



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

GREEN ENERGY
GREEN FUTURE

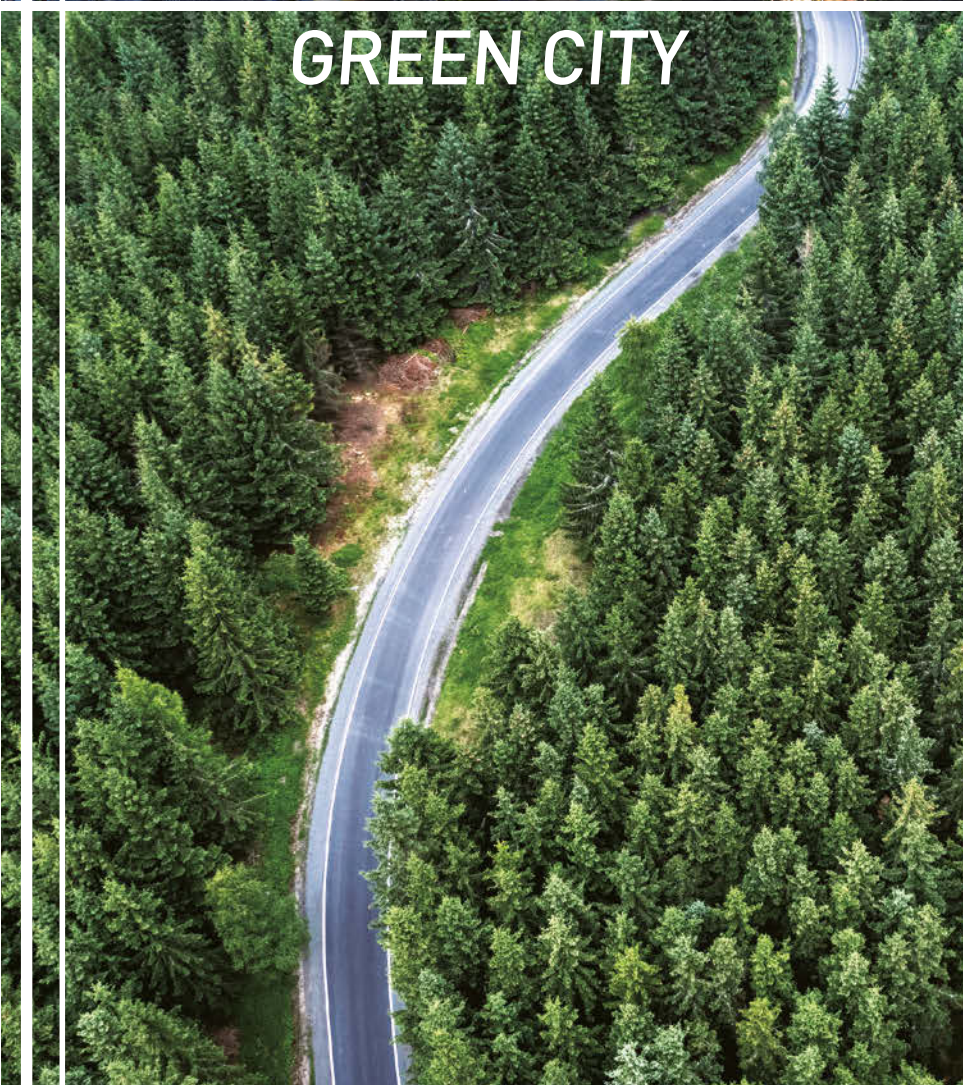
綠色動力 綠色未來

2021

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



CLEAN CITY



GREEN CITY

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CHAIRMAN'S STATEMENT



2021 witnessed an special and extraordinary journey of the development of Huaneng International. Confronted with the major changes and the pandemic both unprecedented in a century, accompanied by the extensive power shortage, all members of the Company at different levels worked together to cope with the difficulties in a pragmatic and assiduous manner, harvesting a pleasant start for the “14th Five-Year Plan”. Our achievements in this process include significant strength gaining in independent innovation, great progress in reform, new records of capacity and output, doubled market value, and notable progress in the development of new energy and the structural optimisation of coal-fired power, testifying to our new commitments and new actions in the establishment of a new development model.

Adhering to the philosophy of green and low-carbon development, the Company endeavours to enhance its capabilities of transformation and development. With the goals of peaking carbon dioxide emissions and achieving carbon neutrality, the Company has been making every effort to increase the proportion of clean energy, promote the leapfrog development of new energy, drive the development of gas-fired power by giving it the highest priority, expand the environment-friendly modification and upgrading of coal-fired power generation units, and build a development model of power generation, power grid, load and power storage integration and multi-energy complementation.

Insisting on self-reliance and self-improvement, the Company endeavours to increase capability of independent innovation, optimise the systems and mechanisms for technological innovation and inspire the creativity and vitality of those engaged in innovation. The Company continues to increase investment in research and development to accelerate the application of technological achievements, ensure the implementation and breaking development of critical projects that are technologically such as “Key & Core Technology”, significantly increase the number of technological patents, and make initial progress in digital transformation.

The Company adheres to excellent operation. We strive to improve operation and management capabilities and promote quality-orientated reforms, efficient business operation and asset structure upgrading in an all-round manner, so as to continuously strengthen value creation capability, steadily improve the quality as a listed company and enhance development momentum.



GREEN ENERGY GREEN FUTURE

The Company adheres to the concept of general safety. We strive to improve risk prevention capability, prudently implement pandemic prevention and control, thoroughly fulfil the responsibility for energy supply, and further improve intrinsic safety management, thus guaranteeing personal and equipment safety and achieving success both in the battle against pandemic and the development of production and operation.

The Company adheres to the principles of openness and cooperation. We endeavour to improve international management, actively seek opportunities of overseas business expansion, and participate in the development of the “Belt and Road” initiative at a higher level to promote cooperation to a higher level, improve investment efficiency, supply quality and development resilience, and ultimately promote the Company’s international development and management to a higher level.

Moving forward with responsibilities shouldered, the Company will fully implement the new philosophy of development, insistently adhere to sustainable development, actively promote reform and innovation, continue to improve management and effectively fulfil social responsibilities. Upholding the spirits of persistence and hardworking, we will accelerate the development into a global-leading listed company engaged in power generation and write a grand chapter of high-quality development in the new era.

Zhao Keyu

Chairman
of Huaneng Power International, Inc.



02



ABOUT US



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 of the Company is, by making use of modern technology and equipment and also financial resources available domestically and internationally, to develop, construct and operate large scale power plants while actively exploring power generation markets overseas. The Company is one of China's largest listed power producers, as well as the first power company in China to get listed in New York, Hong Kong and Shanghai.

As the core enterprise of China Huaneng Group Co., Ltd.'s ("Huaneng Group" or "Group Company") central industry, Huaneng International is committed to developing itself into an international leading power generation listed company, committed to providing sufficient, reliable and environmentally friendly power and high-quality energy services for the society, the Company has been insisting on innovations in technologies, structure, and management since its incorporation. On aspects regarding the advancement in power technologies and construction and management of power plants, the Company has been the pioneer and has created various milestones within the domestic power industry, which facilitated the great leap development of the power business and technological advancement of the power station equipment manufacturing industry in China, and also significantly contributed to the improvement of technical and management standards of the domestic power generation enterprises.

Throughout the years, with dedicated efforts, 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 positive transformation to low carbon, clean energy, advantages in scientific and technological innovation and environmental protection, 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 well as strong support from major shareholders.

As at 31 December 2021, the Company has controlled installed capacity of 118,695 MW, equity-based installed capacity of 103,875 MW and the proportion of low carbon, clean energy installation reaching 22.39%. The Company's domestic power plants are located in 26 provinces, autonomous regions and municipalities. The Company wholly owns a power company in Singapore and invests in a power company in Pakistan.

As at 31 December 2021,
Controlling Generation Capacity

118,695_{MW}



Equity-Based Generation Capacity

103,875_{MW}



Low-carbon and Clean Energy Installed Capacity

22.39%

In 2021, the Company was awarded “Excellent Issuer of Corporate Bonds”, “A” grade rating for annual information disclosure granted by the Shanghai Stock Exchange, the Golden Bauhinia Award for the “Best Listed Company” by the China Securities, and “Top 50 Outstanding Listed Company for the Year” by Interface News, etc. In addition, the Company’s ESG practice experience was extracted to White Paper on the ESG Development of Listed Companies in China (2021) (《中國上市公司ESG發展白皮書(2021)》) by China Association for Public Companies and recorded as the first case in the ESG Practice Case for Listed Companies (《上市公司ESG實踐案例》) by China Association for Public Companies, and was invited to introduce the Company’s ESG practical experience to the Main Board of the Shanghai Stock Exchange and listed companies in the Science and Technology Innovation Board at the ESG special training held by the Shanghai Stock Exchange. These awards represented the endorsement by the capital market of the Company’s achievements in continuously deepening reform, vigorously promoting technological innovation and pursuing of green development since the period of “14th Five-Year Plan”. The external auditor has issued a standard unqualified audit report on the Company’s internal control for sixteen consecutive years.

2.2 Corporate Governance

As a public company listed in three markets both domestically and internationally, the Company is subject to the regulations of the security regulatory authorities of the three listing venues and the supervision of investors at large. Since its establishment, the Company has been strictly complying with the laws and regulations of its listing place and continuously completing and improving its modern governance system and capacity. The Company have established and improved a corporate governance structure consisting of the shareholders’ general meeting, the Board, the Supervisory Committee, and senior management and built an operating system where those granted with proprietorship, decision-making power, supervisory power, and management powers have clearly-defined powers and responsibilities, perform their duties, check and balance each other, and coordinate with each other, ensuring the effective enforcement of the decision-making power of the shareholders’ general meeting and the Board, and the supervisory power of the Supervisory Committee, as well as the efficiency and compliance of the operation and management of senior management.

After years of exploration and practice, the Company has built up a normal, effective and sound corporate governance system that caters for the development of the Company. The Company regularly evaluated the applicability and effectiveness of the management system and revised and improved it in a timely manner to achieve dynamic maintenance of the system. In 2021, in light of the latest regulatory requirements and the Company’s actual situation, the Company amended the Management Measures for Information Disclosure (《信息披露管理辦法》), Insider Management Rules (《內幕信息知情人管理辦法》), Code for the Management of the Company’s Shares Held by Directors, Supervisors and Senior Management (《董事、監事及高級管理人員所持本公司股份管理守則》), etc.

2.3 Development Strategy

The Company fully implements the new development philosophy of “innovation, coordination, green, openness and sharing,” adheres to the idea of systemisation, follows the requirements of establishing a clean, low-carbon, safe and efficient modern energy regime, adheres to the principle of treating quality and efficiency as the key focus, reform and innovation as the driving force, institutional mechanism as the safeguard, and deepening the supply-side structural reforms as the cardinal line, coordinates the energy safety and “green development,” comprehensively promotes the high-quality developments, and aims to further develop the Company into a proper managed, leading in technology, energy saving and environmental friendly, reasonable structured, excellently operated world-class listed power generation company with outstanding corporate governance and market value.



Power Plant in Haimen



The Company adheres to the new energy safety strategy of “Four Revolutions and One Cooperation,” promotes the green and low-carbon transformation of energy with the aims of peak carbon emission and carbon neutrality, prioritizes the quality and efficiency, insists on principles of “centralized and distributed construction of equal importance, and independent construction of priority”. Making full use of the favorable conditions for centralized development of new energy power in “Three-North Area,” coastal region, Southwest China region and certain areas in Central China region, the Company further develops large-scale clean energy production base, with the idea of “Three-types and Three-isations” namely “base-type, clean-type and complementary-type, together with intensification, digitalization and standardization”, promotes the leap-forward development of new energy production, accelerates the optimization and upgrading of coal-power structure, prioritizes the gas power and other clean energy power, and provides more competitive and finer comprehensive energy services. The Company proactively adapts to the national structural reform of energy supply, persists on accelerating digitalized transformation, actively develops strategic emerging industries, and carries out transformation of diversified supply and energy service around core industries. Adhering to the new development pattern of integrating domestic and international dual circulations, the Company will strength international cooperation with the principles of clean being primary, profitability being first and prudence being essential, to reinforce the efficient operation of oversea assets and to enhance the anti-risk ability and profitability. The Company aims to actively implement innovative development strategy, focuses on high-quality development led by technological innovation mechanisms, continues to serve the nationwide strategy, and adhere to the facing towards the Company’s major demands. The Company adheres to digital & intelligent development, deepens and enhances the ability of independent innovation, implements scientific and technological demonstration projects, and strengthens basic and forward-looking technical research. The Company aims to vigorously implement the excellent operation strategy, adhere to the strategies of increasing profitability, improving efficiency and creating value, reinforce its operational management, improve its management efficiency, optimize its asset structure, comprehensively improve its modern operating and management level, vigorously promote the improvement of quality and efficiency, improve corporate governance, enhance the Company’s brand value and conscientiously perform its social responsibilities.

2.4 Company Philosophy

Corporate Missions

- Becoming a “red” company that serves national strategies, ensures energy security, and serves socialism with Chinese characteristics
- Becoming a “green” company that carries out energy revolution, helps construct an ecological civilisation, and provides clean energy and power to meet the needs of the people for living beautiful lives
- Becoming a “blue” company that participates in global energy stewardship, serves the “Belt and Road” construction and positively contributes to building a community of shared future for mankind

Corporate Core Values

- Upholding integrity, focusing on cooperation
- Innovating continuously, progressing actively
- Creating achievements, serving the state serving the Country

Corporate Target • Developing itself into an international leading power generation listed Company

Corporate Responsibilities

- Provision of sufficient, reliable and environmental-friendly power for the society
- Strive for delivery of long-term, stable and increasing returns to shareholders
- Support the fully development for employees 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

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 effective ESG management of the Company’s Board of Directors and management drives the improvement of operation and management of Huaneng international.

Situations Faced with the Company's ESG

Focusing on the general trend of national economic development and based on the principle of “priority on stabilization, and advancement from stabilization,” the Central Economic Work Conference proposed several key goals as the fundamental principles and action guidance to follow for the national economy development in year 2022 and longer terms thereafter, such as to implement stable and effective macroeconomic policies, continue to stimulate the vitality of market entities, smoothen the national economic cycle, solidly implement science and technology policies, and stimulate developments by implementing reform and opening up policies, and enhance the balance and coordination of the regional developments and securing the basic goals for residents' livelihood. The Conference also proposed that correct understanding of the essence of the carbon peak and carbon neutralization should be established, and the gradual withdrawal of traditional energy should be based on the safe and reliable substitution of new energy. Based on the basic national conditions of coal, we should pay attention to the clean and efficient utilization of coal, increase the consumption capacity of new energy, and promote the optimal combination of coal and new energy. At the same time, the Conference proposed that renewable energy and raw material energy consumption should not be calculated into the total energy consumption control.

In terms of the electricity supply and demand, according to the analysis and forecast of the China Electricity Council, with the considerations such as the domestic and international economic situation, the steady increment of electrification driven by electric power replacement, statistic comparison base of last year, as well as the uncertainty resulting from the epidemic and other the external events, it is estimated that the electricity consumption of the whole society will have a year-on-year increase of 5%-6% in year 2022, a growth rate that is four percentage points lower as compared to that in year 2021. It is estimated that in year 2022, the newly installed power generation capacity nationwide will be about 230 million kilowatts a record high over the years, while the utilization hours for thermal units will decrease slightly on a year-on-year basis.

In terms of electricity market, on January 18, 2022, the NDRC and the National Energy Administration jointly issued “Guidance on accelerating the construction of a national unified power market system”, aiming to realize the sharing, mutual assistance and optimal allocation of power resources across the country, and accelerate the formation of a unified, open, orderly, safe and efficient power market system with efficient governance. As all coal fired electricity shall totally enter into trade within the electricity grid market as stipulated by principle, the transaction ratio of the total amount of electricity generated demonstrate an upward growth. And considering the combined effects of the fluctuations of coal market prices, the inter-provincial negotiation over electrovalence for outbound transactions, the spot electrovalence fluctuating with coal prices, and the electrovalence of pumped-hydroelectricity being set by the government, the rising range of the price of coal-fired electricity is expected to be less than 20%. Affected by the increase in the number of new energy parity projects putting into operation, the prices of wind and photovoltaics have decreased compared with year 2021, while the price of hydropower electricity remains the same as that of year 2021. In respect of carbon market, China Carbon Emission Trade Exchange (CCETE) was officially launched in year 2021, with the first fulfillment cycle during year 2019 to year 2020 closed smoothly. Carbon emission quota is expected to be tightened under the background of relevant national policy switching from “dual energy consumption control” to “dual control of carbon emission amount and emission intensity”.

In terms of the coal market, the CPC Central Committee currently attaches great importance to the safe supply of coal production and the relevant governmental authorities issued multiple industry policies to stabilize the supply and demand of coal market. On February 24, 2022, the NDRC issued the “Notice on Further Improving the Coal Market Price Formation Mechanism,” specifying that mid- and long-term coal supply contracts should adopt the reasonable price range between RMB570 to RMB770 per ton (tax inclusive) and making it clear that pricing adjustment measures regarding coal price will be made pursuant to the Pricing Law. Such measures are expected to facilitate the normalization of thermal coal price. On the coal consumption side, given the establishment of the policy on controlling the increase of coal consumption during the “Fourteenth Five-Year” period and the scale development of the renewable energy section, it is expected that the increase of the coal demand shall slowdown in year 2022. While on the supply side, the advanced production capability has been gradually released domestically, which, together with the fact that coal exportation by Indonesia restored at a normal level, shall improve the supply situation of the thermal coal market. With the supply-demand situation significantly improved as compared to 2021, it is expected that the coal price will fall into a more reasonable range.

In terms of the capital market, the monetary policy in 2022 is expected to be prudent with proper flexibilities, which will increase the intensity of cross-cycle adjustment, give full play to the dual functions of the total amount and structure of monetary policy tools, and focus on sufficient effectuation, precise effectuation, and forward effectuation, aiming to meet the reasonable and effective financing needs of the real economy without having “flooding irrigation” effects, and focus on increasing financial support for key areas and weak links of the economy, so as to achieve a better goal combining the stabilized total volume with an optimized structure and maintain a reasonably abundant liquidity.

ESG Governance and Management

In addition to providing supervision and guidance, the Company's Board of Directors holds regular meetings at which management teams present their reports on strategic development, 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, approval of the Company's comprehensive risk management annual report, risk rating, risk management, effectiveness evaluation, and approval of risk assessment reports on important decisions. The audit committee, composed entirely of independent directors of the Company, is responsible for identifying



and assessing the risk of fraud committed by board members of the Company and senior executives 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 and communicates with the human resources department on issues concerning recruitment and code of conduct. Independent directors carry out onsite inspection every year to monitor and make recommendations on production safety, operation and management, internal controls, and corporate culture of the Company's subsidiaries. The management of production safety, employee health, energy conservation and environmental protection, fraud risk, internal control and corporate culture has already been incorporated into the daily work of the board and various special committees, which also closely monitor current hot issues such as climate change response and ESG information disclosure, and propel the Company toward balanced development in economic benefits, social benefits and ecological benefits.

To ensure that the requirements of Environmental, Social and Governance Reporting Guide (《環境・社會及管治報告指引》) ("ESG Reporting Guide") issued by The Stock Exchange of Hong Kong Limited ("Hong Kong Stock Exchange" or "HKEX") are effectively implemented, the Company has established an ESG leading workgroup. A dedicated principal of the Company has been assigned as the 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. Different departments also have assigned certain relevant personnel as group members to take charge of daily communication and detailed implementation of ESG actions. 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 the Board 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.

Trainings for Directors, Supervisors, and Senior Management

The Company's directors, supervisors and senior management attach great importance to improving the awareness of compliance and the ability to fulfil duties, and actively participate in various special trainings held by regulatory authorities and industry associations to keep up on the updates of the local regulations and policies of the places where they are listed. In 2021, our people attended various trainings for a total of 40 person-times, including the follow-up training for independent directors organised by the Shanghai Stock Exchange (5 person-times), and the special training for directors and supervisors organised by regulatory authorities (29 person-times). The chairman and general manager actively participated in a variety of important meetings including the special training meeting for the listed companies controlled by State-owned Assets Supervision and Administration Commission ("SASAC") or enterprises directly under the central government, the annual and semi-annual meetings on supervision work held by CSRC Beijing Bureau, supervision meeting on bond and asset securitisation business, etc. The secretary of the Board of Directors participated in 6 sessions of enhanced continuing professional development training organised by the Hong Kong Chartered Governance Institute, receiving in-depth lessons of new regulatory developments, the latest requirements of standards, the Company's compliance operations, cases of violations of laws and regulations, and anti-corruption and anti-fraud cases. All the directors, supervisors and senior management consciously abide by the laws, regulations and the Company's Articles of Association, and strictly follow the principle of self-discipline and bottom line, guaranteeing the continuous improvement of corporate governance. The Company also provides directors with trainings related to the ESG reporting guide by distributing written materials.



2.6 Table of Key Performance Indicators in 2021

Based on the requirements of HKEX's ESG Reporting Guide and the Global Reporting Initiative (GRI)'s Sustainability Reporting Standards (《可持續發展報告標準》), Huaneng International has prepared and analysed the Company's ESG 2021 key performance indicators, benchmarking against the guidelines' requirements and its peer companies, as set out below.

Performance Categories	Performance Indicators	2021	2020
Economy	Operating revenue ¹ (100 million RMB)	2,046.05	1,694.46
	Sales of power and heat ¹ (100 million RMB)	1,936.51	1,614.53
	Sales of coal and raw materials ¹ (100 million RMB)	30.41	18.87
	Port service ¹ (100 million RMB)	2.42	1.98
	Transportation service ¹ (100 million RMB)	0.60	0.52
	Others ¹ (100 million RMB)	76.11	58.56
	Operating expenses ¹ (100 million RMB)	2,102.86	1,557.34
	Net profit ¹ (100 million RMB)	-131.91	26.11
	Controlling generation capacity ¹ (MW)	118,695	113,357
	Equity-based generation capacity ¹ (MW)	103,875	98,948
	Domestic power generation (100 million kWh)	4,573.36	4,040.16
	Average annual unplanned outage (times/unit-annum)	0.22	0.19
Environment	Coal consumption rate for thermal power unit (g/kWh)	290.69	291.08
	Year-on-year change of coal consumption rate for thermal power unit (%)	0.13 ↓	1.00 ↓
	Consumption of standard coal (ten thousand tons of standard coal) ²	13,200.22	11,817.11
	Oil consumption in production (tons)	37,709.02	29,761.39
	Natural gas consumption (ten thousand of standard cubic meters)	581,655.30	537,014.18
	House consumption rate of thermal power unit (%)	4.34	4.33
	Overall water consumption (million tons)	23,126.31	18,193.78
	Fresh water consumption in power generation (million tons)	361.16	382.74
	Water consumption in open cooling circulation (million tons)	22,765.15	17,811.04



Performance Categories	Performance Indicators	2021	2020
Environment	Performance value of consumption of fresh water in power generation (kg/kWh)	0.79	0.95
	Performance value of emission of sulphur dioxide (g/kWh) ³	0.07	0.07
	Performance value of emission of nitrogen oxides (g/kWh) ³	0.14	0.13
	Performance value of soot emission (g/kWh) ³	0.01	0.01
	Sulphur dioxide emissions (tons) ³	28,712.24	25,990.39
	Nitrogen oxides emissions (tons) ³	58,347.32	50,875.08
	Soot emissions (tons) ³	3,636.08	3,264.55
	Total amount of energy-related direct greenhouse gas emissions (ten thousand tons of carbon dioxide equivalent) ⁴	–	33,328.88
	Greenhouse gas emissions generated by coal consumption (ten thousand tons of carbon dioxide equivalent) ⁴	–	32,107.79
	Greenhouse gas emissions generated by natural gas consumption (ten thousand tons of carbon dioxide equivalent) ⁴	–	1,024.91
	Greenhouse gas emissions generated by fuel consumption (ten thousand tons of carbon dioxide equivalent) ⁴	–	9.53
	Greenhouse gas emissions generated by desulphurisation (ten thousand tons of carbon dioxide equivalent) ⁴	–	186.65
	Energy-related direct greenhouse gas emission intensity (grams of carbon dioxide equivalent/kWh) ⁴	–	726.09
	Total amount of energy-related indirect greenhouse gas emissions (ten thousand tons of carbon dioxide equivalent) ⁴	–	11.37
	Energy-related indirect greenhouse gas emission intensity (grams of carbon dioxide equivalent/kWh) ⁴	–	0.25
	Total water discharge (million tons)	20,781.65	17,282.60
	Total discharge of sewage (million tons)	26.54	31.98
	Total discharge of open cooling circulation water (million tons)	20,755.11	17,250.62
	Hazardous liquid water production (tons)	1,277.32	784.59
	Production of denitration catalysts (tons)	7,602.35	7,899.14
	Production of other hazardous solid waste (tons)	577.15	201.09
	Intensity of hazardous waste (g/kWh)	0.02	0.02
	Production of general solid waste (ten thousand tons)	4,707.38	4,133.50
	Production of fly ash and cinder (ten thousand tons)	3,738.26	3,274.18
	Production of desulphurised gypsum (ten thousand tons)	969.12	859.32

Performance Categories	Performance Indicators	2021	2020
Environment	Intensity of general solid waste (kg/kWh)	0.10	0.10
	Comprehensive utilisation rate of fly ash and cinder (%)	92.20	89.08
	Desulphurisation gypsum disposal utilisation rate (%)	87.07	87.55
	Amount of grievous (and above) environmental accidents (times)	0	0
Society	Total amount of full-time contractual employees ¹ (persons)	57,513	57,874
	Total number of male employees (persons)	44,959	–
	Total number of female employees (persons)	12,554	–
	Total number of employees aged 30 and below (persons)	11,386	–
	Total number of employees aged between 31 and 50 (persons)	31,540	–
	Total number of employees aged above 50 (persons)	14,587	–
	Total number of employees in China (persons)	56,915	–
	Total number of employees in overseas regions (including Hong Kong, Macao and Taiwan) (persons)	598	–
	Total number of full-time employees (persons)	57,513	–
	Total number of part-time employees (persons)	0	–
	Employee turnover rate (%)	0.36	–
	Turnover rate of male employees (%)	0.36	–
	Turnover rate of female employees (%)	0.37	–
	Turnover rate of employees aged 30 and below (%)	0.97	–
	Turnover rate of employees aged between 31 and 50 (%)	0.28	–
	Turnover rate of employees aged above 50 (%)	0.07	–
	Turnover rate of employees in China (%)	0.29	–
	Turnover rate of employees in overseas regions (including Hong Kong, Macao and Taiwan) (%)	7.02	–
	Number of employees received trainings (persons)	54,720	–
	Proportion of employees received trainings (%)	95.14	–
	Proportion of male employees received trainings (%)	96.15	–



Performance Categories	Performance Indicators	2021	2020
Society	Proportion of female employees received trainings (%)	91.53	–
	Proportion of management personnel received trainings (%)	95.16	–
	Proportion of non-management personnel received trainings (%)	95.14	–
	Training hours per employee (hours)	133	–
	Training hours per male employee (hours)	134	–
	Training hours per female employee (hours)	130	–
	Training hours per management personnel (hours)	93	–
	Training hours per non-management personnel (hours)	137	–
	Number of employee deaths due to duty ⁵ (persons)	1	0
	Number of contractor and subcontractor deaths due to duty ⁶ (persons)	0	1
	Grievous personal injury and death accidents employees (times)	0	0
	Personal injury and death accidents during the power production (times)	1	0
	Accidents that endangered safe operation of power grid (times)	0	0
	Days lost due to work injury (days)	0	–
	Rate of work-related deaths (%)	0.0017	–
	Total suppliers (number)	54,294	–
	Domestic suppliers from Mainland China (number)	53,910	–
	Overseas suppliers including Hong Kong, Macao and Taiwan (number)	384	–
	Customer complaints (number)	0	–
	Concluded lawsuits on corruption against the Company and its employees (number)	0	0
	Average equivalent availability of thermal power units (%)	93.26	94.92

¹ The scope of statistic of Operating revenue (including Sales of power and heat, Sales of coal and raw material, Port service, Transportation service and Others), Operating expenses, Net profit and Total amount of full-time contractual employees, takes Singapore Tuas Power Ltd., the wholly owned subsidiary of Huaneng International and Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited into consideration, of which the Operating revenue (including Sales of power and heat, Sales of coal and raw material, Port service, Transportation service and Others), Operating expenses and Net profit are published in accordance with the International Financial Reporting Standards, Others including Lease income. The statistical range of Controlling generation capacity and Equity-based generation capacity includes Singapore Tuas Power Ltd., the wholly owned subsidiary of Huaneng International.

