



We

affordable reliable eco-friendly

Energy



We
a
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Energy

affordable
reliable
eco-friendly

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 operate both conventional and renewable power business 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

Message from CEO

Banpu Power Public Company Limited is committed to delivering the sustainable energy for creation of economic and social development as well as environmental conservation. The sustainable energy in the context of Banpu Power consists of three important features: Accessible energy with reasonable prices in each area (Affordable), able to deliver energy continuously (Reliable) and friendly to society, community, and environment (Eco-Friendly). These are the sources of the first ever sustainability report of Banpu Power.

Throughout the year 2018, Banpu Power took another stride on the path to sustainable growth with the “Greener & Smarter” strategy turning into concrete actions as the Banpu Group’s energy generation business group. Thanks to sound management and competency development as well as high efficiency of consistent power supply, the Company recorded an operating profit of THB 4,729 million in 2018, increasing 9% compared to 2017. Additionally, another three power plants commenced commercial operations with a total production capacity of 77 MWe, including the expansion of Luannan Power Plant’s Phase 2 in China, Mukawa Solar Power Plant, and Nari Aizu Solar Power Plant in Japan.

Banpu Power aims to expand its production capacity to more than 4,300-MWe with a minimum of 20% of the capacity from renewables by 2025. Banpu Power focuses on the investment in the Asia-Pacific countries with electricity demand and favorable government policies. At present, we have operated 17 power plants with equity production capacity of 2,145 MWe, consisting of 1,955 MWe from conventional power plants and 190 MW from renewable power plants, respectively. In addition, we have 11 power projects, which are under development with a total power generation capacity of 724 MWe. These power plant projects will gradually start commercial operations by 2023 including the conventional power plants using High Efficiency, Low Emissions (HELE) technology in China, the solar power plant projects in Japan, and the wind power plants in Vietnam.

Climate change is a major challenge to sustainable development the world is facing today. It is an important factor leading to changes which are the Company’s challenges. We, therefore, prepare ourselves to be adaptive to change and participate in mitigating climate change with a goal to invest in renewable energy no less than 20% by 2025. The Company also aims to reduce greenhouse gas emissions per unit of product not less than 15% by 2020 (from the year 2012 baseline), improving production processes and promoting innovation to use energy and resources efficiently.

A carbon price study has been conducted to evaluate the project’s values. In addition, the Company has continuously taken steps to improve the air quality released. For example, the air quality released from the power plant’s stacks in China is continuously better than the standards set by the government.

Occupational health and safety is the most important aspect for our work at Banpu Power. It is, therefore, a duty of executives to create a safety workplace environment by providing knowledge and creating awareness on occupational health and safety to employees, contractors and those involved with the operating areas. In 2018, the safety performance of the power plants where the Company has management control was satisfactory. There was neither lost time injury nor fatality. However, in January 2018, there was a fatality of our joint-venture power plant’s contractor. With this respect, I would like to express my heartfelt condolences to the families losing the beloved one. We have partnered with the contractor to find the root cause of this incident, improve and correct as well as set up preventive measures to prevent recurrence of such incident. This incident is a reminder that we must always improve the management of occupational health and safety in the areas to be better.

The Company has paid great importance on the community engagement and acceptance. The power business we have operated for more than 20 years was started with the community participation since the feasibility study, construction, and operation. Realizing that the community is the host, we therefore have to minimize the impacts and create sustainable values wherever we operate. The operation of community engagement must be appropriate with the context of each area, and respectful to differences and human rights. We have formulated effective communication channels so as to know community opinions and able to properly respond to the local community concerns.

Business ethics is something Banpu Power has adhered to and proudly enjoyed throughout its business operations. We are dedicated to operating our business with a transparent and fair manner equally to all stakeholders. We announced the anti-corruption policy; reviewed risks associated with corruption as well as communicated the Company’s intention to the stakeholders. Furthermore, this intention has been expanded to the power plants which are joint-venture companies. The communication channel open for all complains has been developed with systematic practices. Not only the business ethics aspect, but also all stakeholders’ concerns will be investigated to find the root causes and properly corrected.

Employees are the most valuable resource for sustainable growth of the organization. They are also the driving force to accomplish the Company's goal and missions as promised. We have paid great attention to employee's competency development in terms of professionalism and expertise as well as leaderships. The future skills necessary for employees have been evaluated while the appropriate internal and external training courses have been arranged. We have opened opportunities for employees to learn both from trainings and direct experiences through assignments to work for various projects, internal rotations to learn functional works from other departments, etc. These opportunities have been equally provided to employees without discrimination of genders, races, religions, and others. The diversity of employees has helped us to open a broader perspective and strengthen the organization for more than two decades as can be seen from the various innovative projects in the organization initiated by employees who dare to think and make it materialized.

In the past year, the Company redefined its corporate shared value into the "Banpu Heart," consisting of "Passionate," "Innovative," and "Committed." The "Banpu Heart" is our corporate culture to which Banpu Power people have adhered for working together. It has been also passed to our co-workers to experience or feel about the uniqueness of Banpu Power people.

In 2018, Hongsa Power Plant was certified with the ISO 14001 environmental management system standard. Hence, all of the conventional power plants where the Company has direct management control or the joint venture companies, have been certified for environmental management system standards. In addition, it is a great pride that the Company was selected to enlist in Thailand Sustainability Investment (THSI) since the first year of participation in the THSI assessment. Respectively, I would like to thank all employees who have contributed to the sustainable growth of Banpu Power. Last but not least, I would also thank all stakeholders for your trust, which is an encouragement and a driving force making us dedicate to work together with Banpu Group. The aim is to be the leader in integrated energy solutions as the energy generation business delivering valuable energy, encouraging development throughout the supply chain, and creating sustainable values.



Mr. Sutee Sukruan

Chief Executive Officer and
Chairman of the Sustainable Development Committee





About Banpu Power Public Company Limited

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 power business and supplied electricity from conventional power generation and renewable power production in the Asia-Pacific region, including Thailand, Lao PDR, China, Japan, and Vietnam.

Presently, 17 power plants have been commercially operated while 11 power projects are under development. The Company's total production capacity of power and steam based on equity investments from operating power plants is 2,145 MWe and another 724 MWe from the power plants projects which are under development. Banpu Power aims to expand its equity production capacity of more than 4,300 MWe, consisting of a minimum 20% of renewable energy investment by 2025 following the Greener & Smarter strategy to drive towards one of the leading sustainable power generators and electricity suppliers in the region. In 2018, the Company's total assets was at THB 51,566 million, an increase of THB 3,868 million compared to that of 31 December 2017.

For more information about Banpu Power, please visit www.banpupower.com



About This Report

This sustainable development report (“the report”) is published for the first ever year in order to disclose management approach and performance particularly to the material topics relating to economy, society, environment and governance of Banpu Power Public Company Limited previously disclosed in the Sustainable Development 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. Its financial information has complied with the Thai Financial Reporting Standards while contents have been scrutinized by assessing 32 sustainability issues of the power business, of which details are related to the core sustainability materials of the Company

■ Reporting Period

This report covers our operational performance during the fiscal year starting from 1st January 2018 to 31st December 2018. To keep the most updated information for readers, ongoing activities within the first quarter of 2019 have also been included in the report.

■ Reporting Boundary

This report cover the assets that Banpu Power holds investment greater than 50 percent and has direct management control. Therefore, the contents encompass all material topics involved with the operations in China, Japan and head office in Thailand. Businesses operated in other countries that have not yet started production, however, are not reported.

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

For BLC Power Plant and Hongsa Power Plant which the Company holds investment in form of joint venture and has indirect management control through Board of Directors, therefore the performance data of these two power plant are excluded from reporting boundary. Since these two power plant are contributed significant growth of the Company, some information receiving high interest from stakeholders are reported separately.

■ Assurance

The Company indirectly assures the information in this report together with the Banpu Group. Additionally, some information receiving high interest from stakeholders has been certified by an external party. The Company’s certified data include energy consumption and greenhouse gas emissions in the power business in China where the Company holds major investments and has management control. The Company is committed to expanding the scope of the report to cover every production unit, starting with those we have direct management control.

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Banpu Power supply chain

Energy Supply:

- Coal
- Diesel
- Waste Gas
- Solar
- Wind

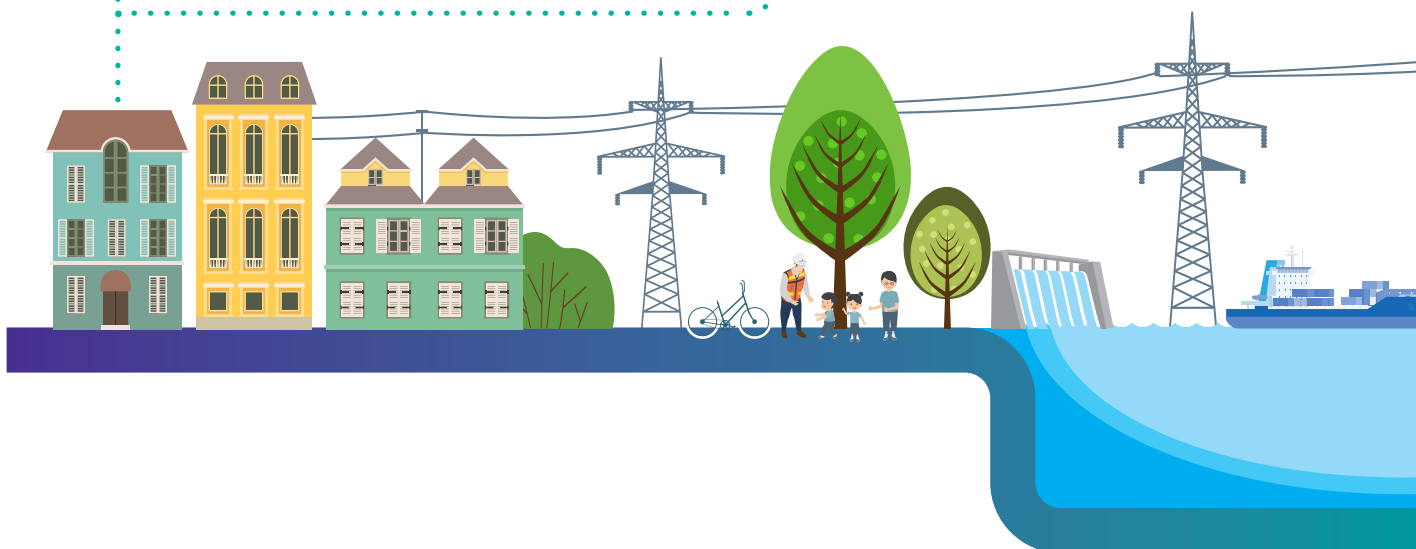
Logistics and Transportation:

- Road freight
- Rail freight
- Sea freight







Community






- Procurement products and services
- Employment



Power plant:

-  Conventional power plant
-  Combined heat and power plant
-  Solar farms
-  Wind farms
(project development phrase)

Product:

-  Electricity
-  Steam & hot water
-  Cooling water
- By-Product**
 -  Ash
 -  Construction Material

Customer:

- Power Grid
- Industrial factory
- Commercial area
- Resident/Community



Contractor:

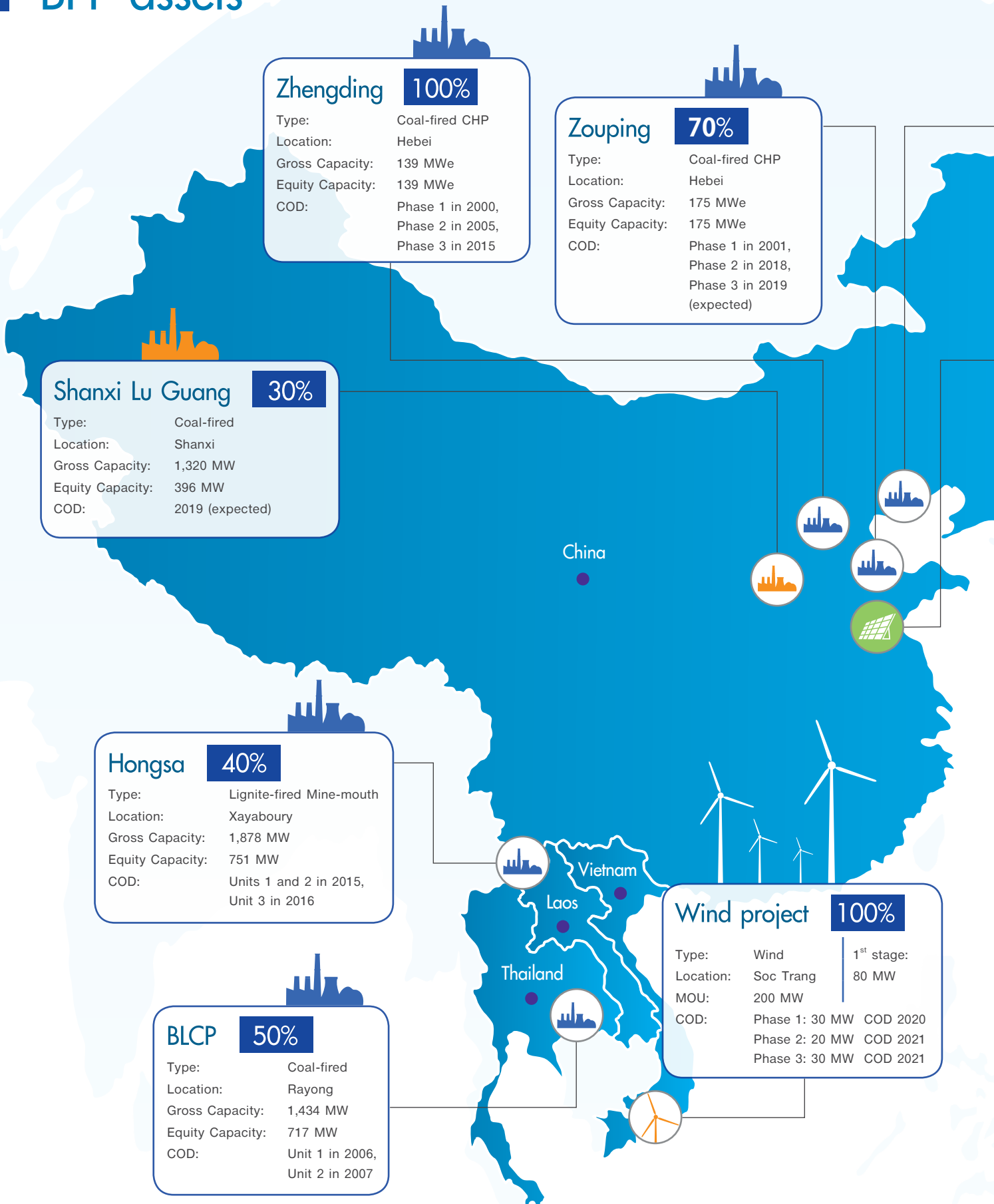
Operation & Maintenance (O&M) Contractor

Maintenance and Services Contractor

Engineering, Procurement and Construction contractor



BPP assets



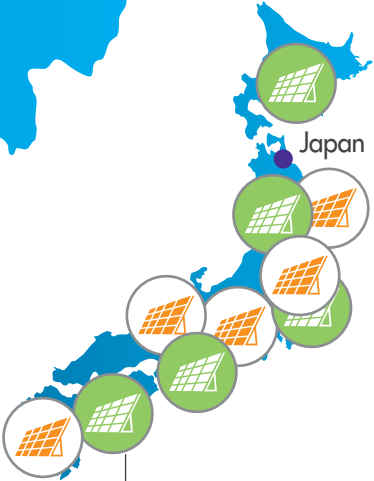


Luannan **100%**

Type: Coal-fired CHP
 Location: Hebei
 Gross Capacity: 175 MWe
 Equity Capacity: 175 MWe
 COD: Phase 1 in 2001,
 Phase 2 in 2018,
 Phase 3 in 2019

China Solar **100%**

Type: Solar
 Location: Shandong, Zhejiang
 Gross/Equity Capacity:
 30 MW (Jinshan)
 20 MW (Huineng)
 20 MW (Haoyuan)
 20 MW (Huien)
 50 MW (Dayuan)
 10 MW (Xingyu)



Japan Solar **40 - 100%**

Type: Solar
 Gross Capacity: 358 MW
 Equity Capacity: 233 MW
 COD: 2013-2023 (expected)

Pipeline

Type: Conventional/Renewable
 Location: Japan, China, SE Asia

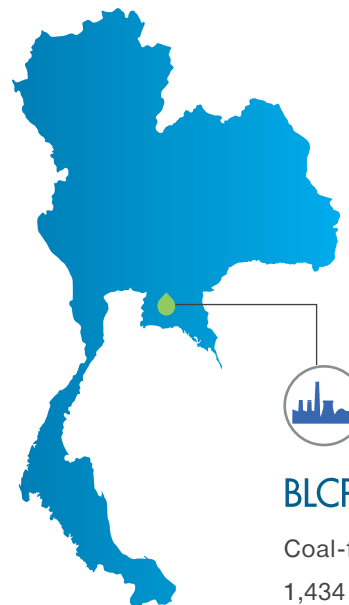
-  Coal-fired Power Plant
-  Solar Farm
-  Wind Farm
-  Asset Under Development

Banpu Power Business



Thailand

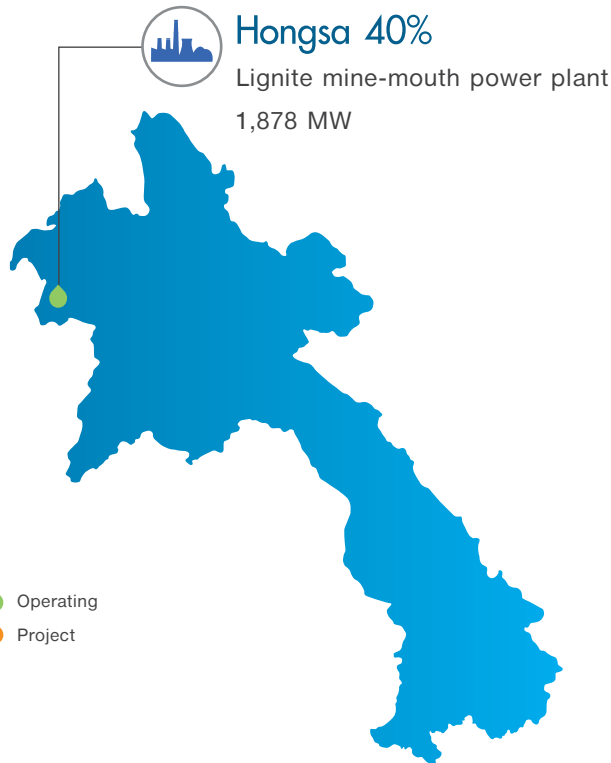
Banpu Power Public Company Limited holds 50 percent of paid - up capital in BLCP Power Limited, one of the large Independent Power Producers (IPP) in Thailand. BLCP is a 1,434 MW coal-fired power plant located in the Map Ta Phut Industrial Estate, Rayong Province. Using high quality bituminous coal imported from Australia as a fuel, the BLCP's two power stations have a power generation capacity of 717 MW each. BLCP has signed the Power Purchase Agreement (PPA) with the Electricity Generating Authority of Thailand (EGAT) since its second unit commenced a commercial operation, with the contract term of 25 years. Starting construction in August 2003, the BLCP's first and second units commenced commercial operations in October 2003 and February 2006, respectively. Presently, BLCP Power Plant has reached the 11th year operation.



● Operating
● Project

BLCP 50%

Coal-fired power plant
1,434 MW



The Hongsa Power Plant, located in Hongsa District, Xayaburi Province, is a lignite mine-mouth power plant with an installed power capacity of 1,878 MW. The plant consists of three power units with a generation capacity of 626 MW each. The first unit commenced its commercial operation on 2nd June, 2015 while the second and third units started commercial operations on 2nd November 2015 and March 2016, respectively.



- | | |
|-------------------|-----------|
| 1 Luannan | 5 Jinshan |
| 2 Zhengding | 6 Huineng |
| 3 Zouping | 7 Haoyuan |
| 4 Shanxi Lu Guang | 8 Hui'en |
| | 9 Deyuan |
| | 10 Xingyu |

Lao People's Democratic Republic

The Company together with an affiliate of Ratchaburi Electricity Generating Holding Public Company Limited (RATCH) and Lao Holding State Enterprise (LHSE), a state-owned enterprise of Lao PDR, have jointly established Hongsa Power Company Limited (HPC) and Phu Fai Mining Company Limited (PFMC) with an aim to construct and operate the Hongsa Power Plant in Lao PDR with following objectives:

- ✓ HPC has received a concession from the Lao government for the right to develop, construct and operate the Hongsa Power Plant. The concession right has begun since November 2009 until the maturity date of 25 years from the commercial operation date of Hongsa Unit 3 in March 2016. The Company and RATCH each hold 40 percent of stakes while LHSE holds 20 percent of shares in HPC.
- ✓ The Lao Government has granted a concession to PFMC for the right to operate lignite coal mines. The Company and RATCH each hold 37.5 percent of shares while LHSE holds 25 percent of stakes in PFMC.

People's Republic of China

The Company has operated the Combined Heat and Power (CHP) plants as well as solar power plants in China as following details.

1. **Combined Heat and Power (CHP) Business:** The Company holds 100 percent of paid-up capital in Banpu Power Investment Co., Ltd. (BIC). BIC is registered in Singapore through Banpu Power International Co., Ltd. The Company has invested in three CHP plants in the north of China with a total power generation capacity of 323 MW, and a steam capacity of 808 tonnes per hour totaling 561 MWE. Details are as followings:

- 1 **Luannan CHP Plant (Luannan)** Located in Tangshan City, Hebei Province, Luannan is a CHP plant with an installed capacity of 125 MW and a steam capacity of 278 tonnes per hour, totaling 175 MWE.
- 2 **Zhengding CHP Plant (Zhengding)** Zhengding, located in Shijiazhuang City, Hebei Province, is the CHP plant producing power, steam, hot and chilled water. The plant has an installed capacity of 73 MW and a steam capacity of 370 tonnes per hour, totaling 130 MWE.
- 3 **Zouping CHP Plant (Zouping)** Zouping is located in Zouping County in Binzhou City, Shandong Province. It is the CHP plant with an installed capacity of 125 MW and a steam capacity of 670 tonnes per hour totaling 274 MWE (based on equity investment).

- 4 **Shanxi Luguang (SLG) Power Project** Banpu Power Investment Co., Ltd. (BPIC) has signed a joint-venture agreement for studying and jointly developing the SLG Power Project. SLG Power Project is BPIC's new thermal power plant with a production capacity of 1,320 MW. It is located in Changzhi City, Shanxi Province in China (about 3 kilometers from Gaohe Mine).

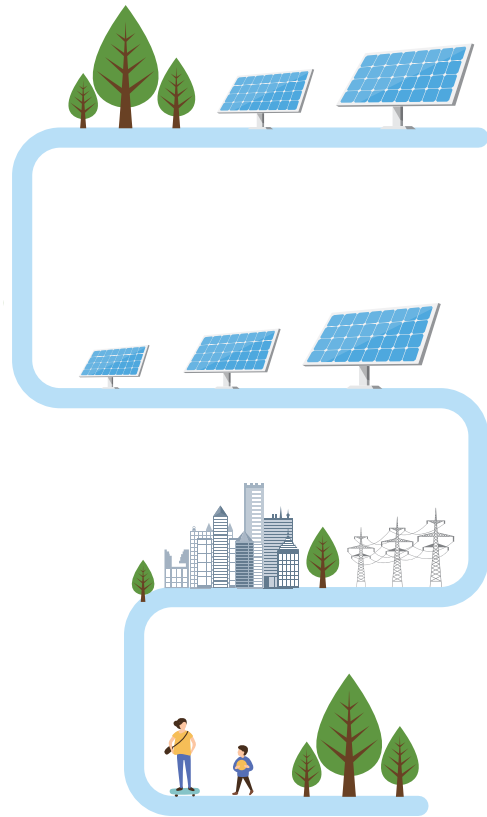
This joint-venture power project is owned by BPIC with 30 percent equity while Gemeng International Energy Co., Ltd. (Gemeng) and Shanxi Lu'an Mining Group (Lu'an) each hold 35 percent of shares. Lu'an is one of the joint-venture companies of Shanxi Gaohe Energy Company Limited, the shareholder and operator of Gaohe coal mine in Shanxi Province (Lu'an holds 55 percent stake while Banpu indirectly holds 45 percent shares in Gaohe coal mine.) SLG Project received final

approval from Shanxi Provincial Development and Reform Commission in November 2015. The project is under construction expected to commence its commercial operation by 2019 and will supply the power to Hebei Province.

Solar Power Plants

- 5 **Jinshan Solar Power Plant** is located in Weifang City, Shandong Province with a total generation capacity of 28.95 MWp. Jinshan started its commercial operation in September 2016.
- 6 **Huineg Solar Power Plant** is located in Weifang City, Shandong Province with a total capacity of 21.50 MWp. Huineg Project consists of two power stations, namely Huineg 1 with a production capacity of 10.43 MWp and Huineg 2 with a power capacity of 11.08 MWp. Huineg commenced its commercial operation in July 2016.
- 7 **Haoyuan Solar Power Plant** is located in Taian City, Shandong Province with a production capacity of 20 MWp. Haoyuan started its commercial operation in October 2016.
- 8 **Huie Solar Power Plant** is located in Weifang City, Shandong Province. Commencing its commercial operation in January 2017, Huie has a production capacity of 19.70 MWp.
- 9 **Deyuan Solar Power Plant** is located in Jiaxing City, Zhejiang Province. With a generation capacity of 51.64 MWp, Deyuan began its commercial operation in February 2017.
- 10 **Xingyu Solar Power Plant** is located in Taian City, Shandong Province. The plant has a production capacity of 10.30 MWp and commenced its commercial operation in July 2017.





Japan

The Company has expanded into the renewable energy sector since 2014 by investing in solar power projects in Japan. Presently, we have 13 solar power projects as followings:

1. **Olympia Solar Power Plant** has a generation capacity of 10 MW(AC). The Company has invested 40 percent in Olympia Solar Power Plant which operates five solar farms, namely:
 - 1 **Hitachi Omiya Solar Power Plant** is located in Ibaraki Province with an installed capacity of 2.00 MW(AC). The plant commenced its commercial operation in July 2013.
 - 2 **Hitachi Omiya Solar Power Plant No.1** is located in Ibaraki Province with a production capacity of 2.00 MW(AC). Its commercial operation started in January 2015.
 - 3 **Oseno Sato Katachna Solar Power Plant** is located in Gunma Province. It has a production capacity of 2.00 MW(AC) and commenced a commercial operation in January 2015.

4. **Sakura Solar Power Plant No. 1** is located in Tochigi Province. With a generation capacity of 2.00 MW(AC), The Sakura Plant started its commercial operation in December 2015.
5. **Sakura Solar Power Plant** is located in Tochigi Province. Commencing its commercial operation in October 2015, the plant has a generation capacity of 2 MW(AC).
2. **Hino Solar Power Plant (Hino)** is located in Shiga Province with a production capacity of 3.50 MW(AC). It started commercial operation in May 2016. The Company holds 75 percent of shares in Hino.
3. **Awaji Solar Power Plant (Awaji)** located in Hyogo Province, has an installed capacity of 8.00 MW(AC). Commercially operated in May 2017, the Company has a 75 percent investment in Awaji.
4. **Mukawa Solar Power Plant** has an installed production capacity of 17.00 MW(AC). It is located in Hokkaido Province and commenced a commercial operation in August 2018. The Company holds 56 percent of stakes.



5. **Nari Aizu Solar Power Plant (Nari Aizu)** has an installed capacity of MW(AC). Located in Fukushima Province, the plant started its commercial operation in December 2018. The Company has 75 percent investment.
6. **Yamagata Solar Power Project (Yamagata)** is under construction with an installed production capacity of 20.00 MW(AC). Yamagata project is located in Yamagata Province where the Company owns 100 percent of shares. It is expected to commence a commercial operation in 2019.
7. **Yubuki Solar Power Project (Yabuki)** is under development with an installed production capacity of 7.00 MW(AC). Located in Fukushima Province, the plant is expected to commence a commercial operation in 2019. The Company holds 75 percent of shares.
8. **Kurokawa Solar Power Project (Kurokawa)** is under development. With an installed capacity of 18.90 MW(AC), the plant is located in Miyagi Province and expected to start a commercial operation in 2019. The Company holds 100 percent of shares.
9. **Shirakawa Solar Power Project (Shirakawa)** is under development with an installed capacity of 10 MW(AC). The project is located in Fukushima Province and expected to commence its commercial operation in 2019. The Company owns 100 percent of stakes.
10. **Kesenuma Solar Power Project (Kesenuma)** is under development with an installed capacity of 20 MW(AC) Located in Miyagi Province, the project is expected to commence a commercial operation in 2019. The Company owns 100 percent of its shares.
11. **Hiroshima Solar Power Project (Hiroshima)** is under development with an installed capacity of 8.00 MW(AC). The project is located in Hiroshima Province and expected to start a commercial operation in 2019. The Company holds 100 percent of shares.
12. **Onami Solar Power Project (Onami)** is under development with an installed capacity of 16.0 MW(AC). Located in Fukushima Province, the project is expected to commence its commercial operation in 2020. The Company holds 75 of stakes.
13. **Yamagata Iide Solar Project (Yamagata Iide)** is under development and has an installed production capacity of 200.00 MW(AC). Located in Yamagata Province, the project is expected to commence its commercial operation in 2023. The Company has initially invested 51 percent in Yamagata Iide project and later received the right to increase another 34 percent of investment when the project started construction. The Company will invest the rest 15 percent when Yamagata Iide Project starts a commercial operation expected in 2023.





Vietnam

The Company has got approval for the plan to develop wind energy in Vietnam. The Investment Registration Certificate (IRC) was granted to Phase 1 with a production capacity of 30 MW from a total capacity of 80 MW. The commercial operation is expected to gradually start in 2020 – 2023.

The Investment Registration

Certificate (IRC) was granted to Phase 1 with a production capacity of 30 MW

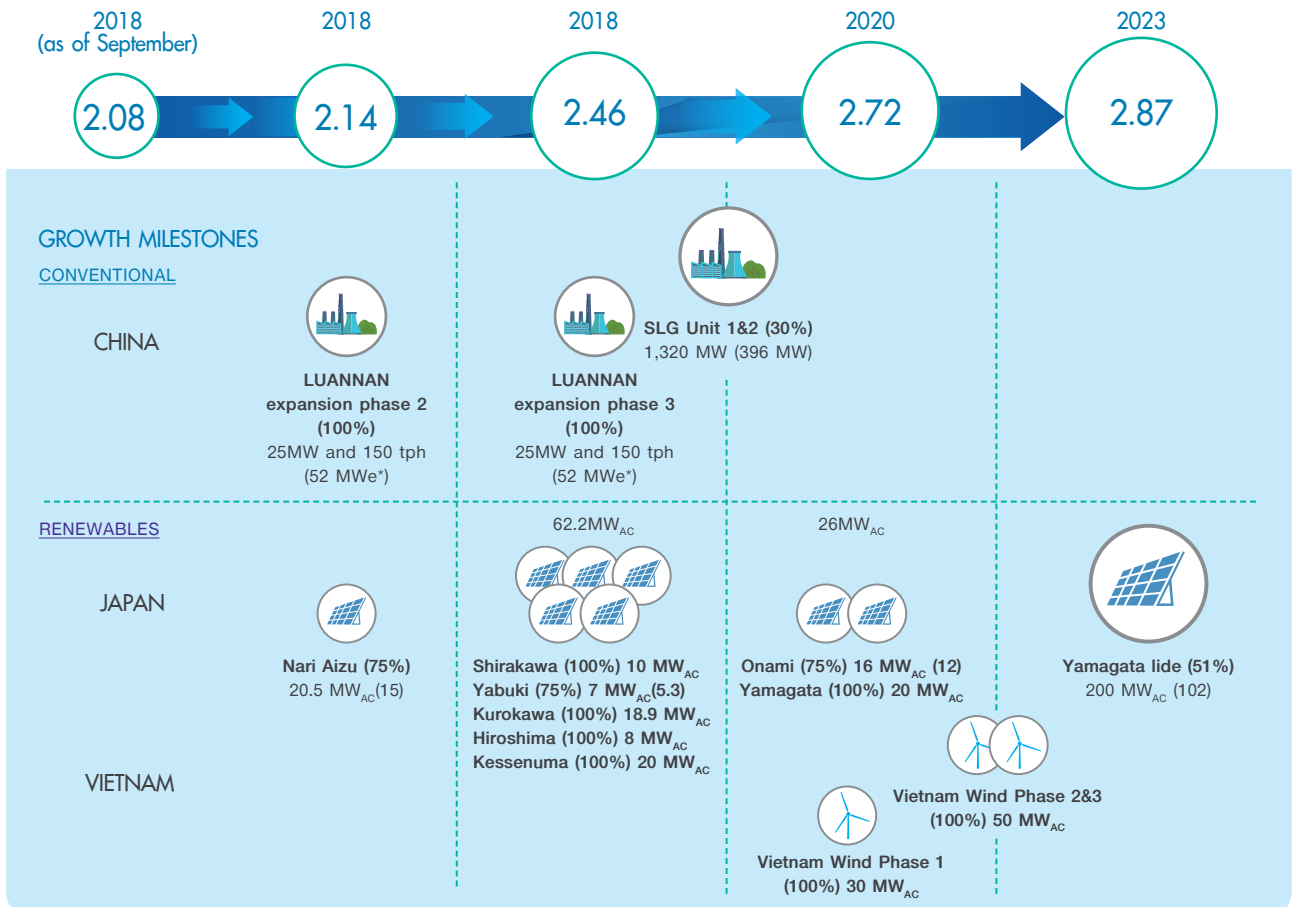


- Operatin
- Project



Power Projects: 801MWe* Pipeline To 2023

Total Perating Equity Capacity At Year-End (GWe)



As of September, 2018

Corporate Governance



The key responsibility of the Board of Directors is to oversee and govern the Company to reach its goals in accordance with the corporate governance framework and ethical principles, fully concerning on the economic, social and environmental impacts possibly arising from the operations, to ensure optimal benefits to all stakeholders and the sustainable development of the Company.

The Board of Directors has determined on operation management corresponding to the development goals of listed companies under the Securities and Exchange Commission, which encourages the Thai capital market to support innovation and businesses that create added values to the economy and society, as part of driving the sustainable development and increasing competitiveness and quality growth of the nation.



Driving the sustainable development
increasing competitiveness
and quality growth of the nation

The Chief Executive Officer is responsible for managing the Company's business operations including sustainability management to ensure that the Company is developed in tandem with social and environmental development.

In 2015, the Board of Directors established the "Practices of the Board of Directors of Banpu Power Public Company Limited" as a practice guideline for transparent management in accordance with the good governance principle regarding information disclosure and the Board's duty. Subsequently, an independent director shall hold office for a term not exceed nine years or three consecutive terms. In addition, the appointed directors shall hold a limit of five board seats in other listed companies in the Stock Exchange of Thailand, and the resolution shall be passed by the Board of Directors meeting, with a quorum of at least 2 out of 3 directors of the whole Board.

In addition, the Company has continuously reviewed and amended the Board practice in order to comply with regulations and correspond to changes on business characteristics. In 2018, the Board practice was improved by adding details about anti-corruption measures in the authorities and responsibilities of the Board of Directors.

Corporate Governance Structure

Banpu Power Plc.'s structure of the Board of Directors is a One Tier System with three sub-committees, namely, the Corporate Governance and Nomination Committee, the Audit Committee and the Compensation Committee.

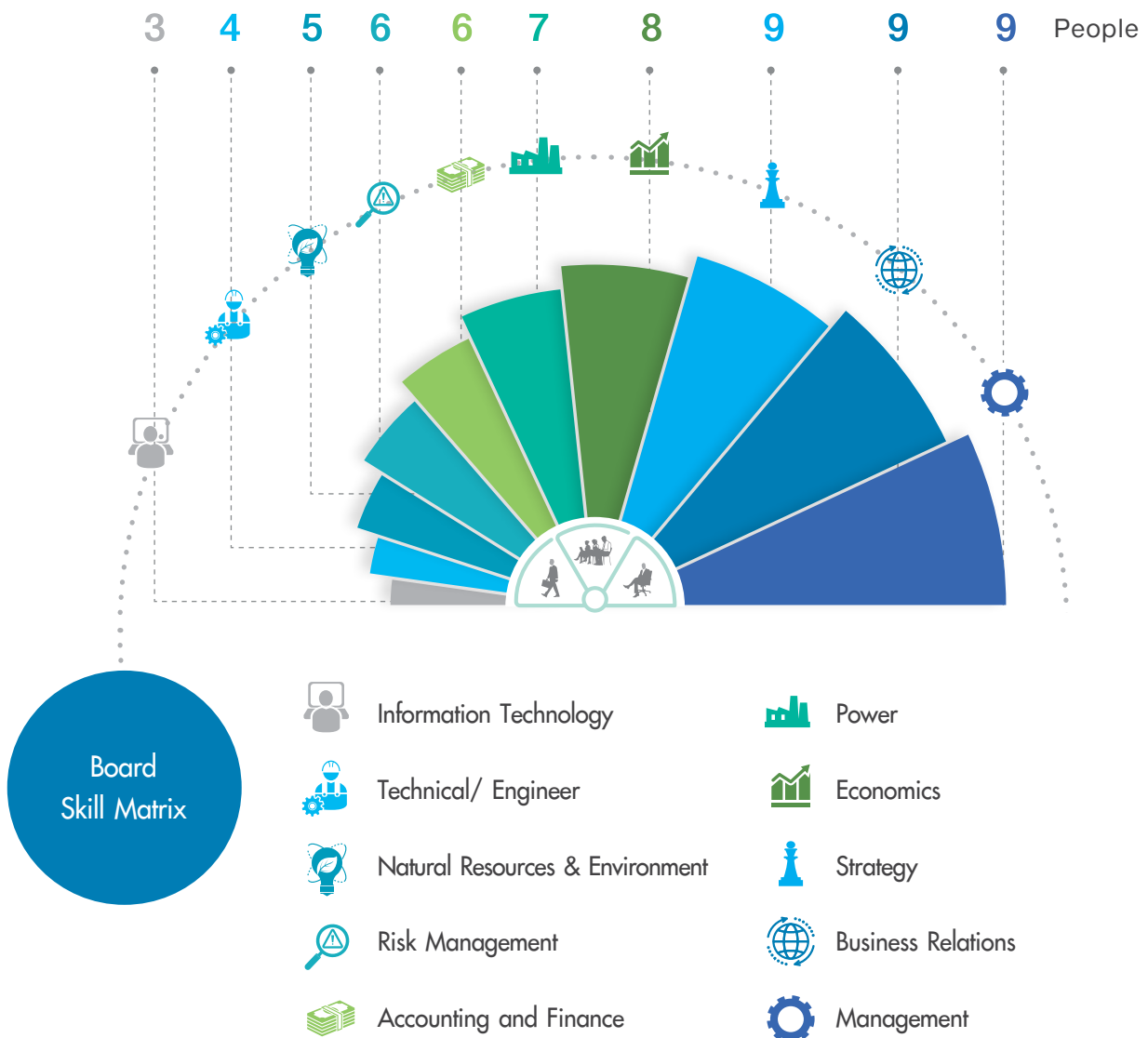
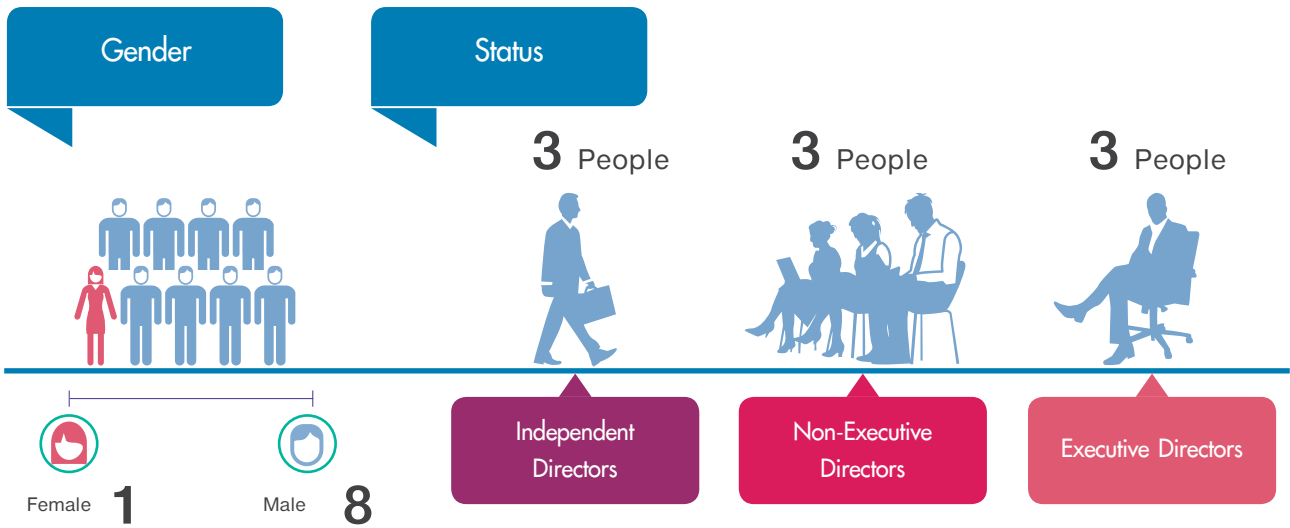
	The Corporate Governance and Nomination Committee	The Audit Committee	The Compensation Committee
Board of Directors	3	3	3
• Executive Directors	-	-	1
• Non-executive Directors	2	-	1
• Independent Directors	1	3	1
Related Charters	The Charter of the Corporate Governance and Nomination Committee	The Charter of the Audit Committee	The Charter of the Compensation Committee
Key Responsibilities	<ul style="list-style-type: none"> Determine the Corporate Governance Policy and the Code of Conduct. Monitor compliance with the policy and good governance practice framework. Recruit and nominate persons to be appointed as Directors, Chief Executive Officers and Executive Officers. Monitor a succession plan of senior executives. 	<ul style="list-style-type: none"> Review the financial report, internal control and risk management system as well as law and regulatory compliance. Consider action plans and performance review of the Internal Audit Office. Consider the disclosure of the Company's information in case of related party transactions and conflicts of interest. 	<ul style="list-style-type: none"> Recommend guidelines regarding management of compensation and other benefits for the Board of Directors, sub-committees and the Chief Executive Officer. Review the overall compensation and the structure of the salary and annual bonus.

Board of Directors Nomination

Fully aware of the Board's significance and roles in the Company's sustainable growth, 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 as 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 Directors



Board Meeting Attendance

In the previous year, Directors attended the Board of Directors meetings and 3 sub-committee meetings as follows:

	Percentage of Meeting Attendance
The Board of Directors	95.37
The Compensation Committee	100
The Corporate Governance and Nomination Committee	100
The Audit Committee	91.67



Board of Directors Performance Evaluation

To maximize the efficiency of the Board and to provide the Board members opportunities to periodically review their performances, obstacles and feedbacks, the Corporate Governance and Nomination Committee proposes performance evaluation criteria to the Board of Directors for approval. The annual performance evaluation covers the Board as a whole, sub-committees

and individual directors. Recommendations and results from the evaluations are used for improvement of the Board's performance to ensure greatest benefit to the Company in the future. In the previous year, the Board's satisfaction has been found in all criteria of the performance evaluation and results of the evaluation are as follows:

Board/Committee	Average Score (from 5)	Result
Board of Directors	4.81	Very Good
Sub-committees	4.79	Very Good
Individual Directors	4.81	Very Good

Competency Development of the Board of Directors

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

Program	Organizers	Number of Directors Attending
IT Governance (ITG) Class 7/2018	Thai Institute of Directors (IOD)	1
Advance Audit Committee Program (AACP) Class 29/2018	Thai Institute of Directors (IOD)	1
Director Certification Program (DPC) Class 254/1018	Thai Institute of Directors (IOD)	1
Knowledge Sharing : BPP Assets Management & Reporting	Banpu Power Public Company Limited	3
Knowledge Sharing : BPP Risk Management & Reporting	Banpu Public Company Limited	3
Knowledge Sharing : Insurance for Power Business (Assets)	Banpu Power Public Company Limited	3

Significant Policy and Practice that has been announced/reviewed in 2018



Sustainable Development Policy

The Company announced the sustainable development policy as a major framework for operations by emphasizing on growth and increasing competitiveness as well as building sustainable values for all stakeholders, equally.



