綠色能源
Green
Energy

+

綠色發展
Green
Development

—

碳排放污染
Less
Pollution

=

未來 低碳 綠生活
GREEN FUTURE

環境、社會及管治報告
Environmental, Social
& Governance Report 2017

華能國際電力股份有限公司
Huaneng Power International, Inc.

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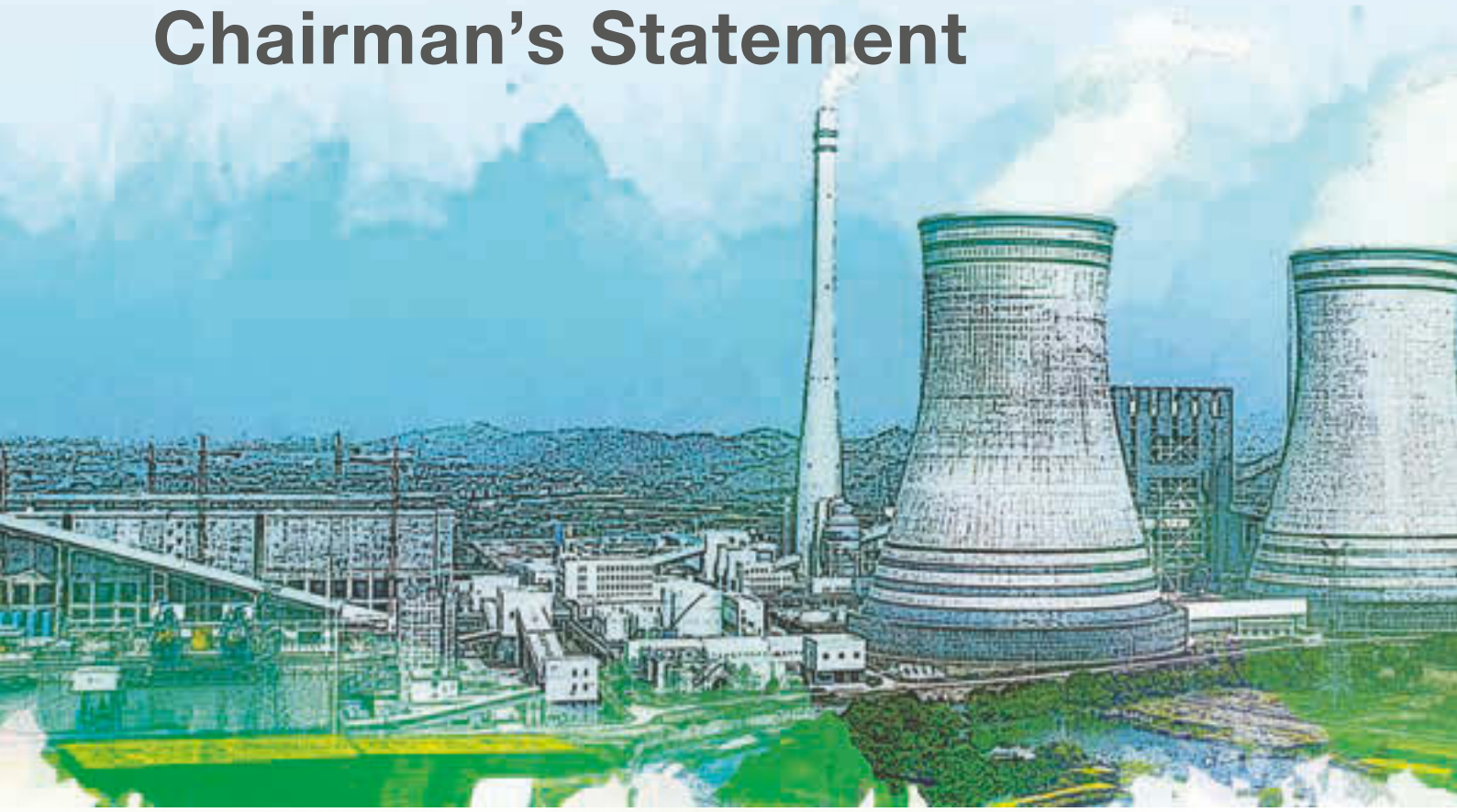
Chairman's Statement



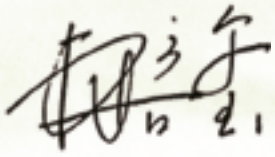
2017 has seen the deepening of supply-side structural reform and was an important year for China's 13th Five-Year Plan at a time when Huaneng International has developed itself into a global leading public power company.

As a responsible enterprise citizen, Huaneng International has persisted in the environment protection concepts of "energy conservation, emission reduction, and clean development", initiatively practice national target responsibility of energy conservation and emission reduction, consolidated its leading position in clean and efficient conventional energy, vigorously developed new energy, persistently reduced resource consumption and pollutant emission, and enhanced efficiency of energy use, put the concept of "focus on science, technology, and environment protection" into all aspects of our work. In 2017, Huaneng International has continued to intensify its energy conservation and emission reduction, fully implementation the ultra-low emissions and exceeded our target for reducing unit power consumption in power generation, uninterruptedly diminished emissions of sulphur dioxide, nitrogen oxides, soot and other pollutants, and made due contributions for the environmental, social and economic development.

As a responsible enterprise citizen, Huaneng International always adheres to the production safety principles of "people first, safety first, prevention first, comprehensive management", conscientiously implements state policies on enhancing production safety, rigorously complies with policies and measures relating to the reform and development of the production safety field, and proactively practices the responsibility system for safety in production to cement the foundation for strengthening responsibilities. In 2017, we successfully delivered on our service guarantee promises during the 19th National Congress of CPC, the "two sessions" and the Belt and Road Summit.

As a responsible enterprise citizen, Huaneng International has insisted on harmonious development concepts of "serve the Country, benefit society, seek multilateral benefits and develop together", and is committed to working with stakeholders to promote economic and social development. In 2017, through close cooperation with stakeholders, as well as thorough consideration of and effective response to their demands, Huaneng International has strived to bring about mutual benefit, create shared values, enhance our operating capacity and contribute to society.

2018 marks the 40th anniversary of the reform and opening up of China and represents an important nexus stage for securing decisive victory in building a moderately prosperous society as well as for implementing the state's "13th Five-Year Plan". Huaneng International will continue to insist on new development concepts, stick to our core values of "upholding integrity, emphasizing cooperation; innovating constantly, progressing proactively; creating achievements, serving the Country", further enhance our operating capacity by pushing ahead with quality development and facilitating the supply-side structural reform, and contribute to promoting the sustainable and healthy development of the economy and our society, thereby helping to secure decisive victory in building a moderately prosperous society.



Chairman of Huaneng Power International, Inc.

02
About Us

2.1 Company Profile

Huaneng Power International, Inc. ("Huaneng International", "the Company" or "we") was incorporated on 30 June 1994, the core business is to develop, construct and operate large-scale power plants throughout China by making use of modern technology and equipment and financial resources available domestically and internationally. It is one of China's largest public power generation companies, as well as the first domestic power company that goes public in New York, Hong Kong and Shanghai.

As the core enterprise of China Huaneng Group Co., Ltd.'s ("Huaneng Group") central industry, Huaneng International always committed to build into a global leading power generation listed company, devoted to providing sufficient, reliable and eco-friendly energy to the community and provide quality energy services. The Company has been committed to system, technology and management innovations. The Company has been the pioneer and has created various milestones within the domestic power industry in areas such as power technology advancement and power plant construction and management, which dramatically facilitated the great-leap forward development of the power business and technological advancement of the power station equipment manufacturing industry in China, and also greatly contributed to the improvement of technical and management standards of domestic power generation enterprises.

Throughout the years, with efforts in seeking expansion and operating our business in a prudent manner, the Company has expanded successively with steady growth in competitive strengths. The success of the Company is attributable to its various advantages, including advantages in scale and equipment, advantages in geographic layout of power plants, strong support from major shareholders, sound corporate governance structure, advantages in market reputation, extensive experience in the capital markets, advantages in overseas development, staff with high calibre and professional management.

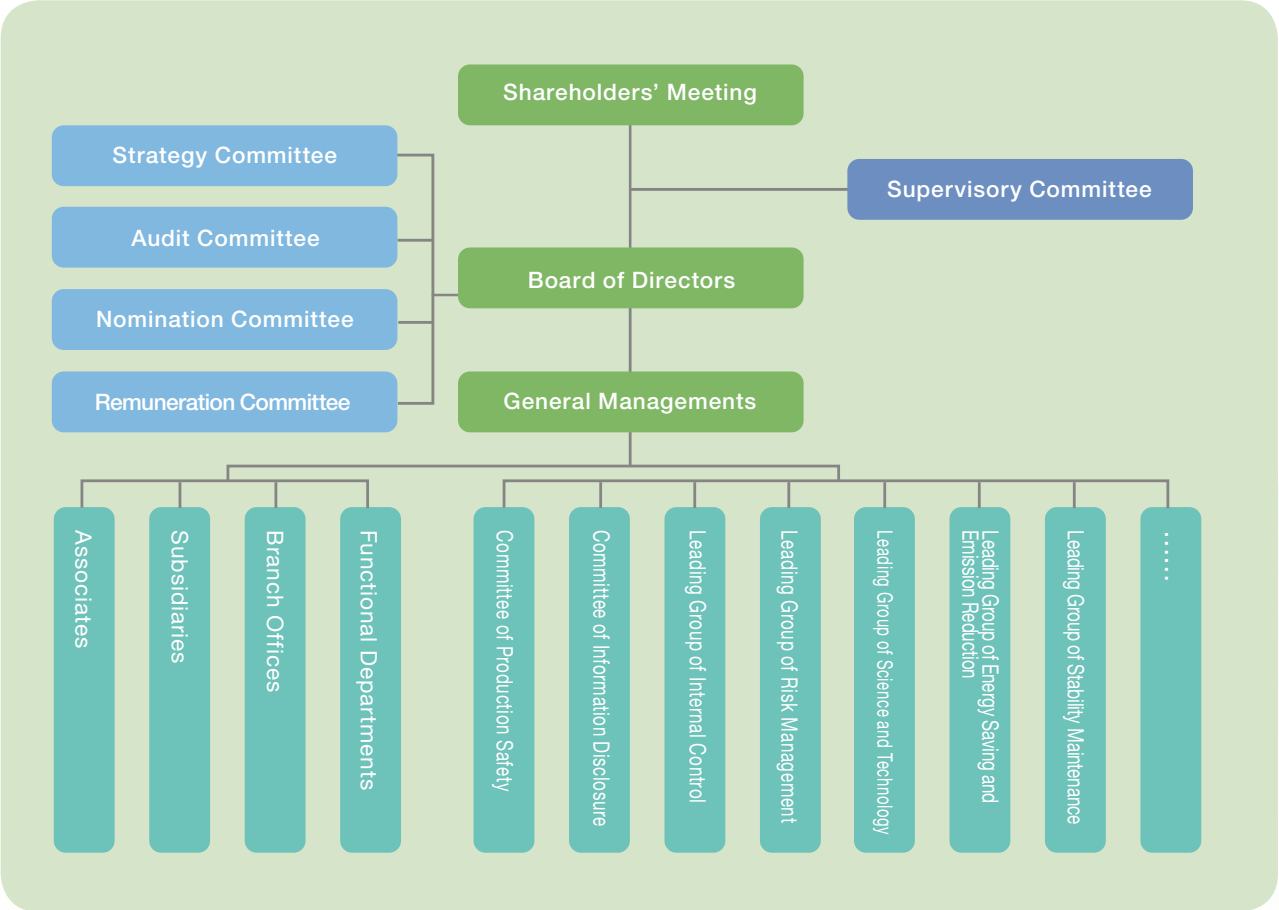
As at 31 December 2017, the Company is one of China's largest listed power producers with controlling generation capacity of 104,321 MW and equity-based generation capacity of 92,003 MW, and its domestic power plants are located in 26 provinces, autonomous regions and municipalities. The Company also has a wholly-owned power company in Singapore.

The Company was awarded "The Best Listed Company" and "The Best CEO of Listed Company" awards in the 2017 China Securities Golden Bauhinia Awards Competition, and the "2017 Outstanding Issuer of Corporate Bonds on Shanghai Stock Exchange Bond Market" award. Besides, the Company was on the list of "Platts Top 250 Global Energy Listed Companies Award" for nine consecutive years and ranked 59th in 2017.

2.2 Corporate Governance

As a public company listed in three stock exchanges both domestic and overseas, the Company has been subject to regulation by securities regulatory authorities of the three domestic and overseas places of listing, and supervision from its vast shareholders. The Company has highly valued the importance of corporate governance by enhancing its corporate governance system, which comprises the general meetings, the Board, the Supervisory Committee and the operation team. It has established an operating mechanism with clear terms of reference among decision authority, supervisory authority and operation authority to enable each of them to perform their respective liabilities subject to balance and coordination among the same parties, so that the right of the Shareholders' meeting and Board to make decision over material issues and the right of the Supervisory Committee to supervise relevant matters can be effectively exercised to ensure the operation team can deal with operational issues in an effective and regulatory way.

Through years of exploration and practices, the Company has gradually formulated a regulated, efficient and enhanced corporate governance structure, and also established a sound and effective system that suits the own development needs of the Company. The Company has assessed the applicability and effectiveness of the management system on a regular basis, carried out revision and improvement thereof timely, and has thus achieved the dynamic maintenance of the system.



2.3 Development Strategy

Huaneng International is committed to implementing new development initiatives in line with the general trend of China's economic and energy reform and development in the new era. The Company will adhere to the objective of establishing first-class company with international competitiveness, focus on improving the quality and performance of its development, and seek to accelerate transformation and upgrade in accordance with the requirements of market-oriented electricity reform and supply side structural reform. The Company will also put in place a new mechanism under the principle that management shall be centered on competitiveness improvement, operations shall be centered on customers, development shall be centered on market demands, so as to strengthen the strategic leadership and continuously improve its core competitiveness. The Company aims to consolidate its leading position in the conventional energy sector, speed up the new energy development, improve the synergy within the industry, expand sales and services presence, maintain steady expansion in overseas market, achieve all-around improvement of the Company's operating results, quality performance and corporate vitality, and build the Company into an internationally leading public power producer with standardized management, advanced technologies, energy saving and environment-friendly, reasonable operating structure, outstanding operations, sound corporate governance and superior market value.

The Company is committed to safe, green, efficient and sustainable growth. With insightful understanding of macro-economic environment, systemic reform development, industrial growth and other market trends, the Company aims to grow strategically with innovative initiatives and sound management. It will employ development, mergers and acquisitions and access to capital market and strategic investors at domestic and international markets to consolidate its leading position in clean, efficient conventional energy sector and to accelerate its development in new energy sector. The Company also aims to further enhance its key competitiveness, industry leadership, market influence and risk control with improved integration of resources, logistics, power generation and distribution system that draws strength from its organization, security, management, information and human capital, and strive to build up its modern energy sector system.

DISTRIBUTION OF POWER PLANTS OF THE COMPANY

The controlled power generation capacity of the Company as at 31 December 2017 is 104,321 MW, distributed in areas as depicted in the chart (Unit: MW)


Heilongjiang
3,636
Jilin
2,547
Beijing
2,766
Liaoning
4,981
Inner Mongolia
99
Tianjin
1,665
Gansu
3,647
Hebei
2,695
Shandong
18,465
Ningxia
20
Jiangsu
9,993
Henan
6,902
Shanxi
2,855
Shanghai
4,990
Anhui
1,389
Chongqing
3,575
Zhejiang
5,838
Hubei
3,847
Hunan
2,869
Guizhou
96
Fujian
2,730
Yunnan
3,784
Jiangxi
4,114
Guangdong
5,361
Hainan
2,639
Guangxi
210

2.4 Company Philosophy

Corporate Missions	• Being a “red company” that serves the socialism country with the special characteristics of China • Being a “green company” that focuses on science, technology, and environment protection • Being a “blue company” that keeps abreast of the latest development and is open world widely for innovative learning
Corporate Core Values	• Upholding integrity, focusing on cooperation • Innovating continuously, progressing actively • Creating achievements, serving the state serving the Country
Corporate Target	• Developing itself as an global leading listed power producer
Corporate Responsibilities	• Provision of adequate, reliable and environmental friendly power for the society • Strive for delivery of long-term, stable and increasing returns for shareholder • Support the fully development for employee to establish self achievements
Corporate Spirits	• Spirit of professional dedication-undergoing all conceivable hardships and using every conceivable means • Spirit of pioneering-cutting paths through mountains and building bridges across rivers • Spirit of progress-finding oneself gaps and pushing oneself ahead • Spirit of innovation-daring to lead and venturing to do the impossible
Corporate Manner	• Being good at pioneering; focusing on efficiency; caring for reputation; thrifty in working
Employee Image	• Having high ideals, moral integrity, good education and a strong sense of discipline

2.5 ESG Responsibility Management

The Board of Directors assumes the overall responsibility for the Company’s tactics and reports on environmental, social and governance (“ESG”) as well as for the assessment and determination of risks concerning ESG, and ensures for the Company the establishment of a proper and effective system of risk management and internal supervision thereto. The Company’s management provides information to the Board of Directors to assess the effectiveness of the system. The requirements of ESG play a catalytic role for the improvement of operation and management level of Huaneng International.

Situations Faced with the Company's ESG

In 2018, China's economy will enter a new era which would profoundly affect the energy supply and demand situation. China's economy is expected to move to quality growth from high-speed growth with upgraded economic structure driven by innovation rather than factors and investment. Industrial restructuring and upgrading, gradual reduction of energy demand, and supply-side structural reform will play the leading role in China's efforts towards new development and construction of modern economic system. The tasks to address overcapacity, deleverage and prevent risks still loom large. Continued development of an environmental-friendly civilization presents new requirements for energy production. Accelerated eco-system reform and building of a market-oriented and diversified environmental compensation mechanism will impose stricter environmental protection standards on energy development which will result in continued increase of coal-fired power generating costs and investment in environment protection oriented initiatives. Energy restructuring will maintain fast track development as the government issues policies and regulations on carbon trading, non-hydro renewable energy quota, and solar energy development to guide businesses towards green growth. China will deepen reforming efforts to make state-owned businesses competitive and extensive, improve the top-level design of state-owned enterprise, improve the corporate governance structure of state-owned enterprises, and enhance the competitiveness of enterprises. China will continue to push forward power sector reform and evolve towards a liberalized and competitive power market with market-based power generation, increased power transaction and extensive inter-provincial power exchange. Sectoral boundary and competition landscape are redefined by the ever competitive power sales, expanded reform of power distribution market, and accelerated construction of pilot spot market, which engenders new business models and profit-making models urging enterprises to be more market oriented, thus enhancing overall efficiency of the industry. The national initiative of "The Belt and Road" lend efforts for enterprises to deepen their cooperation with foreign countries and innovate their foreign investment mechanism, and also provides enterprises with ample opportunities for infrastructure investment and asset allocation, including energy and power sectors.

In the electricity market, with consistently favorable economic growth in China, the demand for electricity in 2018 is expected to maintain rapid growth continually. It is predicted by China Electricity Council that in 2018, total electricity consumption nationwide will grow by 5.5%, with newly installed generation capacity of approximately 120 million kW, of which thermal generation units will represent a reduced percentage from last year. In 2018, annual power generation utilization hours nationwide are expected to be 3,710 hours, and utilization hours of thermal generating units are estimated to be 4,210 hours, generally the same with 2017. Curtailment of hydro, wind and solar generated power is expected to be gradually addressed. The State Electricity Reform will progress steadily, power generation market is in the process of steady and planned liberalization, and medium-to-long term market transactions, cross-provincial and cross-regional transactions, spot transactions of clean energy are further expanded. The five-year winter clean heating initiative in northern China promoted by the government will have considerable power substitution effect.

In the fuel market, China will continue implementing policies to phase out obsolete production capacities and release advanced production capacities. It will speed up construction of the northern coal transportation corridors, coordinate efforts on capacity reduction and supply protection, and maintain coal supply and demand balance and price stability. The government will also strive to restore coal price to reasonable range with multiple efforts including accelerated increase of advanced coal production capacities, enhanced enforcement of medium-to-long coal contracts, execution of mutual guaranty agreement among coal producers, transporters and users, and setting up the regulatory system to control minimum and maximum coal inventory.

In the capital market, China has put more emphasis on risk prevention. Prudent monetary policy will have a stabilizing effect on the overall money supply. The credit and capital market will grow at a stable and reasonable pace. China will also strengthen the asset-liability ratio and capital requirements to urge deleveraging by state-owned enterprises. The capital market is expected to see a tight balance, potentially leading to an increase in the cost of capital.