² The consumption of standard coal is the sum of various types of energy consumption, calculated according to the General Principles for the Calculation of Comprehensive Energy Consumption 《綜合能耗計算通則》 (GB/T2589-2020).

³ The Company's exhaust gas emissions are counted and calculated according to the actual concentration of pollutants.

⁴ On July 16, 2021, the national carbon market officially opened the first performance cycle of carbon emissions trading, according to the Ministry of Ecology and Environment of the PRC of the carbon emissions trading management approach (trial) 《碳排放權交易管理辦法(試行)》, the performance unit in carbon emissions quota amount quantity should be greater than or equal to last year's actual carbon emissions, carbon emissions quotas by the national carbon trading market. Therefore, the actual greenhouse gas emissions in 2021 are trade secrets and will not be disclosed for the time being. Disclosure will be made at the end of 2022 after the performance of the contract is formally completed.

⁵ Number of employee deaths due to duty: the number of employees who died from production safety incidents in 2019 and 2020, we had no work-related deaths.

⁶ 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 Communication with Stakeholder and Identification of Material Issues

2.7.1 Information about and Communication with Stakeholder

Huaneng International has always been adhering to the corporate responsibilities of “providing sufficient, reliable and environmental-friendly electrical power to the society; creating a long-term, stable and incremental return to our shareholders; and providing our staff with an environment which encourages contribution and facilitates career development and integrated development” by fully considering and effectively responding to stakeholders’ demands, and worked together with all stakeholders to promote economic and social development and share corporate development achievements.

Stakeholders	Expectations of Stakeholders	Main Mechanisms of Communication and Participation	Responses from the Company
Investors	Increase of the Company’s market value and profitability. The Company’s environmental and social responsibility performance continues to improve	Shareholders’ meeting; information disclosure; company website	Truthful and thorough disclosure of information; investment of efforts in improving business performance and generating profits; absorption of market opinions for rectification of operating behaviours; investment of efforts in the improvement of environmental and social responsibility management
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	Strict observance of provisions within employment contracts; improvement of the institution of employee’s assembly; improvement of administration of salary and welfare; provision of healthy and safe work environment; 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 organisation 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 energy meetings, work reports, policy consultation and information submissions	Strict observance of relevant laws and stipulations; vigorous advocacy and promotion of energy conservation and emission reduction
Competitors	Fair competition; honest cooperation; joint development; safe production	Participation in industry associations ⁷ , policy studies, daily meetings and business exchanges	Competition and cooperation with competitors; jointly creation of a healthy and orderly competitive environment; mutual benefits and joint progress

⁷ Such as China Electricity Council, Chinese Society for Electrical Engineering, Global Energy Interconnection Development and Cooperation Organization, etc.



2.7.2 Process of Identification of Material Issues

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

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

1

Identifying relevant issues: sources of issues include Environmental, Social and Governance Reporting Guide of HKEX, GRI Sustainability Reporting Standards (《可持续发展报告标准》) and matters disclosed by domestic and international peers.

2

Prioritising issues: internal stakeholders, when it comes to prioritisation, mainly consider impacts on the Company's strategies, policies, processes and objectives, on the Company's competitive advantage and management excellence, and 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 impacts on assessment and decision-making of the Company as well as on its own interests.

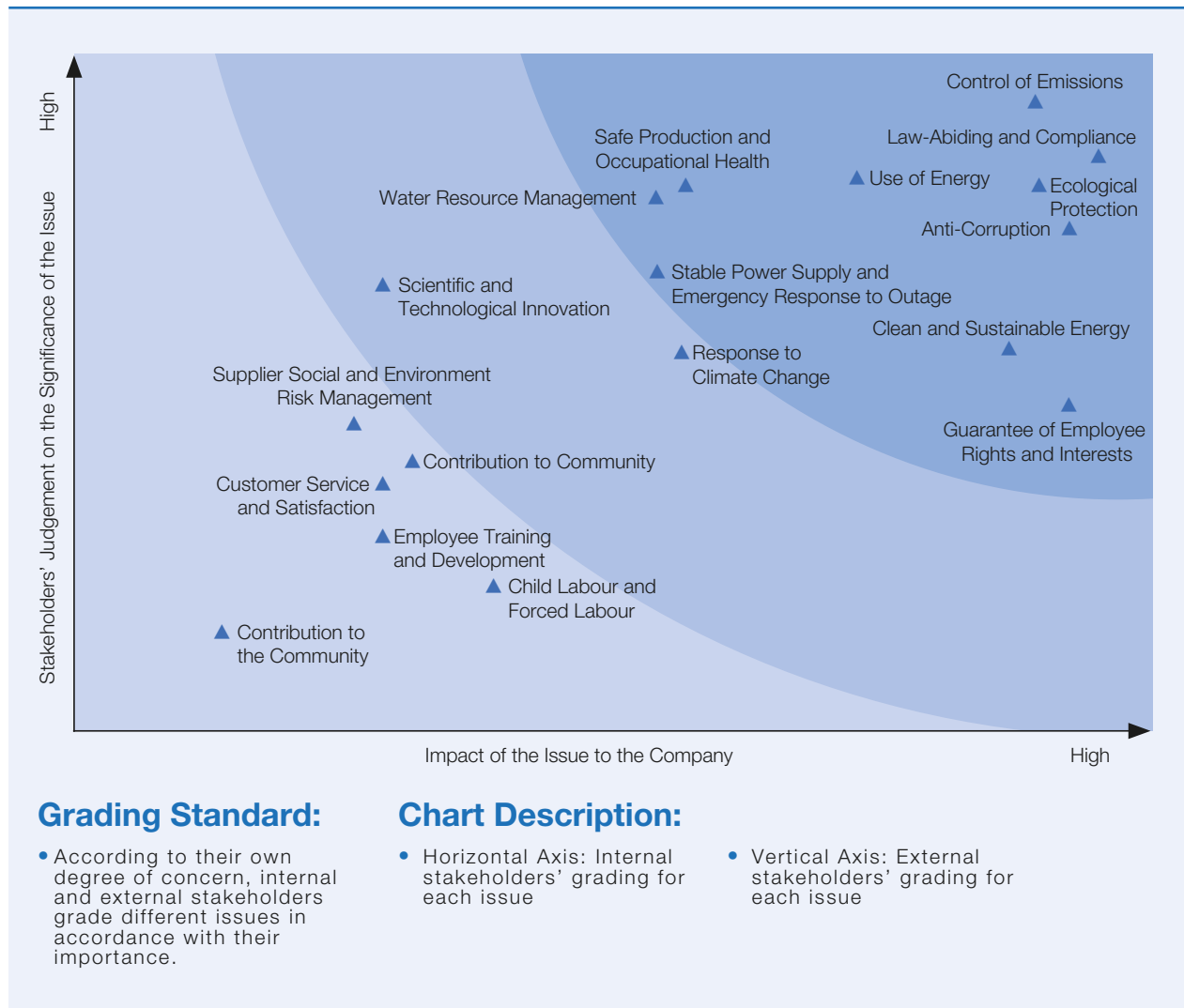
3

Deliberating: the Company management assesses and approves identified issues and their prioritisation.

4

Reviewing: after the end of one reporting period, the Company will request internal and external stakeholders to provide feedback on the contents of this report to enhance future disclosure.

Following our communication with various stakeholders, the Company has identified the following issues as well as their respective priorities.



DISTRIBUTION OF POWER PLANTS OF THE COMPANY

The controlled installed capacity of the Company as at 31 December 2021 was 118,695 MW, distributed in areas as depicted in the chart (Unit: MW)



CHINA NETWORK

Heilongjiang 3,896 	Jilin 3,150 	Liaoning 5,138 	Inner Mongolia 273 	Hebei 3,027 	Gansu 3,897
Ningxia 20 	Beijing 2,766 	Tianjin 1,675 	Shanxi 3,732 	Shandong 21,670 	Henan 8,080
Jiangsu 11,448 	Shanghai 5,012 	Chongqing 3,735 	Zhejiang 6,251 	Hubei 3,973 	Hunan 2,954

Jiangxi
6,748



Anhui
1,614



Fujian
4,053



Guangdong
6,306



Guangxi
321



Yunnan
3,800



Guizhou
745



Hainan
2,403



OVERSEAS NETWORK

Singapore
2,009



Total
118,695

LEGENDS



Wind-power



PV Power



Coal-fired



Combined Cycle



Hydro-power



Biomass power



PUSHING FORWARD THE REFORM OF ELECTRIC POWER SYSTEM



03



Since the reform in March 2015, the National Development and Reform Commission (“NDRC”) and the National Energy Administration (“NEA”) have worked with local governments and electricity-generating companies. The construction of the national power market is progressing steadily and orderly, with the proportion of electricity traded on market increased significantly. The reform of electricity market has been gradually advanced in an all-round manner.

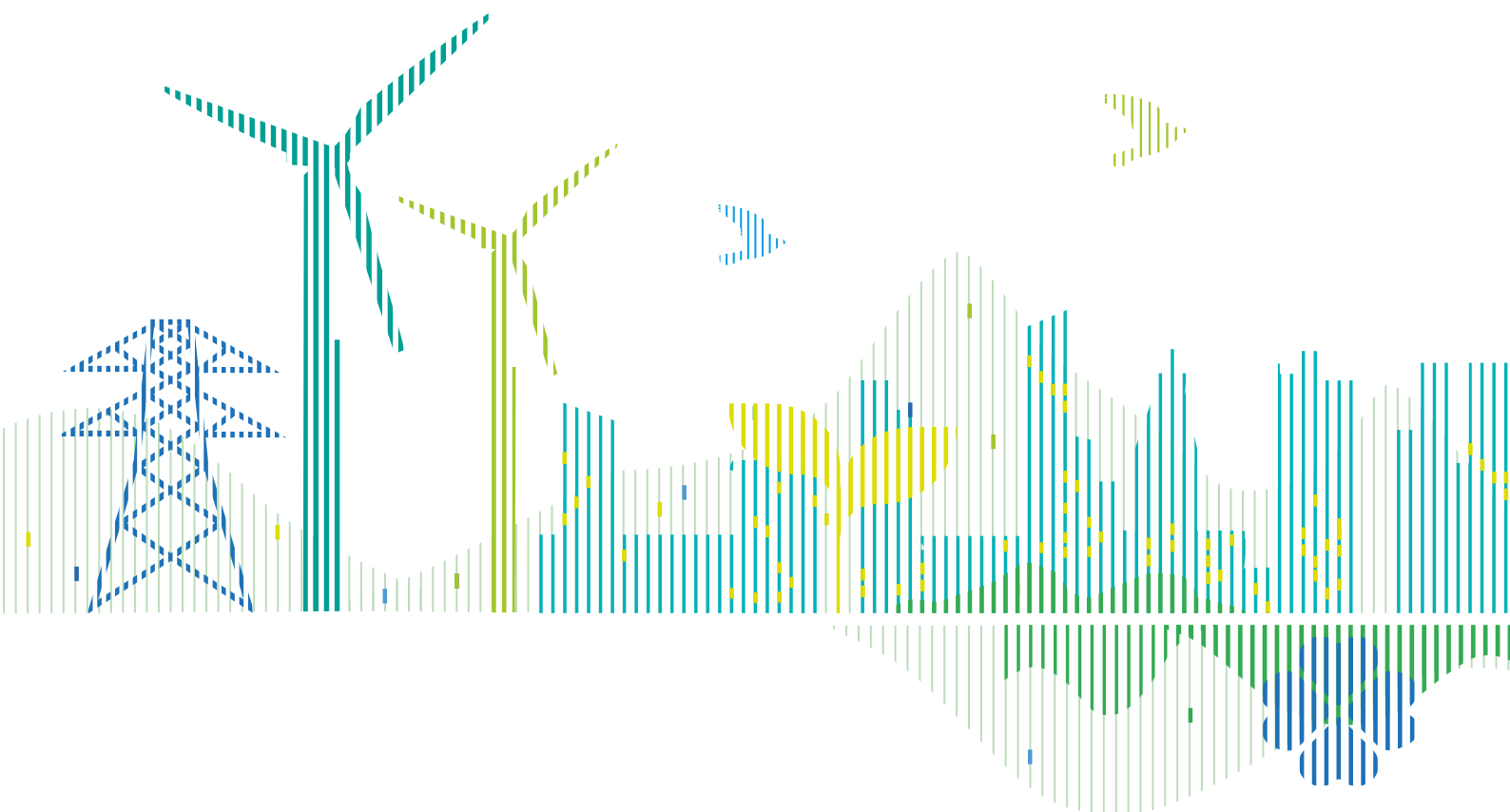
Pushing Forward the Reform of Electric Power System

On October 15, 2021, NDRC issued the Notice on Further Deepening the Market-Based Reform of the On-grid Price for Coal-fired Power Generation (《關於進一步深化燃煤發電上網電價市場化改革的通知》). The notice clarifies that all coal-fired power generation will enter the power market in principle, and the range of trading electricity prices in the coal-fired power generation market will be expanded to no more than 20% in principle. Electricity prices, to promote all industrial and commercial users to enter the electricity market. The Company deepened the reform of the power system, accelerated the market-oriented reform of electricity pricing, promoted the mechanism of market-based electricity pricing, assisted in the construction of a new electric power system, and guaranteed the safe and stable supply of electricity.

As one of the most influential enterprises in the electric power industry, Huaneng International will lend its full support to national policies and work conscientiously for arrangements concerning the Central Economic Work Conference and various government work reports by enhancing communication with electric power end customers, entering strategic cooperation and jointly promoting the energy production and consumption reform to build an energy system featuring clean energy, low-carbon emission, safety and efficiency.

Our Targets

Against the backdrop of the reform of the electric power industry, Huaneng International has coordinated the business of both the 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 maintaining a traded amount of electricity no less than the generation capacity and keeping 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

In 2021, facing the new situations and challenges brought by the continuous progress of electricity reform and the tough task of guaranteeing energy supply, the Company made active response, spared no effort to promote the work of increasing coal-fired electricity price and safeguarded stable power supply by playing its role in the market supply. The major measures adopted are as follows:



1 The introduction of policies related to favourable electricity pricing. The Company has carefully studied the power reform policies and actively guided the introduction of favourable policies to promote the implementation of various supporting policies, relieve the pressure on the operation of coal power and guarantee the stable supply of power and heat.



2 The flexible adjustment of power generation strategy. We insistently keep an eye on and study the national macro-economy, the supply and demand of power, and the situation of the coal market, coordinate all subsidiaries and power plants to adjust power generation and trading strategies, explore the potential of internal coordination and peak regulation, and make a full use of various favourable policies to maximise the Company's overall efficiency.



3 Enhancing learning and training. The Company promoted the establishment of operation centres in the second batch of pilot subsidiaries in Hubei and Liaoning, and guided the pilot subsidiaries to accelerate the selection, training, and reserve of trading personnel. The Company organised three sessions of sales skill training courses, one session of advanced training course for spot quotation staff, and two sessions of training courses on spot trading for director-level marketing staff, comprehensively enhancing the competitiveness of the marketing team.



04



Adhering to the target of “developing itself into an international leading power generation listed company”, the Company actively makes stable progress and takes practical actions to accomplish the tasks of “Six Stabilisations” and “Six Guarantees”⁸ raised by the state. The Company has established and improved its power supply assurance mechanism to practically ensure the supply of electric power; it has gradually enhanced its internal management and continuously implemented its organisational reform, so as to improve its capability in compliance driven governance in a constant manner.



PERFORMING DUTIES BY ASSIDUOUS ACTION



Performing Duties by Assiduous Action

4.1 Improving Capability of Guaranteeing Energy Supply

Huaneng International is committed to developing itself into an international leading power generation listed company and providing sufficient, reliable and environmentally friendly power and high-quality energy services for the customers. Each of the Company's power plants has put in place contingency plans and response measures to ensure a safe and stable power supply.

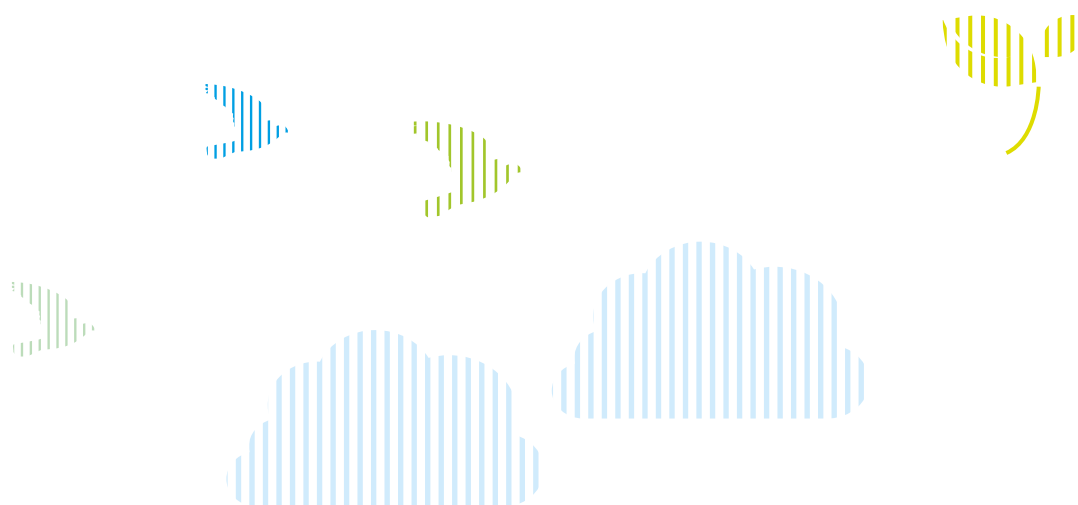
Establishing a Policy Guarantee Mechanism

In accordance with the Company's emergency management measures for major incidents and accidents and the contingency plans for major production accidents and large-scale blackouts in case of accidents such as power units tripping, alternating current and direct current power outages, bus bar outages and large-scale power grid outages caused by system collapses, all units of the Company have formulated Emergency Plan for Thorough Power Failure (《全廠失電應急預案》), Emergency Plan for Black Start (《黑啟動應急預案》), Plan for Island Operation (《孤島運行方案》) and other preparatory measures and established corresponding emergency handling organisations in order to minimise negative impacts on society. These include unified leadership, clear division of labour, rapid response and fluent communication upon occurrence of accidents. Besides, the Company and subsidiaries will also manage accident report to power dispatch department and offices of local governments, handle examination and approval of information disclosed to the public, start emergency measures and be attentive to public concern. We put in rescue control measures with inspection, prevention and repair of power outage to ensure timely recovery of power generation and resumption of power supply.

Strengthening Daily Equipment Management

The Company has focused on its equipment and technology transformation management to ensure that equipment is safe to use, reliable and advancement. The Company has been pushing ahead with the work of "reducing deficiencies and controlling unplanned power outages", strengthening generator units' unplanned power outage control with the unplanned power outage control as a breakthrough point, issuing unplanned power outage analysis report and conduct related monthly performance reporting. The Company initiated equipment management and risk investigation for several power plants, as well as project planning and process quality inspection for Grade A/B¹¹ overhauling units to enable full process management of reliability indicators for the main engine and key auxiliaries. We also strengthened technical supervision and management, conducted site evaluation and stepped up efforts in technology transformation projects to constantly improve equipment health and ensure the safety of equipment and our staff.

As of 31 December 2021, the Company has been achieving an average 0.22 times of unplanned outages per unit per year.



⁸ Six Stabilisations: the stabilisation of the six fronts (employment, finance, foreign trade, inbound investment, domestic investment, and market expectations); Six Guarantees: the guarantee of the six priorities (jobs, daily living needs, food and energy, the interests of market players, industrial and supply chains, and the smooth functioning of grassroots government).

⁹ A/B: Level-A maintenance refers to an overall dismantling, inspection and repair of the generator unit to maintain, restore or improve the performance of equipment; Level-B maintenance refers to a portion of level-A maintenance items carried out conditionally and specifically based on the equipment status, system features and operation conditions of the unit.

Strengthening the Guarantee of Heating Safety

With earnest implementation of the requirements of China and industry regulators on heat supply, the Company has established a leadership team for power and heat supply guarantee in a timely manner, arranged a supply-guarantee plan, conducted daily supervisions, weekly supervision and monthly summary, made assiduous efforts in ensuring the security of supply-guarantee funds, and promoted the implementation of various measures. All the subsidiaries resolutely shoulder their political and social responsibilities, source coal through various channels, strengthen equipment maintenance, and strictly implement instructions of power grid dispatching, with 220 coal-fired power generator units operating as per requirements of such instructions. By doing so, the Company has fully performed its responsibilities and duties. In addition, the Company has also taken the following measures to strengthen the guarantee of heating safety.

- 1 Enhancing the management of boiler fuel.** We formulated specific plans for fuel procurement, storage and transportation, optimised plans for mixed burning of coal and improved the measures for low-load and stable burning, so as to ensure steady operation of power units.
- 2 Ensuring personnel safety in heating production.** With improvement to the accountability system, regulations and operating instructions related to production safety, we enhanced safety education and training for relevant personnel, provided inspection equipment and protective materials, and organised drills for emergency rescue.
- 3 Attaching great importance to management of direct heating network.** We maintained the normal operation of the heating network by conducting routine management of heating network equipment, ensuring sufficient reserve of materials and human resources, timely eliminating the defects of heating network equipment and pipes, and focusing on the operation and management of water replenishing for heating network.
- 4 Being well prepared for heating emergency.** We improved our capabilities of dealing with disastrous events by preparing emergency heating measures in advance, formulating emergency plans in case of outage of heating equipment, quickly identifying, treating and recovering failure equipment, establishing emergency plans for personal injury and death accidents, and enhancing the communication between local government and heating companies.
- 5 Strengthening the on-duty work of heating.** We strengthened the policy of personnel on duty on holidays, executed the policy of major operations with the attendance of leaders. We reported the operation of heating units in a regular basis and reported the heating emergencies in a timely manner.
- 6 Enhancing the awareness of heating services.** By taking the initiative to find out the outstanding heating issues raised by our people, we gained understanding of their demands, and resolved the issues effectively.

Successfully Coping with Natural Disasters and Extreme Weather

In 2021, the subsidiaries of the Company worked together to overcome severe tests from natural disasters, and successfully accomplished the task of ensuring power supply in this crucial period. The safety production of the Company's system overall maintains stable. The Company always considers flood relief and stable supply of power and heat as highly urgent political tasks, assumes duty to guarantee energy consumption for people's livelihood, and resolutely overcomes the adverse effects of the continuous sharp increase of coal prices and lower-than-cost price. The Company resolutely shoulders and implements the political responsibility of guaranteeing the security of electricity and heat supply and flood control.

In October 2021, the strongest autumn flood occurred in Shanxi since the meteorological records. Zuoquan Power Plant responded promptly by deploying an emergency rescue team of 30 people, preparing sufficient supplies for flood relief and pandemic prevention, and actively participating in road rescue and the evacuation of victims. The Zuoquan power plant made every effort in the temporary maintenance and flood control of No.1 Unit, carefully eliminated defects of equipment, performed trial operation of the system, and enhanced fuel transfer to ease the pressure on inventory and guarantee supply security for this winter and the next spring.

Yushe Power Plant, Dongshan Thermal Plant, Shanxi Comprehensive Energy Company and other subsidiaries strictly implemented the emergency plans for flood control and power guarantee, distributed flood relief supplies, strengthened the inspection of key points, and rectified the findings in a timely manner to ensure the reliable operation of equipment and effective response to flood hazards.



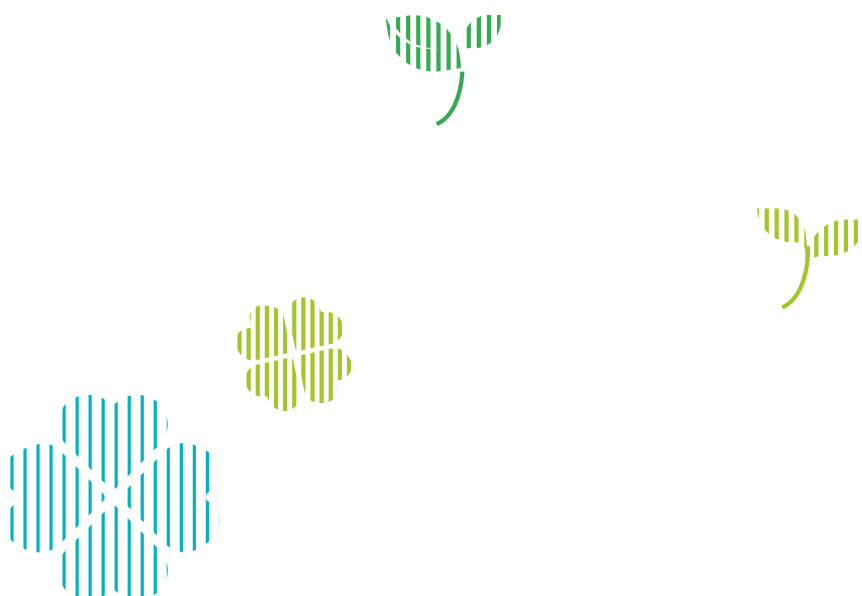
PERFORMING DUTIES BY ASSIDUOUS ACTION

Successfully Guaranteeing Energy for Important Periods

In 2021, under the unprecedented pressure in fuel supply guarantee and the conditions of supply shortage and sharp rise of coal prices, the Company strengthened organisational leadership, increased procurement through multiple channels, set the target for annual inventory control, and ensured the fulfilment of the responsibility of fuel supply guarantee. Working tenaciously, collaboratively, resolutely in the front of fuel supply, we shouldered the political responsibility of fuel supply guarantee, successfully handled the peak power consumption in summer, and guaranteed the fuel supply for the 100th anniversary of the founding of the Communist Party of China ("CPC"), the peak power consumption in winter, and other important and special occasions and periods.

In addition, during important periods such as the beginning of the year and the Spring Festival, the Company took various production safety measures to ensure safe and stable power production and reliable heat and steam supply:

- 1 Performing safety management for operating power units.** Learning from the internal and external production safety accidents, we seriously implemented the policy of "Two Tickets and Three Systems"¹¹, strengthened operation management and routine inspection, improved equipment defect management and attached great importance to equipment defect elimination.
- 2 Strengthening the management of external supply of heating and steam.** By earnestly implementing various measures of the Company, we enhanced the inspection and maintenance on heating equipment and heating pipe network and improved relevant emergency plans and early warning mechanism.
- 3 Attaching great importance to fuel support.** Giving priority to ensuring people's livelihood and supply, we took into account the price control and effectively enhanced allocation and transportation, so as to ensure the supply.
- 4 Enhancing allocation and transportation.** We managed to match the resources with the transport capacity and made arrangement for urging of delivery and shipment. Considering the potential adverse effects of extreme weather on transportation, we made application for green channel support to local traffic management department in advance.
- 5 Continuing the pandemic prevention and control.** We strengthened the pandemic prevention and control in production, and adhered to the implementation of all precautionary measures, so as to guarantee for the life and health of employees and ensure stable and orderly conduction of routine production work.



¹¹ Two Tickets and Three Systems: work ticket and operation ticket; shift system, patrol inspection system and the system of periodic test and rotation of equipment.

4.2 Sparing no Effort in Compliance Management

Huaneng International continuously enhances its anti-corruption efforts, insists on clean and honest business practice, established a law-abiding corporate governance. We closely monitor new changes in regulatory laws and regulations in the place of listing to grasp the regulatory trends and effectively implement the new regulatory requirements. The Company is committed to operational compliance, regulated operation to continually improve its risk prevention ability and corporate governance, and building a corporate culture that values integrity and compliance.

4.2.1 Management by Law

In 2021, upholding Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the Company thoroughly implemented the strategic plan of the CPC Central Committee on comprehensively advancing the rule of law. Under the unified leadership of the Party committee and management of the Company, the Company comprehensively advanced the rule of law and deepened reform of the rule of law by improving the management of compliant operation, enhancing the capability of the team engaged in the rule of law, and promoting the awareness of the rule of law.

Improving the Corporate Governance Structure

After years of exploration and practice, the Company has continuously improved its modern governance system and governance capability in accordance with the requirements of the modern enterprise system, forming a standardised and sound corporate governance structure. We have established and improved the corporate governance structure consisting of the shareholders' meeting, the Board of Directors, the Board of Supervisors, and management, and continuously improved the system of decision-making, execution and supervision on the basis of equal rights and responsibilities, coordinated operation, and effective checks and balances.