Environment Policy

The Company announced the environmental policy by focusing on three key elements:

- 1) Reducing environmental impacts
- 2) Improving environmental quality with operational standards, technology and conservation
- 3) Efficiently consuming resources.



Climate Change Policy

The Company announced the climate change policy. Realizing that its businesses have been involved with greenhouse gas emissions, the Company; therefore, focuses on participating in mitigating climate change issues by reducing greenhouse gas emissions with high-efficiency technology to get more power supply from renewable energy including creating self-potential and stakeholders in adjusting to climate change.



Water Policy

The Company announced the water policy since water is an important raw material for power generation by the thermal power plants and the combined heat and power plants which may affect the consumption of water resources of people in the area. Therefore, the Company, especially, focuses on water conservation and management.



Occupational Health and Safety Policy

The Company announced the occupation, health, and safety policy in order to have a framework for the management of occupational and safety risks, legal compliance, safety awareness, and safety culture cultivation throughout the organization.



Community Development Policy

The Company announced the community development policy as an operational framework emphasizing on community engagement, human right respect, energy conservation, environmental protection, and employee's participation in community development.



Business Continuity Policy

The Company announced the business continuity policy in preparation for any crisis arising from natural disasters or other events. During the crisis, the Company would be able to recover necessary activities to deliver products and services to stakeholders in an appropriate period of time, whereas, the internal and public communication is effectively managed.




Human Right Policy

The Company announced the human right policy as a framework for human rights operations with stakeholders and involved parties. The preventive measures for human rights violations have been created so that all stakeholders including employees, ethnicities, minorities are treated equally by respecting to their differences. This includes an employment of unlawful labors.



Challenge and Opportunity

Countries	Challenges and Opportunities	Banpu Power' Strategies
		
<p>Conventional Power Business</p>		
<p>Thailand</p>	<ul style="list-style-type: none"> • According to Thailand's new Power Development Plan for 2018-2037 (PDP 2018), a proportion of power production capacity still mainly relies on natural gas and promotes renewable power generation. A use of coal as a fuel, however, will be reduced. • An increase in captive power producers, including an Energy Saving Plan has led to a more decreasing demand for electricity in the system. • The environmental awareness has resulted in an improvement of laws and standards to be more strictly. 	<ul style="list-style-type: none"> • Monitoring the governmental policies and other related organizations to assess the competitive advantages and the readiness for participating in various governmental projects. • Improving power plant efficiency and equipment maintenance to regularly reduce environmental pollution.
<p>Lao PDR</p>	<ul style="list-style-type: none"> • The Lao Government focuses on reforming the country to become the ASEAN energy source (Battery of ASEAN) and being an important electricity exporter of the region. • An urbanization development and a continuous improvement of infrastructures in the country. 	<ul style="list-style-type: none"> • Studying on details and impacts of policy and regulatory changes by relevant government agencies, including seeking investment opportunities. • Focusing on promoting community participation in the area in parallel with improving living standards of local people.
<p>China</p>	<ul style="list-style-type: none"> • The growing manufacturing and service sectors has affected the economic growth and the demand for electricity in each locality. • Adjustment of standard energy tariff prices in each province reflects the fuel costs and more strictly environmental quality standards. 	<ul style="list-style-type: none"> • A readiness to adjust sales of electricity, steam, hot water, and chilled water either in the summer season or according to market conditions, including a plan to expand the power generating capacity in preparation for the power plant's availability for production and supply of both power and steam. • Assessing the tariff rate impacts according to a purchase agreement specified with customers, and considering the new rates corresponding to the changing fuel costs.



Renewable Energy Business

China

- The policy to decrease subsidies for renewable energy in order to promote a project development using advanced technology and being independent from the government's capital incentives.

- Monitoring the governmental policies and other related agencies to assess the competitive advantages and investment opportunities.

Japan

- The country's energy management including the determination of energy policies is well defined and focusing on renewable energy generation.
- The feed in tariff (FIT) scheme, however, was adjusted by reducing the FIT rate and changing the solar power purchase policy to be more strictly.

- Collaborating with partners to seek investment opportunities for preparedness of evaluating investment opportunities and project development.
- 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.



Businesses under feasibility study and project development

Vietnam

- The clarity in energy management with a plan to increase the proportion of domestic power capacity generated from coal and renewable energies including wind power, solar energy and biomass. Tariff (FIT) (Feed-in-tariff: FIT) The renewable power generation receives supports as a feed-in tariff (FIT) scheme offering guarantee purchase at a fixed price throughout the project's full life-cycle. However, such a FIT rate will be binding on the projects operated within the specified period. Construction delays may affect the success of the project.

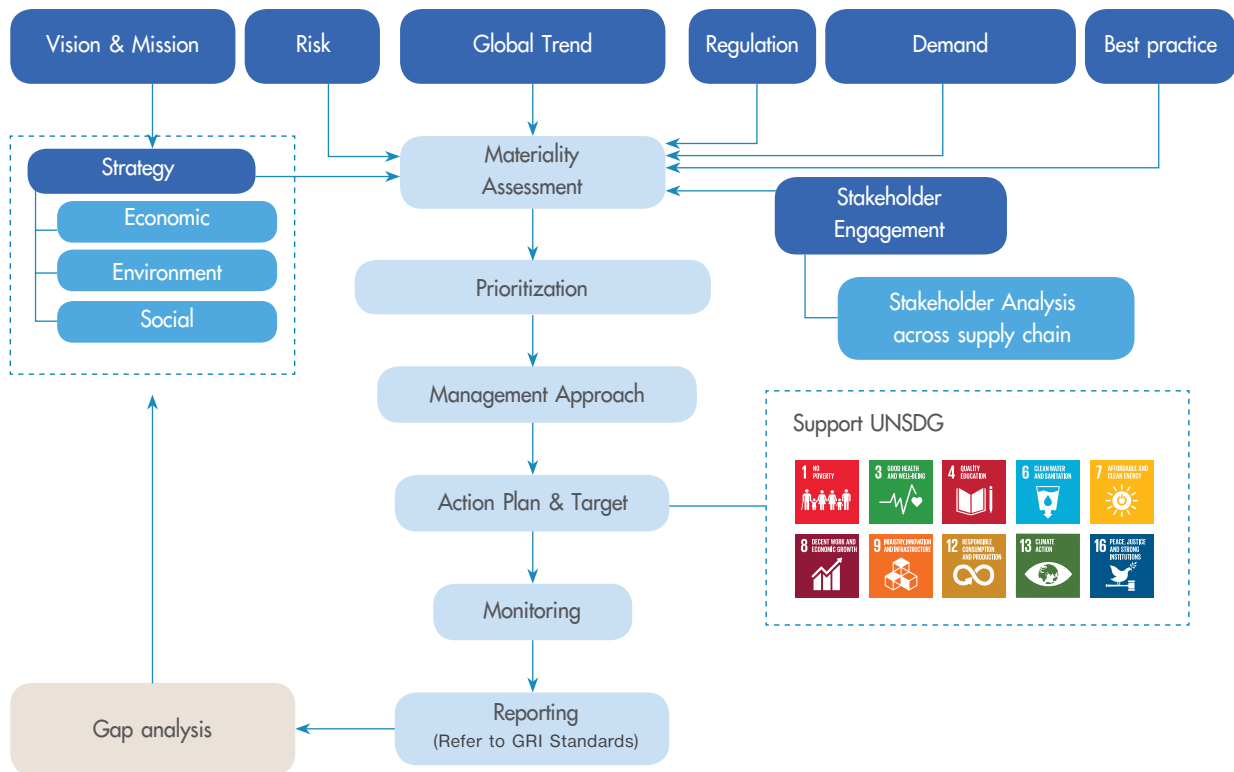
- Creating relationships with local government focusing on being a good partner who shares responsibilities with the government agencies in taking care and developing local communities in a sustainable manner.
- Studying primary information and thoroughly evaluating the investment feasibility by hiring consultants in various fields, such as engineering and environmental experts, legal counsels, financial advisors, and accounting and tax specialists, etc.

Sustainability Governance



Banpu Power Public Company Limited has dedicated to striving towards the vision to be “the pioneer in the power business in Asia” at the heart of appropriate innovation and technology. In order to deliver **affordable, reliable, and eco-friendly** energy creating values for economic development, 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.

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 economic, 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 enhancing their leadership and adaptive to change competencies including promoting a cross-section 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 resource 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 that are reliable and environmentally friendly with reasonable prices.

Creating Values for Stakeholders

- **Compliance with Laws:** 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, minimize resource consumption and waste generation, as well as promoting the efficient use of resource 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.

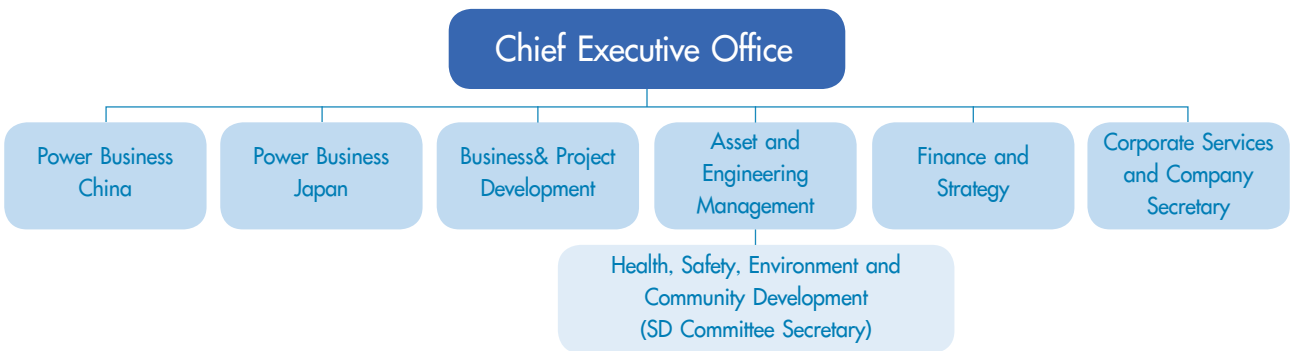
Sustainable Development Committee Structure

In 2018, 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/business unit with following responsibilities:

- Review ‘Banpu Power’s Sustainable Development’ policy, related policies, and corresponding governance and management systems to ensure license-to-operate and strengthen company’s competitive position,
- Review the performance of Banpu Power Group in regards to the health, safety, environment, economic, and social consequences of decisions and actions on stakeholders and on the reputation of the company,

- Encourage all functions in Banpu Power Group to develop policies, guidelines and practices congruent with Banpu Power’s Sustainable Development policy.

The policies and operating results must be considered and received feedbacks from the Board of Directors prior to implementing/practicing. Additionally, all employees and executives have a duty to achieve the corporate sustainability through performing their duties, creating a corporate culture including communicating the sustainability policies and operations to the joint venture companies, business alliances, trading partners, contractors, sub-contractors, customers and communities.



Evaluation/Assessment of Sustainability Performance

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.

1 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

3 The employee’s performance review
 has been conducted twice a year via the Key Performance Indicators (KPI) in two aspects-operating performance and behaviors relating to corporate culture promotions.

2 The performance appraisal of executive and senior executives is conducted twice a year based on the long-term target and the single year target.

4 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 tools including a sustainability assessment by Down Jones Sustainability Index (DJSI) and Carbon Disclosure Project (CDP), an annual sustainability assessment by the Stock Exchange of Thailand, etc.



In 2018 the company was listed in Thailand Sustainability Investment by Stock Exchange Thailand



Stakeholder Engagement



The Company emphasizes on stakeholder engagement both in all level of management and business unit level of every operations as all stakeholders participated/engaged in an importance role to the sustainable growth of the organization.

Since the company has invested in multiple operation in joint venture company form, therefore stakeholder engagement process are implemented through

communication between stakeholders carried by employees in each business units 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:

1 Inclusiveness
through the stakeholder engagement



2 Materiality
considering the issues that are significant to the Company and impacts on the stakeholders





3 Responsiveness
systematic management practice and transparent on performance disclosure

Stakeholder Analysis

- 1. Identify Stakeholders:** By considering various factors, for example, dependency, responsibility, influence, and other factors as appropriate.
- 2. Define levels of Company's impact on Stakeholders:** By considering economic, social, and environmental issues.
- 3. Define levels of Stakeholder's influences to the Company:** By considering the influence of finance, operation, regulation, reputation, and operational strategies.
- 4. Categorize Stakeholders:** To identify the stakeholders based on the level of impact and influence to the Company.
- 5. Prioritize Stakeholders:** Base on the appropriate engagement methods for each stakeholder.

All stakeholder's concerned issues in previous year are as follows:

Stakeholders	Stakeholder's Expectations	Sustainability Topics	Engagement and Communication Channel
Employee 	<ul style="list-style-type: none"> • Direction and sustainable growth of the organization • Business ethics and responsible business practices • Reasonable wages • Benefits • Performance Evaluation • Opportunities for career advancement and development • Knowledge development • Enhance participation of employees in decision-making and expressing opinion • Safe and healthy work environment • Work and Life Balance 	<ul style="list-style-type: none"> • Challenges and opportunities • Business management • Corporate Culture • Competency Development • Leadership Development • Succession Planning • Employee Engagement • Occupational Health and Safety 	<ul style="list-style-type: none"> • Employee engagement survey • Promote corporate culture in accordance to 'Banpu Heart' • Welfare/Benefit Committee • Occupational Health and Safety Committee • Innovation Committee • Activities to promote social responsibility • Develop a communication channel • Performance Evaluation • Activities to promote corporate culture • Publication of 'Banpu Insight' for internal communication • Publication of annual report and sustainability report
Government 	<ul style="list-style-type: none"> • Value creation for economic and social • Business Ethics • Compliance with laws and regulations • Maximization of natural resources • Supply chain management • Social and environmental impact management 	<ul style="list-style-type: none"> • Sustainability Governance • Business Ethics • Anti-corruption • Compliance • Process Improvement • Energy • Supplier Management • Contractor Management • Customer Management • GHG Emissions • Sulfur Dioxide • Oxide of Nitrogen • Particulate Matter/Dust • Water Discharge • Hazardous Waste • Spill • Compliance with environmental laws 	<ul style="list-style-type: none"> • Occasional visits and meetings • Performance Audit • Response to requests for information disclosure or report • Support to government initiatives and activities • Publication of annual report and sustainability report




Stakeholders	Stakeholder's Expectations	Sustainability Topics	Engagement and Communication Channel
Customer 	<ul style="list-style-type: none"> • Availability and Reliability • Reasonable price and quality • Business Continuity Management • Manage impacts of products and production processes towards social and environment 	<ul style="list-style-type: none"> • Customer Management • Business Ethics • Compliance with laws and regulations • Risk management • Business Continuity Management • System performance • Production and Innovation Development • Management of electricity consumption 	<ul style="list-style-type: none"> • 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 to requests for information disclosure or report • Customer satisfaction surveys • Develop variety of communication channel such as telephone or website
Supplier 	<ul style="list-style-type: none"> • Procurement and returns • Fair and transparent procurement process • Business opportunities 	<ul style="list-style-type: none"> • Supplier Management • Business Ethics 	<ul style="list-style-type: none"> • Provide procurement information through website or mobile application • Regular meeting with supplier
Contractor 	<ul style="list-style-type: none"> • Operation and Maintenance • Business opportunities 	<ul style="list-style-type: none"> • Contractor Management • Business Ethics 	<ul style="list-style-type: none"> • Regular meeting with contractor • Regular training to build contractor competency and work safely.
Community 	<ul style="list-style-type: none"> • Environmental Management 	<ul style="list-style-type: none"> • Sulfur Dioxide • Oxide of Nitrogen • Particular Matter/Dust • Water discharge • Hazardous waste • Spill 	<ul style="list-style-type: none"> • Community satisfaction survey • Communication channel through telephone and website • Regular meeting with community • Establish Community Consultative Community (CCC)
	<ul style="list-style-type: none"> • Community development project • Social Responsibility 	<ul style="list-style-type: none"> • Community Engagement • Community Development 	<ul style="list-style-type: none"> • Activities to improve community relation and engagement
	<ul style="list-style-type: none"> • Job and business opportunities 	<ul style="list-style-type: none"> • Community Engagement • Community Development 	<ul style="list-style-type: none"> • Occasional visit to company's operations
	<ul style="list-style-type: none"> • Environmental Management 	<ul style="list-style-type: none"> • GHG Emissions • Compliance with environmental laws • Community Engagement 	

Economic

Environment

Social

Additional Information

Stakeholders	Stakeholder's Expectations	Sustainability Topics	Engagement and Communication Channel
Investor Shareholder Business Partner and Financial Institute 	<ul style="list-style-type: none"> Financial performance, progress on project development and business growth Financial and Accounting policies Cash flow management Payment controls Accurate and complete financial data within the time period 	<ul style="list-style-type: none"> Financial performance and growth 	<ul style="list-style-type: none"> Annual General Meeting of Shareholders Board meetings at subsidiary and associated companies Opportunity Investment Roadshows such as quarterly meeting and visit for presentation and Analyst Meeting Presentation on Opportunity Day organized by Stock Exchange of Thailand Communication Channel Website
	<ul style="list-style-type: none"> Risk Management 	<ul style="list-style-type: none"> Risk Management Business Continuity Management 	
	<ul style="list-style-type: none"> Business Transparency 	<ul style="list-style-type: none"> Business Ethics Anti-corruption 	
	<ul style="list-style-type: none"> Innovation and operational excellence 	<ul style="list-style-type: none"> Reputation System Performance Production and Innovation Development 	
	<ul style="list-style-type: none"> Professional Board of Directors and Management Remuneration 	<ul style="list-style-type: none"> Corporate Governance 	
	<ul style="list-style-type: none"> Value creation for economic and social 	<ul style="list-style-type: none"> Sustainability Governance 	
Civil Society 	<ul style="list-style-type: none"> Value creation for economic and social 	<ul style="list-style-type: none"> Sustainability Governance 	<ul style="list-style-type: none"> Publication of annual report and sustainability report Occasional visit to company's operations
	<ul style="list-style-type: none"> Optimization of natural resources 	<ul style="list-style-type: none"> Process Improvement 	
	<ul style="list-style-type: none"> Environmental Management 	<ul style="list-style-type: none"> GHG Emissions Compliance with environmental laws Community Engagement 	
Media 	<ul style="list-style-type: none"> Inform on operational, progress on project development and performance 	<ul style="list-style-type: none"> Financial performance and growth Challenges and Opportunities 	<ul style="list-style-type: none"> Response the requests for information disclosure or reports Press conference Occasional visit to company's operations Website
	<ul style="list-style-type: none"> Fair, transparent and up-to-date disclosure of information 	<ul style="list-style-type: none"> Business Ethics 	
	<ul style="list-style-type: none"> Compliance with laws and regulations 	<ul style="list-style-type: none"> Compliance with laws and regulations 	
	<ul style="list-style-type: none"> Social Responsibility 	<ul style="list-style-type: none"> Community Engagement Community Development 	

Materiality Assessment

In the past year, the Company compiled all relevant materiality from internal and external stakeholders' participation according to various participatory channels, such as organizing meetings asking for opinions and workshops, etc. The data collected from these activities were assessed to find the materiality affecting the sustainable development. The corporate sustainability management framework has been set up in accordance with the Global Reporting Initiative (GRI) and the AA 1000 Account Ability Principle Standard (AA1000APS). In addition, the Company has developed strategies,

management framework, targets, and clear indicators for the significant materiality.

The Company has given top priority to a set-up of management framework since we have invested in many areas with different sustainability contexts. Furthermore, investing in a joint-venture company needs to be discussed and determine the appropriate scope of work with business partners. Additionally, the sustainability materiality from Banpu Group has also been important for a determination of our corporate sustainability management framework.



Materiality Assessment Procedures

1 Identifying Sustainability Topics

The Company has identified the sustainability materiality covering environmental and social aspects totaling 32 topics, which have been derived from stakeholders' participation and expectation.



2 Identifying Impacts on the Organization

The Company has assessed the degrees 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 Impacts on Stakeholders

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

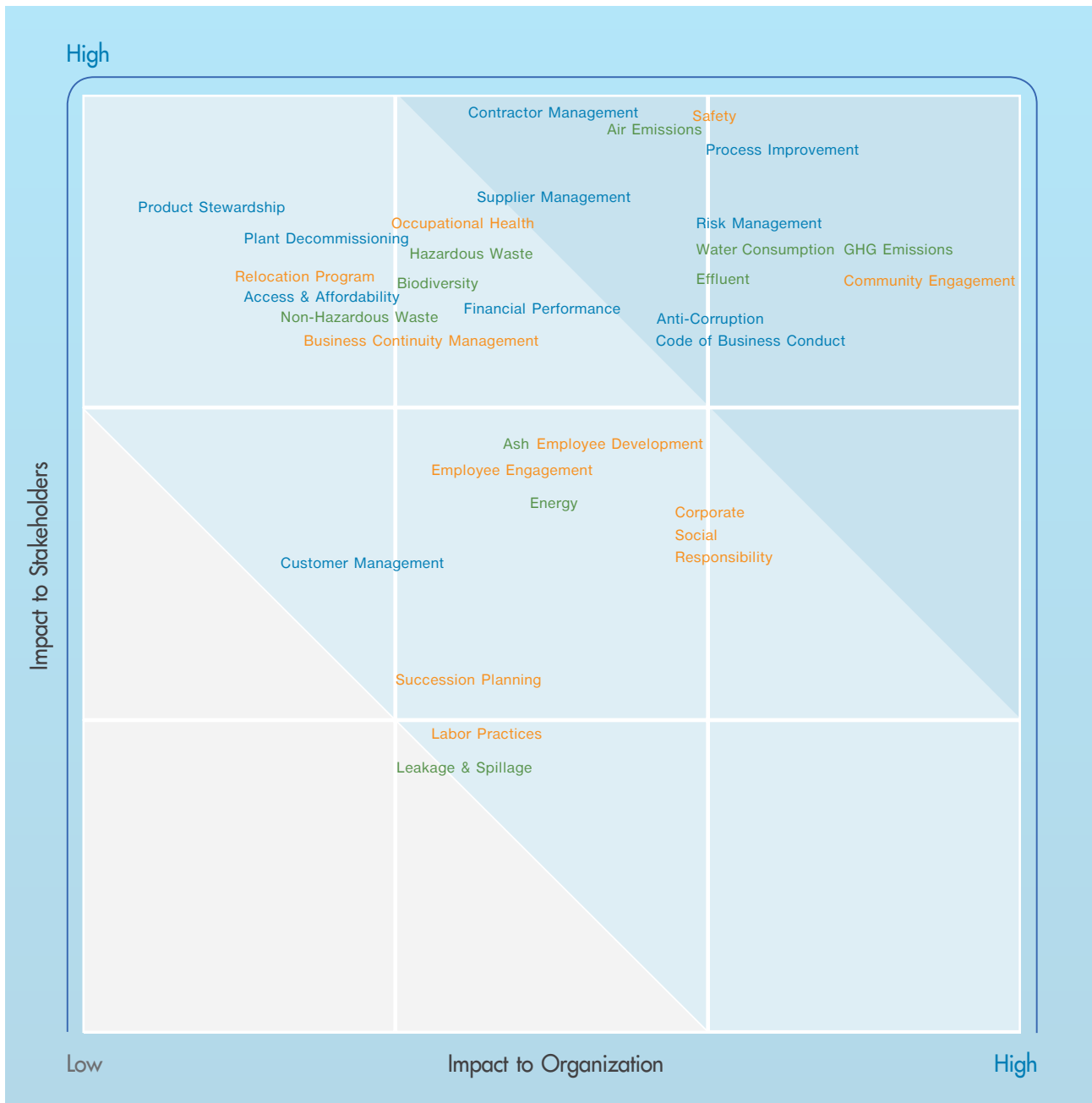


4 Prioritizing Topics

Each topic is screened and prioritized according to its impacts on the Company and the stakeholders in order to select the significant materiality to formulate strategies and operations for sustainability approved by the Sustainable Development Committee and the Board of Directors



Materiality Matrix



Economic











Environment



Social

Materiality Topics and Impact Boundary

Materiality Topic	Impact Boundary										Indicator and target (2018-2020)	Linkage with GRI Standards	Page	
	Internal				External									
	Banpu Power	Banpu	Subsidiary	Joint Venture/Business Partner	Community	Contractor	Creditor/Lender	Customer	Government/Regulatory Body	Shareholder/Investor				Supplier
Economic														
1. Business Ethics 	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> A Proportion of significant CG complaints resolved, compare to the materialized ones. No incident related to business ethics unethical issues. 	-	55
2. Anti-Corruption 	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> Significant corruption complaints that are resolved in appropriate timeframe. Zero tolerance against corruption. 	205-3	60
3. Risk Management 	✓	✓	✓			✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> The Risk Management System covers all business entities in which the Company has invested. 	-	69
4. Process Improvement and Innovation 	✓	✓	✓	✓		✓					✓	<ul style="list-style-type: none"> A continuous increase of efficiencies and reliabilities of the production system. Increase employee's participation in the innovation program. 	EU10 EU11	78, 83
5. Contractor Management 	✓	✓	✓	✓		✓			✓			<ul style="list-style-type: none"> Zero work-related fatalities of contractors. 	403-9 EU10	90
6. Supplier Management 	✓	✓	✓	✓							✓	<ul style="list-style-type: none"> The proportion of new suppliers selected under environmental and social criteria. The implementation of Supplier Code of Conduct covers all business units by 2020. 	308-1	86





Materiality Topic	Impact Boundary											Indicator and target (2018-2020)	Linkage with GRI Standards	Page
	Internal			External										
	Banpu Power	Banpu	Subsidiary	Joint Venture/Business Partner	Community	Contractor	Creditor/Lender	Customer	Government/Regulatory Body	Shareholder/Investor	Supplier			
Environment														
7. Air Emissions 	✓	✓	✓	✓	✓				✓			<ul style="list-style-type: none"> Air emissions from stack are better than standards or regulatory requirements. 	305-7	114
8. Effluent 	✓	✓	✓	✓	✓				✓			<ul style="list-style-type: none"> Effluent quality are better than standards or regulatory requirements. 	303-4	120
9. Greenhouse Gas (GHG) Emissions 	✓	✓	✓	✓	✓			✓	✓			<ul style="list-style-type: none"> Reducing 15% GHG emissions intensity per unit of product by 2020 against the 2012 baseline by 2020. A proportion of renewable energy production capacity is not less than 20% by 2025. 	305-1 305-2 305-4	100
10. Water Consumption 	✓	✓	✓	✓	✓				✓			<ul style="list-style-type: none"> Decrease water intensity per unit of production 	303-3	120
Social														
11. Safety 	✓	✓	✓	✓		✓	✓		✓			<ul style="list-style-type: none"> Zero fatalities for employees, contractors, and others involved with the Company's operations. Decrease Lost Time Injury Frequency Rate (LTIFR) 	403-9	144
12. Community Engagement 	✓	✓	✓	✓	✓				✓			<ul style="list-style-type: none"> No significant complaints from the community No incidents resulted from the community's complaints disrupt the businesses. No Human Rights incident 	413-1	152

Banpu Power and Sustainable Development Goals

Banpu Power Public Company Limited aims to be a part in driving the United Nations Sustainable Development Goals (UNSDG) by delivering reasonable









price energy for economic development with reliable, trustworthy and environmentally friendly manner.

Alignments with UNSDGs are as follows:

Banpu Power	Sustainable Development Goals (SDGs) and target in 2030	Relevance and progress in the year 2018
<p>Business Ethics</p>   <p>Anti-corruption</p>  <p>Risk Management</p>  	<p>16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all</p> <p>16.6 Develop effective, accountable and transparent institutions at all levels</p> <p>8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value</p> <p>16.5 Substantially reduce corruption and bribery in all their forms</p> <p>12.2 By 2030, achieve the sustainable management and efficient use of natural resources</p> <p>12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment</p> <p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</p>	<p>The Company has conducted its business adhering to good corporate governance and business ethics. It strictly complies with all laws and regulations. These include the use of good operating standards at the international level, the promotion of transparency and equality from the executive level to the employees.</p> <p>In the past year, none of complaints on corporate governance was found. Read more about previous performance on the topic of “Corporate Governance.”</p> <p>The Company has assessed the risks on corruptions and announced its intention to fight against any forms of corruptions as well as communicated to employees and the public.</p> <p>In the previous year, the Company did not find any complaints about corruptions. Read additional information on the topic of “Anti-corruption.”</p> <p>The Company has applied a risk management system across the entire organization to monitor and assess risks effectively. Risks on using raw materials for production, environmental and social management, and climate change have already been included in the Company’s risk management system.</p> <p>Read more about past operational information on the topics of “Risk Management, Water Resource Utilization and Water Discharge, Greenhouse Gas Emission, Air Quality Occupational Health and Safety and Business Continuity Management.”</p>



Banpu Power	Sustainable Development Goals (SDGs) and target in 2030	Relevance and progress in the year 2018
<p>Process Improvement and Innovation</p> 	<p>7.1 By 2030, ensure universal access to affordable, reliable and modern energy services</p> <p>7.2 By 2030, increase substantially the share of renewable energy in the global energy mix</p> <p>7.3 By 2030, double the global rate of improvement in energy efficiency</p>	<p>The Company has put great emphasis on promoting innovation and continuous improvement through employee feedbacks to be presented and considered prior to practical actions. In addition, the ideas are exchanged within the organization via knowledge management and the annual Innovation Conference.</p> <p>Furthermore, the Company continues increasing its investment in renewable energy as part of delivering clean energy for development.</p> <p>Read more about past operational details on the topics of “Production Process Development and Innovation, Energy Consumption, and Climate Change.”</p>
<p>Greenhouse Gas Emission</p> 	<p>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</p> <p>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<p>To be part of problem solving on climate change, the Company has increased the proportion of its investment in renewable energy, improved production procedures by reducing energy consumption, and decreased GHG emissions. Moreover, the Company has prepared for any dangers and natural disasters by designing proper engineering system for each area. Business Continuity Management system has also been applied.</p> <p>Read more about past operational details on the topics of “Greenhouse Gas Emission, Energy, and Business Continuity Management.”</p>
<p>Air Quality</p>   	<p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p> <p>9.4 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</p> <p>12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment</p>	<p>The Company has attached importance to air quality control to meet design standards and comply with laws and regulations. To create confidence among local communities, the real-time monitoring system has been employed at the stack area and nearby communities. As China has continuously issued the air quality improvement regulations, the Company has further prepared and studied for air quality improvement. Last year, the air quality released met a standard level. All of the Company’s coal stockyards in China were also built in a closed system.</p> <p>Read more about past operational details on the topic of “Air Quality.”</p>



Banpu Power	Sustainable Development Goals (SDGs) and target in 2030	Relevance and progress in the year 2018
<p>Water Resource Utilization</p> 	<p>12.2 By 2030, achieve the sustainable management and efficient use of natural resources</p>	<p>The Company has realized the importance of efficient water consumption as water is a key raw material in cooling system and boilers in the power plants. The goals are to optimize water reuse, reduce leakage in the system and control water quality in order to decrease water drainage.</p> <p>Read more about past operational details on the topic of “Water Resource Utilization and Water Discharge.”</p>
<p>Water Discharge</p>   	<p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p> <p>6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes</p> <p>14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution</p>	<p>The Company has set a goal to minimize wastewater as well as control the quality of drained water which has to comply with laws and regulations. Additionally, the corporate social responsibility activities have been implemented together with local communities to protect and restore the ecosystem.</p> <p>Read more about past operational details on the topic of “Water Resource Utilization and Water Discharge.”</p>
<p>Occupational Health and Safety</p>  	<p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p> <p>8.8 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</p>	<p>The Company aims to establish a safety environment and culture in a workplace in order to ensure employees’ occupational health and safety. The goals include zero accidents, zero deaths, and zero injuries.</p> <p>Read more about past operational details on the topic of “Occupational Health and Safety.”</p>
<p>Community Engagement and Development</p>  	<p>1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day</p> <p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p>	<p>The Company has put top emphasis on receiving any opinions and complaints possibly caused by environmental, health and safety management. Contact channels therefore are available for any complaints at a production unit and central office.</p> <p>The Company also wishes to be part of local community development in a poverty area. To generate incomes and better living, the Company has promoted knowledge on increasing productivity and supported infrastructures for communities. The community development projects have been operated under a concept of self-reliance and sustainability of local communities.</p> <p>Read more about past operational details on the topic of “Community Engagement and Development.”</p>

Economic



Environment

Social

Additional Information

Banpu Power	Sustainable Development Goals (SDGs) and target in 2030	Relevance and progress in the year 2018
<p>Contractor Management</p>  	<p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p> <p>8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors</p> <p>8.8 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</p>	<p>Since construction and production contractors play a vital role in achieving financial, production and business expansion goals, the Company has placed importance on the constructors' safety, equivalent to its employees. To prevent accidents in a workplace, the Company has set a recruitment procedure, evaluation, safety training and motivation for the contractors prior to starting the work. Consequently, the contractors are required to comply with the labor laws.</p> <p>Read more about past operational details on the topic of "Contractor Management."</p>



Banpu Power	Sustainable Development Goals (SDGs) and target in 2030	Relevance and progress in the year 2018
<p>Employee</p>  	<p>4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship</p> <p>4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations</p> <p>8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value</p>	<p>The Company has placed emphasis on developing employees' potential as well as encouraging professionalism for changes and leaderships. The individual potentiality development plan and cross functional work promotion have been implemented through the organizational culture so that employees learn to know each other.</p> <p>The Company has also focused on job evaluation and fair promotion in a workplace via human resources management system.</p> <p>Read more about past operational details on the topic of "Competency and Leadership Development"</p>



Economic

We are Energy



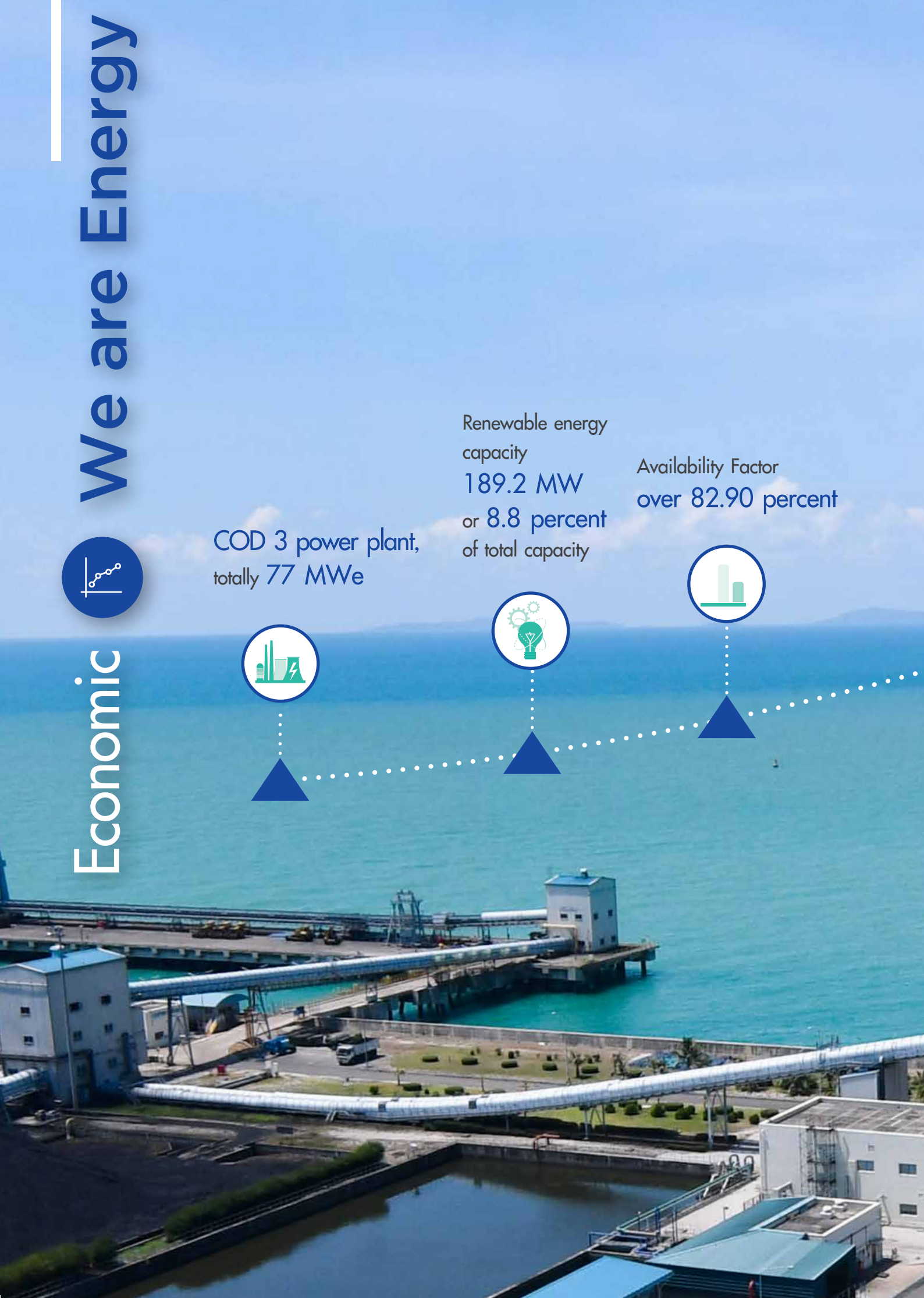
COD 3 power plant,
totally 77 MWe



Renewable energy
capacity
189.2 MW
or 8.8 percent
of total capacity



Availability Factor
over 82.90 percent



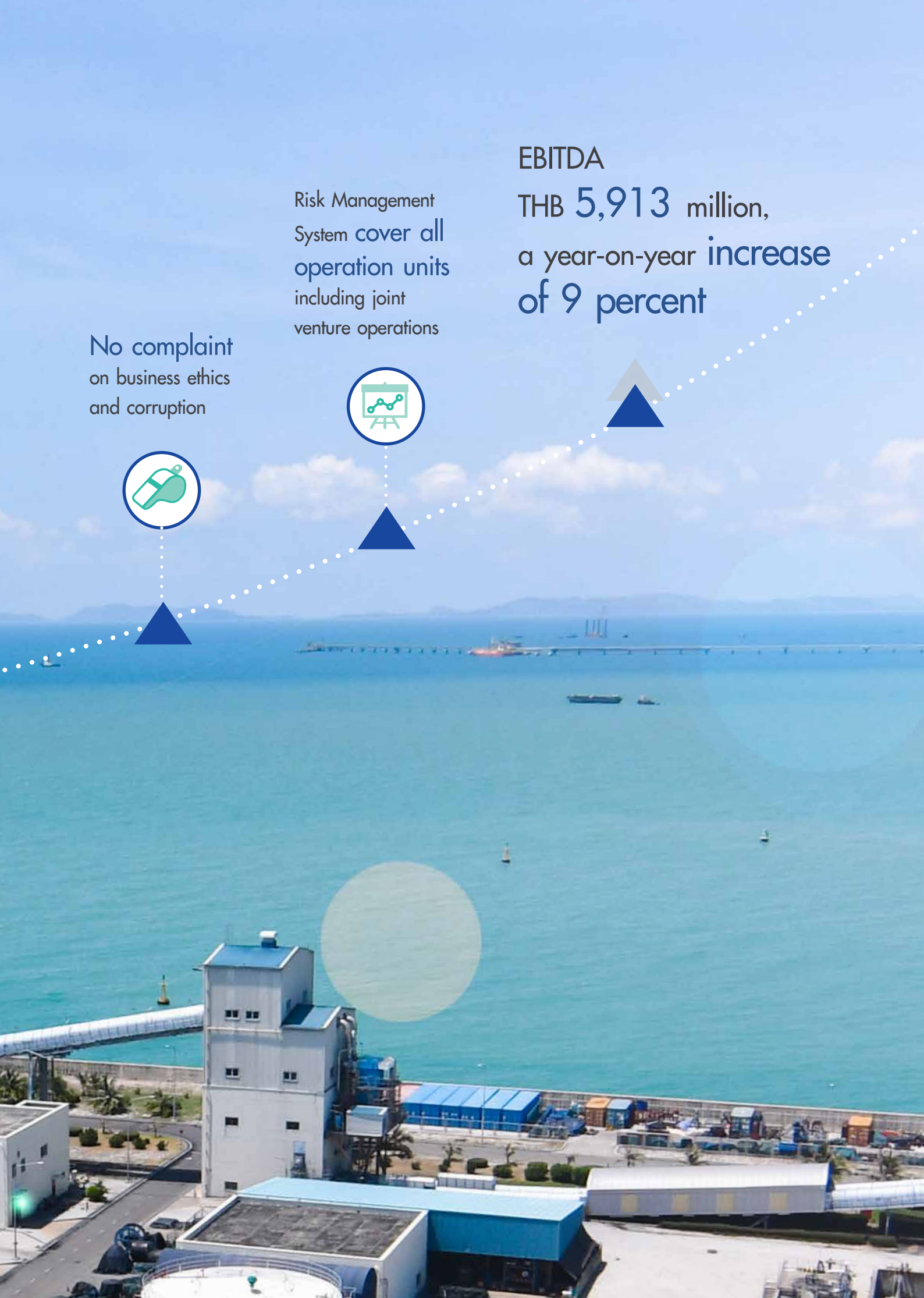
No complaint
on business ethics
and corruption



Risk Management
System cover all
operation units
including joint
venture operations



EBITDA
THB 5,913 million,
a year-on-year increase
of 9 percent





Financial Performance and Business Growth

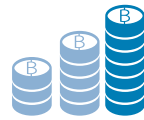
Financial Highlights



Total Assets

(THB million)

42,963	47,698	51,666
2016	2017	2018



Gross Profit and Gross Profit Margin

(THB million)

1,937	1,540	1,271
2016	2017	2018



Total Shareholder's Equity

(THB million)

37,881	39,785	41,181
2016	2017	2018



EBITDA

(THB million)

5,575	5,410	5,913
2016	2017	2018



Net Debt to Equity Ratio

(Times)

0.03	0.10	0.13
2016	2017	2018



Net Profit (Loss)

(THB million)

4,138	4,155	3,813
2016	2017	2018



Total Revenues

(THB million)

5,542	6,419	6,322
2016	2017	2018



Basic Earnings per Share

(THB/Share)

1.74	1.36	1.25
2016	2017	2018



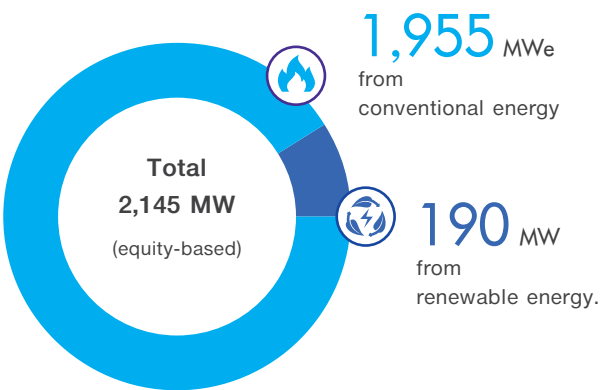
In 2018, Banpu Power reported Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) of THB 5,913 Million from its Operation, increasing by 9 percent from 2017, the majority of which came from significant profit increase of Hongsa Power Plant in Lao PDR. The power plant efficiently produced and

distributed electricity with impressive Equivalent Availability Factor (EAF) at 87 percent. This well demonstrates Banpu Power's competence profit generation from our power plants in Asia-Pacific countries.

The increased capacity in 2018 was a result of the successful start of the commercial operations i.e.



Our outstanding performance was our achievement to expand the total installed capacity to 2,145 MWe (equity-based), of which are



Banpu Power is stepping forward to achieve our goals with the 'Greener' strategy and always on the lookout for growth opportunities in high potential countries such as Vietnam, where Banpu Power's wind power plant project phase 1 is expected to achieve commercial operation date in 2020. With over two decades of well-rounded experience and expertise in energy business of our management and staff, robust financial status and strong relationship with Banpu Public Company Limited as well as good relations with government and private sectors in all locations where we have business operations.

At year end, Banpu Power owned 28 power plants and power plant projects in Thailand, Lao PDR, China, Japan, and Vietnam. The projects under construction and development, with an expected capacity of 724 MWe, include conventional power plant projects with the High Efficiency, Low Emissions (HELE) technology in China, namely the expansion of Luannan Combined Heat and Power (CHP) Plant Project Phase 3 and Shanxi Lu Guang Power Plant Project Phase 1 and 2. In addition to those, solar power plant project in Japan and a wind power plant project in Vietnam are among our renewable projects. All of them will gradually achieve commercial operation dates by 2023 and increase the total equity-based power generation capacity to 2,869 MWe.