The Company will comply with the overall trend of national economic and energy development in the new era, implement new development concept, pay close attention to policy and market changes, effectively control risks and improve its core competitiveness in line with the requirements of market-oriented electricity reform and supply-side structural reform and achieve the goals of safe, green, efficient and sustainable development.

ESG Management

In addition to providing supervision and guidance, the Company's Board of Directors hold regular meetings at which management teams present their reports on production safety, operation and management, internal controls, and corporate social responsibility. There are four committees under the board, namely strategy, audit, nomination, and remuneration and evaluation. The strategy committee is in charge of the Company's decision making in comprehensive risk management and regularly reviews reports on the Company's risk management work. Its responsibilities include, but are not limited to, risk rating, risk management effectiveness evaluation, and approval of the Company's comprehensive risk management annual report as well as risk assessment reports on important decisions. The audit committee is responsible for identifying and assessing the risk of fraud committed by senior executives and board members of the Company, and compiles independent fraud risk assessment reports. It also regularly reviews reports on the Company's internal controls and evaluates the effectiveness of the internal control system, as well as communicating with the human resources department on issues concerning recruitment and code of conduct. All members on the audit committee are independent directors of the Company who carry out on-site inspection every year to monitor and make recommendations on production safety, operation and management, internal controls, and corporate culture. The management of production safety, employee health, energy conservation, fraud risk, internal controls and corporate culture has already been incorporated into the daily work of the board and its various committees.

To ensure that the requirements of Environmental, Social and Governance Reporting Guide ("ESG Reporting Guide") issued by Hong Kong Exchanges and Clearing Limited (HKEx) are effectively implemented, the Company has established ESG work leading group. A dedicated principal of the Company has been assigned as group leader, with principals of different departments and offices being vice group leaders. They make decisions on major issues during the process of the guidelines' implementation. Meanwhile, different departments also have assigned certain relevant personnel as group members to take charge of daily communication and detailed implementation of ESG management. With the establishment of ESG work leading group, the contact mechanism of ESG management has made its appearance in the Company. This has established a work model of ESG management, which is guided by heads of Boards of Directors, led by the Company's managements and participated by many departments together, and comprehensively guaranteed the effectiveness and applicability of the Company's ESG management.

2.6 Table of Key Performance Indicators in 2017

Based on requirements from HKEx's ESG Reporting Guide and Global Reporting Initiative (GRI)'s *G4 Sustainability Reporting Guidelines*, Huaneng International has analysed the Company's environmental, social and governing status, carried out the standard analysis with respect to guidelines' requirements and peer companies' situations, and finally laid down key performance indicators of year 2017. Please see the table below.

Performance Categories	Performance Indicators	2017
Economy	Operating revenue[1] (100 million RMB)	1,524.59
	Sales of power and heat[1] (100 million RMB)	1,489.25
	Sales of coal[1] (100 million RMB)	11.43
	Port service[1] (100 million RMB)	2.32
	Transportation service[1] (100 million RMB)	0.74
	Others[1] (100 million RMB)	20.85
	Operating expenses[1] (100 million RMB)	1,419.00
	Net profit[1] (100 million RMB)	15.84
	Donation in the Company's name[1] (ten thousand RMB)	1,000.18
	Controlling generation capacity[1] (MW)	104,321
	Equity-based generation capacity[1] (MW)	92,003
	Average annual unplanned outage (times/unit•annum)	0.30
Environment	Average coal consumption rate for power sold (g/kWh)	306.48
	Year-on-year decrease of average coal consumption rate for power sold (%)	0.39
	Consumption of standard coal (ten thousand tons of standard coal)	10,885.99
	Oil consumption in production (tons)	29,951.27
	Natural gas consumption (ten thousand of standard cubic meters)	340,735.00
	Weighted average house consumption rate (%)	4.66
	Overall water consumption (million tons)	19,344.24
	Fresh water consumption in power generation (million tons)	423.42
	Water consumption in open cooling circulation (million tons)	18,920.82
	Performance value of consumption of fresh water in power generation (kg/kWh)	1.07
	Performance value of emission of sulphur dioxide (g/kWh)	0.11

Performance Categories	Performance Indicators	2017
Environment	Performance value of emission of nitrogen oxides (g/kWh)	0.15
	Performance value of soot emission (g/kWh)	0.02
	Sulphur dioxide emissions (tons)	43,392.91
	Nitrogen oxides emissions (tons)	59,789.73
	Soot emissions (tons)	6,247.77
	Total amount of energy-related direct greenhouse gas emissions (ten thousand tons of carbon dioxide equivalent)	33,559.30
	Greenhouse gas emissions generated by coal consumption (ten thousand tons of carbon dioxide equivalent)	32,629.28
	Greenhouse gas emissions generated by natural gas consumption (ten thousand tons of carbon dioxide equivalent)	743.96
	Greenhouse gas emissions generated by fuel consumption (ten thousand tons of carbon dioxide equivalent)	9.27
	Greenhouse gas emissions generated by desulphurization (ten thousand tons of carbon dioxide equivalent)	176.79
	Energy-related direct greenhouse gas emission intensity (grams of carbon dioxide equivalent/kWh)	770.09
	Total amount of energy-related indirect greenhouse gas emissions (ten thousand tons of carbon dioxide equivalent)	38.42
	Energy-related indirect greenhouse gas emission intensity (grams of carbon dioxide equivalent/kWh)	0.88
	Total water discharge (million tons)	18,449.64
	Total discharge of sewage (million tons)	34.34
	Total discharge of open cooling circulation water (million tons)	18,415.30
	Hazardous liquid waste production (tons)	959.04
	Production of denitration catalyst (tons)	1,358.99
	Production of other hazardous solid waste (tons)	128.24
	Production of general solid waste (ten thousand tons)	4,002.46
	Production of fly ash and cinder (ten thousand tons)	3,289.62
	Production of desulphurised gypsum (ten thousand tons)	712.84
	Comprehensive utilization rate of fly ash and cinder (%)	91.40
	Desulphurization gypsum disposal utilization rate (%)	100
	Amount of grievous (and above) environmental accidents (times)	0

Performance Categories	Performance Indicators	2017
Society	Total amount of full-time contractual employees[1] (persons)	53,962
	Number of employee deaths due to duty[2] (persons)	0
	Number of contractor and subcontractor deaths due to duty[3] (persons)	0
	Grievous personal injury and death accidents(employees) (times)	0
	Personal injury and death accidents during the power production (times)	0
	Accidents that endangered safe operation of power grid (times)	0
	Lawsuits on corruption raised and concluded against the Company or its employees (items)	0
	Average equivalent availability factor of coal-fired power units (%)	94.55

[1] The scope of statistic of Operating revenue (including Sales of power and heat, Sales of coal, Port service, Transportation service and Others), Operating expenses, Net profit, Donation in the Company's name, Controlling generation capacity, Equity-based generation capacity and Total amount of full-time contractual employees, takes Singapore Tuas Power Ltd., the wholly owned subsidiary of Huaneng International, into consideration. Of which the Operating revenue (including Sales of power and heat, sales of coal, Port service, Transportation service and Others), Operating expenses and Net profit are published in accordance with the International Financial Reporting Standards.

[2] Number of employee deaths due to duty: the number of employees who died from production safety incidents.

[3] Number of contractor and subcontractor deaths due to duty: the number of deaths of contractors and subcontractors during production for which the Company is responsible.

2.7 Stakeholder Engagement and Identification of Material Issues

2.7.1 Information about and Communication with Stakeholder

Huaneng International has always been adhering to concepts of harmonious development of "serve the Country, benefit the society, seek multilateral benefits and develop together", worked together with all stakeholders to promote economic and social development and share corporate development achievements.

Stakeholders	Expectations of Stakeholders	Mechanisms of Communication and Participation	Responses from the Company
Investors	Increase of the Company's market value and profitability	Shareholders' meeting; information disclosure; company website.	Truthful and thorough disclosure of information; investment of effort in the improvement of achievements and creation of profits; absorption of market opinions for amendments to operating behaviours.
Clients	Assurance of high-quality products; guarantee of good service.	Making contracts and agreements	Supply of sufficient, reliable and eco-friendly energy and services; guarantee of safe stable delivery of power and heating.
Employees	Guarantee of welfare, health and security; improvement of communication mechanism; impartiality concerning in chances of promotion and development.	Employment contracts; employees' assembly; employee's satisfaction survey.	Strict observance of provisions within employment contracts; improvement of the institution of employee's assembly; improvement of administration of salary and welfare; provision of avenues for vocational advancement and training.
Suppliers	Honest, fair and just cooperation; mutual benefits and win-win scenarios.	Making contracts and agreements; regular communication through mutual visits; correspondence through files, letters and telegraphs.	Adherence to open and transparent business principles and processes; active fulfilment of contracts and agreement; promotion of mutual visits.
Communities	Joint cultivation of communal civility; support for public welfare; focus on social development.	Promotion and organization of public welfare activities; participation in volunteer activities; guarantee of employment.	Extensive organisation of and active participation in public welfare undertakings; cultivation of harmonious and civilized communities; attempts at growth of local employments.
Regulatory authority	Observance of disciplines and laws; compliance with operation; green energy; energy conservation and emission reduction.	Participation in relevant meetings and work report on energy.	Strict observance of relevant laws and stipulations; vigorous advocate of energy conservation and emission reduction.
Competitors	Fair competition; honest cooperation; joint development; safe production.	Participation in industry associations, policy studies, daily meetings and business exchanges.[4]	Competition and cooperation with competitors; jointly creation of a healthy and orderly competitive environment; mutual benefits and joint progress.

[4] China Electricity Council, Chinese Society for Electrical Engineering and etc.

2.7.2 Processes of Identification of Material Issues

According to requirements of HKEx's ESG Reporting Guide, Huaneng International refers to relevant procedures for substantive analyses from Global Reporting Initiative, collects issues at the heart of key stakeholders' interests by way of questionnaires, interviews, etc. Huaneng International analyses and prioritizes collected information and determines the Company's material issues with respect to ESG, which are disclosed in report.

The process of identification of material issues is divided into four steps:

- Identifying relevant issues: sources of issues include Environmental, Social and Governance Reporting Guide of HKEx, *G4 Sustainability Reporting Guidelines* of Global Reporting Initiative (GRI), and issues disclosed by domestic and international peers;
- Prioritising issues: internal stakeholders, when it comes to prioritisation, mainly consider impacts on the Company's strategies, policies, processes and commitments, on the Company's competitive advantage and management excellence, and on the Company's current and future financial status; external stakeholders, with respect to prioritisation, largely focus on the extent to which a certain issue has impact on assessment and decision-making of the Company as well as on its own interests;
- Verifying: the Company management assesses and approves identified issues and their prioritisation;
- Reviewing: after the end of one reporting period, the Company will organize internal and external stakeholders to provide feedbacks on contents of this report in order to prepare for the next one.

In 2017, the Company has further deepened analysis on material matters, expanded the scope of interviews with external stakeholders and fine-tuned the materiality matrix according to interview responses, which are similar to those of last year.

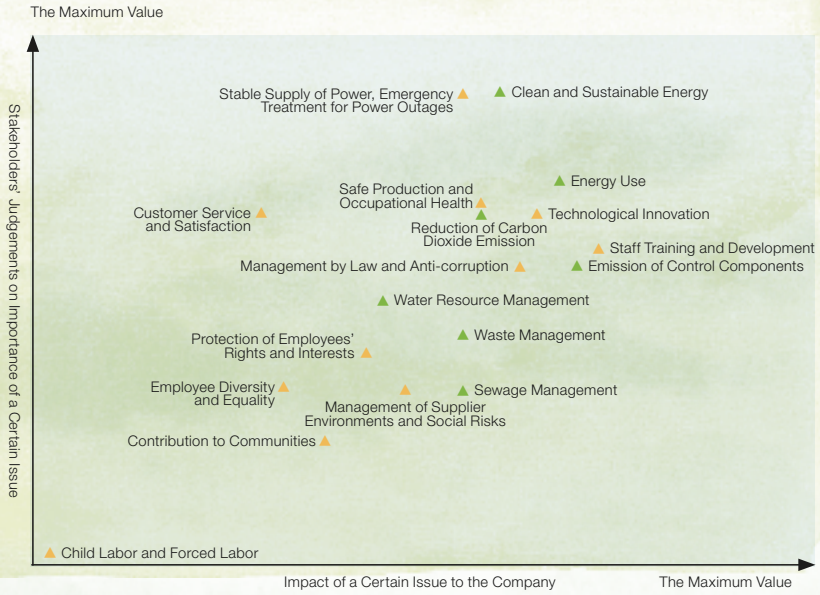
Grading Standard

- According to their own degree of concern, internal and external stakeholders grade different issues in accordance with their importance.

Chart Description

- Horizontal axis : Internal Stakeholders' grading for each issue
- Vertical axis : External Stakeholders' grading for each issue

▲ Social Issues
▲ Environmental Issues



03

Industry Hotspot

In March 2015, *Several Opinions on Further Deepening the Reform of the Electric Power System* was published by the CPC Central Committee and the State Council. As one of the most influential enterprises in the electric power industry, Huaneng International will lend its full support to national policies by enhancing business communication with electric power end customers and jointly promoting the structural transformation and industry upgrading of the electric power industry.

Our Targets

Against the backdrop of the reform of the electric power system, the scope of business of Huaneng International has been expanded to cover generation and sale of electricity and the Company will strive to create a healthy and sustainable market environment. On the generation side, our specific targets are to maintain a traded amount of electricity no less than the generation capacity and keep electricity trading prices as high as possible and no lower than the market average. On the sale side, our specific targets are to sell all electricity generated and keep electricity selling prices as high as possible and no lower than the market average.

Management Mechanism

To meet the requirements of the electric power market reform, the Company has further improved its 1+N marketing administration system by revising *"Marketing Administration Regulations"* on the basis of actual circumstances, formulating the *"Measures for Individual Rewards of Marketing Business"* and *"Measures for the Administration of Electric Power Trading"*, continuing with the monthly assessment, and enriching the annual assessment with the addition of criteria like "company market share for electricity retailers" and "electric power recovery" to strengthen marketing assessment and incentives. At the same time, the Company has conducted surveys and research on relevant subjects whose results translate into the formulation of *"Measures for the Administration of Company Operations Relating to Energy Retailers"*, *"Measures for the Administration of Transactions in the Ancillary Services Market"* and *"Measures for Electric Power Recovery Administration and Assessment"*. In response to the state pilot program of spot markets, *"Guiding Opinions on Promoting the Work on Spot Markets"* has been published.

To gain greater access to the end customer market, the Company has adopted a three-pronged approach to improve customer service quality and customer satisfaction: First, operate with integrity in electric power trading to establish customer trust in the Company; second, maintain good relationships with customers to deepen mutual trust and understanding; third, further improve user satisfaction through electric power value-added services. The Company has 19 registered provincial-level electricity retailers and 13 registered regional electricity retailers.

Information System

The Company is proactively promoting the establishment of a marketing information system, which makes use of Internet, big data and cloud computing technologies to provide a platform for trading support and decision making relating to marketing informatization. After conducting surveys and research on the needs of the Company's headquarter and regional branches, a blueprint of the marketing information system has been drafted.

04

Stable Supply and Regulated Operation

4.1 Intensive Guarantee of Power Supply Stability

Huaneng International strives to become a global leading public power company and provide users with safe, efficient and clean energy as well as quality services. Each of the Company's power plants has put in place contingency plans and response measures to ensure safe and stable power supply even in case of emergency.

Safeguard Policies

Based on *Huaneng Group's Emergency Management Measures for Major Incidents (Accidents)* and *Emergency Plan for Thorough Power Failure*, all departments of the Company, in view of possible large area power-off and other accidents caused by the trip of all power units, alternating current and direct current power outage, busbar outrage and system disruption, has jointly composed *Emergency Plan for Thorough Power Failure, Emergency Plan for Black Start, Plan for Island Operation* and other preparatory measures and established corresponding emergency handling organizations in order to minimize negative impacts on society, upon occurrence of accidents, by unified leadership, clear division of labour, rapid response and fluent communication. Besides, the Company will also manage accident report to power dispatch department and due offices of local governments, handle examination and approval of information disclosed to the public, start emergency measures, and be attentive to public concern, in order to reduce adverse impacts on society. Meanwhile we will do well in check and preparation for restart in the aftermath of power outage, making sure that after troubles hooting we can timely restart power units to resume power supply.

The Company always seeks to tackle the roots of problems, identify potential risks and remedy deficiencies with a view to further improving equipment reliability through standardized management, quality assurance and technical supervision. On-site analysis and work supervision are carried out by professional teams of the Company to identify the technical and management problems for any unplanned outages. Notifications of major and common problems will be sent to all parties concerned in a timely manner for arranging supervision and inspection of rectification work. Inspection is carried out quarterly to ensure that rectifications are implemented effectively.

A Proven Track Record of Stable Power Supply

In 2017, the Company's unplanned power outages of thermal power units were 0.30 times per unit per annum. Twenty-six thermal power plants, including those in Yueyang and Huaiyin, recorded no unplanned outage. Shangan No.6 power unit and Baiyanghe No.6 power unit achieved long-periods of operation of 637 days and 615 days respectively while Jinling No.2 coal-fired power unit smashed national records by operating for 606 consecutive days. Five of the Company's power units, including Yuhuan No.2 power unit and Haimen No.4 power unit, received national benchmark rankings for their reliability indices, making Huaneng International one of the most reliable power companies in the industry.

Stable Supply Under Extreme Weather Conditions

In 2017, the Company successfully maintained stable supply under very hot weather and in times of typhoon by planning ahead and making early preparations in accordance with the requirements laid down by the Safety Committee of the State Council, the National Energy Administration and the Group Company. To ensure production during flood and drought seasons, various units of the Company have formed a flood prevention and drought relief working group led by the persons in charge and mobilized personnel and resources to step up inspection and carry out emergency drills according to contingency plans formulated with reference to regional meteorological features and actual circumstances. Technological measures have also been implemented to ensure the safe operation of the power generation units in the spirit of our iron-clad determination to ensure safe production. In 2017, there was no production safety accident caused by natural disasters and neither was there any incident endangering the safety of the power grid.

Supporting Beijing to Address Power Supply Demand

Since July, Beijing has been hit by persistent high temperatures. The output of the Beijing power grid and the daily power consumption in the city are hitting new highs as rising demand makes the task of power supply even more daunting. Huaneng International's coal-fired power plant in Beijing has declared a state of emergency in response to a request by the Beijing Municipal Commission of City Management. Upon receiving the order, various departments of the power plant took immediate actions to rise to challenges and proactively initiated a series of work relating to personnel preparation, resource allocation and equipment testing. At 8:51 on 21 July, the No.4 unit was successfully connected to the power grid after just one attempt and other units have also been turned to hot standby mode for use anytime to alleviate the power supply situation in the capital city.

Sparing No Effort in Preparing for Winds and Typhoons

Coastal areas like Fujian and Guangdong were pounded by Typhoon No. 7 Locke, Typhoon No. 8 Sonca, Typhoon No.9 Nesat and Typhoon No. 10 Hato one after another while places like Hunan, Jiangxi, Shandong, Chongqing and Shanghai were lashed by heavy rainfall and hit by persistent high temperatures. During times of typhoon, the Company promptly took stock of the precautionary work undertaken by its various power plants in terms of fuel reserves and coal-unloading equipment at ports, discussed alternative shipping routes and subsequent coal supply plans, and gauged the impact on equipment, power generation units and setting up wires outgoing lines. The corresponding regional branches were delegated to take proactive response measures to minimize losses from extreme weather conditions, ensure safe production and contribute to the safe operation of power grids by guaranteeing satisfactory and stable power generation in times of typhoon.

Guarantee of Power Supply during the 19th National Congress of CPC

In strict accordance with the *National Energy Administration's Work Plan on Guarantee of Power Supply and Huaneng Group's Comprehensive Work Plan on Maintaining Safe and Stable Power Supply During the 19th CPC National Congress*, the Company has requested the stepping up of publicity by various units on guarantee of power supply, clear division of labor and responsibilities, and also across-the-board implementation.

During the 19th National Congress of CPC, no incident was reported in the Company concerning personal injury or death, power plant complete outage or external power outage, equipment failure, power plant-related power grid failure, fire outbreak, pollution, preventable traffic accident, cybersecurity threat, and other issues having a negative impact on society. The Company was able to maintain normal operation with a performing workforce to ensure the reliability of electric power and heat supplies, thereby creating a harmonious and stable social environment.