Strengthening the Mechanism of Litigation Risk Prevention and Control

The Company insistently strengthens the management of litigation and disputes, and supervises the handling of the cases carried over from the past following a problem-oriented approach. For the significant cases that have impaired the Company's reputation or caused heavy losses, the Company strengthens coordination and urges relevant subsidiaries to make active and responsible response. The Company has strengthened the management of filing and statistics of litigation cases, conducted the analysis of cases and results, checked weak links in the system and management, improved the system and the management.

Enhancing the Review of Legal Issues

Attaching attention to solving the difficulties of reform with a thinking and methodology based on the rule of law, the Company promoted the thorough integration of legal affair management and operation management to ensure mutual cooperation and efficient coordination between the legal affair department and other business departments and regulate the working process. The Company improved its comprehensive capability of reviewing legal issues and enhanced the review of issues related to significant decision-making, regulations and systems, asset disposal, capital operation, legal authorization, contracts and business administration, etc., to ensure that all operations would be carried out in a lawful and reliable manner. By promoting the integration and the interfacing of the legal management information system and other business operation systems, the Company fully exploits the management efficiency of the information system, and continuously increases the application range of the information system.



Improving Staff's Awareness of Laws by Various Activities

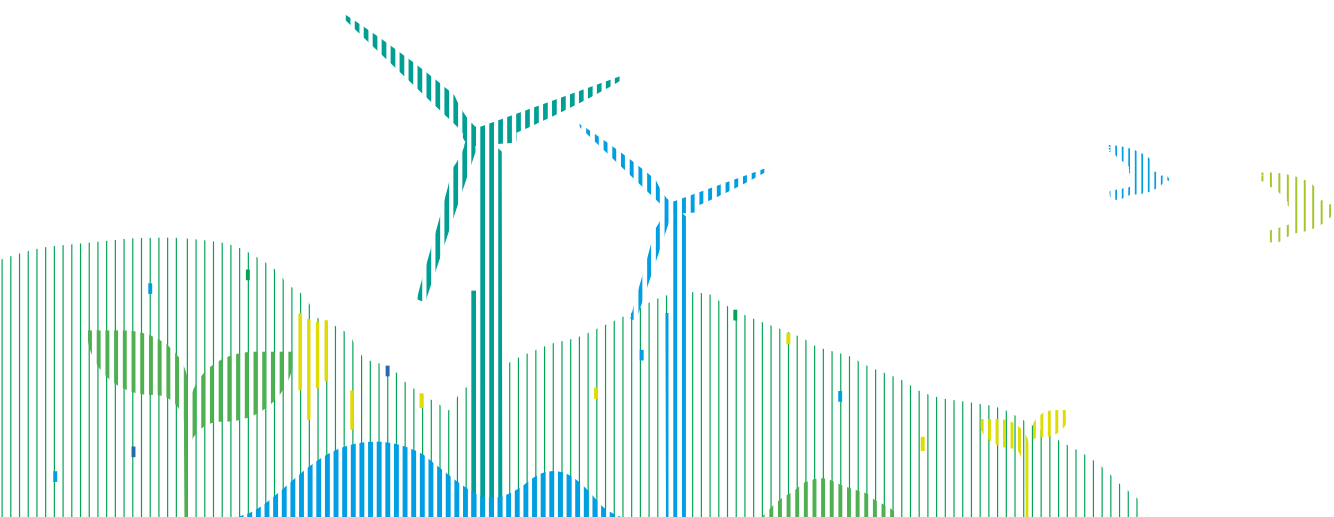
The Company persistently carries out in-depth publicity and education to improve staff's awareness of laws, innovates new forms of publicity, and properly designs such publicity and education with solid results obtained. In 2021, under the guide of Xi Jinping Thought on the rule of law, in light of the requirements of the CPC Central Committee, relevant governing departments and superior authorities and the Company's need of improving staff's awareness of laws, the Company has formulated the Eighth Five-Year Plan for Law Publicity and Education (《開展法治宣傳教育第八個五年規劃》), planned and carried out law publicity in a systematic manner. The Company keeps a close watch on promulgation of new laws, and comprehensively studies the laws and regulations related to corporate governance. A series of briefings on the new laws were released via online columns for the purpose of further publicising the laws and regulations such as the Securities Law (《證券法》), the Company Law (《公司法》), the Administrative Measures for the Disclosure of Information of Listed Companies (《上市公司信息披露管理辦法》), the Guidelines for the Implementation of Affiliated Transactions of the Shanghai Stock Exchange (《上交所關聯交易實施指引》), etc. The Company continues to pay attention to the trends of regulations in New York, Hong Kong and Shanghai, and incorporates new regulatory requirements and policies into its plan of law publicity in a timely manner. We have established a high-quality and efficient platform of law publicity, which legally guarantees the standardisation and institutionalisation of the Company's information disclosure system.

The Company has always attached importance to the publicity of the Civil Code (《民法典》) since its promulgation, and profoundly studied and publicised the basic principles and main contents of the Civil Code. On the one hand, the Company insists on integrating the publicity of the Civil Code with the corporate governance. According to its own situation and the needs of law publicity, the Company timely reminds all the departments of the Company of the potential risks in the Company's operation and management after the implementation of the Civil Code by reminder letters and legal opinion letters in order to control risks in advance and safeguard the legal rights and interests of the Company. On the other hand, the Company insists on integrating the publicity of the Civil Code with ongoing learning. The Company distributed the books of Civil Code of the People's Republic of China (Practical Version) (《中華人民共和國民法典(實用版)》) to every employee at the headquarters for their daily use and improving their awareness of law. Meanwhile, the Company makes full use of the internal network platform to assiduously carry out online courses regarding the Civil Code, achieving solid results of learning. By doing so, the staffs have obtained deep understanding of the Civil Code with Chinese socialism characteristics.

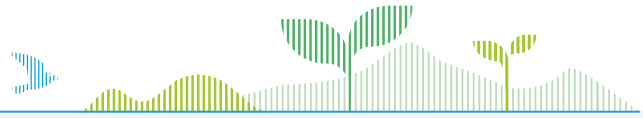
4.2.2 Anti-corruption

In 2021, strictly complying with the Supervision Law of the People's Republic of China (《中華人民共和國監察法》), the Regulation of the Communist Party of China on Disciplinary Actions (《中華人民共和國監察法實施條例》), the Regulation of the Communist Party of China on Disciplinary Actions (《中國共產黨紀律處分條例》), the Work Rules for the Discipline Inspection Organs of the Communist Party of China on Supervision of Discipline Enforcement (《中國共產黨紀律檢查機關監督執紀工作規則》), the Criminal Law of the People's Republic of China (《中華人民共和國刑法》) and other laws and regulations, the Company assiduously carried out conduct improvement and anti-corruption campaigns, urged all employees to uphold ethics as well as Party disciplines and state laws and created an atmosphere where everyone remained disciplined, abided by the law, discharged duties in a standardised fashion, and practised clean operation so as to provide a solid political, ideological organisational and disciplinary support for the Company's sustainable business development.

In 2021, the number of lawsuits on corruption raised and concluded against the Company or its employees was zero.



Implementing the Responsibility System for Conduct Improvement



- 1 The Company held the 2021 conference of conduct improvement and anti-corruption campaigns.
- 2 The Company formulated and issued the Key Task Division Plan for Conduct Improvement and Anti-corruption Campaigns of the Company's Party Committee for 2021 (《公司黨委2021年黨風廉政建設和反腐敗工作重點任務分工方案》) which broke down the annual conduct improvement and anti-corruption campaigns into 25 specific tasks and defined the division of responsibilities.
- 3 All the departments and offices signed totally 12 letters of commitment to integrity for 2021 under the organisation of the Company, and carried out the segregation of duties for conduct improvement among staff at all levels.
- 4 The Company restructured the leadership group for conduct improvement and anti-corruption campaigns in a timely manner based on the adjustment of the Company's internal structure, personnel changes and actual needs.
- 5 The Company held the specific report meeting to collect work reports from management personnel, the discipline inspection committee and various departments and offices with respect to the management, supervision and execution.

Strengthening Daily Supervision and Targeted Supervision



- 1 The Company battles against "power-related misconducts". The Company endeavours to improve the long-term mechanism, and has formulated 21 preventive measures against "power-related misconducts" and promoted the effective implementation of such measures. The Company organised warning education targeting at the "power-related misconducts" for the staff engaged in engineering, technology and economy.
- 2 The Company strengthens the supervision of the "top leaders" and the leadership team. The Company has promoted the implementation of system that the "top leaders" are subject to the overall responsibility and supervision while the subordinates at each level are subject to their respective responsibilities and supervision.
- 3 The Company has established the integrity archives of middle-level management cadres of the Company's Party committee and implemented dynamic management.
- 4 The Company strictly assesses the integrity when appointing and promoting cadres to prevent the promotion or appointment of any cadre with improper conduct.
- 5 The Company strengthens the risk prevention and control of overseas projects. The Company carried out special training on integrity for the staff of Tuas Power, and organised course and publicity of Beijing Initiative for the Clean Silk Road (《廉潔絲路北京倡議》) and The United Nations Convention Against Corruption (《聯合國反腐敗公約》), so as to continue to improve overseas staff's awareness of integrity.



PERFORMING DUTIES BY ASSIDUOUS ACTION

Strengthening Integrity Campaigns



- 1 The Company sends integrity message at important moments. On major holidays such as the New Year's Day, the Spring Festival, the Labour Day, the Dragon Boat Festival, the Mid-Autumn Festival, and the National Day, we send integrity messages to the Company's employees to urge cadres at all levels to uphold integrity, frugality, and high moral standards.
- 2 Based on the typical cases of violating the eight-point decision on improving work conduct announced by the CPC Central Commission for Discipline Inspection and the National Supervisory Commission, we strengthen warning education to enhance cadres' awareness of practising the eight-point decision on improving work conduct and the relevant implementation rules on their own initiative.
- 3 The Company vigorously rectifies the formalism and bureaucratism. Through daily supervision, we thoroughly identify the formalism and bureaucratism, so as to take serious measures for rectification.

Conducting Warning Education on Integrity



- 1 The Company practically carries out disciplinary interviews under the "four forms". We urge all departments and offices of the Company to carry out disciplinary interviews under the "four forms" as required. Throughout the year, 22 routine interviews with principals of different departments and offices were conducted by the Company's discipline inspection teams, and 73 with personnel under different departments and offices by the principals.
- 2 The Company holds onto the warning education on integrity. During the year, 7 warning educations were conducted for cadres and personnel in key positions, with an attendance of more than 750 person times, through which we further raised employee awareness of self-discipline and integrity, and laid a solid foundation for uprightness and entrepreneurship.

Facilitating the Construction of Discipline Inspection Teams



- 1 In order to strengthen the standard management of discipline inspection, we have formulated the Rules for the Discussion and Deliberation of the Discipline Inspection Commission (《公司紀委議事規則》) and the Rules for the Implementation of Discipline Inspection of the Discipline Inspection Commission (Trial)(《公司紀委執紀工作實施細則(試行)》), further specifying working procedures of the Discipline Inspection Commission, for discussion and deliberation, and handling of complaint letters and visits and clues to the problems.
- 2 The Company intensifies training for full-time and part-time discipline inspection personnel. We organised 7 trainings on discipline inspection and supervision for discipline inspection personnel, and distributed training materials for them to consistently improve their political awareness of and competence in discipline inspection.
- 3 The Company rigidly follows the requirements of discipline inspection to strengthen self-supervision. Through intensive education, daily work exchanges, and routine interviews, we conduct strict education, management and supervision on discipline inspection personnel to prevent any unnoticed corruption practices.

4.2.3 Protection of Intellectual Property Rights

The Company, in an all-round way, strengthens the protection of intellectual property rights, and implements the Plan on the Development of Intellectual Property Rights Power (2021-2035) (《知識產權強國建設綱要(2021-2035年)》) to facilitate and consolidate the high-quality development and technological innovation. We have been constructing and improving a system to protect intellectual property rights. Supported by the Measures for the Management of Technological Intellectual Property Rights (《科技類知識產權管理辦法》) released earlier this year, the Company has further rolled out relevant requirements and policies for intellectual property rights agency to open channels for patent application, guarantee the efficiency of patent application, and consolidate the coordinated development of “quality” and “quantity” of patents. Sticking to the goal of strengthening patent innovation and protecting patent rights, we launched a special project for patent enhancement, and coordinated patent application and renewal based on the Company’s management, further standardising the management, development and application of intellectual property rights, refining the protection mechanism for technological achievements and facilitating the formation and transformation of technological innovation and proprietary intellectual property rights.

In 2021, the Company strictly followed the Patent Law of the People’s Republic of China (《中華人民共和國專利法》), the Copyright Law of the People’s Republic of China (《中華人民共和國著作權法》), the Trademark Law of the People’s Republic of China (《中華人民共和國商標法》), the Rules for the Implementation of the Patent Law of the People’s Republic of China (《中華人民共和國專利法實施細則》), the Regulations for the Implementation of the Copyright Law of the People’s Republic of China (《中華人民共和國著作權法實施條例》), the Detailed Rules for the Implementation of the Trademark Law of the People’s Republic of China (《中華人民共和國商標法實施條例》) and other laws and regulations of China, and received no punishment or lawsuit from the government for intellectual property infringement.

Formulating Patent Improvement Measures

Patent quality is an important symbol to measure technological innovation. The head of the Company’s secondary unit division and the chief engineer took the lead in establishing a special working group to explore the establishment of a responsibility system for technological innovation headed by the chief engineer, and refine and implement various patent indicators, deeply integrating the patent work with scientific research, planning, infrastructure and technical transformation of production, and formulating patent improvement measures appropriate to the Company.

Strengthening Training for Intellectual Property Rights

The Company actively conducts research on the compliance management of intellectual property rights. We organise patent work trainings within the system and complete the patent application and protection as well as the trademark protection and publicity to improve the patent application knowledge of frontline employees and guide all units to achieve Industry-University-Research-Practice cooperation, in an effort to promote joint application, ownership and use of patents.

Protecting and Maintaining Intellectual Property Rights

The Company attaches great importance to the protection and maintenance of intellectual property rights. We require all units to strictly follow relevant laws, regulations and policies, timely revise the Measures for the Management of Trademarks and Fonts of the Company (《商標及字號管理辦法》) as required by the management to strengthen the protection for intellectual property such as core technologies, technical secrets, trademarks and fonts, and prudently decide on the transfer and licensing of core intellectual property rights. In addition, we further enhance all-round management of core technical secrets and business secrets, and reinforce competition restrictions on key talents knowing the Company’s core technology secrets. With respect to intellectual property rights of others, we, adhering to the principle of full respect and proper use, define the use, methods, prohibited acts and liability for breach through a license agreement to use such intellectual property rights in a legal and compliant manner. We establish and improve the coordination mechanism between intellectual property rights agencies and Legal Department of the Company so as to better deal with disputes arising from intellectual property rights, enhance risk control and establish a multi-level intellectual property protection system.

Strengthening the Management of Patent Information

We establish a patent information management system covering the whole process. Starting from the patent application, we strictly manage and maintain the dynamic patent information in the system, and link all patents to relevant project, realising full tracking management throughout the life cycle of patent application, authorisation, maintenance, achievement transformation and invalidation.



TRANSFORMATION DEVELOPMENT DRIVEN BY INNOVATION





05



As a responsible company, Huaneng International strongly promotes ecological development, vigorously develops clean energy, continuously optimise the industrial strategic plan, actively engages in technological innovation, strengthens environmental protection, maximises energy efficiency, boosts the development of the green management system, so as to promote the green development of the Company.

Transformation Development Driven by Innovation

5.1 Accelerating the Green Development

“Innovation, coordinated development, green growth, open economy and shared development” are the five key development concepts of our country. President Xi Jinping has stated the goal to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060, and the Chinese government’s response to climate change has been accorded as a major strategy for national economic and social development. The country vigorously develops a green economy and earnestly promotes various emissions reduction measures as core climate change policies.

The “14th Five-Year Plan” period is the first five years of a new journey towards building China into a modern socialist country in an all-round way, the start of a new normal in China’s economic and social development, as well as a crucial period for developing Huaneng International into a world-class listed power generation company. In the meantime, Huaneng International redoubled its efforts to promote the development of low-carbon and clean energy by continuously improving the development quality, and advanced business transformation and upgrading by introducing low-carbon and clean energy power units. We proactively adapted to the development of the power generating industry to accelerate the green development.

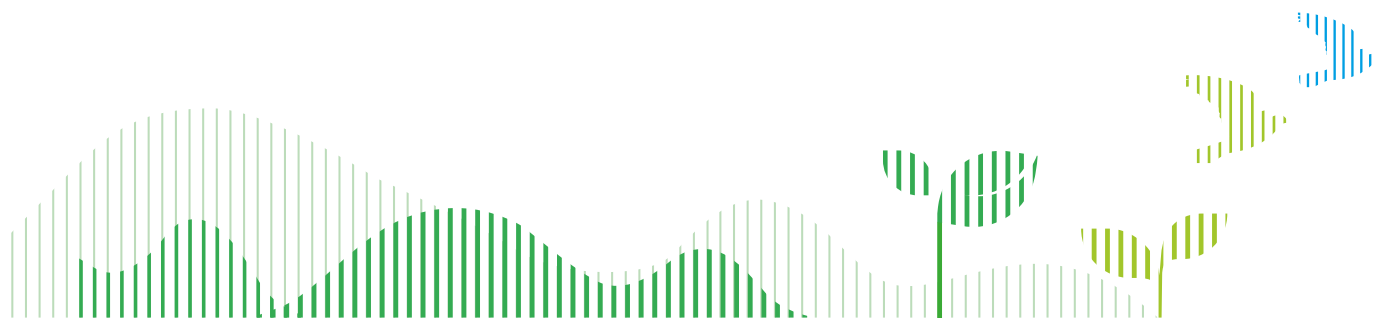
Optimising the Energy Structure Constantly

In 2021, moving towards the goal of “carbon peak and neutrality”, Huaneng International focused on promoting low-carbon clean energy development, continuously improved the proportion of installed capacity of low-carbon clean energy, and vigorously facilitated the development and construction of new energy projects such as PV and wind power generation, achieving a larger increase in the low-carbon clean energy installed capacity.

During the “14th Five-Year Plan” period, the Company has been optimising the energy structure. In detail, we coordinate energy security and green development, deepen the supply-side structural reform to thoroughly drive the high-quality development and accelerate the leap-forward development of new energy, and speed up the optimisation and upgrading of the coal power structure.

Sticking to the goal of carbon peak and neutrality, the Company promotes the green and low-carbon energy transformation. On the one hand, we adopt renewable energy sources and vigorously develop new energy resources to build a new power system with new energy as the main body. On the other hand, we transform to develop coal power, prioritise gas and other clean energy power generation, and actively plan pumped storage power generation to achieve an integration of sources, network, loads and storage and a pattern of multi-energy complementary development.

We focus on developing gas power generation projects in areas with confirmed gas sources and gas price, strict environmental protection requirements, strong bearing capacities for electricity price, and large peak load distribution demands. In areas with large installed capacity of gas turbine, we comprehensively consider the integrated development mode of gas and electricity by utilising existing pipeline natural gas and LNG receiving stations and self-built LNG receiving stations, or by way of cooperative development with upstream gas suppliers. Focusing on combining with the peak load distribution demand of the receiving end of the clean energy bases and utilising relevant policies of the State that support the development of pumped storage, we put efforts to strength cooperation with power grid enterprises in areas with mature ancillary service markets and peak-valley electricity prices by taking regional companies as the main body and giving full play to the role of professional companies, forming a business model of mutual benefit, optimally planning pumped storage power stations, and promoting the development of pumped storage power stations. The Company does well in site protection and resource reserve while taking a large proportion of shares in Hainan Changjiang Nuclear Power Plant Phase I, Shidao Bay Nuclear Power Plant and Xiapu Nuclear Power Plant. We pay close attention to the application of other new energy sources for power generation, and actively seek investment cooperation and opportunities for merger and acquisition of properties of renewable energy power generation. We build biomass power units in combination with citizen’s heat supply. We develop energy storage industry according to local conditions, combining with the development of new energy and the requirements of regional peak load distribution. We optimally launch comprehensive energy supply and service stations such as distributed energy, microgrid, etc.



Developing Clean Energy Vigorously

The Company gives priority to quality and benefit and adheres to the principle of “adopting centralisation and decentralisation and focusing on self-sustaining development”, pays equal attention to independent development and acquisition, and strives to gain resources that match its market share. The Company continued to focus on green development, vigorously developed new energy and make full use of the favourable conditions for the centralised development of renewable energy in the country’s “Three-North”, coastal, south west and part of the central China, and further built an energy base of “base type, clean type, complementary type, intensification, digitalisation, and standardisation”. The Company developed and construct offshore wind power bases in areas such as Guangdong, Jiangsu, Zhejiang, Shandong and Liaoning, and actively planed a new model of scattered and distributed development throughout counties. The Company optimally developed gas power and other clean energy power generation, and steadily developed pumped storage power generation to promote the development of pumped storage power stations by taking into account the peak load distribution demand of the receiving end of the clean energy bases. Besides, the Company actively implemented major regional strategies of the State, such as Guangdong-Hong Kong-Macao Greater Bay Area, Yangtze River Delta and Beijing-Tianjin-Hebei, to integrate ourselves into the new development pattern.



Huaneng Shandong Peninsula South No. 4 Offshore Wind Power Project

On 10 December 2021, all 58 wind turbines of the Huaneng Shandong Peninsula South No. 4 Offshore Wind Power Project, the first offshore wind power project in Shandong Province, were connected to the grid for power generation. Located in the southern waters of Haiyang City, the project, as one of large offshore wind farms with the deepest single-pile foundation in China, has a total installed capacity of 300 thousand kilowatts and 30 MW/60 MWh energy storage devices. With an estimated annual power generation capacity of 821 million KWh after being put into operation, the project can effectively save 246.30 thousand tons of standard coal, and reduce carbon dioxide emissions by 640 thousand tons. This project is of great significance for Shandong Province to replace old growth drivers with new ones and achieve the goal of “carbon peak and neutrality”.



■ Huaneng Shandong Peninsula South No. 4 Offshore Wind Power Project



Huaneng Zhejiang Qinggang PV Power Station

On 17 December 2021, Huaneng Zhejiang Qinggang PV Power Station, the first domestic intertidal-zone full-scale fishery-PV eco-power station invested and constructed by the Company, was connected to the grid for power generation. Located in the waters near Qinggang Town, Yuhuan City, Zhejiang Province, the project has an installed capacity of 130 thousand kilowatts and an estimated annual power generation capacity of 150 million KWh, equivalent to saving about 45 thousand tons of standard coal and reducing carbon dioxide emissions by more than 110 thousand tons per year.



■ Huaneng Zhejiang Qinggang PV Power Station

With PV panels installed on supporting brackets for the upper structure, and permeable structures as the pile foundation for the lower structure, the project would not affect the natural quality of the waters. In addition, mangroves were planted around to restore the natural ecology and functions of the intertidal zone. After completion, the three-level power station, that is, the top for high-efficiency power generation, the middle for biological carbon sequestration and the bottom for full-scale aquaculture, has become the first domestic PV power station with blue carbon sinks for the ecological management of coastal intertidal zones, greatly improving ecological benefits and setting an example for large-scale green development of coastal intertidal zones.



5.2 Breakthroughs in Independent Innovation

Technological innovation drives business development. Huaneng International is committed to becoming an innovation-driven enterprise by improving technological innovation, continuously enhancing our innovation capability, earnestly investing in research and development, optimising the systems for innovation decision making and management, and relentlessly developing innovation platforms to accelerate the development of the Company.

Innovation Management

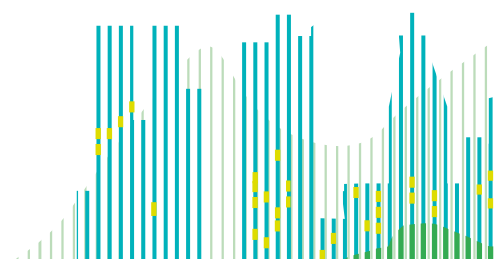
The Company implements the new development concept in an all-round way. We earnestly implement the decisions and arrangements of the central government and the SASAC on technological innovation, thoroughly practise the technological innovation strategy, and vigorously embrace the challenges and opportunities in technological innovation arising from the “carbon neutrality” and the new round of revolution in the energy industry. In alignment with the strategy of serving the country and the major demands for the Company’s development, we improve our competence in independent innovation and significantly raise the industrialised level of technological achievements by adhering to make breakthroughs in key technologies, focusing on improving innovation systems and mechanisms, and relying on strengthening the construction of technological talent teams and innovation platforms. In addition, we take the lead in technological innovation to support and usher in the high-quality development of the Company, while accelerating the construction of an international first-class listed power generation company to promote the high-quality development of the domestic energy industry.

In 2021, Huaneng International was committed to serving the national strategy and promoting innovative development with active investments in research and development, to ensure the implementation of major science and technology projects such as “Key & Core Technology”.

Firstly, we actively promote major national science and technology R&D programmes. Among which, the “Key Technology of New High Alkali Coal Wet Bottom Boiler” has passed the acceptance inspection organised by the Ministry of Science and Technology (MOST). The “700°C High-efficiency and Ultra-supercritical Power Generation Technology” is qualified for acceptance inspection. The project of “Optimal Design of Large-scale Offshore Wind Turbines and Key Components and Key Technologies for Mass Manufacturing, Installation, Debugging and Operation” has passed the mid-term acceptance inspection and is progressing as planned.

Secondly, we have made numerous technological breakthroughs in major and key scientific and technological projects such as the special project “1025”. Two technologies from the automation of gas turbines have been included in the Catalogue for the Recommendation on Scientific and Technological Innovation Achievements of Central Enterprises (《中央企業科技創新成果推薦目錄》). We have made key breakthroughs in the industrialisation of high-temperature materials. With respect to network security, a complex laboratory for power infrastructure network security has been established. The project of “Carbon Dioxide Capture, Improvement and Verification through Key Technologies – Yangpu 1,000 TPA of Carbon Dioxide Capture” has completed major design tasks and part of the site piling. The project of “Development and Demonstration of 100 KW Molten Carbonate Fuel Cell Power Generation System” has conducted volume production of bulk materials of cell stacks. In addition, the Company established 5 key scientific and technological projects such as the “Research and Simulating Industrial Verification on Key Technology of Xinjiang High Alkali Coal Wet Bottom Boiler for Combustion” to strengthen the research and application of new energy-saving technologies. We have also organised the “Exchange on Advanced Technology of Work Safety, Energy Saving and Emission Reduction”, applying 34 advanced technologies and achievements to work sites, so as to promote work safety, drive energy saving and emission reduction, and support high-quality development through technological innovation.

In 2021, the Company’s R&D investment increased significantly, and more than 2,400 patents were authorised during the year, including 80 invention patents.



Innovation Achievements

- 1 The project of “High Alkali Coal Wet Bottom Boiler” has passed the 168-hour full-combustion high alkali coal testing at Yangliuqing Thermal Power Plant with good results. The project has passed the acceptance inspection organised by the MOST.
- 2 With respect to offshore wind power, the verification project on key technology of 5 MW and 6 MW wind turbines has been launched.
- 3 With respect to network security, we have developed the first supporting system for online network security risk management and control in the power generation industry, and built a flexible and reconfigurable power infrastructure network security laboratory connecting real systems constructed by physical devices with virtual systems.
- 4 Two proprietary technologies from the automation of gas turbines, that is, the failure analysis and the non-destructive testing and evaluation for key components of gas turbines, have been included in the Catalogue for the Recommendation on Scientific and Technological Innovation Achievements of Central Enterprises (《中央企業科技創新成果推薦目錄》).
- 5 With respect to high-temperature materials, we have made key breakthroughs in industrialised technologies such as high-purity melting, homogeneous control, and thermal moulding of thick-walled large pipes and high- and medium-pressure rotors.
- 6 The supercritical carbon dioxide power generation project has passed the system-wide heavy-load 72-hour trial operation, and has been officially put into operation.