Banpu Power places great importance on aligning our power generation and distribution businesses with global energy trends to ensure energy stability and environmental friendliness.

Total Equity income (Million Baht)



Developments in the past year



August



Banpu Power has diversified its investment into Vietnam's renewable energy focusing on wind-powered energy of total 80 MW capacity in Soc Trang Province. The project comprised three phases with the first phase of 30 MW capacity, the second phase of 30 MW capacity and the third phase of 20 MW capacity. The Company has received Investment Registration Certificate (IRC) from the Department of Planning and Investment (DPI) to develop the first phase of the project with 30 MW capacity. Banpu Power is conducting a feasibility study and expects to achieve Commercial Operation Date (COD) by 2020, while the remaining two phases expect to achieve COD by 2021.



Mukawa Solar Power Plant, Japan, achieved COD with a total capacity 17 MW, or 9.5 MW equity-based capacity



Banpu Power revitalized the Company's corporate identity, brand direction, and corporate culture to be in accordance with Banpu Public Company Limited. The revamped identity will reflect the Company as modernized, dynamic and constantly evolving and strengthening businesses in all countries where it operates to serve the needs of stakeholders.

November



The 2nd phase extension of Luannan Combined Heat and Power Plant, Hebei, China, achieved Commercial Operation Date (COD) with a total capacity of 25 MW electricity and 150 tons of steam per hour, or 52 MWe, increasing its total capacity to 175 MWe.

December



Nari Aizu Solar Power Plant, Japan, achieved COD with a total capacity 20.46 MW, or 15.35 MW equity-based capacity



Competitive Strategies

Thailand

Banpu Power has 50-percent shareholding in BLCP Power Plant, a major power producer who sells electricity directly to Electricity Generating Authority of Thailand (EGAT) with the capacity of 1,434 MW and 97-percent dispatch rate in 2018, reflecting the plant’s reliability in electricity generation and ability in operational readiness management.

Competitive Strategies

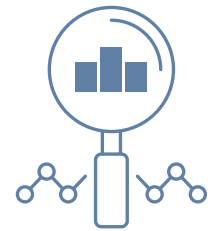
1. Maintaining Efficiency and Operational Readiness of Power Plants

BLCP periodically improves the efficiency of power plants and maintains readiness of equipment according to the maintenance plan to ensure the Availability Factor (AF) and Contracted Available Hours (CAH) in accordance with the power purchase agreement (PPA). In 2018, BLCP reported the Equivalent Availability Factor EAF of 89 percent.



2. Seeking Opportunities for Business Expansion

The Company has always been seeking for growth opportunities by aligning the plan to expand domestic power business with the national Power Development Plan for 2018-2037 (PDP 2018), which proposes to increase capacity from the Isolated Power Supply (IPS) groups and efficient energy-saving policies. The PDP 2018 will reflect in lower power demand than anticipated while new policy promotes power generation from renewables.



Banpu Power projected that development of new power plants would face higher competition in project bidding and in applying for electricity sale license. Accordingly, the Company has prepared competent and experienced employees from the Business and Project Development Department to monitor the policies of the government and related government agencies and evaluate the Company’s competitiveness. This business development team also prepares for the Company’s participation in the government’s project which allows private investment such as the Eastern Economic Corridor (EEC) and responds to the government’s promotion of the business sector’s role in the Independent Power Supply (IPS) project, which constitutes up to 14 percent of the country’s total generating capacity. Currently, the Metropolitan Electricity Authority and Provincial Electricity Authority are preparing for law amendment to allow customers to buy electricity directly from the private sector rather than to buy solely from the Electricity Generating Authority of Thailand.



The People's Republic of China

Banpu Power's CHP plants and solar power plants in China are considered having higher efficiency than normal power plants and complied with pollution control standard. Hence, they enjoy various supports from the Chinese government namely guaranteed electricity sales to local electricity authorities, sole rights to sell steam and heat in permitted zones, and local government subsidies.

Competitive Strategies

1. Cost and Efficiency Management

In 2018, the Chinese government announced the reduction in traffic and steam price to benchmark level in all provinces. Banpu Power has assessed and anticipated such impact by reflecting in power purchase agreements and adjusted the prices accordingly. For example, the Zouping CHP Plant had agreed to sell steam to customers at a reference price of CNY 125 per tonne, and if there is any change in the coal cost, plus or minus, for every CNY 0.01 per kilocalorie (tax and transportation cost inclusive), the price of steam 30 ANNUAL REPORT 2018 can be raised or lowered for CNY 5 per tonne. This risk management on the price fluctuation enabled Banpu Power to lessen the impact from higher fuel cost. The high global coal price situation effected the domestic prices in China as well as Banpu Power's operating results. However, the Company still maintained its profitability by improving production efficiency and strictly controlling the costs using the inventory management strategy to buy and stock up coal when coal prices decline to be used during coal prices increase. Banpu Power also follow its plan to expand capacity to respond to an increase in steam demand due to local economic growth.

2. Environmental Management

The Chinese government has a strict policy on environment and pollution control which restricts the use of coal as a major fuel in factories. Banpu Power uses highly efficient generation processes which comply with current environmental standards with regular maintenance of all equipment and machineries. It also has a plan to upgrade pollution control equipment to be able to meet future standards. Apart from that, Banpu Power monitors and assesses environmental impacts to ensure that its business operations are in full compliance with environmental laws, rules, and regulations. The Company has considered applying the latest technology called Ultra-Supercritical (USC) technology, High Efficiency, Low Emissions (HELE) technologies, in such new project as the Shanxi Lu Guang Power Plant to minimize environmental impacts to meet international standards. Such technology can trap sulfur dioxide, nitrogen oxide, carbon monoxide, and other pollutants before being released into the atmosphere.





Economic



Financial Performance and Business Growth

Environment



Social

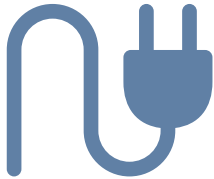


Additional Information



3. High Adaptability and Flexibility

The Company has dedicated team to closely monitor changes in market environment and align with business plan and operations to the market conditions or situations in order to create value from business opportunities as well as mitigate negative impacts. The Company is prompt to adjust the distribution of power, steam, hot and chilled water according to the factors affecting the demand as follows:



- Banpu Power would produce and distribute electricity, steam and hot water at full capacity during winter to respond to the seasonal demand.
- The Zhengding Combined Heat and Power (CHP) Plant would produce chilled water for sales during summer to generate more income and reduce the impacts from the seasonal decrease in electricity sales.

4. Service Quality and Stakeholder Relationship Management

The Company prioritizes the quality of products and services and assures readiness and security in generation and distribution of electricity and steam to respond to customer's needs at all times, especially the distribution of hot steam and water in wintertime, as well as maintaining a good relationship with customers on the basis of mutual trust and benefits. This has earned Banpu Power trust and confidence from customers. Relationship management with local government agencies and communities is on the basis of mutual benefits by providing basic utility services (electricity and steam) to local communities, building trust and equity as well as lending continued support to community. This has brought Banpu Power acceptance from local government agencies and communities as an exemplary local enterprise. Despite a setback from external factors, the Company still enjoys full support from local governments, for instance, financial subsidies or approval to raise steam prices when coal price increased. Apart from that, Banpu Power has continuously supported community activities and communicated with communities, leading to a good relationship between the two parties.

5. Seeking Opportunities for Business Expansion and Value Adding Activities

The Company puts greater emphasis more on investment in renewable energy to align with the government's policy to promote renewable energy. The Company also focuses on creating added value by expanding investment into related businesses while considering the costs of different fuels and appropriate technology. For example, the location of the Luannan CHP Plant is in the urban-industrial area, which gives it a strategic advantage to become a sole distributor of steam. Banpu Power is also considering expanding its customer base to new industrial areas to offer service of the rooftop solar power generation system. Apart from that, the Company is conducting a feasibility study for the development of the Company's existing land to develop the project that integrate biomass power plant with combined heat and power plants.

Lao PDR

Banpu Power owns 40 percent of the shares in Hongsa Power Company Limited which operates the Hongsa Power Plant (HPC), the only mine-mouth power plant in Lao PDR. The Hongsa Power Plant has a total capacity of 1,878 MW and a total equity-based power generating capacity of 751 MW. The power plant sells the majority of electricity solely to Electricity Generating Authority of Thailand under the Independent Power Producer (IPP) scheme and some of its output to Lao PDR.

Competitive Strategies

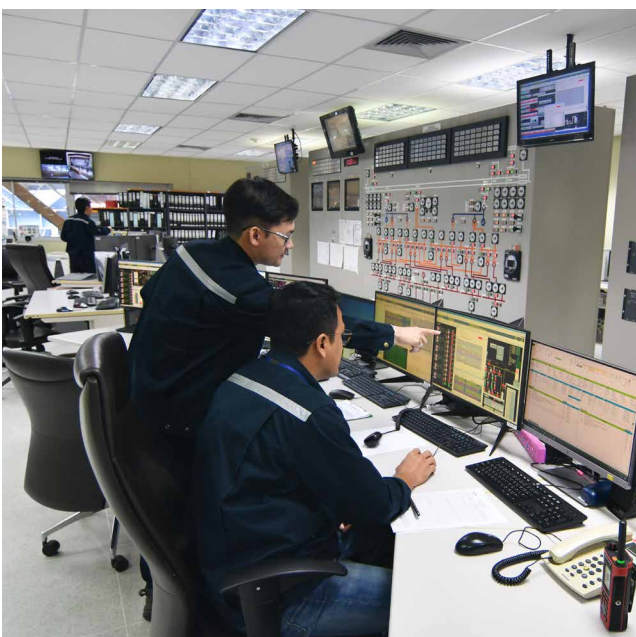
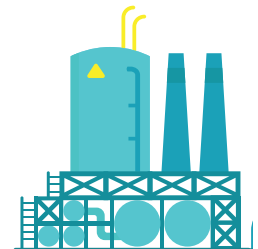


1. Operation Efficiency and Readiness Monitoring

HPC achieved commercial operation dates of all three production units in 2016, with 100-percent dispatch in 2018. This represents the operational stability and the low operation cost, the two important factors for the two countries' electricity system.

2. Managing Relationship with Local Government Agencies and Communities

The Company places importance on community development by promoting community engagement while improving the quality of life of people in the communities. Such development approach materializes into community development initiatives, for example, infrastructure development (water supply, electricity, and roads), prompt construction of houses for relocated people in appropriate areas, vocational training and promotion of local employment, contract for project design and equipment procurement.



3. Cost and Efficiency Management

The Company has improved efficiency and capacity readiness of the Hongsa Power Plant in producing and distributing electricity, thus, contributing to the better Equivalent Availability Factor (EAF) than the past year at 87 percent. Moreover, the power plant maintained readiness by stocking equipment parts for maintenance and keeping all equipment in full capacity, which ensures smooth power generation.

Japan

Banpu Power’s investment in solar plant projects in Japan has a total installed equity-based capacity of 37.5 MW from fully-operational plants and a 196.2-MW capacity from under-development power plants. The Company’s business expansion to Japan started from solar-powered electricity generation together with feasibility study and preparation for assessment of investment and project development opportunities. It focuses on teamwork and human resource management as well as nurturing relationship business partnership to seek significant opportunities for real growth in Japan’s renewable energy business. Government’s support and investment incentives from financial institutions enable Banpu Power to quickly expand its business in Japan.

Competitive Strategies

1. Capability in Investment Management

The Company has a strategy to collaborate with partners in seeking new investment opportunities as well as managing financial cost by tapping from several sources, especially from domestic financial institutions, to increase the capability and to achieve long-term investment goals.

2. Project Development

The Company closely monitors policy and regulatory changes of the Japanese government related to energy, with a specific team to follow up and study the changes in details as well as impacts on under-development projects to ensure that all projects achieve commercial operation dates as planned.



3. Seeking Opportunities for Business Expansion and Creating Added Value

Since Japan’s energy management is governed by clear energy policy, Banpu Power faces low investment risk because retail electricity prices of the Company’s solar power plants are guaranteed under the Feed-In Tariff (FIT) scheme. The Japanese government will announce a measure to reduce purchase price, The Company has thus adapted to change by bootstrapping project management through reduction of construction costs, improvement of major equipment efficiency and seeking long-term financial sources to obtain target return on investment. Additionally, The Company continually seeks investment opportunities in related businesses by building upon the existing power generation business to create added value, such as energy trading and retail electricity to expand business opportunities with retail customers.



Economic

Financial Performance and Business Growth

Environment

Social

Additional Information

Vietnam

Banpu Power has expanded investment in power business into the Socialist Republic of Vietnam since 2016 under an MoU signed with Soc Trang Province People's Committee to carry out a feasibility study of investment in a 200-MW renewable power plant. In 2018, The Company was awarded an Investment Registration Certificate (IRC) to set up a subsidiary company in Soc Trang, Vietnam. The Company has an experienced team with a good understanding of Vietnam's business environment to drive the existing project to achieve commercial operation date as planned as well as seeking more investment opportunities. The project phase 1 with 80-MW capacity is currently under feasibility study.

Competitive Strategies

1. **Managing Relationship with Local Government Agencies and Communities**

Banpu Power builds a relationship with local government agencies on the basis of understanding of social and cultural differences. The Company focuses on becoming a mutually responsible partner with government agencies to sustainably engage in local community development by providing continuous support for community activities.

2. **Project Development**

Banpu Power is fully aware of major factors contributing to an investment decision. That is why the Company always conducts preliminary and feasibility studies of every project. The Company seeks advice from experts in many fields such as engineering consultants, environmental consultants, legal consultants, financial consultants and accounting and taxation consultants in order to accurately evaluate feasibility prior to investment and to ensure compliance with regulations and investment conditions in Vietnam. In addition, the feasibility study helps monitor progress of project development and execution of each construction phase against the plan.



3. **Seeking Opportunities for Business Expansion and Creating Added Value**

Vietnam has enjoyed continuous growth rate in recent years and is expected to attain 6-7 percent of gross domestic product (GDP) in the next ten years. Such a high growth rate estimated implies an increase in power demand. Additionally, the government has a clear energy management plan to increase the portfolio of power generation from coal and renewable energy sources. The Company has seen these opportunities and decided to leverage its strengths in conventional and renewable power generation and fuel purchase capacity to seek investment opportunities in Vietnam.



Indicator

A proportion of significant CG complaints resolved, compared to the materialized ones.



Annual Target



All significant CG complaints were solved.



Strategy



Applying international criteria and domestic regulations to manage corporate ethics within the organization.



Performance



No CG complaint in 2018.



Significance and Reporting Boundary

Conducting business with honesty, transparency and accountability is a material issue interested by all stakeholders since these business ethics result in stakeholders' confidence. Not only making profits, the Company also operates its business by taking into account the best interests of stakeholders on economy, society and environment. This has driven the Company to achieve its short- and long-term goals with stability and sustainability. As a result, the Company emphasizes that executives and employees at all levels throughout the organization are obliged to comply with policies, best practices and standards used as its business mechanism. These include a strict adherence to business ethics, a continuous development of management systems and a pursuant of best practices. To effectively cope with future changes, the Company has strictly adhered to business ethics and continuously developed management systems as well as pursued best practices.

Management Approach

The Company commits to conducting its domestic and international businesses with professionalism and adhering to justices and integrity, including all types of anti-corruptions. It has applied international and domestic business standards and criteria to manage business ethics within the organization as following:

✓ CG ASEAN Scored Card, ASEAN Capital Market Forum

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

✓ The Securities and Exchange Act

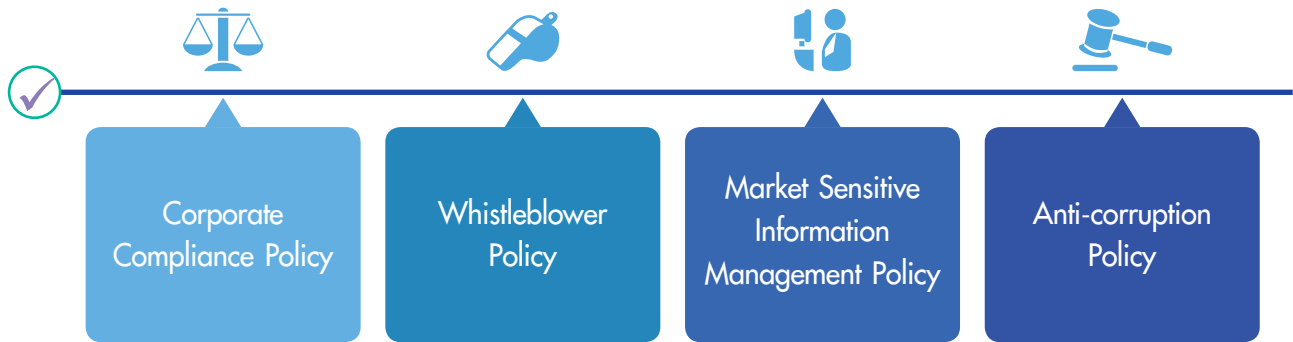
✓ Policy Statement on Code of Best Practices of Directors of Listed Companies

✓ The Principle of good corporate governance by the Stock Exchange of Thailand (SET) and the Securities and Exchange Commission (SEC)



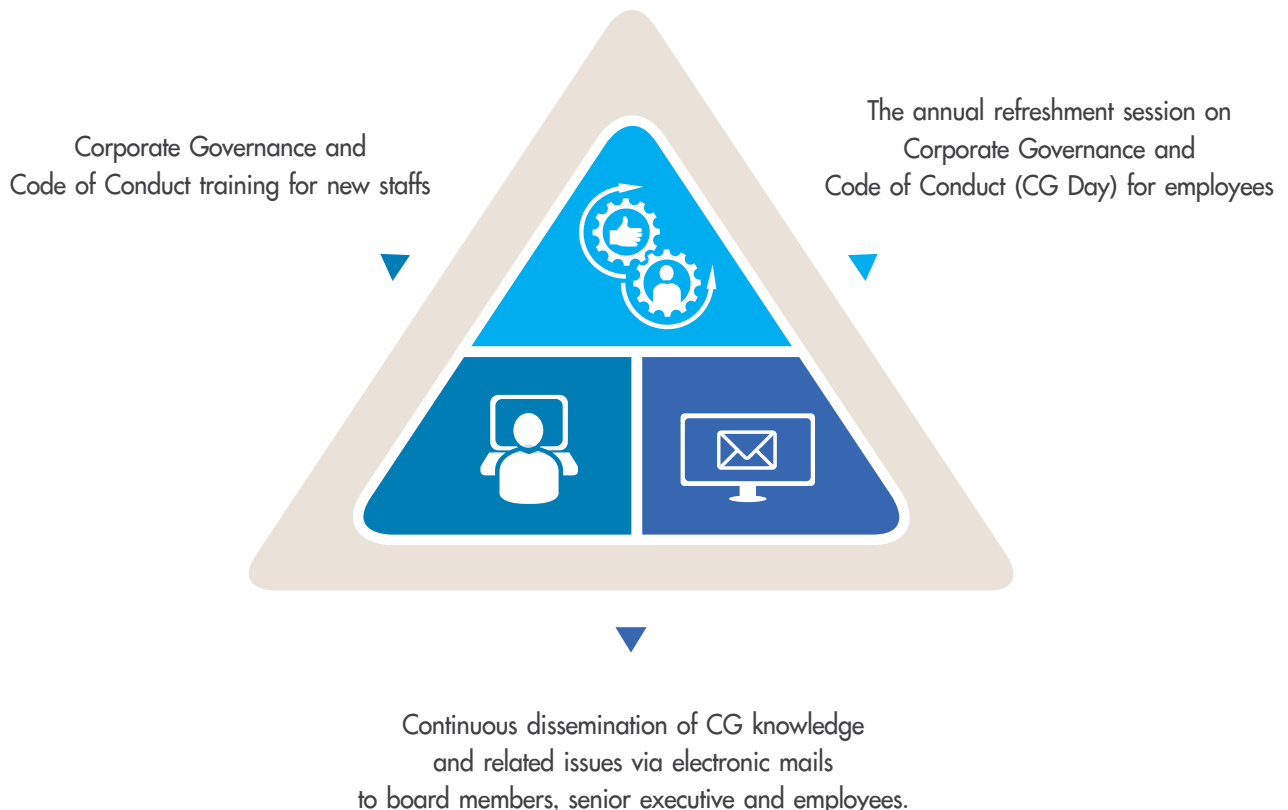
Being aware of the importance of business ethics, the Company announced the Corporate Governance Policy and Code of Conduct both in Thai and English to ensure that employees in all areas where the Company

has an operation understand and adhere to the same ethical standards. For maximum efficiency, the Company also announced additional policies and guidelines for business ethics as follows:



All employees including board of directors and senior executives have to perform their duties in accordance with the Corporate Governance Policy and the Code of Conduct overseen by the Corporate Governance and Nomination Committee. To create sustainability of good corporate governance within the organization, the Company cultivates ethical working culture and

set the “ethics” as one of the corporate core values and the key performance indicators for all executives and employees. The corporate governance and business ethics activities have been continuously promoted throughout the organization to ensure that all employees know well about business ethics and anti-corruptions. These activities are as follows:



To build stakeholders' confidence on Company's compliance with the principles of business ethics and anti-corruptions, the Company has participated in the annual assessment by the Corporate Governance Report of Thai Listed Companies (CGR) project.

In 2018, the Company received "Very Good" assessment result.

Additionally, on 5 February 2018, the Company declared its intention to take part in Thailand's Private Sector Collective Action Coalition Against Corruption's (CAC) project.

Performance

In 2018, Banpu Power announced the Market Sensitive Information Policy and the management approach on confidential information potentially affecting the stock exchange market. It is the duty of directors, executives, employees, consultants and subsidiary companies to understand and comply with the policy and practices as follows:

- ✓ Set up the internal system to prevent leakage of confidential information.
- ✓ Cultivate 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.
- ✓ Limit the number of persons who have the authority to access to confidential information on a need-to-know basis. Deploy the information access control system for contract parties and other service providers who can reach the Company's system.

- ✓ Carefulness in receiving and sending information to and from third parties, being aware of one's responsibility involved in using and controlling confidential information.
- ✓ Set up the appropriate information technology and control system.

In the past year, the Company received no CG complaint from any stakeholders. There was not any incident related to unethical issues either. The summary of CG complaints is quarterly submitted to the Corporate Governance and Nomination Committee and annually reported to the Board of Directors.

Conflict of Interests

The Company has a strict policy not to allow committees, executives and employees to exploit any information or opportunities obtained from being in such positions for their personal interests, inclusive of running business competing with the Company and using inside information for their own or others' interests in buying/selling the Company's stocks.

In case that executives or employees of the Company participate in any special projects related to strictly confidential information and/or under negotiation process especially when the internal information has not yet been disclosed to the public and such information possibly affects the Company's business or its share price, they must sign the Confidentially Agreement until such information is released to the Stock Exchange of Thailand and the Securities and Exchange. This will, in turn, build honesty and transparency as well as provide maximum benefits for all stakeholders.



Transparency of Tax Payment



The Company announced the Tax Management Approach with an aim to reinforce its commitment to be a “good corporate citizen” in every country where it has business operations. The Company has adhered to transparent businesses and in compliance with laws and regulations. The Company has also paid high attention on accurate taxation and continuous disclosure of tax information. To maximize the efficiency of tax administration according to laws and regulations, the Company has regularly assessed its tax risks.

Complaint Handling Process

In 2015, the Company announced and implemented the “Whistleblower Policy” in order to establish a platform for any stakeholders to file complaints related to any wrong-doing of the Company against the laws, rules and regulations, corporate governance principles and code of conduct. The Company has efficient mechanism and is responsible for treating such complaints in a confidential and sensitive manner so that the whistleblowers are confident that they will be protected and their complaints will be transparently investigated.

Complaint Channels



1. **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
2. **Website:** https://www.banpupower.com/complaints_handling

The complaints will be brought into to the corporate fraud management process by the Investigation Committee. The complaints received are investigated 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 reported to the Board of Directors.





CG Day 2018

The “CG Day 2018: CG Light the Way & Faming Your Story” is the annual CG event organized with an aim to express the Banpu Group’s commitment to cultivating good corporate governance as part of its culture. This year a special activity called “Faming Your Story” was created, allowing employees to create video clips expressing innovative ideas about the new corporate values or the “Banpu Heart,” consisting of **“Passionate,” “Innovative,”** and **“Committed.”** The winners were the ones who made the clips about the values of “Passionate” and “Committed”

The Banpu Group also puts high importance on two-way communications with its employees. In addition to communications of good corporate practices, the Company adheres to and promotes the true practices in accordance with standards and business ethics among its employees at all levels through activities and other communication channels. The Company also encourages employees to express their opinions, submit any enquiries, or file involved complaints via various channels provided, including electronic mail, telephones, or whistleblowing system.





Anti-Corruption



Indicator

The number of tolerance against corruption.



Annual Target



Zero tolerance against corruption.



Immediately investigating, detecting, and correcting the complaints received.



Continuously organizing communication activities for the board of directors and employees across the organization including the stakeholders.



Strategy



Banpu Power has cultivated ethical working culture by determining the ethic as one of its core values and as a key performance indicator for its management and employees.



Performance



Zero tolerance against corruption in 2018.



Declaring the Company's intention to join Thailand's Private Sector Corrective Action Coalition Against Corruption (CAC).



Issuing practice guidelines for offering and receiving any favour of gifts, hospitality or other similar forms of rewards (No Gift Policy) consistent with Banpu Power's Anti-Corruption Policy as well as communicating the Anti-Corruption Policy to directors, management and employees across the organization including stakeholders.



Organizing the workshop on corruption risk assessment and preventive measures



Communicating the Anti-Corruption Policy and practice guidelines to BPP joint venture companies namely, the BLCP Power Plant and the Hongsa Power Plant.

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 Company Limited 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 information including the anti-corruption performance in this report covers the businesses in which the Company has more than 50 percent of investment and has management control.

Management Approach

The Board of Directors and all levels of management as well as employees of Banpu Power Public Company Limited mutually agreed to conduct businesses in an ethical and honest 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 visits and workshops, as well as conducting an internal audit together with the joint venture companies’ internal audit departments, etc.

Performance

In 2018, the Company has no complaint and tolerance against corruption. Various anti-corruption activities were implemented as following:



Announcement of the Company’s intention to join Thailand’s Private Sector Collective Action Coalition Against Corruption (CAC) on 5th February, 2018



Formulating a standard practice of receiving and offering gifts, hospitality or other similar forms of rewards (No Gift Policy) compatible to the Anti-corruption policy, To make an action of anti-corruption materialized, the Anti-corruption Policy was communicated to directors, executives, and employees throughout the organization, including those who have interests with the Company.



Setting up the anti-corruption preventive measures by developing working processes and practice guidelines in line with the Anti-corruption Policy and standard practice.



Instituting the anti-corruption monitoring measurements as a procedure to monitor and report possible actions related to corruption in a timely manner. The communication channels for stakeholders and involved parties including management and employees to make complaints or report any corruption or unfair treatment to the Company were also developed. The details and practice guidelines are disclosed on the Company’s website.





Paying high attention on treating any complaints related to any wrong-doing in a confidential and sensitive manner. The preventive process to protect the whistleblowers from any harm or threatening as well as the compensation measures for any damages they may later receive were also formulated.



To make employees well aware of anti-corruption, the internal communication was made through training, orientation, and knowledge sharing via electronic mails. The Anti-corruption Policy and practice guidelines were also disclosed in the annual report, the annual information disclosure report to the Stock Exchange of Thailand and the Company's website for communicating with all stakeholders.

2018 Activities

Anti-Corruption

The Company has complied with laws and regulations and operated its businesses according to the principle of good corporate governance. In addition to putting anti-corruption contents in the corporate governance policy and code of conduct, the Company has also prevented the corruption related risks possibly caused by any intentional or unintentional manners or any lack of understandings, In 2015, the Company issued the Anti-Corruption Policy approved by the Audit Committee and the Board of Directors. This policy was promulgated in all business units in which the Company has more than 50 percent of shares and has management control.



No Gift Policy

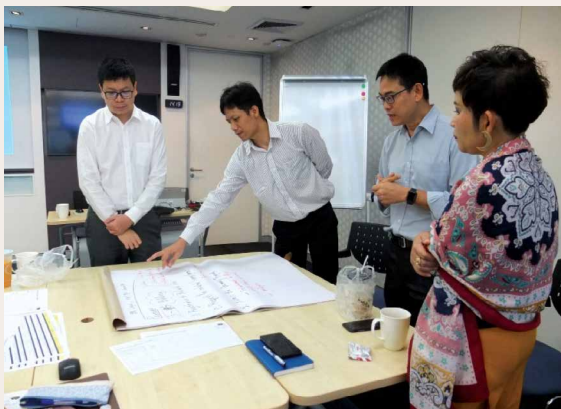
"No Gift Policy" or a practice guideline for refraining from receiving gifts, is a declaration of the Company's intention to refrain from receiving any gifts, entertainments or other benefits. In order to operate businesses aligned with the principle of good corporate governance, business ethics, transparency, avoiding any actions possibly leading to discrimination or any conflicts of interest, the Company announced the "Guidelines of Giving and Receiving Gifts, Entertainment and Other Benefits Regarding Anti-Corruption Policy" Handbook in 2018. To ensure that management and employees perform their duties in line with the international standard, management and employees are requested for cooperation to refrain from receiving gifts from external parties. If receiving any gifts, he/she shall return them to the giver. In case of any inconvenience, employees shall return or register such gifts in the Company's gift receipt system. The gifts would be later transferred to the Company Secretary and Corporate Governance for public donation.





BPP Corruption Risk Workshop & Anti-Corruption Knowledge Sharing 2018

On 20th July, 2018, the “BPP Corruption Risk Workshop & Anti-Corruption Knowledge Sharing 2018” was organized to state the Company's commitment to conducting its businesses with ethical manner as well as cultivate good governance attitude among employees at all levels. The workshop was attended by a number of board of directors, management and employees who jointly assessed the corporate risks related to corruption as well as developed measures to prevent and resolve any possible issues. The Company's anti-corruption risks are mostly caused by project development bidding, an issuance of permit licenses, etc. Additionally, the BPP management and employees also expressed their intention to fight against corruption at this event.



Organizing the communication and knowledge sharing session on corporate governance and anti-corruption for a joint venture company-Hongsa Power Plant



Banpu Power employees attended the National Anti-Corruption Day organized under the theme of "Active Thai Citizens Against Corruption." More than 3,000 people consisting of representatives from the government and private sectors, general public as well as youth and students from various institutions participated in this event.





Indicator

» Coverage ratio of the internal control and compliance system.

» The number of significant fines from non-compliance.



Annual Target



Internal audit and compliance system covers all business entities in which the Company has over 50 percent of investment and management control.



No significant incidents involving non-compliance.



Strategy



Having the effective internal control system in both preventing and monitoring of operational performance categorized into several levels including self-auditing and evaluation by the independent unit reporting directly to the Audit Committee.



Performance



Internal audit and compliance system covers all business units the company has more than 50 percent of investment and management control.



Conducting internal audit and compliance assessment among joint venture companies as well as following up on deficiency resolution to meet the common standards between business partners.



No significant incidents involving non-compliance.

Significance and Reporting Boundary

Compliance with laws is the basic principle that 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.



It also includes doing business by adhering to business ethics, such as anti-corruption, unfair competition and any actions against human rights such as equality. A failure to comply with these laws will affect the sustainability of business operations and credibility of the Company.

Management Approach

The Company 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 shows the Company's responsibility on society and environment in every country where the Company has business operations.

To initiate confidence among stakeholders that the Company has been administrated in accordance with laws and external regulations, Banpu Group has established the Global Internal Audit & Compliance as a major force to coordinate and monitor legal compliance divided into two main functions:

1 Corporate Compliance Unit
is responsible for assessment of compliance with laws and external regulations.

2 Global Internal Audit
is responsible for assessment of internal control systems including compliance with internal policies, regulations and operational practice guidelines.



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

To ensure that our business operations comply with laws and regulations of each country where the Company has investment, the Company has implemented the proactive and preventive operations as well as regularly monitors the performance as follows:

Monitoring corporate compliance with laws and external regulations

The Corporate Compliance Unit of Banpu Group was established with the main objective of ensuring that all business units operate in compliance with relevant laws and external regulations through the specialized monitoring and reporting system based on the ISO 19600 standard (Compliance Management Systems-Guidelines). The Corporate Compliance Unit monitors law compliance by:

1 Developing a legal registration
that each department must comply with one another; then, each department must conduct a self-assessment and submit the results every quarter.

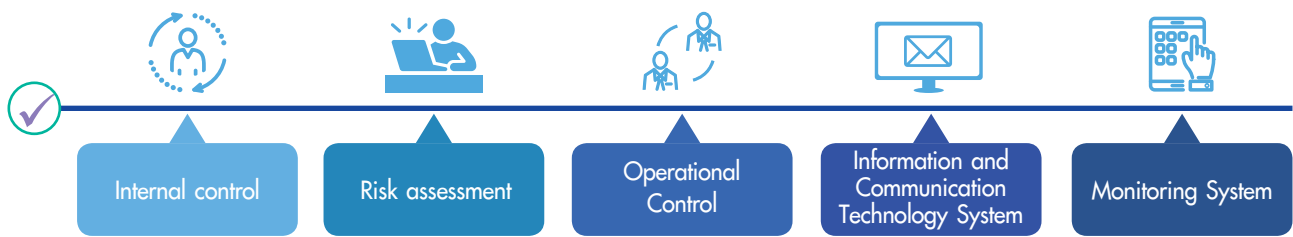
2 Assessment of law compliance
by the Corporate Compliance Unit at least once a year.



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 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 as an independent body, directly reporting 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 international standards, namely Quality Management System Standard (ISO 9001), Environmental Management

System Standard (ISO 14001), Occupational Health and Safety Management System (OHSAS 18001) and Business Continuity Management Standard (ISO 22301) from the International Certified Body located in each country; meanwhile, legal compliance is part of the requirements of such systems.

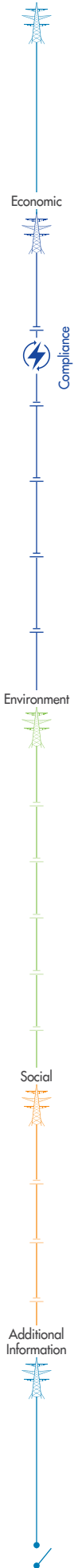
Country	Business Unit	International Standards			
		ISO 9001	ISO 14001	OHSAS 18001	ISO 22301
China	Zouping Power Plant	✓	✓	✓	
	Zhengding Power Plant	✓	✓	✓	
	Luannan Power Plant	✓	✓	✓	
Thailand	Bangkok Office*				✓

*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 supervision of Corporate Services Department, including Health, Safety, Environment and Community Development, Information Technology Department, Legal Affairs, Procurement and General Administration as well as Business Process Management Department, 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.



Monitoring of Environment Quality Required by Laws

The Company has a system to monitor environmental qualities required by laws in each area as follows:



- 1 Air Quality:**
Instituting the Continuous Emission Monitoring (CEM) and installing the Ambient Air Quality Monitoring System (AQM) to monitor air quality in the nearby communities of thermal power plants and combined heat and power plants.



- 2 Water Quality:**
Collecting water samples for quality analysis by external agencies and establishing the continuous monitoring systems.



Air quality and effluent
always comply with regulatory requirements

Performance

In 2018, the Company established an internal audit system and legal compliance supervision covering all business units in which the Company has more than 50 percent of investment and management control including the Head Office in Thailand, Power Business in China and Japan. There were no significant incidents involving non-compliance in all aspects including environment, society, labors, human rights violations as well as business ethics misconduct.

Results of air quality monitored from stacks by Continuous Emission Monitoring (CEM) in all the Company owned CHP power plants in China met the standard as required by laws, including BLCP Power Plant in Thailand and Hongsa Power Plant in Laos. The new air quality regulations recently issued in China,

however, requires construction of the closed-system coal stockyards to reduce dust. Thus, Zhengding Power Plant got warning due to a delay construction of the closed-system coal stockyard which was completed in December 2018.

For other businesses in which the Company has less than 50 percent of either direct or indirect investments, and has no direct management, namely BLCP Power Plant in Thailand, Hongsa Power Plant in Laos, the Company jointly conducted an inspection with our business alliances. Additionally, law and regulatory compliance was assessed through the Board of Directors of each company. In the past year, both power plants did not have significant incidents involving non-compliance.





Risk Management



Indicator

» Coverage ratio of risk management system.

» A proportion of business units having risk indicators.

» The number of risk training for employees.



Annual Target



The Risk Management System covers all business entities in which the Company has invested.



Setting up risk indicators for core assets where the Company has invested.



Organizing risk management trainings for employees in all countries in which the Company holds investment and has management control.



Strategy



Using risk management for decision making and implementation of risk reduction plan.



Using risk indicators to manage risks within the organization.



Improving the risk management system to meet international standards.



Performance



Having risk management system covering all business entities.



Setting up risk indicators for joint venture companies and the Company's performance.



Organizing risk management trainings for employees at the headquarters and those working in Japan and China.



Significance and Reporting Boundary

Since a nature of power business is relevant both directly and indirectly to social and environment, the Company put great emphasis on operating business in accordance with applicable laws and regulations, inclusion of meeting the stakeholders' expectations. Effective risk management is a key mechanism the Company uses to increase its business opportunities and as the operational collateral to gain returns as targeted.

Management Approach

The Company's risk management is under supervision of the Audit Committee. Moreover, the Company has set the Risk Management Committee (RMC) consisting of Chief Executive Officer and senior management. The RCM duties are as follow:

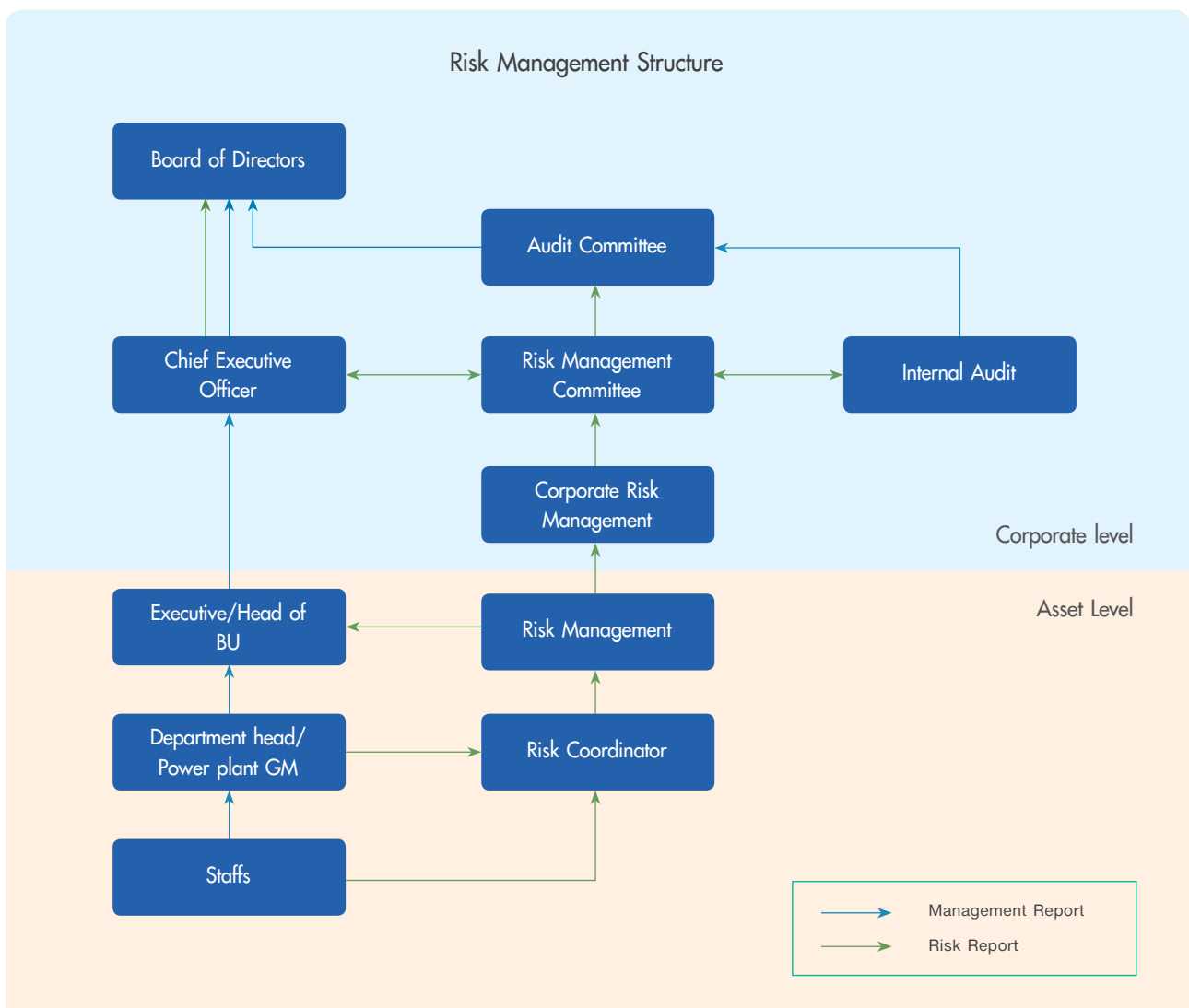


1 Assessing and managing risks to mitigate any risk effects on the Company's operational performance.

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

3 Supporting internal and external resources necessary for efficient risk management.

The Company has declared the Risk Management Policy & Manual and updated it regularly. The recently updated policy and the charter of Risk Management Committee were announced in August 2018. The Risk Management Committee convenes quarterly to monitor risks and risk management performance. The reviews of risk management system are reported to the Audit Committee and the Board of Directors on a quarterly basis.



Risk Management Structure

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. Additionally, there have been other committees' meetings relevant to risk management, for instance, the Financial Management Committee's monthly meetings to monitor financial risks.

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 progress monitoring.



Performance

Presently, the Risk Management System covers all of the Company's business entities including developing projects. Each business unit has developed Key Risk Indicators (KRIs) and reported to the Risk Management Committee quarterly. Moreover, the Company continues

improving its risk management system. In 2018, the risk management workshops were organized for employees in Thailand, Japan and China to create awareness on risk management.

✓ In 2018, the risk management workshops were organized for employees in Thailand, Japan and China



Risk Categories	Example of Risks
1. Strategic Risk	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Exchange rate risks resulted from investments in many countries
3. Operational Risk	<ul style="list-style-type: none"> Risks on power business Risks on occupational health, safety and environment
4. Compliance Risk	<ul style="list-style-type: none"> Risks from regulatory and policy changes in the countries where the Company has invested.
5. Emerging Risk	<ul style="list-style-type: none"> Risks from disruptive technology Risks from climate change
6. Other Risks	<ul style="list-style-type: none"> Risks on human rights

Emerging Risks

According to the Company's risk assessment, two major emerging risks were found, namely disruptive technology and climate change risks.

1 Risk from Disruptive Technology

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 2018. This pilot project was aimed at researching information for future products development in addition to existing projects

2 Risks from Climate Change

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.

In addition, risks associated with climate change are the **risk of water shortages especially in the water stress area and the air quality** in large cities which has a direct effect on health. As climate change has gained high attention worldwide, becoming more severe and frequently happening, the Company will monitor and evaluate its impacts for further adaption.



Organizing Risk Management Workshops

The Company gives top priority to risk management by regularly organizing risk management trainings with an aim to create knowledge and understating as well as awareness of risk management. In 2018, the Company organized risk management workshops for employees in Thailand, Japan and China in order to review the principles and methods of risk management.



Using Key Risk Indicator (KRI) System in the Organization



In 2018, the Company used the KRI system as a key risk indicator, starting with asset management to monitor risks from the Hongsa Power Plant. In 2012, the Company also plans to apply the KRI system to its core businesses in which it has management control.



Business Continuity Management



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 sufficient information to the public in times of crisis.



Target



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



Strategy



The Company has prepared its business continuity management plan and arranged necessary resources including sufficient and appropriate communication, covering possible crisis and in line with the Company's risk management.



Performance



Conducting a risk assessment possibly affecting business continuity across the entire organization.



Conducting a 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, prioritize significant incidents, and improve a BCM manual and communication procedures.

Significance and Reporting Boundary

Business Continuity Management (BCM) is highly interested by stakeholders, especially customers, business partners and contractors due to many risks possibly crippling business operations nowadays, for instance, natural disasters, terrorists, cyber-attacks, protests or any incidents (e.g. fires and chemical leakage). Since electricity is essential for lives and industry, preparation for the rapidly operational

Rehabilitation during the crisis together with appropriate and sufficient communication, can build confidence among stakeholders. Additionally, the Company will be able to minimize the impacts and deliver products and services in an appropriate time, if any incidents occur. This reporting boundary covers all business entities in which the Company holds over 50 percent of shares and has management control.

Management Approach

As for business continuity management, the Company has placed great importance on restoration of main necessary procedures, affecting stakeholders in an acceptable time of crisis, whereas other supportive procedures which are not urgent will be consequently revived. The Company has integrated business continuity management into Banpu Group since

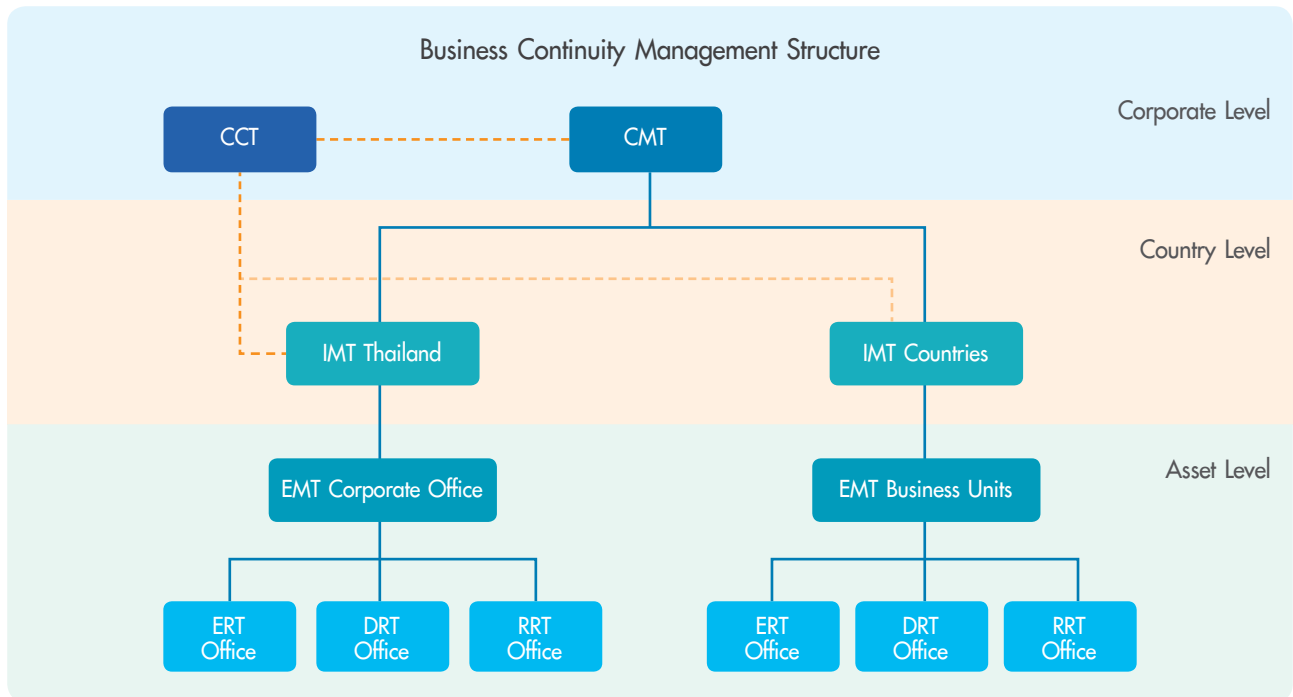
we have management team and offices located nearby. Some executives are concurrently responsible for Banpu Group and have been assigned as a commander to communicate to the public in case of any incidents in the power plants. Therefore, the integrated operation is the most effective and saving resources.

Key targets of business continuity management are as follows:

- Response**
 - Effectively responding to the incidents and prevent extended damages.
 - Appropriately and sufficiently communicating to the public in the time acceptable by stakeholders.
- Recovery**
 - 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.
- Restoration**
 - Rapidly restore all company activities in the time accepted by stakeholders.

The Banpu Group has integrated the ISO 22301:2012 Business Continuity Management Standard into its business continuity management system. The Company has certified the ISO 22301:2012 since 2016. It annually

conducts the BCM drill and uses its result to effectively improve its crisis/ incident responses. The BCM drill is conducted in three levels including the operational site, country and the corporate levels.



CMT: Crisis Management Team IMT: Incident Management Team CCT: Crisis Communication Team
 EMT: Emergency Management Team ERT: Emergency Response Team DRT: Disaster Recovery Team
 RRT: Relative Response Team





Performance

In the previous year, Banpu Group maintained the BCM to ensure that its business continuity management be effective. Whereas, Banpu Power cooperated with Banpu Group in conducting the BCP drill in order to reduce costs and resources.

✓ Passed the ISO 22301:2012 certification audit for three consecutive years.

✓ Regularly conducts the business continuity plan drills for improvements.

✓ Conduct the BCP drills specifically for information technology and necessary information during the crisis.

Presently, the Company has increasingly installed some parts of an information technology system on the cloud computing system. This will help the Company in promptly recovering necessary information and system.

✓ Conduct Crisis Communication drills

The Company's challenge in business continuity management is damage in large power plants which may take a longer period of time for all activity recovery. Therefore, the Company has put emphasis on investing in preventing and controlling as well as reducing the severity of incidents. In addition, immediate and appropriate external communications are also implemented. In the less affected production units

such as a solar power plant, the Company can monitor and inspect the incidents via information technology system from a long distance. A close investigation will be conducted when it is safe. The Company also focuses on a close communication with contractors for damage investigation and will communicate with the power buyers so that they can explore the power supply from other power plants promptly.

Last year, the Company carried out the following activities:



Organized a workshop to review risks and developed a crisis communication manual to cover the power business by considering the severe and high risks as the most priority.



Evaluated and set up an additional business continuity development plan in Beijing Office.



Conducted the BCM drills in cooperation with contractors in all business units having an operational risk.



The BLCP Power Plant and the Hongsa Power Plant, the Company's joint venture companies, conducted a workshop on crisis communications and simulation exercises so that all participants from both plants were able to exchange their experiences.



Economic



Business Continuity Management



Environment



Social



Additional Information





Availability and Reliability



Indicator

The power plant is able to maintain its availability and reliability corresponding to customer's demand as follows:

» The Availability Factor (AF)

» The Planned Outage Factor (POF)

» The Unplanned Outage Factor (UOF)



Annual Target



The three combined heat and power plants in China have the AF higher than **82.90%**

BLCP Power Plant

- The AF is higher than **85.22%**
- The POF is lower than **13.28%**
- The UOF is less than **1.5%**

Hongsa Power Plant

- The AF is higher than **86.47%**
- The POF is lower than **7.5%**
- The UOF is less than **6.03%**



Strategy



Managing operations to ensure that the power plant has high availability in order to continually respond to customer demand.



Performance



The three combined heat and power plants in China, BLCP Power Plant, and Hongsa Power Plant **can maintain their availability and reliability according to customers' demands.**

Significance and Reporting Boundary

The Company has invested in the thermal power plants in Thailand and Lao PDR, namely BLCP Power Plant and Hongsa Power Plant. The major customer of BLCP and Hongsa power plants is the Electricity Generating Authority of Thailand (EGAT) which requires high security of power generation.

BLCP and Hongsa power plants are categorized as the power plants that generate electricity 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.

Meanwhile, the electricity generated from combined heat and power plants in China will be sold to the public through the government transmission system. The steam



and hot water will be sold to factories and residences. The Company has paid high attention to continuously supply steam for industrial and retail customers, especially small 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.



BLCP and Hongsa power plants are categorized as the power plants that generate electricity 24 hours a day at a high power supply rate

Economic



Management Approach

Communicating with customers to create understandings with them in advance in preparation for the effective production and maintenance plan 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 able to operate as targeted. As a result, the power plants are in the best condition ready to operate continuously and complete the availability hours as stated in the contract each year.

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. 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 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 combined heat and power plants, however, will have a longer period of maintenance outages as customers demand the maximum steam and hot water during the winter. As a result, maintenance of each power unit is scheduled for summer until November to ensure that the power plants will have the highest availability throughout the winter season. The maintenance outages for combined heat and power plants will be based on a 3-year medium-term plan and an annual operational plan in order to prepare



Availability and Reliability



Environment



Social



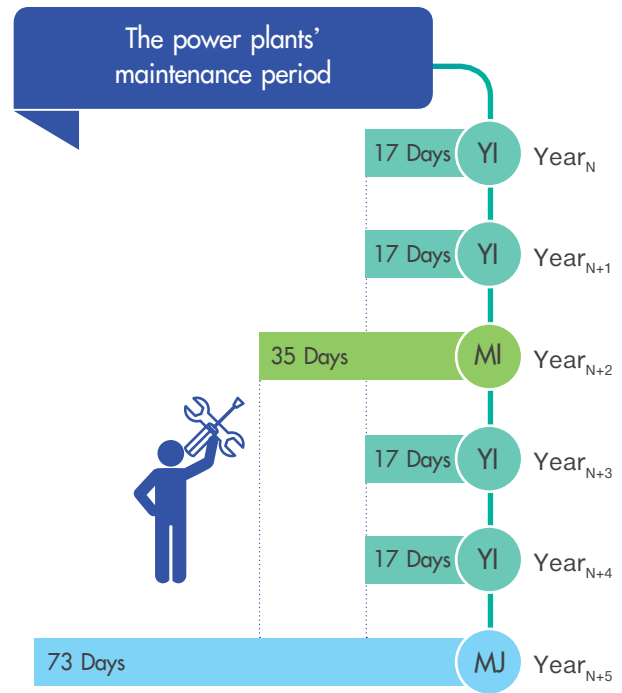
Additional Information



The annual maintenance outage schedule

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.

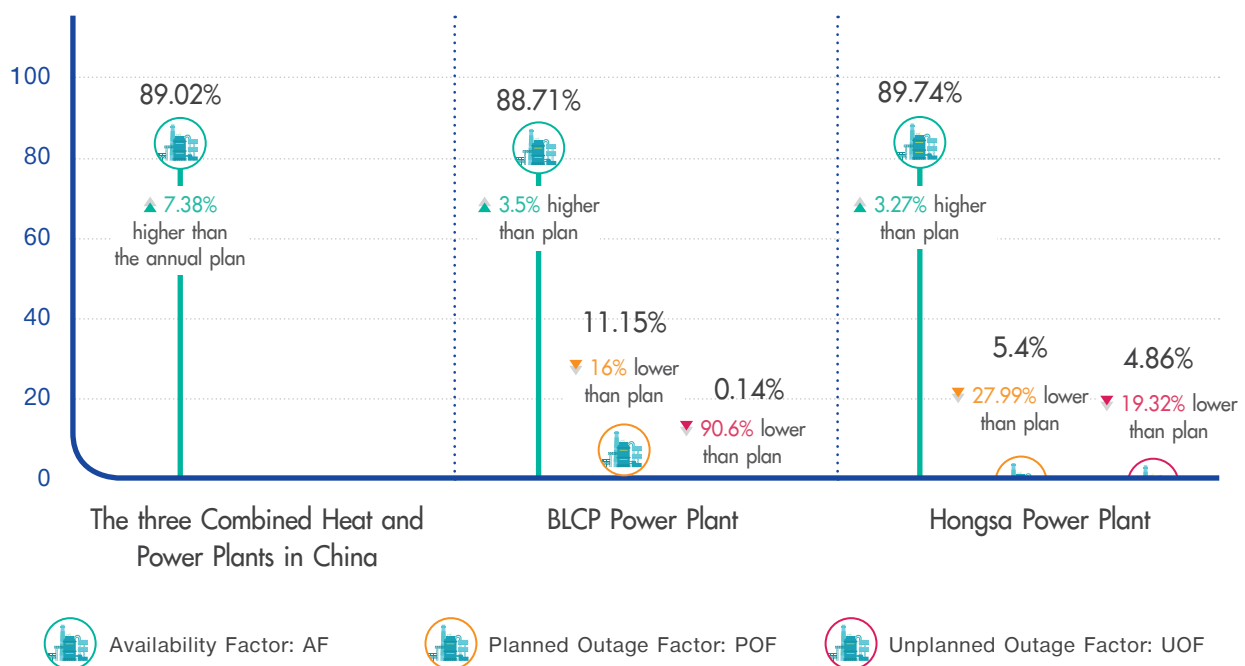
The Hongsa Power Plant will have a yearly inspection (YI) every year, which takes approximately 17 days. In addition, there is a minor inspection every three years while a major inspection is carried out every six years.



The combined heat and power plants in China are scheduled for minor maintenances every year, taking 10-20 days per time. The major maintenance is operated every two years with 30-45 days each time. 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.

Performance

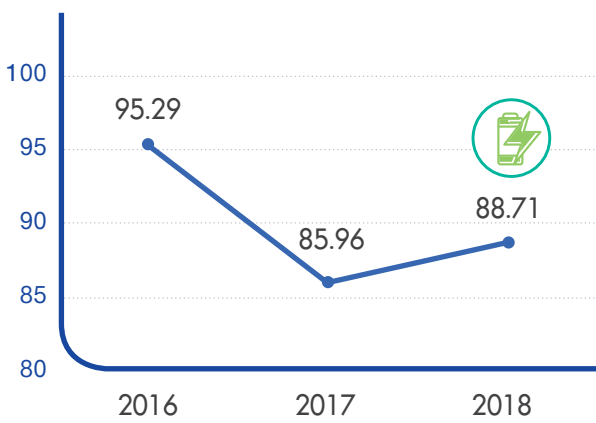
In 2018, the Company was able to maintain the availability and reliability according to customers' demand of the three combined heat and power plant, BLCPPower Plant and Hongsa Power Plant as follows:



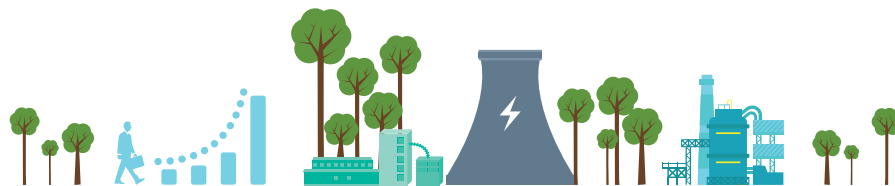
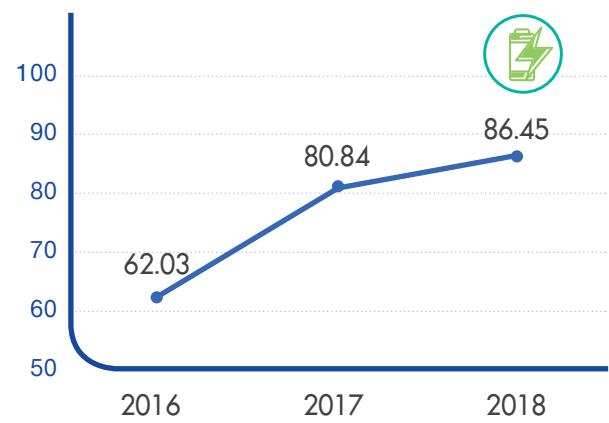
The combined heat and power plants in China have the availability factor, the planned outage factor, and the unplanned outage factor as targeted. The plants were able to sell electricity, steam, and hot water continuously.

The BLCP Power Plant and the Hongsa Power Plant, which are the joint venture companies and the company's main source of revenue, were able to maintain their availability as planned, completing the availability hours as stated in the contract. Furthermore, they also completed the maintenance faster than the target set, making them possible to support the transmission system by generating additional electricity from the power trading hours specified in the power purchase agreement.

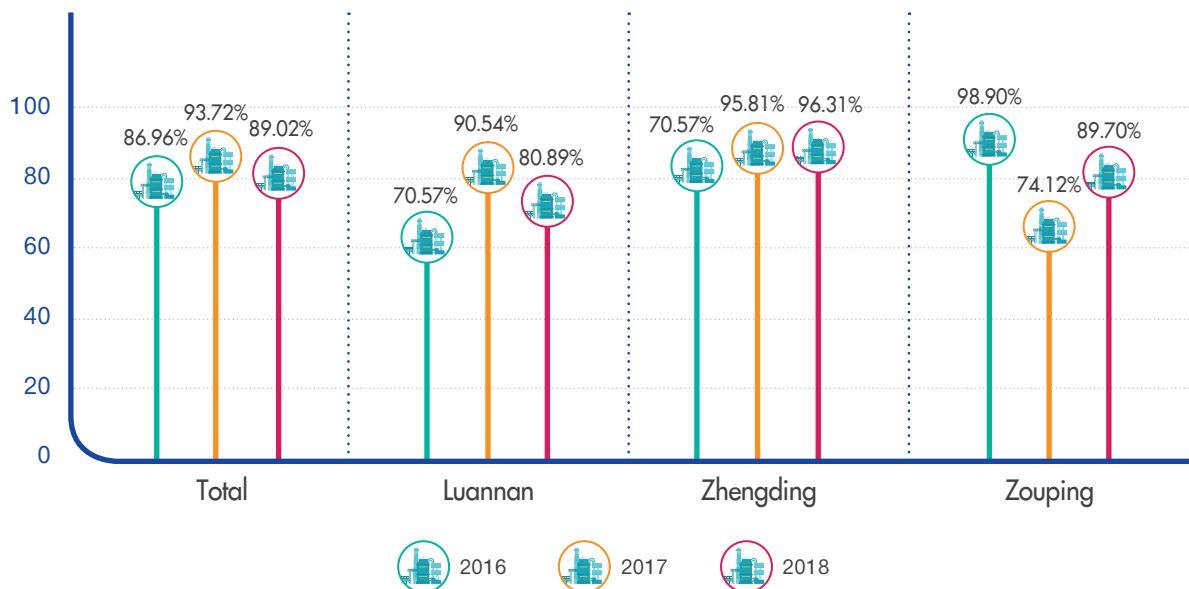
Availability factor of BLCP Power Plant (%)



Availability Factor of Hongsa Power Plant (%)



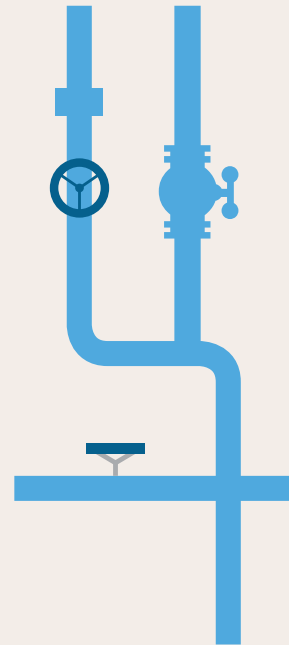
Availability factor of the three Combined Heat and Power Plants in China (%)



Replacing the Reheat Panel to solve the cracking steam pipe problem during production of BLCP Power Plant.

Due to the cracking reheat panels of BLCP's two production units in 2016, the preventive maintenance plan was undertaken by cutting and replacing all reheat panels with the new ones. This is to ensure that the power plant will be available and reliable as planned. It will also help reduce the unplanned outages in the following years because the reheat panels may have deteriorated in the adjacent areas due to a similar working environment.

The replacing reheat panels were designed to be more durable by using new materials to replace the old ones that have been used for more than 10 years. The reheat panel replacement program was included in the plant's major maintenance plan, which took 75 days. The reheat panels of the first unit were replaced in 2017 and the second unit's were changed in 2018. In addition a life-cycle assessment of the main equipment was conducted by the foreign experts in order to find out the power plant's remaining lifetime. As a result, the availability rate of BLCP Power Plant was higher than the plan set significantly reducing the maintenance hours and the unplanned outages.





Process Improvement and Innovation

At a Glance



Economic

Process Improvement and Innovation

Environment

Social

Additional Information



Indicator

» **Productivity efficiency per person** of each business unit.

» **Financial values gained** from the innovation and process improvement projects.



Long-term Target



A continuous increase of efficiencies and reliabilities of the production system.



Increasing financial values gained from the innovation programs.



Increasing employees' participation in the innovation program.



Strategy



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



Performance



An **increase** of the productivity efficiency per person.



An **increase** of the production system reliability.



The number of submitted **innovation projects**.

Significance and Reporting Boundary

An increase in the production costs affected by external factors which are beyond the Company's control, such as fuel prices, is one of the Company's concerns. We believe in the continuous development of process management system, including applying innovations and state-of-the-art technologies to our production process. "Innovation," in the Company's context, is an initiation to improve and change the working process to be more efficient. The improvement probably includes applying advanced technologies to production process or using the initiative ideas to reduce a working procedure, making it faster and more accurate. This will result in the effective production process which is better than the current one. Additionally, an efficient process is also the key driver in helping the Company to sustainably grow with stability amid the rapid changes of the industrial industry.

Management Approach

The Company has improved the production efficiency based on the principles of "Operational Excellence" together with innovation. In order to increase working efficiency and process reliability as well as to reduce costs and losses in a production procedure, employees at all levels collaborate to identify problems possibly arising during working, including its root causes through a systematic process and continuous improvement. The procedure starts with training employees to enable them to identify the problems that may arise during their working process. With the support from a corporate team, the annual seminar on operational excellence has been organized to provide opportunities for employees to present their initiative projects to improve production efficiencies.

The Company has also put great emphasis on promoting innovation among its employees at all levels, ranging from the operational level to the executive level. Various innovation promotional activities have been created with an aim to educate employees to understand the importance of applying innovations to their working life. Since 2012, the Company has included its participation in the innovation promotional activities as one of the strategies by submitting

the innovative projects to compete in Banpu Innovation Convention. Held annually, the Banpu Innovation Convention aims to open opportunities for employees in each country to exchange their ideas about the innovative projects imitated. The innovation awards will be handed over to the excellent innovation projects judged by the committee, consisting of the Chief Executive Officer and top management.

Performance

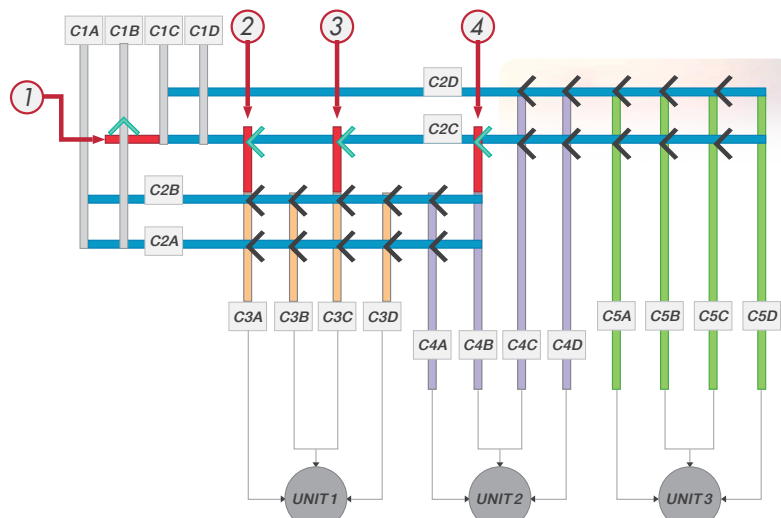
In 2018, the Company held the “Operational Excellence” seminar for our employees in China in order to make them pay high attention to a continuous improvement. Seven innovative projects, which helped the corporate save THB 80 million, were submitted for competing in the Banpu Innovation Convention.

Improvement of the coal conveyor system - Hongsa Power Plant.

In 2018, Hongsa Power Plant dedicated to enhance its power generation performance to be continuously stable in preparation for the machinery readiness for the power plant’s fuel handling system as well as to increase efficiency and continuity of the production process.

In the second quarter of 2015, the fuel conveyor belt of Hongsa Power Plant was broken and unable to deliver fuels to the production process. This resulted in operational shutdowns of the power plant’s Unit 1 and Unit 2 which directly affected the power generation process. The lesson learned from this incident made the Hongsa Power Plant improve its coal handling system by increasing the length of four conveyor belts and the number of conveyor’s plow discharges. The aim is to add more options and diversify machinery usages as well as prevent any risks from the fuel handling system.

The recent efficiency improvement of the fuel handling system has enhanced the stability of Hongsa Power Plant leading to its flexibility to operate the conveyor belts in the production process. In 2018, the three power plants were able to handle fuels continuously and effectively.





Improvement of the system for solving problems and reducing power plant's costs - BLCP Power Plant.

BLCP Power Plant's has aimed to improve its power stations continuously since its commencement. In 2018, BLCP Power Plant improved its system to solve the production process problems and to analyze measures to reduce costs.



Installing lifting motors in replacement of the 120-tonne forklift provided by external parties. Thus, the cost resulted from the annual maintenance was reduced by **THB 5.12 million.**



Increasing the speed of Travelling Screen to prevent unknown stuffs entering into the Cooling Water Pump. As a result, BCLP managed to prevent the loss of **THB 58.9 million** from operational shutdowns.



Producing Reagent Chemical in the BLCP Laboratory instead of purchasing from the external outsources. This helped BLCP reduce its cost in an amount of **THB 2.16 million** per year.

The aforementioned improvements have led BLCP Power Plant to become stable in both business and production aspects, demonstrating its commitment to continuously developing, though having been operating for more than 12 years.



Improvement of the boilers to reduce a pollution problem according to the new standard - Zhengding Power Plant.

In 2018, China has amended the conditions in the new enactment of its environment law by changing the emission standard of nitrogen oxidization (NO_x) from 100 mg. per cubic meter to 50 mg. per cubic meter.

Prior to the new law enactment, Zhengding Power Plant's average NO_x emission was around 80 mg. per cubic meter; thus, the plant had to control and improve its boiler system in the power generating procedure in order to reduce the NO_x emission. Hence, Zhengding Power Plant was able to control and reduce NO_x emission to 30 mg. per cubic meter, 40% better than the new law requirement. This made all production units of Zhengding Power Plant able to continually maintain their power production volumes and comply with the local environment laws.



Supplier Management



Indicator

The proportion of new suppliers selected under environmental and social criteria.



Target



There are **no complaints** regarding supplier management in terms of business ethics, environment and society.



The use of **Supplier Code of Conduct** covers all business units by 2020.



Strategy



Driving the sustainable supplier management in production units through the integration of quality management system standards (ISO 9001), occupational health and safety management system standards (OHSAS 18001/ISO 45001) and environmental management system standards (ISO 14001).



Integrating supplier management with business ethics, environmental and social policies.



Establishing Supplier Code of Conduct covering the areas of business ethics, environment and society.



Supporting and participating in sustainable development with suppliers to reduce risks on environment, society and governance.



Performance



No complaints about supplier management in 2018.



Announcement of Banpu Group's sustainable **supply chain management policy**.



Establishing standards for purchasing products and services that are environmentally friendly in Banpu Group's Bangkok Office.

Significance and Reporting Boundary

Presently, major risks in the Company's supply chain are classified into two main groups as follow:

1. **Fuel Supply Chain:** A main raw material for electricity generation in the Company's conventional power plants is coal. Supplier management, to reduce the risk of supplying coal with quality, price and quantity according to the production plan in each production period, is an important issue for



the management of availability and the production reliability. Additionally, coal is categorized as the commodity product that is volatile with the world market price. Production and transportation of coal from the production sources may be affected by the severe natural disasters caused by climate change, etc.

2. **Machinery Supply Chain:** Manufacturers of machinery parts specific to the maintenance of power plants which cannot be purchased in the general market, are considered the important suppliers to business operation. Therefore, having suppliers with good production, environment and social management would make the Company be assured of smooth production. For electricity generated from renewable energy, major suppliers are manufacturers and distributors of solar cells to which the Company must pay attention on the quality, safety and reliability of suppliers.

Since each solar cell has a lifetime up to 20-25 years, it is necessary to be assured of effectiveness and safety as specified. At the end of use, disposal methods must be appropriate without environmental impacts.



Additionally, the Company strongly intends to supporting suppliers with social and environmental responsibility and good corporate governance according to the Company's policy. This would support the creation of sustainable values throughout the supply chain. The scope of this report covers all business entities where the Company has greater than 50% of investments and management control.

Management Approach

The Company is committed to building sustainable values for stakeholders as well as paying great attention to the performance focusing on environment and society in order to the goals. The Company has guidelines to implement sustainability throughout the supply chain as follows:

- Establishing and applying Supplier Code of Conduct by starting from major suppliers (Critical Supplier).
- Integrating the environmental, social and corporate governance goals with the supply chain management strategies and other associated policies to enhance opportunities and reduce risks possibly occurring in the supply chain.
- Sustainably driving supplier management in the production units based on the Quality Management System Standards (ISO 9001), Occupational Health and Safety Management Standards (OHSAS 18001/ ISO 45001) and Environmental Management System Standards (ISO 14001).
- Conducting reviews on suppliers' environmental, social and corporate governance impacts in order to be able to effectively identify and manage risks.
- Conducting procurement with transparency and fairness in accordance with the Banpu Group's business ethics.
- Promoting business operations with suppliers by adhering to ethical principles with social and environmental responsibility, respecting human rights, and complying with the Code of Conduct and any related policies with suppliers.
- Offer any process to ensure that suppliers comply with local regulations and international labor standards.
- Supporting domestic purchase in which the Company has operations.

- Encourage suppliers to establish practices to achieve sustainability throughout the supply chain with continuous development.
- Regularly disclosing sustainable performance of the supply chain to stakeholders.
- Establishing the performance indicators and regularly monitoring operations to ensure the operations truly achieve the policy's goals.

Performance

In the past year, the Company had no complaints related to supplier management from our major suppliers, including coal suppliers and machinery parts related to the power plants' maintenance suppliers. The Company has managed suppliers according to the laws, environment, transportation and coal market in each area. At present, the company has important supplier management approach as follows.



Conducting procurement with transparency by bidding, keeping all partners inform about coal quality, quantity and time required through the online system.



Evaluating suppliers' qualifications and performance history in terms of operations, reputation and laws compliance to reduce any risks related to purchasing.



Implementing the Quality Management System Standard (ISO 9001), Occupational Health and Safety Management System Standards (OHSAS 18001/ISO 45001) and Environmental Management System Standards (ISO 14001) for operating conventional power plants covering procurement with suppliers. At present, the three combined thermal power plants in China have been approved for all three management systems.



Announcing the sustainability policies covering suppliers' business operations, including policies on business ethics, environment, occupational health and safety, human rights, etc.



Establishing clear criteria and qualifications to select suppliers for the power plants' construction covering the management of quality, environment, society and corporate governance of suppliers.



In the past year, Banpu Group announced the sustainable supply chain management policy to use throughout the organization, including its subsidiaries as a major guideline for supply chain management both in business ethics and also environmental and social management that encourages suppliers to have sustainability management, good corporate governance principles. Additionally, the Company also performs supplier management together with Banpu Group, the process of which is under drafting the Supplier Code of Conduct in order to define suppliers' environment and social criteria more comprehensively as well as to improve priorities of Critical Supplier, which is expected to be completed in 2019.



Supplier Management in Joint Venture Power Plants

- Making long-term contracts with major suppliers with license to distribute coal to power plants, while the quality, operating standards and laws compliance in the countries where the Company has operations, have been evaluated.
- Conducting trainings for local suppliers such as enhancing productivity and quality, marketing, safety and environmental concerns, etc.
- Supporting local procurement such as food, consumer products, agricultural products, including local handicrafts as souvenirs.





Contractor Management



Indicator

The number of contractor's fatalities relating to work.



Annual Target



Zero work-related fatalities of contractors.



Strategy



Sound quality performance together with working-safety management standards.



Performance



Zero work-related fatalities of contractors at the power plants in which the Company has management control.



One contractor's fatality related to work at the joint-venture power plant.

Significance and Reporting Boundary

The contractor' safety and work quality is significant. The Company, therefore, has paid serious attention to this issue in addition to power generation management and power plants' efficiencies in order to cover risks on occupational health, safety, and environment. Since a contractor works closely with the Company's operations and is one of the key drivers in creating stability of power generation process, the sound operational performance and safety is required from either long-term contractors or maintenance contractors.

Management Approach

A contractor is one of stakeholders working closely with the Company and is also a part of creating quality performance and corporate stability.

Hence, the Company has set the criteria in selecting quality and high potential contractors under the appropriate budget and within the proper period according to good governance principles. The contractor selection criteria are based on their working experiences, past performance qualities, budgets, and performance assurances. After a selection of contractors, the Company has put high emphasis on operational safety by providing the safety working environment, including conducting trainings to educate contractors about working safety and environment, which is part of safety management. Additionally, a continuous monitoring and evaluation of contractor's performance has been instituted to ensure our stakeholders that the Company has properly managed contractors with a quality performance.



Economic



Contractor Management



Environment



Social



Additional Information



Performance

Besides putting great importance on contractor’s performance quality by means of properly selecting contractors, the Company has also focused on the contractor’s work safety. The training to increase understandings about working and managing operations safely is, therefore, a part of the quality, safety, and environment management. Furthermore, contractors are responsible for preventing any accidents or damages possibly affecting their works, society, and environment as well as the Company. The training on social requirements has been also organized in order to help contractors properly operate

in compliance with rules and regulations set by the society in areas with different cultures. Additionally, the Company has improved working environment suitable for working conditions. This includes providing the resting area for contractor members during their free-time, organizing recreational activities to help contractors feel relaxing after their working-hours. Various activities to strengthen relationships, such as sports competitions and traditional events have also been organized to create good relationships and cooperation between the Company and contractors as well as to care about the safety of each other.

In 2018, there was none of work-related fatalities of contractors at the power plans where the Company has management control. However, one contractor of our joint-venture power plant was dead from work related accidents. As a result, the Company has still closely monitored the contractor's operations. In order to standardize and increase efficiencies of contractor management, the Company has paid high importance on developing measures to reduce work -related risks and accidents.



Contractor works closely and is one of the key drivers

In creating stability of power generation process, the sound operational performance and safety





Customer Management



Indicator

» Availability and Reliability » Customer complaints. » Customer satisfaction.
according to customer needs.



Target



The combined heat and power plants can maintain the availability and reliability according to the needs of customers.



No complaints related to issues on business ethics and how to keep information on customer privacy.



Receiving over 90% of customer satisfaction.



Strategy



Driving sustainable customer management in production units through the integration of quality management system standards (ISO 9001), occupational health and safety management system standards (OHSAS 18001/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.



Improving production system to high sustainability and efficiency for continuous product delivery to customers.



Performance



The three combined heat and power plants in China, BLC Power Plant and Hongsa Power Plant can maintain the availability and reliability according to the needs of customers.



No complaints related to issues on business ethics and how to keep information on customer privacy.



Customer satisfaction level of all three combined heat and power plants in China is 95-100%.



Economic



Customer Management



Environment



Social



Additional Information



Significance and Reporting Boundary

The Company has five main types of customers, namely:

1 Government agencies, electric state enterprises, or legal entities with the government as a major shareholder, primary buyers under the power purchase agreement.

2 The industrial sector buying electricity and/or 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

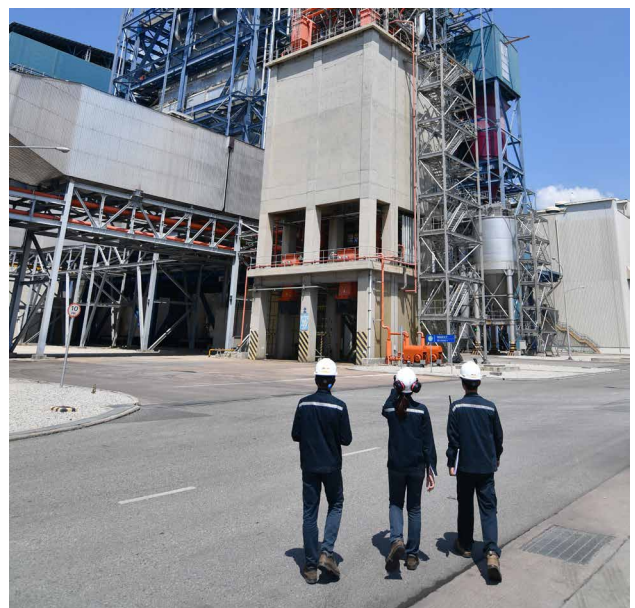
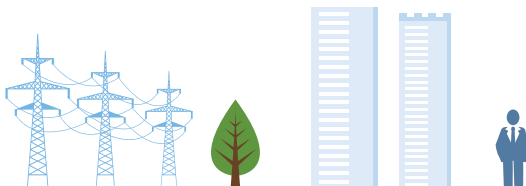
5 Companies buying fly ashes.

The primary customers that mainly generate revenues are the government agencies/state enterprise, the primary electricity buyers under the power purchase agreement, as well as the industrial sectors buying electricity and/or 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.

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:

- ✓ Understanding needs and expectations of customers.
- ✓ Setting operational goals in accordance with customers' needs and expectations.
- ✓ Communicating throughout the organization to create understanding on customers' needs and expectations
- ✓ Measuring customer satisfaction.
- ✓ Establishing a systematic customer relationship.
- ✓ Taking into account the balance in responding to the needs of customers and other stakeholders.



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.



- 3 People values**
by knowledgeable staff with corporate culture as the qualified human resource with ability to accurately solve the customers' problems in timely manner.



- 4 Image values**
by operating businesses professionally based on business ethics and good corporate governance.



Performance

In the past year, the combined heat and power plants in China were able to maintain availability and reliability according to the needs of customers in both public and private sectors. From the customer satisfactory survey, it was found that the level of satisfaction was at 95-100%; besides, there was no complaint related to business ethics issues and keeping information on customer privacy. Additionally, the power plants also had flexibility to adjust steam supply before the deadline to accommodate the customers' needs during the winter that came earlier than usual in the previous year.

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 quality of electricity would be determined, such as the characteristics of voltages, frequencies, etc. In this regards, the Company was able to generate power according the international quality standards and the power purchase agreements.

The power plants under joint venture companies, namely BLCP Power Plant and Hongsa Power Plant were able to maintain availability and reliability in accordance with the power purchase agreements with the government sector. Moreover, they have been entrusted to perform full production in accordance with the production capacity to help maintain stability of the power system and energy security in Thailand.



Customer Complaint Handling Process

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.
- Proving 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. To designate process of receiving complaints and handling them 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 customer satisfaction surveys through various channels, for example:

- An interview to evaluate in-depth satisfaction for assessing 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 score.

The combined heat and power 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.



Safeguarding Customer Information

The Company is fully aware of the significance of safeguarding information receiving from customers in order to prevent damages and build trusts among customers. Policy and guidelines are as follows:

1 Use of Information

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

2 Information Disclosure 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.

3 Security Maintenance of Information

- The Company protects 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.

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 on 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 reasonable prices.



2) Providing accurate and sufficient 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 quick response to customers.

6) Securing customers' confidentiality and not to use the data for self-benefit or any wrongful related persons.

7) Providing advices on user manual of the Company's products and services effectively with the utmost benefit to the customers.

Economic



Customer Management



Environment



Social



Additional Information

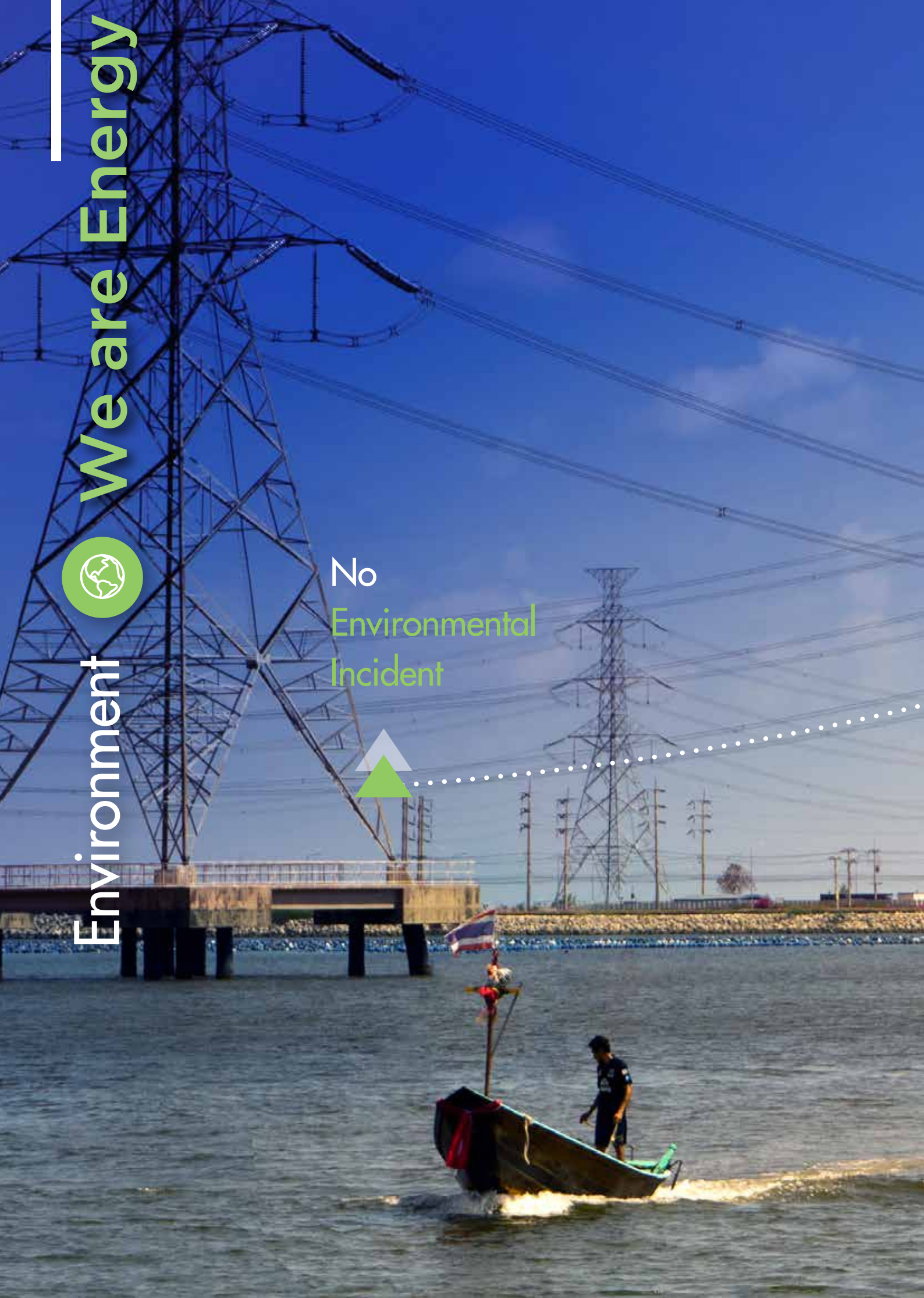


Environment



We are Energy

No
Environmental
Incident



GHG emission rate
0.6130 tonne
CO₂e/MWh

Sulfur Dioxide
Rate 0.0248
Tonne/GWh

Oxide of Nitrogen
Rate 0.0536
Tonne/GWh

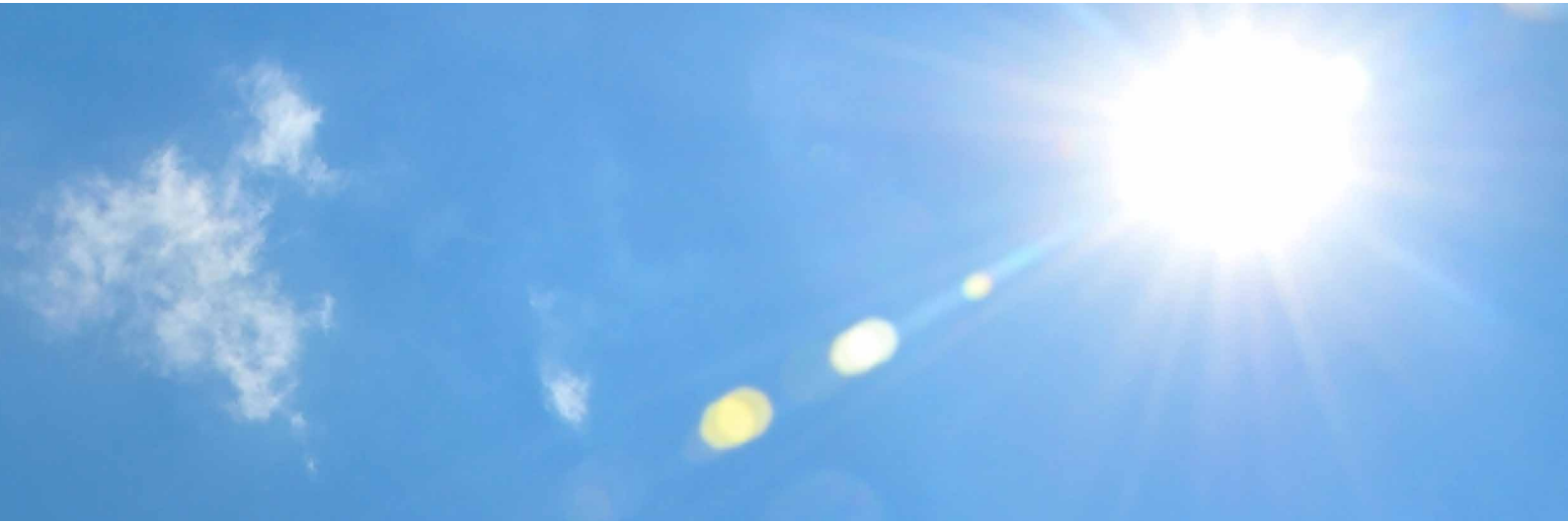
Particulate Matter
Rate 0.0039
Tonne/GWh

Water Consumption
Rate 1.103
cubic meter/MWh





Green House Gas (GHG) Emissions



Indicator

» **GHG emissions intensity** per unit of product.

» **Investing in renewable** power generation projects.



Target



Reducing **15%** GHG emissions intensity per unit of product by 2020 against the 2012 baseline by 2020.



A proportion of renewable energy production capacity is **not less than 20%** by 2025.



Strategy



Reducing greenhouse gas (GHG) emissions per unit of product 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.



Performance



The GHG emissions intensity per unit of product was 0.6130 tonnes of CO₂e/MWh, **increased by 2.9%** compared to 2012.



The production capacity of renewable energy was 189.2 MW, **representing 8.8%** of the total electricity generation.

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 2 degrees Celsius. As such, the policies and laws regarding climate change have been issued such as the Emission Trading Scheme (ETS), the promotional scheme for clean energy investment, for example a renewable energy, etc.

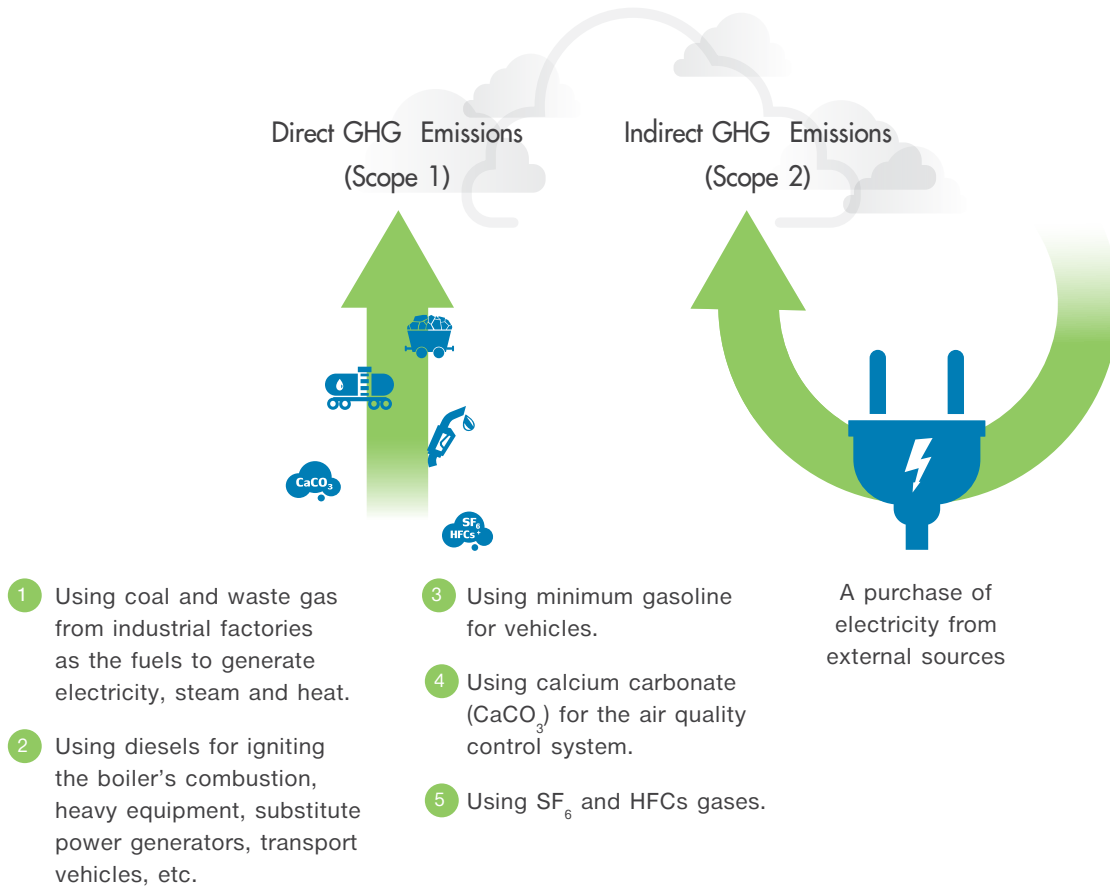
During the 24th United Nations Framework Convention on Climate Change (COP24) held last year, the operational practices according to the Paris Rulebook and the Paris Agreement Work Programme (PAWP) were certified. As a result, all countries will have enough time to prepare themselves to manage the climate change issue according to such agreement in the next two years. Hence, it is expected that the GHG emission reduction measures of each country will be clearer such as the announcement of policies and laws by the government body, the enhancement of accessing to

funding sources in developing countries. This may be an opportunity for the Company to invest in the clean energy in the future.

The GHG emissions data disclosed in this report cover all thermal power plants and solar power plants in China and Japan in which the Company has direct operational control. In addition, the disclosed data are in accordance with the GHG Protocol Corporate Accounting and Reporting Standard (Revise Edition),

which is in line with the Banpu Group's one. The two joint venture power plants in Thailand and Lao PDR of which the Company has not had direct operational control namely, BCLP Power Plant (50%) and Hongsa Power Plant (40%), have reported their GHG emissions exclusively, not including in the Company's GHG emissions data in accordance with Banpu Group's practices on GHG emissions reporting earlier mentioned.

The Company's activities causing GHG emissions are summarized as follows



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

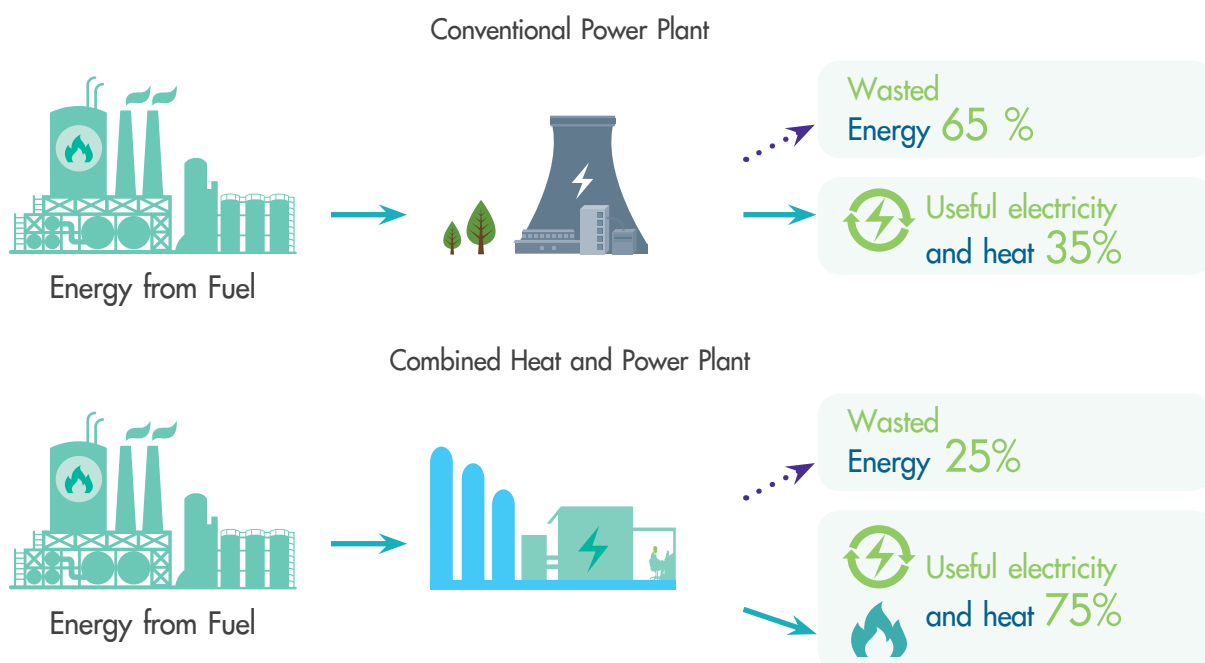
their intentions to reduce greenhouse gas emissions in the Paris agreement. The Company has a management approach to reduce greenhouse gases as follows.



The Conventional Power Generation Plant that Currently Operating

- The combined heat and power 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 GHG emissions intensity. Customer's demand to purchase steam at different times, however, will directly affect the efficiency of energy consumption and GHG emissions. The Company therefore, focuses on using innovation to improve the power plant efficiency. Additionally, The Company together with Banpu Group have monitored and checked the accuracy of the greenhouse gas emissions database. The three combined heat and power plants were inspected and certified for GHG emissions in 2018.
- The conventional power plants which are the joint venture companies, namely BLC Power Plant and Hongsa Power Plant, focus on the quality management and annual maintenance. This also includes the implementation of an information system 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.

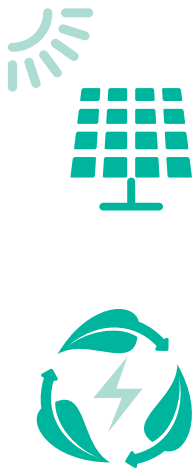
In addition, the Company is also looking for opportunities to use a variety of fuels in response to the stakeholders, being able to get fuel supplied in the area such as natural gas, biomass and industrial waste gas, etc.





Conventional 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 Luguang (SLG) Power Project which is under development.



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 per production unit. At present, the Company has the solar power plant and hydro 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 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

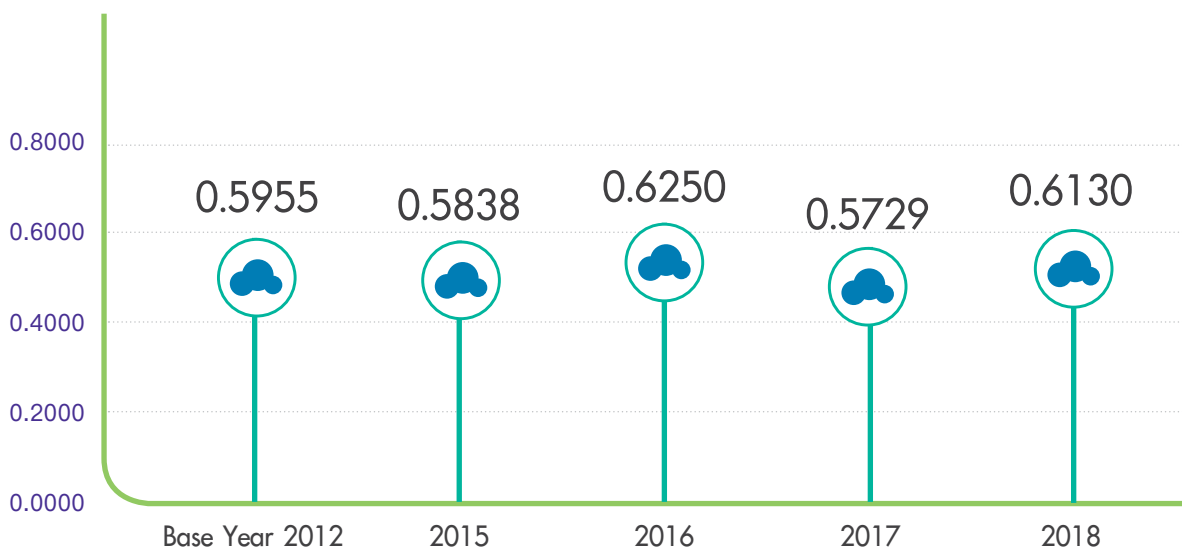
Green House Gas Emission Per Unit of Product

In 2018, the GHG emissions intensity increased by 2.9% compared with the 2012 baseline due to a temporary increase in energy consumption caused by following factors.

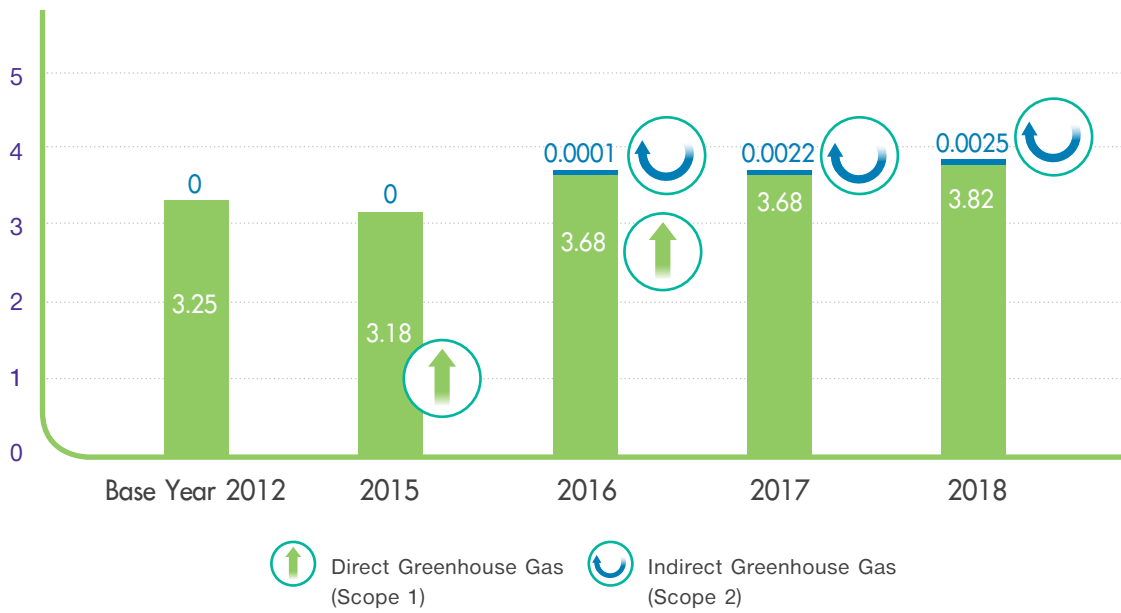
- 1  A temporary decrease in steam demand from customer leads to change production methodology that used higher energy intensity.
- 2  A production capacity expansion of Luannan Power Plant Phase 2.
- 3  A construction closed coal storage for all three power plants
- 4  A construction to improve air quality released from Luannan and Zhengding power plants.
- 5  A construction to improve efficiency and safety of all three power plants
- 6  The solar power projects in China were ordered to temporarily suspend their operations due to an accident in the governmental power station.
- 7  The solar power projects in Japan had to suspend their electricity supply temporarily due to the earthquakes.

As a result of this, the Company's GHG emissions intensity per unit of product was up in the previous year, although the Company was able to launch two additional solar power plants, namely Mukawa and Nari Aizu

Greenhouse gas emissions intensity (tonnes of CO₂e/megawatt-hour)

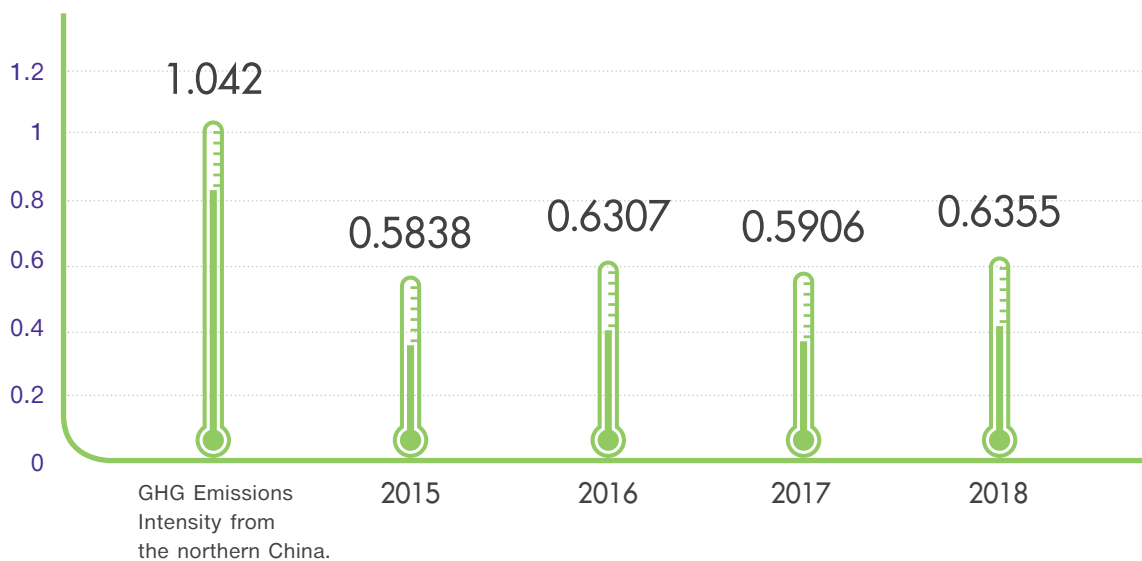


The amount of direct and indirect GHG emissions (million tonnes of CO₂e)



Economic

The GHG emissions intensity from the combined heat and power plants in China (tonnes of CO₂e/megawatt-hour)



Environment

Green House Gas (GHG) Emissions

Social

Reference:
IGES List of Grid Emission Factors (2017)

The thermal power plants of which the Company has no direct management control namely BLCP Power Plant and Hongsa Power Plant, on the other hand, have different operational scope though they are the conventional power plants. The Hongsa Power Plant's GHG emissions intensity was higher because it is a mine-mouth power plant. Therefore, the greenhouse gas was emitted from electricity generation, coal mining and limestone. Meanwhile, the BLCP Power Plant

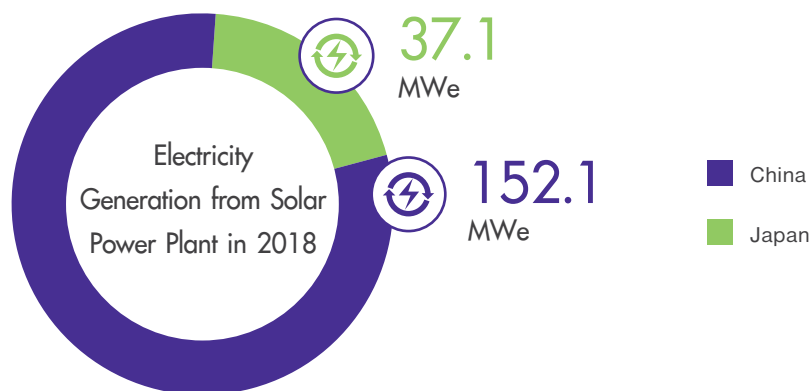
purchased coal from external sources so that its GHGs were emitted only from power generation. However, the GHG emissions intensity of the two power plants was higher than that of Chinese power plants. As the electricity generated by BLCP and Hongsa power plants was for sales only, their energy loss and GHG emission intensity were higher than those of the combined heat and power plants which generate power and steams for sales.

Additional Information

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

Following our goal 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 an electricity production capacity of solar energy accountable for 8% of a total production,

consisting of 152.1 MWe from China and 37.1 MWe from Japan. There were two solar power projects commencing their commercial operations in 2018, namely the 17 MWe-Mukawa Project (representing 9.5 equity MWe) and the 25 MWe Nari Aizu Project (equivalent to 15 equity MWe).



In addition, the Company's plan to develop wind energy business Vietnam was approved and received the Investment Registration Certificate (IRC) for Phase 1, with a capacity of 30 MW from the total capacity of 80 MW. It is expected that the wind power plants in Vietnam will gradually start commercial operations in 2020-2023. This is the key milestone for the Company's business investment in Vietnam.

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.





The production expansion of Luannan Power Plant has turned the plant from the electricity and steam supplier to the integrated energy provider.

Presently, China's energy structure is moving towards the changing mode. Most of the combined heat and power plants are affected by policy changes in reducing coal energy consumption and increasing renewable energy production. In addition to selling electricity to the state's grid/electricity system, Luannan Power Plant, located in the city and the only supplier of steam to the city, expanded its power production capacity of Phase 2 last year. The plant increased its power production capacity to 52 MW by using clean and highly efficient technology as well as installing the sulfur dioxide detectors having equivalent standards to the European countries. A close monitor on energy policies has made Luannan Power Plant well prepared. The plant is looking for opportunities to expand its solar power generation capacity of distributed solar PV for industrial plants in the area. The aim is to sell electricity to industrial factories according to government support scheme.

Economic



Environment



Green House Gas (GHG) Emissions

"A Feasibility Study for Adding Values of Gas Discharged from Coal-fired Power Plants with By-products of Hydrogen Gas for Methanol Production"

BLCP Power Plant and Thailand Institute of Scientific and Technological Research (TISTR) signed the cooperative agreement to conduct a "feasibility study for increasing the values of waste gas from coal-fired power plants in conjunction with by-products from hydrogen gas to produce methanol" on 6 September 2018. The aim was to jointly develop wastes/effluent from the coal-fired power generation process as a model for coal fired power plants using clean technologies in order to reduce waste gas released, including nitrogen, carbon dioxide, sulfur oxides, and nitrogen oxides.

Social



Additional Information



Carbon Pricing

The power generation and energy industry is part of the significant greenhouse gas emissions to which the Company is committed as part of mitigating climate change by reducing GHG emissions. A carbon dioxide price or a GHG cost is commonly called the “carbon price.”

In the past year, the Company studied on the internal carbon price which would determine the GHG cost in various areas used as part of the cost. In analyzing 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.

Carbon Pricing Mechanism



Other Indirect GHG Emissions (Scope 3)

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

Type of Activities	Association	Description
1. Purchased of goods and services	✓	A production and transportation, coal, oils, electricity, several chemical substances, constructional materials, contractors' services, etc. (Exclusion of the Hongsa Power Plant, which is a mine-mouth power plant)
2. Capital goods	✓	The Company's capital goods mostly include machineries, spare parts, vehicles, project's constructional materials.
3. Fuel and energy related activities outside direct (Scope 1) and indirect (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 in operations	✓	Affluent treatments or disposals by external persons/parties such as hazardous waste treatments and disposals 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 little 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 some energy.
11. Use of sold products	✓	The consumer's consumption of electricity, steam, hot and cold water is considered of the in-direct GHG emissions by customers.
12. End-of-life products treatment of sold products	○	The electricity and heat is no 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	✓	The Company has various investment projects including the thermal power plants and the renewable power plants. The power plant projects significantly emitting GHGs are joint-venture companies namely, the Hongsa Power Plant and the BLCP Power Plant, inclusion of fuels and other energies used by sub-contractors during the project construction.

Notes

- ✓ Associated with the Company's operations
- Associated with the Company's operations but without significance
- ✗ Not associated with the Company's operations





Indicator

The energy consumption intensity per unit of product.



Annual Target



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



Strategy



Controlling the use of fuels at the highest efficiency



Deploying the high efficiency and environmental-friendly technology.



Supporting projects and innovations related to energy saving.



Performance



The energy consumption intensity was 1.72 Gigajoule per Megawatt-Hour, **increasing 4.2%** compared to 2017.

Significance and Reporting Boundary

The major costs of thermal power plants and combined heat and power 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 standards for local government production units, such as those in China, are considered as the challenges the electricity producers must adapt to keep up with changes. This includes the improvement of current power plants and projects under development in response to clean energy demand in the future.

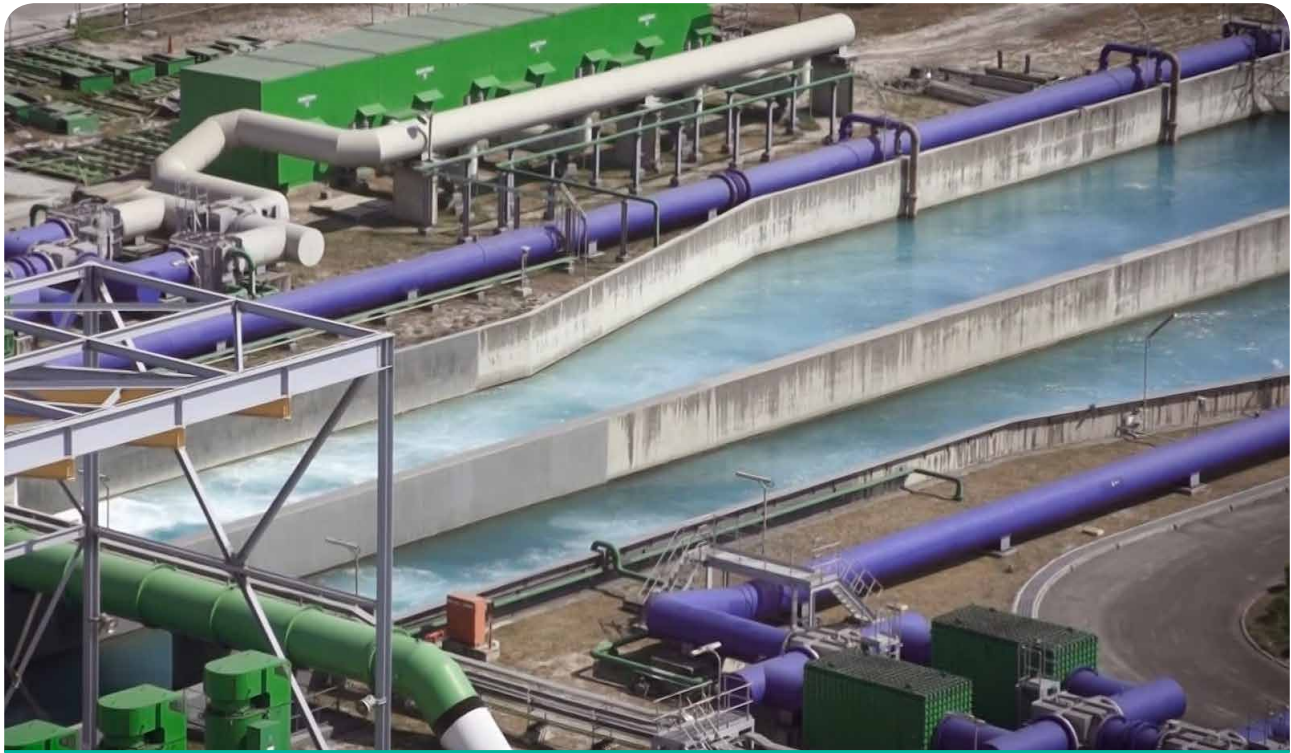
The power plants having lower energy consumption intensity and participating in mitigating climate change are included in the energy consumption reporting

boundary in accordance with the greenhouse gas report. This covers business entities in which the Company has greater than 50% of investments and management control including the power business in China and Japan. The energy consumption of joint venture companies namely, BLCP Power Plant and Hongsa Power Plant, however, has been reported separately in performance data section.



The Company has greater than 50%

of investments and management control including the power business in China and Japan.



Activities related to energy consumption in producing electricity, steam and heat



Using coal as a fuel to generate power, steam and heat.



Using other fuels such as waste gas from industrial factories.



Using diesel to ignite the boilers and as a fuel for heavy equipment and transportations.



Using gasoline for transportations.



Purchasing electricity from external sources such as the solar power plants.



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 negligible energy, only using electricity purchased from external sources in the office during a night time. The Company, therefore, focuses on power management in its power plants as follows.



Economic



Environment



Energy



Social



Additional Information



Current Thermal Power Plants	Future Thermal Power Plants	Renewable Power Plants
<ul style="list-style-type: none"> Improving the boiler efficiency in order to achieve the most complete combustion. 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 machines. 	<ul style="list-style-type: none"> Using the high-efficiency technology with low fuel consumption and environmental-friendly. 	<ul style="list-style-type: none"> Increasing electricity production from renewable energy with no less than 20% by 2025.
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Arranging the fuel transportation system and others appropriately to reduce the transportation's energy consumption. 	<ul style="list-style-type: none"> 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 1.72 gigajoules per megawatt-hour, increasing by 4.2% compared to 2017. Due to the production capacity expansion of Luannan Power Plant's Phase 2 and the installation of machinery and equipment to improve the air quality of Luannan and Zhengding Power Plants, the overall energy consumption was higher. The Company has regularly

monitored and compared the imported energy to the energy produced and energy consumption in each production unit since it is the main cost of electricity generation from thermal power plants and combined heat and power plants. It is also looking for opportunities to reduce the use of fossil fuels which are the costs and cause greenhouse gas emissions such as:



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.



Looking/ 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.

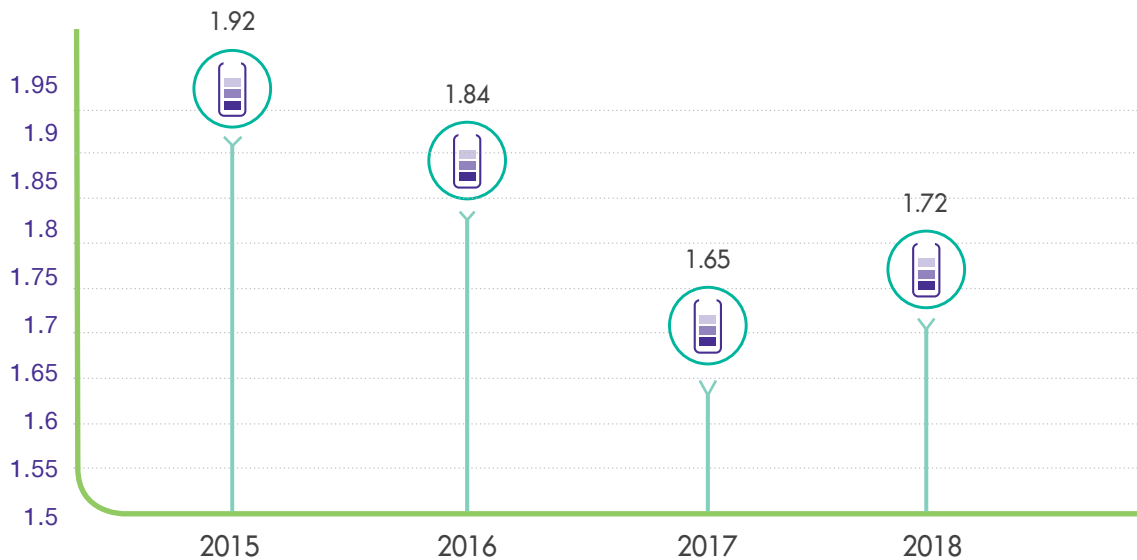


Sales of other products related to electricity production according to market demand such as steam and cold water can reduce energy loss and energy consumption rate per unit of product.

In the past year, Luanan Power Plant's Phase 2 commenced its commercial operation with a capacity of 52 MW. Additionally, the two new solar power plants in Japan, namely Mukawa and Nari Aizu started commercial operations with a total production capacity of 37 MWe (24.5 equity MWe). Increasing a production capacity by using efficient technologies and generating electricity from renewable energy will result in a reduction of the Company's energy consumption rate per unit of product in the future

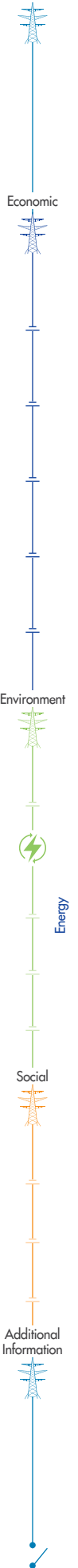


The below graph demonstrates the energy consumption rate per unit of product (Gigajoules/MWh)



In addition, BLCP Power Plant and Hongsa Power Plant have studied an improvement of the boiler's fuel combustion efficiency in order to use energy with maximum efficiency. This will not only help in saving

fuels, but also extending the life of various devices, reducing maintenance costs, increasing the power availability, and improving the air quality released from the stacks.





Indicator

- » The sulfur dioxide (SO₂) emission rate per unit of product.
- » The oxide of nitrogen (NO_x) emission rate per unit of product.
- » Particulate Matter (PM) emission rate per unit of product.



Annual Target



The SO₂ emission rate per unit of product is not exceeding **0.0282** tonnes per GWh.



The SO₂ emission rate per unit of product is not exceeding **0.0737** tonnes per GWh.



Particulate Matter (PM) emission rate per unit of product is not exceeding **0.0057** tonnes per GWh.



Strategy



Choosing the right fuel.



Improving the combustion system efficiency.



Developing the effective trapping system and controlling air quality before discharging from the stacks.



Installing the air-quality monitoring system at the stacks and the surrounding communities.



Performance



The NO_x emission rate per unit of product was at **0.0248** tonnes per GWh.



The SO₂ emission rate per unit of product was at **0.0536** tonnes per GWh.



Particulate Matter (PM) emission rate per unit of product was at **0.0039** tonnes per GWh.

Significance and Reporting Boundary

Sulfur dioxide (SO₂) and oxides of Nitrogen (NO_x) as well as a quantity of dust are the indicators of air quality released at the stacks of thermal as well as combined heat and power plants. Since these gases and dusts may have the effects to air quality, agriculture, 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 power plants in which the Company holds greater than 50% of investments and management control including

the power business in China and Japan. The power plants releasing SO₂ and NO_x as well as dusts are the three combined heat and power plants in China. The solar power plants in Japan, however, have not released any

of SO₂. BLCP Power Plant and Hongsa Power Plant, which are the joint-venture companies, separately disclosed the information on SO₂ and NO_x management in the “operating performance” section.

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 to control air quality as followings:

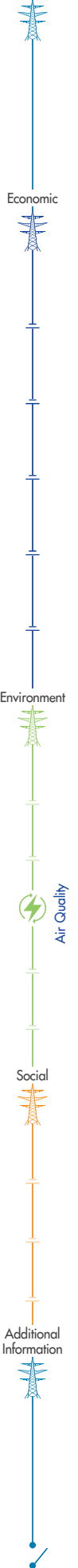
1 The Company has opted to use coal with low sulfur contents to reduce the amount of sulfur dioxide at the original point. It has established a long-term purchase contract for the quality coal resources as specified. The online trading system has been open for coal traders to offer the coal quality meeting the Company’s requirements.

5 A study was conducted and the air quality models were created in the surrounding project’s areas so as to calculate the appropriate height of the stack with sufficient circulation and distribution of air as well as prevent risks on blowing pollutants to the communities in some seasons.

2 The clean technology has been used to help the boiler igniting completely, such as the introduction of clean technology namely, the “Pulverized Fuel Combustion” to reduce SO₂ and NO_x as well as dusts during the boiler’s combustion. This includes the use of Low NO_x Burner to control the combustion temperature in order to reduce oxides of nitrogen.

3 The high standard precipitator has been installed at the stack, for example a dust precipitator called the “Flue Gas Desulfurization (FDG),” a dust capture system-the Electrostatic Precipitator, and a dust filter-the “Bagfilter,” etc.

4 The Continuous Emission Monitoring System (CEMs) has been implemented to continuously monitor the air quality released at the stack, while the Ambient Air Quality Monitoring System (AQMS) has been installed in neighboring communities. In addition, samples of quality have been collected by third parties in order to verify the reliability of the system.



Performance

The amount of emissions from the stack depends on the quality of coal used for combustion, the boiler's combustion efficiency, and the efficiency of trapping pollutant gases before being released. The three combined heat and power plants in China have continuously improved the air quality at the stacks

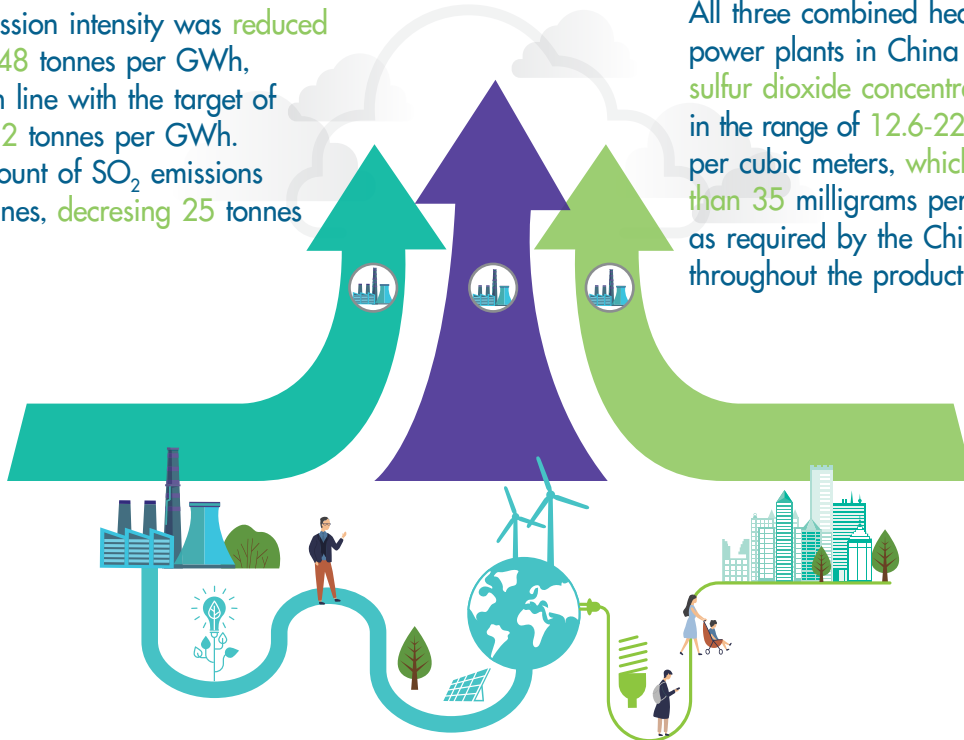
before being released since 2013. This has resulted in a significantly higher air quality released at the stack. In the previous year, the air quality of all three power plants in China was released in accordance with the standards specified by laws while the amount of emissions decreased as the target set.



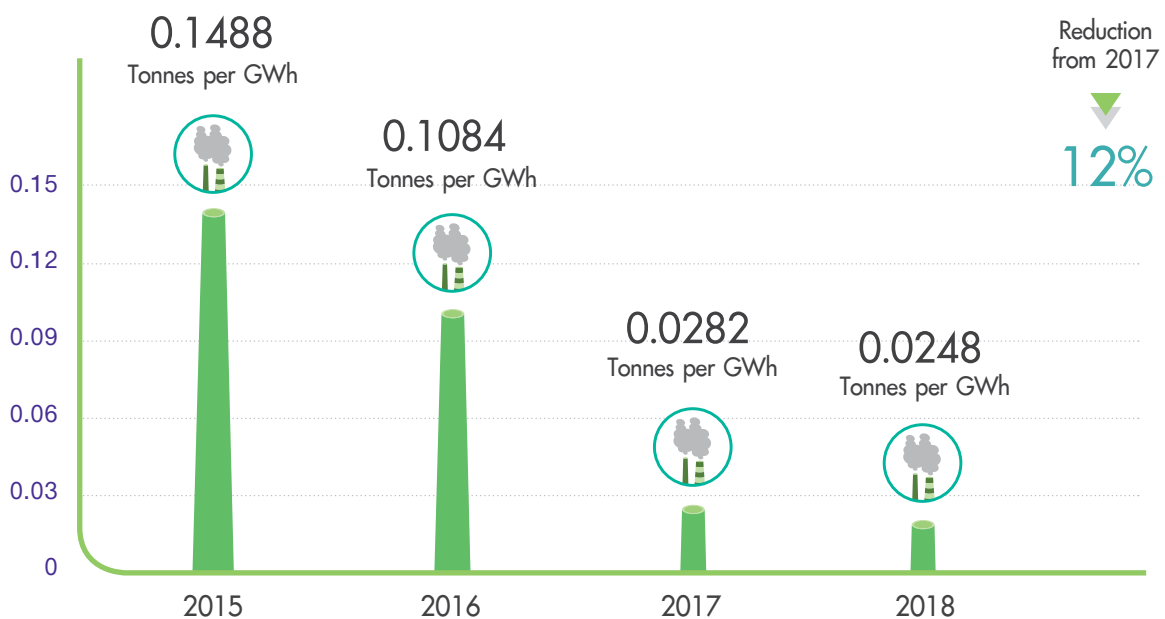
The SO₂ emission intensity was reduced to only 0.0248 tonnes per GWh, which was in line with the target of below 0.0282 tonnes per GWh. The total amount of SO₂ emissions was 149 tonnes, decreasing 25 tonnes from 2017.



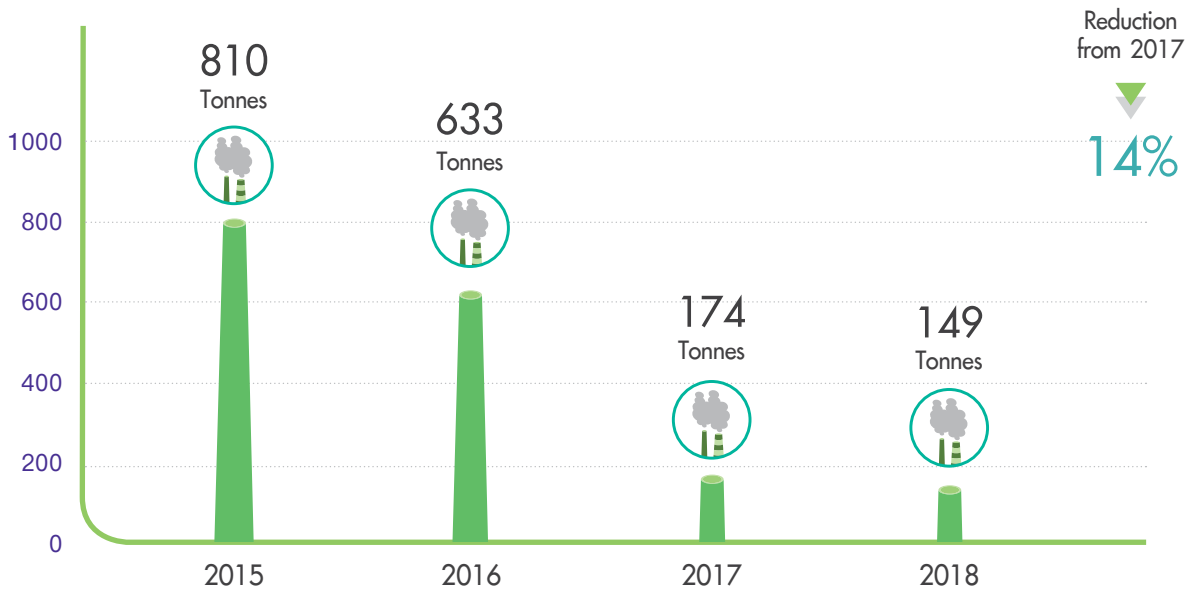
All three combined heat and power plants in China have sulfur dioxide concentrations in the range of 12.6-22.45 milligrams per cubic meters, which is lower than 35 milligrams per cubic meters as required by the Chinese laws throughout the production period.



NO_x emissions rate for power business (Tonnes per GWh)



The amount of SO₂ emissions (Tonnes)

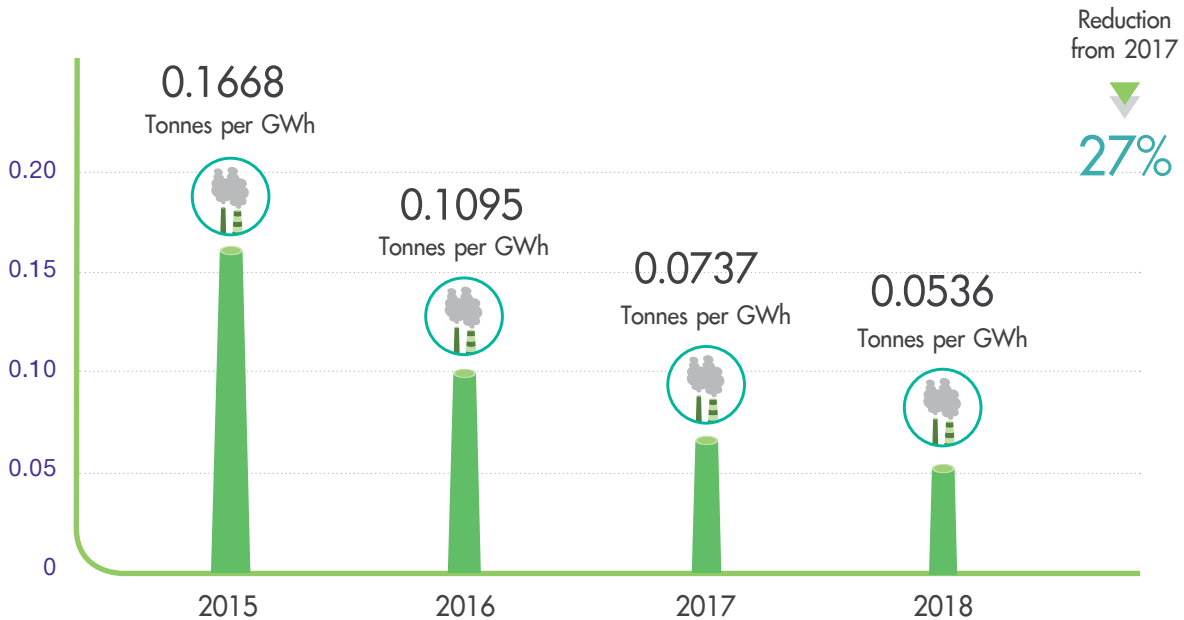


The oxide of nitrogen (NO_x) emission rate reduced to only 0.0536 tonnes per GWh in line with the target set below 0.0737 tonnes per GWh. The total amount of NO_x emissions was 323 tonnes, decreasing by 132 tonnes from 2017.



All three combined heat and power plants in China had NO_x concentrations, ranging from 19.00 milligrams per cubic meters to 85.56 milligrams per cubic meters, which was lower than 50-100 milligrams per cubic meters as required by the Chinese laws throughout the operational period.

NO_x emission rate per unit of product (Tonnes per GWh)



Economic

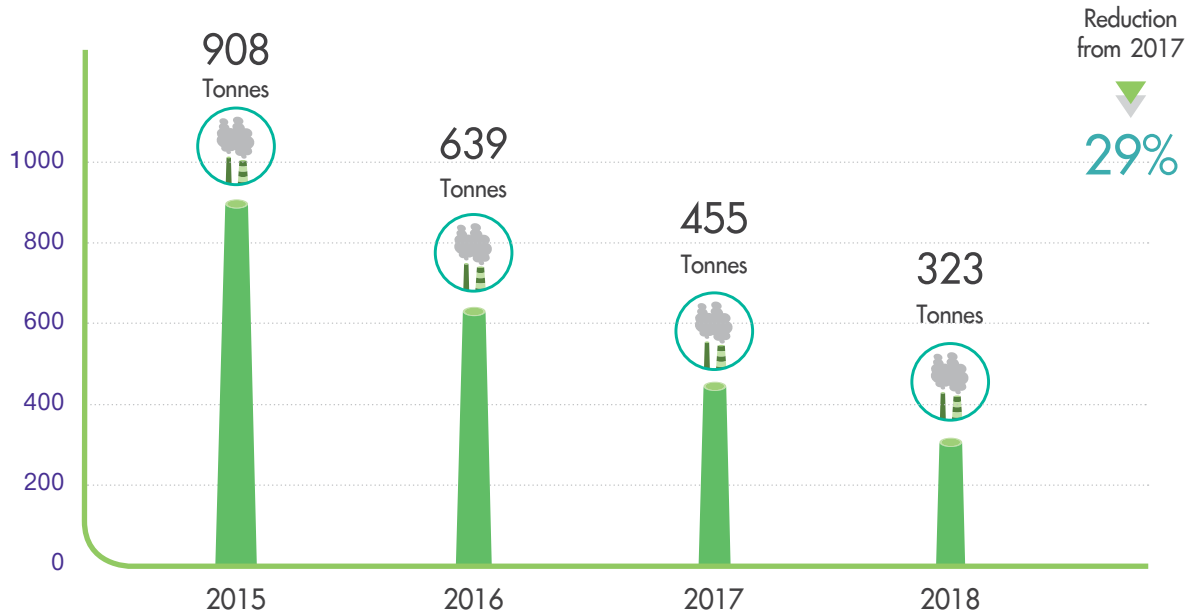
Environment

Air Quality

Social

Additional Information

The amount of NO_x emissions (Tonnes)

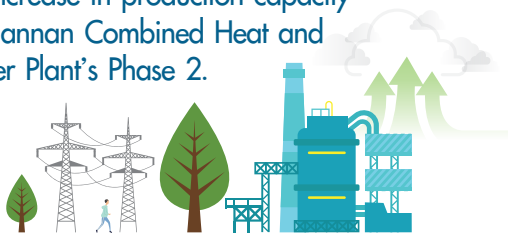


The dust emission rate was 0.0039 tonnes per GWh, which was in accordance with the target set at lower than 0.0057 tonnes per GWh. This represented the total amount of dust emissions of 24 tonnes, which was 11 tonnes lower than the previous year even though there was an increase in production capacity of Luannan Combined Heat and Power Plant's Phase 2.

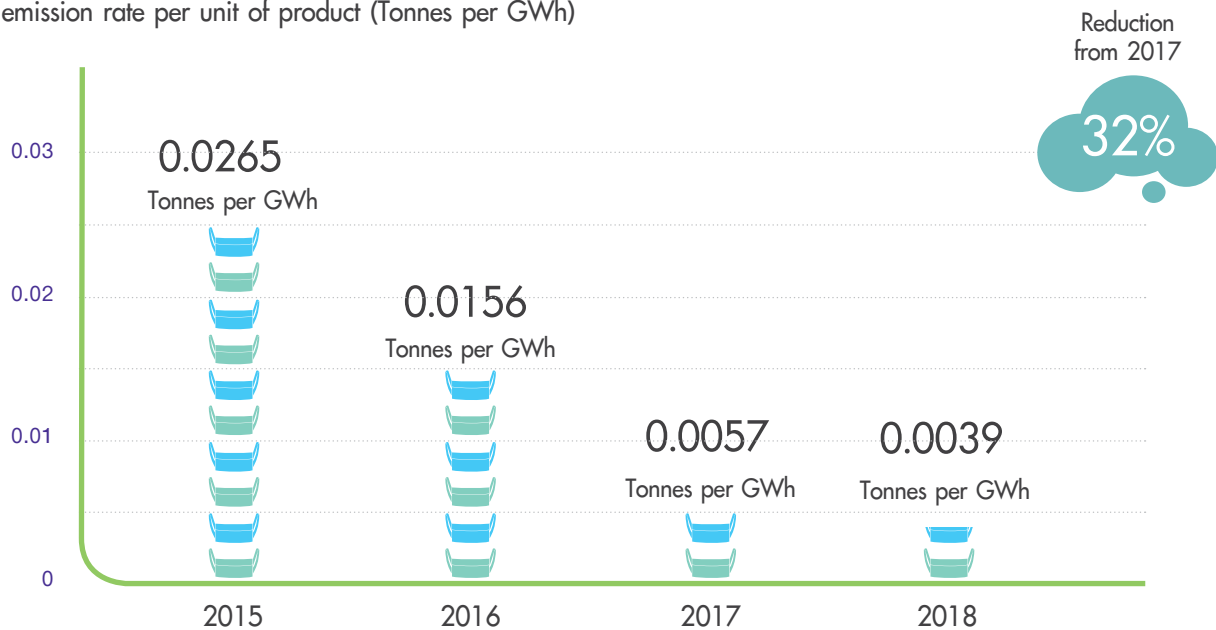


The three combined heat and power plants in China had an average concentration of dust emissions in the range of 1.17-3.86 mg per cubic meters, 10 mg per cubic meters lower than that required by the Chinese laws throughout the production period. In addition to controlling the amount of dust released from the stacks.

The three power plants also constructed a closed-coal storage system in order to decrease the amount of dust generated from coal stockpiles to the minimum level in accordance with the laws.

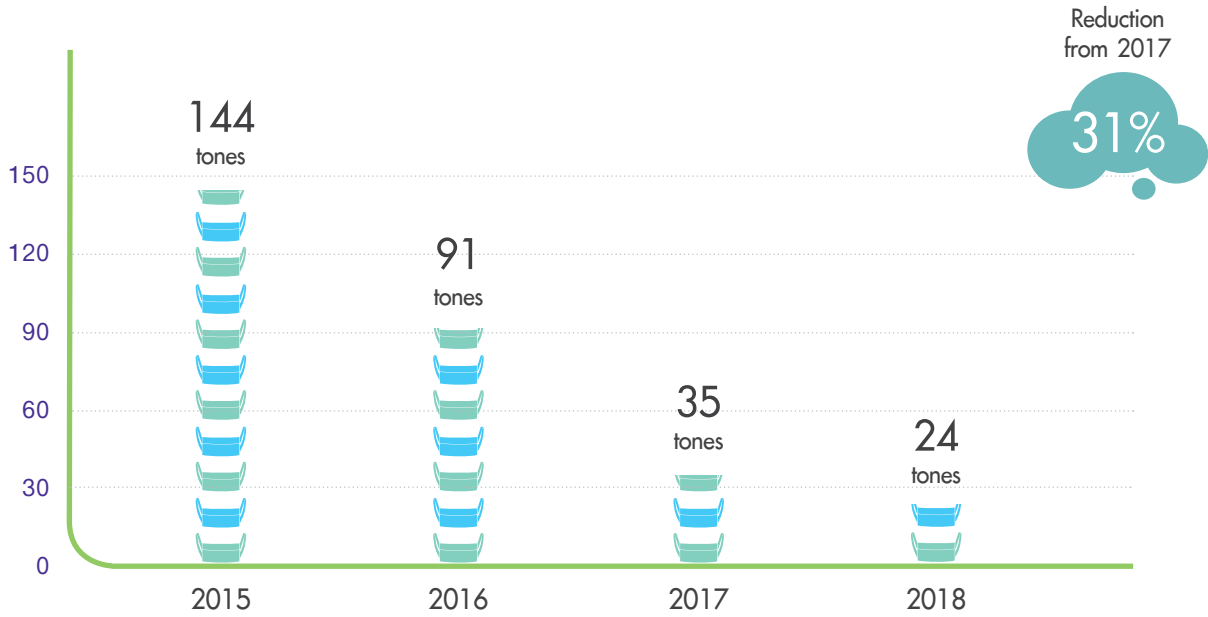


Dust emission rate per unit of product (Tonnes per GWh)





The amount of dust emissions (tones)



An improvement of the boiler to enhance air quality according to the new standards at Zhengding Power Plant

In 2018, the conditions of China’s environmental laws were amended by setting the standard for the amount of NO_x released from the original amount of 100 mg per cubic meters to be only 50 mg per cubic meters. Previously, Zhengding Power Plant had an average amount of NO_x released for 80 mg per cubic meters before the new law announcement. This resulted in a control and improvement of boiler system in the production process in order to reduce the amount of NO_x emissions. As such, Zhengding Power Plant was able to control and reduce the amount of NO_x emissions

to just only 30 mg per cubic meters, making the air quality released at the stack better than that of 40% as required by the new law. As a result, all production units of Zhengding Power Plant were able to generate power continuously in accordance with the laws.



All production units of Zhengding Power Plant were able to generate power continuously in accordance with the laws.





Water Resource Utilization and Water Discharge



Indicator

- » The discharge water quality compared to the standards prescribed by law.
- » A water consumption rate per unit of product.



Annual Target



A discharge water quality is complied with the standards set by laws.

A water consumption rate per unit of product is **lower than 1.232 cubic meters/megawatt-hour.**



Strategy



Improving a production process, reducing loss, and using 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 participation from stakeholders in water management in the area.



Performance



A released water quality is in accordance with the standards required by laws.



A water consumption rate per unit of product is **1.103** cubic meters/megawatt-hour.



Assessing the location of business units vulnerable to water shortages in order to develop a conceptual framework for water accounting and water balance in the production process.

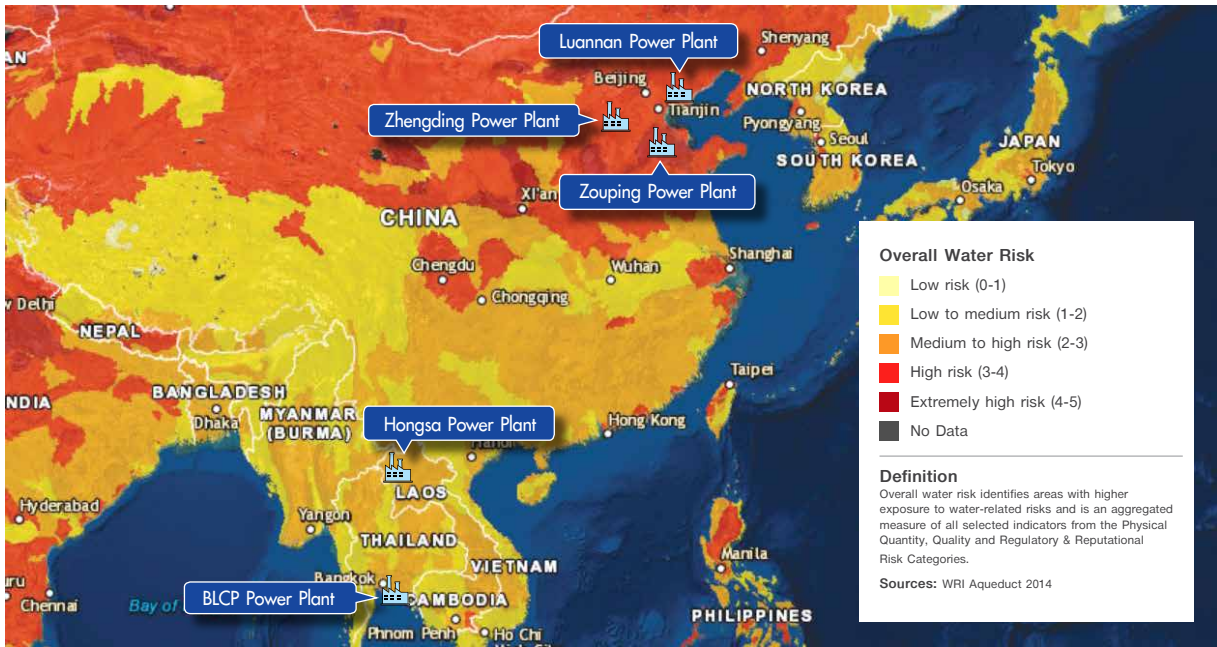
Significance and Reporting Boundary

Water resources are essential to the human life, agriculture, and industry. An access to clean water and having adequate water sources are the key factors for the sustainable development. Presently, the water resource shortage problem is increasingly due to climate change and increasing populations. The Company has put great emphasis on the efficient use of water resources/efficient water consumption especially in the areas with water shortages since the water consumption in thermal power plants may absorb all limited water resources in the area which will have an effect on lives and development of the area.

The three combined heat and power plants in China are located in areas with high risks of water resources possibly causing water shortages in the future. The thermal power plants which are the joint-venture companies namely, BLCP Power Plant in Thailand and Hongsa Power Plant in Laos where water is one of the main raw materials for power generation, have medium risks for water shortages. The Company is, therefore, well aware of the significance of water resource management.



The framework of this report covers the power plants of which the Company has direct management control, inclusion of the three combined heat and power plants in China that have supplied electricity, steam and cold water. The solar power plants in Japan, however, are not reported since they have not used water for power generation significantly. The information of water resource management for the thermal power plants, which are the joint-venture companies, are separately disclosed on the performance data section.



Note The classification of areas with water resource related risks is referred to the WRI Aqueduct Water Risk Atlas, a program displaying maps that help identify areas vulnerable to water regarding physical, economic, legal and predictable risks in the future.

Management Approach

Water resources are the important raw materials for generating electricity, steam, and coal water in the combined heat and power plants. The water usage indicates not only the natural resources consumption, but also the power plant’s operational system efficiency and the loss in various systems such as heat loss, chemical usage, energy consumption and water treatment costs, etc. The water discharge may be from cooling water, water used for the boilers, rainwater from the gutters, cleaning water and other water consumptions, which must be treated and inspected so that the water quality is complied with the standards required by laws before being discharged.

As a result, the consumption of water resources and water released must be well managed because it may lead to conflicts from resource shortages and water quality in the area, affecting stakeholders and surrounding communities. Hence, the Company has set the water management guidelines in accordance with operational standards as followings:



1 Managing water usage for maximum benefit and looking for opportunities to reduce water consumption, 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 emergencies in order to reduce the impact and recover 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 stakeholders engagement especially the local communities and the research sector in order to conserve water resources, improve water quality and management in the area.

7 Supporting the community capacity building so as to have sufficient water sources in the project's areas appropriately.

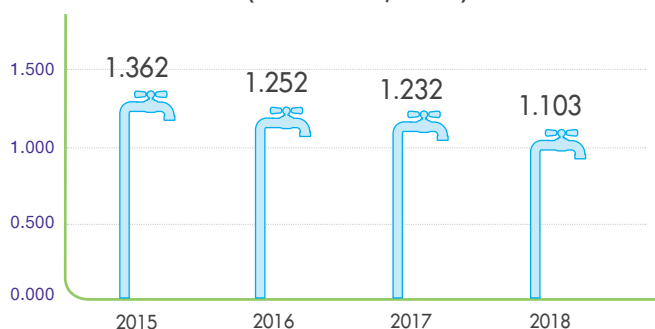
Performance

In the past year, the Company's water consumption rate per unit of product was 1.103 cubic meters/megawatt-hour, decreasing by 10.5% compared to the previous year. The water consumption was mainly from a production of the three combined heat and power plants in China, with a draw of 7.8 million cubic meters of natural water sources, of which 65% was the surface freshwater while the rest was the groundwater. The reduction of water consumption, however, was due to an improvement of the boiler's water quality to be higher. This made it possible to extend the period for

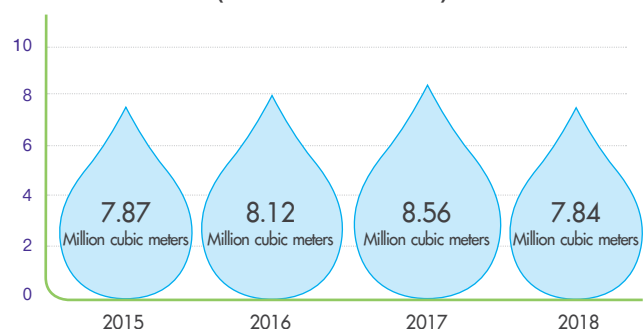


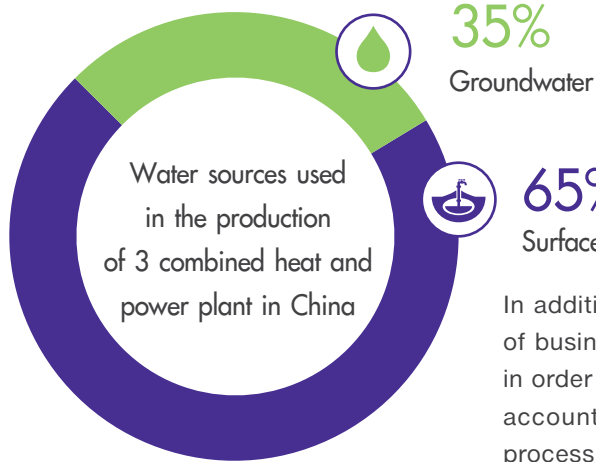
water discharge and keep water used in the boilers stay longer. Most of water discharge were from the combined heat power plants amounted to 0.95 million cubic meters. The effluents were carried to the authorized external parties for treatment. The water quality discharged was in accordance with the standards set by laws while there was no incident regarding chemical leakage into the water source.

Water Consumption Rate
(Cubic meter/MWh)



The amount of water used from natural water sources
(Million cubic meters)

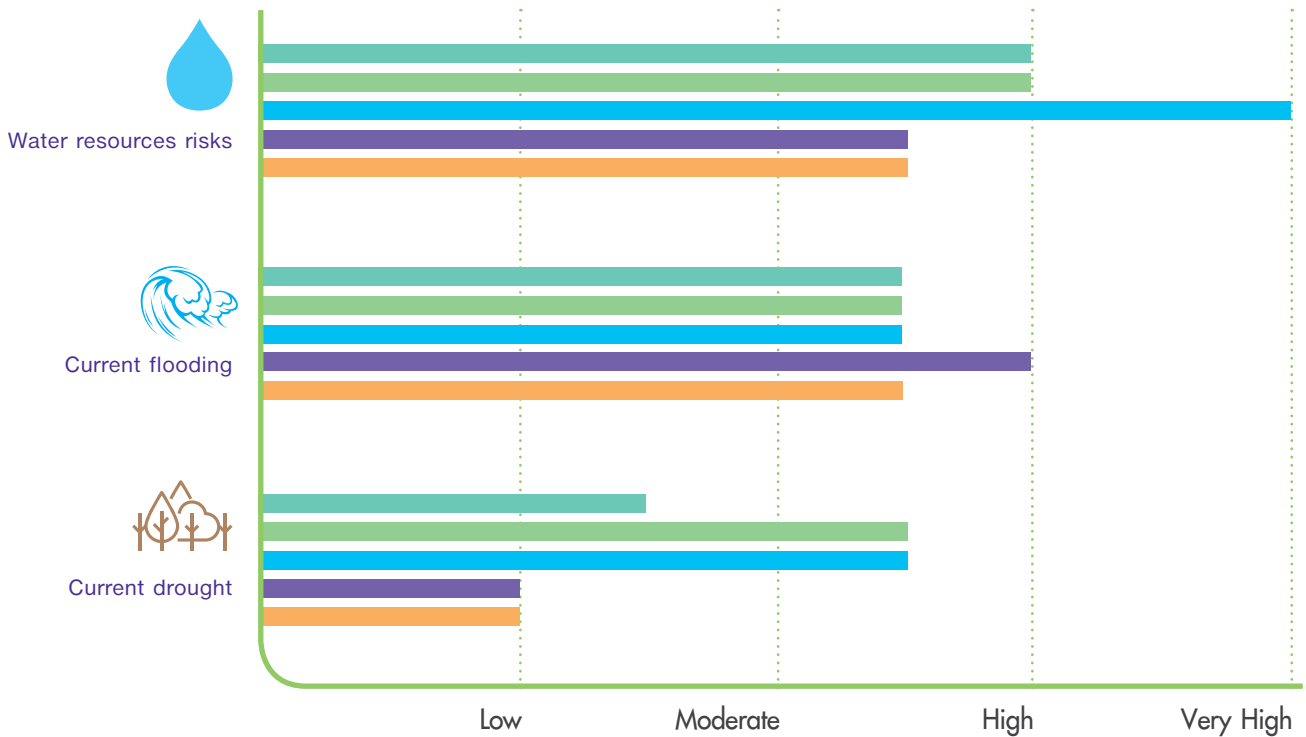




In addition, the company has assessed the locations of business units having water shortage related risks in order to develop a conceptual framework for water accounting and water balance in the production process in the next phase.

Forecasting Water Resource Related Risks

	Luannan	Zhengding	Zouping	Hongsa	BLCP
Country	China	China	China	Lao PDR	Thailand
River Basin	LUAN HE	YONGDING HE	-	MEKONG	-
Prediction of future water demand	▲ Increasing around 1.2 times				
Prediction of the severity of future water shortages.	← The same →				▲ Increasing around 1.4 times





Indicator

A proportion of reused and recycled non-hazardous wastes.



Annual Target



The amount of non-hazardous waste is reused and recycled not less than **50%** per annum.



A proportion of fly ash eliminated by recycling is not less than **100%** per year.



Strategy



Reducing the use of waste generated at its sources



Promoting a reuse and recycling of waste.



Developing measures to prevent and solve the leakages of hazardous waste.



Performance



80% of hazardous waste was reused and recycled per annum



35% of non-hazardous waste was reused and recycled per year.



A proportion of fly ash eliminated by recycling is **100%** annually.



All production units conducted a risk assessment, managed hazardous waste, developed preventive measures, and corrected the impacts from hazardous waste spills.

Significance and Reporting Boundary

The Company has placed top priority to the management of non-hazardous waste generated by operations since it is the best practice for natural resources conservation. This has been carried out by reducing the use of natural resources at its original sources in order to generate minimal affluent. Most of the Company's wastes are ashes generated from fuel combustion, which can be sold as materials for mixing with construction materials. Additionally, the Company emphasizes the hazardous waste management since it will have an impact on environment and surrounding communities if leaking and improperly disposed. Additionally, some countries




where there are no basic structures for eliminating hazardous wastes and no clear laws and regulations, will cause risks on operations, transportations and disposals.

The boundary of this report covers the businesses of which the Company has more than 50% of shares and direct management control including the three combined heat and the power plants in China and the solar power plants in Japan. The information of the joint venture power plants namely, BLCP Power Plant and Hongsa Power Plant, however, is separately disclosed in the performance data section.



Management Approach

The Company has guidelines for managing waste as follows:

Waste	Waste Samples	Management Approach
1. Non-hazardous waste 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Reducing consumption Storing and classifying for reuse and recycling.
2. Hazardous wastes 	<ul style="list-style-type: none"> Lubricant Battery Chemicals used to improve water quality and packaging Electronic wastes such as solar cells that will be obsolete in the future 	<ul style="list-style-type: none"> Reducing consumption Reducing the use of packaging 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 leakage 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.
3. Ash 	<ul style="list-style-type: none"> Fly ash Bottom ash 	<ul style="list-style-type: none"> Separating fly ash sizes corresponding to the customers' needs and the market demand. Explore the market to sell fly ash, bottom ash and gypsum as materials for construction.

Economic



Environment



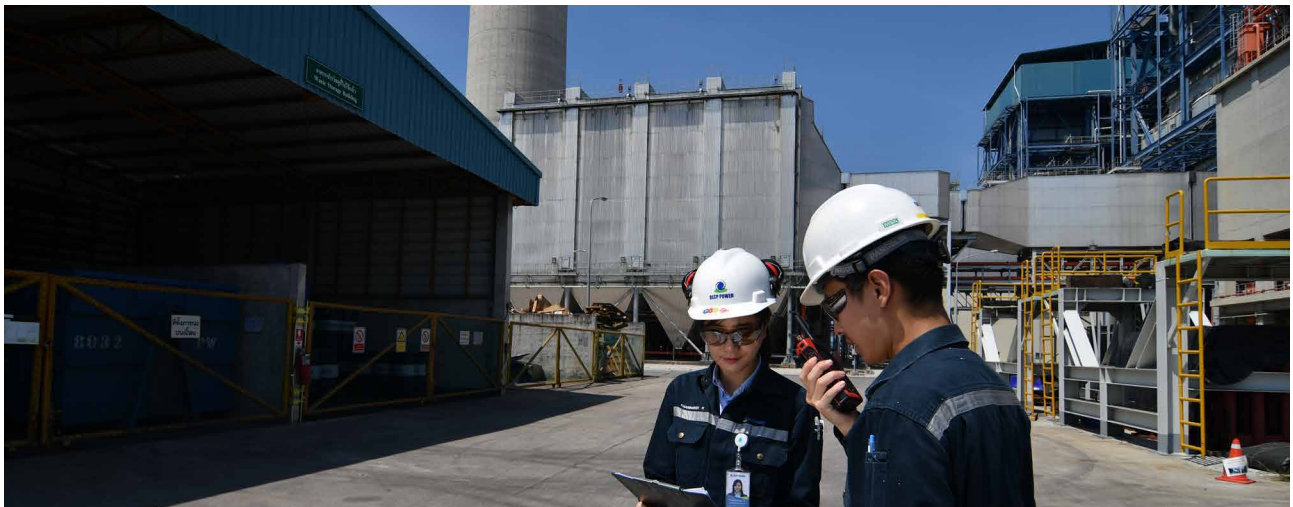
Waste



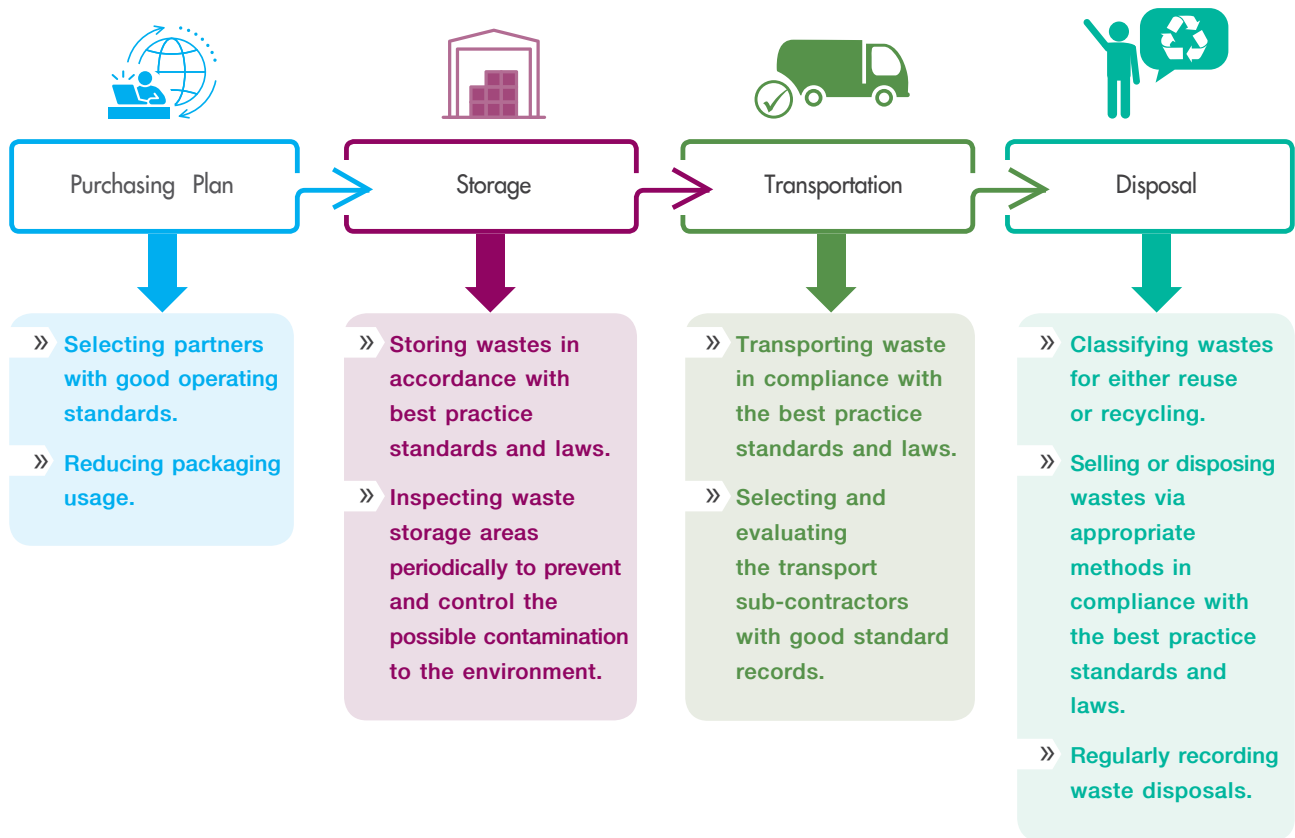
Social



Additional Information



Waste Management

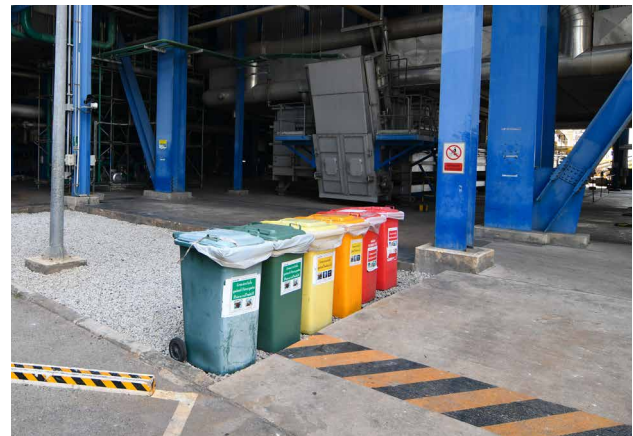


Performance

In the previous year, hazardous waste generated by the Company's operations amounted to 13 tonnes, 80% of which was reused and recycled. This was above the set target of having no less than 50% of hazardous affluent. Meanwhile, the amount of non-hazardous waste was 2,352 tonnes, of which 30% was reused and recycled. The Company, therefore, was unable to achieve its waste management goal.

Fly ash is considered the largest amount of waste and by-products from electricity generation of thermal power plants. Currently, the use of fly ash for mixing with cements to make concretes is widely accepted. The fly ash not only helps improving concrete properties but also saving resources by reducing the use of limestone as well as the areas used for landfill. The amount of ashes generated from the Company's combined heat and power plants in China was 619,138 tonnes, all of which were reused. The size of fly ashes was classified prior to selling as construction materials. Classifying the 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 have not met the customer's expectation.

The solar power plants in Japan, on other hand, have not significantly generated any wastes. Additionally, the solar power plants 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 for recycling and disposal of wastes at a beginning stage of environmental impact before starting operations.



The Company has prepared a water cylinder as a gift for its stakeholders to **create awareness and reduce wastes** generated from using packages.



Social



We are Energy

Tailored community engagement process and CSR projects to fit each community context

No Human Right incident and significant complaints





5 Leadership
Development Programs

15 Competency
Development Programs

“Banpu Heart”,
a strong corporate culture
that creates synergy
to drive business success

Fatality = 0

LTIFR = 0





Indicator

Developing the “Banpu Heart” plan for employees to practice within the organization.



Target



Communicating the corporate culture by raising a concentration level from the core values of "Banpu Spirit" with the newly launched corporate shared value "Banpu Heart" to all employees in countries where the Company operates its core businesses, including Thailand, China and Japan.



Strategy



Driving the “Banpu Heart” corporate culture program by Banpu Spirit Change Leaders (BCL) who are the employee representatives.



Performance



Communicating the newly launched “Banpu Heart” shared value by leveling up concentration of the previous core value “Banpu Spirit” for employees in Thailand, China and Japan.



Improving KPI evaluation by dividing into two parts including the work related KPI accountable for 70% and the behavioral based KPI, representing 30%. The behavioral based KPI is measured through the core values behaviors.

Significance and Reporting Boundary

The previous corporate shared value “Banpu Spirit,” consisting of “Innovation,” “Integrity,” “Care,” and “Synergy” has helped the employees of Banpu Power Group not only in working harmoniously without differences on genders, ethnicities and religions, but also having the consistent mind and commitment to achieving corporate goals. On 3 July 2018, the Company launched the new corporate shared value “Banpu Heart” as the corporate culture.

The newly launched corporate shared values of “Banpu Heart” are comprised of “Passionate,” “Innovative,” and “Committed.” The “Banpu Heart” was originated from the workshop conducted for a diverse group of employees across the organization, who jointly initiated and searched for Banpu’s core values applicable with the Company’s vision and business strategies. 10 core behaviors of the “Banpu Heart” are as followings:

Banpu Heart



Passionate Value includes:

- (1) Pursue for success
- (2) Can do more
- (3) Be agile and change
- (4) Express care and share



Committed Value includes:

- (1) Adhere to Integrity and Ethics
- (2) Synergize and network
- (3) Engage to sustainability



Innovative Value includes:

- (1) Transcend the trend
- (2) Ideate and get real
- (3) Learn fast, do first

Economic

Environment

Social



Corporate Culture

Additional Information

Management Approach

To transform the corporate culture “Banpu Heart” into tangible actions, the Company has continuously improved and implemented following activities:



- Conducting the “Banpu Heart Desired Behaviors Workshop” participated by employee representatives both in the management and operational levels in order to drive the Company to reach its goals.
- 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 new employees 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 with maximum participation, such as the “Banpu Heart” Sharing Session, the Monthly Lunch Sharing, and the Banpu Outing, etc.
- Promoting and encouraging the innovative environment leading to an application of the “Banpu Heart” into innovative practices. This activity has been run through creating understandings as well as increasing work efficiency among employees.

Performance

On 3 July 2018, Banpu Group organized the event called “Our Way in Energy: Leading the Transformation,” to launch the new Banpu Brand and its corporate culture “Banpu Heart.” More than 300 employees from Thailand and overseas attended this event. The “Our Way in Energy: Leading the Transformation”

event demonstrated an important step towards a major change leading to a creation of strength from inside-out and a vision to be a leading energy company in Asia committing to innovation, technology, and sustainability.

“As we are the Banpu Brand Ambassador, starting changing is initially from ourselves.”

“Banpu Heart: Passionate | Innovative | Committed – the three Core Values
Leading Banpu to the Future”

The three core values, namely Passionate, Innovative, and Committed were expressed through the colorful light and sound performance conducted by the committed Banpu Group representatives. Mr. Chanin Vongkusolkrit, the Board of Director of Banpu Power Public Company Limited and the Chairman of Banpu Public Company Limited gave a remark summarizing key significances of the three core values that will unite all Banpu people into one, and will lead Banpu to proudly reach its goals.



Additionally, Mr. Chanin together with Ms. Somruedee Chaimongkol, CEO of Banpu Plc. passed on to executive management in all countries where Banpu operates, including Australia, China, Indonesia, Japan, Mongolia, and China, the missions to continue carrying on the new corporate value “Banpu Heart” and Banpu Brand. Highly impressed by all participants, the event ended with a launch of Banpu’s new theme song reflecting Banpu Brand and its new corporate shared values. The “Banpu Heart” activity was later launched in China and Japan, respectively.





Economic



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Corporate Culture

Additional Information



Corporate Culture Promotion Activities in 2018



- 1 Thailand Innovation Awards Recognition
- 2 The 6th Banpu Innovation Convention 2018
- 3 New Employees Meet Top Management
- 4 Happy Songkran Day
- 5 Lunch Sharing Friendship
- 6 BANPU Spirit Outing: SYNERGY with CARE
- 7 BANPU Freshy Day 2018
- 8 BANPU Young@Heart



On 2 March 2018, Banpu Group organized the "6th BANPU Innovation Convention 2018: The Power of Digital Connection" in Bangkok with an aim to encourage employees to think creatively, create opportunities from learning new things, and share knowledge within the organization. The event was also a platform for employees participating in the innovation contest to demonstrate their potentials. Participants of this innovation contest were from all countries in which the Company has operations. More than 140 executives and employees of Banpu Group from both Thailand and overseas including the joint-venture power plants also presented their innovative projects.

This year, Banpu Group selected 10 innovative projects to be alternatively presented at the event. At the event, the innovation success stories helping improve the corporate procedures and performances, inspired all participants. The three innovation projects from the Company and its joint venture companies were as followings:

1) **Improving the Design of Boiler’s Ash Tubes at Zhengding Power Plant Project**
to ensure combustion with proper internal temperature, increase combustion efficiency, use less fuel, and extends the power plant’s lifetime as well as reduce nitrogen oxidation.

2) **Construction of a Closed-System Coal Stockyard at Zhengding Power Plant Project**
to reduce dust diffusion by using materials from the original structure and windproof fences for waste reduction and cost saving.

3) **Using the Reverse Osmosis System to Improve Sea Water Used for Boilers at BLCPPower Plant Project**
to reduce using fresh water in the area, heighten water quality, decrease water consumption and lessen water discharged from the water-pipe system in order to adjust pressure.

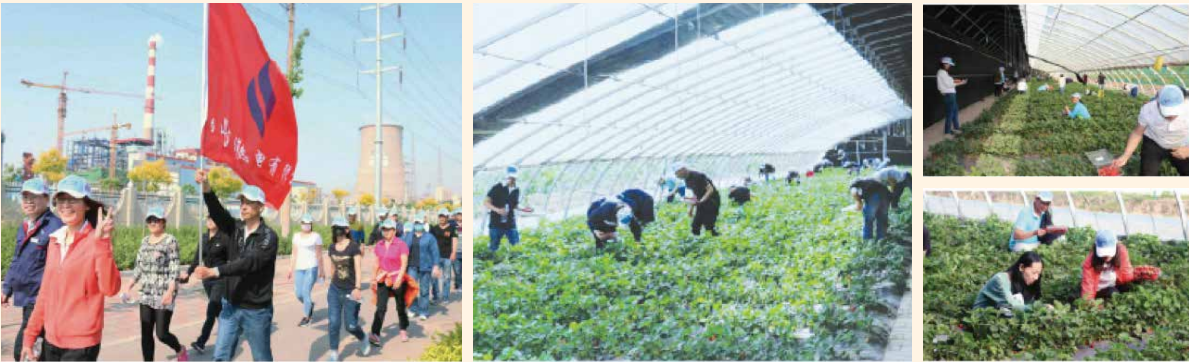


Scan for
Innovation 2018 clip video



The First Ever Long-Distance Walk Activity of Luannan Power Plant Employees

The first joint - walking activity of Luannan Power Plant employees was held in May 2018. The activity was aimed to enhance the corporate culture among its employees and to create an opportunity for them to participate in outdoor activities as well as promote healthy exercises. The walking route started from the Luannan Power Plant and ended at Hongya Fruit Orchard, with a total distance of 5.3 km. There were 130 employees from Luannan Power Plant participated in this activity. In addition to walking, the employee had a chance to join various fruitful activities, such as the internal communication related session to enhance communication skills within the team. The strawberry collection activity drew laughter and fun to participants. The long-distance walk activity helped strengthen relationships among employees of the power plant.





Competency and Leadership Development



Indicator

A proportion of employees attending the leadership development trainings.



Target



Employees attending the “Global Leadership Program and Engaging Leader” training



Strategy



Developing leadership competency and strength as well as managing a succession plan for key positions.



Developing leaders and employees equipped with new necessary skills and roles in line with business directions by establishing the Individual Development Plan.



Performance



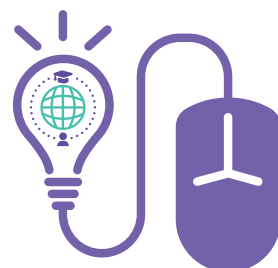
Employees selected to attend the “Global Leadership Program and Engaging Leader” training include:

- Vice Presidents and higher **70%**
- Managers and higher **78%**
- Section Managers **37%**

Significance and Reporting Boundary

An opportunity for self-development is the first priority the Company and employees pay attention to since the competency development in the areas of professionalism, management, and leadership is a key element for the career path and growth of employees. Additionally, the employee’s competency and leadership development in response to the Company’s business expansion and competitive advantage, is one of the major human resources management policies and is continuously supported by the Company. The Company, therefore, has prepared the comprehensive development plan for both executives and employees to increase

their learning ability and work efficiency. The leadership development plan implemented through the future desired-skill development programs will finally lead to successes as targeted and stated in the corporate missions.



Management Approach

In designing the training course for executives and employees, every year the Human Resources Department will take into consideration various factors as parts of the course design. HR courses are comprised of the short-term training course (one year) and the long-term ones (according to business strategic plan). The HR training courses are as follows:

- The development of short-term training courses will focus on the ones appropriated with each employee' competency profile by taking following criteria into consideration.

1 The annual individual training plan by comparing the employee's competency assessment with job positions.

2 The employee's competency development guideline specified for each department which is different from job characteristics.

3 The updated knowledge receiving high interest from employees.

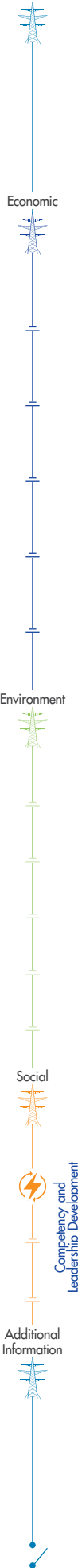
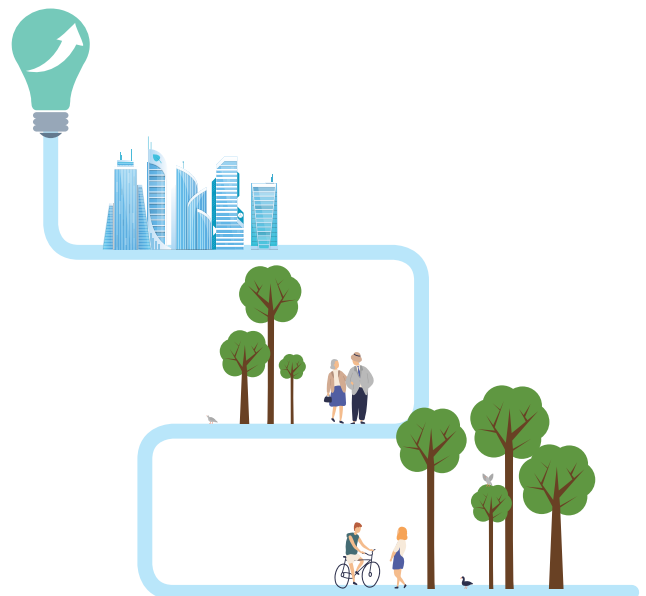
- The long-term training development will emphasize on designing the courses that are in line with the Company's strategies and respond to the trend of business needs, as well as the demand for new skills in the global market. This is to prepare our employees to be able to lead changes in the business trends and to link diversities of each country where the Company operates.



