organization	Front cover			
102-2	Activities, brands, products, and services	6-7			
102-3	Location of headquarters	Back cover			
102-4	Location of operations	8-9			
102-5	Ownership and legal form	130	18-21		
102-6	Markets served	8-9, 16-17			
102-7	Scale of the organization	130, 134, 141			
102-8	Information on employees and other workers	141			
102-9	Supply chain	66-71, 135-136			
102-10	Significant changes to the organization and its supply chain	10-11			
102-11	Precautionary Principle or approach	50-53	40-43		
102-12	External initiatives	30-31			
102-13	Membership of associations	132			
EU1 ^E	Installed capacity, broken down by primary energy source and by regulatory regime	135			
EU2 ^E	Net energy output broken down by primary energy source and by regulatory regime	136			
EU3 ^E	Number of residential, industrial, institutional and commercial customer accounts	-		On the process of data standardaization	
Strategy					
102-14	Statement from senior decision-maker	2-3			
102-15	Key impacts, risks, and opportunities	16-17, 50-53			
Ethics and integrity					
102-16	Values, principles, standards, and norms of behavior	38-43			
102-17	Mechanisms for advice and concerns about ethics	42			
Governance					
102-18	Governance structure	12-15			
102-19	Delegating authority	12-15			
102-20	Executive-level responsibility for economic, environmental, and social topics	18-21			
102-21	Consulting stakeholders on economic, environmental, and social topics	22-25			
102-22	Composition of the highest governance body and its committees	13-15			
102-23	Chair of the highest governance body	13-15	22		
102-24	Nominating and selecting the highest governance body	13-15	26		
102-25	Conflicts of interest	13-15, 45	23-27		
102-26	Role of highest governance body in setting purpose, values, and strategy	13-14, 19			
102-27	Collective knowledge of highest governance body	15	24		
102-28	Evaluating the highest governance body's performance	15, 20			
102-29	Identifying and managing economic, environmental, and social impacts	18-19			
102-30	Effectiveness of risk management processes	18-19, 50-53			
102-31	Review of economic, environmental, and social topics	19-21			
102-32	Highest governance body's role in sustainability reporting	19-21			
102-33	Communicating critical concerns	18-21, 50-52			
102-34	Nature and total number of critical concerns	22-29, 52-53			
102-35	Remuneration policies	15, 20	26		

Disclosure	Description	Page		Omission	External Assurance
		SR	AR		
102-36	Process for determining remuneration	15, 20	26		
102-37	Stakeholders' involvement in remuneration	-			
102-38	Annual total compensation ratio	-			
102-39	Percentage increase in annual total compensation ratio	-			
Stakeholder engagement					
102-40	List of stakeholder groups	22-24			
102-41	Collective bargaining agreements	143			
102-42	Identifying and selecting stakeholders	22			
102-43	Approach to stakeholder engagement	22-24			
102-44	Key topics and concerns raised	22-24			
Reporting practice					
102-45	Entities included in the consolidated financial statements	130		18-21	
102-46	Defining report content and topic Boundaries	26-29, 133, 162			
102-47	List of material topics	28-29			
102-48	Restatements of information	162			
102-49	Changes in reporting	162			
102-50	Reporting period	162			
102-51	Date of most recent report	162			
102-52	Reporting cycle	162			
102-53	Contact point for questions regarding the report	162			
102-54	Claims of reporting in accordance with the GRI Standards	162			
102-55	GRI content index	157-161			
102-56	External assurance	162-164			
Economic					
GRI 201: Economic Performance 2016					
103-1	Explanation of the material topic and its Boundary	34		Not a material topic	
103-2	The management approach and its components	34-35			
103-3	Evaluation of the management approach	35, 37			
201-1	Direct economic value generated and distributed	134			
201-2	Financial implications and other risks and opportunities due to climate change	53, 82, 85			
201-3	Defined benefit plan obligations and other retirement plans	-			
GRI 203: Indirect Economic Impacts 2016					
103-1	Explanation of the material topic and its Boundary	-		Not a material topic	
103-2	The management approach and its components	-			
103-3	Evaluation of the management approach	-			
203-1	Infrastructure investments and services supported	-			
203-2	Significant indirect economic impacts	134			
GRI 204: Procurement Practices 2016					
103-1	Explanation of the material topic and its Boundary	66		Not a material topic	
103-2	The management approach and its components	67			
103-3	Evaluation of the management approach	67-69			
204-1	Proportion of spending on local suppliers	136			
GRI 205: Anti-corruption 2016					
103-1	Explanation of the material topic and its Boundary	44			
103-2	The management approach and its components	44			
103-3	Evaluation of the management approach	44-45			
205-1	Operations assessed for risks related to corruption	44-45			
205-2	Communication and training about anti-corruption policies and procedures	44-45			
205-3	Confirmed incidents of corruption and actions taken	44-45			