Development Directions

Huaneng International puts technological innovation in a more prominent position according to the requirements of the Company's strategic development. Next, the Company will strengthen efforts to tackle core technologies and accelerate R&D with a focus on clean combustion, network security, automation of gas turbines, intellectual heat supply and other fields, so as to further improve the independent innovation capability. We will make overall plan and coordination on key projects and tasks required for the Company's production safety, infrastructure, management and development, and maintain advanced technical and economic indicators in environmental protection, materials, operation and maintenance and heat supply, forming a high-quality patent system that leads domestic and international market.

In addition, the Company will also actively promote the integration of technologies, such as carbon capture, fuel cell, AI, IoT, block chain, cloud computing and big data, with all aspects of the energy industry. With the implementation of the “Digital Huaneng, Intelligent Huaneng” strategy and the national policy on “carbon peak and neutrality”, a number of scientific and technological achievements with significant impact at home and abroad have been made in the field of clean and highly-efficient power generation technology. The Company will also carry out demonstration projects to expedite industrial restructuring and enhance core competitiveness.

5.3 Promoting Energy Saving and Consumption Reduction Solidly

In 2021, embracing the spirit of the annual production conference, the Company carried out the rating work of units in an all-round way, promoted the energy-saving upgrading and transformation of coal-fired power, and high-quality heat supply renovation. These were effectively implemented with the goals of improving major technical and economic indicators and realising energy consumption index's "leading positions in overall energy consumption efficiency", under the principles of improving the quality of energy management, focusing on energy consumption index benchmarking and ensuring key generating units' outstanding performance. In 2021, the Company did not incur any environmental accident that was defined as major or above grade.

5.3.1 Overall Planning

Committed to an industry leader in overall energy consumption efficiency and ultra-supercritical unit energy consumption efficiency, Huaneng International has formulated rules and regulations, such as the Measures for Energy Saving Management (《節能管理辦法》), the Regulations on Environmental Protection Management (《環境保護管理規定》), the Standards and Acceptance Measures for Energy Saving and Environmentally Friendly Coal-Fired Power Plants (《節約環保型燃煤發電廠標準及驗收考核辦法》), and the Incentive Measures for Achievement of Energy Efficiency Excellence and Enhancement in (Ultra-) Supercritical Power Units (《超(超)臨界機組能耗指標創優及能耗指標提升獎勵辦法》). Various systems of energy saving are specified by each unit of the Company according to their actual circumstances, and publicity, training, supervision and inspection are carried out in a timely manner as well. The Company actively promotes coal-fired power units' energy saving and emission reduction, plans to carry out energy saving and environmental protection, and has successfully fulfilled its targets and responsibilities of energy saving and emission reduction to ensure that the Company's coal-fired units continuously lead in energy conservation and environmental protection and maintain its competitive advantage, and contribute to the reform of the national energy production and consumption and enhance the clean and efficient development of coal power generation.

5.3.2 Energy Consumption Management

As an advanced power company, Huaneng International strictly abides by the Environmental Protection Law of the People's Republic of China (《中華人民共和國環境保護法》), the Energy Conservation Law of the People's Republic of China (《中華人民共和國節約能源法》) and other relevant laws during its development.

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 2021, the Company's coal consumption rate for thermal power units was 290.69 g/kWh. The house consumption rate of plants was 4.34%. The annual consumption of standard coal was 13,200.22 ten thousand tons. Oil consumption in production totalled 37,709.02 tons, while natural gas consumption was 581,655.30 ten thousand standard cubic metres.

Management Objective

Through multiple measures, the Company strives to reduce the coal consumption rate for thermal power units by about 5 g/kWh compared with 2020 and below 286 g/kWh by 2025.

Management Mechanism

The Company's regional branches are responsible for the energy saving management. In accordance with the Energy Conservation Law of the People's Republic of China (《中華人民共和國節約能源法》), and with the consideration of actual operations, we have formulated regulations and guidance related to energy saving, such as the Measures for Energy Saving Management (《節能管理辦法》), the Incentive Measures for Achievement of Energy Efficiency Excellence and Enhancement in (Ultra-) Supercritical Power Units (《超(超)臨界機組能耗指標創優及能耗指標提升獎勵辦法》), the Standards for Energy Saving and Environmentally Friendly Coal-Fired Power Plants (《節約環保型燃煤發電廠標準》), the Acceptance Measures for Energy Saving and Environmentally Friendly Coal-Fired Power Plants (《節約環保型燃煤發電廠驗收考核辦法》), the Measures for the Selection of Advanced Energy Saving Units (《節能先進單位評選辦法》) and the Implementation Plan for the Comprehensive Upgrading and Retrofitting and Energy Saving Replacement of Coal-fired Power Plants (《燃煤電廠綜合升級改造及節能替代實施方案》).

During the construction period, each project formulates the Overall Planning of Green Construction Project (《綠色建造工程總體規劃》) to specify detailed plans for the quantitative control of construction water and electricity indicators, and establishes the Implementation Plan and Rules of Green Construction Project (《綠色建造工程實施方案與細則》) and the Measures for Green Construction, Energy Saving and Emission Reduction (《綠色施工及節能減排措施》), and other management policies to define specific control measures.

In terms of target management and control, the Company maintains its leading position in energy consumption indicators by vigorously developing heat supply renovation, implementing energy-saving projects and practising effective energy-saving management measures. Huaneng International strengthens the budget management of energy consumption indicators and has formulated special assessment regulations to ensure that each unit can achieve optimal consumption of coal, electricity, oil, natural gas. The Company adopts an approach that combines goal management and process management. Firstly, we set the annual energy consumption indicators taking into account specific energy efficiency level of each grassroots power generation units and carry out assessment on the degree to which the reference target is met. Secondly, regarding those units which have difficulty in meeting the target or unsatisfactory energy consumption outcome, the Company will arrange on-site inspection performed by professionals, who then carry out comprehensive investigations according to specialties and systems, provide recommendations and take remedial measures to ensure the fulfilment of target energy saving and emission reduction assigned by the State and the Company, and ensure that the Company's coal-fired units maintain the leadership in energy saving.

Management Measures

In 2021, the Company continued to meet stringent key energy consumption performance targets and focused on energy saving and consumption reduction measures 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 its achieved key energy consumption performance targets by various key energy attributes.

On energy saving through management, we improved the three-level energy saving management system, optimised the three-level energy saving supervision network for grassroots units and introduced energy saving benchmarks into grassroots units' performance management. First, we strengthened the management of energy saving targets by following up with units that were behind the annual energy saving targets and holding dialogue with key units. Second, we enhanced the implementation and management of energy saving responsibilities by urging a breakdown of the responsibilities of all personnel in regional branches and basic-level thermal power plants by job nature for looking after energy saving-related tech-economic indicators to raise energy saving awareness. Third, we enhanced benchmark checking for power units of the same type to identify discrepancies against management, technology, safety, fuel and market benchmarks and improve energy saving management. Fourth, we initiated the selection of advanced energy saving units and benchmark power plants, promotion of the review and verification of energy saving and environmental protection excellence power plants, and a reward system for energy saving excellence and enhancement with incentive funds, and evaluation as well as encouragement of pioneering and improvement of energy consumption indicators.

On energy saving through structure, first, we organised power plants to explore their heat supply potential and tap into a wider heat supply market according to local conditions. Second, we urged regional branches to optimise their operating capacity through electricity transfers and enabled low energy consumption power units to absorb the additional power generation capacity. Third, we suggested that grassroots units modulate energy saving economics to increase the output coefficient of their power units where policies allow. Fourth, we stepped up fuel procurement work and management of blended coal as fired to ensure that the heating value of coal as fired is consistent across all power plants and that the heating value of coal as fired remained at a high level for ultra-supercritical power units.

On energy saving through technology, we focused on promoting the transformation of existing power units for thermoelectric power cogeneration, facilitating the environmentally friendly and efficient utilisation of coal with a further testament to energy utilisation enhancement. In 2021, the Company's overall energy saving indicator and the energy consumption indicators of seven key models (e.g. 1,000 MW ultra-supercritical wet cooling, 600 MW ultra-supercritical wet cooling, 600 MW supercritical wet cooling, 600 MW supercritical air cooling, 600 MW sub-critical wet cooling, 350 MW standard wet cooling and 300 MW standard wet cooling) maintained a leading position in the industry. 52 generating units won the awarded prizes in the China Electricity Council thermal power generation unit energy efficiency benchmark. In the special evaluation of energy consumption indicators, 11 generating units of the Company were rated as the units with the best coal consumption for power supply or plant power consumption rate.

In terms of engineering construction, the Company formulated reasonable construction energy consumption indicators to improve construction energy utilisation. Based on the principle of energy conservation, each infrastructure project carefully calculated the power load and load usage time, rationally designed temporary office and living facilities in accordance with the natural conditions of the site, and selected the construction transformers with reasonable capacity and optimised the layout location of construction transformers. The power devices for construction were fully equipped with electricity meters and hierarchical management was adopted in calculating power consumption. The Company set power consumption control indicators, regularly performed calculating, accounting, and comparative analysis, and formulated preventive and corrective measures to reduce construction power consumption. The Company gave priority to the use of energy-saving, efficient, and environmentally friendly construction equipment and machinery, preferred to use energy-saving construction process, rationally reduced the time for night work through reasonable arrangement of construction procedures and progress with sharing of construction machinery, and carried out construction and commissioning in a refined manner to strive for the success of each trial operation and test with consideration of trial operation condition of power units at all stages. During the construction period of each project, the power and fuel consumption were kept under control.



TRANSFORMATION DEVELOPMENT DRIVEN BY INNOVATION

In 2021, the Company made steady progress with positive momentum in its production and environmental protection. In terms of equipment management, reliability was improved year by year and outperformed industry peers, and the unplanned outage times of generating units decreased year by year. In terms of energy saving and consumption reduction, the coal consumption for power supply decreased by 0.39 g/kWh year-on-year, and the energy efficiency of thermal power units remained industry-leading for many years. The Company paid close attention to optimising the energy consumption and achieving the environmental protection targets, and stepped on a new journey of high-efficiency and low-carbon development. The Company strived for excellence of energy consumption indicators, guided and assisted backward power units, and conducted the applications of advanced energy-saving technologies such as wide-load high-efficiency power generation and generalised regeneration in a targeted manner. The leading advantage of key models was continuously consolidated. In addition, the Company consistently drove the green and low-carbon development.

In the future, the Company will continue to promote the transformation of existing power units for thermoelectric power cogeneration technology, implement energy-saving technical retrofits of existing power units and deepen the application of generator unit ratings to facilitate management improvement.



Huangtai Power Plant – Driving Jinan’s Development through Power Supply

Huangtai Power Plant established a leading group for energy conservation to structure a robust three-level management network for energy conservation, actively carry out energy audits, clean energy production, as well as review and certification of cogeneration units, and implement the management responsibilities for energy conservation. In addition, the Plant attached importance to breaking down and implementing energy consumption indicators, carried out various publicity activities, contests and benchmarking, and quantified rewards and punishments to establish and improve online energy monitoring systems such as the “plant-level monitoring information system for thermal power plants”. In 2015, ultra-low emission was achieved in the Plant’s four sets of generating units, and the high back pressure heat supply renovation and the zero-output transformation of low-pressure cylinder of steam turbines were successively completed, significantly increasing the energy saving and emission reduction capacity of the units, and realising the shift from old growth drivers to new ones. The Plant’s quality of flue gas emissions is far better than the national standard. The existing four generating units stay the leading position in major energy consumption indicators. The Plant’s coal consumption for comprehensive power generation is lower than 300 g/kWh. Among the four generating units, No. 7 and 8, which have been in operation for 30 years, have won the first prize for energy efficiency benchmarking among similar units in China for the sixth consecutive year since 2016.



■ Huangtai Power Plant



■ National First Prize Certificate for Energy Efficiency Benchmarking of Similar Units



Qinbei Power Plant #6 Unit Comprehensive Energy Saving Renovation Project Connected to the Grid and Generated Electricity

On May 27, 2021, Huaneng Qinbei Power Plant #6 unit comprehensive energy saving renovation project was connected to the grid and generated electricity, running stably. The transformation maximized the operation safety, economy and flexibility of the unit, and the economic indicators exceeded the leading level of the unit with the same capacity in China. The project uses modern advanced turbine design technology to redesign all components of the high, medium and low pressure flow parts of the turbine, to give full play to the advantages of multi-stage reaction technology, reduce enthalpy drop at all levels, appropriately increase the flow series and improve cylinder efficiency. The intake of steam adopts the structure form of full-circumference intake + supplementary valve to improve the intake efficiency; AIS seal design system is adopted to reduce the loss of steam leakage.



Huaneng Qinbei Power Plant

5.3.3 Water Resources Management

The Company strictly followed the government's requirements for the protection of fresh water and issued the Guiding Opinions for Thermal Power Plant's Water Saving and Wastewater Treatment (《火電廠全廠節水及廢水綜合治理指導意見》) to push forward the plant-wide water saving and wastewater treatment work. The main water consumption of Huaneng International is for power units generating electricity, replenishing water for closed circulating water, and wet desulphurisation, etc. Surface water, urban water, and a small amount of groundwater, etc. are used for generating power, and river water or sea water is used for circulating. In 2021, the overall water consumption of the Company was 23,126.31 million tons, the fresh water in power generation was 361.16 million tons, the open cooling circulation water was 22,765.15 million tons, and the performance value of consumption of fresh water in power generation was 0.79 kg/kWh.

Management Objective

By 2025, the Company is committed to devoting greater effort in the transformation of water conservation for the purpose of zero discharge of wastewater.

Management Mechanism

In accordance with the Company's management systems for technical supervision, maintenance, technical transformation and energy conservation, the various thermal power plants have established a set of water consumption management systems and procedures, which include:

- 1 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.
- 2 An account management system has been constructed, including the whole plant account and 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.
- 3 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.



TRANSFORMATION DEVELOPMENT DRIVEN BY INNOVATION

Management Measures

In 2021, Huaneng International launched the water saving and wastewater treatment work plan in its power plants. As at the date of the report, all its subordinate power plants actively enforced the water saving and wastewater treatment measure. Upon completion of the treatment, the fresh water consumption for power generation has met the criteria set out in the Standards for Energy Saving and Environmentally Friendly Coal-Fired Power Plants of the Company (《節約環保型燃煤發電廠標準》), with sewage discharge meeting the requirements set out in the waste discharge permits and local environmental regulations.

In 2021, the Company faced no imminent threats in terms of tapping water resources. To address the water shortage risk, the Company adopted a precise management approach for water supply and consumption based on the Guiding Opinion for Thermal Power Plant's Water Saving and Wastewater Treatment (《火電廠全廠節水及廢水綜合治理指導意見》) to refine the criteria for recycle of water and classification of use of water and reduce the fresh water consumption. Currently, Weihai Power Plant's seawater desalination project has been put into operation. The projects of water saving and wastewater treatment of all plants in key areas such as Beijing-Tianjin-Hebei and neighbouring "2+26" cities, Yangtze River Delta and Fen-Wei Plain are advanced in an orderly manner.

During the construction period, the Company's infrastructure projects respectively determined domestic water and construction water quota indicators based on the characteristics of projects and on-site construction conditions, and conducted calculation and assessment management separately. When entering into a service contract with the construction unit, the water conservation quota indicators were included in the contract terms for calculation and assessment. In the design stage, the supply and drainage systems of the office and living areas at the construction site shall be reasonably arranged, and a water-saving system shall be applied for domestic water with obvious water-saving marks set at the water source location. In addition, on-site construction organisation shall be strengthened for each project, and the on-site water supply pipe network shall be simple, reasonable, and leak-free through design analysis and rational arrangement at the construction site; a reusable water collection and treatment system shall be established at the construction site to make water resources available for cascade recycling; rainwater collection tanks shall be set up to recover rainwater, which will be used for road spraying, vehicle washing and greening after treatment; domestic sewage treatment stations shall be designed, constructed and put into use in advance, and all the domestic sewage in the construction area will be treated by the sewage treatment stations, the treated water shall be reused for vegetation greening, road spraying, etc. The Company's water resource consumption during the construction of various projects shall be kept within the scope of management objectives.

5.3.4 Emissions management

The Company abides by laws and regulations such as the Environmental Protection Law of the People's Republic of China (《中華人民共和國環境保護法》), the Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution (《中華人民共和國固體廢棄物污染環境防治法》), the Law of the People's Republic of China on Prevention and Control of Air Pollution (《中華人民共和國大氣污染防治法》) and the Law of the People's Republic of China on Noise Prevention and Control (《中華人民共和國環境噪聲污染防治法》), and in accordance with the national policies on environmental protection and policy documents such as regarding ecological environment and energy conservation and emission reduction and the requirements of relevant authorities, the Company has put forward the plan to become a first-class enterprise for environmental protection based on the aim to build a world-class listed power generation company and in consideration of its actual situation. In addition, the ultra-low emission transformation, water saving and wastewater treatment, and comprehensive utilisation of solid waste are fully deployed. The Company attaches great importance to the discharge management of pollutants. All thermal power units are required to install desulphurisation, denitration and dust removal devices and wastewater treatment and other environmental protection facilities. We strengthen the operation, maintenance and repair of environmental protection facilities, and strictly abide by the requirements of sewage permits, and the discharge of pollutants meets national standards and territorial requirements.

During the construction period, the construction unit and each participating unit established a green construction management system, and formulated management systems such as the Overall Planning of Green Construction Project, the Implementation Plan and Detailed Rules of Green Construction Project and the Measures for Green Construction and Energy Saving and Emission Reduction, which were independently defined in the general design of the engineering construction organisation with detailed regulations on green construction and environmental protection. The quantitative control targets for controlling emissions during the green construction process were clarified with specific pollution control measures. The Company's construction projects strictly implemented the requirements of "Three Simultaneities"¹¹ for environmental protection, in accordance with various environmental protection work and environmental protection measures recommended by the environmental impact assessment approval. In addition, we strengthened the stable operation of environmental protection facilities, ensured the emission of pollutants met the standards, and entrusted an environmental protection supervisor to supervise, inspect and guide the implementation.

¹¹ Three Simultaneities: Simultaneous design, simultaneous construction, simultaneous use

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 its subordinate power plants during the process of combustion in the coal-fired utility boiler. The Company's emissions of sulphur dioxide, nitrogen oxides and soot were 28,712.24 tons, 58,347.32 tons and 3,636.08 tons respectively, with emission performance values of 0.07 g/kWh, 0.14 g/kWh and 0.01 g/kWh respectively.

Management Objective

The Company is committed to enclosing all major coal yards of 19 coal-fired power plants in Beijing-Tianjin-Hebei and neighbouring "2+26" cities, with local environmental protection fugitive emission requirements to be implemented strictly. It is expected that the Company's ultra-low emission unit capacity will reach 100% in 2022.

Management Mechanism

The Company formulated the Regulations on Environmental Protection Management (《環境保護管理規定》), Measures for Evaluation and Accountability for Environmental Protection Work (《環境保護工作考核及責任追究辦法》), Operation Management Rules (《運行管理規定》), Overhaul Management Rules (《檢修管理辦法》), Technical Supervision Management Measures (《技術監督管理辦法》) and Management Measures for Capital Expenditure in Electricity Generation (《電力生產資本性支出項目管理辦法》) to ensure the progress on the work related to ecological environment protection and air pollution prevention and control projects.

The Company made full use of its internal information platform to grasp the situation of excessive emission, focused on the analysis of events with long duration, seriously excessive emissions and typical causes, and guided all units to learn from one another and take active measures to improve the Company's overall environmental protection management capability. In addition, giving consideration to the promotion of annual key tasks, major projects, air quality assurance tasks, etc., the Company launched environmental protection inspections irregularly to ensure active and effective rectification of the environmental risk.

Management Measures

To enhance waste gas management, the Company has taken the following measures:

- 1 Enhance the supervision and implementation of work tasks. Enhance the review management of environmental protection renovation projects, optimise review procedures, secure renovation investment, strengthen supervision and management of key process such as bidding process and inspect and supervise key work tasks to carry forward the pollution prevention and control tasks.
- 2 Ensure effective cleaning. Continuously maintain the safe and reliable operation of environmental protection facilities, strengthen real-time monitoring of pollutants discharge, ensure discharge compliance, and effectively control pollutant discharge in accordance with requirements set out in the pollutant discharge permit to secure a leading position in terms of pollutant discharge in the industry.
- 3 Successfully complete the air quality assurance tasks. Ensure good air quality during key hours and weathers with serious pollution, ensure effective pollution prevention and control in key regions such as Beijing-Tianjin-Hebei and neighbouring region, Yangtze River Delta and Fen-Wei Plain, and fully adopt measures such as load reduction of diesel trucks, non-peak-hour transportation and control of fugitive emissions to fulfil the Company's social responsibilities.
- 4 Continuously innovate environmental protection technology. Successfully demonstrate the desulphurisation wastewater bypass exhaust evaporation technology in Huangtai Power Plant and launch the R&D on the digital circulating water waste discharge reduction technology in Mianchi Power Plant to provide experience for the subsequent projects and promote the innovation of environmental protection technology.
- 5 In accordance with the "Four Conservations and Environmental Protection" (energy conservation, land conservation, water conservation, material conservation and environmental protection) standard, the Company makes specific optimisation of the corresponding requirements of green construction in the design process. Emission of hazardous gases from machinery and equipment and vehicles entering and leaving the site shall meet the requirements of national annual inspection, and the emission of welding fume shall comply with the Integrated Emission Standard of Air Pollutants (《大氣污染物綜合排放標準》). The project environment shall be assessed and a report shall be issued on a monthly basis. A continuous emission monitoring system (CEMS) was installed at the site to monitor the soot of flue gas pollutants, sulphur dioxide (SO₂) and nitrogen oxides (NO_x) in real time. During the construction period, there was no excessive emission of hazardous gases during the construction of each infrastructure project.



Work Achievements

In 2021, most of Huaneng International's coal-fired units have achieved ultra-low emissions, with the capacity of 99%. The emission of three major pollutants, namely sulphur dioxide, nitrogen oxides and soot, remained at the same level compared with the same period last year, and has maintained a stable ultra-low emission level and continued to outperform industry peers.



The COAP Research and Development and Pilot Testing Verification Project has Passed the Acceptance Inspection

On 7 May 2021, the COAP Research and Development and Pilot Testing Verification Project developed by Huaneng International has passed the acceptance inspection at Yueyang Power Plant. Through the project, multiple pollutants in flue gas can be removed at one time, achieving "near-zero emissions". Compared with conventional technologies, no limestone, urea and denitration catalyst are required for the COAP technology, and sulphur and moisture in flue gas can be recovered as well, maximising the utilisation of flue gas waste heat, with the operation cost basically equal to that of conventional technologies. Through the technology, flue gas emissions, namely sulphur dioxide and nitrogen oxides, are less than 1 mg per standard cubic metre; and dust emissions are less than 2 mg per standard cubic metre. The removal rate of sulphur trioxide, mercury, hydrogen chloride and VOCs (volatile organic compounds) is higher than 97%. The success of the COAP technology will support the leap-forward development of domestic coal-fired power plants from "individual pollutant control" to "multi-pollutant integrated control", from "ultra-low emissions" to "near-zero emissions", and from "resource consumption" to "resource reuse".



COAP

Future Plan

First, the Company will continue to drive its pollution prevention and control efforts, focus on environmental protection transformation projects in key regions, including close-down of coal field, wastewater treatment, and ash field treatment for power plants, while expediting pollution prevention and control projects such as ultra-low emission renovation for clean energy heating units in the northern region.

Second, the Company will continuously promote clean production practices, enhance permit-based waste discharge management, ensure effective management and control for air quality in key hours and weathers with serious pollution, strengthen the inspection management for environmental protection supervision at different level and improve the prevention and response for public opinion risk related to environmental protection.

Third, the Company will maintain vigorous environmental protection supervision and management, strictly comply with the requirements set out in the Environmental Protection and Pollution Control Accountability Measures (《生態環境保護及污染防治攻堅工作責任追究辦法》), strengthen supervision and site inspection to ensure effective supervision and management of the implementation of air pollution prevention and control tasks.

Fourth, the Company will establish a sound environmental protection standard system, promote the research and development and application of technologies such as integrative removal of pollutants and comprehensive energy saving and environmental protection transformation, and summarise experiences from demonstrative projects to provide guidance to other projects.

5.3.4.2 Management of Greenhouse Gases

In 2020, China made a solemn commitment to reaching “peak carbon dioxide emissions” by 2030 and achieving “carbon neutrality” by 2060. The Company plans to accelerate increase in clean energy during the “14th Five-Year Plan” period, strengthen the transformation and operation of environmental protection equipment of coal-fired units. The Company will also closely follow relevant national policies regarding carbon emission and trade, actively participate in the implementation of the policies and play our role in “peak carbon dioxide emissions” and achieving “carbon neutrality”.

The Company has actively carried out management work related to greenhouse gas, issued related regulations and systems and made timely amendments in accordance with changes in state policies to provide guidance and regulations for carbon asset management and carbon asset trading, etc. The Company has issued the Interim Measures for the Management of Carbon Emissions Trading (《碳排放權交易管理暫行辦法》), covering management institutions and their responsibilities, statistics and reporting of carbon emissions, trade preparation, trading and contract performance, development and trading of emission reduction projects and risk management, etc. In terms of reducing carbon emissions, the Company currently embarks on its work in the two following aspects: 1) focusing on energy saving and consumption reduction through management, structural and technical adjustment, and reducing coal consumption rate for power units to decrease the carbon emission intensity; 2) constantly improving the proportion of the installed power capacity using clean energy through adjustment of energy structure to reduce total carbon emissions.

2021 was the first year in which carbon trade market advanced into its full operational phase in China. According to the Administrative Measures for the Carbon Emissions Trading (Trial) (《碳排放權交易管理辦法(試行)》) issued by the Ministry of Ecology and Environment, the settled carbon emission quota of a performance unit in the current year should be greater than or equal to the actual carbon emissions in the previous year. Considering that the Company’s contract performance of the carbon trade market in 2021 has not been completed, data relating to actual greenhouse gas emissions is considered as trade secrets until the contract performance is completed. Therefore, the relevant data is not disclosed in this report, until the contract performance is completed by the end of 2022.

Carbon Reduction Targets

The Company is to achieve peak carbon emissions as soon as possible through structural adjustment and energy saving and consumption reduction efforts.

Carbon Asset Management

The Company carried out the following work:

- 1 The Company actively responded to the national carbon emission market trading and provided feedback and suggestions with thorough study of key management rules and quota allocation plan for the carbon market to gain favourable policies;
- 2 The Company issued regulations on carbon trading management and aligned its carbon trading management model with the national carbon market;
- 3 The Company strengthened the centralised and professional management for carbon trade. All grassroots enterprises of the Company have appointed Carbon Asset Management to provide one-on-one training and assist them in completing carbon emission audits and carbon trading;
- 4 The Company organised data reporting, inspections and account opening, cooperated with system tests and actively participated in first batch of trading;
- 5 The Company prepared the contract performance plan based on the dynamic calculation on quota surplus and deficit and took advantage of CCER offset policies to reduce contract performance costs. Enterprises in the pilot regions successfully completed the national carbon market contract performance tasks for 2019 to 2020, meeting emission performance standards for the 8th consecutive year;
- 6 The Company organised business training concerning carbon trade and continuously improved the management capability on the carbon trade.



TRANSFORMATION DEVELOPMENT DRIVEN BY INNOVATION**Performance in Carbon Trade Pilot Regions**

In accordance with the national and pilot carbon market work arrangements, enterprises in Beijing, Tianjin and Guangdong continued to complete 2020 contract performance tasks in the pilot carbon market. The Company's grassroots units in the above pilot regions appointed Carbon Asset Management to conduct carbon emission audits and carbon emissions trading. All of them successfully met the annual carbon trading and contract performance targets in accordance with the pilot requirements of lead local agencies. All other regions were included in the national carbon market.

Participation in National Carbon Emission Trade Market

Continuously improve centralised and professional management of carbon asset. The Company has established a three-level carbon emission management system to specify the bodies and personnel responsible for carbon asset management, and has formed a mechanism for work handover among the various levels of management staff to establish the division of labour and implementation responsibility. All grassroots enterprises of the Company have appointed Carbon Asset Management to assist them in completing carbon emission audits and carbon trading.

Actively participate in the policy study for the national carbon trading market. The Company closely monitored the policy development related to the construction of the national carbon trade market, carbon trade in pilot regions and voluntary emission reduction development and offset rules so as to keep ahead of the latest trend.

Actively participate in the performance of carbon quota trade across the country and in pilot regions. The Company organised subordinate companies to perform calculation and allocation of carbon emission quota and completed contract performance of carbon quota as required.