4.2 Lawful Enterprise Management

Effective rules and regulations form the basis for regulated management of company. Enterprise governance is fundamental to earnestly rectifying and standardizing the order in the market economy as well as to the sustainable development of an enterprise. Huaneng International is committed to regulated operation, standardized procedures, comprehensive risk prevention and continuous operation and management improvement.

4.2.1 Reinforcement of Anti-corruption

In 2017, the Company rolled out anti-corruption campaigns, urging all employees to uphold ethics as well as Party disciplines and state laws and create an atmosphere where everyone remains disciplined, abides by the law, discharges duties in a standardized fashion, and practices clean operation.

Corruption Punishment and Prevention

In order to prevent corruption, bribery and other acts of the sort, Huaneng International steadily combines anti-fraud education firmly with attainment of anti-corruption and with implementation of what is stipulated in the *Manual of Prevention and Control of Risks of Corruption* ("Manual"), so as to energetically carry out education on anti-grand and clean career and continuously strengthen control on risks of corruption. First, the Company strictly effectuates responsibility system for the establishment of an incorrupt party, and party members of each level give a written undertaking thereof. Second, the Company rigidly implements stipulations within the spirit of the "eight-point" guideline for fighting bureaucracy and formalism and rejecting extravagance among party members and Huaneng International's own 30 stipulations on improving working manners. Third, the Company vigorously develop anti-trickery education. In 2017, the Company audit department led the organization to conduct anti-fraud training, in which 287 person times of people participated. Fourth, the Company firmly takes good care of the effectuation of the Manual and makes the prevention and control of risks of corruption a crucial means for anti-trickery, which further serve as the promotion for amendment and improvement of relevant management system and for establishment of long-term mechanism of prevention and control of risks of corruption. Fifth, the Company attaches great importance to the work of handling complaints expressed in letters or visits. Sixth, the Company will seize upon critical periods to publish documents and send out text messages to reiterate the relevant requirements, urge and remind people to follow them, and carry out supervision and inspection.

Open Channels for Complaints

The Company has offense reporting hotline and email, opens channels of handling complaints expressed in letters or visits, welcomes letter and visits, regularly collects, analyses clues reported by all units that have to do with corruption, bribery and other undisciplined or unlawful cases.

According to statistics, in 2017 the Company headquarters and subsidiaries did not have any illegal matters of significant influence, and there were also no lawsuits on corruption raised or concluded.

Anti-corruption and Anti-bribery

Within report period, the Company has developed various anti-corruption and anti-bribery activities, including:

Fuel procurement special inspection: Special inspections focusing on fuel procurement management were carried out in 7 regional branches, such as Liaoning branch, and 15 grassroots units, including the Dalian Power Plant, to strictly monitor the bidding management process and identify fraud risks.

Key area investigation: Supervision and inspection have been enhanced in those business areas where corruption, bribery and fraud activities are frequent. In accordance with the Group Company's guidelines, the Company has carried out investigations into and rectifications of misappropriation of funds on high-end liquor.

Disciplinary dialogue: The Company held 19,000 person times of routine disciplinary conversations with employees under normal circumstances, reminding them to comply with laws and regulations in carrying out their work and resolutely oppose corruption and bribery.

4.2.2 Protection of Intellectual Property Rights

Huaneng International attaches great importance to the value of intellectual property rights and patents. We strictly abide by national laws, respect knowledge and technological achievements, and continuously strive for scientific and technological innovation.

The Company's current *"Intellectual Property Rights Management System"* was implemented in January 2012. For the sake of effective management and maintenance, the management of registered and non-registered intellectual property rights has been centralized and is handled by the legal affairs department, subject to a process encompassing application, review, approval, declaration and registration. In doing so, the Company is able to innovate further and stay competitive.

In 2017, the Company launched for the first time an international patents protection project, which aimed to further protect intellectual property rights. Relevant departments of the Company held several rounds of talks with intellectual property agencies to improve project plans and discuss contracts. After receiving the Company's approval, a PCT[5] international application for an invention titled "High-Efficiency Gradient Hierarchy Complex Desulphurizing Tower" (international application no.: PCT/CN2016/090766) was filed on 20 July 2016 and a US patent application relating to the invention (application no.: 15/577046) was filed on 27 November 2017, which is currently under review.

In 2017, the Company paid 9 annual patent fees as scheduled and sorted out 13 expiring "H-type" trademarks. We plan to complete all renewal applications with the Trademark Office by 21 June 2018.

In 2017, no punitive action by the government or litigation was undertaken against the Company regarding intellectual property rights issues.

[5] PCT refers to the "Patent Cooperation Treaty", an international cooperation treaty which mainly deals with the filing, search and examination of patent applications as well as the cooperativeness and rationality of disseminating the technical information contained therein.

05

Environmental Protection and Green Development

Our planet provides us with the space and environment upon which to survive. Therefore, it is everyone's responsibility to protect the environment. As a responsible enterprise citizen, Huaneng International regards environmental protection as a prerequisite for the survival and development of an enterprise. To live up to our environmental responsibilities, we are committed to promoting structural adjustment, optimizing industrial layout, vigorously developing clean energy, promoting scientific and technological innovation, increasing efforts on energy conservation and environmental protection, improving efficiency of resource consumption, and reducing pollutant emissions.

5.1 Speeding Up the Development of Clean Energy

The Chinese government's response to climate change has been accorded the status of a major strategy for national economic and social development to advance eco-civilization, develop a green economy and earnestly promote various emissions reduction measures as core climate change policies.

During the "13th Five-Year Plan" period, the pace of China's power structure adjustment will be further accelerated. The proportion of installed capacity and power generation of low-carbon clean energy power will be further increased. There will be a more stringent requirement on the total power generation ratio of power generation companies' power generated by non-water renewable energy. Huaneng International closely focuses on improving the quality and efficiency of development, optimizes its industrial layout under the guidance of developmental strategy, and further accelerates its pace of power structure adjustment to achieve goals concerning low-carbon clean energy development.

Directions of Development

During "13th Five-Year Plan" period, Huaneng International will focus on promoting low-carbon clean energy development, and continuously improves installed capacity of the proportion of low-carbon clean energy. By 2020, the Company will boost its low-carbon clean energy installed capacity to above 20%. The main development directions include:

1. Vigorously developing wind power. The Company is going to further increase the reserves of resources of high-quality wind power project, optimize the base-type wind power development program, speed up the development of efficient low-velocity wind power, increase the development of offshore wind power, develop and build complementary wind power projects according to local conditions.

2. Accelerating the development of solar power. The Company is going to vigorously promote the development of wind-photovoltaic power plants, make full use of its own land to build photovoltaic power plants, actively develop distributed photovoltaic, promote projects aiming at comprehensive utilization of photovoltaic power plants, research and pilot on relevant works on development of power generation through light and heat.

3. Optimally developing natural gas power generation. The Company is going to optimize the development of large-scale gas turbine cogeneration units, moderately increase reserves of gas spike power generation projects, accelerate the layout of natural gas distributed energy projects, strive to develop user-oriented co-production and co-suppliance of heating, electricity, and cold and integrated energy service that combines purchase, distribution and sell, and actively pilot complementary distributed energy system that combines gas, light, wind, and geothermal energy.

4. Discretionary layout of pumped storage power station. The Company is going to respond to the continuously increasing demand of safe, stable and economical operation of power grid and to the rapid rising need of improving the market share of new energy, and, when appropriate, carry out research on investment opportunities for pumped storage power stations.

5. Striving to participate in nuclear power investment. Given the owned shares of Shandong Shidaowan Nuclear Power, Hainan Changjiang Nuclear Power and Fujian Xiapu Nuclear Power, the Company attempts to participate in nuclear power investment, and perform well in site protection and reserving resources.

6. Actively seeking investment cooperation and opportunities for merger and acquisition of properties of new energy power generation.

Clean Energy Projects

At present, Huaneng International's clean energy types include wind power, hydropower, nature gas power, photovoltaic power. As of December 31, 2017, the Company has 99 clean energy production units in China with a total capacity of 1,426.19 ten thousand kW; 45 wind power units with the capacity of 457.83 ten thousand kW; 8 hydropower units with the capacity of 35.21 ten thousand kW; 12 nature gas power units with the capacity of 854.31 ten thousand kW; 34 photovoltaic power units with the capacity of 78.84 ten thousand kW. In 2017, the Company's managed fans' availability reached 98.3%, and main equipment of clean energy is maintained well.

In 2017, the Company successively put into operation Rudong offshore wind power (30.24 ten thousand kW), Linghua mountain wind power (10 ten thousand kW), Zhanhua Qingfenghu wind power (10 ten thousand kW), Huaining Longchi wind power (9.9 ten thousand kW), Tongshan Xiehe wind power (4.8 ten thousand kW), Jiaoziding wind power (4.8 ten thousand kW), Guanglingzi wind power (4.8 ten thousand kW) and other wind power projects, with the capacity of 88.76 ten thousand kW in total; Zhanhua Qingfenghu photovoltaic power (10 ten thousand kW), Huishan zhaozhuang photovoltaic power (8 ten thousand kW), Yushe photovoltaic power (5 ten thousand kW), Taicang power plant ash pond photovoltaic power (4 ten thousand kW), Jining photovoltaic power (2 ten thousand kW), Laiwu Niuquan photovoltaic power (2 ten thousand kW), Qinbei power plant ash pond photovoltaic power (2 ten thousand kW), Yueyang Leigutai photovoltaic power (2 ten thousand kW), Zhaodong Dechang photovoltaic power (2 ten thousand kW) and other photovoltaic power projects, with the capacity of 62.76 ten thousand kW in total. In 2017, the Company's wind power and photovoltaic production capacity accounted for 46% of its total production.

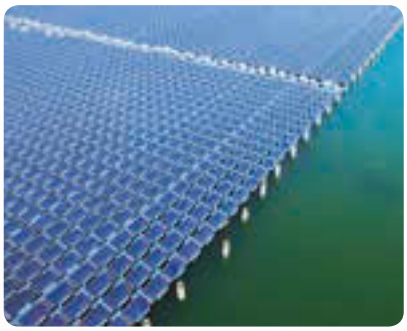
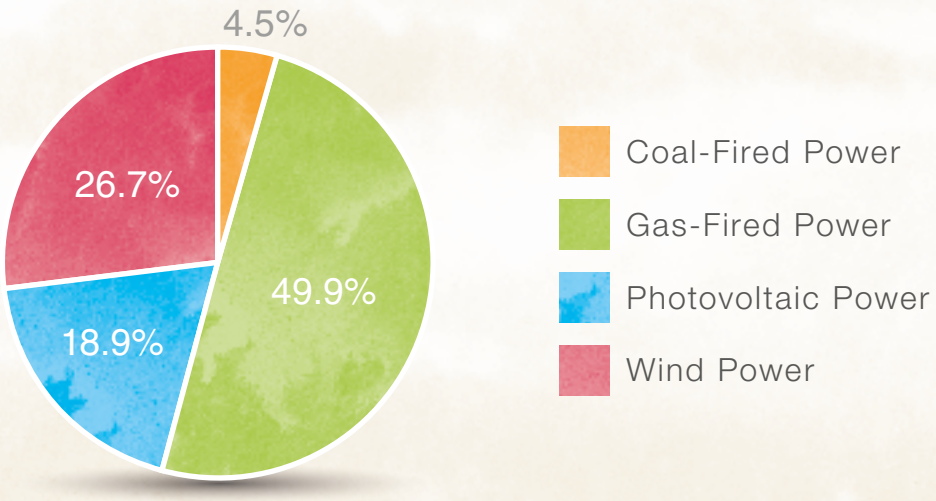


Table: 2017 thermal power (coal-fired and gas-fired power unit), wind power and photovoltaic power production scale of the Company (ten thousand kW)

	Coal-Fired Power	Gas-Fired Power	Wind Power	Photovoltaic Power
2017 production scale	15	166	88.76	62.76



Rudong Offshore Wind Power Plant—the Largest Offshore Wind Power Project with the Highest Generation Capacity in Asia

Rudong Baxianjiao offshore wind power project in Jiangsu began full commercial operation in 2017. It is the first offshore wind power project run by Huaneng International and is Asia's largest wind power project to date in terms of generation capacity. The project is located in Rudong sea area in Nantong, Jiangsu Province, with a total generation capacity of 302.4MW and a total of 70 wind turbines, including 4MW, 4.2MW and 5MW wind turbines, of which 20 5MW offshore wind turbines are used in batch for the first time in China. The Unit 70 wind turbine boasts the world's largest rotors with a diameter of 171 meters. The project employed the mode of "large isolated island" creatively, and two 110kV offshore booster substations were built to ensure the yawing, anti-corrosion and communication functions of wind turbine generators under special conditions.

To develop Rudong Offshore Wind Power Plant into Huaneng's first "national best project" and "exemplary project", close attention was paid to safety and quality in project construction, strengthened site control and technological innovation, and its construction was carried out in an orderly and timely manner. Despite a number of difficulties and challenges, such as frequent occurrence of typhoon and complex topography of the construction sea area, the Company has successfully created a number of "firsts" in offshore wind power construction in China and accumulated valuable experience for offshore wind power construction. The annual average feed-in electricity generated by the wind power is estimated at 820 million kWh. Going by the standard coal consumption of 305 g/kWh for power generation, the project can bring significant economic, social and environmental benefits by saving 25.01 ten thousand tons/year of standard coal, reducing CO_2 emissions by 55.05 ten thousand tons/year, reducing ashes by 100 thousand tons/year, and reducing water consumption by 2.4 million m^3/year.

Zhanhua Qingfenghu Photovoltaic Power Plant—Photovoltaic Poverty Alleviation Project

The Zhanhua Qingfenghu Photovoltaic Power Plant was among the first batch of photovoltaic poverty alleviation projects approved by the National Energy Administration and the State Council Leading Group Office of Poverty Alleviation. It was Huaneng's first photovoltaic poverty alleviation power plant project and it was also the Company's largest "6·30" photovoltaic poverty alleviation project put into operation in 2017, with a total generation capacity of 100 MW.

The construction project began in April 2017 and in just 88 days, the installation of all 61 thousand pipe piles, 15 thousand supports and 336 thousand photovoltaic panels was completed. On 27 June, prior to incorporation into the power networks, the project passed the acceptance of the State Grid Shandong Electric Power Company and smashed national records with the shortest period of construction as a project with a generation capacity to the tune of millions of watts The power plant can generate 106 million kWh clean electric power each year. According to the standard of RMB3,000 per household per year, the project accounts for the precise poverty alleviation of 4,000 poor families in Zhanhua District of Binzhou, Shandong Province. Going by the thermal power coal consumption of 350 g/kWh in Zhanhua, the project can save 3.71 ten thousand tons/year of standard coal, reduce 7.77 ten thousand tons/year of CO_2 emissions, reduce 563.03 tons/year of SO_2 emissions, reduce 320.65 tons/year of nitrogen oxide emissions, reduce ashes 1.18 ten thousand tons/year, reduce water consumption by 42 thousand m^3/year.

5.2 Unwavering Commitment to Scientific and Technological Innovation

Scientific and technological innovation is the driver of growth for enterprises. Huaneng International is committed to developing itself into an innovation-driven enterprise by improving technological innovation, enhancing our self-developed innovation capability, constantly investing in research and development, optimizing the systems of decision making and management relating to scientific and technological innovation, and continuously developing platforms for innovation to accelerate the development of the Company.

Innovation Management and Investment

Huaneng International persistently orients itself by demand, sticks to the combination of living in the present and planning in the long-term, plays its role as scientific and technological mainstay and leader, adheres to the combination of scientific and technological innovation and institution and mechanism innovation, strengthens its incentives, and resolutely combines independent innovation and collaborative innovation in order to improve innovation efficiency.

The Company has set up the Technology department to carry out research and development activities related to design, production, infrastructure and new technology study. At the same time, the Company, Xi'an Thermal Power Research Institute Co., Ltd. ("Xi'an Thermal"), Huaneng Group Clean Energy Technology Research Institute Co., Ltd. ("Huaneng Clean Energy Research Institute") cooperate to discuss and solve technical problems. The Company has cooperated with universities, manufacturers and other external parties to form a powerful alliance in order to complete project research.

In 2017, the Company invested a total of RMB92.26 million in research and development and obtained 73 patents, including 10 invention patents.

Innovation Achievements

(1) Study on New Energy Technology

The Company will continue to strengthen the research and development of new energy technologies and conduct research into new technologies for offshore wind power, high mountain wind power, low wind speed wind power, solar power as well as various energy storage technologies. Our research success relating to key offshore wind power technologies in 2017 provides the Company with the technological support for new energy development.

(2) Study on Transformation for Flexible Power Unit

The Company initiated the study on transformation for flexible power unit at the Dandong power plant. The study aimed to tap into the potential of boilers under light loads and develop a technology that enables the stable combustion of boilers under low-load conditions, with a view to making boilers more economically sound, stable and environmentally friendly. The technology has been applied at some power plants in Liaoning and Jilin and has achieved good results, which help to promote the large-scale adoption of renewable energy sources in power generation across China.

(3) Study on 700°C Ultra-supercritical Coal-Fired Power Generation Technology

The Company has successfully launched China's first 700°C key components test facility at Huaneng Nanjing Power Plant, which is used to conduct long-period testing. Through long-period operation and testing at the 700°C test facility, important data on high temperature alloy materials in actual operation, as well as practical experience, can be obtained. By accumulating relevant experience in design, manufacture, installation and operation from on-site testing of the properties and manufacturing techniques of 700°C materials, the technological risks involved in demonstration projects can be greatly reduced. This has laid a solid foundation for the construction and demonstration operation of 700°C units in the future and contributes to the development and advancement of China's electric power industry and the relevant manufacturing industry.

The "Research and Demonstration on High-parameter Ultra-supercritical Secondary Reheating Key Technology" project has won the "China Power Innovation Award" given by the China Electricity Council. The "Technical Innovation and Application of 660MW Efficient Ultra-supercritical Coal-fired Power Generating Units" project has won the second highest "China Power Science and Technology Award" given by Chinese Society for Electrical Engineering and the highest "China Power Innovation Award" given by China Electricity Council.

(4) Study on Long-Distance Large-Capacity Heating Technology

The Company has substantially increased the heating radius of heat sources and expanded our heat supply, which now covers the long-distance heat users, to meet the demand for centralized heat supply and scale up power cogeneration so that energy consumption and pollutant emissions can be further reduced. The next step is to implement this practice at Shangan Power Plant and Qinbei Power Plant.

(5) Study on Pollutant Combined Treatment Technology

The Company has proposed to directly remove major pollutants from flue gas treatment equipment as well as combinedly remove other pollutants, and create conditions for the removal of pollutants from other equipment. The Company has developed a flue gas combined treatment method that employs low-low temperature electrostatic precipitator technology and deep desulfurization with high-efficiency dust remove technology. The Company has pioneered an enterprise technical standards system for comprehensive multi-pollutant combined treatment and developed key equipment and components for high-efficiency pollutant combined treatment. This has helped resolve the technical issues involved in the application of low-low temperature electrostatic precipitator technology given the complex quality of coal in China, and highly achieved SO_2 ultra-low emissions for single-tower use high sulfur coal-fired. This technology has been fully employed by all power plants of the Company, with a total generation capacity of over 100 GW, thereby making the Company a global leader in achieving ultra-low emissions.

Development Directions

According to *the 13th Five-Year Plan for Energy Development*, China's CO_2 emissions per GDP should be reduced by a further 18% by 2020 from the level laid out in the previous Five-Year Plan. The four major directions of the Company's technological development are summarized below:

First, the Company will vigorously develop low-carbon environmentally friendly renewable energy and optimize the industrial structure. Second, we will conduct further research and develop high-efficiency environmentally friendly high-parameter large-capacity thermal power units to further increase efficiency and reduce emissions. Third, we will earnestly develop smart power plants with the technological support of new generation sensing, Internet of Things, artificial intelligence and virtual reality to maximize the safety, cost-effectiveness, efficiency and environmental friendliness of operation. Fourth, we will continue to develop energy storage technology, frequency modulation technology, distributed energy and multi-energy application technology.

5.3 Energy Conservation and Emissions Reduction

The environment of our planet is fundamental to human lives and health, and the natural resources it provides are the driving force of the development and progress of humanity. Only by reducing consumption of non-renewable energy, waste disposal and pollutant emissions can we achieve sustainable development for our society. Huaneng International attaches great importance to environmental protection, strictly abides by the latest environmental laws and regulations of our country, takes the initiative to take environmental responsibility, actively promotes energy conservation, optimizes the energy structure, continuously improves the efficiency of resource use, and creates, through "efficient environmental protection and green ecology", the global leading listed power generation company, leading the industry's green development. In 2017, the Company did not experience any serious accidents.

5.3.1 Overall Planning

To implement the State Council's *Program of Action for the Energy Development Strategy (2014-2020)* and become an industry leader in overall energy use efficiency and ultra-supercritical unit energy use efficiency, Huaneng International has formulated the "*Rules on the Administration of Environmental Protection (Provisional)*" and the "*Environmental Emergency Response and Heavy Pollution Contingency Plan*", as well as incorporating environmental protection requirements into its intrinsic safety system. The Company actively promotes the Company's coal-fired power units' energy conservation and emission reduction, plans to carry out year by year energy conservation and environmental protection, strives to complete the national task of energy saving and emission reduction in advance and excess, ensures that the Company's coal-fired units takes continues lead in energy conservation and environmental protection, ensures competitive advantage of coal-fired power generation units, and makes contributions on promoting revolution on the nation's energy production and consumption, enhancing the clean and efficient development of coal power level, and achieving the 2020 national target of coal-fired power generation units' energy conservation and emission reduction.

5.3.2 Energy Consumption Management

As an advanced power company, Huaneng International strictly abides by the *Environmental Protection Law*, *Energy Conservation Law* and other relevant laws of the People's Republic of China. The Company continues to implement energy saving transformation projects and energy saving technologies like waste heat recovery, roll out energy conservation and environmental protection activities, enhance management of the operation and maintenance of environmental protection facilities, and step up supervision and assessment relating to energy conservation and environmental protection.

The Company mainly consumes coal and natural gas in the power generation process, and consumes a certain amount of oil during the start-up ignition and production combustion process. In 2017, the Company's average coal consumption rate for power sold was 306.48 grams/kWh, representing a decrease of 0.39% from that of the same period last year. A total of 10,885.99 ten thousand tons of standard coal, 29,951.27 tons of production oil, 340,735.00 ten thousand of standard cubic meters of natural gas have been consumed during Company's power generating, and the weighted average house consumption rate was 4.66%.

Management Mechanism

The Company's production department is responsible for the centralized administration of energy conversation. In accordance with the relevant state laws and regulations and in view of actual circumstances, the Company has established a system for energy conservation by implementing the three-level administration of energy saving, vigorously promoting energy conservation and increasing the efficiency of energy consumption. Various systems of energy saving are specified by each unit of the Company according to their actual circumstances so as to carry out publicity, training, supervision and inspection in a timely manner.

To enhance the budget management of energy consumption, Huaneng International has formulated the *Special Assessment Requirements for Energy Conservation and Emissions Reduction* to ensure an optimal level of consumption of coal, electric power, oil and natural gas. By combining goal management and process management, the Company first sets the annual energy consumption reference taking into account the energy efficiency level of each grassroots unit and carries out assessment on the degree to which the reference target is met. Second, regarding those units which have difficulty meeting the target or whose energy consumption rebounds severely, the Company will arrange on-site inspection performed by professionals, who then carry out comprehensive investigations, provide recommendations and take measures to ensure that the energy conservation and emissions reduction targets set by the state and the Company are met. By doing so, the Company can maintain its leading position in energy conservation.

Management Measures

In 2017, the Company strived to meet stringent the major energy consumption reference targets and focused on energy conservation and energy saving work in three areas, namely management, structure and technology. With the concerted effort of various units, the Company has maintained its industry-leading position in terms of the major energy consumption reference targets achieved both by the Company and by its major types.

On energy conservation management, first, the Company has set up a leading group and a working group dedicated to driving the major type indicators in leading position to coordinate work on technology, safety and fuel. Second, various units of the Company have formulated a plan on advancing development and set a timetable for implementation. Third, a special reward fund has been set up to provide incentives for advancement.

On structural energy conservation, first, the Company requires that the relevant units keep a close on policy changes and take guided action to promote energy conservation and economic dispatching, increase the output coefficient of high-efficiency units and effectively reduce coal consumption for power supply. Second, the Company encourages all units to tap into a wider heat supply market according to local conditions. Third, the Company has enhanced fuel procurement to maintain higher levels of coal calorific value amid a gradual decrease in coal calorific value on a yearly basis.

On energy conservation technology, the Company has put itself ahead of the curve by diagnosing the energy saving potential of major types, researching into advanced technology and establishing the *Reference Table for Key Unit Transformation Projects*. Through unit maintenance and ultra-low emissions retrofitting, we seek to achieve optimization of stream admission of stream turbines, low temperature economizer, led to add one and preheater flexible seal transformation, optimization of air and flue gas ducts, and optimization of coordinated control systems. In 2017, the Company completed 76 energy conservation technological transformation projects. Based on the current data, it is expected that the overall coal consumption of thermal power units for power supply can be further reduced.

Through a series of effective management measures, as at December 2017, the Company has beaten the other four competitors and maintained its leading position for energy conservation in coal consumption for power supply by major type, such as 1,000MW ultra-supercritical wet cooling, 600MW ultra-supercritical wet cooling, 600MW super-critical wet cooling, 600MW super-critical air cooling and 600MW subcritical wet cooling.

Fifty-three power units of the Company managed to gain a spot in the energy efficiency competition and benchmarking organized by China Electricity Council. Of the units awarded, 14 units, including Laiwu No.6, received the highest honor; 13 units, including Jinling No. 1, received the second highest honor; 16 units, including Haimen No. 4, received the third highest honor; 5 units, including Laiwu No. 6, received the “optimal coal consumption power unit” award and 5 units, including Weihai No. 6, received the “optimal house consumption rate power unit” award.

Weihai Power Plant—Energy Conservation and Emissions Reduction Transformation

To implement the state's action plan for the transformation and upgrading of coal-fired power saving and emissions reduction, Weihai Power Plant has been making concerted efforts to overcome difficulties and persevere over the past three years by continuously applying and innovating the most cutting-edge energy saving technologies. Since then, major energy conservation and emissions reduction transformation has been completed for 4 thermal power units.

Between 2015 and 2016, the Company successfully implemented the advanced energy conservation technology integrated application and demonstration project for Unit 6, which included the integrated application and transformation of 13 advanced energy conservation technologies, and gained ownership of the intellectual property rights pertaining to 4 new self-developed technologies. After the transformation, the house consumption rate of the power unit dropped by 1.51 percentage points to 2.23%; coal consumption rate for power sold went down by 7.16 g/kWh to 278.52 g/kWh, breaking world records concerning an installed capacity of 600MW. Subsequently, two phases of stream turbine flow remolding and low-temperature economizer retrofitting for Unit 3 and 4 were completed. Between November 2016 and February 2017, the Company applied the energy conservation advanced integrated application approach adopted in Unit 6 to Unit 5 and implemented 9 integrated energy conservation transformation projects, including low-temperature economizer retrofitting.

Following three years of hard work, the house consumption rate of the power plant dropped by 0.32 percentage points and coal consumption rate for power sold went down by 8.61 g/kWh, which translates into a reduction of 8.45 ten thousand tons of annual coal consumption. This represents an exemplary energy conservation transformation for coal-fired power and valuable experience for the 2014-2020 national energy conservation and emissions reduction transformation and upgrading of coal-fired power units. Weihai Power Plant has won the 2016 China Power Market Golden Bridge Award, Huaneng Group Technological Innovation Award, the highest award in the 2016 National 600MW thermal power units energy efficiency benchmarking and competition, the Most Optimal Coal Consumption for Power Supply Award and the Most Optimal House Consumption Award.

5.3.3 Water Resources Management

Huaneng International has always been committed to the protection of water resources, strengthen water saving, deepen the recycling of water and improve water use efficiency, to achieving the Company's "energy saving and environmental protection" standards. The water management system was set up in accordance with the national laws, regulations and standards, and meets the requirements of local laws and regulations of the power plants' regions.

In 2017, the Company's total water consumption was 19,344.24 million tons, the fresh water for generating power was 423.42 million tons, the open cooling circulation water was 18,920.82 million tons, and the consumption performance value of fresh water for generating power was 1.07 kg/kWh.

Management Mechanism

The main water consumptions of Huaneng International are for power units generating electricity, replenishing water for closed circulating water, and wet desulphurization, etc. Mostly, surface water such as rivers, urban water, a small amount of groundwater, etc., is used for generating power, and river water or sea water is used for circulating.

In accordance with the Company's requirements, the various thermal power plants have established a set of water consumption management systems and procedures, which include:

- A water management system has been established and managed by specific personnel, who shall formulate rules for water usage, instruments maintenance and management. All water-usage sectors and professionals conduct regular maintenance and calibration for water metering, water quality testing instruments and water-usage equipment, etc., so as to eliminate unreasonable water usage.
- An account management system has been constructed, including the whole plant account, drainage account, water quality monitoring, water metering instrument basic information table, equipment installation location and parameter table, records of instrument test/calibration and maintenance, etc. They also regularly calculate the water management index of the whole plant, and the water usage account is based on the actual monitoring data.
- The thermal power plants also comprehensively utilised various wastewater of the plant area and reduced discharge rate, according to the principles of shunting sewage and clean water, classification and recovery, and disposal and reuse.

Management Measures

In 2017, the Company rolled out a number of important water saving measures to mitigate the risk of water shortage.

The Company's two-pronged approach to enterprise evaluation and assessment centered on "energy conservation and environmental protection" requires power plants to implement water saving management and assess water consumption for power generation. Water-saving thermal power plants has established a sound water quantity and quality monitoring system and adopted new technology, new craft and new equipment to improve water usage efficiency of the power plant. In the regions with serious water shortages, the power plant carried out in-depth technical transformation of water saving or implemented the technical upgrading project of wastewater zero emission, such as building air cooling units to reduce reliance on water.

Next year, the Company will formulate the *Technical Guide to Water Conservation and Wastewater Treatment* for coal-fired power plants and carry out power plant retrofitting for water conservation for wastewater reduction and utilization.

Shangan Power Plant—"Three-Step" Water Conservation

To ensure that water conservation work is carried out smoothly, Shangan Power Plant has formed the Huaneng Shangan Power Plant Water Conservation Leading Group led by the power plant manager to look into the current water saving practices and formulate water saving plans. With underground water consumption reduction as the focus, the power plant has carried out a number of technological transformation projects for water conservation.

To meet the targets of doing away with underground water, using reclaimed water as the sole water resource for production and "zero drainage" of wastewater, since 2010, the power plant has switched from wet fly ash to dried fly ash to substantially reduce underground water consumption and adopted a recycled water reverse osmosis operation system that can save 5 million tons of water a year. Besides, the power plant has commissioned the Xi'an Thermal Power Research Institute to conduct preliminary study and analysis on formulating plans for the transformation and upgrading of the reclaimed water treatment system, the recycled water reverse osmosis system and the water desalination system to gradually increase the consumption of reclaimed water month by month. By October 2017, the power plant's consumption of reclaimed water surpassed that of underground water for the first time, thereby reducing the consumption of underground water resource.

To achieve smart monitoring of water consumption and "zero drainage" of wastewater, the power plant has designed a three-step roadmap to water conservation and sewage treatment. The first step is to implement wastewater system basic transformation for separation and reuse of rainwater and sewage. The second step is to implement water saving and emissions reduction projects, such as water saving transformation of the recycled water and sewage reverse osmosis and treatment system and the reclaimed water advanced treatment system as well as transformation of the second-generation boiler feed water ion exchange treatment system to reverse osmosis. The third step is to implement wastewater and sewage treatment projects, namely small quantity with high salinity wastewater treatment, such as desulfurization wastewater treatment using evaporation crystallization, dry flue gas and spray irrigation to achieve the "Zero Drainage" of wastewater target.

Yuhuan Power Plant—"On Demand" Water Supply

Located at the west of Yuhuan Peninsula and east of Yueqing Bay, Yuhuan Power Plant is surrounded on three sides by mountains with one side facing the sea, an area resembling a port. Because there is lack of fresh water and abundant seawater, seawater is used for the power plant's circulating cooling water system. Fresh water for production and living at the power plant comes from desalinated seawater using the double-membrane method. The power plant adopts an "on demand" approach to water supply, meaning that water supply is provided only when water volume is lower than the reference level of equipment water consumption, in order to encourage wastewater treatment and reuse. Yuhuan Power Plant has implemented an operation-specific management mechanism for separation of fresh water and sewage. Solid walls are used for fuel operating sites; moat-like conduits are used for coal-fired and ash storage sites; both solid walls and conduits are used for desulfurization sites. To further conserve water resource, measures such as rain water reuse and water recycling have been rolled out and a comprehensive roadmap to "wastewater decontamination, waste water reduction and wastewater resource reclamation" has been designed to achieve wastewater reuse. As a result, Yuhuan Power Plant's total fresh water consumption has maintained a downward trend.

5.3.4 Emissions Management

In accordance with *China's 13th Five-Year Plan for Ecological and Environmental Protection*, *13th Five-Year Comprehensive Work Plan for Energy Conservation and Emissions Reduction*, *13th Five-Year Work Plan for the Control of Greenhouse Gas Emissions*, as well as the relevant requirements of the National Development and Reform Commission, the Ministry of Environmental Protection and the State-owned Assets Supervision and Administration Commission of the State Council, and guided by *China Huaneng Group Company's 13th Five-Year Plan for Establishing a Globally Competitive World-Class Enterprise*, Huaneng Group Company have formulated *China Huaneng Group Company's 13th Five-Year Special Plan for Leading the Development of Environmental Protection*, which is based on Huaneng Group's environmental protection work progress and experience during the 12th Five-Year period.

In strict accordance with Huaneng Group's 13th Five-Year Plan for environmental protection, Huaneng International requires that all its power plants comply with national and local standards on pollutant emissions and strictly abide by the provisional pollution control measures implemented by local governments in accordance with the law in the event of abnormal weather conditions or important social activities. The Company's headquarters operates the production management department, which comprises an environmental protection office and a production monitoring office and is responsible for supervising and coordinating the environmental protection management and pollutant emissions control of regional companies. Each regional company operates its safety and production department, which is responsible for supervising and coordinating the environmental protection management and pollutant emissions control of its power plants. Power plants operate their own production department, operation department and maintenance department, which are responsible for the operation, maintenance, repair and retrofitting of various environmental protection facilities.

By fully utilizing Huaneng Group's internal information platforms, Huaneng International is able to get informed of emissions in excess of the prescribed standards in a timely manner and conduct focused analysis on those cases involving longer periods, higher levels of severity and more typical problems. Through regular and ad-hoc reporting, as well as sharing of experience and lessons learned, various power plants can take precautionary measures accordingly and the Company can improve its environmental protection management.

To gauge public opinion and encourage public debate on environmental protection, the Company has established a comprehensive information collection system to canvass opinion on various environmental issues. We will work with power plants and formulate response measures in enhancing exchange of ideas among the public. In accordance with the requirements of the Ministry of Environmental Protection, the Company actively carries out voluntary monitoring of pollutants and discloses environmental protection information. In accordance with the requirements of local environmental protection departments, pollutant emissions information disclosures are made on the Company's website or the online platform of the corresponding environmental protection department of local governments.

5.3.4.1 Exhaust Gas Management

The exhaust gas discharged by Huaneng International is mainly carbon dioxide, sulphur dioxide, nitrogen oxides and soot generated from coal-fired power plants during the process of combustion in the coal-fired utility boiler. In 2017, the Company's emissions of sulfur dioxide, nitrogen oxides and soot were 43,392.91 tons, 59,789.73 tons and 6,247.77 tons respectively, with emission performance values of 0.11 g/kWh, 0.15 g/kWh and 0.02 g/kWh respectively.

In daily administration, the Company's production monitoring office is responsible for maintaining and using the "production real-time monitoring system" to monitor emissions data through real-time connection between plant-level monitoring systems and air pollutant emissions monitoring systems of each power plants. In the event of emissions in excess of the prescribed standards and the annual pollutant performance target, the Company will impose fines on the relevant units and make internal announcements. Besides, upon collecting monthly, quarterly and annual pollutant emissions performance data, the Company will conduct analysis on the causes and patterns of performance changes and provide guidance for relevant units to investigate potential risks and take effective measures to meet annual performance targets.

Comprehensive Retrofitting of Power Units for Ultra-low Emissions Near Completion

A total of 205 power units of Huaneng International are in need of retrofitting for ultra-low emissions, accounting for an installed capacity of 84,354MW. 48 units have undergone retrofitting in 2015, 87 in 2016 and 68 in 2017, with the remaining 2 expected to complete retrofitting in 2018.

Denitrification Under Heavy Load

In the face of expensive low-nitrogen oxides remolding method for thermal system optimization and wide-temperature catalyst retrofitting, various units of the Company earnestly explore and innovate for increasing the denitrification flue gas inlet temperature. Through operation optimization and adjustment, we have developed a pre-incorporation denitrification technique without equipment alteration and at lower costs. In summing up the experience of five power plants, including Haimen, Yuhuan and Qinbei, from denitrification prior to incorporation into the power grid, the Company has decided to go in the direction of "changing the heat distribution of the boiler rear heated surface and increasing the flue gas inlet temperature" and published *the Guiding Opinions on Low Nitrogen Oxides Operating Technology of Coal-Fired Power Units"*. In light of the publicity on this technology, relevant experts form the Company have provided guidance and advice for those power plants with greater difficulty in implementation. Currently, only 5 units of the Company have not carried out denitrification prior to incorporation into the power grid.

Luohuang Power Plant—Emissions Reduction Advanced Group

In 2017, Luohuang Power Plant completed retrofitting of 5 power units for ultra-low emissions on schedule, accounting for 137.5% of the annual retrofitting progress prescribed by the Chongqing municipal government and fulfilling the retrofitting target set by the local environmental protection department ahead of schedule.

During the transformation process, the power plant vigorously promoted scientific and technological innovation and pioneered the adoption of a large ratio of bituminous coal blending (up to 70% or above) for its No.5 and No.6 600MW "W"-flame boilers. This practice can reduce coal consumption for power supply and substantially reduce the total amount of pollutants produced at source (the concentration of nitrogen oxides at furnace exit dropped from 1,200mg/Nm^3 to 700mg/Nm^3; the concentration of dust at electrostatic precipitator entrance went down from 45g/Nm^3 to 25g/Nm^3; and the concentration of sulfur dioxide at desulfurization entrance decreased from 9,500mg/Nm^3 to 4,000mg/Nm^3). This makes retrofitting for ultra-low emissions easier and less expensive. The waste charge per unit power generation went down by 50.77% year on year.

The power plant pioneered the application of low-temperature economizers for its coal-fired power units using coal with a sulfur content of more than 3%. It also conducted an in-depth study on the "single-tower deep desulfurization" technology. It was showed that the single-tower high-efficiency desulfurization technology is of a higher application and promotional value when used to desulfurize coal with a sulfur content of more than 3%. After the retrofitting, emissions of nitrogen oxides, sulfur dioxide and soot were less than 50, 35 and 5 mg/Nm^3, which outperformed national standards on ultra-low emissions as well as competitors in the industry. Luohuang Power Plant was awarded the title "12th Five-Year Advanced Group in Emissions Reduction" by the Chongqing municipal government.

Fuzhou Power Plant—Protecting the Environment with Integrity

With the objective of achieving ultra-low emissions, the power plant has set up a technological transformation department to carry out ultra-low emissions retrofitting projects and enhance the management of environmental protection retrofitting projects. Following the ultra-low emissions retrofitting of Unit 3, 4 and 5 in 2016, the power plant carried out comparable ultra-low emissions projects for Unit 1, 2 and 6, fulfilling the 2017 annual target set in the *Fujian's Work Plan for Comprehensively Implementing the Ultra-Low Emissions and Energy-Saving Upgrade of Coal-Fired Power Plants*. Three months ahead of schedule. The retrofitting projects for Unit 1 and 2 were carried out simultaneously, and despite the difficulty in retrofitting and the challenge of meeting high safety standards, the projects were successfully completed ahead of the BRICS Xiamen Summit.

In taking its self-assessment on environmental protection seriously and working hard for recognition from the local environmental protection department, the power plant was awarded the "2016 Enterprise Protecting the Environment with Integrity", the highest honor given at the provincial level by Fujian environmental protection department in 2017.

During the 2017 BRICS Xiamen Summit, the power plant implemented strict controls on pollutant emissions, enhanced the operation and maintenance of environmental protection facilities, and strengthened fugitive dust control on coal storage sites, ash storage sites and operating sites to prevent production suspension and reduction resulting from environmental concerns, while strictly complying with the requirement of daily information submission relating to environmental protection issues to achieve the target of "zero report" on safety.