Disclosure	Description	Page		Omission	External Assurance
		SR	AR		
GRI G4 Sector Disclosures: System Efficiency					
EU11 ^E	Average generation efficiency of thermal plants by energy source and by regulatory regime	135			
Environment					
GRI 302: Energy 2016					
103-1	Explanation of the material topic and its Boundary	86			
103-2	The management approach and its components	87			
103-3	Evaluation of the management approach	87-89			
302-1	Energy consumption within the organization	137			Yes
302-3	Energy intensity	87-88, 137			Yes
302-4	Reduction of energy consumption	89			
GRI 303: Water and Effluents 2018					
103-1	Explanation of the material topic and its Boundary	94			
103-2	The management approach and its components	94-96			
103-3	Evaluation of the management approach	95-97			
303-1	Interactions with water as a shared resource	95-97			
303-2	Management of water discharge-related impacts	95-96			
303-3	Water withdrawal	96-97, 138			
303-4	Water discharge	138			
303-5	Water consumption	95-97, 138			
GRI 304: Biodiversity 2016					
103-1	Explanation of the material topic and its Boundary	100		Not a material topic	
103-2	The management approach and its components	100-101			
103-3	Evaluation of the management approach	101-103			
304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	139-140			
304-2	Significant impacts of activities, products, and services on biodiversity	102			
304-3	Habitats protected or restored	-			
304-4	IUCN Red List species and national conservation list species with habitats in areas affected by operations	-			
EU13 ^E	Biodiversity of offset habitats compared to the biodiversity of the affected areas	-			
GRI 305: Emissions 2016					
103-1	Explanation of the material topic and its Boundary	78			
103-2	The management approach and its components	78-80			
103-3	Evaluation of the management approach	79-85			
305-1	Direct (Scope 1) GHG emissions	81, 136			Yes
305-2	Energy indirect (Scope 2) GHG emissions	81, 136			Yes
305-3	Other indirect (Scope 3) GHG emissions	136			
305-4	GHG emissions intensity	79-81, 136-137			Yes
305-5	Reduction of GHG emissions	81-82			
305-6	Emissions of ozone-depleting substances (ODS)	138			
305-7	Nitrogen oxides (NO _x), sulfur oxides (SO _x), and other significant air emissions	91, 137-138			
GRI 306: Effluents and Waste 2016					
103-1	Explanation of the material topic and its Boundary	98			
103-2	The management approach and its components	98-99			
103-3	Evaluation of the management approach	99			
306-2	Waste by type and disposal method	138-139			
306-3	Significant spills	140			
306-4	Transport of hazardous waste	139			

Disclosure	Description	Page		Omission	External Assurance
		SR	AR		
GRI 307: Environmental Compliance 2016					
103-1	Explanation of the material topic and its Boundary	46		Not a material topic	
103-2	The management approach and its components	46-48			
103-3	Evaluation of the management approach	47-49			
307-1	Non-compliance with environmental laws and regulations	140			
GRI 308: Supplier Environmental Assessment 2016					
103-1	Explanation of the material topic and its Boundary	66, 70		Not a material topic	
103-2	The management approach and its components	66-67, 70-71			
103-3	Evaluation of the management approach	67-69, 71			
308-1	New suppliers that were screened using environmental criteria	136			
Social					
GRI 401: Employment 2016					
103-1	Explanation of the material topic and its Boundary	-		Not a material topic	
103-2	The management approach and its components	-			
103-3	Evaluation of the management approach	-			
401-1	New employee hires and employee turnover	141-142			
401-3	Parental leave	142			
GRI 403: Occupational Health and Safety 2018					
103-1	Explanation of the material topic and its Boundary	118			
103-2	The management approach and its components	118-119			
103-3	Evaluation of the management approach	119-123			
403-1	Occupational health and safety management system	47, 120			
403-2	Hazard identification, risk assessment, and incident investigation	120			
403-3	Occupational health services	121			
403-4	Worker participation, consultation, and communication on occupational health and safety	121-122			
403-5	Worker training on occupational health and safety	112			
403-6	Promotion of worker health	121, 123			
403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	118-119			
403-9	Work-related injuries	119, 143			Yes
GRI 404: Training and Education 2016					
103-1	Explanation of the material topic and its Boundary	110		Not a material topic	
103-2	The management approach and its components	110-111			
103-3	Evaluation of the management approach	111-113			
404-1	Average hours of training per year per employee	142			
404-2	Programs for upgrading employee skills and transition assistance programs	112-113			
404-3	Percentage of employees receiving regular performance and career development reviews	111, 113			
GRI 405: Diversity and Equal Opportunity 2016					
103-1	Explanation of the material topic and its Boundary	-		Not a material topic	
103-2	The management approach and its components	14			
103-3	Evaluation of the management approach	14			
405-1	Diversity of governance bodies and employees	14, 141			
GRI 411: Rights of Indigenous Peoples 2016					
103-1	Explanation of the material topic and its Boundary	-		Not a material topic	
103-2	The management approach and its components	128			
103-3	Evaluation of the management approach	-			
411-1	Incidents of violations involving rights of indigenous peoples	-			
GRI 412: Human Rights Assessment 2016					
103-1	Explanation of the material topic and its Boundary	-		Not a material topic	
103-2	The management approach and its components	41, 116			
103-3	Evaluation of the management approach	140			