Shanghai Shidongkou 120,000 Tons Per Year Phase-change Carbon Dioxide Capture Project

Relying on the CO₂ capture device of 120,000 tons per year, Huaneng Group Clean Energy Technology Research Institute Co., Ltd., Huaneng Shanghai Branch and Huaneng Shanghai Shidongkou Second Power Plant started the renovation of the phase-change carbon dioxide capture device in September 2021. Huaneng (Shanghai) Power Maintenance Co., Ltd. was responsible for the construction and completed the on-site renovation and acceptance on 10 December 2021. At the end of December 2021, after continuous and stable operation for more than 72 hours, the first phase-change carbon dioxide capture demonstrative device of 120,000 tons per year in China, developed by Huaneng Group Clean Energy Technology Research Institute Co., Ltd., was officially put into operation at Huaneng Shanghai Shidongkou Second Power Plant. The industrial verification would be carried out subsequently over phase-change carbon dioxide capture technology, along with a comprehensive assessment of key technical indicators under long operating cycle such as solvent loss, corrosion and degradation, and regeneration heat consumption. According to the calculation, the renovated device, compared with the original device, saves around 30% of the regeneration steam heat consumption. The device can produce 120,000 tons of liquid carbon dioxide per year with a purity of 99.7%, which can be used in food, chemical engineering and industrial manufacturing.



120,000 tons/year Phase-change Carbon Dioxide Capture Device

Future Plan

The Company will pay close attention to national carbon market policy issuance, actively participate in policy formulation and research, and make timely response plans for trading; continuously strengthen centralised and professional management of carbon trading and utilise collaborative resource advantages of marketing personnel to continuously explore the integrated operation strategies of the power-carbon market; organise the data reporting of carbon emissions, carbon trading and contract performance as required, continuously improve the technical support quality, and strengthen the supervision and management of carbon trading, ensuring the completion of national carbon market tasks as scheduled.

5.3.4.3 Wastewater Management

The Company generates a certain amount of wastewater in the process of electricity production, including those from the concentration of steam turbine circulating cooling water, the wet desulphurisation facilities, the auxiliary production facilities of the generator set, the coal field flush as well as sanitary sewage.

In 2021, the total water discharge of the Company amounted to 20,781.65 million tons, the discharge of open cooling circulation water totalled 20,755.11 million tons, and the total discharge of sewage (including industrial and desulphurisation wastewater) was 26.54 million tons. Some of these wastewater were allowed to be discharged when they reached a certain standard after treatment, e.g. wastewater from circulating water; some were reused after treatment and cannot be discharged, e.g. those from desulphurisation facilities and coal field flush; and certain power plants did not allow any wastewater to be discharged to achieve zero discharge. In accordance with the national pollution prevention and control requirements, the Company rigorously implemented the sewage discharge licensing requirements and formulated the wastewater discharge transformation plan. Nearly 63% of the enterprises have started wastewater treatment, which is expected to be completed by 2022.

The Company adopted the following measures in the management of wastewater treatment and discharge:

- 1 The Company rigorously implemented the applicable water pollution policies and sewage discharge licensing requirements. All thermal power plants of the Company obtained the corresponding sewage discharge licenses as scheduled;
- 2 Inspection and rectification were carried out against the sewage discharge licensing requirements. A company level comprehensive pollution prevention and control plan was formulated based on environmental protection requirements at various levels, and power plant water saving, and wastewater treatment transformation projects were launched in an orderly manner in accordance with the requirements of local governments and environmental assessment;
- 3 The Company also performed on-site checks and inspections of environmental protection facilities, including wastewater treatment units;
- 4 The Company continuously improved its environmental protection system by formulating the Guiding Opinions on Water Saving and Wastewater Discharge Transformation to ensure the compliance with environmental protection requirements through research and optimisation;
- 5 The Company actively adopted the latest wastewater treatment technology and launched wastewater transformation demonstrative projects.



Future Plan

The Company will continue to strengthen water pollution control and promote the enhanced treatment and comprehensive utilisation of industrial wastewater and domestic sewage, as well as launch wastewater zero discharge transformation projects in an orderly manner in areas where specific environmental protection requirements apply.

With the gradual deepening of wastewater treatment work as well as the increased wastewater treatment technology research efforts by domestic tertiary institute, Xi'an Thermal Power Research Institute Co., Ltd. ("Xi'an Thermal") and Huaneng Clean Energy Research Institute, we will formulate a roadmap for developing practical, reliable and cost-effective wastewater treatment technology. We will gradually carry out thermal power plant water saving and wastewater comprehensive treatment transformation in key areas in order to eventually enable all thermal power plants to comply with the updated pollutant discharge licensing requirements, with some reaching even higher standards.

5.3.4.4 Waste Management

The Company's disposal of wastes strictly complies with laws and regulations such as the Law of the People's Republic of China on Prevention and Control of Solid Waste Pollution (《中華人民共和國固體廢物污染環境防治法》) as well as the Company's regulations including the Regulations on Environmental Protection Management(《環境保護管理規定》), the Measures for Evaluation and Accountability for Environmental Protection Work(《環境保護工作考核及責任追究辦法》), the Management Standards for Solid Waste(《固體廢棄物管理規範》), the Governance and Management Standards for Desulphurisation By-products(《脫硫副產品治理管理規範》), the Governance and Management Standards for Fly Ash(《粉煤灰治理管理規範》), etc. The Company requires that the storage, discharge, and disposal of waste comply with national laws and local policies. We also cooperate with qualified third parties to deal with waste and strengthen waste recycling to minimise waste emissions.

Management Objective

In accordance with the Law of the People's Republic of China on Prevention and Control of Solid Waste Pollution (《中華人民共和國固體廢物污染環境防治法》) and in adherence to the principles of "reduction, recycling, harmlessness" in the prevention and control of solid waste pollution, the Company actively promotes the compliant and comprehensive utilisation of solid waste and insists on source management with whole-process responsibility system and traceable information management in place. The hazardous waste management plan is filed in accordance with regulations with such waste stored, transported and disposed of as required. The comprehensive ecological protection treatment and transformation for ash disposal area is expected to be completed by 2025.

Non-hazardous Waste

Huaneng International's production activities are mainly concentrated in the area of power production and 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 desulphurisation in power plants. The Company produced 4,707.38 ten thousands tons of solid waste, among them, 3,738.26 ten thousands tons of fly ash and cinder, and 969.12 ten thousands tons of desulphurised gypsum during the year of 2021 were generated. The comprehensive utilisation rate of fly ash and cinder stood was 92.20% and the desulphurisation gypsum disposal utilisation rate was 87.07%.

Fly ash and cinder, desulphurisation gypsum and other solid waste can be sold as raw materials in related industries, such as cement, concrete, aerated blocks and gypsum board. The Company has established an environmental protection supervision and management system for fly ash and cinder, desulphurisation gypsum and other solid waste to effectively control the canning, stacking and marketing of fly ash and cinder and desulphurisation gypsum.

When loading cinder and gypsum, the Company rigorously follows the operational norm for load control, separates the cinder and gypsum and controls the load capacity during transportation and conducts thorough check and cleaning before vehicle entry to prevent "escape, spill over, dripping and leakage" of solid wastes. Most of the cinder and gypsum collected from boilers will be directly transported to the processing plants for secondary use. 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 power plants will temporarily place some fly ash and cinder on ash storage sites and the Company 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 local environmental protection authorities, 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 local environmental protection standards.

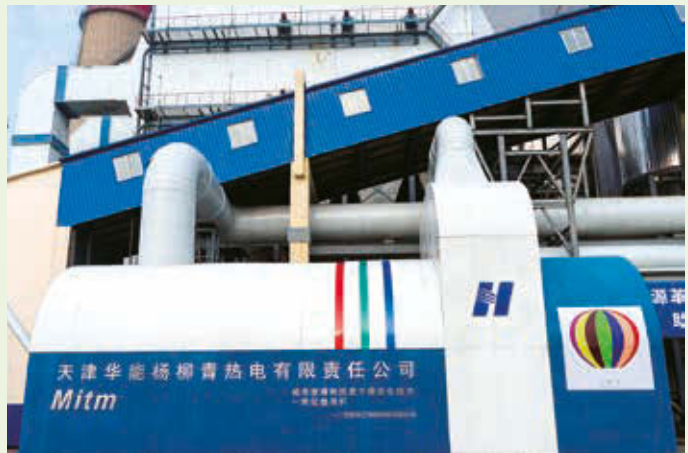
In the construction project, the generation of waste is effectively reduced at the project site through relevant measures such as permanent and temporary combination of roads and office locations. The project waste is collected by classification, stored in a centralised way and cleaned up regularly, and corresponding units are entrusted to clear and transport it regularly. The gravel and earthwork construction waste from the project is used as the on-site roadbed backfill material to realise harmless treatment.



Huaneng “Municipal Waste Pre-Drying Carbonisation Technology” was Successfully Applied in Industrialization for the First Time

On January 30, 2021, the coal-fired coupled sludge power generation project of Unit 5 of Huaneng Yangliuqing Thermal Power Plant passed EIA monitoring and officially entered commercial operation. This marked the first successful industrial application of “municipal waste pre-drying carbonisation technology” with independent intellectual property rights, which filled the gap in the field of sludge power generation in Tianjin and provided the best way for the reduction and harmless disposal of sludge in Tianjin.

The project adopts the “municipal waste pre-drying carbonisation technology” of Huaneng Changjiangxi Thermal Boiler Environmental Protection Company with completely independent intellectual property rights, and builds two sets of integrated processing systems with a processing capacity of 250 tons/day. The set of “drying, carbonization, grinding, transmission” is an organic whole, with simple process, short process, no secondary pollution such as waste gas, waste water. The products after incineration are discharged by the existing tail flue gas purification equipment of the unit, which can effectively handle bacteria, microorganisms, etc. in the waste, at the same time to prevent the formation of harmful substances such as dioxins.



Integrated Treatment Equipment for Municipal Waste Pre-drying Carbonisation Technology





The First Sludge-coupled Power Generation Project in Jining Was Put into Operation

On 21 December 2021, the No. 5 and No. 6 power units of Huaneng Yunhe Power Plant, the only pilot enterprise in Jining, successfully achieved continuous operation for 72 hours in the sludge-coupled power generation project, which was the second key application of the independent intellectual property rights "municipal waste pre-drying carbonisation technology" in the industrial construction. In the project, the sludge was dried and milled by extracting high-temperature flue gas from the boiler tail flue. The dried sludge then entered the hearth with the flue gas and was incinerated by the boiler. The incinerated product was purified by the flue gas purification equipment at the boiler tail and discharged after meeting the standard. The project was planned to dispose of 230 tons of municipal sludge per day and nearly 60,000 tons of domestic sludge per year, accounting for almost 40% of the total domestic sludge in Jining's urban area.

The sludge-coupled power generation project is an important practice of the Company in fulfilling its social responsibility. With utilisation of coal-fired thermoelectric power cogeneration units, the project achieves multi-path methods for sludge treatment that the sludge is disposed of in adherence to the principles of "harmlessness, stabilisation, resource recovery and greenisation", which can provide reliable support to the stable operation of urban sewage treatment plants, as well as contribute to the fight against pollution control and protection of the environment.



Sludge-Coupled Coal-Fired Power Generation Project of Yunhe Power Plant

Hazardous Waste

The main hazardous waste produced by the Company during the process of power generation includes such hazardous solid waste as used denitration catalysts and ion exchange resin deactivated in wastewater treatment, as well as hazardous 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. Inactivated ion-exchange resin from chemical water treatment can be restored to its original state for reuse after being rinsed with mineral acids or alkalis of a certain concentration. The Company will, based on relevant requirements, hire qualified agencies to deal with denitration catalysts that could not be renewable anymore, 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 will detail statistics on the amount of waste generated, the amount of disposal, and the audit of the qualifications of disposal units, etc., and strictly manage the generation and disposal of waste. In 2021, the Company, in the process of production and operation, generated 7,602.35 tons of denitration catalysts, 577.15 tons of ion exchange resin and other hazardous solid waste and 1,277.32 tons of waste oil and other hazardous liquid waste.

Future Plan

The Company will continue to strengthen waste recycling and strive to minimise waste emissions. In addition, the Company will well implement environmental protection transformation projects in key regions, including close-down of coal field and treatment of ash field for power plants.

5.3.5 Other Environmental Impacts

Huaneng International always handles its operations with great care to minimise their impact on the environment, and performs strict management of noise, dust and the environment of engineering projects in accordance with the Law of the People's Republic of China on Noise Prevention and Control (《中華人民共和國環境噪聲污染防治法》).

5.3.5.1 Noise Management

From the initial stage of the construction of power plants subordinated to the Company, relevant departments of environmental protection determined the sensitive points of noise within the boundaries of power plants and relevant noise control level, in accordance with environmental impact assessment approval requirements. Each construction site formulated noise reduction measures in strict accordance with the requirements of the state's Standards for Environmental Noise Emission at the Construction Sites (《建築施工場界環境噪聲排放標準》) and performed regular inspection and recording of noise at the construction sites. Noise control during the construction period was mainly to control the noise source. Low-noise construction machinery and transportation vehicles were used for each project, and the repair, maintenance and management of equipment, construction machinery and transportation vehicles were strengthened to avoid noise generated by abnormal operations. Noise reduction and sound insulation measures have been adopted for strong noise sources such as noise from construction machinery and equipment, pipe flushing, sandblasting, and spraying construction. The strong noise equipment at the construction site was installed on the side far away from the residential area. Noise reduction measures such as closing or setting up noise reduction walls are adopted for strong noise equipment and steam pipe blowing was notified of in advance. The noise control during the construction of each project met the requirements of national standards. In the environmental completion acceptance of the power units in all power plants, the monitoring authorities will monitor according to the environmental impact assessment approval requirements, and only when the monitoring results are qualified will the acceptance concerning noise control pass. During the operation of power units, the power plants entrusted relevant monitoring authorities to regularly monitor the noise control regularly in accordance with requirements of environmental protection authorities and published the monitoring reports in different 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 as the cooling water tower area. When the power units are undergoing transformation or equipment failure happens which causes excessive noise, the Company will conduct noise reduction transformations accordingly.

In 2021, the Company paid more attention to noise management and organised research project on "technical standards for noise control in coal-fired power generation projects", which could effectively guide the power plants to improve noise control after construction and renovation.

5.3.5.2 Dust Impact

Other environmental impact generated by power plants also includes coal field dust, ash field dust and unorganised emissions from non-road machinery. All power plants owned by the Company during their initial stage of construction are all required to pass the environmental impact assessment approval by the relevant environmental protection departments, in order to avoid serious impact on the surrounding environment and natural resources during operations. During operations, the power plants strictly abide by national environmental emission standards, and discharge wastes within the standards. Some of the power plants actively responded when the requirements of surrounding environment changed, to ensure that the surrounding environment and natural resources are protected. To enhance the management of unorganised emissions from coal yards, the Company has carried out coal field closure retrofits in key areas and introduced wind and dust suppression nets, covers and sprays to effectively control coal and dust pollution from coal fields and improve their surrounding environments. In terms of engineering construction, all participating units have carried out construction in strict accordance with the green construction plan and organisational measures, and suppressed the generation of dust by taking measures such as regular spraying and construction road hardening.

5.3.5.3 Environmental Impact of Engineering Projects

The environmental impact of the Company's projects is fully considered in the process of feasibility study before the projects enter the approval or filing stage. In terms of land location, the Company, with strict reference to government land planning, avoids ecological red line areas, agricultural land, etc., so as to prevent the resultant ecological problems. After the location is determined, the Company conducts a systematic survey of the environment of the project's location at the feasibility study stage, and prepares a detailed environmental management and monitoring plan based on actual condition and relevant regulations. Before the construction begins, the Company fully considers the environmental protection measures of the project during stage of construction and operation, and earnestly implements relevant regulations to reduce impact on the surroundings, ensuring that the environment will be restored through land reclamation, vegetation restoration and other measures after the completion of the construction, and rigorous monitoring and treatment of pollutants, electromagnetism, noise, etc., are carried out based on the requirements of relevant laws and regulations on environmental protection. When economic benefits permit, we strive to integrate power generation projects with environmental protection, promote the preliminary investigation and implementation of ecological projects, and make positive contributions to local environmental governance and improvement.



06



Safety is the foundation for the development of an enterprise. Huaneng International always adheres to its high standard of safety risk culture, solidly implemented its three-year action plan on special rectification of safety production to improve the safety production management system, enhance safety production management capability, fundamentally eliminated potential dangers and prevent and resolve major safety risks to ensure the safety of our people and facilitate high-quality development of the Company.



SOLIDIFYING THE BOTTOM LINE FOR SAFE PRODUCTION



Solidifying the Bottom Line for Safe Production

In accordance with the Production Safety Law of the People's Republic of China (《中華人民共和國安全生產法》) and other production safety laws and regulations, Huaneng International regards safety as its top priority, builds a solid foundation for safe production, pays attention to the inspection and remedial of safety hazards, has a zero-tolerance policy for safety incidents, permanently adheres to the production safety principles of "people-oriented, safety first, prevention first, comprehensive management", upholds the safety conception of "safety is credibility, efficiency, competitiveness, and responsibility of safety is of the greatest significance". The Company aims to prevent production fatality accident, mishandling of operations with malicious intent, major equipment damage, serious and extraordinary serious equipment incidents, fire outbreaks, traffic accidents for which someone is held responsible, environment pollution and other incidents that may adversely affect the Company's reputation. The Company places safety in the first place and attaches great importance to the personal safety and occupational health of employees. We strengthen the red line awareness and effectively implement safe production.

The Company has identified five key safety management tasks for this year: (1) continuously carried out inspections and evaluations of the work safety responsibility system, ensured the establishment of a list of responsibilities for each post, standards for the work in place, and accountability mechanisms, sorted out, summarized, and notified common problems to encourage enterprises to make joint corrections; (2) promoted a dual prevention mechanism and made earnest efforts in the implementation of Guidelines for Classified Safety Production Risk Control (《安全生產風險分級管控導則》); (3) vigorously strengthened safety management in infrastructure construction and promoted an intrinsic safety management system in this regard; (4) learned from the accidents and focused on the weakness in outsourcing safety management and the system implementation, to enhance outsourcing safety management. Meanwhile, strictly controlled outsourcing personnel's entry, and enhanced rectifications for violations to ensure construction safety; (5) made thorough preparation for safe production in the flood seasons to get through the flood safely. The Company is committed to achieving the overall objectives of strengthening the implementation of safety responsibility, improving outsourcing management and enhancing natural disaster response capabilities through the above key tasks.

In 2021, there had been no significant violation identified in the Company related to providing a safe working environment and protecting the employees from occupational hazards. In 2021, the number of employee deaths due to duty was 1, with the ratio of 0.0017%. In 2019 and 2020, the number and ratio of employee deaths due to duty was 0.

6.1 Consolidating the Closed-loop of Intrinsic Safety

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, which comprises intrinsic safety of personnel, process equipment, environment and management, including:

Ensuring Intrinsic Safety of Personnel

Intrinsic Safety of personnel includes management staff and all employees' safety awareness, safety conception and safety management knowledge and skills. Management staff are required to have safety management knowledge and skills and lead by example, while employees are required to ensure safe operation by carrying out adequate controls. The safety behavior of employees should gradually change from passive to active, and we urged employees to act in accordance with rules and regulations, and show good safety behavior everywhere.

Ensuring Intrinsic Safety of Equipment

Intrinsic safety of equipment refers to the fact that equipment, facilities, or process technologies contain inherent functions that prevent accidents from an occurrence. We adhered to high design and manufacturing standards and conducted a systemic safety risk analysis of process, equipment, inspection and maintenance. We also put forward and implemented risk control measures to ensure the safe, stable and regular operation of equipment and systems within the prescribed operating and maintain effective control.

Ensuring Intrinsic Safety of Environment

Environment includes space environment, physical and chemical environment, the natural environment, etc. Environment safety thus means meeting all kinds of requirements. For the intrinsic safety of the spatial environment, we made sure that the production space, layout, various safety and sanitation facilities and passages complied with the state's relevant regulations and national standards. For the intrinsic safety of the physical and chemical environment, effective measures were taken to manage and control lighting, ventilation, temperature and humidity, noise, dust and toxic and harmful substances in compliance with national standards to ensure workers' health and safety. As for the intrinsic safety of the natural environment, we enhanced the disaster resistance and prevention capabilities of process and equipment and implemented emergency response and precautionary measures.

Ensuring Intrinsic Safety of Management

Intrinsic safety of management requires, under the condition of fulfilling national laws and regulations, companies' formulation and implementation of higher standards on safety, norms, and regulations, as well as their development of a comprehensive management system. In respect of safety management, we were transitioning from post-incident based to identification-based in addressing safety issues, and we were placing more emphasis on process controls rather than remedial efforts in responding to safety incidents. We also sought to apply safety system engineering principles and conduct scientific analysis in formulating pre-emptive measures.

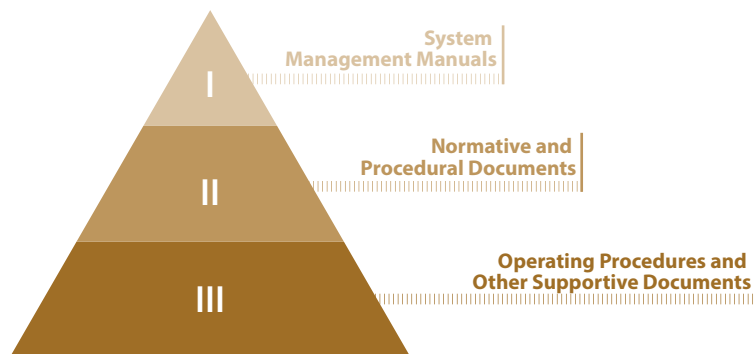
The PDCA Management Model of Intrinsic Safety System

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



SOLIDIFYING THE BOTTOM LINE FOR SAFE PRODUCTION

The Company's Intrinsic Safety System's documents consist of system management manuals, standards and procedural documents, as well as operating procedures and other supportive documents, mainly including the Administrative Measures for Production Safety Supervision (《安全生產監督工作管理辦法》), the Regulations on Production Safety (《安全生產工作規定》), the Implementation Rules for Safety Performance Assessment (《安全績效考核實施細則》), and the Emergency Management Measures for Major Incidents (Accidents) (《重大突發事件(事故)應急管理辦法》) of the Company, etc.



In 2021, the Company continued to develop its Intrinsic Safety System:

- 1 The Company was fully prepared for epidemic prevention and control under the standard production safety work, through issuing the Highlights on the Priorities for Safety Management During the Pandemic Prevention and Control (《疫情防控期間安全管理重點工作提示》), the Safety Production Priorities in 2021 (《2021年安全工作要點》), and the Selected Production Safety Accident Cases (《生產安全事故案例選編》), to guide grassroots units in developing resumption plans, delivering risk alert or warning education on accident cases and strictly practising epidemic prevention and control and safety production.
- 2 In line with the State Council Work Safety Committee's deployment, the Company implemented special rectifications for safety production, and formulated the Three-year Action Plan for Special Rectifications for Safety Production (《安全生產專項整治三年行動方案》). The Company vigorously managed the "Two Lists"¹² and carried out unannounced or uninformed inspections following the principle of "Site Visit subject to Four Noes"¹³, timely reported issues and fulfilled responsibilities for the purpose of rectification and improvement on safety production management.
- 3 In order to enhance risk control and prevent safety risks, the Company issued and implemented the Guidance on Classified Control and Management of Safety Production Risk (《安全生產風險分級管控導則》), comprehensively promoted the construction of the "dual" prevention mechanism of graded risk control and hidden danger detection and management and implemented the essential safety management system for infrastructure construction. In addition, the Company developed a constraint system for contractors and introduced detailed rules to launch a "blacklist" to manage contractors. Meanwhile, the Company conducted special inspections on hazardous chemicals, network-related safety, restricted space, and power supply during special event periods.
- 4 The Company strengthened emergency management and scientific innovation, explored the construction of scenario-based emergencies and carried out more emergency exercises to enhance its emergency response capability. Besides, the Company promoted its achievements in safety technologies, of which 22 projects were recommended for the National Award for Safety Technology Progress.

¹² "Two Lists" refers to the risk list and potential hazards inspection and clearance list.

¹³ "Site Visit subject to Four Noes" refers to site inspection or visit by going straight to grassroots units or sites with no announcement issued, no notice given, no report accepted and no accompanying person required.

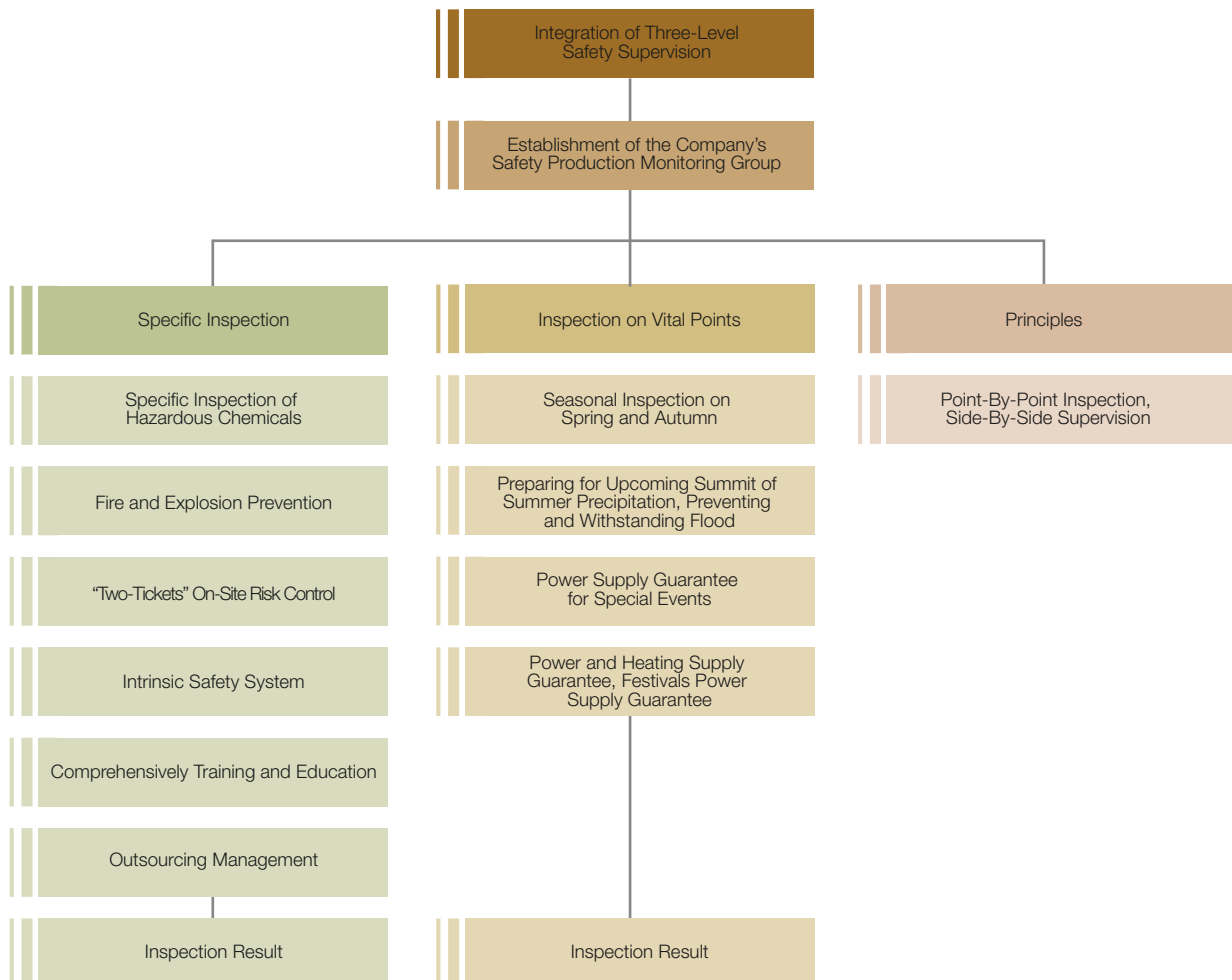
6.2 Consolidating the Foundation of Safety Development

The Company and all its affiliated units have established a robust safety management structure and a complete set of safety supervision mechanisms to fulfil safety supervision responsibility. As the management, construction and operation maintenance team and other business functions incorporate the safety production principle with their business line to better form a safety production protection system. The interaction of safety supervision and protection ensures the accomplishment of safety production targets.