Future Plan

Huaneng International will continue to adhere to high standards on emissions, strictly comply with the licensing clauses on sewage discharge, and ensure reliable and stable operation of all environmental protection facilities and equipment.

Besides, the Company will work towards eliminating white smoke plume from the chimney by developing technology, conducting in-depth research and instructing power plants to formulate a technical feasibility plan for eliminating white smoke plume in a cost-effective and energy-efficient way in accordance with the requirements of national and local environmental protection policies.

5.3.4.2 Management of Greenhouse Gases

In order to actively support the national carbon trade market, Huaneng International has consecutively introduced the *Management Methods of the Company's Carbon Asset*, *Managemental Regulations on Greenhouse Gases' Emission Statistics*, *Management Regulations on the Development of the Company's Voluntary Emission Reduction Projects* and *Managemental Regulations on Performance and Transaction of the Company's Quota*, which provides detailed guidance and regulations of carbon asset management, greenhouse gases' statistics management, voluntary emission reduction projects and carbon asset transactions.

Carbon Emission Reduction

Carbon dioxide is the major greenhouse gas produced during the operation of the Company. It is mainly produced in the combustion process of coal, and a small amount is produced in the wet limestone-gypsum desulphurization process. In 2017, the Company's total amount of energy-related direct greenhouse gas emission was 33,559.30 ten thousand tons of carbon dioxide equivalent, of which coal consumption, natural gas consumption, fuel consumption and desulphurization generated respectively was 32,629.28, 743.96, 9.27 and 176.79 ten thousand tons of carbon dioxide equivalent. The energy-related direct Greenhouse gas emission intensity was 770.09 grams of carbon dioxide equivalent/kWh. The Company's total amount of energy-related indirect greenhouse gas emission was 38.42 ten thousand tons of carbon dioxide equivalent. Its indirect greenhouse gas emission intensity in energy-related was 0.88 grams of carbon dioxide equivalent/kWh.

The Company has established a sound management mechanism in reducing greenhouse gas emissions. By comprehensively strengthening the management of fossil fuel consumption, the Company has reduced its consumption, increased the efficiency its use, and increased the proportion of green energy such as hydropower and wind power to meet the purpose of carbon dioxide emission reduction. According to the characteristics of the power plant equipment, the Company adopts the advanced and practical energy saving technologies, such as transformation of lean coal to the bituminous coal in boiler, steam turbine transformation, heating transformation, waste heat recovery from flue and gas, integration of fans, frequency conversion, speed control and so on, in order to reduce the coal consumption and greenhouse gas emission.

According to the Company's 13th Five-Year Plan, the intensity of carbon dioxide emissions from all power units should decrease by about 25% by 2020. By 2020, the Company seeks to build a carbon asset management system geared to the national carbon market and the goal of establishing a global first-class leading enterprise.

Carbon Asset Management

Organizational Structure

In order to strengthen the management of carbon assets, the Company has set up a leading group for domestic emission reduction and project development ("leading group"). Its main responsibilities include: (1) formulating the Company's overall carbon emission quota and strategy of target transaction and transaction of certified emission reduction; (2) approving the emission statistics reports of the Company and the grassroots units prepared by the external professional organizations; (3) verifying the annual carbon emission quota gap and the annual budget; (4) approving the development plan of annual voluntary project on emission reduction; (5) deciding follow-up implementation plans for Clean Development Mechanism project (CDM project).

The leading group supervises a working group, which is responsible for managing, instructing and coordinating the development and implementation of the Company's work on carbon asset trading, voluntary emissions reduction projects and greenhouse gas emissions statistics. Special bodies have been set up by regional companies of the Company to carry out work on carbon asset trading and contract performance, as well as greenhouse gas reporting and budget declaration. Under the leadership of regional companies, project units and emissions control enterprises form special bodies managed by designated persons, who are assigned to carry out work on emissions trading, voluntary emissions reduction project development, data monitoring and reporting to management.

Daily Administration

The Company has entrusted Huaneng Carbon Asset Management to formulate trading strategies, provide agency transaction and escalate compliance issues to higher authorities. After communicating with grassroots units and taking into consideration grassroots units' actual circumstances and market trends, Huaneng Carbon Asset Management prepares a quarterly report on "Quarterly Trading Strategies" and submits it to the Company's leadership. The report covers market supply and demand analyses, price trend forecasts, trading directions, trading price ranges, trading caps and budgets. The Company's Commerce department organises conferences among managements to examine and approve relevant trade strategies. Approved strategies will be despatched to every branch offices and production unites, and guide them with carbon assets transactions and implementation.

Performance in Carbon Trade Pilot Regions

With the support of Carbon Assets Company, the Company has carried out effective greenhouse gas emission reduction and carbon trade in eight provinces or cities (Beijing, Shanghai, Tianjin, Chongqing, Shenzhen, Hubei, Guangdong and Fujian), where carbon asset transactions are carried out in recent years.

From year 2014 to 2017, the Company has successively launched projects of carbon quota trade, CCER[6] displacement, etc., in eight carbon trade pilot regions, and successfully fulfilled all the tasks of honouring agreements for thermal power companies. Comparing with average transaction value in the market, the Company respectively lowered the cost of honouring agreements by RMB 7.01 million, RMB4.51 million, RMB8.12 million and RMB8.62 million from year of 2014 to 2017 respectively, which aggregates to RMB28.26 million.

Concerning carbon finance innovation, the Company reasonably utilised financial tools, developed a series of carbon finance innovation projects based on actual circumstances of production unites, and attained preliminary achievements. On the basis of such carbon financial innovation businesses as allocation of carbon-CCER exchange options and the allocation of carbon trust launched in 2015 and 2016 respectively, in 2017, the Guangdong branch's unit signed a allocation of carbon options transaction agreement with external institutions while grassroots units from Beijing, Shanghai and other places made use of CCER to comply with the limits set by the government at a lower cost. These innovation businesses have reduced the Company's compliance costs.

Concerning developments of CCER projects, from the year of 2013 the Company developed 50 CCER projects in five batches which are mainly wind power and photovoltaic projects, and in estimation they will reduce emission by 2.5 million tons each year. By the end of 2016, the Company has 10 projects put on records in the National Development and Reform Commission, four projects put on records for emission reduction, and on records around 3 million tons of emission reduction in total. The development of CCER projects and the storage of CCER well lay a solid foundation for the Company.

Responding to the Start of National Carbon Trading Market

According to the work plan of the National Development and Reform Commission, the national carbon trading market kicked off at the end of 2017 and the power industry was among the first batch to be incorporated in the market. Taking into account the Company's business features and drawing on our experience of pilot market participation, we have formulated a series of response measures:

On organizational system, relevant units outside the 8 carbon trade pilot zones will set up carbon asset management bodies and assign responsible persons in accordance with the requirements of the Company's three-level management system to enable seamless transition of work, define key measures and requirements, and clarify division of labor and responsibilities.

[6] CCER: The full name is "China Certified Emission Reductions", which means that a unit is in line with the principles and requirements of the Clean Development Mechanism, and it is its emission reduction issued and confirmed by the CDM project.

On institutional system, the Company will further enhance operation efficiency and lower compliance costs for carbon assets. Drawing on the experience of piloting units and taking note of the features of the national carbon market, the Company will further improve the three-level carbon asset system, revise the current carbon asset system, and enhance supervision and inspection of the implementation of the system.

On carbon verification and gap estimation, the National Development and Reform Commission started the process of public consultation on quota allocation for the power industry in the first half of 2017, although the official document has yet to be published. In 2018, the Company will carry out carbon verification for 2016 and 2017. Quota gap estimates will be calculated against the baseline emissions set out in the quota allocation plan taking into consideration different stress parameters and capacity levels. In doing so, an overall quota gap forecast can be made, which serves as preparatory work for the Company to participate in the national carbon trading market.

Regarding voluntary emissions reduction project development and voluntary emissions reductions reserve, in response to the introduction of the national carbon trading market, the Company will through with the development of voluntary emissions reduction projects in accordance with national project declaration and reductions offset policies. The key focuses are as follows: first, after the reinstatement of the national voluntary emissions reduction project declaration policy, the Company will promptly promote the development of voluntary emissions reduction projects concerning wind power and photovoltaic power as far as possible to offset the compliance pressure on thermal power units; second, the Company will start building its emissions reductions reserve as soon as possible and keep a close eye on relevant voluntary emissions reductions offset policies. Taking advantage of a positive policy outlook, the Company can accurately calculate the amount of voluntary emissions reductions against which emissions from thermal power units can be offset. The Company will also initiate emissions procurement for unmet internal quota demand to mitigate the impact of carbon restrictions in the early stages of the national carbon trading market.

The Company will put more effort into emissions trading and compliance work in the pilot zones as well as lowering compliance costs. According to national and local governing departments' arrangements, units in the pilot zones are probably required to remain compliant in those carbon trading market in 2018. The Company will closely monitor policy changes. Once compliance arrangements are confirmed, the Company will conduct market analysis, formulate trading strategy and initiate trading. As long as favorable policies are in place, the Company is eager to operate in carbon finance, such as CCER, with a view to lowering compliance costs.

5.3.4.3 Wastewater Management

In accordance with national and local environmental protection standards and policies, various power plants of Huaneng International considers wastewater treatment one of our key focuses. The Company has established an environmental protection supervision and management system to improve management mechanisms and contingency plans, specify the responsibilities of environmental protection personnel at various levels and impose strict controls on the production, treatment and discharge of sewage with the aim of reducing environmental pollution.

The sewage produced by the Company includes industrial waste, which is mainly generated from Company's powering facilities such as circulation system of steam turbines, and desulphurization wastewater produced during the operations of the unit's wet desulphurization facilities. In the year of 2017, the total water discharge of the Company is 18,449.64 million tons, the total discharge of the open cooling circulating water is 18,415.30 million tons, and the total discharge of sewage, which is mainly industrial wastewater and desulphurization wastewater, is 34.34 million tons.

Since the implementation of the permitting system for pollutant discharge, the Company has imposed more stringent requirements on power plants regarding wastewater discharge. By 2017, all power plants of the Company have obtained pollutant discharge permits and strictly abide by the requirements of the permit concerning the outlet and water quality. To optimize the utilization of water resource, the Company has formulated "*The Guide of Water Saving and Wastewater Treatment Technologies*" for coal-fired power plants and has proactively promoted the work of water saving and wastewater treatment transformation. In 2017, the Company approved the initiation of 10 retrofitting and preparatory work projects on water saving and wastewater treatment, of which four were special treatment projects and six were projects of feasibility study on the preparatory work for retrofitting. Various technologies for zero wastewater discharge have become more mature, such as the flue gas bypass evaporation system developed by the Xi'an Thermal Power Research Institute. The technology has been tested at Huangtai Power Plant on a certain scale and has shown good performance.

Given the complexity and diversity of wastewater treatment, the Company will continue to work with scientific research institutes to enhance wastewater research and develop practical, reliable and cost-effective wastewater treatment technologies. Taking into account the actual circumstances facing the power plants and in accordance with the requirements of the sewage discharge permit, the Company insists on the idea of "on power plant, one policy" and complies with the principles of diversion of clean water and sewage, water recycling, and treatment classification, thereby helping to promote the transformation of water saving and wastewater treatment

5.3.4.4 Waste Management

Huaneng International has implemented a stringent waste management system, which requires that the storage, discharge, and disposal of waste comply with national laws and local policies, cooperates with qualified third parties to deal with waste, strengthens waste recycling, and strives to minimize waste emissions.

Hazardous Waste

The main hazardous waste produced by the Company during the process of power generation includes such solid waste as used denitration catalysts and ion exchange resin deactivated in wastewater treatment, as well as liquid waste like waste oil produced during the operation of power plant units. The Company regenerates the denitration catalysts which have reached their life limit and continues to charge them into denitration devices for use. The ion exchange resin can be washed by an appropriate concentration of inorganic acid or alkali, thereby returning to the original state and being reused. The Company will hire qualified agencies to deal with denitration catalysts that could not be renewable any more, ion exchange resins that cannot be reused and hazardous liquid waste such as lubricant and other waste oil during operations. Besides, through managing the accounts, we detailed statistics on the amount of waste generated, the amount of disposal, and the audit of the qualifications of disposal units, etc., and strictly managed the generation and disposal of waste.

In 2017, the Company in the process of production and operation generated 1,358.99 tons of waste denitrification catalysts, 128.24 tons of ion exchange resin and other hazardous solid waste and 959.04 tons of waste oil and other hazardous liquid waste.

Solid Waste

The main solid waste generated during the Company's power generation process includes fly ash and cinder produced during the combustion process of the boiler, and gypsum produced during the limestone wet desulphurization in power plants. The Company produced 4,002.46 ten thousand tons solid waste, 3,289.62 ten thousand tons of fly ash and cinder, and 712.84 ten thousand tons of desulphurization gypsum during the year of 2017. The rate of comprehensive utilization of fly ash and cinder stood at 91.40% and the rate of utilization of desulphurization gypsum disposal was 100.00%.

Fly ash and cinder, desulphurization gypsum and other solid waste can be sold as raw materials in related industries, such as cement, concrete, aerated blocks and gypsum board. In accordance with national and local environmental protection standards and policies, the Company has established an environmental protection supervision and management system to effectively control the canning, stacking and marketing of as hand desulfurization gypsum.

When loading fly ash, cinder and gypsum, the Company rigorously follows the operational norm for load control and conducts thorough check and cleaning before entry to prevent "escape, spillover, dripping and leakage". The Company closely monitors where the by-products of power generation are being transported and how they are going to be used to prevent environmental pollution and public issues that have a negative impact on society.

The Company will temporarily place the unsold fly ash and cinder on ash storage sites and has implemented a rigorous control system to ensure the safety of ash dams and prevent seepage by carrying out regular assessment and inspection. In accordance with the requirements of environmental protection departments, construction and retrofitting of wind-proof and dust control facilities have been carried out to ensure that the storage of ash and gypsum is in line with environmental protection standards. The Company has developed an ash storage site management information system with two major functions, namely safety assessment and production operation management. The introduction of the ash storage site management system represents several breakthroughs in terms of dynamic monitoring, mobile application and GPS positioning of ash storage sites. By using drones for inspection at piloting power plants, the Company has taken a substantial leap to improving production safety management of ash storage sites.

5.3.5 Noise and Other Environmental Impacts

Noise Management

From the initial stage of construction to the operation period of the power plants, Huaneng International continued to pay attention to noise management to prevent the noise pollution.

On the initial stage of construction, relevant departments of environmental protection determined the sensitive points of noise between plants and the noise control level, in accordance with environmental impact assessment approval requirements. In the environmental completion acceptance of the power units in all power plants, the monitoring department will monitor according to the environmental impact assessment approval requirements, and only when the monitoring results are qualified will the acceptance concerning noise pass. During the operation of power units, the power plants, complying with requirements of environmental protection departments, regularly commissioned relevant monitoring departments to monitor and published the reports in various ways.

The power plants installed noise coverings on equipment such as fans which are the noise sources in the plant area, and built noise walls in key areas such the Liangshuita area. When the power units are undergoing transformation or equipment failure which cause excessive noise, the Company will conduct noise reduction transformations to those noise-excessive equipment, so as to achieve the relevant requirements.

Other Impacts

All power plants owned by the Company during their initial stage of construction are all required to pass the EIA approval by the relevant environmental protection departments, in order to avoid serious impact on the surrounding environment and natural resources during operations. All power plants during operations strictly abide by national environmental emission standards, and discharge within the standards. Some power plants actively responded when the requirements of surrounding environment changed, to ensure that surrounding environment and natural resources are protected.

To enhance the management of unorganized emissions from coal yards, the Company has promoted closed coal yard renovations at power plants in Beijing-Tianjin-Hebei 2+26 cities and the Yangtze River Delta. Not only can this reduce the environmental pollution caused by the coal dust and coal yard rainwater and improve the surrounding environment of coal yards, but also increase the coal storage capacity, improve the mechanical operating conditions and reduce the equipment maintenance work. Shanghai Shidongkou No.1 Power Plant coal yard enclosure project, with “Great Pressure on Small” in consideration of equal capacity, carry out coal yard enclosure in the form of Eurosilo, China’s first enclosure coal storage project in the power system. In order to make full use of idle space at the top of the coal shed and maximize the effectiveness of energy saving and emissions reduction, the Company is ready to carry out all the photovoltaic construction for the new closed coal yard project.

06

People-Oriented Safe Production

Huaneng International regards safety as its own life, tolerates no safety incidents, always adheres to the production safety principles of “life-oriented, safety first, prevention first, comprehensive management”, uphold the safety conception of “safety is credibility, efficiency, competitiveness, responsibility of safety is of the greatest significance”. Prevention of personal death, mishandling of operations with malicious intent, major equipment damage, major equipment incidents, fire outbreaks, traffic accidents for which someone is held responsible, and other incidents that may adversely affect the Company’s reputation. The Company places in any case safety in the first place, attaches great importance to safety and occupational health of employees, strengthens bottom line awareness, and effectively implements safe production.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According to the Company's 13th Five-Year Arrangement for Safety Production, by 2020, the Company and various units regulate the operation of the intrinsic safety system, incorporate outsourcing into the scope of the Company's management and further enhance training on production safety for comprehensive control of risk management, effective implementation of the responsibility system and prevention of safety accidents and occupational diseases. The target is to achieve zero injury (minor or above) and zero (equipment) incident in grassroots unit. Major production safety tasks during the 13th Five-Year include strengthening outsourcing management, deepening the operation of the intrinsic safety system, deepening risk control, deepening the management of safety hazards, strengthening emergency response management, pushing ahead with production safety education, strengthening on-site monitoring, promoting the information of safety management and creating a corporate safety culture.

In 2017, the Company and its various units met the production safety target.

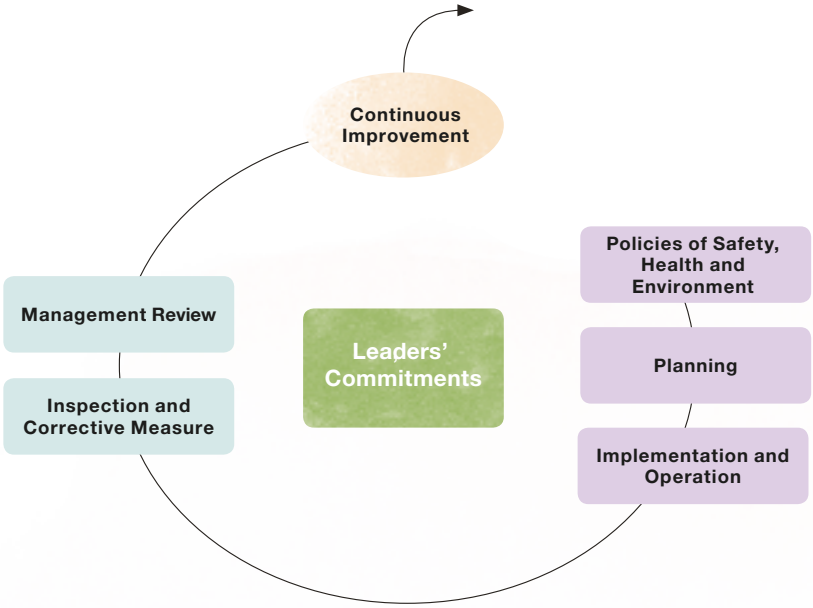
6.1 Promoting the Intrinsic Safety System

According to laws and regulations on production safety stipulated by the state, the Company, taking into consideration actualities of its subsidiaries, has established its own fourfold Intrinsic Safety System ("ISS"), which comprises intrinsic safety of personnel, process equipment, environment and management.

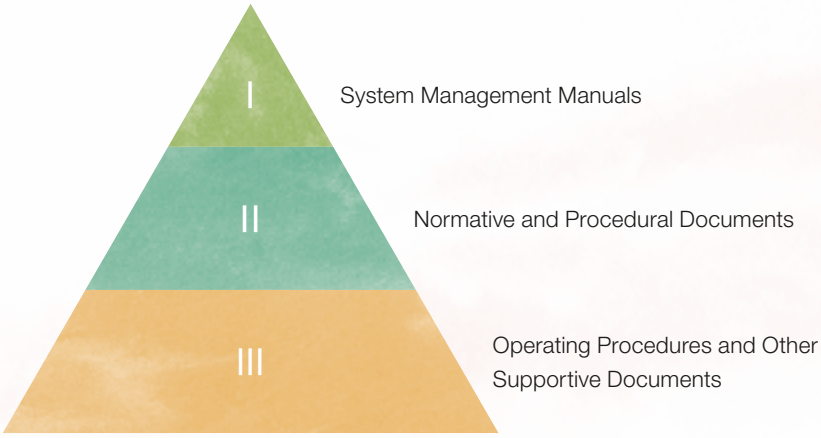
The fourfold intrinsic safety system include:

The PDCA Management Model of Intrinsic Safety System

The Company's intrinsic safety system follows the PDCA management model, i.e. PLAN, DO, CHECK, and ACTION, establishes circulation and improves continuously. The management model consists of six key elements: leaders' commitments, policies of safety, health and environment, planning, implementation and operation, inspection and corrective measure, and management review.



The Company's Intrinsic Safety System's documents consist of system management manuals, normative and procedural documents, as well as operating procedures and other supportive documents.



Revision and Review the Intrinsic Safety System Documents

In 2017, the Company revised, reviewed and published the intrinsic safety system regulations. By sorting and consolidating the 109 original safety management documents, 96 documents were finalized. In the second half of that year, the Company started revising the document on regulations for hydropower management of the intrinsic safety system and soon to be published.

6.2 Establishing a Sound Safety Management Mechanism

Establishing a Three-level Safety Supervision System

Huaneng International has set up the Committee of Safety, Occupational Health and Environmental Protection, whose main aims are to adhere to the policy of "safety first, prevention first, comprehensive management", implement the national, industrial, and Huaneng Group's own guidance and arrangements on safety production, organize and guide the Company's work of production safety, analyse and propose important decisions and measures concerning production safety, and coordinate and solve key problems therein.

Under the leadership of the Committee of Safety, Occupational Health and Environmental Protection, the Company establishes and improves management and organizational institutions of production safety, and has built a three-level security inspection system made up of "headquarters – regional companies – production units". The three-level management and organizational institutions of production safety forms complete supervisory system of production safety, performs duties of supervising production safety, and guarantees the realisation of aims of production safety with the system of production safety system.

The headquarters is responsible for system design, business guidance, worksite monitoring services, assessment and evaluation, etc. Regional companies are responsible for the implementation of the Company's safety management requirements, work plans and decision deployments, give full play to the role of organization and coordination, and supervise basic production units' implementation of responsibility of subjects. Production units are responsible for the implementation of *Comprehensive Standard of Production Safety Responsibility*, implement security responsibility of the Company's all levels and posts, and set up the sense of responsibility of "whoever works is responsible, whoever checks is responsible, whoever supervises is responsible, and whoever approves is responsible".

Target Responsibility System Concerning Production Safety

The Company and its subsidiaries apply target responsibility system concerning production safety. Every year the Company's managements sign a memorandum concerning target responsibility of production safety with principals from subsidiaries, carry out monthly pre-assessment and yearly final assessment, and guarantee the implementation of responsibility at every level. The Company's target of production safety abides by "one vote veto", which refers to a quantitative evaluation on production safety performance of each unit with starting score of 100 points. Whenever employees' injury or death accident, injury accidents of outsourcing personnel for whom the Company is responsible, serious and above equipment accidents for which the Company is responsible, or fire disasters, environmental pollution and devastation accidents happen, 100 points will be deducted.

6.3 Implementation of Effective Safety Measures

Huaneng International sees safe production and employees' occupational safety and health as paramount. In order to guarantee production safety, the Company has taken comprehensive and effective measures, continuously updated methodology, and contributed to lasting enhancement of the level of production safety.

In 2017, the Company has formulated an annual work plan and rolled out a series of activities to ensure all grassroots units implemented production safety measures effectively:

Building an Intrinsic Safety System

To implement an intrinsic safety system, deepen employees' knowledge and understanding of it and expedite the construction of such a system at various grassroots units, the Company has formed a dedicated team to garner support for the initiative. The team has held 35 talks, provided training for 47 thermal power plants and completed publicity work at 75 power plants regarding the introduction of an intrinsic safety system.

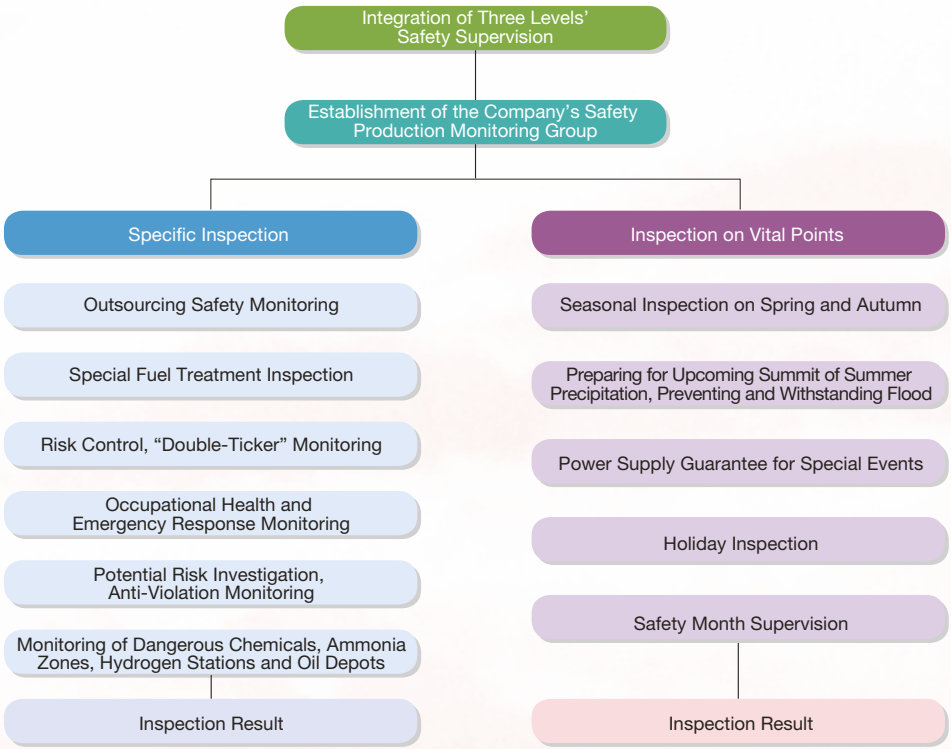
In addition, the Company has carried out review and verification of the intrinsic safety system at grassroots units, confirmed the work, urged all units to complete the review of the system documents and put them into operation on site, and conducted an annual assessment of the effectiveness of the confirmed operation of the intrinsic safety system at grassroots units.

In 2017, the Company carried out acceptance check on the intrinsic safety system at 8 grassroots units.

Strengthening On-site Safety Monitoring

Currently, grassroots units are in the phase of mandatory management. This means that grassroots units are required to comply with the safety measures formulated by the headquarters. Strengthening on-site safety monitoring is a measure taken during this phase. Being in accordance with national requirements and taking into consideration production units' circumstances of overall production, the Company has devised 2017 safety monitoring plan, including spring and autumn safety checks, holiday inspection, monitoring for summer peak and flood control, Safety Month supervision, outsourcing safety monitoring, risk control, "double-ticket" (work tickets and operation tickets) monitoring, potential risk investigation, anti-violation monitoring, monitoring of dangerous chemicals, ammonia zones, hydrogen stations and oil depots, special fuel treatment inspection, occupational health and emergency response monitoring, and monitoring of power security measures during critical periods.

Safety monitoring takes place both at the company level and at the regional company level, while cross-monitoring takes place at the regional company level. For any problem found, the Company will issue supervision handbook requesting timely rectification and regular evaluation of rectification work by the unit under monitoring, urge regional branches to fulfill their duties and supervise all grassroots units to implement various measures.



Enhancing Risk Control

In 2017, the Company fine-tuned the acceptance and assessment standards of its risk control system to further enhance its risk control capabilities. The Company encourages grassroots units to identify and analyze on-site hazards to make "dangers visible and risks quantifiable". Based on a "double-ticket" model, grassroots units carry out identification work in respect of personal, equipment and environmental dangers, establish a database for danger identification, and regulate the "double-ticket" management process to better identify, analyze and control dangers. The establishment of a risk control system has enhanced operators' ability to identify risks, personnel safety awareness and their ability to prevent and control operating risks so as to ensure effective implementation of safety measures, strengthen risk control and improve civilized production.

In 2017, the Company completed acceptance check on the risk control system at 4 grassroots units.

Yingkou Power Plant Phase II before and after
the civilized production of outdoor side hydrophobic expander

Yingkou Power Plant Phase II before and after
the civilized production treatment of outdoor side fuel platform

Enhancing Potential Risk Investigation and Anti-violation Work

Through various safety inspection activities, the Company has established a mechanism to enhance routine inspection, special inspection and the integration of self-inspection and supervised inspection for the normalization and standardization of safety hazard investigation and anti-violation work.

Improving the Emergency Response Management System

In 2017, the Company earnestly encouraged all grassroots units to carry out assessment on emergency response capability in accordance with the requirements of the National Energy Administration. The Company required grassroots units to specify the major responsibilities, establish a long-term and effective mechanism, and enhance publicity and training for emergency response capability assessment, in order to strengthen emergency response management and build a sound emergency response management system.

The Company mainly instructs and supervises grassroots units to enhance their organizing and leadership in emergency response management, formulate emergency plans according to actual circumstances in a timely manner, and complete the review and filing of contingency plans as required by the government in line with the practical situation.

As at the end of 2017, grassroots units of the Company formulated a total of 101 comprehensive contingency plans, 1,617 special contingency plans and 2,779 on-site disposal plans.

Conducting Safety Evaluation

The Company conducts comprehensive safety evaluation regularly, in accordance with Measures for the Administration of Safety Evaluation and in collaboration with specialists and professionals at all levels, to inspect and assess the work on ensuring production safety at power plants.

Accidents are often the results of unsafe human behaviors, unsafe conditions of objects, safety management failure and bad operating environments translating into safety hazards and violations. Safety evaluation is the process by which to formulate rectification and preventive measures through evaluation and analysis of equipment system, labor and working environment, and safety management, to achieve an optimal human-machine-environment matching for advanced control of accidents.

For initiation of safety evaluation, grassroots units first conduct self-inspection, self-evaluation and self-rectification. After that, they are required to submit an application for expert evaluation to higher level management units. Regional companies then arrange expert evaluation. Upon division of labor by specialty, the expert team carry out verification based on grassroots units' self-inspection report and evaluation criteria to compile an expert evaluation report. In view of the problems and rectification recommendations put forth in the evaluation report, grassroots units formulate rectification plans and implement them accordingly. They are then required to submit an application for expert review to higher level management units. This time round, the expert team focus on reviewing the effectiveness of rectification plans to verify whether the enterprise's PDCA closed loop management mechanism is operating effectively.

In 2017, the Company conducted safety evaluation at 9 grassroots units.

Roll-out of the "Year of Deepening the Implementation of the Production Safety Responsibility System" Activity

In 2017, to implement the *Opinions of the CPC Central Committee and the State Council on Promoting Reform and Development in the Field of Production Safety*, the Company formulated and published the *Plan of Huaneng International for the Year of Deepening the Implementation of the Production Safety Responsibility System*, and rolled out the "year of deepening the implementation of the Production Safety Responsibility System" activity. The Company has carried out inspection and evaluation of the implementation of the production safety responsibility system at regional companies, and has issued supervision handbook requesting grassroots units to rectify the problems identified during inspection and evaluation. Through the activity, the Company has helped grassroots units put in place the production safety responsibility system to ensure that they "know their responsibilities, fulfil their responsibilities and take their responsibilities" in improving the Company's production safety management.

Roll-out of "Production Safety Month" Activity

In 2017, the Company actively participated in the 16th national "Production Safety Month" activity with the topic of "National implementation of responsibility of enterprises' production safety subjects" in which Qinbei Power Plant was honored as an advanced unit in production safety.

6.4 Protecting Occupational Health and Safety

Occupational diseases in the electric power industry are often caused by coal dust, noise and electrical work. Huaneng International has always been emphasizing employees' occupational health. In accordance with the requirements of the intrinsic safety system, the Company has formulated the *"Occupational Health Management Standards"* and *"Employee Health Guardianship Management Standards"* (collectively referred to as *"Occupational Health Management Standards"*) to strengthen employees' safety awareness, prevent hazardous events, and protect employees' health and safety.

Various grassroots units have set up occupational disease prevention organizations to specify and put in place occupational disease prevention responsibilities as well as identify and evaluate workplaces with occupational hazards against relevant standards to rate the hazards. Employees are provided with training on occupational disease prevention, while clear warnings are put up in workplaces with potential occupational hazards where regular inspection is carried out.

The Company regularly conducts occupational health examinations for employees in production positions and has established occupational health management records. At present, no occupational disease has occurred.

6.5 Continuously Improving Safety Awareness and Skills

Raising employees' safety awareness is key to the Company's safety management. To develop and encourage employees to participate in the Company's all kinds of security activities in order to establish good security behaviours is the key guarantee to create an intrinsic safety enterprise.

Safety Training Management Mechanism

Huaneng International's management has incorporated safety education and training into the Company's annual and long-term plan, established double-level and triple-level educational and training mechanisms, and ensured the implementation of required coaches, funds and materials. The Company's Safety department is responsible for the preparation of safety education outline, design of plans, organisation of safety education and training, and sorting well the records and archives of safety trainings. All units of the Company ensure that employees receive adequate training, adjust safety education plan and organize training for power plants, departments, and teams according to the characteristics of departments' and teams' production.

Safety Training

In 2017, the Company organized 81 speaking tours to grassroots units, covering topics like "creating my safe working conditions", "the work ticket for repair work risk control", "analysis of safety rules", "outsourcing management" and "overview of the intrinsic safety system", in which 4,300 person times of employees took part.

The Company has further improved the safety education and training platform and system, upgraded and optimized system software in a timely manner, held training and examinations on the training platform. A total of 4,383 training sessions were held during the year where 172,123 person times of employees took part, and a total of 2,505 examinations were held, attended by 97,343 person times of employees. A certain number of units have uploaded some quality self-developed courseware onto the platform, which is specific, rich in content, targeted, instructive and highly applicable, adding to the diversity of the education platform's content.

The Company has established a safety rules test question database, educated grassroots units on the topic of personal injury and death, improved personnel safety training acceptance standards, and standardized personnel safety training acceptance for 12 grassroots units, all of which passed acceptance with good results.

6.6 Comprehensively Regulating Outsourcing Management

To enhance the management of outsourced teams and employees, the Company has incorporated the long-term outsourced repair and maintenance partner teams into its safety management system in accordance with the "four in one" management requirement in line with the way formal employees are managed to make outsourcing risks controllable and bring them under control for protection of the personal safety of outsourced workers.

Promoting the Standardization of Outsourcing

Over the past two years, various coal-fired power plants have made significant progress through the standardization of long-term outsourcing. In 2017, the Company continued to promote the standardization of long-term outsourcing by conducting inspection and acceptance of the standardization of outsourced teams at Beijing Thermal Power Plant, Jinling Gas Turbine, Zhongyuan Gas Turbine and Liangjiang Gas Turbine, as well as doing publicity work at some of those newly acquired grassroots units in Shandong, Heilongjiang and Jilin.

Advancing the Construction of an Outsourcing Information System

The Company has further advanced the construction of an outsourcing information system, and supervised various units to put the system into operation, implement the access control system and integrate with the outsourcing information system.

The Company has also optimized and improved the outsourcing information system software, granted the production department and human resources department greater access to outsourced personnel information, and expanded the use of the system.

Enhancing Safety Education and Training for Outsourced Personnel

Grassroots units formulate outsourced personnel training plans in accordance with Huaneng International's employee job training standards, require outsourced personnel to understand the basics and fundamentals of their position, provide outsourced personnel training in line with employee training, and engage them in activities like spring and autumn checks, Safety Month and safety inspection, so as to continuously enhance their technical skills and safety awareness.

Apart from receiving the entry three-level safety education and training, outsourced personnel have to attend continuous safety education and training as well as professional and technical training throughout the whole daily work process. The Company assesses major outsourced personnel by holding annual examinations on operating procedures, repair procedures and safety rules to increase their learning and understanding of the Company's business.

07

Fostering Solidarity and Growing Together

Huaneng International recognizes that talent is the most fundamental resource of an enterprise and forms the basis for developing into a global leading company. Huaneng International follows the concept of "people-oriented, pragmatic and efficient development". We highly value our employees, reasonable incentivization, employee cohesion and employees' all-round development with a view to integrating employees' personal progress with the Company's development, creating a harmonious and happy working environment and making employees feel more attached to the Company.

7.1 Equal Employment and Equity Protection

The Company strives to establish a long-term and stable employment relationship with employees, employs people in accordance with the law, upholds the principle of equal employment and protects the legitimate rights and interests of employees.

Legal Employment

The Company insists on legal and equal employment and requires all units to strictly abide by the state's *Labor Law, Labor Contract Law* and relevant laws and regulations. The Company has signed the labor contract with all of its employees and abide by the state's *Provisions on the Prohibition of Using Child Labor*, prohibits the use of child labor.

At the same time, the Company adopts equal and non-discriminatory employment policies to provide equal employment opportunities and labor security to employees of different nationalities, ethnicities, genders, religious beliefs and cultural backgrounds.

As at the end of 2017, the Company had 53,962 employees, 74% of whom had college qualifications or above.

No labor disputes due to violation of laws and regulations occurred in 2017.

Protection of Employee Rights and Interests

The Company has established a comprehensive and stringent system for protection of employee rights and interests.

Remuneration system: The total remuneration of the Company's employees includes wages, bonuses and allowances. By adopting a remuneration system based on talent, performance, efficiency and the fairness principle, the Company can ensure that its highly performing and competitive workforce are rewarded in a fair manner.

Social insurance: The Company has set up various kinds of social insurance, housing provident fund, enterprise annuity and supplementary medical insurance in strict accordance with the relevant national and local government policies and regulations to ensure that employees enjoy equal rights according to law in respect of pension, medical treatment, work injury, unemployment and childbirth. In 2017, the Company did not have any social insurance violation or default.

Working hours: The Company strictly abides by the state's *Labor Law* and relevant laws and regulations, and does not practice compulsory labor.

Trade Union: All units of the Company have formed the Trade Union in accordance with the *Trade Union Law of the People's Republic of China* and all employees are members of the Trade Union. The various Trade Union conscientiously perform their duties, safeguard the legitimate rights and interests of employees, encourage employees to participate in management and decision making, jointly achieve the goals of the Company, and help mediate disputes between the Company and its employees.

Democratic Management

Employees' congress is one of the most important forms of open and democratic management of factory affairs. In 2017, the Company published Measures for *the Implementation Method of Employees' Congress*, among four others, to further improve and enrich the system of employees' congress. Early this year, the first third session employees' congress was successfully held and the Company solicited proposals from members of the congress for the first time. The fact that the Company has finished responding to all proposals is testament to its employees' enthusiasm and active involvement in the Company's management work.

Besides, the Company continues to promote democratic systems like the system of publicizing factory affairs and the responsibility system for complaint letters and visits, carry out democratic management performance appraisal, recognize employees' rights to information, participation, expression and supervision, and mobilize the enthusiasm, active involvement and creativity of employees. In 2017, Yuhuan Power Plant and Yunhe Power Plant were awarded "the National advanced units of open and democratic management of factory affairs".

Collective Care

The Company sees that giving employees the support they need is the best way to safeguard their rights and interests. In 2016, RMB2.988 million was dedicated to helping 205 employees in need and all funds have reached them since. In 2017, the Company helped 309 employees in difficulty complete procedures for the declaration of assistance funds totaling RMB4.171 million.

Love Donation

In 2017, the Labour's union of the Company initiated a donation drive to raise funds for our employee Liu Chang who suffered from serious illness. The funds raised were sufficient to cover 30% of the total treatment fee, which provided a timely reprieve from the huge financial burden on her family.

7.2 Employee Training and Career Development

With the belief that "elites are the forefront important assets", the Company has actively implemented the strategy of developing the enterprise by talents, focused on the tri-tasks of attracting, training and making good use of talents, accelerated the establishment of a team with high-level and highly skilled talents as core members. As a result, a team of talents with excellent quality, which is well structured, professionally equipped, devoted to careers in Huaneng and in line with the Company's developmental and strategic needs, has been formed.

Training System

Taking full advantage of our resources, the Company's training system consists of three levels, namely the headquarters level, the regional branch level and the grassroots unit level. The headquarters formulates the annual target for training, competition and assessment according to the Company's needs, while regional companies implement relevant plans, and at the end of the year make statistical analysis and conclusions on the yearly training performance.

Institutional guarantee: The Company conscientiously carries out the Group Company's *"2015-2017 Implementation Plan on the Work of Enhancing Training in Production Skills"*, *"Notice on Further Enhancing Training for New Employees of Power Enterprises"*, *"Rules on Team Lead Training"* and *"Rules on Production Personnel Training"*. The Company instructs the roll-out of training in a timely and orderly manner.

Training modes: The Company provides different modes of training, including cadre training, orientation training, post training, skill training, continuing education and international cooperation training.

Training bases: At present, the Company has six group-level training bases(Shanghai overhaul company, Huaiyin, Shantou, Dalian, Huangtai and Weihai), an increase of two bases year on year, and two group-level relay protection training bases(Qinbei and Huangtai), an increase of one base year on year. The Company also has three secondary training bases (Taicang, Yanglu and Luohuang).

In 2017, various business departments organized training according to the annual target, while regional companies and grassroots units centralized the organizing of induction training, different kinds of technical training and on-the-job training for a total of 33 ten thousand person times.

Career Development

The Company places emphasis on establishing a platform for employees' personal growth and nurturing the leadership of the Company. The Company's promotion policy is open, fair, just, performance-driven, dynamic and merit-based, and employees can be promoted either at the job position level or at the job function level. Promotion at the job position level concerns factors like job duties and overall qualities, whereas promotion at the job function level concerns factors like specializations and business nature.

The Company attaches great importance to the development of professional and technical personnel, and has established a sound management mechanism to clearly define the professional and technical skills, job responsibilities, terms of service, selection process, exit mechanism and assessment. The Company insists on promoting staff who possess the best qualities, have outstanding performance and are recognized by other employees. Promoted employees are appointed for a fixed period and automatically enjoy the benefits of the position upon completion of the term.

In 2017, in cooperation with China Business Executives Academy at Dalian, the Company organized special training on leadership for 172 employees at the leading position level and above in three batches; 24 managers in charge of regional companies were selected to attend 7 classes of training at National Cadre Academy and Yan'an Cadre Academy; 20 leaders were selected to attend training on leadership at the group level. The focus of training rested on "teach to study, study to teach, study to study, study to application", which enhanced the relevance of training. At the same time, the Company boosted the exchange of 76 person times of employees in leading positions. The Company transferred 32 employees in leading positions to the group headquarters and selected 20 employees in leading positions to work out by assuming positions at the Company's headquarters. The relevant training and exchange were aimed at enhancing the overall capacity and management capability of the Company's leadership, improving the mechanism for talent mobility and promoting the optimization of allocation of human resources.

In the future, the Company will further enhance talent development, continue to build its workforce and place more emphasis on employee education, training and career development, with a view to growing together.

7.3 Happy Work and Happy Life

Huaneng International upholds the concept of "happy work, happy life", and encourages employees to strike a work-life balance. The Company provides employees with benefits and organizes many cultural, sports and volunteer activities that are beneficial to employees' physical and mental health.

Sports Activities

The Company's headquarters and regional companies have organized a series of exciting sports activities, such as the third session of "ten thousand steps every day, I will be healthier than anyone" activity, basketball, tennis, badminton and table tennis matches, sports games and autumn outings.

Walking activity

Basketball match

Planting Activities

On 31 March, as our tradition, the Company organized a tree planting activity for headquarters employees who were enthusiastic about it. Since 2010, the Company has organized tree planting activities for employees for eight consecutive years, which attests to our environmental responsibilities. The activities have also facilitated communication and exchange among employees and made them more engaged in contributing to the development of the Company.

Reading Activities

The Company has launched a reading campaign among all employees and fosters a culture of "loving reading, reading good books, using good books and collecting good books" to make reading a habit, let books keep you company and promote literacy among employees as well as their ideological and cultural development. The Company won two national top prizes and two national second prizes at the "Shuxiang 3·8" activity.

Volunteer Activities

The Company champions the volunteer spirits of dedication, fraternity, mutual help and progress, and strives to build an organizational structure combining the organization of the Communist Youth League and volunteer service team to optimize the operating model for volunteer service. In accordance with the Group Company's Notice on Enhancing and Regulating the Management of "Three-Color Sail" Young Volunteer Service Activities and Volunteer Registration, the Company has regulated the management of young volunteer activities under the unified branding of "three-color sail" to enhance young volunteers online registration management. As of the end of December, 107 Youth Leagues have completed the work of full coverage of volunteer online management.

08

Creating a Win-Win Situation and Giving Back to Society

Huaneng International has insisted on harmonious development concepts of “serve the Country, benefit society, seek multilateral benefits and develop together”, as well as thorough consideration of and effective response to stakeholder demands, with a view to sharing the Company’s achievements with stakeholders and jointly improving the Company’s environmental, social and governance performance.

8.1 Continuously Enhancing Supplier Management

Huaneng International believes that cooperation is an indispensable driving force for the development of the Company, and is committed to building a platform for closer cooperation and more effective communication with suppliers to bring quality products and services to our clients. The suppliers of the Company include material suppliers, engineering suppliers and fuel suppliers, with which the Company has established a long-term and stable partnering relationship and jointly enhances our environmental, social and governance performance, thereby helping suppliers bring a more positive impact on the environment and society.

The Company's tender committee and tender working group are in charge of decision making and authorized management of the administration of company-level suppliers of the Company respectively, while the business contract department is in charge of the centralized administration of material suppliers. The finance department is responsible for appraising the finances and credit status of suppliers while relevant technical departments are responsible for technical appraisal of suppliers. The grassroots materials use unit is involved in daily administration and regular appraisal of suppliers.

The Access of Suppliers

Basic requirements: The Company requires suppliers to be legally registered and accredited for safety, quality and environmental protection. Suppliers should have legal proof for the source of their products and a track record for better product performance compared to competitors in the industry, with good business reputation and a sound financial and accounting system.

Selection mechanism: Suppliers are selected in an open, fair and just way upon thorough consideration of the impact they bring to the environment and society.

All engineering suppliers are selected by open tender upon comprehensive appraisal in areas such as environmental protection, safety, labor, quality, turnover, business reputation and social responsibilities.

Material suppliers are basically selected by open tender to further enhance competitiveness, lower procurement costs and improve procurement quality.

Regarding fuel procurement, the Company has published the *Requirements for Fuel Supplier Management*, which include qualification, reputation and capability subject to one-vote veto.

Procurement of Coal

The fundamental principle concerning the procurement of coal is to source coal from major state-owned mines and large coal mines and transport it directly from there to power plants. The Company recognizes that the major state-owned coal mines have stronger ability to perform the contract, stricter controls on product quality, and stronger commitment to the law, social responsibilities and environmental protection. The state has also imposed environmental protection requirements on the planning, design, construction, mining and goaf treatment of large coal mines. Such requirements must be met before an approval of initiation is obtained for production and operation. The state also has a series of special requirements on the induction and labor protection of mine workers at large mines where there is no child labor and no lack of safety protection. Therefore the Company opts for major state-owned mines and large coal mines as qualified suppliers to ensure that suppliers have lived up to their social, environmental and labor protection responsibilities and obligations.

Supplier Appraisal

The centralized administration departments of the Company's various suppliers carries out regular and ad-hoc supplier appraisals.

Daily appraisal: Statistical analysis on supplier daily compliance, including supply quality, delivery, prices and services, is conducted based on procurement contract performance ledgers. For suppliers in violation of laws, regulations and rules, different penalties will be imposed, depending on the severity of the violation. In more serious cases, the supplier concerned will be blacklisted and barred from participating in any procurement projects for a period of five years.

Annual appraisal: The Company conducts annual appraisal of those suppliers engaged in the appraisal year, the scope of which includes on-time delivery, quality passing rate, quality complaint, after-sale service and collaborative attitude based on supplier performance in that year.

Internal Supervision

In accordance with relevant monitoring, audit and internal control requirements, the Company's monitoring department and audit department carry out comprehensive and systematic inspection and audit of the supplier management system, including the supplier selection process, to ensure compliance.

Supervision of Environmental and Social Responsibilities

While the Company encourages suppliers to fulfill their environmental responsibilities, we require suppliers to fully comply with labor and human rights laws against child, forced or compulsory labor, remain vigilant in compliance and achieve the target of zero incident.

8.2 Building Harmonious and Stable Relationships with Clients

Huaneng International is committed to providing power grid companies and other downstream enterprise consumers with quality power products and services to ensure safe and stable power supply in sharing the Company's achievements with clients.

A Tradition of Harmonious and Stable Relationships with Clients

Currently, Huaneng International's clients are mainly power grid companies, which account for the purchase and sale of most of the power generated and are responsible for settlement. The Company has maintained a long-term and friendly partnering relationship with power grid companies. Since the power consumption of clients is not affected, no complaint from end users has been received. The Company successfully achieved the target of zero breach of contract in 2017.

Extending Our Reach for New End Users

Amid the reform of the electric power system, the Company has expanded its client base by incorporating power consumer enterprises involved in direct trading and sales trading, other power generating enterprises involved in generating rights trading, and other electricity retailers involved in sales trading. The Company is determined to strive for reform and international cutting-edge electricity retailing experience to develop new end users and build our capacity in meeting clients' needs.

8.3 Fulfilling Corporate Social Responsibility

Huaneng International is actively involved in social and community services through innovative cooperation channels to contribute and give back to society by bringing our care and support to the needy.

Community Involvement

The Company always upholds our commitments to "serve the Country, benefit the society, seek multilateral benefits and develop together" in a harmonious fashion, fully considers and effectively responds to the demands of stakeholders, and actively participates in community and public services. We encourage all units to provide social support for the needy, engage in volunteer work and organize open days in further enhancing our community involvement and building a good corporate image.

Anyuan Power Plant Normalizes Publicity on Environmental Protection

Between 2016 and 2017, Anyuan Power Plant organized three power plant visits for more than 130 students from nearby primary schools. Led by power plant's staff, the students visited the exhibition hall, production sites and environmental facilities. They also attended talks on power generation procedures and environmental protection measures. They were invited to a "Draw my ideal power plant" activity to express their thoughts and ideas about a truly modernized power plant using pictures. Through a series of fun-filled activities, students brought home knowledge about the power plant's advanced clean and efficient power generation technologies as well as the power plant's work and effort in protecting the environment. The power plant hopes that the students can become its ambassador to nearby communities and help build connections to create a harmonious external environment for the power plant's development.






Haimen Power Plant “Poverty Alleviation + Support for Education + Empowerment”

Quality education is the key to tackling intergenerational poverty by transforming lives from “dependence” to “self-reliance”. Haimen Power Plant’s local team highly values the role of education in poverty alleviation. Taking into account local conditions and with the support of Beimen Community, the power plant has organized a variety of activities for poor students, such as popular science base visits, campus talks on popular science, winter clothes donation drives and volunteer engagements, with the aim of promoting education-precise poverty alleviation by bringing underprivileged children back to school.

Zuoquan Power Plant Volunteer Activities – Care for the Elderly

On 9 September 2017, staff volunteers from Zuoquan Power Plant came to the Red Army Nursing Home for an elderly visit.

Apart from bringing their best wishes to the elderly residents, volunteers pitched in to help with the housekeeping work as they listened to their honorable seniors talking excitedly about their glorious days during the revolution period. The staff volunteers lived out the traditional Chinese virtues of respect and care for the elderly with their actions and learned from the conviction, dedication and sacrifices of the once frontline revolutionary fighters about the importance of kindness, filial piety, love for the country and loyalty to the people.

Besides, staff volunteers from Lingang Combined-cycle Power Plant, Chaohu Power Plant and other units took part in volunteer service activities on visits to welfare institutions, primary and secondary schools, and special education schools where they spent time interacting with children and brought them warmth. Yingkou Thermal Power Plan, Yangliuqing Thermal Power Plant and other units held open days and social popular science activities through which to interact with primary and secondary students and community members, enhance public understanding of and support for the Company, and get closer to the community.

Public Welfare Donations

The Company strictly abides by the state's relevant laws and regulations as well as policies. To help the needy, a reasonable scale and standard of public donations is set based on the Company's finances in a way that does not violate social morals and does not damage the public interest as well as the legitimate rights and interests of others. The Company has formulated a series of rules and regulations such as "Rules on the Management of External Donations". Our management of the Company's system of external donations is guided by the principles of "donating according to laws, within capabilities, being honest and trustworthy, and focusing on effectiveness".

In 2017, the Company donated a total of RMB10.0018 million under its name to support local public welfare activities.

Besides, various units of the Company launched different kinds of donation drives.

On 3 May 2017, Chaohu Power Plant held a book donation activity called "Give love, give books, give hope" and received a total of 612 donated books. After sorting, the books were donated to children living in poverty-stricken mountainous areas with the help of Chaohu Mutual Aid Association. Part of the donations was sent to Anhui branch's precision poverty alleviation point at Huangchongcun, Huoqiu County, to build a "village library".

On 22 September 2017, Yangliuqing Power Plant held a donation activity called "The warmth of old clothes" where a large number of staff responded by bringing their spare winter clothes to the plant and donating to poverty-stricken mountainous areas as a way of showing their care for residents there. Young volunteers sorted the clothes one by one and at the end of the activity, a total of 705 clothes were received.

09

Going Global and Moving Forward

As a wholly owned subsidiary of Huaneng International, Singapore Tuas Power Ltd. ("Tuas Power") is one of the three major power generating companies in Singapore and one of Singapore's major public utility and environmental service providers.

About Tuas Power

Tuas Power is one of the three largest power companies in Singapore, which Tuas Power owns and operates two plants, Tuas Power Station and Tembusu Multi-Utilities Complex (TMUC). In 2017, Tuas Power counts for 21.9% of Singapore's power generation market share.

Tuas Power Station has been providing safe, reliable and efficient electricity supply to Singapore since 1999. The Station has five Combined Cycle Power (CCP) plants and a steam plant that contribute to the country's energy demands at a high reliability performance record of over 99%.

The Tembusu Multi-Utilities Complex was completed in 2013, and it serves the petrochemical industries in the Tembusu area of Jurong Island. TMUC is composed of Biomass Clean-Coal (BMCC) thermoelectric cogeneration plant, water treatment plant and waste water treatment plant, which provides different types of electricity, steam, high-quality industrial water and softened water for industrial customers.

Going beyond energy, the company enlarged its operations to cover multi-utility, environmental, oil terminals and storage services – all of which harness leading-edge technologies and world-class practices to power today's industries.

Tuas Power emphasizes efficient and environmentally responsible energy solutions for modern business and industrial needs. Tuas Power insists on conducting operations in an environmentally responsible manner through maximizing plant efficiency, resource conservation, reducing waste and controlling emissions. The system of Tuas Power for the management and planning of its environment, occupational health and safety has been certified by OHSAS 18001 (Occupational Health and Safety Assessment Series) certification and ISO 14001 (Environmental Management System) certification, both Tuas Power Station and TMUC.

In the year 2017, Tuas Power has had no reportable environment-related incidents. Tuas Power will continue to enhance environmental and safety.

Energy Conservation

Energy Conservation Efforts at Tuas Power Station

Tuas Power Station initially used fuel oil generator with a unit efficiency of only 34%. Through the expansion, the Station has now achieved a strategic transformation to a more energy-efficient and cleaner power generation. The Station has now owned five most advanced F-class CCP generation units with an average efficiency of 48% and the less efficient oil-fired unit is now on standby mode.

In the latest project completed in May 2017, the Station has successfully replaced the aging air-cooled chillers to water-cooled chillers for the Station Administration. The replacement has resulted in an improvement in energy efficiency of the air-conditioning system from 2kW/RT to 0.62kW/RT (about 70% savings). A measurement and verification exercised over 2 months has validated that an annual energy savings of over 3,400MWh is achievable. Following this successful achievement of energy savings, The Station will be looking into expanding the energy conservation efforts onto other parts of the plant.

Energy Conservation Efforts at TMUC

In 2017, TMUC completed several energy saving projects, including the optimization of seawater intake pumps, load distribution optimization on Steam Turbine Generators (STG), and LED retrofitting in the Circulating Fluidized Bed (CFB) boiler areas.

The optimization of seawater intake pumps are being carried out by gradually reducing its speed to an optimum operating level without comprising plant reliability. An annual saving of 882 MWh has been achieved from this initial action. The optimization of load distribution for STGs has gained an annual savings of 3,790 MWh. Fluorescent lightings at the CFB boiler areas are replaced with energy savings LED lightings. This project has an annual saving of 135 MWh. These three projects were submitted as part of the mandatory annual submission to National Environmental Agency (NEA) under the Energy Conservation Act (ECA).

To demonstrate the corporate's commitment in continuous effort to conserve energy and to comply with local regulatory requirements, TMUC plans to achieve ISO 50001 (Energy Management System) certification in 2018.

Emission Management

Greenhouse Gas Management

With the installation of 5 CCP plants, Tuas Power Station's carbon emission factor decreased and is now lower than that of the national average of all power plants in Singapore. In addition, upon smooth completion of the ongoing project to replace air-cooled chillers with water-cooled chillers, it is expected that 1,655 tons of carbon dioxide emission are to be reduced every year.

The usage of 20% carbon-neutral biomass (Palm Kernel Shell & Woodchips) is a mandatory requirement by the local authority to lower the carbon. By co-firing 80% coal with 20% biomass, TMUC has lowered the carbon footprint and will lower the carbon tax TMUC has to bear when carbon tax implements in 2019.

Exhaust Gas Management

Tuas Power Station operates gas-fired units in preference to the older oil-fired unit whenever possible. As a consequence, the emission of SO_2 has decreased in 2017.

TMUC reduces NO_x and SO_2 emissions by using advanced Circulating Fluidized Bed (CFB) boiler, reducing the use of coal and purchasing low-sulfur coal. The low furnace temperature of CFB boilers and the use of low-sulfur low-ash coal have ensured a low NO_x and low SO_2 emission. SO_2 monitoring devices are also in place to achieve a low emission. TMUC is able to meet the stringent air emission limits set by *the Air Impurities Regulation of the Singapore Environmental Protection and Management Act*.

Ash Recycling and Utilization

In Singapore, the landfill of the ash generated in industrial process is prohibited. Now TMUC has achieved 100% comprehensive utilization of ash by cooperating with local building materials company, EnGro.

Tuas Power had initially conducted coal-biomass combustion pilot trials in 2008 to gather fly ash samples for companies to explore feasibility of use. In 2014, the fly ash application on blended cement developed by EnGro finally got approval from local authorities, the Building and Construction Authority (BCA) and the National Environmental Agency (NEA), which is mandatory regulatory requirement for the TMUC project.

In 2016, TMUC manage to collaborate with EnGro to use the bed ash in a sustainable concrete application that was approved by the authorities such as BCA and NEA. The bed ash from TMUC are used as an alternative to fine aggregates or sand in concrete production, complied with EN 12620:2008 Specifications of Aggregate for Concrete standard.

Wastewater Management

In the case of water treatment, the TMUC project has established wastewater treatment facilities to treat the wastewater produced internally and the wastewater generated by the petrochemical industry in the Denpasar region to ensure that the drainage is in line with the relevant regulations.

To leverage on the well-designed water cycle and demonstrate TMUC's effort for water conservation, customers are incentivized for returning clean condensate for TMUC's steam production. High temperature return condensate from customers is used to pre-heat deaerator feed water. Water cleaning is also replaced with vacuum cleaning. Boiler blow down water is recycled back to the Water Treatment Plant as an alternative source of raw water. Treated water from the Industrial Waste Water Plant is being reused for plant washing and process usage in TMUC Site 2.

Providing Customers with High-Quality Services

Since 2003, Tuas Power has been serving customers with high-quality service. These customers range from individual businesses to developers and landlords of commercial buildings.

The Tuas Power Green Programme

The Tuas Power Green Programme is designed to provide customers with a wide range of various energy solutions, including green consultancy service and lighting solution. The green consultancy service is customer focused, and encourages companies to undergo energy audits to maximize energy efficiency. It also helps them identify and recommend improvements in the base design and features of their buildings, and bring value to customers. The lighting solution helps customers achieve significant energy-saving effects through changing simple details, such as using energy-efficient lighting system instead of existing traditional lighting systems, so as to reduce energy conception and save costs.

Integrated Energy Management System (IEMS)

Tuas Power started a comprehensive energy management system service in Jan. 2016, with its business highlight of automated meter readers. This instrument can detect the amount of electricity consumed by the target company for half an hour and conduct it to the portable side in real time, so that customers can view the data in real time through the mobile application, enabling immediate management and immediate adjustment. As part of the integrated energy management system, the automated meter reader provides an automated meter reading function that provides better service to customers, reduces human input, improve efficiency, and improves billing accuracy. After researches and studies in Europe, the employee of Tuas Power improved this intelligent meter to better meet the needs of local customers.

In handling customer information, Tuas Power enters an agreement with the contractor to protect customer information. Its own employees are subject to the same requirements as the contractor, and comply with the Company's governance policies that protect customer information.

Community Co-construction

Tuas Power is close linked to the community and actively provides public services, financial supports and cooperation for government statutory committees, charitable organizations and non-profit organizations. Cooperative institutions include Singapore Children's Association and preschool students' educational organizations, etc. The Tuas Power also supports the horticultural research and conservation through the Garden City Fund, in order to protect Singapore's green government.

Communication with the Company

There is a frequent interaction and mutual assistance between Tuas Power and the Company.

Personnel from two sides have carried out a number of related business exchanges. Several groups of technical and engineering employee from Tuas Power have finished trainings in the Company's operational experiences. Tuas Power have also consulted with technical experts from the Company to further improve and strengthen operational efficiency of the Tuas Power Station and TUMC.

Through Tuas Power's own experience with navigating the gradually deregulated electricity market in Singapore, the Company has given many in-depth talks in Guangzhou, Hangzhou, Shenzhen and Beijing to various departments within the Huaneng Group and Huaneng International. Tuas Power has shared the experience of Singapore's electricity market reform with relevant Chinese government agencies and the Company's business partners such as Singapore's market structure and operations the retail competition, competitive differentiation from competitors and so on, which help the Company to be more prepared to meet the reform of China's electricity market.

10

Looking Forward and Overcoming Challenges

We look forward to the future, and continuously accumulate experience for a time of use. Electric power industry is closely related with international development and people's lives. Although it has existed for around a hundred years, it is still vibrant. It requires responsible enterprises to continuously tap their own potentials and improve their self-requirements. Face current situations of risks and opportunities coexisting, Huaneng International adheres to steady progress, promotes transformation and upgrading, actively reforms and innovates, and has established practical stage targets of the year 2020 and through our continuous hard work, we have seen meaningful achievements.

Scale of the Company	To achieve a controllable installed capacity of more than 100 million kilowatts, and further strengthened synergies.
Business Performance	To significantly improved our operating efficiency, ensure profitability to approach close to or surpassed the global leading listed power generation companies.
Company Operation	Power generation business comprehensively achieve excellent operations, and our operating indicators generally reach the international industry-leading level. Use of hours maintain the domestic industry-leading level, and power efficiency indicators continued to maintain the international industry-leading level. Cost of installation per unit and safe production level reach the global leading level.
Development Potential	Transformation and upgrading achieve significant results, installed capacity of low-carbon clean energy account for more than 20%. Financial situation and operating strength further enhance, with further improvement of development potential.
International Business	Scale of overseas business further expand. International business operations and oversees business efficiency rank among the global leading power generation companies.
Overall Management	Overall management further develop. To form a scientific and complete modern management system and mechanism, to enhance ability of management innovation, to continuous consummate management mechanism. Performance management, financial management, risk management and other overall managements of the Company and its subsidiaries comprehensively enhance, reach the standard of global leading listed power generation companies.
Talent Management	To build an global leading talent team with 200 of senior managers, 400 of senior professionals, and 3000 of senior technical employees. Innovate personnel, labour and distribution system, mechanisms of talents selection and appointment, assessment and evaluation, assembly and deployment, incentive and insurance, and training and development tend to be perfected.
Brand Reputation	Significantly improve the Company's branding ability, enhance Huaneng brand awareness and reputation. To be evaluated as "well-known brands" by the authoritative agency. Further strengthen the Company's social responsibility system and internal communication system to be an internal harmonious enterprise.
Company Governance and Risk Management	Complete company system, normative company governance, and harmonious relationship with investors, which makes the Company a good model for domestic listed companies. Sound risk control system, maturely grasping and flexibly adapting to changes in policies and markets, achieved a steady growth of operation performance.
Party Building	Study in-depth the spirit of a series of significant speeches of General Secretary Xi Jinping, follow the plan of Huaneng Group's party group and further implement the overall requirements of the CCP Party Central Committee to comprehensively govern the party in a strict manner. Comprehensively deepen party building of the Company, and focus on the implementation of three key works, namely, "one post two responsibilities", strengthening the branch party construction, and consolidate and enlarge the achievements of behaviour construction. Strive to achieve "clear targets, implemented responsibilities, specific contents and quantified assessments".

11 Appendix

11.1 About this Report

This report is the second "Environmental, Social and Governance Report" released by Huaneng International. This report focuses on the Company's efforts and contributions to the environment, society and governance, as well as our outlook for the future. We hope that through the publication of this report, we will strengthen communication and liaison with our stakeholders.

The Board of Directors and all the Directors hereby warrant that the contents of this report do not contain any false representations, misleading statements or material omissions and take joint and several liabilities for the authenticity, accuracy and completeness of the contents.

The Scope of the Subject of this Report

Huaneng International and its domestic and foreign affiliated branches and its wholly owned and controlled companies. Unless otherwise stated, the data disclosed in this report are about Huaneng International and its affiliated subsidiaries and its wholly-owned and controlled companies.

In 2017, the Company acquired Huaneng Shandong Power Generation Co., Ltd., Huaneng Jilin Power Generation Co., Ltd., Huaneng Heilongjiang Power Generation Co., Ltd., and Huaneng Henan Zhongyuan Gas Power Generation Co., Ltd..

Reporting Period

The Company's "Environmental, Social and Governance Report" is an annual report for the period from January 1, 2017 to December 31, 2017, and some of the statements and data are traced back to the previous year.

Reference Remarks

In order to facilitate the presentation and be easy to read, "Huaneng Power International, Inc." in this report is referred to as "Huaneng International", "the Company" or "we". "China Huaneng Group Co., Ltd." in this report is referred to as "Huaneng Group".

Content Compiling

The contents of this report are prepared in the light of the HKEx's "Environmental, Social and Governance Reporting Guide", the Global Reporting Initiative (GRI)'s "G4 Sustainability Reporting Guidelines" and its supplementary guidelines for power generation industry.

Access to this Report

You can download the Chinese and English version of this report on Huaneng International's website at http://www.hpi.com.cn. This report is published in both Chinese and English. In case of any discrepancies among the different versions, the Chinese version shall prevail. If you have any questions or suggestions, please call 010-63226582.

11.2 Contents Index of Environmental, Social and Governance Reporting Guide of Hong Kong Exchanges and Clearing Limited

Environmental, Social and Governance Reporting Guide		Page Number	Report Content
Subject Area A: Environment			
Aspect A1: Emissions			
A1	General Disclosure	40-47	5.3.4 Emissions Management
A1.1	The types of emissions and respective emission data.	40-47	5.3.4 Emissions Management
A1.2	Greenhouse gas emissions in total (in tonnes) and, where appropriate, intensity(e.g. per unit of production volume, per facility).	43	5.3.4 Emissions Management
A1.3	Total hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	46	5.3.4 Emissions Management
A1.4	Total non-hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	46	5.3.4 Emissions Management
A1.5	Description of measures to mitigate emissions and results achieved.	40-47 76-78	5.3.4 Emissions Management 9 Going Global and Moving Forward
A1.6	Description of how hazardous and non-hazardous wastes are handled, reduction initiatives and results achieved.	46-47 78	5.3.4 Emissions Management 9 Going Global and Moving Forward
Aspect A2: Use of Resources			
A2	General disclosure	34-36	5.3.2 Energy Consumption Management
A2.1	Direct and/or indirect energy consumption by type (e.g. electricity, gas or oil) in total (kWh in '000s) and intensity (e.g. per unit of production volume, per facility).	34	5.3.2 Energy Consumption Management
A2.2	Water consumption in total and intensity (e.g. per unit of production volume, per facility).	36	5.3.3 Water Resources Management
A2.3	Description of energy use efficiency initiatives and results achieved.	34-36 76-77	5.3.2 Energy Consumption Management 9 Going Global and Moving Forward
A2.4	Description of whether there is any issue in sourcing water that is fit for purpose, water efficiency initiatives and results achieved.	36-39	5.3.3 Water Resources Management
A2.5	Total packaging material used for finished products (in tonnes) and, if applicable, with reference to per unit produced.	–	N/A

	Environmental, Social and Governance Reporting Guide	Page Number	Report Content
Aspect A3: The Environment and Natural Resources			
A3	General disclosure	47	5.3.5 Noise and Other Environmental Impacts
A3.1	Description of the significant impacts of activities on the environment and natural resources and the actions taken to manage them.	47	5.3.5 Noise and Other Environmental Impacts
Subject Area B. Social			
Employment and Labour Practices			
Aspect B1: Employment			
B1	General Disclosure	60	7.1 Equal Employment and Equity Protection
Aspect B2: Health and Safety			
B2	General Disclosure	56	6.4 Protecting Occupational Health and Safety
B2.1	Number and rate of work-related fatalities.	15	2.6 Table of Key Performance Indicators in 2017
B2.3	Description of occupational health and safety measures adopted, how they are implemented and monitored.	56 64-65	6.4 Protecting Occupational Health and Safety 7.3 Happy Work and Happy Life
Aspect B3: Development and Training			
B3	General disclosure	62-63	7.2 Employee Training and Career Development
Aspect B4: Labour Standards			
B4	General disclosure	60	7.1 Equal Employment and Equity Protection
Operating Practices			
Aspect B5: Supply Chain Management			
B5	General disclosure	68-69	8.1 Continuously Enhancing Supplier Management
B5.2	Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, how they are implemented and monitored.	68-69	8.1 Continuously Enhancing Supplier Management

Environmental, Social and Governance Reporting Guide		Page Number	Report Content
Aspect B6: Product Responsibility			
B6	General Disclosure	22	4.1 Intensive Guarantee of Power Supply Stability
B6.1	Percentage of total products sold or shipped subject to recalls for safety and health reasons.	–	N/A
B6.2	Number of products and service related complaints received and how they are dealt with.	69	8.2 Building Harmonious and Stable Relationships with Clients
B6.3	Description of practices relating to observing and protecting intellectual property rights.	25	4.2.2 Protection of Intellectual Property Rights
B6.4	Description of quality assurance process and recall procedures.	–	N/A
Aspect B7: Anti-corruption			
B7	General Disclosure	24	4.2.1 Reinforcement of Anti-Corruption
B7.1	Number of concluded legal cases regarding corrupt practices brought against the issuer or its employees during the reporting period and the outcomes of the cases.	24	4.2.1 Reinforcement of Anti-Corruption
B7.2	Number of products and service related complaints received and how they are dealt with.	24	4.2.1 Reinforcement of Anti-Corruption
Community			
Aspect B8: Community Investment			
B8	General Disclosure	70-73 79	8.3 Fulfilling Corporate Social Responsibility 9 Going Global and Moving Forward
B8.1	Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport).	70-73 79	8.3 Fulfilling Corporate Social Responsibility 9 Going Global and Moving Forward
B8.2	Resources contributed (e.g. money or time) to the focus area.	73	8.3 Fulfilling Corporate Social Responsibility

11.3 Contents Index of G4 Sustainability Reporting Guidlines of Global Report Initiative

G4 Indicator	G4 Description	Pages	References and Remarks
Strategy and Analysis			
G4-1	Statement from the most senior decision-maker of the organization	2-3	1 Chairman's Statement
Organizational Profile			
G4-3	Name of the organization	6	2.1 Company Profile
G4-4	Primary brands, products, and services	6	2.1 Company Profile
G4-5	Location of the organization's headquarters	92	11.4 Reader's Feedback
G4-6	Number and names of countries where either the organization has significant operations or that are specifically relevant to the sustainability topics covered in the report	6	2.1 Company Profile
G4-7	Nature of ownership and legal form	6	2.1 Company Profile
G4-8	Markets served	6	2.1 Company Profile
G4-9	Scale of the organization	6 13	2.1 Company Profile 2.6 Table of Key Performance Indicators in 2017
G4-10	Employee statistics	60	7.1 Equal Employment and Equity Protection
G4-11	Percentage of total employees covered by collective bargaining agreements	60	7.1 Equal Employment and Equity Protection
G4-12	Organization's supply chain	68-69	8.1 Continuously Enhancing Supplier Management
G4-13	Significant changes during the reporting period regarding the organization's size, structure, ownership, or its supply chain	83	11.1 About this Report
G4-14	Explanation of whether and how the precautionary approach or principle is addressed by the organization	6 10-12	2.2 Corporate Governance 2.5 ESG Responsibility Management
G4-15	Externally developed economic, environmental and social charters, principles, or other initiatives to which the organization subscribes or which it endorses	10-12	2.5 ESG Responsibility Management
G4-16	Memberships of associations	16	2.7.1 Information about and Communication with Stakeholder

G4 Indicator	G4 Description	Pages	References and Remarks
Identified Material Aspects and Boundaries			
G4-17	a. List all entities included in the organization's consolidated financial statements or equivalent documents b. Report whether any entity included in the organization's consolidated financial statements or equivalent documents is not covered by the report	83	11.1 About this Report
G4-18	a. Explain the process for defining the report content and the Aspect Boundaries b. Explain how the organization has implemented the Reporting Principles for Defining Report Content	83	11.1 About this Report
G4-19	List all the material Aspects identified in the process for defining report content	17	2.7.2 Processes of Identification of Material Issues
G4-20	Aspect Boundary within the organization for each material aspect	17	2.7.2 Processes of Identification of Material Issues
G4-21	Aspect Boundary outside the organization for each material aspect	17	2.7.2 Processes of Identification of Material Issues
G4-23	Significant changes from previous reporting periods in the Scope and Aspect Boundaries	17	2.7.2 Processes of Identification of Material Issues
EU1	Install capacity by primary energy and regulatory mechanism	6 13-15	2.1 Company Profile 2.6 Table of Key Performance Indicators in 2017
Stakeholder Engagement			
G4-24	List of stakeholder groups engaged by the organization	16	2.7.1 Information about and Communication with Stakeholder
G4-25	Basis for identification and selection of stakeholders with whom to engage	16	2.7.1 Information about and Communication with Stakeholder
G4-26	Report the organization's approach to stakeholder engagement, including frequency of engagement by type and by stakeholder group, and an indication of whether any of the engagement was undertaken specifically as part of the report preparation process	16	2.7.1 Information about and Communication with Stakeholder
G4-27	Report key topics and concerns that have been raised through stakeholder engagement, and how the organization has responded to those key topics and concerns, including through its reporting. Report the stakeholder groups that raised each of the key topics and concerns	16	2.7.1 Information about and Communication with Stakeholder
Report Profile			
G4-28	Reporting period (such as fiscal or calendar year) for information provided	83	11.1 About this Report
G4-29	Date of most recent previous report (if any)	83	11.1 About this Report
G4-30	Reporting cycle	83	11.1 About this Report

G4 Indicator	G4 Description	Pages	References and Remarks
G4-31	Provide the contact point for questions regarding the report or its contents	83	11.1 About this Report
G4-32	'In accordance' option the organization has chosen, GRI Content Index, reference to the External Assurance Report	–	Core suitable plan
Governance			
G4-34	Governance structure of the organization. Committees responsible for decision-making on economic, environmental and social impacts	6	2.2 Corporate Governance
Ethics and Integrity			
G4-56	Organization's values, principles, standards and norms of behavior such as codes of conduct and codes of ethics	7 10	2.3 Development Strategy 2.4 Company Philosophy
Economic Performance			
G4-EC1	Direct economic value generated and distributed	13 73	2.6 Table of Key Performance Indicators in 2017 8.3 Fulfilling Corporate Social Responsibility
Energy (Material Issues: Energy Use, Clean and Sustainable Energy)			
G4-EN3	Energy consumption within the organization	34-36	5.3.2 Energy Consumption Management
G4-EN5	Energy intensity	34-36	5.3.2 Energy Consumption Management
Water			
G4-EN8	The total water consumption by source. (EU) the total amount of water used by treatment, cooling and consumption of thermal power and nuclear power equipment, including ash and clean coal water	36-39	5.3.3 Water Resource Management
G4-EN10	Percentage and total volume of water recycled and reused	36-39	5.3.3 Water Resource Management
Emissions (Material Issues: Reduction of Carbon Dioxide Emission and Emission of Control Components)			
G4-EN15	Direct greenhouse gas (GHG) emissions (Scope 1) According to the regulatory mechanism classification, the net generated power of the generating capacity, the fossil fuel power generation, the estimated net power per tonne of carbon dioxide equivalent sent to the end user, including the emissions of its own power generation facilities	43-45	5.3.4.2 Management of Greenhouse Gas
G4-EN16	Energy indirect greenhouse gas (GHG) emissions (Scope 2)(EU) According to regulatory mechanism classification, carbon dioxide equivalent of estimated net power per megawatt hour sent to end user, including emissions from its own power generation facilities	43-45	5.3.4.2 Management of Greenhouse Gas

G4 Indicator	G4 Description	Pages	References and Remarks
G4-EN18	Greenhouse gas (GHG) emissions intensity	43	5.3.4.2 Management of Greenhouse Gas
G4-EN21	NO_x, SO_x, and other significant air emission (EN) Generating capacity of the net power generation, and nitrogen oxides', sulphur oxides' and other major gas' emissions per megawatt hour, when the fuel is burned by a power plant	40	5.3.4.1 Exhaust Gas Management
Effluents and Waste			
G4-EN22	Total water discharge by quality and destination(EU) Heat emission in the total amount of planned and accidental water emission	45	5.3.4.3 Wastewater Management
G4-EN23	Total weight of waste by type and disposal method(EU) PCBs in the total weight of hazardous and general waste	46	5.3.4.4 Waste Management
Products and Services			
G4-EN27	Reducing the degree of environmental impact of products and services	34-37	5.3 Energy Conservation and Emissions Reduction
Compliance (Material Issues: Energy Use, Emission of Control Components and Reduction of Carbon Dioxide Emission)			
G4-EN29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	14	2.6 Table of Key Performance Indicators in 2017
Supplier Environmental Assessment			
G4-EN33	Significant actual and potential negative environmental impacts in the supply chain and actions taken	68-69	8.1 Continuously Enhancing Supplier Management
Occupational Health and Safety (Material Issue: Safe Production and Occupational Health)			
G4-LA6	Type of injury and rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender(EU). Health and safety performance of contractors' and subcontractors 'employees inside and outside the workplace	15 56	2.6 Table of Key Performance Indicators in 2017 6.4 Protecting Occupational Health and Safety
Training and Education (Material Issue: Staff Training and Development)			
G4-LA10	Programs for skills management and life long learning that support the continued employability of employees and assist them in managing career endings	62-63	7.2 Employee Training and Career Development

G4 Indicator	G4 Description	Pages	References and Remarks
Supplier Assessment for Labor Practices			
G4-LA15	Significant actual and potential negative impacts for labor practices in the supply chain and actions taken	69	8.1 Continuously Enhancing Supplier Management
Child Labor			
G4-HR5	Operations and suppliers identified as having significant risk for incidents of child labor, and measures taken to contribute to the effective abolition of child labor	60 68-69	7.1 Equal Employment and Equity Protection 8.1 Continuously Enhancing Supplier Management
Forced or Compulsory Labor			
G4-HR6	Operations and suppliers identified as having significant risk for incidents of forced or compulsory labor, and measures to contribute to the elimination of all forms of forced or compulsory labor	60 69	7.1 Equal Employment and Equity Protection 8.1 Continuously Enhancing Supplier Management
Anti-corruption (Material Issue: Management by Law and Anti-corruption)			
G4-SO4	Communication and training on anti-corruption policies and procedures	24	4.2.1 Reinforcement of Anti-Corruption

11.4 Readers' Feedback

Dear readers:

Hello! Thank you for reading this report. We particularly wish to listen to your comments and suggestions, and your comments and suggestions are the driving force behind our continuous improvement of our report. Please help to complete the relevant questions raised in the feedback form and mail it to the headquarters of the Company (headquarters address: Huaneng Building, Fuxingmennei Street 6, Xicheng District, Beijing).

1. Your overall assessment of the Company's "Environmental, Social and Governance Report" is:

○ good ○ fair ○ poor

2. Do you think this report reflects the Company's significant impacts on the environmental, social and governance?

○ good ○ fair ○ poor

3. What do you think of the information, and the accuracy and completeness of the indicator data disclosed in this report?

○ good ○ fair ○ poor

4. What do you think of the Company in serving its customers and protecting the interests of its stakeholders?

○ good ○ fair ○ poor

5. Which part of the report do you concern the most?

_____

_____

6. Is there any content that you are looking for but not found in this report? If yes, please write down what you are concerned about.

_____

_____

If you wish, you are welcome to provide personal information to facilitate further communication with you:

Name:	Occupation:	Organization:	Contact Address:
Postal Code:	Tel:	Fax:	E-mail:

華能國際電力股份有限公司
Huaneng Power International, Inc.