Disclosure	Description	Page		Omission	External Assurance
		SR	AR		
GRI 413: Local Communities 2016					
103-1	Explanation of the material topic and its Boundary	124		Not a material topic	
103-2	The management approach and its components	124-126			
103-3	Evaluation of the management approach	126-129			
GRI 414: Supplier Social Assessment 2016					
103-1	Explanation of the material topic and its Boundary	66, 70		Not a material topic	
103-2	The management approach and its components	66-67, 70-71			
103-3	Evaluation of the management approach	67-69, 71			
414-1	New suppliers that were screened using social criteria	136			
GRI 415: Public Policy 2016					
415-1	Political contributions	134			
GRI 418: Customer Privacy 2016					
103-1	Explanation of the material topic and its Boundary	72		Not a material topic	
103-2	The management approach and its components	72-73			
103-3	Evaluation of the management approach	73-75			
418-1	Substantiated complaints concerning breaches of customer privacy and losses of customer data	135			
GRI 419: Socioeconomic Compliance 2016					
103-1	Explanation of the material topic and its Boundary	46		Not a material topic	
103-2	The management approach and its components	46-48			
103-3	Evaluation of the management approach	47-49			
419-1	Non-compliance with laws and regulations in the social and economic area	136			
GRI G4 Sector Disclosures: Access					
EU28 ^E	Power outage frequency	135			
EU29 ^E	Average power outage duration	135			
EU30 ^E	Average plant availability factor by energy source and by regulatory regime	135			
Material topics not covered by GRI Standards					
Business Ethics					
103-1	Explanation of the material topic and its Boundary	38			
103-2	The management approach and its components	38			
103-3	Evaluation of the management approach	39-43			
Employee Engagement					
103-1	Explanation of the material topic and its Boundary	114			
103-2	The management approach and its components	114			
103-3	Evaluation of the management approach	115-117			
Business Continuity Management					
103-1	Explanation of the material topic and its Boundary	54			
103-2	The management approach and its components	54-55			
103-3	Evaluation of the management approach	55-57			
Risk Management					
103-1	Explanation of the material topic and its Boundary	50			
103-2	The management approach and its components	50-52			
103-3	Evaluation of the management approach	51-53			
Process Improvement and Innovation					
103-1	Explanation of the material topic and its Boundary	62			
103-2	The management approach and its components	62			
103-3	Evaluation of the management approach	62-65, 84			

^E GRI-G4 Electric Utilities Sector Disclosures 2010

* The company has external assurance with Banpu group

About this Report

Banpu Power Public Company Limited (BPP) has annually developed the sustainability report (Report). This 2nd year one was aimed to disclose management approach and performance particularly to the material topics relating to economics, society, environment and governance of BPP previously disclosed together with the Sustainability Report of the Banpu Group.

The Report has been developed in accordance with the Global Reporting Initiatives Standards (GRI Standards): Core Options with additional indicators for electric utilities sector disclosures. Meanwhile the operational performance has been presented in line with the United Nations Sustainable Development Goals. Additionally, its financial information has complied with the Thai Financial Reporting Standards while contents have been scrutinized by assessing 31 sustainability issues of the power business, of which 13 topics are related to the Company's core sustainability materials.



Reporting Period

This Report includes BPP operational performance during the 2019 fiscal year starting from 1st January-31st December 2019. Ongoing activities within the first quarter of 2020 have also been encompassed in the Report in order to keep the most updated information for readers.



Reporting Boundary

The Company reported its sustainability performance, covering businesses in which the Company has greater than 50% of investments and direct management control. The contents therefore encompass all material topics involved with the operations in China, Japan, and Headquarters in Thailand. Businesses operated in Vietnam that have not yet commenced production, however, are not reported.