Establishing a Three-Tier Safety Supervision System

Huaneng International has set up a Committee of Safety, Occupational Health and Environmental Protection, which mainly aims to adhere to the policy of “safety first, prevention first, comprehensive management”, implement the national, industrial, and Huaneng Group’s guidance and arrangements on safety production, organise and guide the Company’s work of production safety, analyse and propose essential decisions and measures concerning production safety, and coordinate and solve critical problems therein. Under the leadership of the Committee of Safety, Occupational Health and Environmental Protection, the Company has built a three-level safety supervision system made up of “headquarters – regional branches – grassroots business units” to ensure intrinsic safety in production and operation. The Company takes charge of system design, business strategy, on-site supervision and work assessment. Regional branches are responsible for implementing the Company’s various safety management requirements, work plans and deployment decisions, giving full play to the role of organisation and coordination as well as specifying the major responsibilities of their affiliated grassroots units. Grassroots business units are tasked with implementing the Standard on the Fulfilment of Production Safety Responsibilities (《各級人員安全生產責任到位標準》), ensuring all personnel’s fulfilment of their respective safe production responsibilities and enhancing their consciousness of responsibility.

The Company and all its affiliated units have established a robust safety management structure and a complete set of safety supervision mechanisms to fulfil safety supervision responsibility, and together with the safety protection mechanisms, ensure the accomplishment of safety production targets.



SOLIDIFYING THE BOTTOM LINE FOR SAFE PRODUCTION**Safety Production Target Responsibility System**

The Company and its subsidiaries have adopted a target responsibility system concerning production safety. Every year the Company's management and their subordinate unit's person in charge sign the Safety Production Target Responsibility Memorandum (《安全生產目標責任書》) and carry out monthly pre-assessment and yearly final assessment to guarantee that the responsibilities are fulfilled at each level. The Company's target of safety production abides by "one vote veto", which refers to a quantitative evaluation of production safety performance of each unit with a starting score of 100 points. If there is any injury or death accident of employees, injury or death accident of contracted personnel for which the Company is responsible, serious equipment accidents for which the Company is responsible, fire disasters, environmental pollution and damage accidents for which the Company is responsible, 100 points will be deducted.

6.3 Adopting Vigorous Safety Measures

Huaneng International sees safe production as paramount. The Company has taken comprehensive and effective measures in system improvement, risk control reinforcement and emergency management through the responsibility system to promote the implementation of safety production, and solidly implemented special rectifications for safety production, contributing to the continuous enhancement of safety production.

Overall Production Safety

Facing COVID-19, the Company made concerted efforts for pandemic prevention and control, overcoming the difficulties and ensuring the power supply. In line with the deployment in the State Council Work Safety Committee's Three-year Action Plan for Special Rectifications for Safety Production throughout the country, the Company implemented special rectifications, ensuring power supply during important events and periods. The Company also carried out flood prevention and control to defend against the worst natural disasters over 20 years. In 2021, there was no severe safety injury, or accidents that occurred at the Company.

**Jinling Power Plant Implement "Combo Punch" of the Safety Production Month**

During 2021, Jinling Power Plant focused on the theme of "implementing safety responsibilities and promoting safe development", aiming to complete the 100-day safety power protection task for the 100th anniversary of the founding of the Communist Party of China with high quality and safety production throughout the year, focusing on doing a good job in safe production under the normalization of epidemic prevention and control, continued to carry out special rectification of electric power production safety, and make a solid "combination punch" for safety production month.

Strike a good "responsibility punch", strengthen double prevention. The Company practiced the new safety development concept, activated the safety supervision and prevention system, strengthened the control measures, and laid a solid foundation for the safety of the production site.

Strike a good "supervision punch", strengthen on-site control. The Company took the construction of dual prevention mechanism as the starting point to improve the level of risk control, extending from the traditional "behaviour supervision, operation supervision, on-site supervision" to "policy and regulation implementation supervision, system and regulation implementation supervision, management efficiency improvement supervision".



Employees of Jinling Power Plant Sign Their Names on A Safety Propaganda Banner



Jinling Power Plant

Strike a good "publicizing and implementation punch", strengthen the participation of all staff. Combined with on-site operation, safety training and team management, the Company accurately detected the weak links in safety management and carried out targeted "consultation and pulse detection" to improve the "safety quality" of all staff.

By popularizing safety knowledge, improving safety quality of all staff, enhancing risk prevention, cultivating safety culture, and implementing safety responsibility of all staff, Jinling Power Plant has carried out safety production monthly activities in an all-round way, and made efforts to promote safety management level to a new level.

Carrying out Comprehensive Safety Inspections to Eliminate Hazards in Time

- 1 Strengthen process tracking and make decisions in real time. We hold daily morning meetings concerning safety production to analyse problems, keep abreast of the safety production conditions of the grassroots units, release security instructions, and deploy related work in time. We established three WeChat Groups for flood prevention to release early warning timely and get unimpeded flood information. We also prepared daily reporting of dynamic flood information, providing information support for flood condition analysis and deployment decisions;
- 2 Enhance organisation management to ensure that responsibilities are individual-specific and the on-duty policy is strictly implemented. The leading groups at all levels take the lead in fighting the floods;
- 3 Strengthen the routine investigation and handling of potential hazards. We focus on the hazards identified to ensure thorough risk prevention and control with measures in place and hazards being properly managed;
- 4 Put emphasis on "personnel safety". We inspect the slopes around the production and living areas, as well as the prevention and avoidance of debris flow, to ensure that production and living facilities avoid hazardous areas;
- 5 Strengthen emergency management, carry out emergency exercises, improve emergency plans and ensure adequate reserve for emergency materials;
- 6 Strengthen monitoring and early warning, take emergency response measures timely and scientifically. We cooperate with local governments by following the orders, actively participating in emergency rescue and rescuing personnel in time.



SOLIDIFYING THE BOTTOM LINE FOR SAFE PRODUCTION**Implement Safety Responsibility Assessment, Strengthen the Responsibility**

In line with the State Council Work Safety Committee's deployment, the Company put ongoing efforts in safety responsibility assessments, developed position responsibilities, performance indicators and accountability mechanisms, and summarised and reported safety issues for rectification. The Company formulated the Three-year Action Plan for Special Rectifications for Safety Production (《安全生產專項整治三年行動方案》). The Company vigorously managed the "Two Lists" (potential risks and countermeasures) and carried out unannounced or uninformed inspections following the principle of "Site Visit subject to Four Noes" towards Huaneng Beijing Thermal Power Plant and other enterprises.

Strengthen On-site Management and Control, and Improve Safety Risk Management and Control Ability

- 1 We urged each business unit to conduct on-site risk investigation and analysis to "identify potential dangers and quantify risks" from the perspectives of personal safety, equipment safety and environment safety based on the "Two Tickets" policy, putting together a risk identification database and standardising the "Two Tickets" management process. We continued to promote the construction of the "dual prevention" mechanism combining classified risk control and potential risk inspection and clearance, systematising and standardising potential risk inspection and classified risk control. In addition, the abilities of grassroots business units in risk identification, analysis and control were further improved.
- 2 Based on the construction of the dual prevention mechanism, the Company strengthened potential risk inspection and clearance and on-site supervision while standardising the "Two-ticket, Three-policy" management process for grassroots units. We took a zero-tolerance attitude towards non-compliance and imposed stringent controls on key areas, key procedures, key event periods, key positions and key persons to strengthen safeguards and prevent casualties. We focused on the investigation of fire risks in power supply, coal transportation, boiler fuel oil, lubricating oil, desulphurisation, hydrogen and other systems, as well as the management of liquid ammonia tanks to prevent accidents such as explosions of the four major pipelines and pressure vessels to minimise the risk of major accidents.
- 3 The Company continued a series of special treatment projects and special inspections, covering dangerous chemicals and major hazards, fuel systems, outsourcing standardised acceptance, metal supervision, flood prevention and control, fire safety and fall prevention to prevent the occurrence of accidents. In addition, the Company promoted the construction of the safety production risk monitoring and warning system for hazardous chemicals, urged business units to sort out and classify their existing risk sources and connect to the government's safety production risk monitoring and warning system for hazardous chemicals in accordance with local governments' requirements and time limits.
- 4 The Company enhanced the safety management for natural gas pipelines and issued the Notice on Enhancing the Safety Management of Natural Gas Pipelines (《關於加強天然氣管道安全管理的通知》), strengthened the tour inspection on equipment pipelines, vigorously controlled the third party construction risk, established accountability for the safety management of natural gas pipelines, enhanced pipeline corrosion control and management and facilitated the implementation of internal and external inspection to ensure effective risk control for gas pipelines. At the same time, the Company organised experts to conduct special safety inspections in Suzhou Thermal Power Plant and Guilin Gas Turbine Power Plant.



Huangtai Power Plant Made Assiduous Efforts in Ensuring the Safety

Huangtai Power Plant was fully committed to safety production with a focus on power supply. With the advent of the summer, rainfall in the area where the Power Plant located gradually increased. Huangtai Power Plant attached great importance and took various measures to satisfy the peak power consumption in summer and prepared for flood prevention and control, ensuring power units' stable operations even in extreme weather. To cope with the peak consumption in summer, the Huangtai Power Plant planned, arranged and implemented earlier in conjunction with the characteristics of the summer flooding season and the problems identified in spring inspection, comprehensively investigating risk hazards from the safety responsibility, hazards inspection, economic operation, and equipment maintenance, rectifying the safety vulnerability, and formulating flood prevention plans. The Plant conducted flood prevention exercises and special potential hazards inspection, made technology breakthroughs, and strengthened technical supervision and operation management. The Plant counted emergency materials and ensured normal operations of equipment and devices by enhancing operators' abilities as well as waterproof and anti-thunder devices with overtemperature protection. On the occasion of the 20th national "Safety Production Month", Huangtai Power Plant held the launch ceremony for the 2021 "Safety Production Month" with the theme of "Implementing Safety Responsibilities and Promoting Safe Development". The Plant innovated work system and carried out a variety of activities including safety production publicity, education and training, investigation and rectification of potential hazards, and emergency exercises. The Plant also provided safety production trainings for outsourced teams, laying a solid foundation for the safe and stable operation of the power grid.



Strengthen Equipment Inspection



Operators Carefully Supervise and Inspect

Enhancing Safety Risk Awareness, Improving Staff's Emergency Response

The Company revised the Emergency Management Rules (《應急管理辦法》), the General Contingency Plan (《總體應急預案》) and six unique contingency plans in accordance with the Management Rules on Contingency Plans for Production Accidents (Order No. 2) (《生產安全事故應急預案管理辦法》(2號令)) and the Rules on Response for Production Accidents (Order of the State Council No. 708) (《生產安全事故應急條例》(國務院令第708號)) issued by the Ministry of Emergency Management of China to further improve the compliance and feasibility of the policy and contingency plans. The Company acknowledged that theory and practice should be united. Therefore, it established related management rules and conducted a series of emergency exercises to improve emergency response capability.

The Company continued to promote scenario-based emergency exercises expanding from traditional accident scene emergency simulation to enterprise-local government cooperation in disaster relief, crisis response, and aftermath recovery. Based on such comprehensive scenario-based exercises, the Company identified issues, refining emergency response processes and enhancing the emergency response capacity and efficiency. The Company organised emergency exercises regarding black-start and liquid ammonia leakage in Laiwu Power Plant and Changchun Thermal Power Plant, strengthening the emergency management team and enhancing the staff's emergency response.

6.4 Caring and Safeguarding Occupational Health

The occupational health of our employees has always remained Huaneng International's top concern. Based on compliance with the Labour Law of the People's Republic of China (《中華人民共和國勞動法》), the Production Safety Law of the People's Republic of China (《中華人民共和國安全生產法》), the Prevention and Control Law of Occupational Diseases of the People's Republic of China (《中華人民共和國職業病防治法》) and other laws and regulations, the affiliated units of the Company formulated the Occupational Disease and Hazard Management Standards (《職業病危害管理規範》) and the Occupational Health Supervision and Management Standards (《職工健康監護管理規範》) in accordance with the requirements of the Company's intrinsic safety management system. We always put our employees' health and safety first by raising awareness of work safety and preventing hazards. The Company strictly implemented regular safety hazard inspection, hazard notification, prevention and control and offered regular health checks for positions with occupational disease and established a health monitoring file management system for positions at different levels to ensure that the occupational health and safety were under control.



SOLIDIFYING THE BOTTOM LINE FOR SAFE PRODUCTION

All grassroots business units have set up occupational disease prevention organisations to implement 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. Regular occupational health examinations, i.e., chest X-ray and hearing test, were conducted for employees in relevant production positions such as fuel supply, boiler operation and overhaul, and an established occupational health management database was in place. The Company provided climbers or elevators in all new projects to reduce the possibility of specific occupational diseases (such as lumbar disc herniation) from the wind power industry. Projects already put into production were also required to have the equipment to reduce the staff's climbing exercise intensity and reduce the inducing factor for diseases.



Beijing Thermal Power Plant Targeted the Critical Period of Epidemic Prevention and Control

Go where there is epidemic, fight it till it perishes. Beijing Thermal Power Plant has set up a prevention and control emergency command organization headed by the person in charge of the plant to take precautions, prevent and deal with large-scale infectious disease emergencies, avoid adverse effects on production safety due to the epidemic, so as to ensure the safe and stable operation of plant units. The Company has done a good job of factory security, strictly checking the incoming vehicles and personnel certificates, prevent irrelevant personnel from entering the factory and strictly screening the production related incoming vehicles to ensure that the order of the power plant is controllable. The Company comprehensively sorted out the statistics of all employees (including temporary employees) in and out of Beijing during the Spring Festival, and distributed masks, disinfectants and other epidemic prevention materials to employees. The Company has disinfected the office area and living area in time. The canteen, dormitory, office, production site and other areas in the factory were disinfected twice a day to ensure that there are no dead spots in the disinfection area. The Company actively carried out propaganda and psychological guidance on epidemic prevention and control to the power plant personnel, made use of the power plant's home page and wechat working group to timely release epidemic prevention and attention matters, called on the majority of Party members and cadres to fully carry forward the vanguard and exemplary role, guided all staff consciously to "do not believe rumors, do not spread rumors", and earnestly fulfilled the social responsibility.



Establishment ceremony of Anti-epidemic Production Readiness Team of Beijing Thermal Power Plant

6.5 Improving Employees' Safety Awareness

Raising employees' safety awareness is the key to the Company's safety management. Developing and encouraging employees to participate in the Company's all kinds of security activities to establish appropriate security behaviours is the key guarantee to create an intrinsic safety enterprise.

Safety Training Management Mechanism

Huaneng International has incorporated safety education and training into the Company's annual and middle- and long-term plans, established double-level and triple-level educational and training mechanisms, and ensured the supply of required coaches, funds and training materials. The Company is responsible for preparing training plans according to the safety education outline, organisation of safety education and training, and recording and archiving of safety training. All business units of the Company ensure that employees receive adequate training, and adjust safety education plans and organise training for power plants, departments, and teams according to departments' and teams' production characteristics.

Provision of Safety Training

In June and July 2021, the Company invited renowned national electrical safety experts to the Company's headquarters twice to conduct trainings on "prevention of personal death" in the "25 key requirements for preventing power production accidents". In August and September, workshops concerning production management, safety management, risk prevention and control as well as technical supervision were held, and the responsible persons in charge of production of each subsidiary unit participated in the training.

6.6 Tightening the Focus on Infrastructure Safety Management

The Company is devoted to infrastructure safety management and promoted an intrinsic safety management system in this regard. In addition, the Company focused on the weaknesses in outsourcing safety management and system implementation to enhance outsourcing safety management. The Company strictly controlled the selection of outsourcing personnel and enhanced rectification measures for violations to ensure construction safety. The Company formulated the Regulations for the Safety Management of Power Engineering Construction (《電力工程建設安全管理規定》), specifying rules on how contractors fulfil safety management in contracting power engineering construction and regulating the accomplishment of the safety management target.

Strictly Manage Contractors' Qualifications

The Company ensures that only qualified contractors can participate in any project construction. The contractors are strictly examined for the qualifications, performance and bidding documents. Bidding is only open to contractors with qualifications, proven performance and adequate capabilities for the project. Those with a history of major safety accidents are prohibited from bidding for the Company's projects.

Strictly Manage Subcontracting

Any form of illegal subcontracting is strictly prohibited. The contractor must obtain the construction unit's consent for subcontracting and the subcontractor must have corresponding qualifications and safety production license. Contractors assume overall responsibilities for on-site production safety. They shall strengthen on-site management and control by incorporating their subcontractors into its safety management system and implementing similar safety measures.

Strictly Manage Safety Training and Education

The Company requires contractors to launch safety production training and education, establish a safety training system, specify the safety production training department and its principal, formulate an education and training plan for safety production, establish employee safety training filing records, regularly identify safety education and training needs and assess the effectiveness of training to continuously improve employees' awareness of safety and self-protection.

Deepen the Implementation of the Responsibility Subject

The Company has established a sound safety production responsibility system, specified the responsible personnel, scope of responsibility and assessment standards for each safety production position, as well as safety management responsibilities for construction at all levels, and strengthened safety supervision and management, ensuring the effective operation of the safety supervision and assurance system.

Enhance On-site Safety Control

The Company vigorously improves safety through technology, develops and promotes the function of smart infrastructure security module to assist on-site safety control, implements closed management of construction sites by strict access control, tightens management and control of employees' conducts and working process, and reduces habitual violations. The Company also prepares and approves a technical scheme for operation safety and fulfils technical disclosure for construction safety and on-site safety supervision to control safety risks of contractors effectively.

Enhance Potential Risk Inspection and Mitigation

The Company organises contractors to carry out a large-scale on-site safety inspection at regular intervals to assess timely, record and file the potential safety risks identified. The Company is responsible for supervising contractors to formulate and implement rigorous mitigating safeguards and actions plans as well as the acceptance of the potential hazards mitigation for closed-loop management of preventing potential risk and improving the infrastructure safety.



ENHANCING THE TALENTED TEAM BUILDING





07



Human resource is our first primary resource. The sustainable development of talents is the driving force to the Company's sustainable development. Human resource is essential to the success of the Company. Regarding employees as the foundation for the Company's long-lasting prosperity, Huaneng International is dedicated to building professional teams, prioritising employees' rights and interests, recognising employees' value and building a development platform to promote joint development of the Company and its employees.

Enhancing the Talented Team Building

7.1 Protecting Employees' Rights and Interests

We are devoted to the goal of “maintaining long-term, stable and good relationships with its employees” and the principle of “lawful employment and equal employment opportunity”. We create an environment where everyone has a chance to contribute and achieve career development and self-worth. We are dedicated to improving employees' sense of fulfillment and happiness while continuously enhancing unity within the Company.

Lawful Employment Equity

The Company adheres to two major principles, namely lawful employment and equal employment opportunity, strictly abides by the Labour Law of the People's Republic of China (《中華人民共和國勞動法》), the Labour Contract Law of the People's Republic of China (《中華人民共和國勞動合同法》) and the Provisions on the Prohibition of Use of Child Labour (《禁止使用童工規定》), as well as the Administrative Measures for the Recruitment of College Graduates (Trial) (《高校畢業生招聘管理辦法(試行)》), signs employment contracts with all staff and prohibits the employment of any minor under the age of 16. The Company has consistently strictly implemented national laws and regulations on the minimum age limit and clarified the rights and obligations of both parties regarding labour and employment to avoid the risks of violation such as the use of child labour and forced employment at the institutional and operational levels. The Company provides equal opportunity and protection to staff with different nationalities, races, genders, religious beliefs and cultural backgrounds. We offer equal terms to male and female employees, oppose forced labour and job discrimination and adopt an equal employment policy through the entire employment period of each employee. As the Company is exposed to a lower risk of employing child labour and forced labour, there is no need to establish remedial measures for the violation identified.

As of the end of 2021, the Company had a total of 57,513 employees, of whom 81% had received college qualifications or above. In 2021, no labour dispute arising from breaches of laws and regulations occurred.

Protection of Employee Rights and Interests

Upholding our “people-oriented” principle, the Company regards employees as the primary resource and has established a comprehensive and robust system to protect employees' fundamental rights and interests. We strive to be a caring employer and improve employees' loyalty, and we take employees' concerns to heart.

Basic Protection: In strict accordance with the requirements of the Labour Law of the People's Republic of China (《中華人民共和國勞動法》) and the Social Insurance Law of the People's Republic of China (《中華人民共和國社會保險法》) concerning employees' rights and obligations, the Company has set up several social insurances including basic pension, basic medical insurance, work-related injury insurance, unemployment insurance and childbirth insurance as well as housing provident funds, annuities and supplementary medical insurances to ensure that employees' rights are protected in the event of retirement, medical treatment, work-related injuries, unemployment or childbirth. In 2021, the Company did not have any social insurance violations or defaults.

Compensation System: The Company, based on the employee's “position, performance, work efficiency and the principle of equality”, has established an effective incentive mechanism under which employee's compensation is linked to the Company's operating result and the employee's individual performance. An employee's total compensation includes basic salary, bonus, and allowance, and is paid on time and in full amount.

Right for Leave and Vacation: The Company and its subsidiaries have established sound leave systems in accordance with the state policy and local policy. The standard working hour system or flexible and aggregated working hour system is adopted based on the Company's production condition and the employee's position to protect the employee's right to take leave. The leave system specifies that leaves shall include official holiday, paid annual leave, home leave, marriage leave, funeral leave, maternity leave, sick leave and personal leave, thereby protecting staff's right to take a vacation.

Democratic Management and Openness of Factory Affairs

The Company continues to deepen democratic management to promote a more open and transparent business. In 2021, the Company successfully held the 2021 annual employee representatives' conference. The Company's proposals were solicited from the employee representatives with a response and handling rate of 100%, and the Company adjusted the representative supervisor of the 10th Board of Supervisors, fully activating employees' proactiveness and enthusiasm in participating in the Company's management. The Company deepens transparent business and democratic management to enhance the scientific democratic management, formulates measures for the transparent business list system and timely adjusts the corresponding leading team of the Company, thus protecting employees' rights to know, participate, express and supervise and promoting joint development of the Company and its employees.

7.2 Promoting Employee Development

In the spirit of "human resource as the primary resource of the Company", Huaneng International vigorously promotes its talent-driven development strategy. With talent capacity building as the core and optimisation of talent structure as the main task, we develop talent resources, optimise talent allocation, improve talent ability quality, create an environment for talent growth, and activate talent innovation by seizing the three links of attracting, training and making good use of talents. In doing so, we can build 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.

Training and Development

To strengthen the construction of a training organisation system and further improve the three-level training system consisting of "headquarters – regional branches – grassroots business units", the Company has established nine group-level training bases (training classrooms). All grassroots business units have training centres to actively carry out training related to technology, skills and management.

The Company strictly follows the Regulations on Team Leader Training (《班組長培訓規定》) and the Regulations on Production Worker Training (《生產人員培訓規定》) to facilitate a training that meets the needs of the Company and employees at the regional branches and grassroots business units based on the actual situation. Focusing on the critical tasks of the year, the Company has developed the 2021 training plan, actively and steadily promoting training related to professions, skills and management. Based on the actual situation, each regional branch has formulated its training plan, comprehensively summarising the training work of this year, studying and proposing training plans and ideas for the next year, to improve the training work further.

In 2021, the Company, regional branches and grassroots business units conscientiously fulfilled the annual training plan, coordinated and organised on-board training for recruits, business management training and production skill training. They also carried out various skill contests, technical competitions and on-the-job exercises where 3 employees were awarded the "Great National Craftsmen" title, 4 were awarded the "National Technical Expert" title, 4 were awarded the "Power Industry Craftsmen" title, 2 were awarded the "Power Industry Outstanding Operator" title, 9 were awarded the "Huaneng Craftsmen" title, and 28 were awarded the "Huaneng Group Technical Expert" title. The Company also organised occupational skill appraisals where hundreds of employees received technician certification and thousands of employees received senior technician certification. These activities have effectively improved staff's management capability, standards of business and production skills.



Career Development

The Company focuses on employees' career development. The Company continues to optimise the talent allocation and growth environment, provides diversified career development paths and further promotes the dual hierarchical promotion mechanism whereby employees can move up the corporate ladder either by post or job function. The system is aimed at stimulating employees to work hard and injecting vitality into the Company.

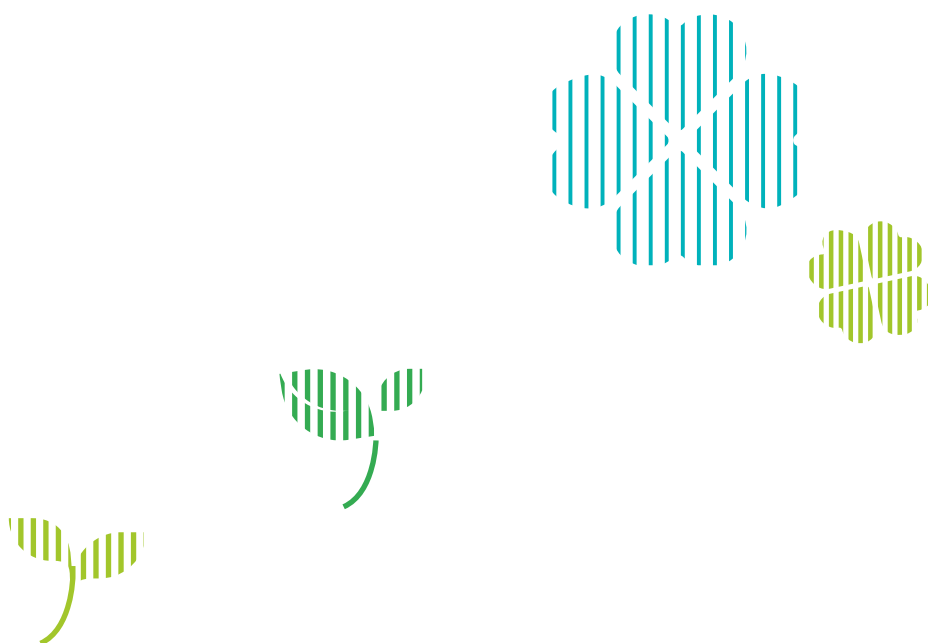
The Company makes more efforts to refine its talent system and mechanism and optimise the recruitment procedure and evaluation mechanism for professional and technical positions. The Company promotes employees with outstanding skill sets and performance or those whom their peers well recognise. Through this approach, the Company has built an excellent platform for talents to showcase their potential.

The Company continues to strengthen its core management team. Upholding Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, and implementing CPC's roadmap in the New Era, we adhere to the basic principles of "evaluating candidates by their moral integrity and professional competence with priority given to the former and appointing those with good merits" to select and appoint cadres. Moreover, we persist in the correct orientation for the selection and appointment of people and concentrate on developing both the Company and Huaneng's business to select the cadres with the right political ideology, strong sense of duty and great performance. We train the leaders in practice through job rotation and promoting communication, thereby facilitating talent flow and optimising human resource structure. In addition, we continuously improve management's performance to manage complex situations and build a talent team of high-quality and professional cadres, which meets the standards of qualified management in the new era who are loyal, honest and responsible.

The Company continuously strengthens talent development, deepens the cultivation of international talents, actively and steadily carries out training work, proactively carries out title management and talent evaluation work, and optimises employee recruitment to improve core management and professional teams' comprehensive skills and management capability.

In 2021, the Company further strengthened the selection and training of young cadres, continuously improving the age structure and stimulating young employees' working enthusiasm. The Company formulated development plans for young talents and enhanced talent training with the consideration of Youth League Committee's work, providing a platform for outstanding youth to practise and strengthen their ability, so as to help the Company develop versatile talents.

In the future, the Company will deepen the reform of labour, personnel and distribution system, further improve talent cultivation mechanism, optimise talent development environment, strengthen talent resource development and encourage staff to continuously improve themselves in their positions to achieve self-realisation and joint development of the Company and staff.



7.3 Caring Occupational Health

Employees are fundamental to the development of the Company. Huaneng International can continuously and steadily supply energy for economic and social development based on the hard work and dedication of all employees. The Company always adheres to the people-oriented development concept and vigorously implements the talent-driven development strategy to enable staff and enterprises to grow together, sharing the fruits of reform and development, which fills employees' work and life with happiness.

In 2021, the Company organised employees to participate in various essay solicitation, art exhibition solicitation, calligraphy, painting and photography collection activities with the theme of celebrating the 100th anniversary of the founding of the Communist Party of China, and diversified and colourful online and offline cultural and sports activities such as walking, friendship activities for young employees for 47 times. At the time of Women's Day, the Company actively organised female employees to participate in the knowledge contest about the Party history and "Shu Xiang Women's Day" reading activity. Through these activities, the Company continuously improves the cohesion and centripetal force of employees and makes positive contributions to the high-quality development of the Company.