- Designing the employee development model different from a level of job positions and in accordance with the most efficient learning process. The Company has supported the employee performance in each level as follows:

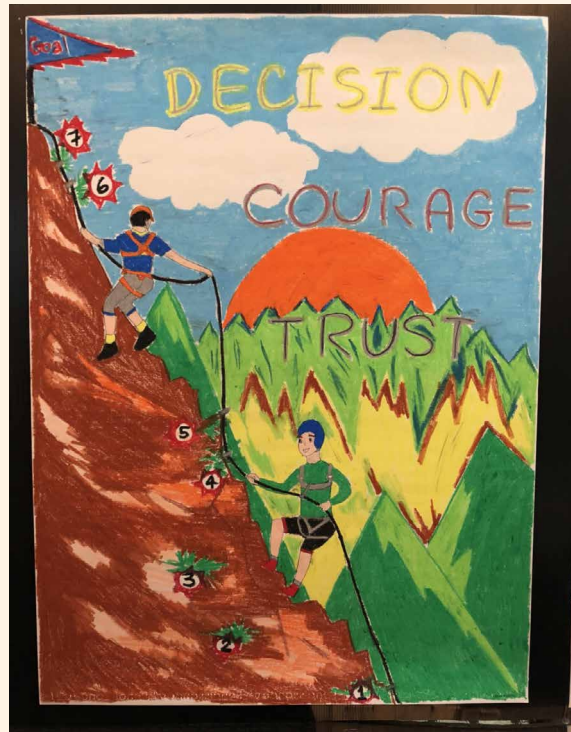
1 Developing the Banpu Group Learning and Development Road Map by taking into consideration necessary knowledge required for the Working System, the People System and the Managerial Skills. The Banpu Power employee development focuses on leadership and functional competencies so that our personnel, ranging from the employee level to the managerial level, can increase their working skills in parallel with leadership skills.

2 Improve the Leadership Competency in accordance with business strategies for year 2016-2020.



In addition, the Company has promoted various learning models, such as:

- A training by internal staff (Internal trainer): This training is the development of employee's knowledge and competency through being a trainer to transfer and share his/her knowledge and experiences.
- Providing opportunities to 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 2018, the Company developed the leadership and competency development programs for employees as follows:

Leadership Development Program	Main Objectives	Target Groups
1. Banpu Engaging Leader & Great Coach: Helping Others Succeed	To create understandings about teamwork management and a promotion of operational management efficiency, the Company has developed and trained its managements as the leaders who encourage employee engagement, and as the persons with whom employees feel comfortable to learn at all times. Various managerial skills development programs were also provided to these management in the areas of coaching, motivation, and inspiration. In addition, the continuing course called “Great Coach” was provided for them to learn about coaching skills, and how apply this skill to coach his/her team members properly, as well as to encourage their subordinates to achieve their works.	<ul style="list-style-type: none"> • Vice Presidents and higher • Department Managers
2. BGLP: Business Leader	Developing managerial competency for sustainable performance in accordance with the organizational strategies.	Assistant Vice-Presidents
3. 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.	Department Managers
4. BGLP: Future Leader	Preparing the employee’s readiness for taking executive positions in the future.	Supervisors

Remark: *BGLP: BGLP means “BANPU Global Leadership Development Program”

The internal competency development programs were organized in Bangkok Office and were equally opened to every employee interested in attending.



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	Department Managers	20
3. Safety for executive management	Complying with laws and providing safety knowledge to executive management	2	External Agencies	Vice Presidents and higher	20

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Competency and Leadership Development

Additional Information

Courses	Objectives	Duration (Days)	Trainers	Target Groups	Maximum Number of Attendees
4. Safety for new employees	Complying with laws and providing safety knowledge to new employees	1	Occupation 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, Department Managers	24
6. Contract execution (Basic Contract Knowledge)	Basic law knowledge for contract execution	2	Laws	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	Strategy and Business Development	Section Managers, Department Managers	24
8. Sustainable Development	The principles of Banpu Group's Sustainable Development.	0.5	Occupation health, safety, environment, and community development	Section Managers, Department Managers	24
9. HR tools for new employees	The human resources management principles and tools for developing the functional works.	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	Department 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, Department Managers	24
12. The 5 Choices	Productivity Enhancement.	2.5	Outsources/ External Agencies	Section-Managers	20
13. Getting Things Done	The Arts for productivity enhancement without stress	2.5	External Agencies	Supervisors	24
14. Understanding Global Perspective	Learning working perspectives in the different cultures for success.	2.5	External Agencies	Section-Managers, Managers	56
15. Building Global Mindset for Success	Learning working perspectives in the different cultures for success	2.5	External Agencies	Supervisors,	30

Employees eligible for the leadership development trainings

Levels	Total numbers	The Number of Attendees (%)	Training Hours (Hours)	The Number of Training Hours per Person (Hours)
Vice Presidents and higher	10	70	153	15.3
Department Managers and higher	9	78	282	31.3
Section Managers	19	37	504	26.5

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.
- 

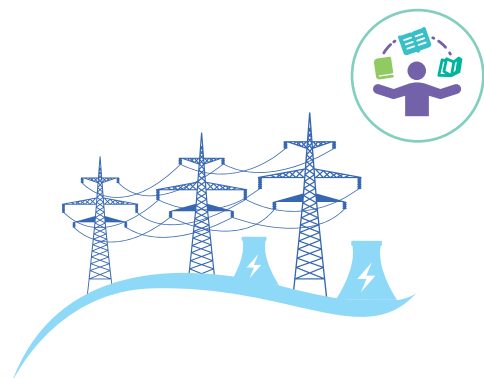
Setting the key and critical profile and developing criteria for further nomination and selection.
- 

Nominating and selecting persons who will succeed such positions. In this regard, the Human Resources Department will work together with the Succession Plan Committee.
- 

Developing, monitoring, and evaluating the Individual Development Program (IDP) of selected persons. In this regards, 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 identifies as high potential human resources according to the international standards.



Economic

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Competency and Leadership Development

Additional Information



Employee Engagement



Indicator

A level of employee engagement



Target



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



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



Performance



The employee engagement survey result for year 2018 is as following:

- 68% for Head Office in Thailand.
- 94% for Head Office and power plants in China.

Significance and Reporting Boundary

Employees, ranging from the operational level to the executive level, are the driving force of the Company. Employee engagement is another target the corporate wants to tangibly achieve. 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.



Management Approach

The Company has formulated the Employee Relations Policy as a practice guideline for strengthening good

relationships with employees. The employee engagement is fostered with “Say Stay Strive” concept.








Performance

In the previous year, the Company together with a consulting firm conducted the employee engagement survey. The survey found that the level of employee engagement at offices in Thailand and China was 68%

and 94%, respectively. The survey result and employee opinions will be used for developing the action plan to further create employee engagement.

To create tangible employee engagement, the Company has implemented some following activities.

- 1  Conducting the employee engagement survey annually to reflect a level of employee engagement and achievement of corporate shared values related activities as well as to provide an opportunity for employees to present their ideas for improvement.
- 2  Developing the engagement action plan resulted from the employee engagement survey, including submitting a progress report to management every quarter in order to build a continuous engagement among employees.
- 3  Promoting the “Work Life Balance” within the organization for example, employees at Bangkok Office are able to plan for effective working schedule, have flexible time to start working (Flexible Hours) and able to work outside the Company (Work Anywhere), etc. To help its employees mentally and physically healthy, the Company has established various sports clubs so that the employees can exercise and release working stress. The physiological consultation service from physiologists has also been provided to our employees.
- 4  Promoting the labor and human rights policies by providing the “Healing Hands” massage program conducted by the blinds from Department of Empowerment of Persons with Disabilities to help employees reduce “Office Syndrome” symptoms.
- 5  Annually organizing the “Banpu Outing” activity in order to have employees at all levels work together through the joint activities, and to build good relationships among employees. In 2018, the Bangkok Office organized a community development related activity for the surrounding communities of Wat Tham Khao Wang, Banrai Sub-District, Uthai Thani Province. The activities included construction of check-dams, a free of charge eyesight measurement and making salt licks for wild animals, etc.

Economic

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Employee Engagement

Additional Information



Occupational Health and Safety (OHS)



Indicator

» The number of fatalities » Lost Time Injury Frequency Rate (LTIFR)



Target



Zero fatalities for employees, contractors, and others involved with the Company's operations.



The LTIFR for employees and contractors is reduced to zero by year 2024.



Strategy



Cultivating the safety culture in all operational areas.



Conducting OHS risk assessment and mitigation in all production activities as well as developing measures to control OHS related risks within the acceptable level.



Performance



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



The LTIFR for employee was zero.



The LTIFR for contractors was zero.

Significance and Reporting Boundary

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

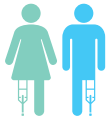
The safety workplace environment is counted as the human rights of which employees, contractors and those working in the area should get sufficiently and equally. In addition, promoting employee participation in expressing their opinions to improve their

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 direct management control. However, the safety data of solar power plants in Japan which are operated from a remote control by contractors and the joint-venture companies, namely BLCP Power Plant and Hongsa Power Plant, are separating reported in a statistic format in the appendix (performance data).

Management Approach

The Company focuses on cultivating/ formulating the safety culture within the organization with the “3 ZEROS” target as followings:



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 incident.

3 Zero Compromise:
Do not ignore compliance with rules, regulations, and safety practice standards.

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

Taking full responsibility and accountability on OHS

The management ranging from the top to operational levels has a commitment and responsibility to create 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 good 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 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 Sufficient OHS Knowledge and Skills

The Company has always provided OHS knowledge to its employees and contractors so as to ensure that they have sufficient safety capabilities and continuously review their knowledge related to OHS.

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Occupational Health and Safety (OHS)

Additional Information

Performance

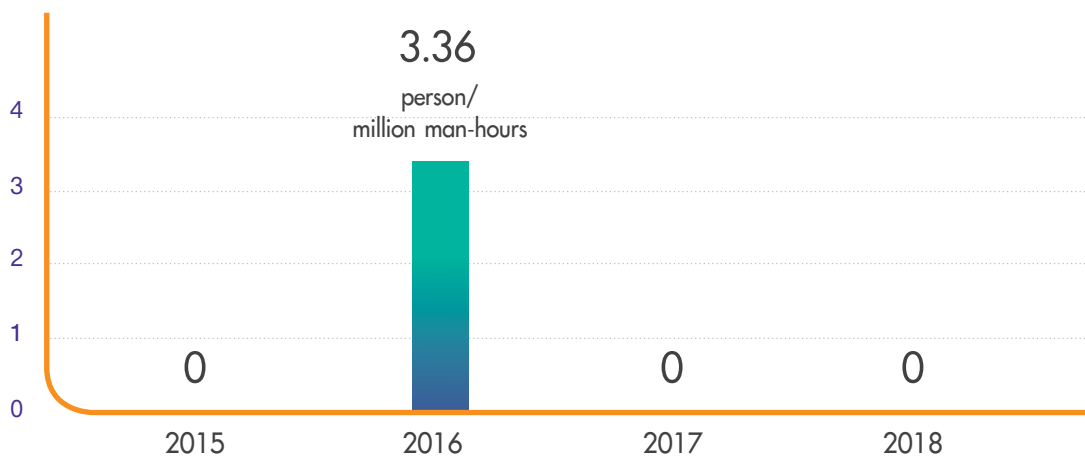


Occupational Injuries

All business units of the power plants in which the Company has direct management control, had no severe accidents resulting in injuries or dead. The LTIFR was zero while there were no fatalities. The Company 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 a 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.

Lost Time Injury Frequency Rate: LTIFR (person/million man-hours)



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. Furthermore, jobs assessed as having high risks 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.

Occupational Health and Safety Management System

The Company has placed great emphasis on working safety of its employees and contractors. The OHSAS 18001 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



Safety Culture Transformation Workshop



the organization for middle and top level management including those from the power plants where the Company has management control in China and Japan and the joint-venture power plants in Thailand and Lao PDR. The workshop was aimed at mobilizing ideas and creating a common way to strengthen the safety work culture. In addition to focusing on good workplace environment management, the most significance to drive the safety culture growing stronger than the traditional one, which emphasized only on safety management and regulations, is **an interpersonal relationship, listening to understand each other, and care for the public safety.**

In the previous year, the Company organized a workshop to create the safety culture across



Chanin Vongkusolkit
Director

"Banpu People and 'Care' Culture"

"The employees and "Care" corporate value are the secret to the success of Banpu today. I personally cannot accept any working related injuries of our people since the "safety" is an invaluable issue for Bnapu. Hence, building leaders and creating corporate safety culture will be accomplished when the "Banpu Heart" corporate culture is integrated with the "Operational Excellence," and turning it into true practice."



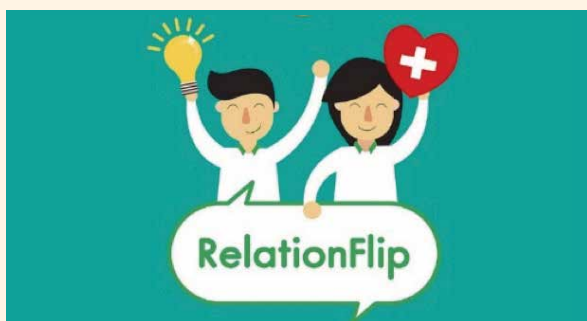
Employee Health Promotion



- An annual health checkup conducted for employees.
- A physical fitness measurement based on risks arising from a nature of work.
- Organizing a “Healthy Day” event to provide health related knowledge such as disease prevention.
- Supporting the employee’s sports clubs such as badminton, golf, running, football, Espak muzzle and etc.
- Providing a fitness room with trainers for employees to exercise before and after work.
- Providing fitness classes such as yoga, Zumba dance, etc.
- Communicating for safety and health awareness through emails and posters, etc.
- Reducing office syndrome symptoms by teaching how to stretch during working and providing relaxation massages by the visually impaired massagers.
- 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.
- Measuring the workplace environment in both the office and production units, and regularly updating to the standards.
- Organizing the health promotion projects such as the friendship football tournament, mini marathon runs, etc.



“RelationFlip” Psychological Consultation Project



Work and personal stress has a profound effect on happiness and balance in life. In the past year, the Company initiated the “RelationFlip” project or psychological counseling for employees. 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 physiologist’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 back. All information will be kept confidentially as well.






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. companies and contractors running routine work in the area, such as contractors, etc.

2. companies 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.

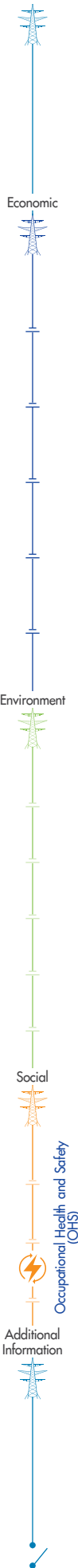
The Company has promoted safety for employees and contractors as follows:

-  All work place must have a sufficient 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 site walk down management
-  Setting up the 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.



Miss Wu Ming Wei, the Luanan Power Plant’s employee who participated in the safety skills competition organized by Tangshan City, was selected to receive the **"Tangshan City Safety Position Model"** Award from over 400 contestants.



A continuous improvement of power plants in China

The power plants in China, namely Luannan Power Plant, Zhengding Power Plant, and Zouping Power Plant, have continually improved their safety. Due to a long service life and an improvement in accordance with new legal standards, the three power plants improved

their efficiency and safety management last year. In addition to maintaining the Safety Management Golden Rules' activities organized continuously, more additional activities were implemented as follows:

- 1  Organizing trainings to ensure a safety leadership for executives.
- 2  Conducting on-site work's safety by management.
- 3  Improving workplace environment and maintenance to improve working efficiency and safety, such as removing rust, repainting, insulating and checking leakages in various
- 4  New painting to easily observe working irregularities.
- 5  Installing safety warning signs, creating a machine to prevent employees from touching the machinery's moving parts, etc.





Implementing the Process Safety Management (PSM) system in BLCP Power Plant

BLCP Power Plant has managed its safety by using a variety of management systems and tools since its operational commencement, such as safety rules for working and operational safety, cultivating behavior base safety (BBS) to reduce risks and promote behaviors leading to safety, etc.

In the past year, BLCP power plant implemented the PSM system to help reduce procedure risks possibly causing severe damages when the incidents happen. The PSM system is a management system popularly used in the high-risk industries, such as oil and gas business, hazardous chemicals industry, etc. Although BLCP Power Plant is not subject to the PSM legal action, the plant is committed to maximizing its safety by using such a system. Last year, BLCP received a certification on safety.

Process Safety Management (PSM)





Community Engagement and Development



Indicator

» Significant complaints from the community

» Incidents resulted

from the community's complaints disrupt the businesses.



Annual Target



No significant complaints from the community



All complaints have been analyzed and corrected



No incidents resulted from the community's complaints disrupt the businesses.



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



A complaint channel and an effective correction



Performance



No significant complaints from the community



No incidents resulted from the community's complaints disrupt the businesses.

Significance and Reporting Boundary

Communities surrounding the power plant are the important stakeholders for the Company's operation because they have received both positive and negative impacts throughout the project. The community's acceptance is a significant factor to measure the achievement and the project's operation.

Establishing the community engagement's procedures and community's comments acceptance since the beginning of the project can therefore create information communication, understandings and good relationship between the project and communities. In addition, all information receiving from community engagement at the beginning stage of the project are 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, resulting from the community engagement and recommendations, to improve its operations and to seek opportunities to work with the local community for a sustainable development. This is a key factor for establishing acceptance and good relationship throughout the project.

The reporting framework covers the power plant business and the solar power plant projects in Thailand, Lao PDR, China and Japan.

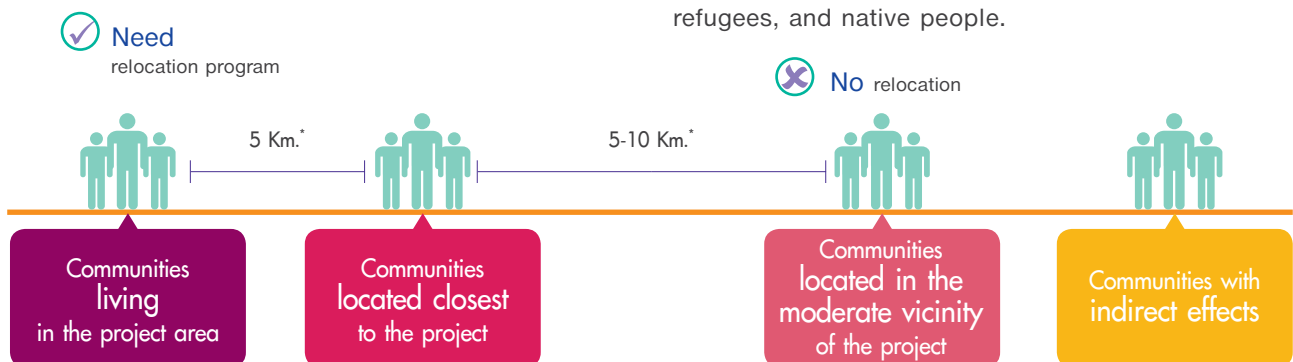
Management Approach

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 beneficial people. The procedures start from receiving comments and concerns, deigning a project, and establishing proper measures to decrease social and environmental impacts for each area. Generally, the program will identify sstakeholders based on impact levels. The identification may differ from locations and regulations of each country.

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 the communities living adjacent to the project or over 5 kms away from the project but not exceed 10 kms (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 kms from the project but not exceed 10 kms (radius may vary upon each area) or the communities that the Company buy 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.



* Radius may be different depend on the project location


As for the large-scale power plants including BLC Power Plant and Hongsa Power Plant, the Company has established community engagement by offering an opportunity for communities to participate in the development and monitoring 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.

Meanwhile, the combined heat and power plants in China 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 in various activities for each location.

Situated in a rural or remote area, the solar power plants in Japan and China have an effect on the communities during the construction 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.

Time Period **Establishment of community engagement**

<p>Feasibility Study and Project Development</p> 	<ul style="list-style-type: none"> • Identifying stakeholders who are directly and indirectly affected. • Preparing thorough community database. • Analyzing significance of stakeholders, community's needs and concerns for further project design. • Analyzing the project's possible impacts for further design and providing appropriate preventive and corrective measures, focusing on environmental management.
<p>Project operation</p> 	<ul style="list-style-type: none"> • Establishing a tripartite committee to provide opinions and examine the project efficiency. • Analyzing and correcting all complaints as well as preventing 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. • Establish 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 for building community engagement such as the Corporate Social Responsibility (CSR) activities



Performance

In 2018 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.



Learning is the power of change and development

Education and learning is the power of a constructive change and sustainable development of Banpu Group. The Company, therefore, has dedicated to organize CSR activities, both at the corporate and local levels, emphasizing the promotion and development of continued “learning” among children and young adults who are the human capital and future of the nation. To ensure sustainable development of communities and society, a number of initiatives-both in and outside the classroom-have been undertaken. These range from learning (both individually and as a team) through daily real-life experiences and hands-on practices to

enhance capabilities and skills. Other supports to fulfill basic needs have been also provided.

Additionally, the Company has also encouraged employees to express their ideas and participated in CSR activities across the organization. Apart from promoting employees to be proud of being a part of social development, the Company has supported the employee’s competency development in various areas, including leadership and teamwork, as well as strengthening the corporate culture.

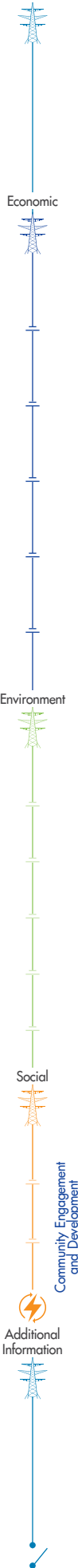
Volunteer Staff being the School Partner in ConnexED, “Pracharath” public-private project



The volunteer staffs of Banpu Group have participated in the ConnexED, “Pracharath” public-private project as the school partners to support 12 schools in Mahasarakham, Khon Khaen and Roiet provinces. The aim is to assist these schools to level up their teaching and learning quality, minimize inequality, develop people’s capacity, and increase competitive advantages, which are all related to encourage youth to be a good and great person.

CONNEXED, the Public-Private Partnerships in Education and Leadership Development Project, is one of the significant mechanisms of the “Pracharath” public-private project in basic education and leadership development. Initiated and established by 12 leading private companies, the project aims to develop a network of new-generation leaders who will play an important role in driving sustainable education in Thailand. School Partners from participating organizations have an opportunity to develop skills and knowledge in several areas so that they are ready to the effective potential leaders who can further create values for themselves, the corporate and society.

The Company has put great emphasis on teaching and learning reforms as well as promoting a two-way classroom through educational media that can draw student participation. In collaboration with the lecturers from Chulalongkorn University Demonstration Secondary School, semi-workshops have been undertaken for all primary school teachers. Furthermore, School Partners have also assisted schools in developing actions plan for the “teaching less-learning more” project, for example an occupational promotion program, aiming to encourage students to think out of the box, extend project ideas, create added values and experiments with new things in schools.





Scholarship for Luannan Banpu Special Education School



Luannan Banpu Special Education School is a full-time boarding school, comprising 37 teachers and staff and 98 students with visual, hearing and intellectual impairment or other physical disability. In July 2008 Tangshan Banpu Heat and Power Co. Ltd. (Launnan Power Plant) made an agreement to grant scholarship worth RMB. 50,000 annually for the school's teaching and learning enhancement. In appreciation of Launnan Power Plant' support, the school was later renamed as Luannan County Special Education School.

During the last 11 consecutive years, Launnan Power Plant has continuously granted the financial support as well as learning and teaching equipment worth CNY 750,000.00 (approximately USD 117,000.00) to the school. With the support from local government and civil society, Luannan County Special School is the only free school in Hebei District since 2012 until present.



Chengfeng Cogen Table Tennis Club



Banpu Table Tennis Club, formerly known as Chengfeng Cogen Table Tennis Club, was co-founded in 2003 by Zhengding Power Plant and the Zhengding National Table Tennis Training Center, one of the most famous table tennis club among national athletes as well as trainers across the world. Since the inception, Zhengding Power Plant has granted a financial support in an amount of CNY 150,000 annually to support the club's training and competition expenses.

In 2007, the Chengfeng Cogen Table Tennis Club was renamed as Banpu Table Tennis Club (BTTC). Located at Zhengding National Table Tennis Training Center, BTTC has currently served 50 female players aged between 8-17 years old. The Zhengding National Table Tennis Training Center has been reputed as the "Cradle of the World" Table Tennis Championship, with top-drawer conditions and facilities to provide effective training and a pleasant living environment for a total of 180 athletes and 19 coaches.

The Zhengding Power Plant's support provided to BTTC has not only helped strengthen competition skills of the table tennis athletes, but also creates a CSR linkage between Banpu Headquarters and its subsidiary companies in China. BTTC has provided an opportunity for Chinese trainers to coach the athletes of Banpu Table Tennis Club in Thailand as well as to Thai players for training at Zhengding National Table Tennis Training Center. During the past few years, Banpu Table Tennis Club's players have great achievements in various competitions.

In the previous year, Banpu Group organized the 7th "Banpu Table Tennis Club Inspiring and Developing Thai Youth" Camp by inviting coaches and the BTTC national table tennis athletes to train 120 northeastern youth aged 6-16 years in Ubon Ratchathani Province.



Making Salt Licks and Conserving Animals & Forests at Khao Yai National Park

Employees of Banpu Headquarters participated in the “CSR Ideas” program. Held annually, the “CSR Ideas” is a corporate social responsibility project that allows employees of Banpu Group to propose their CSR ideas and implement their own project in the target area. In 2018, the employees proposed their CSR project called “Making Salt Licks and Conserving Animals & Forests” at Khao Yai National Park where Banpu Power employees joined hands to make salt licks in a remote area as well as provide jungle survival kits to the National Park’s officers for patrols and deforestation prevention during 6-7 September 2018.

A salt lick provides essential mineral nutrients such as sodium, calcium, iron, phosphorus and zinc for wild animals. Nowadays salt licks are decreasing so that it is necessary to build the artificial ones as mineral sources for the wild animals. The artificial salt licks will help prevent animals moving out from the national park. Additionally, when the wild animals are in good health, they can walk and propagate plants all over the area.

Khao Yai, Tublan, Pang Sida, Ta Phraya National Parks and Dong Yai Wildlife Sanctuary have been announced as the Natural World Heritage Site from UNESCO since 2005 under the name of Dong Phraya Yen-Khao Yai Forest Complex because it is a large scale of forest site and is important for the ecosystem, consisting of high biodiversity. Presently there is a smuggling of Payoong wood (Scientific name: Dalbergia cochinchinensis) which is highly demanded and costly in the market as it is considered a hardwood with beautiful texture and a sacred tree.

Aside from proposing their ideas for helping the society, the employees also gained knowledge on forests and wild animals, realized the importance of forest conservation by the officers from the national park, strengthened their relationships, and knew how to work as a team.

Economic

Environment

Public Hearing in wind power project in Soc Trang province, Vietnam



Social

Community Engagement and Development

Additional Information



BLCP Power has continuously organized the “BLCP Junior Guides” project since 2007, aiming to promote knowledge on power generation and other energies for youth, as well as develop their skills as a tour guide. In response to the educational policy regarding “teaching less, learning more”, this project reinforces learning experience outside the classroom. High school (Grade 9-10) students can apply for a competition as a guide of BLCP Power Plant. Fifty selected youth will have a chance to attend a 3-day training course and receive a certification as a trainee of the junior guides program.

In 2018 BLCP Power has conducted “BLCP Junior Guides” project for 12 consecutive years, hiring a professional for public speaking as a trainer. The training emphasized on ethics and morals for the junior guides, while some knowledge related to the power plant was also provided by BLCP’s trainers. After training completion, all youth will be fully responsible as the junior guide and ready to welcome the visitors.

BLCP Power Plant is a coal-fired power plant with a power generating capacity of 1,434 MW. It is located in the Map Ta Phut Industrial Estate, Rayong Province. In collaboration with the Electricity Generating Public Company Limited (EGCO), BLCP has developed the project at the beginning stage of feasibility study and construction. At present, the Company and EGCO each hold 50% of stakes of BLCP Power Plant.





Economic



Environment



Social



Community Engagement and Development

Additional Information



BLCP Continuous Activities/ Projects in 2018



- 1 Artificial Coral Exploration and Development Project
- 2 Mangrove Forest Conservation Project with BLCP and Mangrove Forest Learning Center at the Floating Pagoda.
- 3 The 15th BLCP Scholarship Project
- 4 Bottom Ash Research and Development Project
- 5 Fly Ash Bricks Project, Kao Pai Community Enterprise
- 6 A project under occupational development master plan for 13 small fishery boat groups
- 7 Ecosystem Restoration around the Saket Island Project
- 8 Organic Farming Project under sufficient living concept
- 9 The international beach garbage collection project in collaboration with a group of factories in the industrial estate.
- 10 Organizing the joint-projects with the Community Partnership Association
- 11 The 8th check-dam construction project to celebrate Queen Sirikit, is the employee volunteer project in collaboration with the power plant group
- 12 The 13th forest-robe presenting project
- 13 The 2018 V-EsEPC Technician Development project, Map Ta Phut Technical College, Rayong Province to support technicians who have skills and specific qualifications in response to the industry's demand.
- 14 BLCP in collaboration with Thailand Institute of Scientific and Technological Research conducted a preliminary feasibility study to add values from gas released from the coal-fired power plant together with by-products of hydrogen gas to produce methanol.
- 15 BLCP in collaboration with the Royal Thai Marine Corps, Rayong Province, has run the marine ecosystem restoration and coral reefs reproduction project at Saket Island and Gai Tia Island.



Public Health Improvement and Health Monitoring Project for local people surrounding Hongsa Power Plant



Located in Xayaboury Province of Lao PRD, Hongsa Power Plant is a thermal power plant project with a power generation capacity of 1,878 MW. The Company has developed the project at the beginning stage starting from a feasibility study to construction. Presently, the Company and Ratchaburi Electricity Generating Holding Public Company Limited each own 40% of shares, while Lao Holding State Enterprise (LHSE) holds 20% of stakes. Hongsa Power Plant supplies 100 MW of electricity to Lao State Enterprise and 1,473 MW to Electricity Generating Authority of Thailand.

Hongsa Power Plant has been designed and constructed with preventive environmental impact measures by using the clean technology. The plant is installed with Flue Gas Desulphurization (FGD) system which eliminates 92% of sulfur dioxide, Electro-Static Precipitator (ESP) system which eliminates 99.86% of dusts, and the Continuous Emissions Monitoring System. Meanwhile, the air quality monitoring stations have been installed at the surrounding communities. Moreover, the water for electricity production will be treated within the power plant area to meet the quality standard before disposal to the public water sources.

However, during the project development and public hearing stage, it was found that stakeholders in the community were concerned about health impact. Hongsa Power Plant, therefore, organized the health monitoring project for local people surrounding the project site due to community's concerns.

In addition, the power plant's location is in a rural area of Lao PRD, where infrastructures and public health were insufficient for better living. The project realized that when the construction began, there would be high labor relocation into the power plant area. Hence, Hongsa Power Plant consulted with Environmental Health Department to improve quality of life and local public health in the area. A mechanism to improve public health has been created while health monitoring has been conducted since the beginning of the project to the present as follows:

1) Providing health check-up for all community people and monitoring local environment

before operating the project, focusing on the vulnerable groups such as the elderly, children, and minor groups who have limited access for public health. Data collected are used as the basic information for the project.

2) Setting up the village volunteer forces

as representatives for providing suggestions and knowledge as well as monitoring household's hygienic conditions, for instance, water consumption, food preparation, waste disposal, and disease-carrier prevention and elimination. These activities have been organized in collaboration with the government sectors.

3) Regularly providing trainings and knowledge

with the government agencies such as household's public health training and the outbreaks of diseases, etc.

4) Allocating a budget

for infrastructure improvement and public health.

5) Developing Geographic Information System

regarding the community development, for example, a relocation data collection, health check, household hygienes, and complaints in order to analyze all information together with the environmental quality monitoring and the power plant operation.





At present, it is found that the health surveillance project and the improvement of public health in the community of which Hongsa Power Plant has worked with village volunteers who are representative of

local communities and the government, can create community engagement. The project is also used as a communication channel and receives comments from local communities effectively.

Continuous Activities/ Projects of Hongsa Power Plant for year 2018.



- 1 Health impacts monitoring system for the public
- 2 Improvement of infrastructures in the villages surrounding the project and relocating villages.
- 3 Development of highland agriculture and Na Pong Learning Center
- 4 Land development and promotion of livestock farming
- 5 Promoting alternative jobs for the group of people affected by the project
- 6 Improving an access to the market mechanism, and setting up cooperatives.
- 7 Monitoring the employment and incomes of the relocating groups.

Hongsa Power Plant was certified Environmental Management System (ISO 14001)



Economic

Environment

Social

Community Engagement and Development

Additional Information

Employees of Banpu Power in Japan assisted surrounding communities during the earthquake

Situated in Hokkaido Island, Japan, Mukawa City was severely affected by the powerful earthquake on 6 September 2018. Since the beginning of the earthquake, the Company in collaboration with its business partners continuously supported Mukawa City in which the Company's solar power plants are located.

At the beginning, the Company provided some food and electricity from portable generators for power supply to the areas where electricity systems were damaged. The Company's assistance received a positive feedback from the government officers and local people. After that, Japan Self-Defense Force reached the site and brought some more food for local people. Between October and November, the restoration process and accommodation cleaning were undertaken. Until December, some local people who were affected by the earthquake and moved to complementary accommodations could return to their home, while some moved to the new temporary accommodation sites.

However, the city's main infrastructures could not re-operate as a whole, the Company donated portable solar generators and uninterruptible power supply batteries to Mukawa City in case of electricity cut down by natural disasters.

The handover ceremony will be held on 27 March 2019. The Company plans to install the generators at five important points in Mukawa City, including Shiniko, Yagata, Ditto, Mukawa City Hall, in front of Hobetsu Company and Hobetsu dinosaurs' museum. Each generator can supply power for 120 mobile phones. As part of its sustainable community development, the Company is committed to continuously supporting the Japan government.



Native People Engagement

The Company has placed great importance on respecting human rights and native 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 native 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 native people. The Company has 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.



List of Business

Power Business



Country	Project Name	Business Type	Production Capacity	Current Status	Ownership
China	Zhengding	Combined Heat and Power Plant	139 MW	Operating	100%
	Luannan	Combined Heat and Power Plant	123 MW	Operating	100%
	Zouping	Combined Heat and Power Plant	247 MW	Operating	70%
	Shanxi Lu Guang	Coal-fired Power Plant	1,320 MW	Under Construction	30%
	Jinshan	Solar Power Plant	28.95 MW	Operating	100%
	Huineng	Solar Power Plant	21.51 MW	Operating	100%
	Haoyuan	Solar Power Plant	20 MW	Operating	100%
	Hui'en	Solar Power Plant	19.7 MW	Operating	100%
	Deyuan	Solar Power Plant	51.64 MW	Operating	100%
	Xingyu	Solar Power Plant	10.3 MW	Operating	100%
Japan	Olympia	Solar Power Plant	10.0 MW	Operating	40%
	Hino	Solar Power Plant	3.5 MW	Operating	75%
	Awaji	Solar Power Plant	8.0 MW	Operating	75%
	Nari Aizu ^(a)	Solar Power Plant	20.0 MW	Operating	75%
	Mukawa ^(b)	Solar Power Plant	17.0 MW	Operating	58%
	Yamagata	Solar Power Plant	20 MW	Under Construction	100%
	Kurokawa	Solar Power Plant	18.9 MW	Under Construction	100%
	Shirakawa	Solar Power Plant	10 MW	Project Development	100%
	Yabuki	Solar Power Plant	7.0 MW	Under Construction	75%
	Onami	Solar Power Plant	16.0 MW	Project Development	75%
	Kesenuma	Solar Power Plant	20.0 MW	Project Development	100%
	Hiroshima	Solar Power Plant	8.0 MW	Project Development	100%
	Yamagata lide	Solar Power Plant	200.0 MW	Project Development	100%
Lao PDR	Hongsa	Coal-fired Power Plant	1,878 MW	Operating	40%
Thailand	BLCP	Coal-fired Power Plant	1,434 MW	Operating	50%
Vietnam	Soc Trang ^(c)	Wind Power Plant	30 MW	Project Development	100%

(a) Commercial Operation Date in December 2018

(b) Commercial Operation Date in August 2018

(c) The Investment Registration Certificate (IRC) was granted in May 2018 (Phase 1)

Awards & Recognitions



Power Plant	Awards/Recognitions	Host Institute
Luannan Power Plant	Pass the revaluation of Demonstration Enterprise on Safety Culture Construction in Tangshan City	The Safe Production Committee of Tangshan City
	Heat and Power Comprehensive Engineering Technology Study Center of Luannan County	Science and Technology Bureau Luanan County
	Ma Zhentian innovation studio	Labour Unions of Luannan County
	Employee 'Wu Mengwei' won the title of "model of production safety management of Tangshan City"	The Safe Production Supervision and Administration Bureau of Tangshan City
	Employee 'Li Jianhua' was awarded the honorary title of "excellent safety production volunteer of Tangshan City"	The Safe Production Supervision and Administration Bureau of Tangshan City, etc.
Zhengding Power Plant	Top 100 Private Enterprise Tax payer	Shijiazhuang Tax Bureau
	"Excellent Enterprise" Award for the 40 th Anniversary of Reform and Opening-up of Shijiazhuang	Jointly issued by Publicity Department of the Municipal Committee of Shijiazhuang; Bureau of Industry and Information Technology of Shijiazhuang; Shijiazhuang Radio and TV Station; Shijiazhuang Entrepreneur Association
	Model Home for Staff	General Labor Union of Hebei Province
	Advanced Unit of Safe Production in Zhengding	Bureau of Industry and Information Technology of Zhengding
Zouping Power Plant	Advanced Environmental Protection Units in 2017	Zouping Environmental Protection Bureau
	Human Resources and Social Security Law-abiding and Honest Grade A Unit in 2017	Binzhou Human Resources and Social Security Bureau
Haoyuan Solar Power Plant	Foreign Investment Project Promotion Award by Tai'an City	Dongping County Commercial Bureau
Jinshan Solar Power Plant	Excellent Company Award	Wushan Town Government
Deyuan Solar Power Plant	Excellent EPC Award-Second Prize	China Planning and Design of Electric Power Association

Participation and Membership



Organization	Status	Role
Thai Listed Companies Association (TLCA)	Chairman of Center for Building Competitive Enterprise	Provide advises for building competitiveness to Thai enterprises
Thai Listed Companies Association (TLCA)	Advisor of the Chairman	Provide advices to the Chairman, raise issues of business sector to the government
The Securities and Exchange Commission	Chairman of the working group for Sustainable Development of Thai Listed Company	Prepare "Corporate Governance Code 2017" as practice principles to create a sustainable value for a listed company
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

Subsidiaries

Business	Organization	Status
Banpu Investment (China) Co., Ltd.	Chinese Thermal & Power Professional Management Association	Member
	Thai Chamber of Commerce in China	Member
	China Association of Enterprises with Foreign Investment	Member
	Henan Association of Enterprises with Foreign Investment	Member
	Shanxi Association of Enterprises with Foreign Investment	Member
Zouping Power Plant	Shandong Overseas Chinese Entrepreneurs Association	Member
	Binzhou Overseas Chinese Entrepreneurs Association	Member
	Shandong Electric Power Enterprises Association	Member

Economic

Environment

Social

Additional Information

Data Boundary



Sustainability Topic	Head Office, Thailand	Power Plant (Direct Operational Control)			Joint Venture Company	
		China		Japan	Thailand	Lao PDR
		Combined Heat and Power Plant	Solar Power Plant	Solar Power Plant	BLCP	Hongsa
Financial Performance	●	●	●	●	●	●
Business Ethics*	●	●	●	●	×	×
Anti-Corruption*	●	●	●	●	×	×
Risk Management*	●	●	●	●	×	×
Business Continuity Management	●	●	○	○	×	×
Process Improvement and Innovation*	●	●	●	●	+	+
Access & Affordability	●	●	●	●	×	×
Product Stewardship	NR	●	●	●	×	×
Plant Decommissioning	NR	NR	NR	NR	×	×
Contractor Management*	NR	●	●	●	+	+
Supplier Management*	●	●	●	●	+	+
Customer Management	●	●	●	●	+	+
Energy	NR	●	●	●	+	+
Greenhouse Gas Emission*	NR	●	●	●	+	+
Air Quality*	NR	●	●	NR	+	+
Water Resource Utilization*	NR	●	NR	NR	+	+
Water Discharge*	NR	●	NR	NR	+	+
Hazardous Waste	NR	●	NR	NR	×	×
Non-Hazardous Waste	NR	●	NR	NR	×	×
Ash	NR	●	NR	NR	×	×
Leakage and Spillage	NR	●	NR	NR	×	×
Biodiversity	NR	●	●	●	×	×
Safety*	●	●	○	○	+	+
Occupational Health	●	●	○	○	+	+
Labor Practice	●	●	●	●	×	×
Competency Development	●	●	●	●	×	×
Succession Planning	●	●	●	●	×	×
Employee Engagement	●	●	●	○	×	×
Community Engagement*	NR	●	●	●	+	+
Community Resettlement	NR	NR	NR	NR	×	+
CSR After Process	●	●	○	●	+	+

* 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.

×

+

NR No relevant to the business

Performance Data



Economic Performance

Data	2015	2016	2017	2018
Revenues (THB million)	5,630	5,542	6,419	6,322
EBITDA ^(a) (THB million)	4,251	5,557	5,410	5,913
Net Profit (THB million)	2,923	4,273	4,242	3,852
Gross Profit Margin	36%	35%	24%	20%
Interest Coverage Ratio	14.0	4.5	10.1	NA
Net Debt to Equity Ratio	1.10	0.03	0.10	0.13

(a) Earnings before interest, taxes, depreciation and amortization.



Tax Payment-by-Country

Data	2015	2016	2017	2018
China				
• Net Profit before Tax (CNY Million)	369	385	257	126
• Income Taxes ^(a) (CNY Million)	(102)	(96)	(67)	(31)
• Income Tax Paid (CNY Million)	(112)	(107)	(52)	(50)
• Corporate Income Tax Rate	25%	25%	25%	25%

(a) Consisting of Corporate Income Tax, Withholding Tax and Deferred Tax.



Economic Distributions

Data	2015	2016	2017	2018
Suppliers and Contractors ^(b) (THB million)	2,548	2,376	3,527	3,651
Employee ^(c) (THB million)	492	801	842	775
Financial Institutions ^(d) (THB million)	221	420	106	229
Shareholders (THB million)	2,075	1,606	1,676	1,831
Public Sector ^(e) (THB million)	1,747	1,460	806	709
Community and Society ^(f) (THB million)	3	4	3	5
Environment ^(g) (THB million)	41	29	27	26

(b) Includes expenses for supplier and contractors.

(c) Includes Salary, Wage, Welfare, Provident Fund and Employee Development Expense.

(d) Includes Interest Expense, Financial Expense.

(e) Includes Corporate Income Tax, Local Maintenance Tax, Property Tax, Specific Business Tax and Other Tax.

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

(g) Includes expenses for environmental management.

Economic

Environment

Social

Additional Information



Business Ethics

Data	2015	2016	2017	2018
Number of significant complaints relating to Good Governance (Case)	0	0	0	0
Number of significant business ethics breaches (Case)				
• Corruption	0	0	0	0
• Use of Information	0	0	0	0
• Bribery	0	0	0	0
• Human Rights	0	0	0	0
• Tax	0	0	0	0



Risk Management

Data	2015	2016	2017	2018
Coverage of Risk Management System	100%	100%	100%	100%
Coverage of Risk Indicator Development	100%	100%	100%	100%



Product Stewardship

Data	2015	2016	2017	2018
Percentage of solved complaint within determined timeframe	-	-	-	100%
Number of Complaints (Case)				
• Customer privacy information	-	-	-	0
• Safety and environmental impact from using products	-	-	-	0



Operation

Data	2015	2016	2017	2018
Installed Capacity (MW) ^(a)				
• Current	355	356.5	471.1	533.6
• Capacity under construction	0	53	82.5	88.9
System Efficiency ^(b)				
• Efficiency Rate for electricity generation (g/KWh)	274	272.55	261.33	270.02
• Efficiency Rate for steam production (Kg/GJ)	37.96	37.89	37.53	37.58
• Availability Factor (%)	89.37%	86.96%	93.72%	89.02%
• Overall Efficiency (%)	66.60%	67.79%	69.70%	66.69%
Solar power plant Capacity Factor (%)				
• China (%)	-	13.7%	14.9%	14.9%
• Japan (%)	-	13.9%	14.2%	11.3%
Planned Outage ^(b)				
• Planned Outage Frequency (Case/Year)	22	18	23	22
• Planned Outage Hour (Hours)	10,900	8,961	9,534	13,851
• Average Planned Outage Duration (Hours/Case)	1,674	1,488	1,302	1,867



Data	2015	2016	2017	2018
Unplanned Outage ^(b)				
• Unplanned Outage Frequency (Case/Year)	7	0	7	4
• Unplanned Outage Hour (Hours)	1,080.53	0	381	1,928
• Average Unplanned Outage Duration (Hours/Case)	983.3	0	48.98	1,913.70
Total Outage ^(b)				
• Total Outage Frequency (Case/Year)	29	18	30	26
• Total Outage Hour (Hours)	11,981.2	8,961	9,915	15,780
• Average Total Outage Duration (Hours/Case)	1,328.95	1,488.31	1,078.18	1,869.69

(a) Estimate from 100% 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.



Product

Data	2015	2016	2017	2018
Electricity Sold (MWh)	1,455,954	1,531,993	1,691,107	1,715,684
Steam Sold (MWh)	3,634,782	4,017,692	4,236,338	3,975,903
Heat Sold (MWh)	352,706	341,357	444,362	546,686



Greenhouse Gas (GHG) Emissions

Data	2015	2016	2017	2018
GHG Emissions (Tonnes CO ₂ e)	3,177,885	3,681,906	3,650,542	3,824,124
• Direct GHG Emissions (Scope 1)	3,177,803	3,681,214	3,648,340	3,821,632
• Indirect GHG Emissions (Scope 2)	82	692	2,202	2,492
GHG Emissions Intensity (Tonnes CO ₂ e/MWh)				
• Electricity	1.038	1.067	0.954	0.991
• Steam and heat	0.418	0.470	0.435	0.470
GHG Emission Intensity-China (Tonnes CO ₂ e/MWh)				
• All generation capacity	0.584	0.625	0.574	0.615
• Fossil fuel generation capacity	0.584	0.631	0.591	0.635
GHG Emission Intensity-China ^(a) (Tonnes CO ₂ e/MWh)				
• All generation capacity	-	-	0	0
• Fossil fuel generation capacity	-	-	NA	NA
SF ₆ Emissions (Tonnes CO ₂ e)	-	-	-	110

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

Economic

Environment

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Additional Information





Energy

Data	2015	2016	2017	2018
Total Energy Consumption (TJ)	10,461	10,866	10,545	10,721
Renewable Energy Consumption (TJ)				
• Renewable energy ^(a)	0	0	0	0
• Electricity purchased ^(b)	0	0	0	0
• Self-electricity generation	0.16	197	718	815
Non-Renewable Energy Consumption (TJ)				
• Fossil fuel ^(c)	30,057	31,874	32,756	32,354
• Electricity purchased	0.34	2.82	9.01	10.36
• Steam, heating and cooling	0	0	0	0
Renewable Energy Sold (TJ)				
• Electricity	0	195	701	809
Non-renewable Energy Sold (TJ)				
• Electricity	5,241	5,320	5,387	5,368
• Steam	13,085	14,464	15,251	14,313
• Heat	1,270	1,229	1,600	1,968
Energy Intensity (GJ/MWh)	1.92	1.84	1.65	1.72

(a) Renewable energy 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.



Water

Data	2015	2016	2017	2018
Water Withdrawal (Mega Litter)				
• All area	7,874	8,121	8,563	7,838
• Water-stress area	-	-	-	7,838
Water Withdrawal-By Sources (Mega Litter)				
• Surface fresh water	4,576	5,330	6,056	5,076
• Groundwater	3,298	2,790	2,508	2,761
• Sea water	0	0	0	0
• Produced water	0	0	0	0
• Third-party water	0	0	0.5	1
Water Withdrawal from water stress area (Mega Litter)				
• Surface fresh water	-	-	-	5,076
• Groundwater	-	-	-	2,761
• Sea water	-	-	-	0
• Produced water	-	-	-	0
• Third-party water	-	-	-	1
Third-Party Water Withdrawal from Water Stress Area (Mega Litter)				
• Surface fresh water	-	-	-	1
• Groundwater	-	-	-	1
• Sea water	-	-	-	0
• Produced water	-	-	-	0
Water Discharge (Mega Litter)				
• All area	463	744	712	960
• Water stress area	-	-	-	960

Data	2015	2016	2017	2018
Water Discharge (Mega Litter)				
• Surface fresh water	0	0	0	0
• Groundwater	0	0	0	0
• Sea water	0	0	0	0
• Third-party water	463	744	712	960
Water Consumption (Mega Litter)				
• All area	7,411	7,377	7,851	6,878
• Water stress area	-	-	-	6,878
Water Intensity (Cubic Meter/MWh)	1.362	1.252	1.232	1.103
Reuse and Recycle water (Mega Litter)	-	602	602	494
Change in water storage (Mega Litter)	-	-	-	NA

Economic



Air

Data	2015	2016	2017	2018
Air Emissions Load (Tonnes)				
• NO _x	908	639	455	323
• SO _x	810	633	174	149
• PM	144	91	35	24
Air Emissions Intensity for all generation capacity (Kg/MWh)				
• NO _x	-	0.1085	0.0714	0.0517
• SO _x	-	0.1075	0.0273	0.0239
• PM	-	0.0154	0.0055	0.0038
Air Emissions Intensity for fossil fuel generation (Kg/MWh)				
• NO _x	-	0.1095	0.0737	0.0536
• SO _x	-	0.1084	0.0282	0.0248
• PM	-	0.0156	0.0057	0.0039
Ozone-depleting substances (ODS) (Kg CFC-11e)				
• ODS consumption	-	0	0	0

Environment



Waste^(a)

Data	2015	2016	2017	2018
Hazardous Waste Transportation (Tonnes)				
• Hazardous Waste Transported	-	-	-	113
• Hazardous Waste Imported	-	-	-	0
• Hazardous Waste Exported	-	-	-	0
• Hazardous Waste Treated	-	-	-	113
Hazardous Waste Disposed (Tonnes)				
• Reuse	-	-	-	0
• Recycle	-	2 ^(b)	5 ^(b)	10
• Recovery (including for fuel sources)	-	0	0	101
• Incineration	-	0	0	3
• Landfill	-	0	0	0
• Other	-	0	55	0

Social

Additional Information

Data	2015	2016	2017	2018
Non-hazardous Waste Disposed (Tonnes)	1,020	383	130	2,589
• Reuse	0	0	0	0
• Recycle	1,020	383	130	808
• Composting	-	-	-	1
• Recovery (including for fuel sources)	-	-	-	236
• Incineration	-	-	0	0
• Landfill	-	-	0	1,517
• Others	-	-	0	27
Waste transported across international borders	-	-	-	0%

(a) Exclude ash and gypsum from power plant.

(b) Include recovery hazardous waste.



By Product

Data	2015	2016	2017	2018
Ash (Tonnes)	605,462	617,405	627,167	619,138
• Reuse	605,462	617,405	571,402	619,138
• Recycle	0	0	0	0
• Landfill	0	0	0	0
• On-site storage/fill	0	0	0	0
• Other disposal	0	0	55,765	0
Percentage of reuse ash	100%	100%	91%	100%
Gypsum (Tonnes)	-	-	53,306	90,346
• Reuse	-	-	53,306	90,346
• Recycle	-	-	0	0
• Landfill	-	-	0	0
• On-site storage/fill	-	-	0	0
• Other disposal	-	-	0	0
Percentage of reuse gypsum	-	-	100%	100%



Environmental Compliance

Data	2015	2016	2017	2018
Environmental Non-Compliance (Case)				
• Effluent	0	0	0	0
• Air quality	0	0	0	0
Significant fine (Case) ^(a)	0	0	1	0
Significant fine (USD)	0	0	14,757	0
Non-monetary sanction (Case)	0	0	0	0
Events leading to dispute resolution (Case)	0	0	0	0
Significant spill (Case) ^(a)	0	0	0	0
Volume of significant spill (Liter)	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	2015	2016	2017	2018
Significant complaint (Case)	-	0	0	0
Significant community complaint handled (Case)	-	NA ^(a)	NA ^(a)	NA ^(a)

(a) No significant complaint.



Community Resettlement

Data	2015	2016	2017	2018
Number of community resettlement (Case)	-	-	-	0
Complaints related to community resettlement (Case)	-	-	-	0



Human Rights

Data	2015	2016	2017	2018
Number of Significant Human Rights Complaint (Case)	-	-	-	0
Coverage of business unit assessed Human Rights Risk	-	-	-	100%
Coverage of relevant businesses that has Human Rights Risk Management Plan	-	-	-	100%



Compliance with Social Laws and Regulations

Data	2015	2016	2017	2018
Number of Significant social non-compliance Total number violations of significant social legal obligations/regulations (Case)	-	-	-	0
Number of significant fines (Case)	-	-	-	0



Employee

Data	2015	2016	2017	2018
Employee-Total (Person)	-	934	952	968
Employee-by country (%)				
• Thai	-	4.71	4.41	4.44
• China	-	95.07	95.17	94.63
• Japan	-	0.21	0.42	0.83
• Vietnam	-	0.00	0.00	0.10
• Others	-	0.00	0.00	0.00
Employee-by gender (%)				
• Male	-	74.95	76.37	76.96
• Female	-	25.05	23.63	23.04
Employee-by nationality (%)				
• Thai	-	4.93	4.41	4.55
• Chinese	-	95.07	95.17	94.42
• Japanese	-	0.21	0.42	0.62
• Vietnam	-	0.00	0.00	0.10
• American	-	0.00	0.00	0.31

Economic

Environment

Social

Additional Information

Data	2015	2016	2017	2018
Employee-by age group (%)				
• Under 30 years	-	26.66	26.37	23.76
• 30-39 years	-	39.94	39.39	39.05
• 40-49 years	-	28.16	27.94	30.58
• over 50 years	-	5.25	6.30	6.61
Employee-by employee type (%)				
• Permanent	-	97.97	97.16	96.90
• Temporary	-	2.03	2.84	3.10
Employee-by level (%)				
• Senior Management	-	1.39	1.47	1.45
• Middle Management	-	4.07	4.20	4.96
• Junior Management	-	20.24	21.64	22.00
• Staff and Supervisor	-	74.30	72.69	71.59
Management-By gender (%)				
• Male	-	75.42	75.38	73.82
• Female	-	24.17	24.62	26.18



New Employee

Data	2015	2016	2017	2018
New Employee-total (Person)	-	61	75	65
New Employee-by gender (Person)				
• Male	-	50	65	56
• Female	-	11	10	9
New Employee-by country (Person)				
• Thailand	-	4	3	3
• China	-	57	70	57
• Japan	-	0	2	4
• Vietnam	-	0	0	1
• Others	-	0	0	0



Employee Engagement

Data	2015	2016	2017	2018
Level of Employee Engagement (%)				
• Thailand	-	50	57	68
• Chinese	-	97	95	94
Level of alignment between employee behavior and the Corporate Culture (%)				
• Thailand	-	73.67	77.10	74
• Chinese	-	94.50	98.94	-



Training

Data	2015	2016	2017	2018
Average cost per head of training-by country (USD/Person)				
• Thailand	-	1,150	1,300	1,540
• China	-	323	211	244
• Japan	-	-	685	1,020
• Others	-	-	1,500	2,000
Average Cost of Training-by level (USD/Person)				
• Senior Management	-	410	389	370
• Middle Management	-	1,189	742	883
• Junior Management	-	924	910	834
• Staff and Supervisor	-	167	139	167
Average hours of training-by country (Hours/Person)				
• Thailand	-	-	30	27.5
• Chinese	-	-	26	20.5
• Japanese	-	-	24	18
• Others	-	-	56	40
Average hours of training-by level (Hours/Person)				
• Senior Management	-	-	15	21
• Middle Management	-	-	22	44
• Junior Management	-	-	41	38
• Staff and Supervisor	-	-	19	25

Economic



Succession Planning & Leadership Development

Data	2015	2016	2017	2018
Critical positions having a succession plan (%)	-	-	100	100
Critical positions having a succession plan-by level (%)				
• Senior Management	-	-	100	100
• Middle Management	-	-	100	100
Succession of leadership development program-total (%)	-	56	70	72
Succession of leadership development program-by course (%)				
• Strategic Leader	-	100	100	100
• Business Leader	-	-	41	77
• First Line Leader	-	39	50	52
• Future Leader	-	-	-	39
• Engaging Leader	-	30	88	90

Environment

Social

Additional Information





Turnover Rate

Data	2015	2016	2017	2018
Turnover Rate-total (%)	-	3.03	3.03	6.25
Turnover Rate-voluntary (%)	-	3.03	3.03	3.13
Turnover Rate-by country (%)				
• Thailand	-	3.03	3.03	6.25
• China	-	0	0	0
• Japan	-	0	0	0
• Other	-	0	0	0



Parental Leave

Data	2015	2016	2017	2018
Number of employee taking parental leave-by country (Person)				
• Thailand	-	0	0	0
• China	-	0	0	0
• Japan	-	0	0	0
• Others	-	0	0	0
Percentage of employee returning to work after parental leave-by country (%)				
• Thailand	-	0	0	0
• China	-	0	0	0
• Japan	-	0	0	0
• Others	-	0	0	0



Collective Bargaining Agreements

Data	2015	2016	2017	2018
Percentage of employees covered by collective bargaining agreements (%)				
• Thailand	-	0	0	0
• China	-	0	0	0
• Japan	-	0	0	0
• Others	-	0	0	0

Note: The employee information was consolidated as Banpu employee until 2016, when Banpu Power was listed on the Stock Exchange of Thailand. Therefore, some data in 2015 are not available.



Occupational Health and Safety

Data	2015	2016	2017	2018
Work-related Fatalities (Person)	0	0	0	0
• Employee	0	0	0	0
• Contractor	0	0	0	0
• 3 rd Party	0	0	0	0
Fatality Rate (Person/Million Man-hours)	0	0	0	0
• Employee	0	0	0	0
• Contractor	0	0	0	0
Number of Injuries (Case) ^{(c)(d)(e)}				
• Employee	0	1	0	0
• Contractor	-	-	-	-

Data	2015	2016	2017	2018
Total Recordable Injury Frequency Rate (TRIFR) ^{(b)(c)(d)(e)} (Person/Million Man-hours)				
• Employee	0	3.93	0	0
• Contractor	-	-	-	-
Lost time Injury Frequency Rate (LTIFR) ^{(b)(e)(f)} (Person/Million Man-hours)				
• Employee	0	3.36	0	0
• Contractor	-	-	-	-
Injury Severity Rate (ISR) ^{(b)(e)(g)} (Day/Million Man-hours)				0
• Employee	0	177.77	0	0
• Contractor	-	-	-	-
High Consequence Work Related Injuries ^{(b)(c)(e)} (Case)				0
• Employee	-	-	-	0
• Contractor	-	-	-	0
High Consequence Work Related Injuries Rate ^{(b)(c)(e)} (Person/Million Man-hours)				0
• Employee	-	-	-	0
• Contractor	-	-	-	0
Major Incident ^(h) (Case)	0	1	0	0
• Thailand	0	0	0	0
• China	0	1	0	0
• Japan	0	0	0	0

Economic

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Additional Information

(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

Topic	Sub-topic	Unit	2016	2017	2018
Installation capacity					
	Electricity	MW	1,434	1,434	1,434
	Capacity under construction	MW	0	0	0
	Planned future investments	THB	0	0	0
Production					
Annual production	Electricity Sold	MWh	10,932,315	10,091,687	10,383,584
		GJ	39,356,334	36,330,073	37,380,902
	Electricity generated	MWh	11,460,567	10,572,880	10,877,823
System Efficiency					
Production efficiency	Efficiency Rate (Power Production)	g/KWh	353.64	348.66	355.66
	Efficiency Rate (Steam Production)	Kg/GJ	-	-	-
	Availability factor	%	91.0%	84.2%	86.6%
	Overall efficiency	%	38.2%	38.3%	38.7%
Planned Outage	Planned Outage Frequency	Case/Year	2	2	2
	Total Outage Hours	Hrs	792	2,208	1,968
	Average Power Outage Duration	Hrs/Case	396	1,104	984
Unplanned Outage	Power Outage Frequency	Case/Year	2	2	1
	Total Outage Hours	Hrs	59	257	14
	Average Power Outage Duration	Hrs/Case	29.50	128.50	14.00
Total Outage	Power Outage Frequency	Case/Year	4.00	4.00	3.00
	Total Outage Hours	Hrs	851	2,465	1,982
	Average Power Outage Duration	Hrs/Case	212.75	616.25	660.67
Transmission	Length of transmission line	Km	47	47	47
Energy					
Energy consumption within the organization	Direct fuel consumption	GJ	104,821,754	96,781,462	99,917,245
	• Coal	GJ	104,799,626	96,731,871	99,894,682
	• Diesel	GJ	22,128	49,591	22,563
	Indirect energy consumption	GJ	0	0	0
	• Electricity purchased	KWh	0	0	0
Water					
Water withdrawal by source	Total water withdrawal	megaliter	688	765	518
	• Surface fresh water	megaliter	688	765	518
Water consumption	Total water consumption	megaliter	424	618	228
Water recycled and reused	Total water recycled/reused	megaliter	264	147	291
	• Recycled back in the same process	megaliter	0	0	0
	• Recycled and reused in different process	megaliter	264	147	291
Biodiversity					
Total Area	Total operation area	Km²	0.96	0.96	0.96
	How operation area related to protected area				
	• Located inside protected area	Km ²	0	0	0
	• Adjacent to protected area	Km ²	0	0	0
	• Contain portion in protected area	Km ²	0	0	0



Economic



Topic	Sub-topic	Unit	2016	2017	2018
ICUN Red list species in operation area	Level of extinction risk				
	• Critically endangered	Number	0	0	0
	• Endangered	Number	0	0	0
	• Vulnerable	Number	0	0	0
	• Near threatened	Number	0	0	0
	• Least concern	Number	0	0	0
Emissions					
Greenhouse Gas	Total Greenhouse Gas (Scope 1&2)	Ton CO₂e	9,266,649.17	8,849,959.61	9,111,041.46
	• Direct GHG (Scope 1)	Ton CO ₂ e	9,264,594.00	8,846,181.00	9,109,143.29
	• Indirect GHG (Scope 2)	Ton CO ₂ e	2,055.17	3,778.61	1,898.17
	• GHG Intensity	Kg CO ₂ e/KWh	0.833	0.837	0.838
NO _x	Average Concentration	mg/m ³	247.40	237.30	228.60
	Degree of Compliance	%	100	100	100
SO _x	Average Concentration	mg/m ³	253.40	279.40	258.10
	Degree of Compliance	%	100	100	100
Particulate matter (PM)	Average Concentration	mg/m ³	18.90	16.60	32.40
	Degree of Compliance	%	100	100	100
Effluent					
Water discharged by destination	Total water discharged	megaliters	302	447	181
	• Surface water	megaliters	0	0	0
	• Groundwater	megaliters	0	0	0
	• Seawater	megaliters	0	0	0
	• Third-party water (total)	megaliters	302	447	181
	• Third-party water sent for use to other organizations	megaliters	0	0	0
Water discharged	Fresh water (<1000 mg/L Total Dissolved Solids)	megaliters	302	447	181
	Other water (>1000 mg/L Total Dissolved Solids)	megaliters	0	0	0
pH	Average	-	7.50	7.83	7.61
	Degree of Compliance	%	100	100	100
BOD	Average	mg/L	< 0.2-3.2	< 0.2-2.5	< 0.2-4.3
	Degree of Compliance	%	100	100	100
COD	Average	mg/L	< 25.0	< 25.0	< 25.0
	Degree of Compliance	%	100	100	100
Temperature	Average	mg/L	34.23	34.26	34.45
	Degree of Compliance	%	100	100	100
Significant spills	Total number of significant spills	Case	0	0	0
	Total volume of significant spills	Liter	0	0	0
Waste					
Waste disposal by disposal method	Total hazardous waste disposed	Tons	178	345	231
	• Reuse	Tons	0	0	0
	• Recycle	Tons	59	116	105
	• Recovery (including energy recovery)	Tons	56	79	83
	• Incineration	Tons	0	0	0
	• Deep well injection	Tons	0	0	0
	• Landfill	Tons	63	150	43

Environment



Social



Additional Information



Topic	Sub-topic	Unit	2016	2017	2018
Waste/by-product from power plant	• On-site storage	Tons	0	0	0
	• Other (please specify)	Tons	0	0	0
	Total non-hazardous waste disposed	Tons	614,157	543,927	580,697
	• Re-used	Tons	0	0	0
	• Recycle	Tons	378	455	348
	• Compositing	Tons	0	0	0
	• Recovery (including energy recovery)	Tons	612,957	542,648	579,081
	• Incineration	Tons	0	0	0
	• Deep well injection	Tons	0	0	0
	• Landfill	Tons	822	823	1,269
	• On-site storage	Tons	0	0	0
	• Other (please specify)	Tons	0	0	0
	Total waste disposed (Hazardous & Non-hazardous)	Tons	614,335	544,271	580,928
	Total production of ash	Tons	612,540	543,467	592,708
	• Fly ash	Tons	542,514	473,077	532,713
	• Bottom ash	Tons	70,026	70,390	59,995
	• Gypsum	Tons	0	0	0
Re-used/recycled					
• Fly ash recycled	Tons	542,514	472,922	532,474	
• Bottom ash recycled	Tons	70,026	70,390	59,995	
• Gypsum recycled	Tons	0	0	0	
Environmental Compliance					
Non-Compliance with Environmental Laws and Regulations	Total monetary value of significant fines	Case	0	0	0
		THB	0	0	0
	Total number of non-monetary sanctions	Case	0	0	0
	Case brought through dispute resolution mechanism	Case	0	0	0
Environmental Grievance Mechanism					
Complaints from related stakeholders on environment	Significant environmental complaint	Number	0	0	0
	Significant complaint resolved	Number	0	0	0
Safety Performance					
Employee	Man hour	Hrs	614,608	627,848	642,712
	Number of fatality	Male	0	0	0
		Female	0	0	0
	Number of high-consequence work related injury (excluding fatality)	Male	0	0	0
		Female	0	0	0
	Number of Lost Time Injury	Male	0	0	0
		Female	0	0	0
	Number of recordable work-related injuries	Male	2	1	0
		Female	0	0	0
	Day Lost (exclude fatality and permanent disability)	Male	0	0	0
		Female	0	0	0
	Fatality Rate	Person/ Million Man-Hrs	0	0	0
	LTIFR (including fatality and disability)	Person/ Million Man-Hrs	0	0	0
	High consequence work related injury rate	Person/ Million Man-Hrs	0	0	0

Topic	Sub-topic	Unit	2016	2017	2018
Contractor	Total Recordable Injury Rate (TRIR)	Person/ Million Man-Hrs	0	1.59	0
	Number of Occupational Disease	Male	0	0	0
		Female	0	0	0
	Man hour	Hrs	982,393	1,656,177	1,783,171
	Number of fatality	Male	0	1	0
		Female	0	0	0
	Number of high-consequence work related injury (excluding fatality)	Male	0	0	0
		Female	0	0	0
	Number of Lost Time Injury	Male	0	0	0
		Female	0	0	0
	Number of recordable work-related injuries	Male	3	7	3
		Female	0	0	0
	Day Lost (exclude fatality and permanent disability)	Male	0	0	0
		Female	0	0	0
	Fatality Rate	Person/ Million Man-Hrs	0.00	0.60	0.00
		Person/ Million Man-Hrs	0.00	0.00	0.00
	LTIFR (including fatality and disability)	Person/ Million Man-Hrs	0.00	0.00	0.00
	High consequence work related injury rate	Person/ Million Man-Hrs	0.00	0.00	0.00
	Total Recordable Injury Rate (TRIR)	Person/ Million Man-Hrs	0.00	3.02	0.56
		• Number of Occupational Disease	Male	0	0
Public	Female	0	0	0	
	Number of fatalities involving company asset incident	Number	0	0	0
	Number of injuries involving company asset incident	Number	0	0	0
	Number of health and safety related legal case (including disease)	Number	0	0	0
Compensation cost	THB	0	0	0	
OHS Training/communication					
Employee	OHS training hour	Hrs	N/A	N/A	18,173
Contractor	OHS training hour	Hrs			21,033
Expense and investment for safety					
Expense for safety operation	Operation expense	THB	N/A	N/A	24,300,000
	Capex	THB	N/A	N/A	0
Expense for safety improvement project	Operation expense	THB	N/A	N/A	0
	Capex	THB	N/A	N/A	550,000
Non-Compliance with laws and regulations in the social and economic area					
Significant fine and non-monetary sanctions	Total monetary value of significant fine	USD	0	0	0
	Total number of non-monetary sanctions	Number	0	0	0
	Case brought through dispute resolution mechanisms	Number	0	0	0
Full time employee					
Human Resource Management	Total full time employee	Persons	292	278	278
	• Male	Persons	245	232	229
	• Female	Persons	47	46	49

Economic

Environment

Social

Additional Information

Topic	Sub-topic	Unit	2016	2017	2018
	Employee Type	Persons	292	278	278
	• Permanent	Persons	272	268	265
	• Temporary, contract	Persons	20	10	13
	Level		272	268	265
	• Senior Management (DD and up)	Persons	8	7	7
	• Middle Management (section and manager)	Persons	31	32	31
	• Junior Management (senior officer)	Persons	50	47	46
	• Supervisor and staff	Persons	183	182	181
	New Employee	Persons	27	15	16
	• Male	Persons	24	11	12
	• Female	Persons	3	4	4
	Turn over	Persons	19	17	24
	• Total Turnover rate	%	6.51	6.12	8.63
Gender distribution by professional category					
Gender distribution by professional category	Senior Management	Persons	8	7	7
	• Male	Persons	7	6	6
	• Female	Persons	1	1	1
	Middle Management	Persons	31	32	31
	• Male	Persons	24	25	25
	• Female	Persons	7	7	6
	Junior Management	Persons	50	47	46
	• Male	Persons	41	39	39
	• Female	Persons	9	8	7
	Supervisor and staff	Persons	183	182	181
	• Male	Persons	159	158	155
	• Female	Persons	24	24	26
Employee Development					
	Total Training hours	Hrs	13,084	8,084	18,173
	• Senior Management	Hrs	535	186	512
	• Middle Management	Hrs	2,480	1,537	3,297
	• Junior Management	Hrs	2,829	2,014	3,010
	• Supervisor and staff	Hrs	7,240	4,347	11,354
	• Average training	Hrs/Person	44.81	29.08	65.37
Parental leave					
Parental leave	Employee take parental leave	Persons	11	6	6
		%	3.77	2.16	2.16
	Number of employee return to work after parental leave	Persons	11	5	6
		%	100	83	100



Hongsa Power Plant

Topic	Sub-topic	Unit	2016	2017	2018	
Installation capacity						
	Electricity	MW	1,878	1,878	1,878	
	Capacity under construction	MW	0	0	0	
	Planned future investments	THB	0	0	0	
Production						
Annual production	Electricity Sold	MWh	9,062	11,391	12,512	
		GJ	32,622	41,007	45,042	
	Electricity generated	MWh	10,061	12,655	13,780	
System Efficiency						
Production efficiency	Efficiency Rate (Power Production)	g/KWh	1116	1140	1113	
	Efficiency Rate (Steam Production)	Kg/GJ	-	-	-	
	Availability factor	%	68.62%	83.61%	89.65%	
	Overall efficiency	%	31.62%	31.51%	32.06%	
Planned Outage	Planned Outage Frequency	Case/Year	1	2	3	
	Total Outage Hours	Hrs	420	1,940	1,225	
	Average Power Outage Duration	Hrs/Case	420.00	969.96	408.32	
Unplanned Outage	Forced Outage					
	• Power Outage Frequency	Case/Year	36	20	20	
	• Total Outage Hours	Hrs	7,171	2,126	1,275	
	• Average Power Outage Duration	Hrs/Case	199.19	106.30	63.76	
Total Outage	Power Outage Frequency	Case/Year	37.00	22.00	23.00	
	Total Outage Hours	Hrs	7,591	3,096	1,683	
	Average Power Outage Duration	Hrs/Case	205.16	140.72	73.19	
Transmission and Distribution Loss as a percentage of total energy	Length of transmission line	Km	167	167	167	
	Transmission Loss	%	0.95%	0.20%	0.21%	
	Length of distribution line	Km	6	6	6	
Energy						
Energy consumption within the organization	Direct fuel consumption		GJ	115,420,586	144,980,196	154,938,500
	• Coal		GJ	114,606,169.88	144,469,158.16	154,604,073.30
	• Diesel		GJ	814,416.14	511,038.57	334,427.17
	Indirect energy consumption		GJ	0	0	0
	• Electricity purchased		GJ	0	0	0
Water						
Water consumption	Total water consumption	megaliter	N/A	N/A	27,159	
Emissions						
GHG emission	Total GHG (Scope 1&2)		Ton CO₂e	11,850,564.84	16,920,257.84	16,185,216.04
	• Direct GHG (Scope 1)		Ton CO ₂ e	11,850,235.17	16,920,206.73	16,185,163.77
	• Indirect GHG (Scope 2)		Ton CO ₂ e	329.66	51.11	52.27
	• Other Indirect GHG (Scope 3)		Ton CO ₂ e	1,379.16	1,488.25	1,714.47
	• GHG Intensity (Scope 1 and 2)		Kg CO ₂ e/KWh	1.545	1.600	1.384

Economic



Economic



Economic



Economic



Environment



Environment



Environment



Environment



Social



Social



Additional Information



Additional Information



Topic	Sub-topic	Unit	2016	2017	2018
NO _x	• Direct GHG (Scope 1)	Ton CO ₂ e	344,166	558,387	443,680
	• Indirect GHG (Scope 2)	Ton CO ₂ e	685.24	2,536.00	759.76
	Average Concentration	mg/Nm ³	339.05-405.27	313.05-338.00	158.70-198.00
	Standard	mg/Nm ³	510	510	510
SO _x	Degree of Compliance	%	100	100	100
	Average Concentration	mg/Nm ³	101.00-135.72	99.95-117.66	128.74-142.23
	Standard	mg/Nm ³	230	230	230
Particulate matter (PM)	Degree of Compliance	%	100	100	100
	Average Concentration	mg/Nm ³	20.73-42.41	24.16-31.41	5.18-7.87
	Standard	mg/Nm ³	50	50	50
	Degree of Compliance	%	100	100	100
Effluent					
pH	min-max	-	7.74-8.87	8.27-8.85	8.54-9.6
	Standard	-	6-9	6-9	6-9
	Degree of Compliance	%	100%	100%	99.1%
TSS	min-max Concentration	mg/L	12.0-94.0	13.0-160.0	8.0-42.0
	Standard	mg/L	≤50	≤50	≤50
	Degree of Compliance	%	99.1%	99.1%	100%
BOD	min-max Concentration	mg/L	1.8-7.3	0.5-7.4	0-1.4
	Standard	mg/L	≤40	≤40	≤40
	Degree of Compliance	%	100%	100%	100%
COD	min-max Concentration	mg/L	≤40	≤40	≤40
	Standard	mg/L	≤120	≤120	≤120
	Degree of Compliance	%	100%	100%	100%
Temperature	min-max	°C	0-1	0-1	0-1
	Standard	°C	<3 different	<3 different	<3 different
	Degree of Compliance	%	100%	100%	100%
Significant spills	Total number of significant spills	Case	0	0	0
Waste					
Waste disposal by disposal method	Total hazardous waste disposed	Tons	286,613	528,714	870,302
	• Reuse	Tons	0	0	0
	• Recycle (liquid)	Liter	286,450	528,406	864,802
	• Recycle (solid)	Tons	163	308	N/A
	• Recovery (including energy recovery)	Tons	N/A	N/A	N/A
	• Incineration	Tons	N/A	N/A	N/A
	• Deep well injection	Tons	N/A	N/A	N/A
	• Landfill	Tons	N/A	N/A	N/A
	• On-site storage	Tons	N/A	N/A	5,500
	• Others	Tons	N/A	N/A	N/A
	Total non-hazardous waste disposed	Tons	6,584	4,867	9,316
	• Reuse	Tons	N/A	N/A	N/A
	• Recycle	Tons	0.60	42.96	3,736
	• Compositing	Tons	N/A	N/A	N/A
	• Recovery (including energy recovery)	Tons	N/A	N/A	N/A
• Incineration	Tons	N/A	N/A	N/A	

Topic	Sub-topic	Unit	2016	2017	2018
Waste/By-product from power plant	• Deep well injection	Tons	N/A	N/A	N/A
	• Landfill	Tons	6,477.8	4,688.7	5,580
	• On-site storage	Tons	60	65	N/A
	• Others	Tons	46	71	N/A
	Total waste disposed (Hazardous & Non-hazardous)	Tons	293,197	533,581	879,618
	Total production of ash	Tons	2,079,546	2,250,012	3,027,776
	• Fly ash	Tons	2,079,546	2,250,012	3,027,776
	• Gypsum	Tons	125,221	451,001	687,376
	Re-used/recycled				
	• Fly ash recycled	Tons	668	123,615.21	320,481
• Gypsum recycled	Tons	N/A	N/A	30	
Environmental Compliance					
Non-Compliance with Environmental Laws and Regulations	Total monetary value of significant fines	Case	0	0	0
		THB	0	0	0
	Total number of non-monetary sanctions	Case	0	0	0
	Case brought through dispute resolution mechanism	Case	0	0	0
Return on Environmental Investment					
Environmental expenditure and cost saving	Capital expense	THB	3,636,852.21	2,904,797.85	5,891,396.81
	Operating expense	THB	11,048,257.51	15,330,591.52	10,935,230.65
Environmental improvement project	Capital expense	THB	N/A	12,823,021.02	48,574,584.00
	Operating expense	THB	N/A	N/A	N/A
Environmental Grievance Mechanism					
Complaints from related stakeholders on environment	Significant environmental complaint	Number	8	3	5
	Significant complaint resolved	Number	8	3	5
Safety Performance					
Employee	Man hour	Hrs	1,687,506	1,664,701	1,727,688
	Number of fatality	Male	0	0	0
		Female	0	0	0
	Number of high-consequence work related injury (excluding fatality)	Male	0	0	0
		Female	0	0	0
	Number of Lost Time Injury	Male	0	0	0
		Female	0	0	0
	Number of recordable work-related injuries	Male	4	6	5
		Female	0	0	0
	Day Lost (exclude fatality and permanent disability)	Male	0	0	0
		Female	0	0	0
	Fatality Rate	Person/Million Man-Hrs	0.00	0.00	0.00
	LTIFR (including fatality and disability)	Person/Million Man-Hrs	0.00	0.00	0.00
	High consequence work related injury rate	Person/Million Man-Hrs	0.00	0.00	0.00
	Total Recordable Injury Rate (TRIR)	Person/Million Man-Hrs	2.37	3.60	2.89
	Main type of work-related injury				
• Amputation	person	0	0	0	
• Burn	person	0	0	0	

Economic

Environment

Social

Additional Information

Topic	Sub-topic	Unit	2016	2017	2018	
Contractor	• Chemical	person	0	0	0	
	• Contamination	person	0	0	0	
	• Contusion	person	4	4	2	
	• Dry heat friction	person	0	0	0	
	• Fracture	person	0	0	0	
	• Hernia	person	0	0	0	
	• Irritation	person	0	0	0	
	• Laceration	person	0	2	3	
	• Puncture	person	0	0	0	
	• Rash	person	0	0	0	
	• Strain& Sprain	person	0	0	0	
	• Other	person	0	0	0	
	• Number of Occupational Disease	Male	0	0	0	
		Female	0	0	0	
	Man hour	Hrs	9,659,052	12,939,159	15,389,796	
	Number of fatality	Male	0	0	1	
		Female	0	0	0	
	Number of high-consequence work related injury (excluding fatality)	Male	0	0	0	
		Female	0	0	0	
	Number of Lost Time Injury	Male	4	4	3	
		Female	0	0	0	
	Number of recordable work-related injuries	Male	12	21	21	
		Female	0	2	0	
	Day Lost (exclude fatality and permanent disability)	Male	3,030	27	6,684	
		Female	0	0	0	
	Fatality Rate	Person/Million Man-Hrs	0.00	0.00	0.06	
	LTIFR (including fatality and disability)	Person/Million Man-Hrs	0.41	0.31	0.19	
	High consequence work related injury rate	Person/Million Man-Hrs	0.00	0.00	0.00	
	Total Recordable Injury Rate (TRIR)	Person/Million Man-Hrs	1.66	1.62	1.36	
	Main type of work-related injury					
	• Amputation	person	1	0	0	
	• Burn	person	0	2	1	
	• Chemical	person	0	0	0	
	• Contamination	person	0	0	0	
	• Contusion	person	3	10	10	
• Dry heat friction	person	0	0	0		
• Fracture	person	1	0	0		
• Hernia	person	0	0	0		
• Irritation	person	0	2	1		
• Laceration	person	4	7	5		
• Puncture	person	0	1	4		
• Rash	person	0	0	0		
• Strain& Sprain	person	3	1	1		
• Other	person	0	0	0		
• Number of Occupational Disease	Male	0	0	0		
	Female	0	0	0		

Topic	Sub-topic	Unit	2016	2017	2018
Public	Number of fatalities involving company asset incident	Number	0	0	0
	Number of injuries involving company asset incident	Number	0	0	0
	Number of health and safety related related legal case (including disease)	Number	0	0	0
	Compensation cost	THB	0.00	0.00	0.00
OHS Training/communication					
Employee	OHS training program	Number	55	42	38
	OHS training hour	Hrs	3,210	1,102	1,024
Contractor	OHS training program	Number	750	780	539
	OHS training hour	Hrs	28,457	17,571	17,579
Expense and investment for safety					
Expense for safety operation	Operation expense	THB	16,677,903	23,892,511	24,701,400
	Capital Expense	THB	39,920,256	29,384,720	2,045,800
Expense for safety improvement project	Operation expense	THB			
	Capital Expense	THB	270,000	36,016,260	20,500,000
Non-Compliance with laws and regulations in the social and economic area					
Significant fine and non-monetary sanctions for non-compliance with laws and/or regulations in the social and economic area	Total monetary value of significant fine	USD	0	0	0
	Total number of non-monetary sanctions	Number	0	0	0
	Case brought through dispute resolution mechanisms	Number	0	0	0
Full time employee					
Human Resource Management	Total full time employee	Person	736	722	734
	• Male	Person	548	559	568
	• Female	Person	188	163	166
	Nationality	Person	736	722	734
	• Thai	Person	258	270	275
	• Laos PDR	Person	477	451	458
	• Philippines	Person	1	1	1
	Age	Person	736	722	734
	• Under 30	Person	373	345	325
	• 30-39	Person	222	238	251
	• 40-49	Person	91	90	101
	• 50 and over	Person	50	49	57
	Employee Type	Person	736	722	734
	• Permanent	Person	632	712	692
	• Temporary, contract	Person	104	10	42
	Level	Person	653	722	734
	• Senior Management	Person	17	19	19
	• Middle Management	Person	80	80	90
	• Junior Management	Person	179	191	187
• Supervisor and staff	Person	377	394	403	
• Other (worker)	Person	83	38	35	



Topic	Sub-topic	Unit	2016	2017	2018
	New Employee	Person	129	91	44
	• Male	Person	86	66	27
	• Female	Person	43	25	17
	Retainment of employee				
	• Average length of service years	Years	2.88	3.52	4.33
	Estimated total employee eligible to retired in the next 5 years	Person	25	21	26
	• Senior Management	Person	8	9	9
	• Middle Management	Person	6	4	5
	• Junior Management	Person	5	6	8
	• Supervisor and staff	Person	4	1	2
	• Others	Person	2	1	2
	Estimated total employee eligible to retired in the next 10 years	Person	32	28	30
	• Senior Management	Person	4	3	4
	• Middle Management	Person	8	8	8
	• Junior Management	Person	9	8	9
	• Supervisor and staff	Person	8	7	9
	• Others	Person	3	2	0
	Turn over	Person	79	104	36
	• Reassignment	Person	45	22	29
	• Retirement	Person	0	3	0
	• Other termination	Person	34	79	7
	• Total Turnover rate	%	10.73	13.57	4.09
	• Volunteer Turnover rate	%	6.11	3.05	3.95
Gender distribution by professional category					
Gender distribution by professional category	Senior Management	Person	17	19	19
	• Male	Person	15	15	14
	• Female	Person	2	4	5
	Middle Management	Person	80	80	90
	• Male	Person	55	56	64
	• Female	Person	25	24	26
	Junior Management	Person	179	191	187
	• Male	Person	122	130	128
	• Female	Person	57	61	59
	Supervisor and staff	Person	377	394	403
	• Male	Person	308	328	334
	• Female	Person	69	66	69
	Professional and advisor	Person	7	9	7
	• Male	Person	7	9	7
• Female	Person	0	0	0	
Salary/Expense					
	Remuneration cost	THB	457,492,801	477,717,230	520,566,680
	Retirement benefit cost	THB	17,120,160	6,462,618	3,565,901
	Employee development cost	THB	3,504,051	4,415,843	4,862,361

Topic	Sub-topic	Unit	2016	2017	2018
Employee Development					
	Total Training hours	Hrs	12,883	16,642	18,004
	• Senior Management	Hrs	228	341	164
	• Middle Management	Hrs	2,107	3,675	3,523
	• Junior Management	Hrs	4,442	6,530	7,828
	• Supervisor and staff	Hrs	6,106	6,096	6,489
	• Average training Hrs/person	Hrs/Person	20.00	24.00	25.89
	Total Training expense	THB	3,504,051	4,415,843	4,862,361
	• Senior Management	THB/Person	12,000	12,000	12,000
	• Middle Management	THB/Person	14,000	15,000	15,000
	• Junior Management	THB/Person	13,000	15,000	16,000
	• Supervisor and staff	THB/Person	8,000	10,000	11,000
	• Average training expense	THB/Person	5,366	6,456	6,963
Parental leave					
	Employee take parental leave	Person	5	9	11
		%	3	6	7
	Number of employee return to work after parental leave	Person	5	9	11
		%	3	6	7
Absenteeism Rate					
	Absenteeism rate due to common illness	%	0.58	0.59	0.55
Impacted community					
Plant area	Impacted household	Household	-	-	2,588
	Impacted people	Person	-	-	12,336
	compensated household	Household	-	-	975
	compensated people	Person	-	-	5,265
Transmission line	Impacted household	Household	-	-	249
	Impacted people	Person	-	-	1,345
	compensated household	Household	-	-	249
	compensated people	Person	-	-	1,345
Contribute to improve host community quality of life					
Community Investment	Promotion of Supplementary Occupations and Related Techniques	Number of program	-	-	13
		Number of direct beneficiaries	-	-	13,681
	Education	Number of program	-	-	14
		Number of direct beneficiaries	-	-	3,810
	Public health, safety and wellness	Number of program	-	-	4
		Number of direct beneficiaries	-	-	12,818
	Environment and climate change	Number of program	-	-	1
		Number of direct beneficiaries	-	-	130
	Job Opportunity	Person	5,606	5,632	8,100
Complaint					
Complaint from company operation	Total Formal/significant complaint case by communities	Case	10	3	2
	Solved complaint	Case	10	3	2

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GRI 102: General Disclosures 2016				
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^E GRI-G4 Electric Utilities Sector Disclosures 2010.

Note: The company has external assurance with Banpu group i.e. energy and greenhouse gas.

Feedback and Contacts

Banpu Power welcomes your feedback and provide information about our sustainable policies and performance.

Please email your feedback or queries to info@banpupower.co.th

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