Since the Company has operations in various countries while its power has been generated from various technologies, such as conventional fuels and renewable energy, some key issues are different. Hence, the information disclosed is in accordance with the nature of operations and the core materials in such businesses.

The BLCP Power Plant in Thailand and the Hongsa Power Plant in Lao PRD, where the Company has less than 50% of investments and no management control, the supervision is therefore relying on the Board of Directors of each company. Hence, the sustainability performance of these two power plants is not included in the Company's operational results. The power plants, however, pay key roles in generating income. As such, some sustainability results are disclosed based upon stakeholders' interests.



Assurance

This Report has been certified by external agencies under the same database as Banpu Group. The power business' operating performance, including energy consumption data, greenhouse gas emissions, and safety statistics has also been certified so as to ensure that the information reported be accurate in accordance with the reporting principles. The Company is committed to continuously undertaking certification for the Report and adding more key indicators related to sustainability material topics comprising economics, society and environment in the future.



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LR Independent Assurance Statement

Relating to Banpu Power Public Company Limited' Sustainability Report for the calendar 2019

This Assurance Statement has been prepared for Banpu Power Public Company Limited in accordance with our contract but is intended for the readers of this Report.

Terms of engagement

Lloyd's Register Quality Assurance Limited (LR) was commissioned by Banpu Public Company Limited (BANPU) as parent company of Banpu Power Public Company Limited (BPP) to provide independent assurance on BPP's Sustainability Report 2019 ("the report") against the assurance criteria below to a limited level of assurance and at the materiality of the professional judgement of the verifier using LR's verification procedure. LR's verification procedure is based on current best practice, is in accordance with ISAE 3000¹ and uses the following principles of - inclusivity, materiality, responsiveness and reliability of performance data.

Our assurance engagement covered BPP's operations and activities in Japan, the People's Republic of China (PRC) and Thailand, only and specifically the following requirements:

- Confirming whether the selected environmental and social indicators below were compiled according to GRI's Standard 2016 and GRI's Electric Utilities Sector Disclosure.
- Evaluating the reliability of data and information for only the selected environmental and social indicators listed below:

Environmental

- Energy Consumption (GRI 302-1)
- Energy Intensity (GRI 302-3)
- GHG Emissions Scope 1 (GRI 305-1)
- GHG Emissions Scope 2 (GRI 305-2)
- GHG Emissions Intensity (GRI 305-4) and

Social

- Work-related injuries together with Fatality, Fatality Rate, TRIFR, LTIFR, ISR and Major Incident (GRI 403-9 edition 2018).

Our assurance engagement excluded the data and information of BPP's suppliers, contractors and any third-parties mentioned in the report.

LR's responsibility is only to BPP. LR disclaims any liability or responsibility to others as explained in the end footnote. BPP's responsibility is for collecting, aggregating, analysing and presenting all the data and information within the report and for maintaining effective internal controls over the systems from which the report is derived. Ultimately, the report has been approved by, and remains the responsibility of BPP.

LR's Opinion

Based on LR's approach nothing has come to our attention that would cause us to believe that BPP has not, in all material respects:

- Met the requirements above
- Disclosed reliable performance data and information as no errors or omissions were detected
- Covered all the issues that are important to the stakeholders and readers of this report.

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of the professional judgement of the verifier.

¹ GHG quantification is subject to inherent uncertainty.

Note: The extent of evidence-gathering for a limited assurance engagement is less than for a reasonable assurance engagement. Limited assurance engagements focus on aggregated data rather than physically checking source data at sites. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

LR's approach

LR's assurance engagements are carried out in accordance with our verification procedure. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- Auditing BPP's data management systems to confirm that there were no significant errors, omissions or mis-statements in the report. We did this by reviewing the effectiveness of data handling procedures, instructions and systems, including those for internal verification. We also spoke with those key people responsible for compiling the data and drafting the report.
- Sampling the consolidated data and information at BPP head office in Bangkok and visiting Deyuan (Solar Floating Plant in Jiaying) and Luannan (CHP Plant) in the People's Republic of China (PRC)

Observations

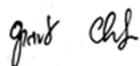
Further observations and findings, made during the assurance engagement, are:

- Reliability:
Data management systems are considered to be well defined, however, BPP should consider regular checking its' data transpose or internal data verification practice.

LR's standards, competence and independence

LR ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent.

This verification is the only work undertaken by LR for BANPU and BPP and as such does not compromise our independence or impartiality.



Opart Charuratana
LR Lead Verifier

Dated: 24 March 2020

On behalf of Lloyd's Register Quality Assurance Ltd
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Modified photo: Deyuan Solar Power Plant,
capacity of 51.64 MW, Zhejiang Province, China