Online Psychological Counselling for Overseas Employees

The Company puts efforts in serving the employees by actively conducting employee visit and providing assistance to employees in difficulties on festivals, to boost the harmonious development of employees and the Company and the social harmony. The Company regards the life safety and health of employees as the priority and provides comprehensive physical examination and cancer prevention screening for employees every year. Besides, the Company attaches great importance to the prevention and control work of COVID-19 and actively provide health services for employees, especially pays great attention to the physical health of overseas employees, sends letters for consolation in time, and makes plans for the stabilisation of Chinese employees working abroad. We also organise personnel stationed in Singapore to actively participate in online psychological counselling and "A Letter From Home" activity.



08



As a responsible corporate citizen, Huaneng International has always adhered to the harmonious development concept of “serving the nation, benefiting the society, seeking multiple wins and growing together”. We fully consider and effectively respond to the demands of stakeholders and actively devote ourselves to serving or operating areas. Furthermore, we cooperate with stakeholders to push forward economic and social development, share development fruits to give an impetus to build a harmonious and win-win society.



*MAKING CONCERTED
EFFORTS TO
SEEK COMMON
DEVELOPMENT*



Making Concerted Efforts to Seek Common Development

8.1 Deepening Supply Cooperation

Building trusted and cooperative relationships with suppliers are crucial to realizing the Company's strategy. Our policy is to remain open, fair and just in working with suppliers, and we emphasise effective communication to strive for suppliers' understanding and recognition of the Company's corporate values and culture. We hope to maintain long-term and mutually beneficial relationships with suppliers and jointly promote the stable and sustainable development of the industry.

Based on the supply category, the Company divides our suppliers into three categories: materials, service and engineering. The Company's supplier management emphasises the importance of Classified management, rigorous acceptance control, quantitative assessment and dynamic maintenance".

Supplier Development

The Company's business units at all levels conduct supplier stocktakes and analysis each year to try to identify more high-quality suppliers. Meanwhile, the Company solicits eligible suppliers through various channels, such as procurement guides, mass media, product launches, product showcase (sales) events, industry associations, employee recommendations, public tenders and supplier liaison.

Supplier Acceptance

The Company's business units at all levels impose stringent controls on supplier acceptance. Only suppliers with a good reputation, advanced technologies, excellent product performance and strong ability to perform are accepted, and accepted suppliers are scrutinised for the legality of their business operations and the authenticity of their qualifications, among other things.

Supplier Selection

We select suppliers in an open, fair and just manner, considering their environmental and social impact. Procurement activities are classified into two categories, namely tendering procurement and non-tendering procurement. Tendering procurement includes open tender and invitation to tender, while non-tendering procurement includes competitive negotiation, quotation and single-source procurement. Tender projects shall be conducted openly according to the law, related work procedures shall be carried out in strict accordance with national laws and management systems of the Company, and all procurement activities shall be implemented publicly through the procurement management platform and e-commerce platform to achieve the goal of "every effort shall be made for tender and all activities shall be carried out publicly".

The Company requires all suppliers taking part in a tender to have the ISO 14001 environmental management systems certification and the ISO 9001 quality management systems certification. Suppliers included in the List of Enterprises with Serious Illegal and Dishonest Acts by the industry and commerce administration authorities in the National Enterprise Credit Information Publicity System, or the List of Dishonest Persons Subject to Enforcement by the Supreme People's Court on the website of "Credit China" or credit information sharing platforms at all levels are prohibited from participating in procurement activities. And the tendering documents or response documents of those who have participated in procurement activities are invalid. Suppliers whose related relationships are prohibited by law and agents and suppliers sub-authorised are prohibited from participating in the procurement activities of the same project. And the tendering documents or response documents of those who have participated in procurement activities are invalid.

Supplier Assessment

Supplier assessment is based on the "user assesses" principle. Based on Huaneng's procurement management platform, the Company's various business units conduct comprehensive and annual assessments on the project implementation of suppliers who have contractual relationships with each unit. Suppliers will receive assessment feedback through the e-commerce platform, which serves as an essential reference for future procurement.

Supplier Monitoring

In response to the quality problems occurring in the provision of procurement services by suppliers as well as the problems in suppliers' integrity, delivery, and service during the course of their participation in warehousing applications, procurement activities, and contract performance, the Company will, depending on the severity of the problems, take punitive measures such as downgrading, suspension of the award of contracts, and suspension of cooperation within a limited time.

Coal Procurement

As a large power generating company, Huaneng International places much emphasis on fuel supplier management. The Company formulated the Fuel Supplier Management Measures (《燃料供應商管理辦法》), which specifies the classifications of suppliers and their corresponding management measures and regulates the supply channels and procurement activities for fuel purchase. Suppliers are generally divided into four categories: A: strategic suppliers, B: general long-term suppliers, C: key market suppliers, and D: general market suppliers. The Fuel Supplier Management Measures (《供應商管理辦法》) also stipulates responsibilities for the development and review of suppliers at all levels, selection criteria, supplier approval and decision-making institutions and procedures, supplier assessment, supplier upgrading and downgrading, exit mechanism, etc.

In 2021, Huaneng International implemented the procurement mode of “long-term agreement + spot” in fuel procurement. Aiming at large coal mine operators, the Company negotiates directly with the suppliers to sign long-term agreements. And procurement is carried out in spot trading through open tender, tender follow-up and tender negotiation. To avoid causing substantial disturbance to the market during the process of fuel tender, Huaneng International controls the procurement scale of each batch, selects representative coal types and flow directions each time, and creates a competitive procurement environment. In doing so, Huaneng International finds out a low market price, seeks resources of “dead end”, and reduces central procurement price. At the same time, Huaneng International performs tender follow-up and tender negotiation with competent suppliers at the tender price to keep the source of goods in batch and meet the demand. Through the procurement mode of open tender, tender follow-up and tender negotiation, Huaneng International not only finds out the lowest market price but also expands the procurement volume at such price, yielding an ideal procurement fruit. Therefore, our tendering price is the market signpost of price.

The Company selects suppliers with great care and carries out the authorised approval procedures for shortlisted suppliers. Priority is given to state-owned large mine operators and large coal mine operators, and a “plant-mine direct supply” model is adopted. In our view, state-owned large mine operators are more able to fulfil contracts, have more stringent product quality controls, are more compliant with laws and regulations and are more likely to take social and environmental responsibilities. On the other hand, large coal mine operators are subject to stringent environmental protection requirements imposed by the state concerning their planning, design, infrastructure, exploitation and goaf management. Only those coal mine operators that meet these requirements are allowed to operate and construct. After phasing out unproductive coal mine operations in recent years and releasing advanced production capability, coal production work has further improved in terms of quality, environmental protection standards, safety and labour protection. There is also a specific set of requirements formulated by the Country for the recruitment of miners in large coal mines. By selecting state-owned large mine operators and large coal mine operators, we ensure that suppliers fulfil their social, environmental, and labour protection responsibilities and obligations.

Regarding the monitoring and management of suppliers, the Company's subsidiaries assess suppliers each year in terms of coal supply stability, contract performance, contract fulfilment, production volume, procurement pricing and dispute resolution. The Company's fuel supplier assessment principles include: (1) Classified management; (2) User takes responsibility; (3) Regular assessment; (4) Dynamic management with an exit mechanism. The Company's various business units perform fuel supplier management inspections from time to time, examining: (1) Whether the relevant supplier management system is sound, whether the decision-making institutions at all levels of supplier management are established, and whether the institutions operate normally; (2) Whether an implementation of such system is in place and whether the access work is standardised; (3) Whether fuel supplier assessments are objective and accurate; (4) Whether dynamic management of suppliers is carried out based on assessment results; and (5) Whether the exit mechanism is put in place.

Always taking the green development concept of “energy saving, emission reduction, clean and environmental protection” as the guide, Huaneng International regards environmental protection as a prerequisite for the survival and development of the Company with the basis on national conditions and energy reform trends. Correspondingly, the coal-fired structure is optimised ceaselessly during the development process to improve resource utilisation efficiency. In the process of fuel procurement, strictly abiding by the Interim Measures for the Quality Management of Commodity Coal (《商品煤質量管理暫行辦法》) promulgated by the state, the Company prohibits the purchase of low-quality coal that fails to meet the national control standards while encouraging the use of high-quality resources of high-calorie, low-sulphur and low-ash, which has made outstanding contributions to the national targets of achieving the annual target of controlling energy consumption and carbon emissions and promoting energy saving and emission reduction.



8.2 Providing Quality Service

Huaneng International is devoted to providing power grid companies and other downstream enterprise consumers with high-quality power products and services in sharing the Company's achievements with clients whilst ensuring a safe and stable power supply. The Company formulated Heat Supply Management Measures (《供熱管理辦法》), Marketing Management Regulations (《市場營銷管理規定》), Electricity Market Trading Management Measures (《電力市場交易工作管理辦法》) and other marketing-related systems to regulate customer service processes. In 2021, the scale of electricity transactions in the provincial and municipal electricity markets accelerated. The Company made use of various channels through electricity sales companies to strengthen the development of power users, with a variety of customer types, a relatively stable number and electricity consumption of large users signed for the whole year, and a rapid increase in the number and electricity consumption of small and medium-sized users. Adhering to the customer-oriented service concept, the Company established a customer service mechanism, and conducted promotion meetings, regular communication via telephone and regular return visits to understand customer needs and solve their problems about electricity. The Company also actively developed value-added services for customers, providing information consultation, quotation agency, electricity consumption monitoring, energy consumption diagnosis, energy saving transformation, operation and maintenance, financial service, etc., so as to continuously improve customer satisfaction and maintain harmonious customer relationships. When receiving customer complaints, the Company immediately transfers the complaints to regional branches and grassroots units, and supervises them to handle the complaints in accordance with the management regulations and procedures.

The Company adopted the following three approaches to improve customer service quality and customer satisfaction and gain greater access to the end customer market further.

- 1 Continuously improve the level of professional technology and electricity sales services, fully consider the differentiated needs of users, and provide users with accurate and high-quality services.
- 2 Establish the service concept and a customer service system, which reflects the warmth of our service and technical professionalism, thus drawing customer relationships closer and improving adhesiveness of users.
- 3 Encourage the development of chargeable value-added services for individual needs, promote the rapid development of value-added services, and actively explore business models that combine carbon trading with electricity trading.

8.3 Fulfilling Social Responsibilities

Huaneng International has always adhered to the harmonious development concept of "serving the nation, benefiting the society, seeking multiple wins and growing together", by actively responding to the call of the state, providing supports and assistance, earnestly fulfilling our social responsibilities and giving an impetus to build a harmonious and win-win society. Major energy media such as "Learning Power" APP, China Electric Power News, China Electric Power Magazine (《中國電業》) and the official WeChat of China Electric Power News reported on the Company's 2020 Sustainability Report (《2020年度可持續發展報告》) upon its release in August 2021, which received widespread praise in the industry and enhanced the Company's brand influence and reputation.

According to the requirements of the SASAC on facilitating the rural revitalisation by central enterprises and the Group's work plan for poverty alleviation through consumption in 2021, we consolidated and expanded the achievements of poverty alleviation to facilitate the rural revitalisation, thus ensuring the constant efforts at paired assistance and poverty alleviation through consumption. By conducting the practice of "bring tangible benefits to the masses", we invited experts from academy of traditional Chinese medicine to the Company to carry out health diagnosis and treatment activities of "treating before disease attack" for employees, so as to better play the important role of the labour union in making concerted efforts to move forward.

Assisting in Rural Revitalisation

In 2021, the Company carefully summarised its experience in poverty alleviation, focused on the rural revitalisation strategy, and carried out targeted assistance initiatives to successively provide assistance in industry, consumption, education and infrastructure. Combining the characteristics of resources in the poverty-stricken areas, the Company gave full play to the advantages of its main business, and invested in the construction of photovoltaic assistance projects such as centralised photovoltaic agriculture and photovoltaic fishery to help solve local electricity shortages and stimulate local economic growth.

In terms of supporting the construction of infrastructure in areas that have been lifted out of poverty, the Company has invested more than 10 million RMB to improve the education, medical care and living conditions for those in difficulties, and promote sustainable rural development. With respect to consumption poverty alleviation, the Company organized online and offline multi-channel procurement of products, and adopted new forms such as live broadcasts with goods, and carried out assistance and sales activities. The accumulated purchase of agricultural products in poverty alleviation areas throughout the year exceeded 50 million RMB. Tuas Power of Singapore earnestly fulfilled its social responsibilities and provided anti-pandemic assistance to the Indian Red Cross Society through the Singapore Red Cross.



Chongqing Branch Contributed to Rural Revitalisation with Heart and Soul

Chongqing Branch contributed to rural revitalisation with heart and soul in the following five major aspects. In terms of talent support, Chongqing Branch selected and appointed the chief secretary stationed in Zhongba Village, Zhongxian County, Chongqing, whose work was well received by local villagers so far. In terms of education poverty alleviation, the Executive Director and the secretary of the Party Committee of the Branch went into the classrooms of Xinsheng Secondary School to tell historical stories of the Party to students, motivating them to change their fate with knowledge. They also presented books to the school and sponsored three students to attend school, thus contributing to the development of education. In terms of project poverty alleviation, Chongqing Branch contributed RMB400,000 to renovate the Party and Community Service Centre in the village and develop the village e-commerce platform. Through the "agricultural and sideline products + Internet + logistics", the villagers could sell agricultural and sideline products without leaving home, which helped them make money and increase income. In terms of poverty alleviation with care, representatives of the Branch paid several visits to old party members and villagers in Zhongba Village, and brought them daily necessities such as rice, oil and milk, making them feel "warm and love". Meanwhile, taking advantage of Huaneng's professional, the League members of the Branch were organised to maintain power lines to ensure the safety of power consumption for villagers in Zhongba Village. In terms of consumption poverty alleviation, the procurement of agricultural and sideline products from Zhongxian County in Chongqing, Yulin City in Shaanxi and Cangxi County in Sichuan amounted to nearly RMB2 million, which drove the enthusiasm of local villagers to make money, increase income and develop the industry.



Chongqing Branch donated books to Zhongxian Xinsheng Middle School



Volunteers Activity of Chongqing Branch





Guizhou Branch – “Caring for Poor Students and Helping Them Grow into a Useful Person”

In active response to the call of the local government, the Guizhou Branch continued to implement the voluntary assistance action of “Caring for Poor Students and Helping Them Grow into a Useful Person”, and carried out various public welfare activities such as donating money to assist students and sending warmth and love to poor students in Guizhou, which were highly praised by the local government and education department. From August to September 2021, a large number of League members of Guizhou Branch visited village households in Jindou Town, Weining County and Gangwu Town, Guanling County to carry out the activity of “Poverty Alleviation Through Increasing People’s Confidence and Helping Them Acquire Knowledge and Skills”. They also built a platform to offer help and support about growth and development, provided advices on college entrance examination application for 18 freshmen-to-be, and granted subsidies totalling RMB24,000, which convincingly improved the effectiveness of poverty alleviation through education and showed the responsibility of the Company in rural revitalisation.



Volunteers Activity of Guizhou Branch



Hubei Branch Contributed to Rural Revitalisation through Creating New Projects

According to the work deployment in rural revitalisation made by the CPC Hubei Provincial Committee and the People’s Government of Hubei Province, Hubei Branch provided paired assistance to Gaojiagou Village, Sanguandian Street, Danjiangkou City. The Branch and the working team stationed in the village actively communicated with the local government, conducted in-depth research and visits, and agreed to help Gaojiagou Village develop the project of integrated agriculture and tourism demonstration park – Gaojiagou, Land of Idyllic Beauty, with investments and donations of RMB1.8 million. This project is adjacent to the Danjiangkou Reservoir and with a magnificent and beautiful natural landscape, Hubei Branch aimed to create a rural revitalisation industry project integrating leisure and vacation, cultural tourism, and health wellness. After completion, the project would effectively increase the collective income of the village, drive the development of local industries, and achieve the effective connection between the consolidation and expansion of poverty alleviation achievements and rural revitalisation.



Gaojiagou, Land of Idyllic Beauty



Shanxi Branch Helped the Younger Generation of Baiguansi Village through Education

Shanxi Branch's working team stationed in the village deeply realised that the rejuvenation of the country depends on the young generation, and education is the key to the rejuvenation. In 2021, the working team stationed in villages adhered to "increasing people's confidence" and "helping them acquire knowledge and skills", made great efforts for poverty alleviation through education in Baiguansi Village, and carried out a series of publicity and education to inspire and nurture villagers with advanced culture. The work team actively communicated and coordinated with village officials, took the initiative to visit students' families and help eligible students register for the "Dewdrop Project", fill in their personal information and deal with the formalities. In 2021, a total of 8 rural students were funded by education alleviation.



Registration for the "Dewdrop Project"- Shanxi Branch



Anhui Branch Boosted Rural Revitalisation Through Industrial Revitalisation

Huangchong Village in Anhui Province, a village enjoying paired assistance from Anhui Branch, suffered from a flood in 2020. Anhui Branch made an in-depth analysis of the flood and its causes, took the initiative to help Huangchong Village in post-disaster reconstruction, specially assisted the implementation of land governance projects, levelled and upgraded the affected farmland, and built 440 mu of high-standard demonstration farmland. In 2021, thanks to the good drainage and flood control ability of the demonstration farmland, the demonstration farmland had a bumper harvest, with a yield of more than 750 kilograms of rice per mu and an increased production and income of more than RMB800,000, despite the widespread damage in the surrounding areas. The project solved the problem that the output of the waterlogged land in the east and west village has been reduced or even lost due to the floods this year, and effectively enhanced the "hematopoietic" ability, which was warmly praised by the masses.



Huangchong Village has a Bumper Harvest



BUILDING AN INTERNATIONAL BUSINESS PLATFORM





09



Huaneng International successfully acquired 100% equity in Singapore Tuas Power Ltd. (“Tuas Power”) in 2008. 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.



Building An International Business Platform

About Tuas Power

Tuas Power owns Tuas Power Station and Tembusu Multi-Utilities Complex (TMUC). In 2021, the cumulative electricity market share of Tuas Power was 19.2%.

Tuas Power Station has been providing safe, reliable and efficient electricity supply to Singapore since 1999. The Station currently has five units of gas-fired Combined Cycle Plants (CCP) in operation that contribute to the country's electricity demand at a high reliability performance of over 99%.

The Tembusu Multi-Utilities Complex commenced operation in 2013, and it serves the petrochemical industries in the Tembusu area of Jurong Island. TMUC comprises a Biomass Clean-Coal (BMCC) cogeneration plant, seawater desalination treatment plant and wastewater treatment plant, which provides different types of utilities – electricity, steam, high-quality industrial water and demineralised water for industrial customers. In respect of the provision of steam, TMUC provide a variety of pressure grades of steam to meet the differentiated needs of different customers while generating electricity. This process is achieved through steam turbine generator sets. This cogeneration process helps to further improve the efficiency of the Tembusu thermal power plant.

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

Tuas Power emphasises efficient and environmentally responsible energy solutions for modern business and industrial needs. Tuas Power insists on conducting operations in an environmentally responsible manner through maximising plant efficiency, resource conservation, reducing waste and controlling emissions. The systems of both Tuas Power Station and TMUC for the management and planning of its environment, occupational health and safety meet international standards and have obtained ISO 14001 (Environmental Management System) certification.

In 2021, Tuas Power had no reportable environment-related incidents. In the future, Tuas Power will continue to enhance environmental protection and safeguard measures.

Energy Conservation

Energy Conservation Efforts at Tuas Power Station

Tuas Power Station had initially developed two units of fuel-oil fired steam generating units in 1999. These were the most efficient oil-fired units during that time. Each had a unit efficiency of 34%. With the availability of natural gas and development of combined cycle power plants, the Station adopted a strategic transformation to more energy-efficient and cleaner power generation. Since 2000, the Station started developing combined cycle power plants, and by 2013 owned five most advanced F-class CCP generation units with an average efficiency of 48.5%. With the development of the efficient combined cycle power plant, the two units of less efficient oil-fired units were relegated to standby units and were deregistered and decommissioned. Tuas Power Station also uses well tested and calibrated thermodynamic models to perform off-line heat balance calculations to monitor the efficiency performance for each of the CCPs. Tuas Power Plant was able to develop a software named "Load Optimiser", to automatically calculate the load of each generator unit based on the overall load required during a specific trading period to minimise fuel consumption and maximise the overall. The Trading Department has been using the load optimiser to calculate the generator units' actual loads for price quotation since March 2019. After the use of load optimiser, the overall efficiency of the power plant improved by about 0.1%. Tuas Power Plant also plans to have exchange and experience sharing sessions with Huaneng Group's domestic power plants to improve its staff's capabilities in power plant performance monitoring and analysis.

In November 2019, Tuas Power Plant has been certified to attain the ISO 50001 energy management system.



Tuas Power Station

Energy Conservation Efforts at TMUC

Located on Jurong Island, Tembusu Multi-Utilities Complex is the first biomass and coal-fired power plant in Singapore built by Huaneng International whose surrounding environment remains free of pollution.

– Tembusu Multi-Utilities Complex

By bringing its world-leading technology and industry experience in biomass and coal-fired power generation to the Tembusu Multi-Utilities Complex, Huaneng International has made history and transformed Singapore's power development.

– Comments made by Zijian Liang, the Former Director of Energy and Chemical Industry Department of the Economic Development Board of Singapore



BUILDING AN INTERNATIONAL BUSINESS PLATFORM

In 2019, TMUC launched the Phase-2 digitalisation project to improve efficiency and reduce heat loss. The project completed in 2020 includes:

- 1 Apply the online performance monitoring and production optimisation system to improve the power plant's performance and heat efficiency.
- 2 Monitor the performance of steam trap in the steam pipe network so that O&M is able to take prompt actions to rectify faulty steam traps to reduce steam/heat loss.

In 2021, mitigation of steam loss was initiated at TMUC. This was done by installing Hi-stop (live seal) adaptors at identified passing header drains to arrest steam losses from steam traps and valves, without the need to shutdown LP header. 3 of these live seals were installed in September 2021.

The above initiatives demonstrate TMUC's continuous effort in improving its plant efficiency and reducing heat losses.

In November 2021, TMUC renewed its ISO 50001 energy management system certification, which fully reflected the enterprise's unremitting efforts and achievements in implementing energy saving and compliance.



Tembusu Multi-Utilities Complex

Emission Management

Greenhouse Gas Management

With the installation of five efficient gas fired CCP generating units in operation, Tuas Power Station's carbon emission factor has decreased and is now lower than that of the national average of all power plants in Singapore.

The usage of 20% carbon-neutral biomass (Palm Shell & Woodchips) is a mandatory requirement by the local authority to lower the carbon footprint of TMUC. By co-firing 80% coal with 20% carbon-neutral biomass, TMUC has lowered the carbon emission and thus lowered the carbon tax. To remain competitive, TMUC gradually increased the proportion of wood chips in its fuel mix. An increase usage of wood chips provided greater flexibility for fuel mix ratio to maintain a higher percentage of carbon-neutral types of biomass fuel and reduce fuel costs. In addition, mitigation measures that reduce energy losses from power plants or increase the power generation efficiency of power plants can also help reduce greenhouse gas emissions.

In accordance with the measurement and reporting requirements for greenhouse gas emissions of Singapore's National Environment Agency, Tuas Power and TMUC submitted their plans and supporting documents for the measurement of greenhouse gas emissions to the Singapore authorities and got approvals in December 2018. Starting from 2019, Tuas Power and TMUC have submitted their annual emissions reports based on these approved documents and paid the relevant carbon taxes accordingly.

Other Emission Management

In 2021, Tuas Power Plant only operated five units of natural gas fired CCP generators and decommissioned all oil-fired generator units to achieve negligible emission of sulphur dioxide. TMUC reduces NO_x and SO₂ emissions by using advanced Circulating Fluidized Bed (CFB) boilers, and purchasing of low-sulphur low-ash coal. The low furnace temperature of CFB boilers and the use of low-sulphur low-ash coal have ensured a low NO_x and low SO₂ emission. Utilisation of high efficiency bag filters at the CFB boilers have ensured the emission is within the compliance limit. 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 Utilisation

In Singapore, the landfill of the ashes generated in industrial process is prohibited. TMUC has achieved 100% comprehensive utilisation of ash (fly ash and bed ash) by working together with local building materials company.

Tuas Power had initially conducted the clean 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 (in collaboration with an established local cement/concrete company) in blended cement finally got approval from local authorities, the Building and Construction Authority (BCA) and the National Environmental Agency (NEA).

In 2016, TMUC collaborated with an established local cement/concrete company 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 EN12620:2008 Specifications of Aggregate for Concrete standard. In parallel, the plant has also put in effort to re-cycle the bed ash progressively in order to reduce bed ash generation. The BA generated has reduced from 300 tons/month to 100 tons/month till date.



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 compliance with relevant regulations.

To leverage the well-designed water cycle, customers are incentivised to return clean condensate for TMUC's steam production. High temperature return condensate from customers is used to pre-heat deaerator feed water to improve efficiency. Boiler blow down water is recycled back to the Water Treatment Plant as an alternative source of raw water. Partial treated water from the Wastewater Treatment Plant is being reused for plant washing in TMUC Site 2.

Customer Service

Since 2003, Tuas Power has been serving many groups of customers from residential customers, individual businesses, to developers, landlords and tenants of commercial buildings. In a recent customer satisfaction survey by Singapore's Energy Market Authority, (in November 2020) Tuas Power has been rated 4.5 stars (5 stars in total) since 2019.

Green Programme

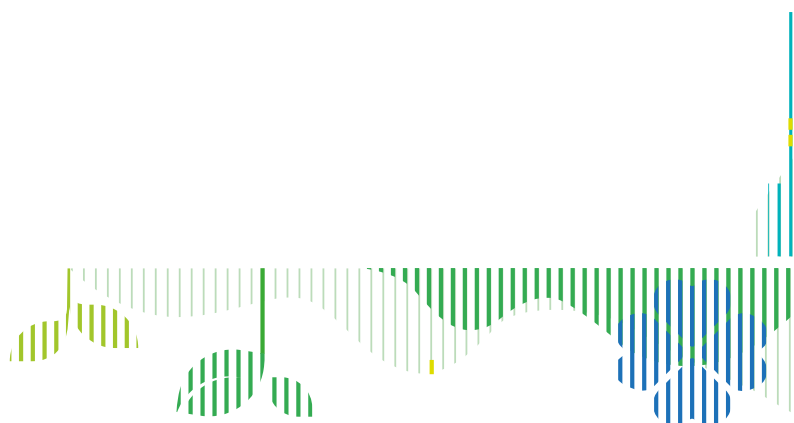
Tuas Power has embarked on various initiatives in support of carbon emission reduction to address the challenges posed by climate change and meet carbon reduction goals. Our initiatives include exploring and participating in importing renewable energy and providing carbon-reduction solutions for customers, such as charging of electric vehicles, solar energy generation, energy efficiency improvements and Renewable Energy Certificates (RECs). In the future, Tuas Power is also exploring future solutions such as hydrogen power generation.

Integrated Energy Management System (IEMS)

Tuas Power introduced a comprehensive energy management system in January 2016, with the implementation of automated metering infrastructure for commercial buildings. The meter is able to record electricity consumption on a half hourly basis in real time for customer to review through a mobile application, enabling changes in energy usage to be activated as part of energy efficiency. The system has also improved the efficiency and accuracy of billing to tenants. To date, Tuas Power has provided this service for more than 200 buildings and installed more than 8,000 electricity meters and related infrastructure.

Customer Information Protection

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



Community Building

Tuas Power is closely linked to the community and provides Statutory Boards of the Singapore Government, charity organisations and non-profit organisations with public service, financial assistance and cooperation, including Gardens by the Bay, Singapore Children's Association, Metta Preschool, Focus on the Family and other public institutions. Tuas Power also cooperates with governmental agencies like the Ministry of Education, Singapore (MOE) and the Singapore Energy Market Authority (EMA) to provide funds for students of local universities and polytechnics, and supports the horticultural research and conservation through the Garden City Fund in order to protect Singapore's green environment.

International Communication

There are frequent interactions and mutual assistance between Tuas Power and the Company.

Staff from Tuas Power and Huaneng regularly consult and discuss technical, production and engineering matters through online methods such as virtual meetings to further improve and strengthen operational efficiency of the Tuas Power Station and TMUC. On 30 November 2021, the Chief Operating Officer of Tuas Power gave an online speech, sharing and exchanging the challenges and experiences that Tuas Power faced in dealing with electricity retail in a fully competitive market environment. The mutual exchange promotes best practices and innovation.

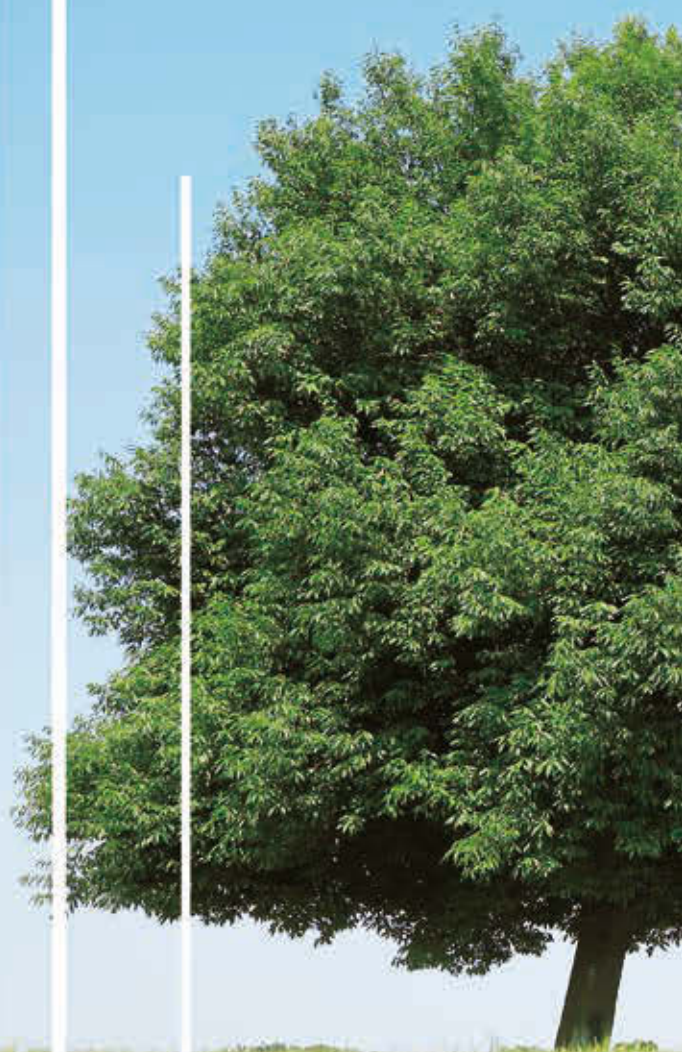
The Company dispatched several technical experts to Tuas Power and TMUC. These technical experts, while working in Singapore, provided local power plants with advanced management experience and professional technical support of domestic power plants, and also benefited from cross-cultural work practices. In view of this, Tuas Power has achieved cultural integration, management synergy and operational improvement at home and abroad.



10



We look forward to the future, and continuously accumulate experience for long-term sustainable development. We forge ahead and make sound development for a far-reaching success. The electric power industry is closely related to national development and people's lives. Although it has existed for more than decades, it is still vibrant. As a responsible enterprise, we will continuously explore our potentials and improve quality and efficiency. Facing the current co-existing situations of both risks and opportunities, Huaneng International, has implemented the Company's development strategy whilst adhering to steady progress, promoting transformation and upgrading, and actively carrying out reforms and innovations.



*SOUND DEVELOPMENT
WITH VIGOROUS
AND DETERMINED
ENDEAVOUR*



Sound Development with Vigorous and Determined Endeavour

By 2025, Huaneng International will basically build an electricity-centred and innovation-oriented modern energy industry system with multi-energy synergy and global layout. With all major indicators reaching the advanced level of peer energy enterprises worldwide, Huaneng International will be enlisted as one of the worldclass listed power generation companies.

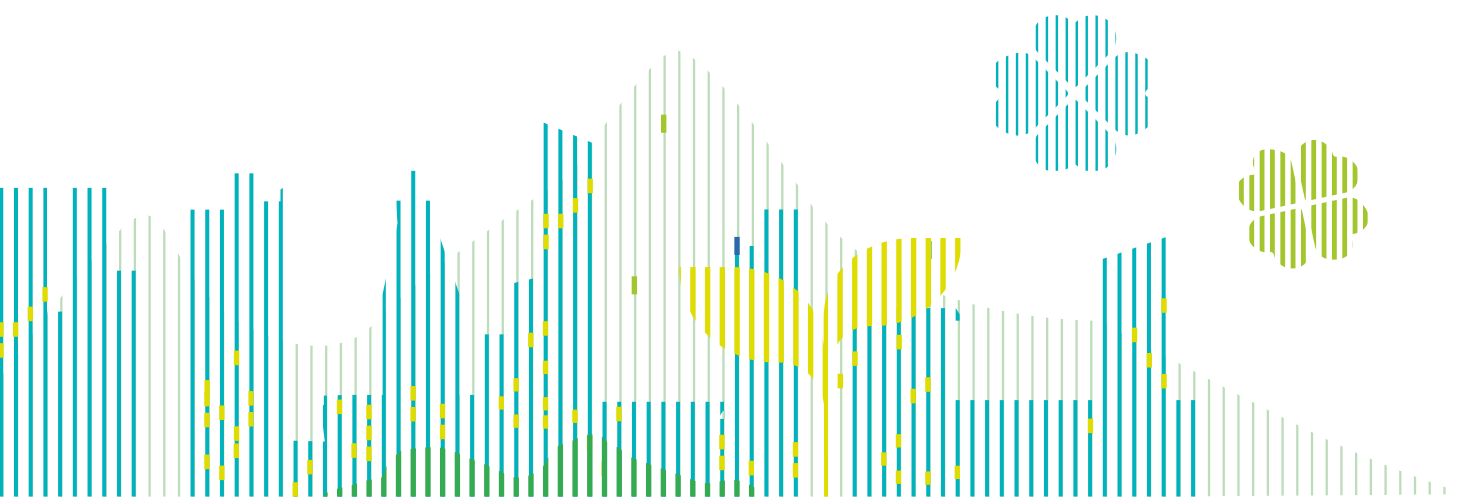
To promote green, low-carbon and circular development, we will promote the development of an integration of sources, networks, loads and storage and the multi-energy complementary smart energy system. Sticking to the objectives of “carbon peak” and “carbon neutrality”, we promote green and low-carbon energy transformation, and adhere to the principle of “national overall planning, priority to conservation, dual-wheel drive, smooth cost alleviation mechanism, and prevention of risks”. During the “14th Five-Year Plan” period, we will effectively reduce carbon emissions, strive to achieve carbon peaks, and lay a solid foundation for carbon neutrality. On the one hand, we adopt renewable energy alternatives and vigorously develop the new energy business to build a new power system with large-scale wind power base as the basis and the surrounding clean, efficient, advanced and energy-saving coal power plants as support. On the other hand, we transform the development of coal power, prioritise gas and other clean energy power generation, actively deploy pumped storage power generation to achieve an integration of sources, networks, loads and storage and the multi-energy complementary development. By 2025, the Company’s installed capacity of low-carbon clean energy will account for about 45%.

We will strengthen and improve the comprehensive energy services, actively adapt to the transformation of China’s energy supply structure, and continue to develop the strategy-focused emerging industries through digitalization. To carry out diversified supply and energy service transformation centred on core industries, we actively develop energy storage, and participate in the demonstration of integrated green hydrogen industry of “production, storage, transportation and utilization”

Adhere to the new “dual circulation” development pattern, and the principle of “clean, benefit, steady”, the Company will strengthen the international cooperation, relying on Tuas Power, to build the Company’s overseas innovation and development platform. We will strengthen the efficient operation of overseas assets, optimize the asset portfolio, and improve the risk resistance and profitability of overseas assets.

To take the lead of scientific and technological innovation, support the high quality development of the Company, we will promote the high quality science and technology innovation development, adhere to the strategy of serving the country, adapt to the need of the Company development, adhere to the digital intelligent development, further enhance the independent innovation ability and the implementation of demonstrative project of science and technology, and strengthen the basic and forward-looking technology research.

The Company adheres to the orientation of promoting profitability, improving efficiency and creating value, works hard to ensure the safety of production, conserve energy and improve efficiency, and protect the ecological environment. We will strengthen and optimize major industries and improve industrial coordination. Focusing on the “two benefits and four rates”¹⁴, the Company strives to improve quality and efficiency as well as deal with difficulties. The Company’s operational vitality is enhanced, and its operational efficiency and other indicators reach the international advanced level.



¹⁴ “two benefits and four rates”: net profit and total profit, operating income profit ratio, asset-liability ratio, R&D investment intensity and labour productivity of all employees.

11 Appendix



11.1 About this Report

This report is the sixth “Environmental, Social and Governance Report” (《環境、社會及管治報告》) 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 can 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 overseas 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 domestic subsidiaries and its wholly-owned and controlled companies.

No major adjustments have been made to the disclosure scope hereof compared with that of the Company’s previous ESG reports, and the statistical approaches adopted remains consistent.

Reporting Period

The Company’s “Environmental, Social and Governance Report” (《環境、社會及管治報告》) is an annual report for the period from 1 January 2021 to 31 December 2021, 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” and “Group Company”.

Content Compiling

The contents of this report are prepared in the light of the HKEx’s “Environmental, Social and Governance Reporting Guide” (《環境、社會及管治報告指引》), and the Global Reporting Initiative (GRI) Sustainability Reporting Standards (GRI Standards) (《可持續發展報告標準》). Currency used in this report is expressed in RMB unless otherwise specified.

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 Statement of the Board of Directors

The Board of Directors assumes the overall responsibility for the Company's ESG management and disclosure, and holds annual board meetings to discuss important ESG-related issues.

The strategy committee is in charge of supervising the Company's comprehensive risk management. The Company has incorporated safe production, environmental protection and other ESG material topics into the comprehensive risk management assessment process. The strategy committee meets regularly every year to discuss assessment over the comprehensive risk management. At the 2021, the strategy committee deliberated on and approved the 2021 Comprehensive Risk Management Report (《公司2021年度全面风险管理报告》), which comprehensively summarised safe production, environmental protection and other ESG-related risks, and formulated detailed responses, with changes in material risks closely tracked and monitored.

At the 2021 annual board meeting, the Board mainly reviewed the assessment of ESG material topics and establishment of environmental targets. The Company identified 18 ESG reporting topics, including 6 material topics, i.e., Control of Emissions, Law-Abiding and Compliance, Use of Energy, Ecological Protection, Anti-Corruption, Safe Production and Occupational Health. As compared with 2020 report, "Response to Climate Change" topic is newly added to this report. The Company sets five environmental performance targets in emission reduction, carbon reduction, waste reduction, energy saving and water conservation, covering Emissions Management, Energy Consumption Management, and Water Resources Management.

2021 ESG Report provides detailed disclosure of the progress and key performance indicators in relation to the above work and ESG topics. The report was reviewed and approved by the Board of Directors in March 2022.



11.3 Contents Index of the Environmental, Social and Governance (ESG) Reporting Guide by the Hong Kong Stock Exchange

Environmental, Social and Governance Reporting Guide	Page Number	Report Content
Statement of the Board of Directors		
<ul style="list-style-type: none"> A disclosure of the Board's oversight of ESG issues A disclosure of the Board's ESG management approach and strategy, including the process used to evaluate, prioritise and manage material ESG-related issues (including risks to the issuer's businesses) A disclosure that how the board reviews progress made against ESG-related goals and targets with an explanation of how they relate to the issuer's businesses. 	92	11.2 Statement of the Board of Directors
Reporting Principles		
Materiality: (i) the process to identify and the criteria for the selection of material ESG factors; (ii) if a stakeholder engagement is conducted, a description of significant stakeholders identified, and the process and results of the issuer's stakeholder engagement.	15-19	2.7 Communication with Stakeholders and Identification of Material Issues
Quantitative: Information on the standards, methodologies, assumptions and/or calculation tools used, and source of conversion factors used, for the reporting of emissions/energy consumption (where applicable) should be disclosed.	11-14 91	2.6 Table of Key Performance Indicators in 2021 11.1 About this Report
Consistency: The issuer should disclose in the ESG report any changes to the methods or KPIs used, or any other relevant factors affecting a meaningful comparison	91	11.1 About this Report
Reporting Scope		
A narrative explaining the reporting scope of the ESG report and describing the process used to identify which entities or operations are included in the ESG report. If there is a change in the scope, the issuer should explain the difference and reason for the change.	91	11.1 About this Report



Environmental, Social and Governance Reporting Guide		Page Number	Report Content
Subject Area A: Environment			
Aspect A1: Emissions			
A1	General Disclosure	44-52	5.3.4 Emissions Management
A1.1	The type of emissions and respective emission data	44-52	5.3.4 Emissions Management
A1.2	Direct (Scope 1) and energy indirect (Scope 2) greenhouse gas emissions (in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	44-52	5.3.4 Emissions Management
A1.3	Total hazardous waste produced (in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	44-52	5.3.4 Emissions Management
A1.4	Total non-hazardous waste produced (in tons) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	44-52	5.3.4 Emissions Management
A1.5	Description of emission target(s) set and steps taken to achieve them.	44-52 82-87	5.3.4 Emissions Management 9 Building An International Business Platform
A1.6	Description of how hazardous and non-hazardous wastes are handled, and a description of reduction target(s) set and steps taken to achieve them.	44-52 82-87	5.3.4 Emissions Management 9 Building An International Business Platform
Aspect A2: Use of Resources			
A2	General Disclosure	40-43 43-44	5.3.2 Energy Consumption Management 5.3.3 Water Resources 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).	40-43	5.3.2 Energy Consumption Management
A2.2	Water consumption in total and intensity (e.g. per unit of production volume, per facility).	43-44	5.3.3 Water Resources Management
A2.3	Description of energy use efficiency target(s) set and steps taken to achieve them.	40-43 82-87	5.3.2 Energy Consumption Management 9 Building An International Business Platform
A2.4	Description of whether there is any issue in sourcing water that is fit for purpose, water efficiency target(s) set and steps taken to achieve them.	43-44	5.3.3 Water Resources Management
A2.5	Total packaging material used for finished products (in tons) and, if applicable, with reference to per unit produced.	–	Not applicable due to product nature

Environmental, Social and Governance Reporting Guide**Page
Number****Report Content****Aspect A3: The Environment and Natural Resources**

A3 General Disclosure

36-53

5 Transformation Development
Driven by InnovationA3.1 Description of the significant impacts of activities on the
environment and natural resources and the actions taken to
manage them.

36-53

5 Transformation Development
Driven by Innovation**Aspect A4: Climate Change**

A4 General Disclosure

47-49

5.3.4.2 Management of Greenhouse
GasesA4.1 Description of the significant climate-related issues which
have impacted, and those which may impact, the issuer, and
the actions taken to manage them.

47-49

5.3.4.2 Management of Greenhouse
Gases**Subject Area B: Social****Employment and Labour Practices****Aspect B1: Employment**

B1 General Disclosure

68-69

7.1 Protecting Employees' Rights
and InterestsB1.1 Total workforce by gender, employment type (for example,
full- or part-time), age group and geographical region.

11-14

2.6 Table of Key Performance
Indicators in 2021B1.2 Employee turnover rate by gender, age group and
geographical region.

11-14

2.6 Table of Key Performance
Indicators in 2021**Aspect B2: Health and Safety**

B2 General Disclosure

56-65

6 Solidifying the Bottom Line for
Safe ProductionB2.1 Number and rate of work-related fatalities occurred in each of
the past three years including the reporting year.

11-14

2.6 Table of Key Performance
Indicators in 2021

B2.2 Lost days due to work injury

11-14

2.6 Table of Key Performance
Indicators in 2021B2.3 Description of occupational health and safety measures
adopted and how they are implemented and monitored.60-63
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716.3 Adopting Vigorous Safety
Measures
6.4 Caring and Safeguarding
Occupational Health
7.3 Caring Occupational Health

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Aspect B3: Development and Training			
B3	General Disclosure	64 69-70	6.5 Improving Employees' Safety Awareness 7.2 Promoting Employee Development
B3.1	The percentage of employees trained by gender and employee category (e.g. senior management, middle management).	11-14	2.6 Table of Key Performance Indicators in 2021
B3.2	The average training hours completed per employee by gender and employee category.	11-14	2.6 Table of Key Performance Indicators in 2021
Aspect B4: Labour Standards			
B4	General Disclosure	68-69	7.1 Protecting Employees' Rights and Interests
B4.1	Description of measures to review employment practices to avoid child and forced labour.	68-69	7.1 Protecting Employees' Rights and Interests
B4.2	Description of steps taken to eliminate such practices when discovered.	68-69	7.1 Protecting Employees' Rights and Interests
Operating Practices			
Aspect B5: Supply Chain Management			
B5	General Disclosure	74-75	8.1 Deepening Supply Cooperation
B5.1	Number of suppliers by geographical region	11-14	2.6 Table of Key Performance Indicators in 2021
B5.2	Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, and how they are implemented and monitored.	74-75	8.1 Deepening Supply Cooperation
B5.3	Description of practices used to identify environmental and social risks along the supply chain, and how they are implemented and monitored.	74-75	8.1 Deepening Supply Cooperation
B5.4	Description of practices used to promote environmentally preferable products and services when selecting suppliers, and how they are implemented and monitored.	74-75	8.1 Deepening Supply Cooperation

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Number****Report Content****Aspect B6: Product Responsibility**

B6	General Disclosure	26-28	4.1	Improving Capabilities of Guaranteeing Energy Supply
B6.1	Percentage of total products sold or shipped subject to recalls for safety and health reasons.	–		Not applicable due to product nature
B6.2	Number of products and service related complaints received and how they are dealt with.	76	8.2	Providing Quality Service
B6.3	Description of practices relating to observing and protecting intellectual property rights.	33	4.2.3	Protection of Intellectual Property Rights
B6.4	Description of quality assurance process and recall procedures.	–		Not applicable due to product nature
B6.5	Description of consumer data protection and privacy policies, and how they are implemented and monitored.	–		Not applicable due to business nature

Aspect B7: Anti-corruption

B7	General Disclosure	30-32	4.2.2	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.	30-32	4.2.2	Anti-corruption
B7.2	Description of preventive measures and whistle-blowing procedures, and how they are implemented and monitored.	30-32	4.2.2	Anti-corruption
B7.3	Description of anti-corruption training provided to directors and staff.	8-10 30-32	2.5 4.2.2	ESG Responsibility Management Anti-corruption

Community**Aspect B8: Community Investment**

B8	General Disclosure	76-79 82-87	8.3 9	Fulfilling Social Responsibilities Building An International Business Platform
B8.1	Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport).	76-79 82-87	8.3 9	Fulfilling Social Responsibilities Building An International Business Platform
B8.2	Resources contributed (e.g. money or time) to the focus area.	76-79	8.3	Fulfilling Social Responsibilities



11.4 Contents Index of GRI Sustainability Reporting Standards (GRI Standards) of Global Reporting Initiative

GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
GRI 101: Foundation 2016			
GRI 102: General Disclosures 2016			
102-1	Name of the organisation	6-7	2.1 Company Profile
102-2	Activities, brands, products, and services	6-7	2.1 Company Profile
102-3	Location of headquarters	106	11.5 Readers' Feedback
102-4	Location of operations	6-7	2.1 Company Profile
102-5	Ownership and legal form	6-7	2.1 Company Profile
102-6	Markets served	6-7	2.1 Company Profile
102-7	Scale of the organisation	6-7 11-14	2.1 Company Profile 2.6 Table of Key Performance Indicators in 2021
102-8	Information on employees and other workers	68-69	7.1 Protecting Employees' Rights and Interests
102-9	Supply chain	74-75	8.1 Deepening Supply Cooperation
102-10	Significant changes to the organisation and its supply chain	91	11.1 About this Report
102-11	Precautionary principle or approach	7 8-10	2.2 Corporate Governance 2.5 ESG Responsibility Management
102-12	External initiatives	8-10	2.5 ESG Responsibility Management
102-13	Membership of associations	15	2.7.1 Information about and Communication with Stakeholder
102-14	Statement from senior decision-maker	2-3	1 Chairman's Statement

GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
102-16	Values, principles, standards, and norms of behaviour	7-8 8	2.3 Development Strategy 2.4 Company Philosophy
102-18	Governance structure	7	2.2 Corporate Governance
102-40	List of stakeholder groups	15	2.7.1 Information about and Communication with Stakeholder
102-41	Collective bargaining agreements	68-69	7.1 Protecting Employees' Rights and Interests
102-42	Identifying and selecting stakeholders	15	2.7.1 Information about and Communication with Stakeholder
102-43	Approach to stakeholder engagement	15	2.7.1 Information about and Communication with Stakeholder
102-44	Key topics and concerns raised	15	2.7.1 Information about and Communication with Stakeholder
102-45	Entities included in the consolidated financial statements	91	11.1 About this Report
102-46	Defining report content and topic boundaries	91	11.1 About this Report
102-47	List of material topics	16-17	2.7.2 Process of Identification of Material Issues
102-48	Restatements of information	–	No previous reports have been rewritten
102-49	Changes in reporting	–	No major changes
102-50	Reporting period	91	11.1 About this Report
102-51	Date of most recent report	91	11.1 About this Report
102-52	Reporting cycle	91	11.1 About this Report
102-53	Contact point for questions regarding the report	91	11.1 About this Report
102-54	Claims of reporting in accordance with the GRI Standards	–	Core suitable plan
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102-56	External assurance	–	No external review temporarily



GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
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103-2	The management approach and its component	6-19	2 About Us
103-3	Evaluation of the management approach	6-19	2 About Us
GRI 201: Economic Performance 2016			
201-1	Direct economic value generated and distributed	11-14 76-79	2.6 Table of Key Performance Indicators in 2021 8.3 Fulfilling Social Responsibilities
Anti-Corruption (Material Issue: Management by Law and Anti-Corruption)			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 30-32	2.7.2 Process of Identification of Material Issues 4.2.2 Anti-corruption
103-2	The management approach and its component	30-32	4.2.2 Anti-corruption
103-3	Evaluation of the management approach	30-32	4.2.2 Anti-corruption
GRI 205: Anti-Corruption 2016			
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205-2	Communication and training about anti-corruption policies and procedures	30-32	4.2.2 Anti-corruption
205-3	Confirmed incidents of corruption and actions taken	30-32	4.2.2 Anti-corruption

GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
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103-2	The management approach and its component	43-44	5.3.3 Water Resources Management
103-3	Evaluation of the management approach	43-44	5.3.3 Water Resources Management
GRI 303: Water Resources and Sewage 2018			
303-2	Management of impacts related to discharge	49-50	5.3.4.3 Wastewater Management
303-3	Water withdrawal by source	43-44	5.3.3 Water Resources Management
303-4	Water withdrawal by destination	49-50	5.3.4.3 Wastewater Management



GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
Emissions (Material Issues: Reduction of Carbon Dioxide Emission and Emission of Control Components)			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 44-52	2.7.2 Process of Identification of Material Issues 5.3.4 Emissions Management
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103-3	Evaluation of the management approach	44-52	5.3.4 Emissions Management
GRI 305: Emissions 2016			
305-1	Direct (Scope 1) Green house gas (GHG) emissions	47-49	5.3.4.2 Management of Greenhouse Gases
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305-4	GHG emissions intensity	47-49	5.3.4.2 Management of Greenhouse Gases
305-7	Nitrogen oxides (NOx), sulphur oxides (SOx), and other significant air emissions	45-46	5.3.4.1 Exhaust Gas Management
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103-2	The management approach and its component	49-50 50-52	5.3.4.3 Wastewater Management 5.3.4.4 Waste Management
103-3	Evaluation of the management approach	49-50 50-52	5.3.4.3 Wastewater Management 5.3.4.4 Waste Management
GRI 306: Effluents and Waste 2016			
306-1	Water discharge by quality and destination	49-50	5.3.4.3 Wastewater Management
306-2	Waste by type and disposal method	50-52	5.3.4.4 Waste Management

GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
Environmental Compliance (Material Issues: Energy Use, Emission of Control Components and Reduction of Carbon Dioxide Emission)			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 40-53	2.7.2 Process of Identification of Material Issues 5.3 Promoting Energy Saving and Consumption Reduction Solidly
103-2	The management approach and its component	40-53	5.3 Promoting Energy Saving and Consumption Reduction Solidly
103-3	Evaluation of the management approach	40-53	5.3 Promoting Energy Saving and Consumption Reduction Solidly
GRI 307: Environmental Compliance 2016			
307-1	Non-compliance with environmental laws and regulations	40-53	5.3 Promoting Energy Saving and Consumption Reduction Solidly
Supplier Environmental Assessment			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 74-75	2.7.2 Process of Identification of Material Issues 8.1 Deepening Supply Cooperation
103-2	The management approach and its component	74-75	8.1 Deepening Supply Cooperation
103-3	Evaluation of the management approach	74-75	8.1 Deepening Supply Cooperation
GRI 308: Supplier Environmental Assessment 2016			
308-2	Negative environmental impacts in the supply chain and actions taken	74-75	8.1 Deepening Supply Cooperation



GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
GRI 400 Social			
Occupational Health and Safety (Material Issue: Safe Production and Occupational Health)			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 63-64 64 65	2.7.2 Process of Identification of Material Issues 6.4 Caring and Safeguarding Occupational Health 6.5 Improving Employees' Safety Awareness 6.6 Tightening the Focus on Infrastructure Safety Management
103-2	The management approach and its component	63-64 64 65	6.4 Caring and Safeguarding Occupational Health 6.5 Improving Employees' Safety Awareness 6.6 Tightening the Focus on Infrastructure Safety Management
103-3	Evaluation of the management approach	63-64 64 65	6.4 Caring and Safeguarding Occupational Health 6.5 Improving Employees' Safety Awareness 6.6 Tightening the Focus on Infrastructure Safety Management
GRI 403: Occupational Health and Safety 2018			
403-2	Hazard identification, risk assessment and incident investigation	63-64	6.4 Caring and Safeguarding Occupational Health
403-7	Prevention and mitigation of occupational health and safety impacts directly related to business relationship	63-64	6.4 Caring and Safeguarding Occupational Health
403-9	Occupational injury	11-14	2.6 Table of Key Performance Indicators in 2021
Training and Education (Material Issue: Staff Training and Development)			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 69-70	2.7.2 Process of Identification of Material Issues 7.2 Promoting Employee Development
103-2	The management approach and its component	69-70	7.2 Promoting Employee Development
103-3	Evaluation of the management approach	69-70	7.2 Promoting Employee Development
GRI 404: Training and Education 2016			
404-2	Programs for upgrading employee skills and transition assistance programs	69-70	7.2 Promoting Employee Development

GRI Standards Indicator	GRI Standards Description	Pages	References and Remarks
Child Labour			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 68-69	2.7.2 Process of Identification of Material Issues 7.1 Protecting Employees' Rights and Interests
103-2	The management approach and its component	68-69	7.1 Protecting Employees' Rights and Interests
103-3	Evaluation of the management approach	68-69	7.1 Protecting Employees' Rights and Interests
GRI 408: Child Labour 2016			
408-1	Operations and suppliers at significant risk for incidents of child labour	68-69	7.1 Protecting Employees' Rights and Interests
Forced or Compulsory Labour			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	68-69	7.1 Protecting Employees' Rights and Interests
103-2	The management approach and its component	68-69	7.1 Protecting Employees' Rights and Interests
103-3	Evaluation of the management approach	68-69	7.1 Protecting Employees' Rights and Interests
GRI 409: Forced or Compulsory Labour 2016			
409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labour	68-69 74-75	7.1 Protecting Employees' Rights and Interests 8.1 Deepening Supply Cooperation
Supplier Social Assessment			
GRI 103: Management Approach 2016			
103-1	Explanation of the material topic and its boundary	16-17 74-75	2.7.2 Process of Identification of Material Issues 8.1 Deepening Supply Cooperation
103-2	The management approach and its component	74-75	8.1 Deepening Supply Cooperation
103-3	Evaluation of the management approach	74-75	8.1 Deepening Supply Cooperation
GRI 414: Supplier Environmental Assessment 2016			
414-2	Negative social impacts in the supply chain and actions taken	74-75	8.1 Deepening Supply Cooperation



11.5 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:

Organisation:

Contact Address:

Postal Code:

Tel:

Fax:

E-mail:

