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 中国华能集团有限公司  
CHINA HUANENG GROUP CO., LTD.

2023

Environmental, Social and Governance Report

Responsibility, Original Aspiration

 中国华能集团有限公司  
CHINA HUANENG GROUP CO., LTD.



This report, the 18<sup>th</sup> consecutive sustainability-related report released to the public by CHNG since 2006, is the second special report named as "Environmental, Social and Governance (ESG) Report". Based on the principles of objectivity, standardization, and comprehensiveness, this report fully incorporates the latest policies and corporate strategy, and delves into the ESG concept embedded in its "three-color" culture, internalized in its main business, and coexisting with its development goals. Besides, this report explores an ESG management and practice system with "CHNG characteristics", systematically sorts out and truthfully discloses information concerning its fulfillment of ESG indicators, demonstrates corporate responsibility, and shapes a good image of corporate citizen that pushes the higher-quality and more sustainable corporate development.



The logo of China Huaneng Group consists of the deformation of letters "H" and "N". "H" and "N" are the first letters of Chinese phonetic transcription of "Huaneng", and the meaning of the combination is: contributing energy and adding momentum for national rejuvenation while creating happiness. Letter "H" adopts a bold font, which is powerful and vigorous, presenting a visual image of safety, reliability and steadiness; letter "N" connects letter "H" with three rays to form a lightning font, symbolizing perpetual and unlimited power; and dark blue is chosen as the base color, demonstrating solemnness, rigor, serenity and harmony, as well as broad-mindedness and lofty ambition. The shape of the letters resembles mountain peaks, emitting a grand atmosphere; the composition of the logo is neat and orderly, giving a sense of solemnness; and the superposition effect is concise and lively, full of vitality, exhibiting the sacred mission and demeanor of Huaneng as a key state-owned backbone enterprise.

## About This Report

### Reporting Period

January 1, 2023 to December 31, 2023. Some of the contents go beyond the above range.

### Reporting Cycle

This report is an annual report released to the public in the third quarter of each year.

### Main Contents

This report discloses CHNG's policies, practices and performance in 2023 in main business, environmental, social and governance aspects. Its relevant basic source materials are all drawn from relevant company documents, statements and grassroots enterprises.

### Compilation Basis

*The Ten Principles of the UN Global Compact* by the United Nations  
*The 2030 Agenda for Sustainable Development* by the United Nations  
*Unified Standard for the Sustainability Reporting* by the Global Reporting Initiative (GRI)  
*Guidelines for Sustainable Disclosure of Enterprises - Basic Guidelines (Draft for Comments)* by the Ministry of Finance  
*Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era* by the SASAC  
*Reference Indicator System for ESG Special Reports of Listed Companies Controlled by Central SOEs* by the SASAC  
*Environmental, Social and Governance (ESG) Reporting Guidelines issued by Hong Kong Exchanges and Clearing Limited*  
*No. 14 Guidelines for Self-regulatory Supervision of Listed Companies - Sustainable Development Report (For Trial Implementation)* by the Shanghai Stock Exchange  
*ISO26000: Guidance on Social Responsibility* by the International Organization for Standardization  
*Guidelines on Social Responsibility (GB/T36000)* by the Standardization Administration of the People's Republic of China

### Title Description

For convenience of expression, in this report, "CHNG", "Huaneng Group", "Huaneng", "the Company" and "We" refer to "China Huaneng Group Co., Ltd."

### Online Access to the Report

The Report is available in Chinese and English. The video version is also available. The Chinese version and the video version are released at the same time. Please visit our website at <http://www.chng.com.cn>, or call 010-63228672 to request for the Report.  
E-mail: [hmsh@chng.com.cn](mailto:hmsh@chng.com.cn)  
Address: No. 6, Fuxingnemei Street, Xicheng District, Beijing  
Postal code: 100031.

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## Studying Guiding Thought, Opening a New Chapter

In April 2023, a meeting on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era was held in Beijing. President Xi Jinping, also general secretary of the Communist Party of China (CPC) Central Committee and chairman of the Central Military Commission (CMC), attended the meeting and made an important speech.

As a central state-owned enterprise, China Huaneng immediately held a mobilization meeting on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era. The meeting aimed to deeply study and implement the guiding principles of general secretary's important speeches, firmly grasp the essential requirements of "Cultivating the Soul, Enhancing Wisdom, Correcting Conduct, and Promoting Action through Study", and to promote the education campaign to be more profound and practical. Based on in-depth research and studies, the Company has achieved solid results in energy supply assurance, green development, and technological innovation. This work has been rated as "Good" by the 52<sup>nd</sup> Central Leading Group of Guidance Work.

### April 12

Held the mobilization meeting on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era



### April 23

Held a study class on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era



### May 8

Wen Shugang, Secretary of Party Leading Group, went to Shidao Bay Nuclear Power Co., Ltd. to conduct the research and studies on the education campaign



### May 15

Wen Shugang, Secretary of Party Leading Group, gave a special Party lecture on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era



### May 17

Wen Shugang, Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Huaneng enterprises in Jiangsu Province



### May 17

Deng Jianling, Deputy Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Central China Branch



### May 23

Wen Shugang, Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Huaneng enterprises in Liaoning Province



### May 31

Deng Jianling, Deputy Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Yangliuqing Thermal Power Plant



### June 7

Wen Shugang, Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Guangxi Branch

### June 13

Deng Jianling, Deputy Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Zhejiang Branch



### July 11

Wen Shugang, Secretary of Party Leading Group, conducted in-depth research and studies on the education campaign at Huaneng enterprises in Shaanxi Province



### September 8

Held the conclusion meeting of first batch and the commencement meeting of the second batch on the education campaign about the study and implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era



## CHNG in High Quality Development

### Strategic Guidance

#### Strategic Vision

Leading China's Power Industry and Striving for World-class Excellence

#### Focusing on "Two Ways"

Focus on enhancing core functions and improving core competitiveness

#### Understanding the "Three Generals"

The general goal of developing state-owned capital and state-owned enterprises stronger, better and bigger  
The general principle of upholding the Party's overall leadership  
The general requirement of serving national strategies

#### Giving Full Play to the "Three Roles"

Technological innovation, serving high-level self-reliance in science and technology  
Industrial control, ensuring the stability and smoothness of the industrial and supply chains  
Security support, ensuring energy resources security

#### "3 Guidances" as the Overall Requirements

One Development Goal: Accelerate the Building of a World-class Enterprise  
One Development Theme: Step up Efforts to Advance High-quality Development  
One Development Direction: Vigorously Accelerate Green and Low-carbon Transition

Implement  
the "366"  
Development  
Strategy

#### "6 Persist-ins" as the Strategic Direction

Persist in Green Development  
Persist in Enterprise Reform  
Persist in Value Creation  
Persist in Risk Prevention and Control  
Persist in Sci-tech Innovation  
Persist in Party Building as the Guiding Force

#### "6 New Leaderships" as the Strategic Task

New Leadership in Sci-tech Innovation  
New Leadership in International Development  
New Leadership in Green Transition  
New Leadership in Corporate Governance  
New Leadership in Efficiency and Effectiveness  
New Leadership in Party Building Quality

#### "Five Better Coordinates"

Better coordinate effective upgrade in development quality and reasonable growth in development quantity  
Better coordinate strategic-emerging industries and traditional industries  
Better coordinate production and operation  
Better coordinate development and security  
Better coordinate Party building and business development

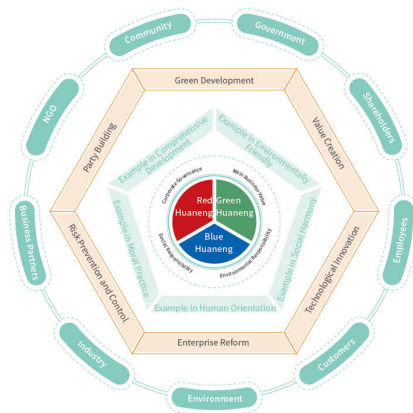
### Mission-driven

A "red" company that serves national strategy, safeguards energy security, and serves the need of socialism with Chinese characteristics.

A "green" company that facilitates energy revolution, protects the environment, and supplies clean energy to ensure a better life for the people.

A "blue" company that participates in global energy governance, serves the Belt and Road Initiative, and contributes to building a community with a shared future for mankind.

### System First



Persisting in serving national interests and development strategies, serving as an example in promoting economic and social development in all respects

Persisting in scientific development and technological innovation, serving as an example in building a resources-conserving and environmentally friendly society

Persisting in pursuing enterprise value in a rational way, serving as an example in promoting harmonious progress of both the enterprise and society

Persisting in the principle of relying on employees and working with the public to develop the enterprise, serving as an example in putting people first and sharing benefits

Persisting in giving back to society and benefiting the people, serving as an example in practicing social ethics

## Board of Directors



**Wen Shugang**  
Chairman of the Board of Directors



**Zhang Wenfeng**  
Board Director, President



**Xu Ping**  
External Board Director



**Wu Weizhang**  
External Board Director



**Zou Zhengping**  
External Board Director



**Liu Yuezhen**  
External Board Director



**Wang Yidong**  
External Board Director



**Yan Xiaopeng**  
Employee Director

## Management Team



**Wen Shugang**  
Chairman of the Board of Directors



**Zhang Wenfeng**  
Board Director, President



**Wang Yihua**  
Chief Financial Officer



**Wang Limin**  
Chief Compliance Officer



**Li Xiangliang**  
Vice President



**Zhang Tao**  
Vice President



**Hao Jinyu**  
Vice President



**Si Weiguo**  
Vice President

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## Message from the Chairman



Wen Zhongqiang  
Chairman of the Board of Directors

The year of 2023 is an extraordinary year. Under the strong leadership of the Party Central Committee with Comrade Xi Jinping at the core, the Company resolutely followed the decisions made by the CPC Central Committee and the State Council, and firmly grasped the mission and responsibility of central SOEs in the new era and on the new journey, and made significant achievements, while forging ahead with enterprise and fortitude. The Company's key production indicators (such as annual power generation, heat supply, and coal production), major operational indicators (such as profit, net profit, and economic value added), and green development indicators (such as renewable energy project construction and completion) reached historical highs. The influence, driving force, and competitiveness have significantly increased, with high-quality development performance through practical actions.

The Company followed Party building initiatives to continuously improve the responsibility system for Party building work, and deeply carried out the education campaign to propel high-quality development and new breakthroughs according to the innovative theories of the Party. This work has been rated as "Good" by the Central Leading Group of Guidance Work. As a key state-owned enterprise, the Company always keeps in mind "The Top Priorities of the Country" and roots its development in national rejuvenation along the path to a stronger China. It focuses on leveraging its roles in **technological innovation, industrial control, and security support** to better fulfill its national strategic mission. **Upholding with Demand, Serving the Strategy, and Deeply Committed to Technological Innovation.** The Company actively promoted the construction of national-level innovation platforms and undertook over 40 national scientific and technological key projects. It has achieved solid results in building the source of original technologies for CCUS and offshore wind power, breaking through the "zero" mark in patent gold awards, and making significant strides in establishing a strategic technological force for the nation. **Aggregating Momentum and Empowering Others in an Open and Integrated Manner, Boldly Leading the Development of the Industry.** The Company's main industrial sectors achieved profitability and year-on-year profit growth, realizing efficient internal synergy. It was actively developing emerging strategic industries, nurturing leading enterprises within the industrial chain, and accelerating the formation of new quality productive forces. **Optimizing the Core Business, Strengthening the Foundation, and Bravely Serving as the Pillar of Energy Supply.** The Company is committed to prioritizing energy security as its primary responsibility, making every effort to ensure the safe and stable supply of electricity, heat, and coal. It successfully completed energy supply tasks during important periods such as Chengdu 2021 FISU World University Games, the 19<sup>th</sup> Asian Games Hangzhou, and the Belt and Road Forum for International Cooperation, playing a crucial role as a central SOE during critical times.

**With the Aspiration for Lucid Waters and Lush Mountains, Firm Steps Towards Low-Carbon Transition.** The Company focused on the national "carbon peaking and carbon neutrality" goals, striving to build a new type of power system. It aimed to achieve "Three Breakthroughs" in the development of renewable energy, the construction of large-scale energy bases, and the advancement of nuclear power. The Company continuously reduced resource and energy consumption, steadily promoted pollution prevention and control efforts, and maintained industry-leading emission performance. It enhanced the construction of a carbon emission data management platform, achieving a year-on-year reduction of 9.4 grams per kilowatt-hour in carbon emission intensity for total power generation. The Company strictly adhered to ecological and environmental protection boundaries, respecting a number of green power demonstration projects that coexist harmoniously with the environment. **Bearing in Mind the**

**Wellbeing of the People, Forging Ahead Toward Prosperity with Bold and Resolute Attitudes.** CHNG attached great importance to the health and safety of its employees, organized high-quality labor competitions and vocational skills competitions, cultivated multiple "Craftsmen of Huaineng" and "Craftsmen of the Nation", and solidly promoted the action plan for strengthening safety management throughout the year, with no major safety accidents occurring. The safety in production, operation, image, as well as cybersecurity maintained a good momentum. CHNG actively played a leading role, and opened up cooperation with governments, enterprises, and overseas institutions in a wider range of areas to support the national major strategies of "Three Groups, Two River Basins and One Port". For the third consecutive time and a total of four times, the Company has received the highest government award in China's public welfare and charity sector, the "China Charity Award". Its targeted assistance work has received the highest evaluation in the national assessment for six consecutive years, making contributions to industry development, local development, and internationalization. **Steady and Sustained Corporate Development through Modern Governance.** The Company has comprehensively enhanced its risk management capabilities, strengthened compliance and internal control management, and continuously improved modern governance standards. The modern enterprise system with Chinese characteristics has become increasingly refined. The initiative to create a world-class enterprise was steadily progressing, with Huaineng Group being included in the SASAC's list of companies building world-class demonstration enterprises. Three subsidiary companies, i.e. Xi'an Thermal Power Research Institute, Clean Energy Research Institute, and Lancang River Hydropower Inc. have been selected as "Demonstration Enterprises Building World-Class Specialized, Refined, and Innovative Enterprises" and "Leading Professional Demonstration Enterprises", further consolidating the endeavor. Additionally, the top-level design of ESG work has been strengthened, actively exploring a management model that aligns with its unique characteristics. The Company was gradually realizing the guiding role of ESG in corporate governance as well as in production and operation, with all listed subsidiaries achieving full coverage of ESG reporting and the quality of information disclosure consistently improving.

**Time engraves glorious dreams, and hard work paints a magnificent picture scroll.** The year 2024 marks the 75<sup>th</sup> anniversary of the founding of the People's Republic of China, a key year for the implementation of the 14<sup>th</sup> Five-Year Plan, and the 10<sup>th</sup> anniversary of the proposal of the new energy security strategy of "Four Reforms and One Cooperation". It is of great significance to carry out various tasks effectively. The Company adhered to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, followed the new development philosophy, adopted the new strategy for energy security as a directive, relied on technological innovation for support, and used deepened reform as a driving force. We seized opportunities, took proactive actions, and strove for new heights, continuously achieving new results in promoting the Company's high-quality development.

**With goals ahead and missions urging us forward, only through hard work can we be steadfast in our actions.** In the future, the Company will rally even closer around the Party Central Committee with Comrade Xi Jinping at its core, bear in mind our mission, be courageous in shouldering responsibilities, and fully commit to delivering the two major tasks of operation, reform and development, as well as Party building. We will play our part in serving the overall national work agenda and create a new chapter of achievements for Huaineng, contributing even more significantly in building China into a great modern socialist country in all respects and advancing the rejuvenation of the Chinese nation on all fronts through a Chinese path to modernization.

# Reflecting on 2023, ESG Showing Its Commitment to Responsibility



## Symposium on Deepening Cooperation between Liaoning Province and Central SOEs

Wen Shugang, China Huaneng Chairman, pointed out in his speech that China Huaneng will actively integrate into Liaoning's development layout of "One Circle, One Belt and Two Zones", striving to build the "Huaneng International Energy Pioneer Zone". This initiative aims to demonstrate greater achievements in Liaoning's journey to accelerate comprehensive revitalization and make significant progress in its modernization efforts in the new era.

## Economic Summit of the China Development Forum 2023

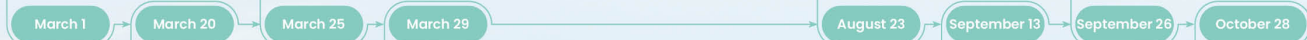
Wen Shugang, China Huaneng Chairman, pointed out in his speech that addressing climate change and promoting green development are common challenges faced by all humanity. China Huaneng is willing to collaborate with all parties to strengthen experience exchange and jointly conduct research on transformation pathways. We actively provide solutions for global green and low-carbon transformation and for building a beautiful China and a beautiful world. Together, we promote the development of green and low-carbon industries, drive a steady decline in global greenhouse gas emissions, and lay down the "green foundation" for sustainable global development. Additionally, we will advance energy technology innovation, enhance the conversion of scientific and technological achievements, and contribute wisdom and strength to the world in addressing climate change.

## SASAC "Building World-class Enterprise" Series Training and State-owned Enterprise Reform Lecture

Wen Shugang, Chairman of the Company, pointed out in his speech that China Huaneng has always regarded building a world-class enterprise as its unwavering goal. Positioned at the forefront of energy and power reform and development, the Company continuously enhances its core competitiveness and strengthens its core functions. It fully leverages its role in technological innovation, industrial control, and safety support in building a modern industrial system and creating a new development pattern. The Company is committed to promoting a green and low-carbon transition, striving to build the Company stronger, better and bigger.

## 2023 Global Energy Interconnection Conference

Wen Shugang, China Huaneng Chairman, pointed out in his speech that China Huaneng is willing to work with all parties to lay a green foundation for corporate development, build a zero-carbon power system, and strive to create a modern society where humans and nature coexist harmoniously. The Company aims to deepen cooperation in energy technology innovation to leverage each other's strengths, and break through key core technologies in clean energy, providing technological support for the global green and low-carbon transition. Additionally, it seeks to enhance the assurance capability of important resource elements, strengthen the resilience of industrial chains, and jointly safeguard the security of global industrial and supply chains.



March 1

March 20

March 25

March 29

August 23

September 13

September 26

October 28

## Symposium on Deepening Cooperation between Inner Mongolia Autonomous Region and Central SOEs

Wen Shugang, China Huaneng Chairman, pointed out in his speech that China Huaneng will further integrate into the overall economic and social development of Inner Mongolia, fully implementing the strategic cooperation framework agreement signed by both parties. The focus will be on establishing a new type of energy system, striving to develop strategic projects for the green and low-carbon transformation of energy bases, leading projects for building a modern energy industry system, and demonstration projects that support high-level self-reliance in science and technology. This initiative aims to assist Inner Mongolia in showcasing greater achievements on its new journey toward becoming a "model autonomous region".

## Boao Forum for Asia Annual Conference 2023

Wen Shugang, Chairman of the Company, pointed out in his speech that, as one of the largest clean energy suppliers in the world, China Huaneng will continue to promote the building of a world-class enterprise, accelerate the pace of green and low-carbon transformation, and adhere to the five-pronged approach of centralized and distributed, onshore and offshore, local energy consumption and external delivery, single variety development and multi-variety complementarity, as well as single scenario and hybrid scenario. This aims to achieve leapfrog development in clean energy. We will uphold technological leadership, with continuous breakthroughs in low-carbon technology innovation. Furthermore, we will deepen international energy cooperation and integrate into the joint construction of a green "Belt and Road", making contributions to achieving the "carbon peaking and carbon neutrality" goals.

## 2023 ESG Global Leaders Conference

Wen Shugang, Chairman of the Company, pointed out in his speech that as a leading enterprise in China's power generation industry, China Huaneng prioritizes high-quality development as its primary task. The Company integrates ESG into its development strategy and accelerates the green and low-carbon transition with a sense of urgency. It fosters technological innovation with an enterprising spirit, promotes harmonious development with a strong sense of mission, and enhances corporate governance with perseverance. China Huaneng is committed to continuously advancing the construction of a "Four-in-one" ESG practice and management system, contributing to national strategies, sustainable growth, and environmental protection. The Company is willing to work together with all parties to jointly advance the ESG initiative, achieving new and greater results. This collaboration aims to solidly promote Chinese modernization through high-quality development and contribute new wisdom and strength to building a global community of shared future for mankind.

## Promotion Meeting for Cultural and Ethical Improvement Program of Central SOE Youth and Youth League Member and Youth Education Campaign Working Conference

Wen Shugang, China Huaneng Chairman, pointed out in his speech that China Huaneng will inspire the youth with a strategic vision of striving to become a world-class enterprise. The Company will sharpen the youth through vibrant practices aimed at achieving world-class standards and will empower them with substantial achievements. Besides, the Company will guide young people to carry out education campaign solidly, further solidifying their determination to uphold core values, strive alongside the Party, and contribute to the nation's prosperity and enterprise growth. With high enthusiasm, they should embark on a new journey and showcase the outstanding qualities and positive image of Huaneng youth in the new era through practical actions and tangible results.

## Responsibility and Mission

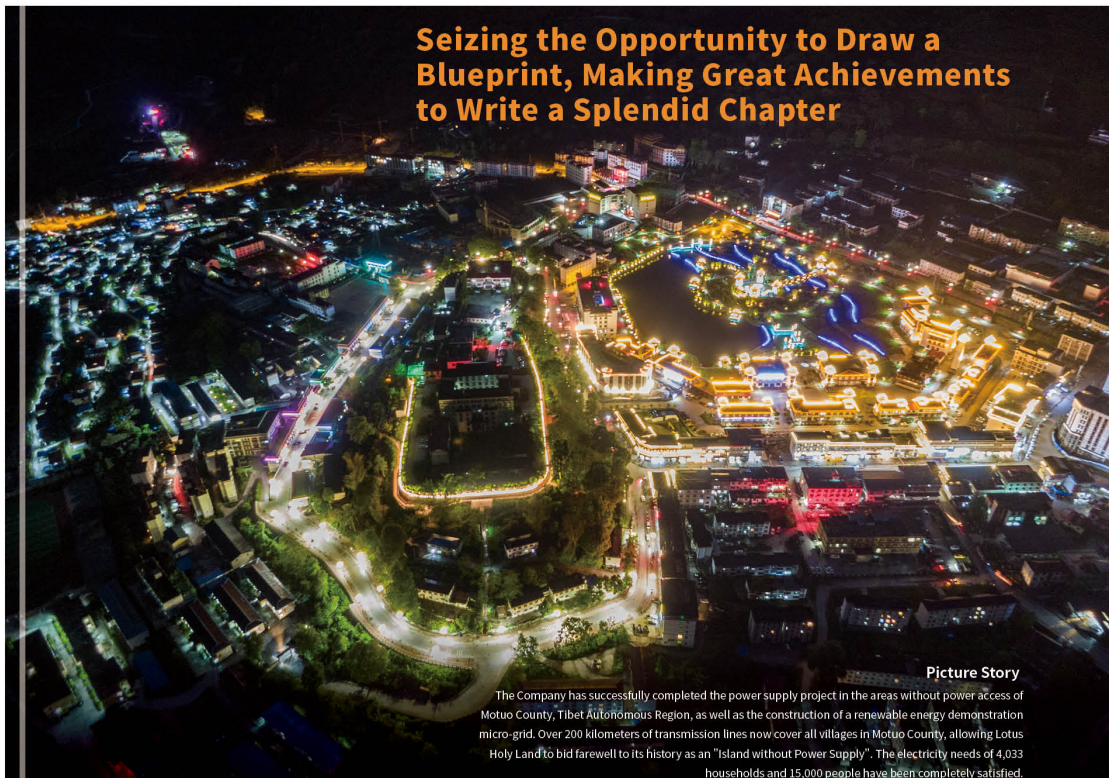
State-owned enterprises are an important material and political foundation of socialism with Chinese characteristics, serving as a key pillar for the Party to govern and rejuvenate the country.

—General Secretary of the Communist Party of China Central Committee: Xi Jinping

Huaneng is a backbone SOE. Our defining feature is to serve the people, with a steadfast commitment to national service. We pursue technological innovation to lead industry progress continuously. We must always keep in mind "The Top Priorities of the Country", recognize the paramount importance of promoting Chinese modernization in governance, and roots our development in national rejuvenation along the path to a stronger China. We focus on leveraging our roles in technological innovation, industrial control, and security support to better fulfill its strategic mission.

—Chairman of the Board of Directors: Wen Shugang

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## Seizing the Opportunity to Draw a Blueprint, Making Great Achievements to Write a Splendid Chapter

### Picture Story

The Company has successfully completed the power supply project in the areas without power access of Motuo County, Tibet Autonomous Region, as well as the construction of a renewable energy demonstration micro-grid. Over 200 kilometers of transmission lines now cover all villages in Motuo County, allowing Lotus Holy Land to bid farewell to its history as an "Island without Power Supply". The electricity needs of 4,033 households and 15,000 people have been completely satisfied.



Aligning with Demand, Serving the  
Strategy, and Deeply Committed to  
Technological Innovation

### The Call of the Party Central Committee

It is essential to promote state-owned enterprises to improve their innovation system, enhance their innovation ability, stimulate innovation vitality, promote the deep integration of innovation chains in industrial chains, enhance the capabilities of state-owned enterprises in demand orientation, resource allocation, transformation and application of original technologies, and strive to build them into sources of original technologies.

—General Secretary of the Communist Party of China Central  
Committee: Xi Jinping



### The Plans of SASAC

Self-reliance in science and technology is not only a matter of development but also a matter of survival. State-owned enterprises play a crucial role in the industry-university-research institute innovation chain in our country. A significant number of leading technology companies have become an important part of the national strategic technological force and should take on the mission of achieving high-level self-reliance in science and technology.

—Secretary of the Party Committee and Chairman of the State  
owned Assets Supervision and Administration Commission of the State  
Council: Zhang Yuzhou



### The Actions of China Huaneng

We need to seize the opportunities presented by a new round of technological and industrial transformation. Based on national needs, challenges faced by industrial and supply chains, industry trends, and the corporate capabilities, we should strengthen the primary role of enterprises in technological innovation. This includes improving the innovation system, enhancing innovation capabilities, stimulating innovation vitality, and constructing an innovative ecosystem. We aim to be the proposers, organizers and providers of original innovations and core technologies, as well as market users, contributing to achieving high-level self-reliance in science and technology.

—Chairman of the Board of Directors: Wen Shugang

## Consolidate the Management of Technological Innovation

Oriented by the needs of serving national strategies, the Company continuously deepened the reform of science and technology institutions and mechanisms, and formulated the *Action Plan for Enhancing Technological Innovation Capability and Core Competitiveness*, the *Measures for Performance Assessment of Scientific and Technological Innovation*, the *Action Plan for Strengthening Basic and Applied Basic Research*, and the *Pilot Plan for National Key Laboratories and Original Technology Source*, effectively stimulating and enhancing innovation vitality and significantly improving innovation efficiency.

The Company has taken the lead in undertaking a batch of major national scientific and technological research tasks, achieving significant technological innovation results. The construction of the source of original technologies for CCUS and offshore wind power was being solidly advanced, while the promotion and application of independent and controllable technologies were accelerating. This marks a solid step forward in building national strategic technological capabilities. By the end of 2023, the Company has invested RMB 12.744 billion yuan in R&D, with an investment intensity of 3.11%.

The Company places a high priority on the development of its scientific and technological talent pool. It organized the first selection of high-level technology innovation talents, aiming to cultivate strategic technological talents, leading talents in key fields, top technological talents, young technological talents, and innovation teams. In 2023, the academicians and expert workstation of the Company was approved for establishment, and one expert was selected as an expert of the National Plan for the Special Support for Top-notch Talents. The Company was selected into the List of Outstanding Enterprises in Science and Technology Innovation of Central SOEs released by SASAC in 2023. Throughout the year, it received 19 first prizes of ministerial/provincial-level technology awards. Three achievements were included in the Recommended Catalogue of Technological Innovation Achievements of Central SOEs (2022 Edition), and three achievements were selected as part of the third batch of the first (set of) major technical equipment in the energy field by the National Energy Administration. Additionally, 25 achievements won the Electric Power Innovation Award of National Enterprise Management Modernization Innovation Achievement, with both the quality and quantity of awards ranking among the leading state-owned power generation enterprises. The two projects completed by the Company, namely "Flexible and Efficient Key Technologies and Their Applications in Transient Process of Coal-fired Power Generation Units for New Power Systems" and "Key Technologies and Their Applications for Intelligent Construction of High Dam Projects under Complex Conditions", won the second prize of 2023 National Science and Technology Progress Awards.

The Company's two achievements such as "Key Technology of Supercritical Carbon Dioxide Cycle Power Generation and Demonstration Application of the First 5 MW Unit in the World" won the first prize of China Electric Power Science and Technology Award; "Intelligent Operation System of Coal-fired Power Plants Based on Domestically-made Intelligent Controller" won the first prize of Energy Innovation Award; Xi'an Thermal Power Research Institute has become the only one in the national power generation industry that has been rated as a benchmark enterprise in the special evaluation of the "Demonstration Action of Science and Technology Reform" for four consecutive years; Huaneng Industrial Internet Platform won the first prize of Electric Power Innovation Award and the second prize of the "Golden Apple Award" in the technical achievement category; "Commercial Operation and Production of Shidao Bay HTR-PM Demonstration Project" ranked first among the Top Ten Scientific and Technological Progress News of China in 2023 selected by academicians of the Chinese Academy of Sciences and Chinese Academy of Engineering.

## Encourage Employees to Innovate in Technology

CHNG furthered the "Mass Entrepreneurship and Innovation", by revising and implementing the *Management Measures for Mass Innovation Projects and the Management Measures for Innovation Studios in Grassroots Enterprises*. It encouraged the establishment of mass innovation projects and actively advanced the construction of employee innovation studio alliances, further stimulating the innovative and productive vitality of employees. In 2023, the Company established a total of 371 mass innovation projects, identified 25 grassroots enterprise technology innovation studios, completed the evaluation of 105 grassroots enterprise technology innovation studios, and effectively created a good atmosphere of "mass innovation".

The Company was committed to strengthening the promotion and transformation of employees' technological innovation achievements. As a pioneer in the power generation industry, it has introduced the *Management Measures for the Promotion and Transformation of Employees' Technological Innovation Achievements*. Throughout the year, the Company achieved the direct promotion and transformation of 23 employees' technological innovation results and the transformation of 31 incubated transformation results. It successfully facilitated the actual operation of three transformation and incubation organizations and achieved over 50 intentions for transformation and application, totaling more than RMB 18 million yuan. Among these, 31 transformation and application projects have been implemented, amounting to RMB 5.6 million yuan.

CHNG the Company deepened the organization and participation in the collection and selection of staff technological innovation achievements, emphasizing the guiding principles of "positioning employee innovation, applying research for practical use, and improving quality". A total of 241 outstanding achievements were selected, among which 196 received recognition as excellent results from the China Electricity Council, the China Energy Chemistry Union, and the China Workers' Technical Association. The Company actively participated in the innovation and efficiency creation activities of China Energy Chemistry and Genio Association, and two achievements won the special prize at the Third Electric Power Enterprise Team Innovation and Efficiency Creation Achievement Competition. The Company's "Dispatching and Command System Based on Computer Network Interaction" won the "Five Small" Excellent Innovative Achievements of National Workers in 2023 by All-China Federation of Trade Unions.

## Improving the Quality of Patents and Standards

The Company placed great importance on patent application. By conducting patent navigation, it clarified research and development directions, determined technical routes, and solved technical difficulties. Besides, it strengthened the internal review of the novelty and creativity of patent disclosure documents to ensure continuous improvement in patent quality. By the end of 2023, the Company has been granted 8,815 patents, including 1,382 invention patents, an increase of 65.17% year-on-year; 715 overseas patents, an increase of 158.12% year-on-year. The Company ranked 19<sup>th</sup> in the 2022 Central SOE Patent Ranking by the SASAC, maintaining a leading position in the industry.

In 2023, CHNG prepared the *Opinions on Further Strengthening Quality and Standardization Work and revised the Regulations on Standardization Work*, and six standardization committees comprehensively carried out the approval review of standard projects, and issued 6 international standards, 16 national standards, 39 industry standards, 74 group standards and 51 enterprise standards throughout the year, further improving the standardization degree.

To ensure more effective intellectual property rights, the Company established an Intellectual Property Center to improve the intellectual property management system. This includes standardized management throughout the processes of application, examination, and authorization. CHNG enhanced the promotion and training of intellectual property, strengthened the monitoring and early warning of intellectual property risks, and promptly carried out applications for patents, standards, copyrights, etc., to prevent infringement.

A Carbon Dioxide Capture System and Process with Multi-stage Split Regeneration won the gold award of the 24<sup>th</sup> China Patent Award, marking a significant breakthrough of Huaneng.

The official release of three international standards related to ion exchange resins marks a significant leap for China, positioning the country's production, sales, research, and testing capabilities of ion exchange resins among the world's leading level.

The international standard *Corrosion of Metals and Alloys Performance Test Method for Corrosion Inhibitor Used in Chemical Cleaning of Industry Equipment* primarily developed by the Company has been officially released. This is the first international standard in the field of corrosion prevention through chemical cleaning of industrial equipment.

## Strengthen the Research and Development of Core Technologies

CHNG continued to achieve significant technological breakthroughs, with new advancements in key core technologies, and took the lead in undertaking over 40 national-level research tasks, including National Laboratory Major Project, 1025 Special Project, and Innovation Consortium, all of which are progressing as planned, with the maximum number of CHNG-led programs in the industry. By the end of 2023, the Company has cumulatively received two first prizes of the China Electricity Power Award, one first prize of the Energy Innovation Award, and one innovation award of the China Electricity Council. All these prizes are the highest among the three awards in the industry, indicating that the Company is in the leading position in the industry. The Technology for Frequency Regulation and Peak Shaving of Molten-salt Thermal Energy Storage Coupled Coal-fired Power Units and Safe Steam Supply developed by the Company was successfully selected into the "Innovation China" Pilot Technology List in 2023.

- For the first time, broke through in the sealing surface built-up welding technology of domestic high-performance valves with a temperature rating of 650°C and above.
- Completed a domestically leading 10-ton solid amine adsorption DAC (direct air carbon capture) demonstration device
- Tested the country's first megawatt-scale full-ratio ammonia/coal co-combustion technology successfully, marking a new breakthrough in the research of clean and efficient combustion technology in China
- Completed the overall technology research and development of drainage water treatment, took the lead in achieving calcium and magnesium removal rate of more than 90%, and formed a complete technical route for drainage water treatment with high salinity
- Continuously promoted the R&D and pilot demonstration of continuous carbon dioxide monitoring, and formed high-precision technical routes and products with independent intellectual property rights
- Completed the R&D and field verification of production, storage and transportation process of new denitrification agent
- Completed the world's first CO<sub>2</sub>P (integrated pollutant removal) technology verification project of 135 MW coal-fired unit
- Completed the world's first 100 MW-class decentralized control network energy storage power station of which the intelligent management technology won the first prize of the Science and Technology Award of the China Electric Power Promotion Council
- Successfully applied and verified the first domestic efficiency monitoring and diagnosis system of 9FA gas turbine and its combined cycle unit in Nanjing Gas Turbine
- The efficiency of large-area perovskite-crystalline silicon laminated assembly reached over 24%, and completed the first kilowatt-class perovskite demonstration power station in China
- Developed China's first set of intelligent underwater inspection robot for offshore wind power, the world's first unmanned electric truck and supporting system with no driving cab
- 18 MW direct-drive offshore wind turbine, with the largest single unit capacity and rotor diameter in the world, jointly developed with Dongfang Electric rolled off the production line in Fujing, Fujian Province

## Promoting the Commercialization of Scientific and Technological Achievements

The Company formulated the *Management Measures for the Transformation of Scientific and Technological Achievements*, revised the *Management Measures for Demonstration Application Projects of the First (Set of) Major Technical Equipment*, and issued the *2023 Advanced Technology Application Promotion Catalog*, laying a solid institutional foundation for the transformation of scientific and technological achievements. In 2023, the Company actively conducted special research and studies on the transformation of scientific and technological achievements, effectively addressing the bottlenecks and challenges in the transformation process. The revenue from the transformation of scientific and technological achievements increased by 25% year-on-year. The contract amount for the promotion of large-scale energy storage systems exceeded RMB 3 billion yuan. The benefits of the transformation were significant, further enhancing the core competitiveness of the industry.

- Promoted and applied Huaneng Ruivo DCS system in a total of 48 units (sets), and promoted and applied PLC in a total of 234 units (sets); Promoted and applied domestically-made hydro-pow generator, excitation system and relay protection in a total of 10 units (sets), 12 units (sets) and 7 units (sets) respectively
- Promoted and applied the pre-drying carbonization machine in a total of 4 units (sets)
- Put Huaneng Ruivo 5316, the first domestic set of photovoltaic monitoring system, into operation in Qinghai Gonghe Shining PV Plant, marking important progress in independent innovation of photovoltaic power station control technology in China
- Demonstrated and promoted the first domestic set of domestically-made digital turbine monitoring instrument system in Laiwu Power Plant and Huaying Power Plant, marking a significant achievement in complete independent control of all key core technologies in this field in China
- Completed 168 hours of full-load operation of the self-developed world's largest "5 MW supercapacitor + 15 MW lithium battery" hybrid energy storage system, marking China's advancement to the forefront of global research, integration, and application levels in supercapacitor technology
- Successfully put the independently-developed high-performance phosphate ester fire-resistant oil into service at Tongchuan Power Plant, filling the gap in China in the application of domestic phosphate ester fire-resistant oil in large-capacity, high-parameter units
- Successfully put the country's first self-developed 2,000 tons/year carbon dioxide capture device for gas turbines and the first domestically produced F-class gas turbine GCB into operation at Yangu Gas-fired Power Station
- Put the peak shaving and frequency regulation demonstration project of the first domestically-developed 650 MW coal-fired power unit coupled with steam molten-salt thermal energy storage at Weijiaman Coal-fired Power Plant
- Lifted the world's first tandem dual-wind turbine unit, independently developed and named "Saaru" at the Tongyu Wind Farm in Jilin, and entered the stage of operational demonstration
- Achieved full-power operation of Huaneng Shuangou 35 MW HV direct-chain energy storage system, the world's largest single-unit power electrochemical energy storage system developed by the Company, at the Shangdu G-level wind power base
- The world's first alkaline water electrolysis hydrogen production system with a capacity of 1,300 standard cubic meters per hour, developed by the Company, has successfully operated at full load at the hydrogen production station in Pengzhou, Sichuan. This marks that the alkaline electrolysis cell with the world's highest hydrogen production capacity of commercial demonstration unit was put into operation

## Build a Platform for Technology Research and Development

The Company systematically advanced the construction of national-level innovation platforms, including the National Key Laboratory for Efficient and Flexible Coal Power and CCUS, as well as the source of original technologies for offshore wind power and CCUS. Moreover, the Company led the establishment of a national CCUS technology innovation consortium, participated in the formation of innovation consortia for new energy storage and advanced power equipment, and deepened the industry-university-research collaborative innovation and development. In 2023, the Company took the lead in obtaining approval for four national key R&D programs, including DC collection for offshore wind farms and advanced ultra-supercritical power generation at 650 °C. Additionally, the Company established five national innovation platforms in the first batch of national innovation platforms released by the National Energy Administration under the "14F Five-Year Plan", which are the Offshore Wind Power Engineering and Operation Technology R&D Center, the Coal-based Carbon Dioxide Capture, Utilization, and Storage R&D Center, the Perovskite Battery R&D Center, the Digital and Intelligent Technology R&D Center for Thermal Power, and the Key Energy Material and Equipment Technology R&D Center. These achievements mark the highest number of approvals in the industry.

- Developed the country's first river basin-level online intelligent dam monitoring platform
- Set up the first set of molten-salt energy storage standardized test platform with high parameters and high voltage level in China
- Established a cloud platform for remote video supervision system for project data information sharing, and realized remote video access on site of projects under construction
- "The Industrial Internet Cybersecurity Technology Innovation and Service Support Platform of Power Generation Industry" was selected into the List of Industrial Internet Pilot Demonstration Projects issued by the Ministry of Industry and Information Technology.

## Aggregating Momentum and Empowering Others in an Open and Integrated Manner, Boldly Leading the Development of the Industry



### The Call of the Party Central Committee

The new development pattern is based on the modern industrial system, and the smooth economic circulation requires orderly chaining, efficient and smooth operation of different industries. We should follow the major trends in industrial development, promote the supplementation of the chain in weak industries, the extension of the chain in advantageous industries, the upgrading of the chain in traditional industries, and the establishment of the chain in emerging industries. This will enhance the continuity and competitiveness of industrial development.

—General Secretary of the Communist Party of China Central Committee: Xi Jinping



### The Plans of SASAC

Industrial competitiveness is crucial to national competitiveness. Only by continuously promoting industrial upgrading can we continually shape new national competitive advantages. State-owned enterprises (SOEs) should have a global perspective and take proactive actions to build modern industrial chains, thereby gaining strategic initiative in the new round of global industrial competition.

—Secretary of the Party Committee and Chairman of the State-owned Assets Supervision and Administration Commission of the State Council: Zhang Yuzhuo



### The Actions of China Huaneng

We must adhere to serving the national strategy, courageously undertake key tasks, and base ourselves on our own endowments. By leveraging our conditional and technological advantages, we should actively lay out and develop strategic emerging industries, foster leading enterprises in the industrial chain, and accelerate the formation of new quality productive forces. We should deeply understand the Company's positioning in the "two chains", promote the integrated development of the industrial chain, and comprehensively enhance the resilience and security level of the industrial chain.

—Chairman of the Board of Directors: Wen Shugang

## Efficient Synergy among Various Sectors

### Focusing on the Development of Power Sector

The power sector of the Company adhered to the concept of green development, sped up the structural adjustment, strove to develop new energy such as wind power and photovoltaics, actively developed hydropower, developed nuclear power in a safe and orderly manner, to continuously improve the installed capacity proportion of low-carbon and clean energy. In 2023, the installed capacity of the Company's wholly-owned and majority-owned power plants at home and abroad reached 243.12 GW, a year-on-year increase of 9.95%, including the wind power installed capacity of 39.29 GW and the PV installed capacity of 33.58 GW, a year-on-year increase of 15.8% and 93.5% respectively.

### Optimizing the Development of Coal Sector

The Company is firmly committed to implementing the arrangement of coal production increase and supply guarantee, and steadily advancing the construction of coal projects. It has established a specialized team for intelligent construction, with the comprehensive control platform achieving online testing for the coal industry. Moreover, it has set up ten coal mine data centers, advancing the intelligent construction in an orderly manner and comprehensively enhancing the management level of coal projects. In 2023, the Company's coal production reached 108 million tons, once again breaking the 100 million-ton mark, with an increase of 6.92 million tons year-on-year, setting a new historical record. The production capacity reached 118.8 million tons per year, with a capacity utilization rate leading the industry. The coal sector achieved a profit of RMB 10.781 billion for the full year, an increase of RMB 509 million year-on-year, exceeding RMB 10 billion for two consecutive years.

- Huajiang and Weijiamao open-pit mines have cumulatively increased their annual production capacity by 5 million tons per year.
- The Shenyu River Loading Station has been put into trial operation, effectively reducing transportation costs.
- Xinshuang Coal Mine set new historical records with a daily drilling progress of 76.3 m and a monthly drilling progress of 1.862 m, both the highest since the mine's establishment. The first mining face 1802 successfully achieved joint trial operation as scheduled. All coal sectors of the Longdong Energy Base were fully completed and put into production.
- The maximum monthly production at the Hetayou Coal Mine reached 670,000 tons. The shaft freezing work for the "one shaft, two faces" capacity achievement project were completed.
- Yannbei Coal Mine successfully passed acceptance for the first batch of intelligent demonstration coal mine in China, becoming the Company's first and Gansu Province's first Class II mid-level intelligent demonstration mine passing the national level acceptance.

The Company formulated industrial synergy policies and special team work plans, proactively reduced external coal supplies, and established a "green channel" for power plants with urgent and special needs, concentrating resources to fully ensure stable internal supply. In 2023, the Company signed annual long-term contracts for coal supply, achieving the full coverage goal. The total internal coal supply for the entire year reached 75.47 million tons, an increase of 9.54 million tons year-on-year, representing a growth of 14.47%. So it played a prominent role of internal supply assurance. The Company's internal coal and electricity industry collaboration contracts amounted to 38.9 million tons, an increase of 13.33 million tons year-on-year. These contracts covered 90% of our coal mining enterprises within the Company and all regional subsidiary companies involved in coal-fired power business, setting a new historical record.

### Effectively Developing Financial Sector

The Company optimized and adjusted its financial industry layout, actively served its core business and the real economy. It facilitated the orderly development of its advantageous financial businesses, including securities, insurance, trust, and leasing by strengthening strategic guidance, enhancing capital strength, and promoting the integration of industry and finance. In 2023, the total assets of the Company's financial business reached RMB 245.492 billion, with cumulative operating revenue of RMB 14,508 billion and cumulative net profit of RMB 5,267 billion, representing a year-on-year increase of 5.53%, thus fully playing its supporting roles in terms of function, service, and performance.

- New progress was made in capital operation, specialized integration of hydropower assets was completed, and 100% equity of Huaneng Sichuan Branch was injected into Huaneng Lancang River Hydropower Inc., a listed company.
- RMB 4 billion of corporate bonds for scientific and technological innovation were issued, and more than 20 industrial chain enterprises were introduced into the Sci-Tech Innovation Financial Port.
- The issuance of RMB 21.152 billion in REITs-like products was completed, with the best cost in the market for the same period.
- The first "hierarchical bill pool" among central state-owned enterprises was established, and the industry's first application of "hierarchical" bill pool business was conducted. A total of 838 transactions were realized through bill pledge and re-issuance, amounting to RMB 400 million, thus opening up the connectivity channel for bills.

- Guicheng Trust issued a total of 8 tranches of renewable energy carbon-neutral bonds for power generation enterprises and 3 tranches of green asset securitization products throughout the year, with a total amount reaching RMB 5.851 billion.
- The mobile APP "Great Wall Changing" for the Smart Ecosystem Platform of Science and Innovation Finance was launched, ushering in a new model of industrial finance.
- The green finance scenarios on the "Cloud Link" platform was enriched, and the financing for the Company's first large-scale photovoltaic desert control project was completed.

### Vigorously Developing Science and Technology Sector

CHNC formulated and implemented the *Special Plan for Scientific and Technological Innovation and the Implementation Plan for the Reform of the Scientific and Technological Innovation System and Mechanism*, to continuously improve the technological innovation system that focuses on CHNC, internal and external coordination, and full coverage of main business. The main business was closely integrated with scientific research, and the technological innovation provided more support and service for the development, engineering, construction, and production of projects, and other fields of the power industry, to speed up the formation of a good development pattern in which the scientific research is guided and financed by the industry and the industrial upgrading is supported by scientific research. In 2023, the Company's science and technology sector achieved an operating revenue of RMB 7.222 billion, representing a year-on-year growth of 33.5%. The total profit was RMB 307 million, an increase of RMB 462 million year-on-year.

### Developing Transportation Sector Steadily

The Company continuously increased its efforts in industrial collaboration, fully ensured the transportation and supply of coal for power generation within the Company. Through the coordinated efforts among the coal, electricity, port, and shipping sectors, its collective ability to withstand market risks was significantly enhanced. In 2023, the cumulative throughput of port enterprises of the Company was 89.4 million tons, basically flat year-on-year, contributing stable profits of RMB 182 million, and achieving a historic high in operating efficiency. The cumulative freight volume of the Company's shipping enterprises was 84.36 million tons, which was almost the same as the previous year. Among them, 36.1 million tons of coal were transported internally for power generation, representing a year-on-year decrease of 33.6%.

- The "Automated Coal Unloading by Ship Unloader" research project at Haimen Port was completed and officially put into operation. This is the Company's first unmanned automated coal unloading system for ship unloaders, further facilitating the construction of a smart port.
- Taichang Port was actively promoting the application and transformation of the "Coal Blockage and Spillage Identification and Early Warning System for Coal Conveyor Belts" innovative achievement to effectively improve the port's loading and unloading efficiency.
- Taichang Port completed shore power connections for 2,729 ship-visits, achieving zero emissions, zero fuel consumption, and zero noise from the source for berthed vessels.
- Caofeidian Port advanced the creation of a "Star-rated Green Port in China" with shore power connections for 20 ship-visits, and maintaining zero sewage discharge.



### Nurturing and Strengthening Strategic Emerging Industries

Leveraging its market position and technological advantages, the Company focuses on strategic emerging industries to build a cluster of industry and research, promote the integrated development of the industrial chain, and better demonstrate the leading and exemplary role of key enterprises. To further foster and expand the development of strategic emerging industries, the Company convened a high-level seminar on strategic emerging industries, formulated a work plan for these industries, and increased investment in emerging sectors such as comprehensive energy services, green hydrogen, and new energy storage. This initiative aims to further promote the commercialization of technology and accelerate the formation of market-competitive and sustainable industrial pathways. In 2023, the revenue from the Company's strategic emerging industries accounted for 17% of total revenue, an increase of 4 percentage points year-on-year, creating a favorable environment for further development.

- An industrialization plan for perovskite was developed, and the photoelectric conversion efficiency of large-area perovskite photovoltaic modules achieved 18.5%, reaching an internationally leading level.
- The world's first 1300 Nm<sup>3</sup>/h high-current density pressurized alkaline water electrolyzer was successfully put into operation.
- The contract for the flexible support system amounted to approximately RMB 18 million was completed. Additionally, condition monitoring and fault diagnosis were carried out on 554 sets of equipment across 11 units.
- The research and development of 11 long-distance intelligent heating projects were completed, and the digital intelligent heating dispatching control system reached the internationally leading technological level.
- The independently developed continuous online monitoring technology for carbon dioxide emissions was successfully demonstrated on 35 units.

### Promoting Digital Transformation and Upgrading

The Company adheres to independent construction and operation & maintenance, fully carrying out work based on the "139" digital transformation framework. It has formulated the *Data Operation Service Implementation Plan* and the *Digital Innovation Ecosystem Construction Proposal* to improve the IT-based management mechanism. Its independent operation and maintenance level continues to rise, with the availability of information systems reaching 99.9%. It constantly advances and deepens demonstration projects for digital transformation in the industrial sector, using digitalization and intelligence to support high-quality development of the enterprise.

- The development of six business scenarios for the Unified Smart Energy Management Platform, including operational analysis, financial analysis, fuel management, energy efficiency analysis, unit rating, and carbon emission management have been completed, and the scenario-based integration of data service business has been realized, achieving significant results.
- The Unified Safety Production Management Platform has achieved full coverage of grassroots thermal power units and has been fully implemented across 25 regional companies, ensuring the seamless integration of the headquarters, regional companies, and power plant operations. This has led to a significant improvement in safety management levels and efficiency.
- The Version 2.0 of the Renewable Energy Smart Operation and Maintenance System has been launched, cumulatively accessed to 841 renewable energy stations with a total capacity of 72,000 MW. The system actively serves external clients, with 12 central SOEs and 26 stations, totaling 278 MW of renewable energy projects connected to it. The availability rate of the projects connected has increased by 3 percentage points.
- The core components of the data sharing platform have been successfully established and accessed to the shared data from more than ten systems, including the comprehensive statistical management system and the digital financial platform. This achievement enables cross-domain and cross-regional data circulation and sharing.
- The mobile portal iHN+ has achieved full coverage across the Group Company, with 110,759 registered users and over 200 access applications.
- The domestically developed OA system has achieved full coverage across the Company, with a total of over 83,000 users and 80,000 documents processed monthly. It is the first fully independently controllable application system in the Company's information technology field and has become a pioneer in the industry to complete the localization of group-level OA system.
- We have carried out the construction of a cloud service operation system, completed the cloud operation planning and own cloud solutions, and successfully migrated a total of 177 systems to the cloud.
- The independently developed IT operation and maintenance service and supervision platform has been launched and is in operation. The connection rate of the intelligent customer service robot is 95.1%, the system availability is 99.9%, and the user satisfaction has reached 100%.
- The "3+6+N" cloud-edge collaborative smart power plant with independent intellectual property rights has been put into operation in Shidongkou NO.1 Power Plant, becoming the first "benchmark" smart power plant in China covering six systems: engineering and construction, operation, safety, maintenance, management and fuel.
- Weijiamao Coal-fired Power Company has established a full-range smart system, and built an intelligent open-pit coal mine. A total of 27 intelligent mine projects have been successfully implemented.

Optimizing the Core Business, Strengthening  
the Foundation, and Bravely Serving as the  
Pillar of Energy Supply



### The Call of the Party Central Committee

Energy security is crucial to the overall economic and social development. We should follow the trend and take advantage of the situation to promote the high-quality development of new energy in China with greater efforts, provide safe and reliable energy guarantee for China's modernization drive, and make greater contributions to building a clean and beautiful world.

— General Secretary of the Communist Party of China Central Committee: Xi Jinping



### The Plans of SASAC

Many SOEs are distributed in important industries and key areas that are vital to national security and the lifeline of the national economy. It is essential to balance development and security, fortify the baseline for "prevention" and enhance the capability for "stability". In critical moments, these enterprises should play a crucial role as the last line of defense.

— Secretary of the Party Committee and Chairman of the State-owned Assets Supervision and Administration Commission of the State Council: Zhang Yuzhuo



### The Actions of China Huaneng

Central SOEs are unshirkably responsible for actively responding to the increasing complexity, severity, and uncertainty of the external environment, and serving national strategic security. We must deeply study and comprehend the important discourse on energy security proposed by General Secretary Xi Jinping, strengthen our bottom-line awareness and thinking, and regard ensuring the safety of energy and power as a major political task. We must make every effort to ensure power generation, heating, and people's livelihood, and resolutely lay a solid foundation for safe development.

— Chairman of the Board of Directors: Wen Shugang

## Stable and Sufficient Supply of Energy

The Company adheres to the primary responsibility of ensuring a stable and secure energy supply, meeting the daily energy needs of economic and social development. It diligently ensures the supply during special and important periods, issues supply guarantee plans, and makes every effort to ensure power generation, heating, and people's livelihood. Key production indicators such as annual power generation, heat supply, and coal production have reached the best levels in history. In the face of natural disaster challenges such as rainstorm and snow, severe cold waves, floods and earthquakes, the vast number of employees and management remain steadfast on the front lines, braving the pressure to ensure the long-term continuous operation of the power units. They provided emergency assistance to Jishishan in Gansu Province during the earthquake disaster, ensuring a stable and orderly energy supply at critical moments. During major national events, we adhere to the principle of "ensuring stable power generation regardless of various challenges". All types of power units were operated to their full capacity, ensuring the successful completion of power supply tasks during critical periods such as the National People's Congress and Chinese People's Political Consultative Conference ("NPC & CPPCC") sessions, the Chengdu FISU World University Games, the Hangzhou Asian Games, and the "Belt and Road" Forum. The Company's power supply assurance work has been fully recognized by the leaders of the CPC Central Committee and the State Council, national ministries and commissions and local governments.



Changchun Thermal Power Plant Conducting Safety Inspections During Heavy Snowfall



Yimin Coal Mine Standing Firm on the Frontline During Heavy Snowfall

In 2023, the Company achieved a domestic power generation of 830.5 TWh, an increase of 4.98% year-on-year, reaching the highest level in its history. It includes the thermal power generation of 598.7 TWh, hydropower of 110.1 TWh, wind power of 87.9 TWh, and photovoltaic power of 33.2 TWh, representing year-on-year growth of 2.63%, decrease of 4.62%, growth of 19.05%, and growth of 87.07%, respectively. The annual cumulative utilization hours ranked first in the industry benchmarking.

As the largest residential heating enterprise in China, the Company's heating and steam supply unit is operating at full capacity, with the total heating area reaching 1.03 billion m<sup>2</sup>, an increase of 2% year-on-year. The annual heat supply reached 51.4 million GJ, a year-on-year growth of 5.53%, setting a new historical record. Among them, the annual steam supply amounted to 43.283 million tons, an increase of 11.33% year-on-year.



Scan the QR code to watch the CCTV program "Live from Winter Energy Supply Sites" and have a view of Beijing's largest thermal power plant

## Ensure the Quality of Engineering Construction

The Company has been continuously strengthening the centralized management of engineering and construction, enhancing communication and collaboration with different professional management departments and secondary units. This effectively leverages the coordinated control role in engineering and construction, deepening mechanisms such as bi-weekly tracking of major project progress, monthly centralized consolidation of engineering and construction information, quarterly analysis and evaluation of progress, and annual centralized performance assessment. These efforts further streamline the management systems and mechanisms for engineering and construction.

- A total of 11 power construction projects, including Ruijin Project Phase II, Dongguan Gas Turbine, Jiangyin Gas Turbine, Ji'ning Thermal Power, Wunonggong Hydropower Station, Dazhou Dingshuang Wind-Solar-Storage Integrated Project, Shandong Peninsula South No.4 Offshore Wind Power, Zhaoyue Wind Power in Liangshan Prefecture, Anbei No.3 Wind Farm, and Jiacha Hydropower Station, were selected into the List of High-quality Power Engineering Projects in China (including medium and small-sized projects), with the number of selected projects ranked first among power enterprises.
- Ruijin Project Phase II and Huangdeng Hydropower Station won the National Gold Award for High-Quality Engineering, Dongguan Gas Turbine, Puyang Wind Farm, Shandong Peninsula South No.4 Offshore Wind Power, and Dafeng Offshore Wind Power won the National High-Quality Engineering Award. The number of awards received ranked the highest in the industry.
- Jiangyin Gas Turbine, Ji'ning Thermal Power, Dezhou Dingshuang Wind-Solar-Storage Integrated Project, Tongyu 2000 MW Wind Power, and Anbei No.3 Wind Farm won the China Installation Engineering Quality Award (China Installation Star), maintaining a leading position in the industry.
- Seven engineering projects including the excavation and masonry work of the main shaft tower at Xinzhuang Coal Mine, won the Coal Industry Quality Engineering Award and the "Sun Cup" Engineering Award.



Puyang Wind Farm



Jiangyin Gas Turbine



Shandong Peninsula South No.4 Offshore Wind Power



Xinzhuang Coal Mine

## Enhance the Level of Marketing Services

The Company has revised the *Marketing Management Regulations*, formulated systems such as the *Green Certificate Marketing Management Measures* and the *Marketing and Trading Business Management Measures*, and innovatively developed and implemented the *Marketing Performance Evaluation Plan* to fully mobilize the initiative of grassroots enterprises and continuously improve the marketing management system. In 2023, the Company's electricity marketing achieved a year-on-year increase in revenue of RMB 17.524 billion. The Company is accelerating the establishment of a credit system and work mechanism, formulating the Credit Management Index System for Power Generation Enterprises, and implementing credit management responsibilities. A total of 402 grassroots enterprises participated in the public credit comprehensive evaluation for certified power generation enterprises conducted by the National Energy Administration. Among them, 397 enterprises were evaluated to be excellent, accounting for 98.75%, ranking first in the industry. The Company is actively promoting the expansion of the electricity market by setting up an official we-media platform for Huangeng Electricity Sales. It is further improving the functions of its online electricity sales mini-program and website. To date, the platform has accumulated 6,611 registered users and signed contracts for 95,230 MWh of electricity. The Company relies on key new energy projects to fully support the green electricity needs of national key regions and important events. Among them, the Shanxi project, as the exclusive green electricity supplier, helps the core office area of Beijing's city sub-center achieve green energy usage. The Shanglu New Energy Project has become the sole green electricity supplier for the Hangzhou Asian Games, delivering over 2.4 TWh of green electricity to industrial and commercial users in North China and East China. Promoting the Huangeng Building in Beijing to achieve 100% green electricity consumption throughout the year. Shanglu 2 GW Wind Power Project has become the first green electricity supplier in Beijing-Tianjin-Tangshan region.

### The Company Successfully Completed High-quality Green Electricity Transactions for the Asian Games and the Asian Para Games

The Company's Shanglu GW-level wind power base project successfully completed high-quality green electricity transactions for the 19<sup>th</sup> Asian Games and the 4<sup>th</sup> Asian Para Games, totaling 91 GWh, accounting for 23.22%. Thus it has become the sole green electricity supplier from the North China Grid to the Hangzhou Asian Games. Taking this green electricity transaction as an opportunity, this project continues to explore market demand for green electricity, ensuring the maximization of benefits from the integrated operation of wind and thermal power plants, and contributing to the realization of low-carbon and green transformation and development.



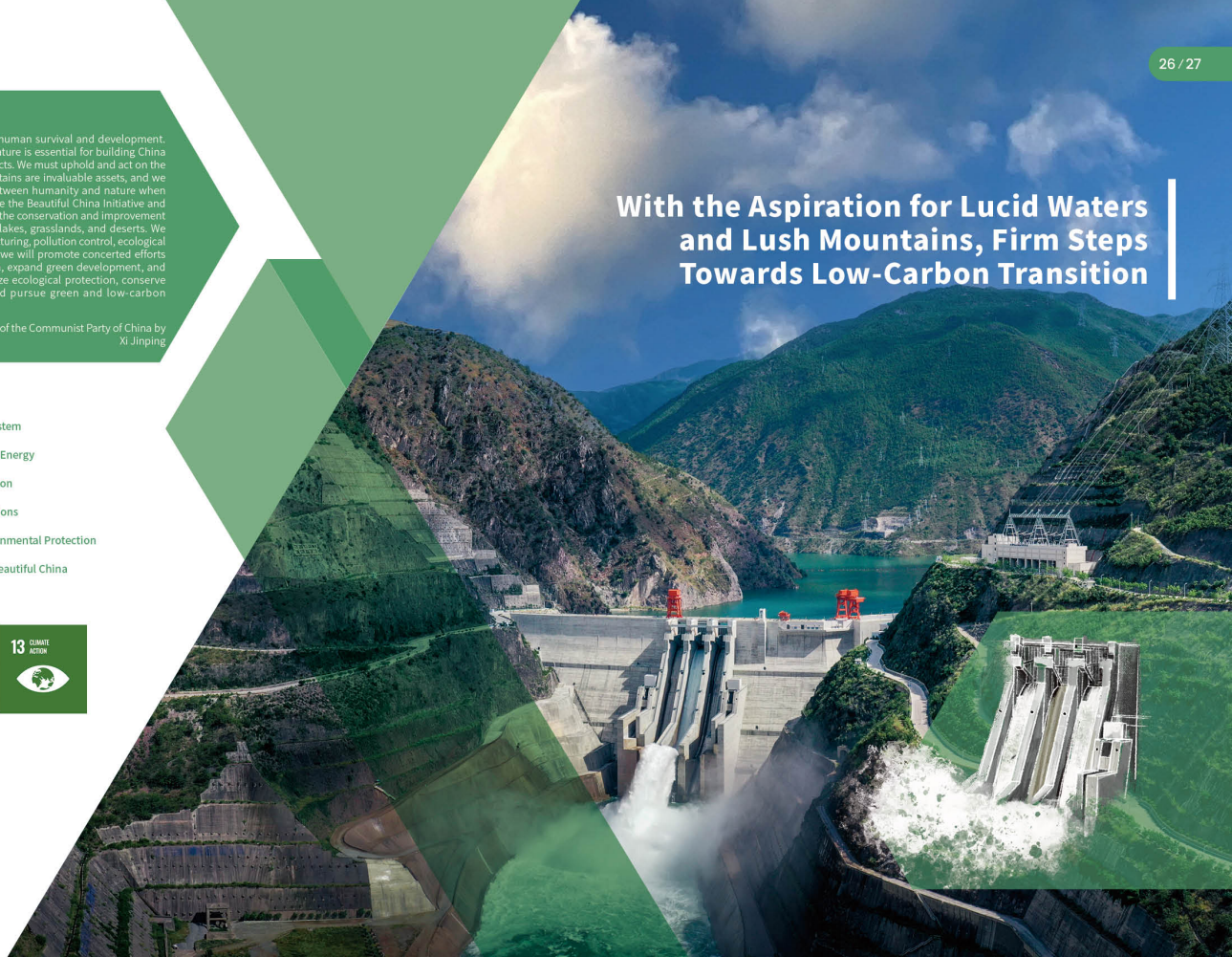
Signing Ceremony for Green Electricity Transactions of the 19<sup>th</sup> Asian Games and the 4<sup>th</sup> Asian Para Games

Nature provides the basic conditions for human survival and development. Respecting, adapting to, and protecting nature is essential for building China into a modern socialist country in all respects. We must uphold and act on the principle that lucid waters and lush mountains are invaluable assets, and we must remember to maintain harmony between humanity and nature when planning our development. We will advance the Beautiful China Initiative and take a holistic and systematic approach to the conservation and improvement of mountains, waters, forests, farmlands, lakes, grasslands, and deserts. We will carry out coordinated industrial restructuring, pollution control, ecological conservation, and climate response, and we will promote concerted efforts to cut carbon emissions, reduce pollution, expand green development, and pursue economic growth. We will prioritize ecological protection, conserve resources and use them efficiently, and pursue green and low-carbon development.

— Report to the 20<sup>th</sup> National Congress of the Communist Party of China by Xi Jinping

## With the Aspiration for Lucid Waters and Lush Mountains, Firm Steps Towards Low-Carbon Transition

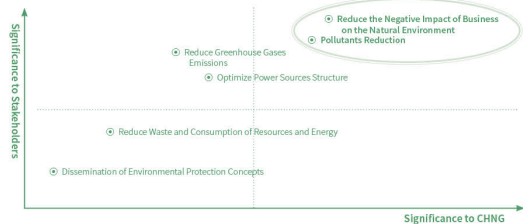
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# Environmental

## RECOGNITION

Analysis of the Issue | Key Point Identification



In July 2023, the National Ecological and Environmental Protection Conference was held in Beijing. General Secretary Xi Jinping attended the Conference and delivered an important speech titled Fully Promoting the Modernization of Harmony Between Humanity and Nature Through the Construction of a Beautiful China. It was pointed out in the Conference that the next five years would be a crucial period for building a beautiful China. We should thoroughly implement the ecological conservation thought of socialism with Chinese characteristics for a new era, adhere to people-centered principles, firmly establish and practice the concept that lucid waters and lush mountains are invaluable assets, and place the construction of a beautiful China as the core in national development and the rejuvenation of the nation. We should make efforts to significantly improve the living environment in both urban and rural areas, achieve notable results in the construction of a beautiful China, and support high-quality development with a high-quality ecological environment.

## RISK

Current Status of the Issue | Existing Risks

In 2023, the Company conducted a comprehensive eco-environmental inspection and identified a total of 837 issues, including but not limited to: Inadequate supervision of the operation of environmental protection facilities in some units; Non-compliance with wastewater and sewage discharge standards; Insufficient implementation of enclosure measures for coal storage and waste disposal sites; Failure to calibrate and verify environmental monitoring data; Failure to timely apply for environmental permits; Noise pollution affecting residents; Unauthorized occupation of forest land. These issues could potentially lead to environmental accidents and even trigger public concerns and media attention, posing significant ecological and environmental risks.

## REQUIRE

Background of the Issue | Policy Requirements

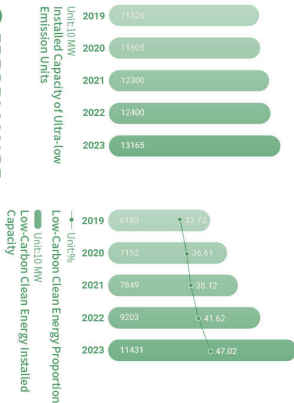
- We should attach great importance to the environmental inspection from the central government, ensure that all preparations for the inspection are well-managed, accurately reflect the existing environmental issues and their contributors, actively communicate and report the rectification plans, and implement specific measures for environmental improvements.
- We should continuously focus on the rectification of ecological and environmental risk hazards based on the results of the 2023 on-site environmental inspections, organize an 'Improvement Year' campaign for environmental risk governance, and intensify on-site supervision and inspection efforts to address issues such as inadequate rectification and repeated occurrence of similar problems.
- We should continuously strengthen the operation and maintenance management of environmental protection facilities, enhancing the reliability management of desulfurization, denitrification, dedusting, wastewater treatment and other facilities. We should also reasonably adjust the pollutant emission control strategy in response to frequent start-stop and deep peak shaving of the unit.
- We should strengthen air quality assurance in key areas and during critical periods, ensuring that the three pollutant indicators meet ultra-low emission standards, and that no environmental notifications, penalties, or public opinion incidents would occur.

## RESPOND

Response to the Issue | Management Planning

## PERFORMANCE

Low-Carbon Transition | Performance Indicators



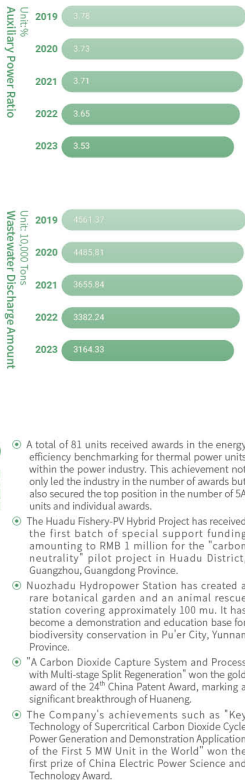
## PRACTICE

Low-Carbon Transition | Fulfilling Commitments Through Action

- The Shidao Bay HTR-PM Nuclear Power Plant Demonstration Project, a major national science and technology initiative, was put into operation. As a result, the nuclear power industry developed a strong momentum for gradual advancement and ongoing development.
- The Company spent five years successfully developing the world's first large-capacity flue gas waste heat deep utilization project in an F-class gas turbine, boasting the largest capacity, the simplest system, and the best performance metrics.
- The Company has developed a negative list of environmental protection for thermal power enterprises and successfully established environmental protection standards for 122 thermal power plants.
- The world's first demonstration project for capturing 2,000 tons of CO<sub>2</sub> per year from gas-fired power station flue gas was successfully launched at Yangpu Thermal Power Plant, achieving a capture rate of over 90%.
- The Company jointly participated in the "Fish Breeding and Release Activity on World Environment Day", released nearly 2 million fish into the Lancang River Basin and the Yajiang River Basin. This initiative significantly contributed to gene exchange among fish populations enhancing the stability of fish genetic diversity.

## PRIZE

Low-Carbon Transition | Continuing the glory





## Building a New Type of Power System

The Company actively serves the national energy policy. Guided by the goals of "carbon peaking and carbon neutrality", it focuses on building a new type of power system. Following the development principles of vigorously developing new energy, actively developing hydropower, safely developing nuclear power in an orderly manner, optimizing the development of coal-fired power, and optimizing the layout of peak shaving gas power, it attaches great importance to large-scale energy base development, and highlights the deepening layout of the "Three Lines and One Belt". In 2023, the Company's low-carbon clean energy installed capacity accounted for 47.02%, an increase of 5.4 percentage points year-on-year and 10.4 percentage points higher than that at the end of the 13<sup>th</sup> Five-Year Plan period.

### "Three Lines and One Belt" Layout

The North Line focuses on promoting the development of large bases in "Gobi Desert and other arid regions". The Eastern Coastal Region continues to focus on promoting the development of offshore wind power and nuclear power. The Southwest Region focuses on promoting the integrated development of hydropower, wind power, and solar power. The Central and Eastern Regions are developing a distributed and decentralized contiguous development belt.

### Integrated and Diversified Development Model

Integrated wind, solar, and thermal power with energy storage in the northern region. Diversification of wind, nuclear power, gas power and smart energy in eastern coastal region. Integrated hydropower, wind power, and solar power in the southwest region. Distributed multi-scenario integration of wind, solar, load, and storage in the central and eastern regions.

China Huaneng is a key state-owned enterprise and a front runner in the power industry, leading the way in building a new type of power system and a new type of energy system. China Electricity Council (CEC) will further deepen communication and exchanges with China Huaneng to promote high-quality development of the power industry.

— Yang Kun, Party Secretary and Executive Vice Chairman of China Electricity Council

## Striving to Vigorously Develop Renewable Energy

Cumulatively Completed Investments for Renewable Energy Totalling RMB

**133.6** Billion Throughout the Year

Installed Capacity for Renewable Energy Exceeding

**72,000** MW

Renewable Energy Power Generation Reached

**121.514** TWh

The Company has vigorously developed renewable energy, allocating 80% of its annual capital investment plan to renewable energy investments. Throughout the year, it cumulatively completed investments totalling RMB 133.6 billion, an increase of RMB 52.6 billion year-on-year.

The Company's total renewable installed capacity, and the capacity of renewable projects that gained approval started construction, and put into operation in 2023 all reached historical highs. The total installed capacity of renewable energy continuously surpassed the 60,000 MW and 70,000 MW milestones within the year, with the cumulative installed capacity exceeding 72,000 MW. Throughout the year, the Company obtained a total of 62,220 MW in renewable energy project approvals, exceeding the annual target. It prioritized the concentrated commencement scheduling of 10,000 MW renewable energy projects, and achieved the commencement of 30,630 MW and the commissioning of 21,580 MW of renewable energy projects in 2023.

The Company's renewable energy power generation reached 121.514 TWh, surpassing the 100 TWh mark for the first time, with a year-on-year increase of 31.8%. Wind power generation reached 68.846 TWh, and photovoltaic power generation reached 32.668 TWh, representing year-on-year increases of 20.1% and 79.4%, respectively. The power generation structure continues to be optimized. In the annual central SOEs renewable energy management benchmarking, the Company ranked first in terms of both photovoltaic and wind power.

## Promote the Development of Photovoltaic Industry

- The preliminary work for the renewable energy power transmission base in the southern part of the Kubuqi Desert is steadily advancing. Among these, an 8,000 MW photovoltaic project has completed its filing to government departments, and a 1,000 MW photovoltaic pilot project has commenced construction.
- The distributed photovoltaic power project at the Lu'an Zhou Port in Changzhou has been connected to the grid and started generating electricity, becoming the first pioneering and demonstrative "gas membrane + photovoltaic" project in China.
- Huaneng Lingao 100 MW "Agriculture-PV Complementary" Project aims at creating a "modern ecological agriculture + green power industry" model. The effective planting area of the photovoltaic vegetable greenhouses reaches 700 mu, achieving zero-emission clean power generation while also realizing the value-added utilization of land.
- The Company's first renewable energy project in Xiong'an New Area—the Anxin County Rooftop Distributed Photovoltaic Power Generation Project—has achieved full capacity grid connection. It can meet the electricity demands of 1,792 "coal-to-electricity replacement" users in the local area and the Baiyangdian Cultural Park scenic area.
- The Huaneng 400 MW Photovoltaic Power Generation Project in Ruicheng County has been connected to the grid. This project is included in the first batch of large-scale wind and photovoltaic base projects approved by China and is also the largest single plant capacity project approved in Shanxi Province. Compared to a coal-fired power plant of the same capacity, it can save 153,800 tons of standard coal annually, bringing significant environmental benefits.
- Huaneng Shanyan 150 MW Photovoltaic Power Generation Project is the first "salt and PV complementary power generation" project of the Company. It is an important part of the national large-scale wind power and photovoltaic base—Lubei saline-alkali beach 10 GW integrated wind and solar power storage and transmission base.
- Jiangsu Rudong "Fishery and Photovoltaic (PV) Complementary" Project has been fully connected to the grid. The project is constructed in a "PV + fish farming" mode, achieving efficient utilization and ecological development of the fish pond land resources.



400 MW Photovoltaic Power Generation Project in Ruicheng County



Shanyan 150 MW Photovoltaic Power Generation Project



Jiangsu Rudong "Fishery and Photovoltaic (PV) Complementary" Project

## Promote the Development of Wind Power Industry

In terms of offshore wind power, the Company is accelerating the development of an integrated offshore wind power belt. The total approved, under construction, and operational offshore capacity for the year exceeded 12,000 MW, firmly placing the Company in the top tier of the industry. In 2023, Hainan Lin'gao 600 MW Project was officially launched, making the Company the first utility to construct offshore wind power in Hainan. The first batch of units for Zhejiang Daishan No.1 Offshore Wind Power Project was successfully connected to the grid, and the 1100 MW project received approval. Zhejiang Cangnan No.2 Offshore Wind Farm Phase 1, with a full capacity of 300 MW, was connected to the grid. Guangdong Lemen 600 MW Offshore Wind Farm has been connected to the grid and was put into operation, marking a significant breakthrough for the Company in offshore wind power development in Guangdong Province.

Regarding onshore wind power, in the first batch of national solar and wind power base projects in the Gobi Desert and other arid regions, we have a grid connection capacity of over 9 GW, leading the industry in terms of scale. Among the first batch of 3.22 GW renewable energy projects in the Longdong Energy Base, 1 GW solar and wind power pilot projects have been completed and were put into operation. 2.78 GW renewable energy projects have been approved, with multiple efforts underway to establish demonstration model projects. The Shanglu Wind Power Base has a full installed capacity of 2 GW and has been connected to the grid, generating a profit of nearly RMB 800 million. The Da'an 'Jilin Power Supply to Shandong' Wind Power Project has a full installed capacity of 500 MW and has been put into operation, marking the Company's first large-capacity cross-regional renewable energy project.



Shanglu GW-level Wind Power Base Project

## Developing Nuclear Power in a Safe and Orderly Manner

The Company has developed an implementation plan for the nuclear power sector to strive for world-class excellence and is continuously optimizing the performance assessment management system. In 2023, the development of the Company's nuclear power projects progressed steadily, with approved, under construction, and operational projects totaling 5 GW. Significant breakthroughs were achieved in the development and construction of Shidao Bay, Changjiang, and Xiapu Nuclear Power Bases. The Shidao Bay HTR-PM Nuclear Power Plant Demonstration Project, a major national science and technology initiative, was put into operation. As a result, the nuclear power industry developed a strong momentum for gradual advancement and ongoing development.



The Shidao Bay HTR-PM Nuclear Power Plant Demonstration Project

- Shidao Bay PWR Project Phase I was approved by the State Council, and construction began on the pouring of the nuclear island containment annulus.
- Changjiang NPP Project Phase II successfully achieved 'Head-Closure' for the two units and fully entered the installation stage.
- The review process for the report of Xiapu NPP PWR began, initially meeting the requirements for submission and approval.

## Actively Developing Hydropower

The Company was fully accelerating the development of integrated hydro-wind-solar hybrid bases in Southwest China. The bases in the Tibet and Yunnan sections of the Lancang River were included in key projects related to the national new power system planning, while the bases in the middle reaches of the Yajiang River were part of the key projects for optimizing and adjusting renewable energy in the 14<sup>th</sup> Five-Year Plan.

- The bases in the Tibet section of the Lancang River continued to deepen research on key technologies for hydro-solar complementarity, integrated development, and transmission schemes. The core power supply project, Rumei Hydropower Station, has been officially approved and construction has begun. Additionally, the feasibility study reviews for important supporting power supplies, including Banda Hydropower Station, Gushui Hydropower Station, and other bases, have been completed.
- The bases in the Yunnan section of the Lancang River have completed the planning research report, which outlined six hydro-solar integrated development projects: Manwan, Miaowei, Gongguoqiao, Xiaowan, Nuozhadu, and Jinghong. The first demonstration project, Manwan Hydro-solar Integrated Demonstration Project, has been successfully completed and is now operational, while Toba Hydropower Station has begun the water storage process.
- Jiexu Hydropower Station, located in the middle reaches of the Yajiang River, has successfully closed the river and secured 900 MW of supporting renewable energy resources.



Scan the QR code to watch the CCTV report titled 'Hainan Changjiang NPP Unit 3 Successfully Completes Dome Lifting'.

China Huaneng has built an HTR-PM Demonstration Project, leading the world in advanced nuclear power technology and achieving internationally recognized accomplishments. IAEA will further deepen cooperation and exchanges with China Huaneng to support the global advancement of HTR technology.

— IAEA Director General Rafael Mariano Grossi

Jinghong Hydropower Station

## Effectively Saving Resources and Energy

### Circular Economy Construction

The Company actively carries out the construction of circular economy, and improves the utilization rate of industrial wastes and waste heat and energy, so as to create a new model of harmonious environmental-economic development.

#### Beijing Thermal Power Plant Launched the World's Largest Gas Turbine Flue Gas Waste Heat Utilization Project

In December 2023, Beijing Thermal Power Plant successfully developed and put into operation the world's first large-capacity flue gas waste heat deep utilization project in an F-class gas turbine, boasting the largest capacity (263 MW), the simplest system, and the best performance metrics. The project introduced an innovative partition wall deep heat transfer technical route with an integrated boiler layout, addressing the high costs and safety concerns associated with traditional methods. This project can recover 2.6 million GJ of heat annually, saving 80 million standard cubic meters of natural gas. It is expected to reduce carbon dioxide emissions by 160,000 tons, recover 500,000 tons of condensed wastewater, and create a zero-carbon heating area of 7.5 million square meters, delivering significant economic and social benefits.



The Factory Building of the F-class Gas Turbine Large-capacity Flue Gas Waste Heat Deep Utilization Project

Case

#### Coal & Sludge Co-fired Power Generation Project Phase II Completed and Put into Operation in Luohuang Power Plant



Luohuang Power Plant Sludge Disposal Center

In December 2023, Luohuang Power Plant Sludge Disposal Center Expansion Project (6×100 t/day) successfully passed its completion acceptance. This project utilized "sludge drying + mixed combustion power generation" technology to achieve large-scale stabilization, reduction, harmlessness, and recycling of urban domestic sludge. The Luohuang Power Plant Sludge Disposal Center has a daily treatment capacity of 1,200 tons of municipal sludge and has cumulatively received and treated over 860,000 tons of wet sludge. The dried sludge can be recycled through mixed combustion power generation, saving 25,000 tons of standard coal and reducing carbon emissions by more than 70,000 tons.

Case

### Reducing Energy Consumption

In accordance with the Energy Conservation Law of the People's Republic of China and other relevant laws and regulations, as well as the Norm of Energy Consumption Per Unit Product of General Coal-fired Power Set, the Norm of Energy Consumption Per Unit Product of Combined Heat and Power Generation and other industry standards, the Company develops policy documents such as the Energy Conservation Management Measures and the Acceptance and Assessment Measures for Efficient and Eco-friendly Coal-fired Power Plants. Additionally, it prepares enterprise standards including the (Excellent) Efficient and Eco-friendly Coal-fired Power Plant Standards, Excellent Heating Enterprise Standards, and Power Generation Equipment Rating Standards. The Company is committed to continuously improving the energy-saving system to enhance energy management levels.

**Functional supervision:** 28 performance assessments for entities with higher energy consumption metrics compared to the same period last year, as well as on-site energy conservation supervision for the top 10 entities with the highest thermal power generation capacity.

**Capacity building:** Throughout the year, on-the-job training was conducted based on energy-saving diagnostics, resulting in a total of 44 individuals trained.

**Benchmarking:** A total of 61 units received awards in the energy efficiency benchmarking for thermal power units within the power industry. This achievement not only led the industry in the number of awards but also secured the top position in the number of 5A units and individual awards.

**Equipment management:** Grassroots enterprises were supervised to enhance the management of key minor indicators. Targeted management strategies were implemented to address drips and leaks in the thermal system, focusing on the year-on-year reduction in the unit makeup water rate.

In 2023, the Company achieved a service power consumption rate of 3.53%, a drop of 0.12% year-on-year. The heating coil consumption reached 40.71 kg/GJ, a drop of 0.29 kg/GJ year-on-year. The coal consumption for power supply was 294.91 g/kWh, with the coal consumption for coal-fired power supply at 299.63 g/kWh, ranking second in the industry benchmarking. The coal consumption for gas-fired power supply was 200.58 g/kWh, ranking first in the industry benchmarking.

#### Daqing Thermal Power Plant Developed Integrated Intelligent Heating System

Daqing Thermal Power Plant has actively implemented intelligent heating renovations to establish an integrated intelligent heating system. Following the completion of this renovation project, the primary network achieved a heat saving rate of 2.15%. In the pilot community of the secondary network, the average heat consumption of unit control system decreased by 6.8 GJ/10,000m<sup>3</sup>/day compared to the same period last year, while average power consumption system dropped by 4.93 kWh/10,000m<sup>3</sup>/day. The average heat consumption of single building control system decreased by 14.22 GJ/10,000m<sup>3</sup>/day compared to the same period last year, and average power consumption fell by 15.25 kWh/10,000m<sup>3</sup>/day compared to the same period last year. These improvements indicated a significant enhancement in heating capacity, remarkable energy-saving effects, and increased stability in heating performance.



Integrated Intelligent Heating System

Case

## Strict Control of Industrial Pollution

In accordance with the Law of the People's Republic of China on *Environmental Protection*, the Law of the People's Republic of China on the *Prevention and Control of Atmospheric Pollution*, the Law of the People's Republic of China on the *Water Pollution Prevention and Control*, the Law of the People's Republic of China on the *Prevention and Control of Environmental Pollution by Solid Wastes* and other laws and regulations of China, the Company has developed several corporate policy documents, including the *Responsibility Investigation Method for Ecological Environment Protection and Pollutant Prevention and Control*, the *Management Measures for the Real-Time Supervision Platform of Pollutant Emissions*, and the *Emergency Plan for Heavy Pollution Weather*. These initiatives aimed to further enhance pollution prevention and control efforts. In 2023, the proportion of ultra-low emission unit capacity reached 99.5%, and the Company maintained a leading position in environmental emission performance metrics among the industry. The Company conducted special inspections on ecological environment protection for 83 grassroots enterprises, including 68 thermal power plants, 10 hydropower plants, and 5 renewable energy facilities, achieving full coverage of thermal power enterprises in the Yangtze River and Yellow River basins. The Company has developed a negative list of environmental protection for thermal power enterprises and successfully established environmental protection standards for 122 thermal power plants. To address outstanding environmental protection issues, the Company has invested RMB 145 billion yuan to accelerate remediation efforts, implementing 105 renovation projects, such as wastewater treatment and ash field management, to promptly eliminate potential environmental hazards.

## Strengthen Exhaust Gas Management

The Company's exhaust gas emission concentration remained stable at the ultra-low emission level. The emissions of sulfur dioxide and nitrogen oxides were 0.069g/kWh and 0.137g/kWh respectively, and their compliance rate exceeded 99.9%. The emissions of sulfur dioxide and nitrogen oxides per 10,000 yuan of output value were 1.15kg and 2.27kg respectively, a drop of 3.5% and 5.1% year-on-year.

## Strengthen Wastewater Management

The Company focused on controlling water ecological pollution and enhanced the informatization of environmental protection management. This included improving the construction of a real-time online monitoring platform for water intake and drainage, accelerating data integration efforts, and effectively enhancing daily supervision and management. The Company also expedited the water conservation and comprehensive wastewater treatment project, achieving standardization and modularization in wastewater discharge and environmental protection management. In 2023, the Company discharged 11,643 million tons of wastewater, a 6.4% increase year-on-year, along with 750.37 tons of chemical oxygen demand (COD) and 61.6 tons of ammonia nitrogen.

## Dezhou Power Plant Strived to Achieve Zero Emissions of Desulfurization Wastewater

In August 2023, Dezhou Power Plant successfully launched its comprehensive wastewater treatment and renovation project. This project utilized bypass flue gas evaporation treatment technology, which was developed with the Company's independent intellectual property rights. It effectively achieved 100% zero discharge of desulfurization wastewater, eliminating potential environmental hazards associated with the power plant. This initiative also reduced the amount of freshwater makeup required for the desulfurization system, conserved water resources, and supported the plant's goals of efficient, energy-saving, and environmentally friendly production. It contributed to the ecological protection of the Yellow River Basin, delivering significant environmental and social benefits.



Completion Effect of Evaporator and Supporting Water Tank

## Strengthen Solid Waste Management

The Company has comprehensively strengthened the management of hazardous and solid waste. It accelerated the construction of hazardous waste storage facilities at operational sites and implemented effective practices for the collection, storage, utilization, and disposal of hazardous wastes, including waste mineral oil and waste denitration catalysts. The Company also continued its efforts in general solid waste management, rigorously applying "Three Prevention" measures to prevent the spreading, loss and leakage of general solid wastes, including desulfurization gypsum, slag, fly ash. The Company enforced sealing measures for general solid waste during loading and transportation. In landfilling operations, general solid waste was layered, compacted, and dust suppression measures were implemented. In 2023, the Company's solid waste emission concentration remained stable at the ultra-low emission level, smoke and dust emission performance was 0.009g/kWh with a compliance rate over 99.9%. The smoke and dust emission per 10,000 yuan of output value was 0.154kg, a drop of 6.5% year-on-year.

## Yueyang Power Plant Launched Multi-Source Solid Waste Harmless Disposal Project

Yueyang Power Plant has invested in the construction of two integrated sludge treatment systems for two 600 MW units, with a capacity of 300 tons per day respectively. These systems were successfully put into operation in January and May 2023 respectively. As the first engineering application project utilizing the Company's original pre-drying carbonization disposal technology with maximum disposal capacity, the system can process 170,000 tons of multi-source solid waste, including sludge, each year. This initiative truly achieved harmless, resourceful, and reduced waste disposal, marking a significant step forward for the Company in becoming a "terminator" of urban waste.



The Integrated Sludge Treatment Systems in Yueyang Power Plant

## Reduce Greenhouse Gases Emissions

According to the Opinions of the CPC Central Committee and the State Council on Working for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy, the Action Plan for Carbon Dioxide Peaking Before 2030 and other laws and regulations, the Guideline of the Greenhouse Gas Emissions Accounting and Reporting of Enterprises - Power Generation Facilities, the Technical Guidelines of Verification of Greenhouse Gas Emissions of Enterprises - Power Generation Facilities and other industry standards, the Company has developed several policy documents, including the Interim Measures for Carbon Emission Right Trading Management, the Technical Specifications for Continuous Monitoring of Carbon Dioxide Emissions, and the Detailed Rules for Carbon Emission Data Quality Management (Trial). These initiatives have strengthened the development of the carbon-related system, providing a solid policy foundation to support the national strategic goals of carbon peaking and carbon neutrality. The Company established a working group to promote carbon dioxide continuous monitoring devices and continued to enhance the carbon emission data management platform. We completed the automatic verification of data validity and the setting of threshold functions, which effectively reduced the burden of data review. We conducted third-party verification of carbon emissions for 122 thermal power companies in 2022, with no reported issues regarding data quality. In 2023, the Company's carbon emissions totaled 537 million tons, and the carbon emission intensity for full-caliber power generation was 613.6 g/kWh, reflecting a decrease of 9.4 g/kWh year-on-year.

The Carbon Emission Intensity for Full-caliber Power Generation Decreased by

**9.4 g/kWh** year-on-year

- The Company has completed a 1,069-hectare vegetation restoration area at the Yimin Open-pit Mine and the Agri-Solar Power Complementary Ecological Project at the Weijiamao Open-pit Mine, collectively absorbing over 150,000 tons of carbon dioxide annually.
- The Huadu Fishery-Solar Power Complementary Project has been developed into the Carbon Neutrality Xinxiang Village Training College, which hosted sightseeing experiences, science popularization study tour, and other activities. This project has also received the first batch of special support funding amounting to RMB 1 million yuan for the carbon neutrality pilot project in Huadu District, Guangzhou.
- The world's first Gas and Flue Gas 2000 tons/year CO<sub>2</sub> Capture Demonstration Project was successfully launched at Yangtu Thermal Power Plant, with a capture rate of over 90%. The key technologies employed have reached an internationally leading level.
- China's first equal-capacity coal-fired power replacement project was fully completed and put into operation at Shidongkou 1<sup>st</sup> Power Plant. Compared to the old units, the new unit's coal consumption for production and power supply has decreased by approximately 20%, which was equivalent to reducing carbon dioxide emissions by 220 g/kWh. The technical, economic, and environmental performance of the new units has achieved the highest standards in their category.



Yangtu Thermal Power Plant



Shidongkou 1<sup>st</sup> Power Plant

## Strengthen Ecological and Environmental Protection

### Harmonious Coexistence of Project and Environment

The potential impacts of the Company's main business on the ecological environment primarily include aquatic issues, such as fish migration caused by the construction of hydropower projects, as well as terrestrial concerns, such as impacts on vegetation and wildlife habitats.

To mitigate these ecological challenges, the Company has established a strong awareness of ecological red lines and has continuously strengthened the protection of both aquatic and terrestrial biodiversity. We actively implemented ecological protection measures and have constructed essential facilities, including fish breeding stations, fish passage structures, and rare botanical gardens. We have developed an intelligent monitoring platform for the comprehensive ecological environment, capable of automatically monitoring and evaluating environmental factors such as water quality, temperature, and local climate through video surveillance. This initiative represented the establishment of China's first cross-border river basin and total factor monitoring system and served as a demonstration of leadership in ecological protection.

### Terrestrial Biodiversity Conservation

- Jinghong Hydropower Station has established a 400-mu area for the protection and transplanting with over 35,000 rare plants transplanted, and has developed a 500-mu elephant feed base.
- Nuozhadu Hydropower Station has created a rare botanical garden and an animal rescue station covering approximately 100 mu. It has transplanted 13,444 protected plants covering 18 species, and rescued and domesticated over 67 individual animals covering 20 categories. This station has become a demonstration and education base for biodiversity conservation in Pu'er City.
- Huangdeng Hydropower Station has established a 5.4-mu nursery for Olea acuminata, cultivating approximately 19,000 seedlings. In collaboration with local governments, a reservoir area for Olea acuminata has also been developed, creating a new model of narrow-area plant protection and management in China.
- Xinhuo Power Plant has implemented effective measures, such as soil covering, watering, and vegetation planting, to treat the ash storage yard. This has transformed the area into an eco-friendly ash storage site, attracting over ten species of migratory birds and significantly enhancing the surrounding ecological environment.



The Rare Botanical Garden in Nuozhadu Hydropower Station



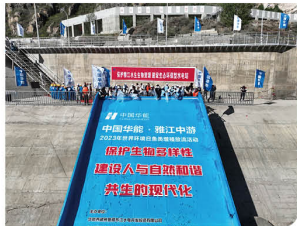
An Eco-friendly Ash Storage Site Established in Xinhuo Power Plant

## Aquatic Biodiversity Conservation

- ④ Yimin Open-pit Mine has established an ecological restoration demonstration area centered around a landscape lake. This area featured a pine forest boardwalk, an autumn water corridor, and other scenic spots, making Yihenuo Lake, the original lake in the mining area, reemerge and attracting gulls, ducks, and other wild aquatic animals to settle there.
- ④ Sichuan Baoxing Hydropower Station has implemented a video surveillance system to track water temperature and fishery resources, while also exploring fish breeding and releasing activities. These efforts have effectively enhanced aquatic biodiversity in the basin surrounding the power station.
- ④ Luoyuan Power Plant has invested over RMB 4 million yuan in three batches of marine breeding and releasing activities throughout the year, resulting in the release of 17,335 million red sea bream, 24,167 million *Babylonia lutosa*, and 65,318 million double-toothed naris siluriforms.
- ④ Huozhadu, Zangmu, Jiacha, and Jiexu hydropower stations jointly participated in the Fish Breeding and Release Activity on World Environment Day 2023. They released 1,692,300 artificially propagated indigenous fish into the Lancang River Basin and 231,000 rare fish into the Yajiang River Basin. This initiative significantly contributed to gene exchange among fish populations upstream and downstream of the dam, enhancing the stability of fish genetic diversity.



An Ecological Restoration Demonstration Area Established at Yimin Open-pit Mine



Fish Breeding and Release Activity on World Environment Day

## Prevention of Ecological and Environmental Risks

In accordance with the Law of the People's Republic of China on *Environmental Protection*, the *Measures for the Supervision and Administration of Energy Conservation and Environmental Protection by Central SOEs* and other laws and regulations, the Company has developed several policy documents, including the *Measures for the Administration of Ecological Environment Protection* and the *Measures for the Selection of Outstanding Environmental Protection Entities*. We have established environmental protection standards and continuously promoted monthly investigations and rectifications of ecological environmental protection risks. By strengthening daily supervision and management and adhering to a problem-oriented approach, the Company has compiled a comprehensive management manual for environmental protection guidelines tailored to thermal power, renewable energy, hydropower, and coal enterprises. These efforts have significantly enhanced the management of ecological environmental protection and effectively controlled related risks.

## Spreading the Concept of Low-Carbon Lifestyle

### Implement Green Office Practices

Through a series of green office measures, the Company guides the employees to start from small things to reduce energy consumption in daily life and enhance their awareness of environmental protection.

- ④ Strictly control air conditioning temperature, and promote the use of energy-saving electrical appliances
- ④ Standardize the use of company-owned vehicles, and strictly control the purchase of company-owned vehicles and fuel consumption of the vehicles
- ④ Purchase, apply for and use office consumables according to demand; replace toner cartridges when they are used up, and print on both sides of the paper
- ④ Substantially simplify meetings and briefings, comprehensively promote video conferences, and reduce energy consumption caused by business travels
- ④ Promote IT-based and paperless office work, reduce paper printing by setting up an internal WLAN

### Carry out Environmental Public Welfare Activities

The Company makes efforts to strengthen publicity and education of green concepts, cultivate employees' awareness of ecological protection, advocate a frugal and low-carbon lifestyle, and actively organize employees to participate in environmental and public welfare activities and environmental knowledge training. The Company has set up a communication platform for stakeholders to better respond to the demands of relevant parties.

#### Rizhao Power Plant Organized Environmental Protection Public-Benefit Activity

On World Environment Day 2023, Rizhao Power Plant conducted the "Changing Old Stuff for Green Plants" Environmental Protection Public-benefit Activity. Young volunteers from the Three-color Sail Organization provided citizens with free green potted plants. Participants exchanged old clothes and books for these plants and took photos in front of the enterprise exhibition board. Over 100 green plants were distributed, contributing to the local ecological civilization and raising public awareness of environmental protection through practical actions.



"Changing Old Stuff for Green Plants" Environmental Protection Public-benefit Activity

#### Linyi Power Plant Organized Voluntary Tree Planting Activity

In March 2023, Linyi Power Plant embraced the environmental protection concept of "Caring for Green Homes Starts with Me". The plant organized a voluntary tree planting activity under the theme "Practicing Green Huaneng Concept and Building a Beautiful Linyi Plant". This initiative encouraged employees to actively participate in the construction of ecological civilization while enhancing the enterprise environment. The activity not only raised awareness of voluntary service among employees but also showcased the positive spirit of the Party members, cadres, and staff at the power plant, contributing significantly to ecological civilization efforts.



A Voluntary Tree Planting Activity under the Theme "Practicing Green Huaneng Concept and Building a Beautiful Linyi Plant"

## Story of Original Aspiration



## Striving to Be the Architect of a Beautiful China

By engraving the country's fundamental interests in mind and adhering to its responsibilities and missions, the Company has proposed to prioritize both hydropower and renewable energy development. Leveraging its hydropower regulation capabilities and connection and transmission advantages in the Lancang River Basin, the Company has established a key component of the "Three Lines and One Belt" development framework—an integrated clean energy base with the combination of hydro, wind and solar power in the Lancang River area. This initiative aligned with great strengths of electricity and actively supported the achievement of carbon peak and carbon neutrality goals.

The total installed capacity of the integrated clean energy base with the combination of hydro, wind and solar power in the Lancang River area was about 90 GW, with over 34 GW of hydropower, over 48 GW of photovoltaic and wind power, and over 6 GW of pumped storage, providing a solid and reliable clean energy guarantee for the region's high-quality, leap-forward development.

Solar power is an important renewable energy component of the energy base. With the commissioning of Yunxian Aihua, Azhutan, Shimenkan, and Wujiacun Solar Power Plants, along with Jingdong Jiangbian Solar Power Plant, the Manwan Hydro-Solar Integrated Project has been fully completed. The generated photovoltaic power and hydropower were bundled and exported, establishing it as the first benchmark demonstration of hydro-solar multi-energy complementarity in Yunnan Province.

### Hydropower



Manwan Hydropower Station

As the foundation of the integrated clean energy base, the hydropower project played a crucial role in providing core support. The Company has completed and put into operation 10 hydropower stations, including Manwan, Jinghong, Xiaowan, Gongguocaijiao, Nuozhadu, Miaowei, Dahuaxiao, Huangdeng, Lidi, and Wunonglong. It has consistently maintained a development strategy of "one batch in operation, one batch under construction, and one batch in reserve".

### Solar Power



Shilin Solar Power Demonstration Area

### Wind Power



Yemaoshan Wind Farm

Starting with Yemaoshan Wind Farm, the first digital wind farm in Yunnan Province, the Company has embarked on large-scale wind power development. We have established the first cross-regional renewable energy centralized control center in Yunnan, with the access capacity exceeding 1GW. This center is responsible for operation management, including production monitoring, centralized equipment control, and operation and maintenance dispatching.

The Company has firmly established and embraced the environmental protection idea that "lucid waters and lush mountains are invaluable assets". We have created a new engine for green energy, transforming barren mountains into invaluable resources. This approach enables enterprises, village collectives, and local communities to share resources, generate profits, and collaboratively advance the vision of "lush mountains plus green electricity".

### Comprehensive Measures to Improve Ecological Governance Efficiency

The Yunxian Solar Power project has consistently focused on protecting and improving the ecological environment by constructing access roads and developing diversified ecological protection systems for slopes. The project employed a combination of engineering techniques and planting measures to implement ecological restoration at construction sites across various levels, key locations and areas. In the early stages of construction, to facilitate the transportation of large equipment and enhance construction efficiency, the project department utilized double-column supports to minimize damage to the surface from heavy drilling equipment. Throughout the construction process, priority was given to tree avoidance strategies to ensure that the work would not harm existing trees.

### Demonstration Protection Ensures a Green Empowerment Model

The Company has made every effort to implement environmental rectification for 5 solar power plants around Manwan Hydropower Station. This included spreading grass seeds, planting trees, building retaining walls, predicting rainwater patterns during the rainy season, and turning waste into valuable resources. In less than half a month, the solar power array area has been transformed, with green grass covering the ground, gaps and open spaces filled with vegetation, and barren hills evolving into green ecological and clean energy bases. In Yunxian County, Lincang City, where Manwan Hydropower Station is located, three years of green energy project construction have led to the annual industrial added value of green energy accounting for more than 10% of the county's GDP. This development has positioned green energy construction as the "golden key" to local economic and social progress, fostering a new ecological development model that integrates green energy with economic growth.

### Ecological Solar Power Promoted the Development of Surrounding Communities

Focusing on the development of green energy, the Company has combined solar power generation with agriculture, aquaculture, animal husbandry, and other industries. We have innovated and explored the "Solar Power Plus Industry and More" Mode, driving the economic and social development of surrounding communities and fostering a new era of win-win cooperation among enterprises, village collectives, and residents. The Company has innovated and implemented a new "Solar Power Plus" Development Mode in the Manwan Hydro-Solar Integrated Project. We leased land from local residents for power station construction and provided the land beneath the solar power panels to village collectives free of charge after completion. This land was utilized for cash crop cultivation and livestock breeding, promoting the "cross-border integration" of solar power energy with traditional agriculture and animal husbandry. This approach enabled farmers to address employment issues locally while benefiting from land income, achieving dual-use of the land and maximizing benefits.



\*Solar Power Plus Agriculture\* Project in Aihua Town, Yunxian County

- ① The Xiaowan Agriculture-Solar Power Project in Xiaowan Town has established a 200 mu demonstration base for "Solar power plus honeysuckle" planting. This project has created employment opportunities for over 200 local residents and paid more than RMB 200,000 yuan in wages to migrant workers, while also increasing the income of the village collective economy by nearly RMB 400,000 yuan.
- ② In the Laohuqing Solar Power Project in Aihua Town, over 200 mu of Chinese medicinal plants, including *Isatis striata* and honeysuckle, have been planted beneath the solar power panels, achieving a survival rate of over 80%. More than 20 mu of Chinese toon were planted, with a remarkable survival rate exceeding 99%.

We must ensure and improve the people's wellbeing in the course of pursuing development and encourage everyone to work hard together to meet the people's aspirations for a better life. We must strive to realize, safeguard, and advance the fundamental interests of all our people. To this end, we must do everything within our capacity to resolve the most practical problems that are of the greatest and most direct concern to the people. We will stay deeply engaged with our people and the grassroot level, adopt more measures that deliver real benefits to the people and warm their heart, and work hard to resolve the pressing difficulties and problems that concern them most. We will improve the basic public services system to raise public service standards and make public services more balanced and accessible, so as to achieve solid progress in promoting common prosperity.

— Report to the 20<sup>th</sup> National Congress of the Communist Party of China by Xi Jinping

## Bearing in Mind the Wellbeing of the People, Forging Ahead Toward Prosperity with Bold and Resounding Footsteps

- 48 Caring and Cultivating Employees
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# Social

## RECOGNITION

Analysis of the Issue | Key Point Identification



## REQUIRE

Background of the Issue | Policy Requirements

Ensuring safety at work is a long-term fundamental national policy of China. According to several important instructions from General Secretary Xi Jinping, Party committees and governments at all levels must prioritize people's lives and safety. In 2002, the *Work Safety Law of the People's Republic of China* was issued and implemented, and was revised respectively in 2009, 2014 and 2021. In 2022, the *15 Measures to Further Strengthen the Implementation of Work Safety Responsibilities and Resolutely Prevent and Curb Major and Serious Accidents* was launched, putting forward more stringent requirements for work safety in the new development stage.

## RISK

Current Status of the Issue | Existing Risks

**Thermal Power:** Some entities exhibited weaknesses in work safety management, including failures to implement safety measures, eliminate illegal operations, identify risks effectively, and manage outsourcing teams and personnel adequately.

**Hydropower:** Sichuan Taipingyi and Minzhi Hydropower Stations are located in earthquake-prone areas, posing potential safety hazards in their dam hydraulic structures.

**Nuclear Power:** A total of four level D operation events occurred in the HTR-PM Demonstration Project, revealing issues such as inadequate safety management and lax implementation of operating procedures at the production site.

**Coal Mines:** The geological hazard conditions of 26 operating mines within the Company were complex, presenting potential hazards such as rock bursts, gas leaks, fires, and water disasters to varying degrees.

## RESPOND

Response to the Issue | Management Planning

**Thermal power:** The Company conducted in-depth self-inspections and corrections regarding habitual violations, strengthened the rectification of issues in infrastructure construction, maintenance, and technical transformation sites, and implemented the safety management system requirements for contractors of utilities. Efforts were made to enhance the safety management of outsourcing projects and teams.

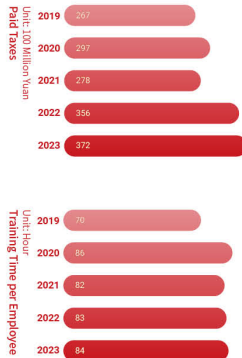
**Hydropower:** The Company intensified the investigation and remediation of hidden dangers in dams, hydraulic structures, and reservoir bank slopes. It monitored for geological disaster risks and strictly enforced emergency measures to prevent mud outbursts and water gushing in underground works.

**Nuclear Power:** The Company continued to enhance the nuclear safeguard system, leveraging the professional and technical strengths of internal units such as Nuclear Energy Technology Research Institute. It reviewed the management systems related to work safety and focused on developing safety operation guarantee measures for the HTR-PM Demonstration Project.

**Coal Mines:** The Company improved the management and technical support systems for major disasters, employing drilling, geophysical, and geochemical exploration methods to identify hidden disaster-causing factors. It also rationally adjusted and established disaster preparedness levels according to strict rather than loose standards.

## PERFORMANCE

Forging Ahead toward Prosperity | Performance Indicators



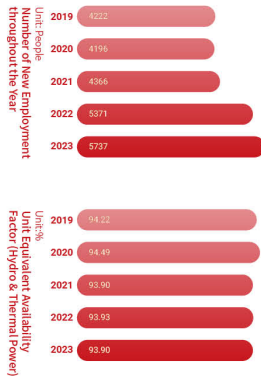
## PRACTICE

Forging Ahead toward Prosperity | Fulfilling Commitments Through Action

- The Company has achieved significant results in 6 national leading labor competitions including Hainan Changjiang Nuclear Power Phase II "United Effort Cup" and 4 group-level labor competitions including fuel cost reduction and efficiency improvement.
- The Company's overall safety situation remained stable, with no major safety incidents occurring. The production, operations, political, image, and cybersecurity aspects maintained a good momentum.
- The Company issued the *Guidelines for Green Procurement*, giving full consideration to factors such as resource conservation, recycling and low carbon, and giving priority to the procurement and use of raw materials, products and services conducive to environmental protection such as energy conservation, water conservation and material conservation.
- A 6.2 magnitude earthquake struck Jishishan County, Linxia Prefecture, Gansu Province. The Company made a swift decision to donate RMB 10 million yuan to support earthquake relief and post-disaster reconstruction efforts.
- The Company actively purchased products for consumption assistance, with a total of RMB 75.94 million yuan spent on purchasing and helping to sell agricultural products from targeted assistance counties and RMB 120.73 million yuan from other poverty-alleviated areas.

## PRIZE

Forging Ahead toward Prosperity | Continuing the Glory



- The Company's 8 groups and individuals were awarded the National May Day Labor Medal and the title of National Worker Pioneer, maintaining a leading position in the industry for consecutive years.
- In the power industry's hydropower unit energy efficiency benchmarking competition, a total of 4 coal-fired units, 2 gas turbines, and 4 hydroelectric units won the prizes and 1 hydropower station under the Company won the awards. In the national power generation unit reliability benchmarking competition, a total of 4 coal-fired units, 2 gas turbines, and 4 hydroelectric units won the prizes.
- The Company's "Smart Supply Chain Service Platform for the Energy Industry Based on Blockchain Technology" project was awarded the "Excellence" evaluation in the "Blockchain + Energy" specialty field at the National Blockchain Innovation Application Pilot Summary Exchange Conference. It is the only project in the power generation industry to receive this title, and the related case has also been used as a typical case of blockchain innovation application in the real economy sector.
- The Company donated to build a distributed photovoltaic project for Duan Village Primary School in Kiongan New Area, and was honored with the title of "Model Enterprise for Donating to Education".
- The Company has received the highest government award in China's public welfare and charity sector, the "China Charity Award", for three consecutive sessions, totaling four awards. The Company's targeted assistance work has been consistently recognized and rated as "excellent" for six consecutive years, achieving the highest national assessment level.

## Caring and Cultivating Employees

### Protection of Employee Rights and Interests

According to the Labor Law of the People's Republic of China, Labor Contract Law of the People's Republic of China and other laws and regulations of China, the Company has formulated series of enterprise policy documents such as the *Guiding Opinions on Standardizing Labor Employment and Labor Contract Management*, *Employee Recruitment Management Measures*, *Management Measures for the Recruitment of College Graduates*, and *Employee Working Market-oriented Labor Management* to continuously improve the basic management of labor employment and effectively protect the rights and interests of employees. As of the end of 2023, the Company had 123,304 employees, with an employee turnover rate of 0.35%. The total labor productivity was RMB 1.37 million yuan per person, maintaining the industry's leading position.

#### Guaranteeing Remuneration and Welfare

- The Company implemented strict salary management for enterprise leaders, adhering closely to the *Interim Measures for the Salary Management of Central SOEs Leaders and the Interim Measures for the Salary Management of Dedicated External Directors of Central SOEs*. It ensured timely public disclosure of relevant information.
- The Company continuously improved the compensation incentive and restraint mechanisms for enterprise leaders, emphasizing business performance and closely linking it to annual and term assessment results, while aligning it with the risks and responsibilities undertaken.
- The Company revised the *Measures for Gross Payroll Management and the Detailed Rules for Implementing Performance Appraisal Linked to Gross Payroll*, establishing a new mechanism for differentiated gross payroll distribution.
- The Company promoted income distribution to serve as a guiding principle, increasing wages for scientific and technological talents, urgently needed professionals, and employees in challenging, hazardous, or demanding frontline positions.

#### Caring Female Employees

- Completed the *Company's Occupational Health Protection Standards for Female Employees* to improve labor protection for female employees and arrange and adjust their work reasonably according to their health status.
- The Company held a symposium for female employees to commend the outstanding collective recognized as the "March 8th Red Banner" and honor the "March 8th Red Banner" outstanding woman pacemaker. Additionally, 2 female employees were elected to participate in the 12th National Women's Congress.
- The Company launched a special initiative for the "In-depth Development of Scientific and Technological Innovation Women's Action" aimed at promoting the high-quality development of women's work and generating new ideas for future planning.
- More than 9,000 female employees participated in the "Law Publicity Month" training class to effectively enhance their awareness of legal rights protection.
- The Company organized the "Reading on March 8th" activity, which saw a record total of 129 works awarded. The Group Working Committee received the National Special Organization Award for the "Reading on March 8th" activity for seven consecutive years, and eight grassroots enterprises were recognized with the Excellent Organization Award.
- The Company promoted the education of female employees, leading to one individual being honored as a National Women's Achievement Pacemaker, two individuals receiving the title of National May Day Women Pacemaker, one collective earning the designation of National Women's Civilized Post, and another collective recognized as a National May Day Women Pacemaker Post.

#### Strictly Regulating Employment

- The Company strictly implemented national laws and regulations regarding the minimum working age and worked to eliminate forced labor and employment discrimination.
- The Company was committed to providing equal employment opportunities and labor security for employees of different nationalities, races, genders, religious beliefs, and cultural backgrounds.
- The Company revised the *Measures for the Administration of Recruitment of College Graduates*, continuously promoting both the quantity and quality of graduate recruitment. The Company recruited 3,271 graduates, which was roughly the same as last year.

#### Deepening Democratic Management

- The Company improved the "1+1" System of Workers' Congress and Refined the Powers of the Three-level Workers' Congress.
- The Company revised and issued the *Measures for the Administration of Open Access to Enterprise Affairs*, promoting standardized disclosure of enterprise matters at all levels.
- Headquarter and eight grassroots entities jointly opened the title of "National Advanced Entity of Open and Democratic Management of Enterprise Affairs" achieving the highest number of entities awarded to date.

#### Building the Home for Employee

- The Company revised and issued the *Measures for the Selection and Commendation of Model Families (Homes) of Employees, Outstanding Union Workers, and Outstanding Union Work Projects of Model Families*. The Company also organized the selection and commendation of model families (homes) of employees, outstanding union workers, and outstanding union work projects.
- The Company advanced the implementation of the *Standard Guideline for the Construction of Employee Homes at CHNG's Wind Power and Solar Power Plants*. The Company allocated special funds to support the construction of employee homes in remote areas and equipped 52 small employee homes at wind power and solar power plants with digital film projectors. This initiative aimed to continuously improve the production, living, and learning conditions for employees.

### Safeguarding Employees' Health

According to the Law of the People's Republic of China on *Prevention and Control of Occupational Diseases*, the *Regulations on the Prevention and Control of Occupational Diseases*, the *Plan for Occupational Disease Prevention and Control Plan (2021-2025)*, the *Measures for Administration and Supervision on Occupational Health Surveillance of Employers* and other laws and regulations, the Company has formulated series of enterprise policy documents, including the *Occupational Health Management Standards*, *Employee Health Monitor and Care Management Standards*, *Personal Protective Equipment Management Standards*, and *Occupational Disease Hazard Management Standards*, and established an occupational health management system with clear division of responsibilities, hierarchical responsibilities, and departmental collaboration. Throughout the year, the Company established two high-quality "health hubs" and actively collaborated with reputable medical institutions. The Company organized four trips for medical expert groups to Qinghai, Tibet, Xinjiang, Hainan, and other regions to implement "sending medical experts to the grassroots" initiatives, thereby fostering "healthy home" for employees.

#### Shanghai Gas Turbine Company Organized a Health Lecture on the Theme of Stress Management



A Health Lecture on the Theme of Stress Management

In December 2023, Shanghai Gas Turbine Company organized a health lecture on the theme of stress management, inviting professional psychotherapists to explain relevant mental health knowledge about stress management in an accessible way. The lecture covered three dimensions: family environment, work environment, and social environment. The aim was to continuously enhance the psychological resilience of employees, fostering a positive and optimistic mindset, so that they can better face their work and life.

### Facilitating Career Development

#### Strengthening the Building of Talent Team

The Company continuously optimized its talent management system, coordinating the top-level design of talent development plans, and organizing a talent program with unique characteristics. It improved career development routes for employees, establishing a career development structure featuring five-sequence and six-tier. The goal was to create a comprehensive talent growth system that covers all employees, ensuring orderly promotion, and allowing for reasonable career transitions.

The Company attached great importance to the construction of high-level talents, formulated and implemented the *Action Plan for Building High-level Scientific and Technological Innovation Talents*, and selected and produced the first 53 high-level scientific and technological innovation talents and 9 scientific and technological innovation teams. Actively explored the coordination mechanism for the joint cultivation of engineering master's and doctoral students between universities and enterprises, with the joint cultivation class reaching 121 people. The academician expert workstation was established to introduce 300 high-tech talents on renewable energy and nuclear power, so as to continuously stimulate the vitality of the talent team.

### "Talent Sailing Plan" Helping Enterprises Achieve High Quality Development

Shanghai Maintenance Company resolutely implements the strategic goal of "strengthening enterprises with talents", preparing and implementing the "14th Five-Year Plan" and the strategic outline for the construction and development of medium and long-term talent teams, innovating and promoting the "talent sailing plan" in an orderly manner, relying on the construction of employee career development channels, and comprehensively carrying out the four talent team construction projects of "Setting sailing, voyage, navigating and piloting" according to the three development routes of operation management, technology and skills. Moreover, the Company was committed to cultivating and bringing up a team with scientific structure and excellent quality. A well-defined talent team laid a solid talent foundation for the realization of high-quality development of enterprises.

- "Setting sailing" serves as a training centered on young employees under the age of 30, dedicated to training "Electricity maintenance workforce".
- "Voyage" is focused on the training of young cadres and technical talents, and is committed to cultivating "Excellent young talents".
- "Navigating" is a training for high-tech talents, dedicated to cultivating "Professional leaders".
- "Piloting" refers to relying on the industrial "Chain leader institution" work model to build a core team of industrial talents that leads the development of the industry.

Case

### Strengthening Vocational Skills Training

The Company carried out high-quality professional talent training, adopting the mixed training mode of "Online and offline" to achieve 100% coverage of nearly 2000 new employees in 46 grass-roots units. In 2023, the Company launched the "Huaneng Technology Skills Cloud Classroom", hosting 9 live sessions throughout the year, with a total of 14,000 views. The Company strengthened the construction of skill training bases (rooms), established the first group-level skill training base in the field of nuclear power, optimized and promoted the operation and use of coal technology and wind power skill training bases, and built a platform for the reserve and cultivation of high-level talents who are urgently needed and in short supply.

### Advanced Training Course on Relay Protection for renewable energy Specialization Officially Opening



The Advanced Training Program on Relay Protection

In June 2023, the Advanced Training Program on Relay Protection for renewable energy Specialization at the Group-Level Wind Power Skills Training Base (Jiangsu) officially commenced at Hohai University. More than 20 relay protection operation and maintenance personnel and technical staff from various grassroots enterprises of the Company, as well as external units such as Shenneng Nanjing Energy Holdings Co., Ltd. and Jingtai Company, participated in the training. This training was independently developed, prepared, and enrolled by the Jiangsu Wind Power Skills Training Base. The curriculum aimed to "Leverage our own strengths and specialties to create Jiangsu-specific characteristic". It fully integrated the company's explorations and practices in the field of independent management of relay protection. The training provided professional skill knowledge to the participants, helping the company to reserve and cultivate high-level urgently-needed talents.

Case

### Carry out Labor Skills Competition

The Company's labor competition has further deepened, with significant achievements in 6 national leading labor competitions, including over 80 GW renewable energy, Longdong Multi-Energy Complementary Energy Base, Hydropower development in the middle reaches of the Yangtze River, water-solar power complementary base in the upper reaches of Lancang River, Lancang River Excellence and Merit Creation, Hainan Changjiang Nuclear Power Phase 1 "United Effort Cup". Additionally, the Shidao Bay Nuclear Power industry-level labor competitions, as well as four group-level labor competitions—renewable energy power generation, high-value patent conversion and application, coal production exceeding 100 million tons, and fuel cost reduction and efficiency improvement—have also achieved notable results. Among these, the installed capacity of renewable energy exceeded 80 GW. The labor competition promoted the cumulative approval (or filling) of 62.21 GW, the start of construction for 30.63 GW, and the commissioning of 21.58 GW of renewable energy, all of which set record high. The labor competition at the Longdong Multi-energy Complementary Energy Base facilitated the full capacity grid connection of 1 GW for local consumption. The Xin Zhuang Coal Mine achieved integrated trial operation, and the entire coal sector of the base was completed.

The Company further expanded its skills competitions, organizing participation in 12 national and industry-level vocational skill competitions, including power cable installation and operation, and teaching skills for young trainers in the power industry. The Company won a total of 7 first-place team awards, 7 grand individual prizes, and 21 first-place individual awards, setting record high in terms of both the level and number of awards. The Company organized 9 group-level "Huaneng Craftsman Cup" vocational skill competitions, including thermal instrumentation and automation, as well as intelligent operation and maintenance of wind power. In 2023, the Company elected 52 Huaneng craftsmen and 156 technical experts.

The Company further strengthened the selection and recognition of model workers and craftsmen. 8 groups and individuals, including those from the Beijing Thermal Power Plant and Yajiang Company, were awarded the National May Day Labor Medal and the National Worker Pioneer title, maintaining a leading position in the industry for consecutive years. The Company formulated and issued the *Guidance on Deepening the Creation of "Youth Civilized Activity" Initiatives*. It established 865 youth pioneer brigades for tackling urgent, difficult, and critical tasks, 81 group-level youth work production demonstration posts, and 534 innovation and efficiency teams. 2 groups were awarded the National May Fourth Red Flag Organization, 2 groups were named Youth Model Unit Award, 9 groups were recognized as National Youth Work Production Demonstration Posts, and 1 group was selected as a National Outstanding Youth Task Force.

### Enhancing Selection of Model Workers & Craftsmen

### Work-Life Balance



According to China's Opinions on Building a Higher-Level Public Service System for National Fitness and other relevant laws and regulations, the Company has embraced the theme of "Being a Good Master, Striving for a New Journey". It has established 11 cultural and sports associations, including calligraphy and painting, photography, yoga, basketball, and cycling, etc. The Company has allocated RMB 1.04 million yuan to organize 17 diverse cultural and sports activities, aimed at enriching the after-work lives of employees and enhancing their interactions. In 2023, 4 works by the Company's employees were selected for the first "Great Power Heavy Equipment" National Industry Photography Art Exhibition. Additionally, 38 works won awards at the first National Industry Micro Film Festival, with the number of awards leading the industry.



The Football Association Organizes Staff Football Matches



The Yoga Association Organizes Activities

## Firmly Holding the Bottom Line of Work Safety

### Consolidating the Management of Safety

The Company firmly established the concept of people-oriented and safe development. Based on China's *Production Safety and other relevant laws and regulations*, the Company has formulated a series of corporate policy documents, including the *Work Safety Performance Management Measures*, the *Work Safety Responsibility Inspection and Evaluation Standards*, the *Inherent Work Safety Management System Specifications (Standards)* and the *Electric Power Work Safety Fund Extraction and Usage Management Measures*. These efforts continuously strengthened and improved the foundational management of safety. The Company strictly implemented the safety work deployment at all levels, established a safety management expert team composed of 100 safety experts, and steadily promoted the "Safety Management Strengthening Year Activity and Production Safety Accident Prevention Year Activity" to ensure the implementation of various work tasks and safeguard measures. In 2023, the Company's overall safety situation remained stable, with no major safety incidents occurring. The production, operations, political, image, and cybersecurity aspects maintained a good momentum.



- We completed the safety production responsibility inspection and evaluation of 20 companies, as well as the re-evaluation of safety assessments for 5 units. We closely monitored the closed-loop rectification of issues and focused on promoting the standardization of work safety.
- We completed on-site supervision and inspection for 8 infrastructure projects and 40 units, covering production, maintenance, and technical renovation. We conducted "Field Investigation without Notice and Report" and "Looking back" inspections at key grassroots units to enhance on-site risk prevention and control capabilities.



- We carried out a special campaign for the investigation and rectification of major accident hazards, focusing on key areas such as power, coal, and infrastructure, etc. We conducted inspections targeting weak areas such as outsourcing management and heating pipeline network, etc. The identified problems were managed through a checklist system, with dynamic follow-up to ensure timely resolution. The rectification completion rate reached 94.5%, eliminating 4 major accident hidden dangers.



- **Special governance for forest fires:** We issued the *Work Plan for Preventing and Investigating Fire Hazards in Important Power Facilities in Forest and Grassland Areas*. This plan involves conducting inspections, organizing, and documenting the conditions of power facilities in key forest and grassland regions, in order to enhance fire prevention in these areas and ensure the safety of power facilities.
- **Special governance for fire safety:** By drawing profound lessons from major fire accidents, we conducted hazard inspections and governance in densely populated areas, key fire prevention sections of production sites, and fire protection equipment and facilities, in order to ensure fire safety.
- **Special governance for gas safety:** In accordance with the *National Gas Special Rectification Plan*, we conducted inspections and rectifications of equipment, facilities, and instrumentation in gas turbine power plants to ensure gas safety.
- **Special action for enhancing safety of hydropower dams:** We improved the safety management level of small hydropower plants in regions such as Gansu and Xinjiang, etc. Completed the construction of online monitoring systems for the safety of 15 dams. The Xinjiang Bedel Hydropower Station has been rated as a Class A safety registered facility by the National Energy Administration.
- **Special action for the transformation of major hazards:** Comprehensive elimination of Level I and Level II major hazards in thermal power plants, with 18 power plants completing the technical renovation projects to replace with urea liquid ammonia as a major hazard.

## Lessons Learned



### Course of the Accident

Yuwang Coal Mine No. 1 (hereinafter referred to as the mine) has entrusted its overall safety production management to Huan Chuxiang Construction Engineering Group Co., Ltd. (hereinafter referred to as Chuxiang Company).

From 16:20 to 16:24 on September 5, 2023, abnormal fluctuations in carbon monoxide levels were observed sequentially in the low-negative-pressure extraction pipeline on the track side of the 1010201 working face (lower section) of the mine and in the low-negative-pressure pipeline of the ground gas pump station. The personnel on duty immediately informed the relevant leaders of the mine and Chuxiang Company, and took emergency measures. On the same day, the mine reported the situation to the higher-level company and regulatory authorities. Moreover, the mine initiated its emergency response plan, established an emergency command center, and ordered the evacuation of all personnel working underground. Under the guidance of Major Disaster Prevention Project Department, developed and implemented measures to "Seal off the belt conveyor roadway, track roadway, and the air return roadway at the boundary of the C2 coalbed roof (west wing) in the working face".

From September 6 to September 9, an emergency response guidance team was established to implement a remote sealing disposal plan, with the Liuzhi Team of the National Mine Emergency Rescue dealing with on-site emergency response. At 6:57 on the 10<sup>th</sup>, all underground sealing work was completed, and all personnel safely returned to the surface. After investigation and comprehensive cause analysis, it was preliminarily determined that the accident was an internal fire accident.

### Handling of the Accident

- The relevant responsible persons of Chuxiang Company were given varying degrees of economic penalties, as well as administrative punishments such as demerit recording and disciplinary warning.
- The relevant responsible persons of the mine were given varying degrees of economic penalties and criticized in a circulated notice.

### Causes of the Accident

#### Direct Cause:

At the top of the fault structure zone in the 1010201 working face (lower section), the C1 coalbed was present. Due to the influence of the fault structure and mining activities, local delamination has occurred in the roof of the roadway. Additionally, the physicochemical properties of the C1 coalbed have changed, leading to slow oxidation, heat accumulation, and spontaneous combustion.

#### Indirect Reasons:

- The preliminary design of the mine fire prevention and control system is too simple, and the measures are too limited.
- The risk awareness is weak, and there is an over-reliance on the preliminary design, without timely implementation of reinforcement plans and measures.
- The risk identification is inadequate, and there has been no further identification of the risk of spontaneous combustion due to continuous oxidation of residual coal in the goaf fault zones.
- The relationship between production and safety has not been properly managed, and no decisive measures are taken after discovering abnormal situations.

### Reflections

- Thoroughly learning from the accident, conducting a comprehensive mine fire prevention and control inspection, and strengthening fire prevention awareness.
- Strengthening the foundation of fire prevention, allocating professional technical personnel, and enhancing fire prevention and knowledge training.
- Improving mine fire prevention and extinguishing measures, preparing special fire prevention and extinguishing design.
- Strengthening the construction of mine fire prevention and extinguishing systems and daily monitoring, adopting comprehensive measures to prevent spontaneous combustion.

### Improving Equipment Safety

The Company attached great importance to the safety level of equipment, and an additional special expenditure of RMB 1.25 billion yuan was mainly used to eliminate defects and potential safety hazards of obsolete units and utility system equipment. The Company has deeply carried out independent maintenance work on its units. Throughout the year, it conducted maintenance on 367 thermal power units and 181 hydroelectric power units. The rate of excellent major overhauls reached 82%, maintaining a high level in the industry. In 2023, the equivalent availability factors for the Company's hydroelectric, thermal, wind, and photovoltaic power were 93.9%, 93.3%, and 99.22%, respectively. The reliability of power generation continued to improve steadily and remained at the leading level in the industry. A total of 120 unscheduled shutdown occurred across all units, a decrease of 3 times compared to the previous year (excluding unscheduled shutdown of newly commissioned units). 35 thermal power plants achieved zero planned shutdown; No major and general equipment accidents occurred throughout the year; Class I equipment malfunctions occurred 5 times. In the power industry's hydropower unit energy efficiency benchmarking competition, a total of 13 units and 1 hydropower station under the Company won the awards, ranking first in the industry in terms of the award-winning rate. In the national power generation unit reliability benchmarking competition, a total of 4 coal-fired units, 2 gas turbines, and 4 hydroelectric units won the prizes.

## Key Area Safety



### Network Information Security

As the president unit of the Network Security Professional Committee of China Staff and Workers Technical Association, the Company established a cybersecurity innovation studio and compiled regulatory documents such as the *Cybersecurity Work Plan for Critical Information Infrastructure and the Data Security Management Measures*. The independently developed network situational awareness security operation platform has passed expert review and has been operating smoothly in 16 pilot units. We successfully held three sessions of the "Advanced Cybersecurity Attack and Defense Skills Training Course" with the cybersecurity talent pool reaching 541 people. The Company strictly implemented the requirements for full-time and comprehensive monitoring, on-duty shifts, and emergency response during the "critical protection" period. All alarm information was properly handled in a closed loop, achieving "zero occurrence" of cybersecurity incidents. In 2023, the Company was awarded the title of "China Industrial Network Information Security Technology Demonstration Base", and the results of network security competition reached a new record high. We won the "First Prize of Enterprise Group" and "Enterprise Award" in China Industrial Internet Contest; in the Ministry of Public Security's "Cybersecurity Drill" initiative, the Company achieved an "Excellent" rating for the first time, representing a significant improvement over previous years; in the "WangDing Cup" network security competition, the team achieved the excellent result of the "Bronze Ding Award". One employee won the title of "Gold Technician" of China Staff and Workers Technical Association.

### Safety in Coal Industry

The Company has formulated the *Comprehensive Plan for Coal Mine Work Safety* deepening the prevention and control of major disasters such as gas, fire prevention, and water control. It has conducted special inspections and rectifications for major accident hazards, carrying out 56 inspections throughout the year, with all identified hazards having been fully rectified; The Company is fully committed to the creation of a standardized safety management system, with 12 mines achieving Level I standardized management. Additionally, 11 coal mines have maintained safe production for more than 3,000 days; Strengthened safety education in the coal industry and accelerated the development of a training APP system. Completed the rotational training for 1,058 team leaders to enhance their safety management skills, and organized a total of 112 participants to attend national coal mine safety production standardization management system training sessions and other related activities; Maintained a high-pressure stance against the "Three violations", and strengthened the corrective measures of "Guard against accidents with workorder", "Guard against accidents with technology" and "Guard against accidents with AI" to effectively ward off safety accidents of various kinds. In 2023, the Company's coal industry achieved the goal of "zero death".

- Dongyia, Dalu and Shanzhai Coal Mines Awarded National Class I Standardized Mines.
- Lingdong, Linglu and Tiebei Coal Mines Passed the Initial Test of National Class I Standardized Mines.
- Matigou Coal Mine has achieved work safety for more than 7100 days, a leading record across the sector.
- 18 coal mines were rated as coal industry safety and high efficiency super mines.



Linglu Coal Mines

### Safety in Nuclear Power Industry

The Company has formulated the *Action Plan for Nuclear Power Safety and Quality Improvement (2022-2025)* to deepen the operation of the nuclear power industry's safety and quality supervision system. It has solidly carried out special activities such as the improvement of nuclear power safety and quality, establishing a work mechanism for daily tracking, weekly assessment, and monthly evaluation of potential hazard investigations. A total of 16 comprehensive and specialized safety inspections have been conducted at the Shidao Bay, Changjiang, and Xiapu nuclear power bases. As a result, operational defects and infrastructure safety and quality problems have decreased significantly year-on-year.

- A special nuclear safety rectification and improvement action has been carried out in response to 4 Level-0 operational events.
- Shidao Bay HTR-PM Demonstration Project underwent safe and reliable operation for more than 301 days within the year.
- A nuclear emergency technical support system was initially established, and the first group-level nuclear emergency comprehensive exercise was successfully organized.

### Safety in Other Fields

#### Safety in Construction Sector

Strengthened the full-process control of sporadic projects, including safety risk identification, formulation of safety technical measures, approval for commencement, implementation of measures, construction organization, supervision and management, and completion acceptance. For high-risk operations, strictly implemented on-site unified command and safety monitoring.

#### Safety in Outsourcing Engineering

Revised the *Standard for Standardized Management of Outsourced Projects and the Safety Management Measures for Power Enterprises Contracting and Subcontracting*. Integrated outsourced teams and fully managed teams into an integrated management system to ensure that progress and quality are well-controlled, responsibilities were clearly assigned without ambiguity, and safety and benefits were guaranteed.

Conducted standardized construction of outsourced safety management, carried out random inspections of key units for outsourced project standardization, and ensured proper on-site safety management for projects.

#### Safety in Overseas Projects

Developed the *Special Work Plan for Preventing and Mitigating Risks of Overseas Projects and the Key Points for Safety of Overseas Institutions and Personnel in 2023*. Completed the construction of the overseas safety emergency command center system to enhance the capability to handle emergencies and unexpected situations abroad.

Effectively prevented and controlled overseas risks, evacuated 114 Chinese employees in Myanmar in time to ensure the safety of employees. Suihwal Power Plant has achieved 2397 consecutive days of safe production, with three consecutive years of "zero unscheduled shutdown" for its units. The plant's equipment management is robust and effective, earning it the "National Fire Safety Award" in Pakistan.

### Enhance Safety Awareness



The Company implemented the *Emergency Management Measures for Sudden Incidents and the Emergency Management Measures for Work Safety Accidents Abroad* etc., to promote the construction of a safety management emergency mechanism. This effectively enhanced employees' capabilities and awareness in preventing and handling safety incidents. The Company continuously strengthened safety training at the team level, closely focusing on the theme of "Everyone Talks About Safety, Everyone Can Respond to Emergencies". It organized various activities during Work Safety Month and consistently promoted the "Dual Improvement Work". The Company has held one training session for grassroots enterprise leaders, two training sessions for heads of safety supervision departments in grassroots enterprises, and two re-education training sessions for registered safety engineers. These efforts effectively enhanced the ability of grassroots enterprise safety managers to master laws and regulations and ensured on-site safety, thereby promoting the overall improvement of safety technical skills among all employees.

### Xi'an Thermal Power Research Institute Held Comprehensive Training on Work Safety Management

In June 2023, Xi'an Thermal Power Research Institute invited experts from relevant professional fields to conduct comprehensive work safety management training. Safety personnel from various business departments of the Company and project managers participated in the training together. The training program was comprehensive, covering a wide range of topics of interest to many cadres and employees, including the work safety practice, safety management for special operations, safety management for outsourced projects, interpretation and analysis of industry accident cases, and other hot issues related to work safety. The training provided diversified and multi-level safety knowledge, effectively enhancing the safety management capabilities of the participants.

Case

### The Company Held the First Group-level Nuclear Emergency Comprehensive Exercise



The First Group-level Comprehensive Nuclear Emergency Exercise

In April 2023, the Company successfully conducted its first group-level comprehensive nuclear emergency exercise. The scenario assumed a coolant leak from the HTR-PM fuel handling system into the fuel handling compartment. Based on the progression of the event, emergency response actions were carried out in the following stages: emergency standby, plant emergency, and site emergency. The participants in this exercise covered the Company's nuclear emergency command center, the nuclear emergency office and its specialized teams, the Huaineng Nuclear Emergency Technical Support Center, and the Shidao Bay Nuclear Power Plant. The exercise effectively tested and strengthened the comprehensive coordination capabilities of the Company's nuclear emergency organization, promoting the systematic, professional, standardized, and scientific development of the Company's nuclear emergency management and preparedness.

Case

### Helicopter Rescue Drills at Sea Help Improved Emergency Response Capabilities

In June 2023, on the occasion of the 22<sup>nd</sup> "Work Safety Month" in China, Huaineng Jiangsu Clean Energy Company organized and carried out offshore helicopter rescue drills at Sheyang Offshore Wind Farm. The drill was based on a scenario where an O&M staff at the offshore booster station of Sheyang offshore wind farm accidentally fell from a height during an inspection, resulting in severe blood loss and unconsciousness. The personnel on duty immediately reported the incident to the drill command center and activated the Sheyang Offshore Wind Farm Emergency Response Plan. They also provided first aid to the injured person by applying bandages to stop the bleeding. Simultaneously, they notified the emergency cooperation unit, Southern Airlines, to dispatch a helicopter to the scene for rescue and contacted a 120 ambulance to transfer the injured person. Ultimately, the injured person was promptly transported to the hospital. The drill was a complete success, further improving the emergency response capability of the Company's offshore operators and creating a good atmosphere where everyone focus on safety and emergency response.



Offshore Helicopter Rescue Drills

Case

## Joining Hands with Partners to Create Value

### Building a Partnership-based Collaboration

The Company continued to deepen and expand its external cooperation, actively strengthening strategic partnerships with local governments, upstream and downstream enterprises, overseas partners, and relevant institutions. It adhered to the principle of mutual benefit and win-win, and opened up cooperation in a broader scope and wider fields.

**Government-enterprise Cooperation:** The Company has signed 5 strategic cooperation agreements with Shaanxi, Ningxia, Xiamen, Weihai, and Xiongan. These agreements aim to strengthen cooperation in areas such as nuclear power development, competitive allocation of renewable energy indicators, environmental protection and people's livelihood project construction, and services for rural revitalization, etc.

**Inter-enterprise Cooperation:** Strategic cooperation agreements have been signed with 7 upstream and downstream enterprises, including CRRC, Dongfang Electric, Shanghai Electric, Harbin Electric, CETC, CREEE and Sungrow Power, in areas such as collaborative development of renewable energy resources, advanced equipment R&D, scientific and technological innovation, and integration of industry and finance, etc. In accordance with the State-owned Assets Supervision and Administration Commission's (SASAC) deployment for specialized integration, 22 project contracts have been signed with 13 Central SOEs, including China National Nuclear Corporation (CNNC), China State Shipbuilding Corporation (CSSC), and China National Offshore Oil Corporation (NOCOC), etc. This marks the beginning of smart operation and maintenance services cooperation in renewable energy for Central SOEs.

**Overseas Cooperation and Exchange:** High-level dialogue and technical exchange with global famous enterprises such as Siemens (Germany), GE (USA), SK Group (ROK), Vaisala (Finland), Orano (France) and Meralco (Philippines).

### Promoting Internationalized Development

The Total Overseas Installed Capacity is

**6.1992** GW

The Total Amount of Overseas Assets is

**101.677** Billion Yuan

The Company remained committed to integrating into the new development pattern of dual circulation at home and abroad, aiming to create a world-class enterprise. It has established 7 overseas representative offices in the UK, Pakistan, Myanmar, Cambodia, Singapore, Australia, and Kazakhstan, focusing on strengthening the "One body, two wings" platform construction and continuously deepening its international development. By the end of 2023, the Company's overseas investment and management projects had a total capacity of 6.1992 GW, with an equity-installed capacity of 2.2621 GW. The total assets amounted to RMB 101.677 billion yuan, and the Company provided technical services and technology exports to more than 20 countries and regions.

The Company strived to improve its foreign affairs management capability and build a "Solid dam" for foreign affairs service assurance. By the end of 2023, the Company had organized 147 batches of outbound delegations on business involving 638 individuals. Among these, 34 batches with 365 individuals belonged to one-time approval for multiple visits within a year.

The Company always adheres to the concept of "international exchange, obey and serve China's diplomatic policy", maintains the enthusiasm of foreign exchanges and strengthens international exchanges and cooperation. In 2023, the Company actively participated in various events such as the ESG Global Leaders Conference, China Development Forum, Boao Forum for Asia, Global Energy Interconnection Conference, China International Import Expo, the China-ASEAN Expo, and China-South Asia Exposition, etc. These activities aimed to spread the voice of Huaineng and showcase its image.

## Full-process Responsibility Purchasing by Invitation to Bid

The Company revised the *Management Measures for Bidding Procurement*, the *Management Measures for Non-bidding Procurement*, the *Implementation Measures for Procurement Management Assessment*, the *Implementation Measures for Material Management Assessment* and other systems, issued the *Further Standardizing Inquiry Procurement Related Work*. This aimed to conduct responsible procurement in a standardized manner throughout the entire process, effectively improving the overall quality of procurement work. In 2023, the company's case study *Building a Standardized and Intelligent Centralized + Remote Tender Procurement System for Large Electric Power Groups* was awarded the Special Prize for Typical Cases of Innovation and Application in the Power Material Supply Chain by the China Electricity Council.

In 2023, the Company had a total of 96589 suppliers and completed 240198 procurement projects, completed a cumulative procurement amount of RMB 194.84 billion yuan throughout the year, saving RMB 38.785 billion yuan compared to the estimated budget, with a capital saving rate of 16.6%. The Company signed strategic cooperation agreements with governments of Inner Mongolia, Shandong, and Hebei's Baoding City, and a low-carbon city research institute with Nanjing City, striving to achieve mutual benefit and win-win results in resource acquisition, project development, energy services, and other aspects.

### Risk Prevention and Control in Bidding and Procurement

We pioneered an integrated risk prevention and control system that combines integrity, compliance, risk management, and internal control within the industry. This system has resulted in the creation of a risk database, risk manual, and job skill standards for the Company's procurement field. Additionally, we have incorporated relevant management requirements, compliance mandates, and control measures into our information systems, embedding them into work processes and procurement operations, thereby establishing a benchmark for risk prevention and control in the purchasing by invitation to bid industry.

We conducted environmental and social risk identification for suppliers and have incorporated elements such as green processes, green equipment, and commitments to social responsibility into our material framework agreements. It ensured that suppliers complied with relevant laws and regulations, effectively reducing environmental and social risks.

### Strengthening Expert Management

In accordance with the principle of "Inclusion as needed", we have completed the review and storage of 5023 bid evaluation experts in two batches, bringing 13,202 experts in the database, a year-on-year increase of 61.43%. Notably, the number of experts in the fields of renewable energy, nuclear power, and coal industry has significantly increased.

### Supplier Management

Regularly monitor and inspect suppliers' environmental and social risk management measures through on-site inspections, document audits, third party assessments, etc. We conducted two types of assessments for suppliers: "Comprehensive Evaluation of Project Execution" and "Annual Comprehensive Evaluation". In response to any negative behaviors identified in the assessment results, we urged suppliers to make timely corrections, continuously improving both product quality and service quality.

Throughout the year, we completed evaluations for 17,040 suppliers, imposing penalties on 58 suppliers for "serious negative behaviors" and on 136 suppliers for "particularly serious negative behaviors".

### Holding Intelligent & High-end Equipment and Service Procurement Signing Ceremony

In November 2023, the Company held a signing event for the procurement of intelligent high-end equipment and services at the 6<sup>th</sup> China International Import Expo. We signed 8 procurement contracts or cooperation agreements related to gas turbine technology equipment and services with partners such as Siemens Energy, General Electric, and Mitsubishi Heavy Industries, with a total amount reaching RMB4.59 billion yuan.



A Signing Event for the Procurement of Intelligent High-end Equipment and Services

Case

## Optimize Supply Chain Management

The Company has developed and implemented the *Work Plan for Strengthening Supply Chain Management in Building a World-Class Enterprise and the Procurement and Material Supply Chain Management Plan (2023-2025)*. We are continuously optimizing and enhancing our supply chain management, aiming to create a lean, collaborative, intelligent, and green supply chain. The company's "Smart Supply Chain Service Platform for the Energy Industry Based on Blockchain Technology" project was awarded the "Excellence" evaluation in the "Blockchain Plus Energy" specialty field at the National Blockchain Innovation Application Pilot Summary Exchange Conference. It is the only project in the power generation industry to receive this title, and the related case has also been used as a typical case of blockchain innovation application in the real economy sector.

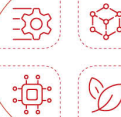
### Building a Lean Supply Chain

- Continuously expanded the scale of centralized material supply and improved the coverage of material categories.
- Promoted the construction of warehousing system and completed the digital transformation of 211 grass-roots enterprises accumulatively.
- Promoted the "Centralized Material Framework Agreement Procurement Plus E-commerce Ordering" instant supply model, achieving a comprehensive coverage of centrally supplied production materials, with an instant supply rate of 92%, has enabled the Company to be recognized as a leading enterprise in the e-commerce procurement and operation model.

### Building a Collaborative Supply Chain

**Enhanced Supply Chain Collaboration:** Strengthened joint reserve efforts, developed a "Five-principle" centralized warehousing and distribution management model, and advanced the construction of three regional central warehouses and one sub-warehouse to achieve integrated storage and preparation of materials.

**Enhanced Industry and Internal Collaborations:** Achieved full-process interconnectivity and interoperability between the trading of large quantities of scrap materials and the Beijing Bulk Commodity Exchange system; Listed idle materials on the Huanguang Mall to promote internal reallocation and utilization, with a total of RMB 38.482 million yuan worth of idle materials reallocated throughout the year.



### Building an Intelligent Supply Chain

**Intelligent Operation:** Prepared the *Procurement and Material Supply Chain Data Governance Standard*, developed the commodity data management module function of Huanguang Mall, and completed the data cleaning of 67381 stock commodities accumulatively.

**Intelligent Procurement:** Deepened the digital procurement application of four intelligent platform and one big data platform (intelligent procurement platform, intelligent auxiliary bid evaluation decision-making platform, intelligent remote supervision platform, intelligent dispatching platform, blockchain-based procurement big data platform), and realized centralized, unified and standardized management of purchasers and suppliers.

**Intelligent Materials:** Built intelligent logistics system based on "Intelligent transportation" system, realized visible and complete online order digital management mode of idle materials in Huanguang Mall.

### Building a Green Supply Chain

- Issued the *Guidelines for Green Procurement*, giving full consideration to factors such as resource conservation, recycling and low carbon, and giving priority to the procurement and use of raw materials, products and services conducive to environmental protection such as energy conservation, water conservation and material conservation.
- Integrated the concept of green and low-carbon into procurement activities by including scoring criteria for green processes and green equipment in procurement documents. Throughout the year, completed green procurement for 10 projects, with a total transaction amount of approximately RMB 15.192 billion yuan.
- Explored the use of renewable energy transportation vehicles in the warehousing and logistics process, with renewable energy delivery vehicles accounting for 22.23%, to reduce transportation pollution and carbon emissions. Promoted the wide application of "Green and environmentally friendly paperless operation" and created a green logistics practice model for power generation enterprises.

## Building a Harmonious Relationship between Enterprises and Local Communities

### Supporting Regional Development

The Company actively implements the national regional development strategy, continues to provide services and support major strategic work plans and action plans for "three clusters, two basins, and one port" (including Beijing-Tianjin-Hebei region, Yangtze River Delta, Guangdong-Hong Kong-Macao Greater Bay Area, Yangtze River Basin, Yellow River Basin, and Hainan Free Trade Port). Through strengthening partnerships with various regions, integrate industrial advantages closely with local resource endowments, resulting in mutual reinforcement in resource acquisition, project development, energy services, and investment effectiveness.

In the **Beijing-Tianjin-Hebei Region**, the Company has signed a strategic cooperation agreement with Xiongan New Area to actively, steadily, and orderly alleviate non-capital functions of Beijing. This collaboration aimed to assist the new area in building a new type of urban-rural energy system, demonstrating Huaneng's responsible image.

- The Company is advancing the construction of the Huaneng headquarters office building in Xiongan New Area to high standards, aiming to create a low-carbon and energy-efficient building throughout its entire lifecycle. The project has successfully achieved the significant milestone of topping out the main structure on schedule, receiving full recognition from the Xiongan New Area Management Committee.
- The Company donated to build a distributed photovoltaic project for Duan Village Primary School in Xiongan New Area, and was honored with the title of "Model Enterprise for Donating to Education".
- The green zero-carbon smart energy project of the Second People's Hospital of Xiongan was successfully put into operation, becoming Xiong'an's first urban green low-carbon smart comprehensive energy demonstration project.
- The comprehensive energy service project for the Company's Xiongan headquarters park is closely coordinated with the construction schedule of the Huaneng headquarters office building project.
- In the activity of "Xiong'an Visit of students and teachers from 100 Colleges and Universities", we signed the Letter of Intent for Cooperation in Research and Demonstration Application Projects of Urban Waste Identification, Sorting and Carbon Reduction Technology with colleges and universities to assist the integrated development of industry, university and research in the new area.



Xiong'an Huaneng Headquarters Office Building under Construction

As one of the first centrally-administered state-owned enterprises (SOEs) to be relocated, China Huaneng is coordinating and advancing various tasks including project construction, personnel relocation, and industrial alignment. The Company is fully supporting the development and construction of the new area, demonstrating its responsibility and commitment to implementing the decisions and deployments of the Central Committee of the Communist Party of China and the State Council, as well as its high regard for the development and construction of the new area.

—Zhang Guohua, Member of the Standing Committee of the CPC Hebei Provincial Committee, Secretary of the Party Working Committee and Director of the Administrative Committee of Xiong'an New Area

In the **Guangdong-Hong Kong-Macao Greater Bay Area**, the Company is actively promoting a number of major projects such as Dongguan gas turbine, Qingyuan gas turbine and Lemen II offshore wind power, optimizing the layout of supporting power sources, and accelerating the construction of 10 GW-level clean energy bases.

For the **Yangtze River Basin**, the Company has formulated the *Guiding Opinions on Further Promoting the High-quality Development of the Yangtze River Economic Belt*, to advance the eco-friendly development of renewable energy and hydropower and the transformation and upgrading of thermal power, and to serve and support the ecological environment protection and restoration and green development of provinces and cities along the river.

For the **Yellow River basin**, the Company has been actively planning large-scale clean energy bases in regions such as Gansu, Inner Mongolia, and Qinghai, promoting ecological environment protection by integrating photovoltaic sand control, and driving high-quality industrial development in the basin through green investment.

In the **Hainan Free Trade Port**, focusing on the construction of green energy island, CHHC has formed a robust multi-energy complementary power guarantee for the whole island with Changjiang Nuclear Power Plant and supporting gas turbine power stations in Haikou, Yangpu and Nanshan as the main components, supplemented by clean energy such as wind power and solar power.

### Public Welfare Service Community

Total Amount of External Donations RMB  
**220.37** Million Yuan

The Company formulated *Measures for the Administration of Three-color Sails Youth Volunteer Activities*, and set up a youth volunteer platform, and carried out in-depth brand public welfare activities of "Three-color Sails" youth volunteers. Activities involved Financial literacy, disaster relief, caring for vulnerable groups, protecting the ecological environment and other public welfare fields to convey the company's love and warmth to the society. In 2023, the Company donated a total of RMB 220.37 million yuan, including RMB 75.79 million yuan for public welfare and charity, aside from special funds for assistance and aid. It includes RMB 50.05 million yuan donated to disaster-affected areas, RMB 12.39 million yuan to education, healthcare, cultural, sports, and environmental protection causes, RMB 7.94 million yuan to social public facilities construction, other public welfare relief, and public welfare undertakings, and RMB 5.41 million yuan for other spaces.

### Finance Empowering Public Welfare and Charity

To consolidate and expand the achievements of poverty alleviation and effectively connect with rural revitalization, Guichen Trust is promoting professional research and business practice efforts through charitable trusts. The charitable trust business has been implemented successfully.

- **Huaneng Trust · Xinshan Duxing · Zhenai Gutzhou Charitable Trust:** With an initial scale of RMB 150,000 yuan, it provides care and support to outstanding students who meet the conditions for public welfare assistance in nine prefectures and cities across Guizhou Province.
- **Huaneng Trust · Xinshan Duxing · Shengtai Fumin Charitable Trust:** With an initial scale of RMB 10 million yuan, it focuses on ecological construction and industrial development in regions such as Guizhou and Guangxi, helping to consolidate the achievements of ecological poverty alleviation and expand the construction of beautiful rural areas.
- **Huaneng Trust · Weilai Zongqing Charitable Trust:** With an initial scale of RMB 5 million yuan, it provides caring assistance for vulnerable groups and promotes social equity.





### Emergency Aid for Earthquake Relief in Jishishan County, Gansu Province

In December 2023, a 6.2 magnitude earthquake struck Jishishan County, Linxia Prefecture, Gansu Province. The Company made a swift decision to donate RMB 10 million yuan to support earthquake relief and post-disaster reconstruction efforts. Meanwhile, Huating Coal Industry and the Qinghai Branch, located relatively close to the disaster area, took urgent action to assist, demonstrating the responsibility of central SOEs.



Huating Coal Industry promptly activated its emergency response mechanism, assembling a rescue team of 26 members and deploying four rescue support vehicles, equipped with over 180 pieces of professional rescue equipment, to urgently head to the earthquake disaster area to carry out rescue work.



The Qinghai Branch immediately organized post-disaster reconstruction assistance, completing the procurement of 300 folding board houses and accompanying emergency supplies, which were delivered on time to the disaster area. It also organized employee donations, raising RMB 45,060 yuan from 168 employees, with a 100% donation rate.

Case

### CHNG's "Three-color Sail" Volunteer Service Team Promoting Traditional Virtues of Respecting the Elderly

CHNG consistently upholds the cultural mission of the "Three-color Concept", actively practicing the spirit of Lei Feng and promoting the traditional virtue of respecting and caring for the elderly in Chinese culture. Several grassroots enterprises have established "Three-color Sail" volunteer service teams to carry out "Caring for the Elderly" initiative, allowing elderly individuals to feel the warmth and care from Huangeng.



In March 2023, the "Three-color Sail" volunteer service team from the Huangeng Renewables Corporation Limited Shandong Branch visited the Ji'nan Social Welfare Institute to care for the elderly of no family and donated supplies.



In November 2023, the Luoyuan Power Plant organized employee volunteers to visit the nursing home in Bill Township to carry out a "Respect for the Elderly and Patriotism" public welfare volunteer service activity, delivering gifts to the elderly residents.

Case

## Achieving Comprehensive Rural Revitalization

The Company resolutely followed the requirements of the CPC Central Committee on consolidating and expanding the achievements made in poverty alleviation in coordination with the extensive drive for rural revitalization, and actively implemented the *Opinions of the Central Committee of the Communist Party of China and the State Council on Comprehensively Promoting the Key Work of Rural Revitalization in 2023*. Anchoring the goal of building a powerful agricultural nation and focusing on "ensuring the bottom line, promoting development, and facilitating revitalization", CHNG has enhanced support for key counties receiving assistance such as Hengshan County in Shaanxi Province, Aheqi County in Xinjiang Autonomous Region, and Jianzhai County in Qinghai Province to advance comprehensive rural revitalization.

The Chairman of the Company serves as the group leader, while the President, and the Full-time Deputy Party Secretary serve as deputy group leaders. To coordinate and carry out this important work, the Company has established a leadership group office under the Strategic Development Department. In 2023, CHNG's assistance case titled *Green Development of Southern Xinjiang's Hydropower Resources: Transforming Desert into Wealth* was included in the *Typical Case of Central Units Supporting the Consolidation and Expansion of Poverty Alleviation Achievement and the Outstanding Cases of Central SOEs Supporting Rural Revitalization*. CHNG has received the highest government award in China's public welfare and charity sector, the "China Charity Award", for three consecutive sessions, totaling four awards. The Company's targeted assistance work has been consistently recognized and rated as "excellent" for six consecutive years, achieving the highest national assessment level. Compared to other energy enterprises of the same type, the Company's frequency of receiving such a high rating is the highest.

**Strengthening Organizational Leadership:** Throughout the year, CHNG held three special working meetings, with senior leadership conducting four field research visits to guide and plan the implementation of assistance work.

**Providing Supervision and Guidance:** It has incorporated targeted assistance work into the party-building responsibility assessment system, conducting over ten supervisory inspections throughout the year.

**Stepping up Input:** CHNG has invested a total of RMB 144.58 million yuan in assistance throughout the year. In targeted assistance areas, it directly provided RMB 58.31 million yuan in non-repayable funds and RMB 326.25 million yuan in repayable funds, along with introducing RMB 2.56 million yuan in non-repayable funds, and RMB 10.547 million yuan in repayable funds.

**Selecting Outstanding Cadres to Provisional Posts:** The Company has selected 8 outstanding cadres to serve as first secretaries in targeted assistance areas, either at provisional or permanent posts. Among them, 3 are located in Yulin City and Hengshan District, Shaanxi Province, 4 are in Kezhou and Aheqi County, Xinjiang, while the remaining 1 are in Jianzha County, Qinghai Province.

**Expanding Assistance through Purchasing Products from Poverty-Stricken Areas:** CHNG has developed and implemented the 2023 Consumer Assistance Action Work Plan, actively participating in relevant consumption assistance initiatives of the NDRC and the SASAC. It has been supporting the enterprises from counties receiving assistance to establish franchise stores and experience shops in first-tier cities, while also collaborating with e-commerce platforms such as b2b.com and LEADING and opening an assistance zone at the Huangeng Electronic Mall, to promote these products both online and offline. The Company actively purchased products for consumption assistance, with a total of RMB 76.34 million yuan spent on purchasing and helping to sell agricultural products from targeted assistance counties and RMB 120.73 million yuan from other poverty-alleviated areas in 2023. It also supported the development of the textile industry in southern Xinjiang by organizing affiliated units to order 58,675 sets of work clothes, amounting to RMB 15 million yuan.

## Industrial Vitalization

In Hengshan County, Shaanxi Province, CHNG has been actively exploring an industrial assistance model that combines "brand building plus financial support to promote industrial upgrading, and mutual assistance funds + cooperative organizations to drive stable income for poverty alleviated farmers". It helped register the "Shanbei Hengshan" series of public brand trademarks and develop a traceability supervision platform for agricultural products, allowing online inquiries for traceability information, ensuring product quality, and effectively enhancing market competitiveness and brand premium. The Company partnered with state-owned enterprises in Yulin City to establish an industrial poverty alleviation fund, helping two leading enterprises to build an integrated operation model through equity participation. It purchased agricultural products at prices 10% higher than the market rate, providing fixed annual income increases of RMB 1,000 to 2,000 yuan for impoverished households without labor power, with households that have transitioned to farming having stable annual earnings exceeding 1.5 times of their loan investments.

In Aheqi County, Xinjiang Autonomous Region, CHNG allocated RMB 20 million yuan in assistance funds for the long-term development of the seabuckthorn industry. It collaborated with JD Group to create the "Aheqi Tianshan Seabuckthorn" regional public brand and constructed an integrated seabuckthorn industrial park for preservation, storage, production processing, and technological research and development. The initiative has attracted leading enterprises and seabuckthorn deep processing projects, resulting in the development of a series of seabuckthorn products such as juice, puree, handmade soap, and cosmetics, the quality of which have received recognition and high praise from national professional institutions. In 2023, the county harvested 1,204 tons of seabuckthorn, involving over 2,000 farmers and herders, generating RMB 5.08 million yuan in harvesting income, with an average income increase of RMB 2,500 yuan per person. The annual sales of "Aheqi Tianshan Seabuckthorn" products reached RMB 45 million yuan.

In **Jianzha County, Qinghai Province**, CHNG allocated RMB 15 million in assistance funds aimed at boosting the local cultural and tourism industry by establishing the "Charming Jianzha" public brand for cultural tourism. The Company partnered with the China Foundation for Rural Development to launch the "Hundred Beautiful Villages" rural tourism demonstration project. This initiative marks the first rural tourism demonstration project in Tibetan areas of China and represents the largest single accommodation development in the country, serving as an optimal start point for creating exemplary demonstration villages in Jianzha County.

In **Daofu County, Sichuan Province**, CHNG invested RMB 100,000 yuan to develop the yak raising industry in Zawa Village, generating an annual increase of RMB 5,600 yuan. This initiative has also led to the establishment of part of a forage planting project in Zawa Village, where high-quality forage has been cultivated on 589 mu of land, resulting in an annual income boost of over RMB 30,000 yuan. This effort successfully integrates the development of both planting and livestock raising.

In **Zhuanglang County, Gansu Province**, CHNG invested in a medicinal herb processing plant in Zhonggou Village. Over the course of the year, the facility processed 250 tons of medicinal herbs, resulting in an income increase of approximately RMB 330,000 yuan. Additionally, the apple sorting center in Lirun Village, also funded by CHNG, sorted and sold 156 tons of apples, generating around RMB 600,000 yuan in additional revenue and creating jobs for over 30 local unemployed workers.

## Talent Vitalization

3350

Person-times of  
Training for Cadres and Talents

In 2023, CHNG carried out 3350 person-times of training for cadres and talents from Hengshan District of Shaanxi Province, Aheqi County of Xinjiang Autonomous Region and Jianzha County of Qinghai Province, including 2242 grass-roots cadres, 371 entrepreneurial individuals in rural revitalization and 737 person-times of various special technical and employment skills training. In **Hengshan District, Shaanxi Province**, the Company partnered with Northwest A&F University to establish a training center for sheep industry development to carry out training grass-roots cadres and talents. In **Aheqi County, Xinjiang Autonomous Region**, the Company built a skills training base for farmers and herders, offering various specialized training. In **Jianzha County, Qinghai Province**, the Company implemented a Star Villager Training Program, introducing Tsinghua University's course resources to build a remote work station for rural revitalization, and cultivating a batch of skilled personnel for local industries.

## Culture Vitalization

In **Hengshan District, Shaanxi Province**, the Company has thoroughly delved into the loess culture of northern Shaanxi, grassland culture, frontier culture, and red culture in old revolutionary base areas, established the North Shaanxi Goat Culture Exhibition Hall and Goat Culture Square, to showcase the rich history, traditional customs, and unique cuisine of local agricultural and pastoral cultures. In **Aheqi County, Xinjiang**, the Company organized to produce a promotional public brand video titled "Aheqi Tianshan Seabuckthorn" and hold brand strategy launch event, and showcase and promote traditional Kirgiz ethnic culture, such as "Hometown of Falcon". In **Jianzha County, Qinghai Province**, the Company sponsored the Yellow River International Triathlon and the International Traditional Ethnic Archery Tournament of Arrows, enhancing the local community's sense of cultural identity.

## Ecological Vitalization



In **Hengshan District, Shaanxi Province**, CHNG invested RMB 1.1 billion yuan to initiate the construction of a 100 MW wind power project and a 100 MW agriculture-animal husbandry-solar power project. Support has also been provided for household courtyard economy projects, completing distributed rooftop photovoltaic projects.

In **Aheqi County, Xinjiang Autonomous Region**, the Company invested RMB 4 billion yuan to build a large-scale water conservancy hub project and a supporting power station project, support the construction of agricultural-photovoltaic complementary projects, and promote the planting of 68,000 mu of Hippophae rhamnoides, which has become an "ecological tree" for local environmental improvement.

In **Jianzha County, Qinghai Province**, the Company assisted in establishing distributed photovoltaic projects at relocation sites to help relocated families stabilize their income. It also invested RMB 2.8 billion yuan to introduce a 400 MW wind power project.

CHNG actively leverages its advantages in the electric power sector, focusing on a distinctive assistance model that integrates energy development with rural revitalization. Through proactively promoting the construction of "solar power plus" renewable energy projects, the Company is optimizing and adjusting the local energy structure, assisting in regional industrial transformation and upgrading, and achieving ecological revitalization in rural areas. In **Lincang City, Yunnan Province**, the Company has completed an agriculture-solar power complementary power generation project, introduced over ten types of medicinal herbs for experimental planting, allowing local residents to earn income from land leasing and nearby employment, while also increasing their income from medicinal herb cultivation, injecting new vitality into local rural revitalization. In **Huanggang City, Hubei Province**, the Huaneng Huanggang Zhaojiantan 90 MW fishery-solar power complementary project organically integrates traditional fish farming with photovoltaic power generation, forming an operational model where "power generation is above and aquaculture is below". The annual power generation capacity can reach 120 GWh, benefiting surrounding households and village collectives. In **Linfen City, Shaanxi Province**, CHNG completed the Qewo 300 MW photovoltaic project, the largest individual renewable energy project connected to the grid in Shaanxi Province. By adhering to the construction concept of "power generation on the panels, planting below", the Company made full use of solar energy and land resources, achieving zero pollution and emissions, and realizing emission reduction and value-added land utilization. In **Guangzhou, Guangdong Province**, the Company has actively invested in and promoted aquaculture through the Huadu fishery-solar power complementary project. A total investment of nearly RMB 3 million yuan has been invested in two phases for the cultivation of soft-shelled turtles and blue lobsters, effectively driving the upgrade of the local aquaculture industry.



Qewo 300 MW Photovoltaic Project



Huadu Fishery-Solar Power Complementary Project

## Organizational Vitalization



In **Majialiang Village, Hengshan District, Shaanxi Province**, the Company has established a comprehensive grid management system, advanced the "toilet revolution" and living condition improvement, and constructed a high-standard farming demonstration area. Additionally, the Party Branch of Company Headquarters Office has carried out joint activities with the Party Branch of Majialiang Village.

In **Biedili Village, Aheqi County, Xinjiang Autonomous Region**, the Company has established a "three-center" work mechanism centered on party-masses service, stability maintenance and comprehensive management, and economic development. These efforts include holding night schools for farmers and herders, carrying out Mandarin study and various cultural and sports activities, and guiding villagers in the "Hundred Beautiful Villages" rural tourism demonstration project and realizing the company-style operation of over 600 hectares of seabuckthorn forests.



## Story of Original Aspiration



## Striving to Be an Action-Oriented Contributor to the Belt and Road Initiative

2023 marked the tenth anniversary of the Belt and Road Initiative. Over the past decade, CHNG's internationalization efforts have never ceased, with numerous Huaneng employees embarking on the Belt and Road journey, envisioning a new blueprint for the initiative that valuing our unique strengths, recognizing the strengths of others, walking together on a shared journey, and achieving collective prosperity.

CHNG has actively participated in the global energy sector's collaborative efforts, successfully completing a range of projects including the Lower Sesan II Hydropower Station in Cambodia, the Sahiwal Power Plant in Pakistan, the Tuas Power in Singapore, the Minety Battery Storage in the UK, the Shweli River I Hydropower Station in Myanmar, and the Rocksavage Power Plant in the UK. The Company has actively engaged in these markets, fostering win-win cooperation and gradually forming a harmonious development model that aligns with the interests of the host countries.

### Lower Sesan II Hydropower Station: A Model for Corporate Involvement in the Global Fight against Poverty

Huaneng Lower Sesan II Hydropower Station in Cambodia is the largest hydropower project in the country, with an installed capacity of 400 MW, accounting for over one-fifth of the total installed power generation capacity in Cambodia. The station has played a significant role in addressing the local power shortage. It is widely acclaimed as a model project for China-Cambodia energy cooperation. By the end of 2023, the station has operated continuously and stably for 2,214 days, maintaining a zero-accident record in safe operation, with a cumulative power generation of 10,218 TWh, sufficient to meet the electricity needs of approximately 3 million local residents annually. CHNG actively fulfilled its social responsibilities by establishing three resettlement villages for displaced residents, completing the relocation of 840 households and 3,690 individuals, thus facilitating Cambodia's largest hydropower related resettlement project in terms of the number of people involved. The Company has introduced "Chinese-style poverty alleviation" management practices, combining external support like a blood transfusion with sustained effort from self-motivation. In the resettlement villages, the Company has constructed temples, schools, hospitals, power grids, and water wells, significantly improving the living and production conditions of the residents. These efforts successfully position the project as a model for corporate involvement in the global fight against poverty. CHNG has received the "Social Responsibility Award" from the government of the Stung Treng Province of Cambodia for four consecutive years, earning high praise from local governments, media, and the public.

*The Lower Sesan II Hydropower Station has provided safe, stable, and clean power resources for our people, bringing tangible benefits to Cambodia and creating job opportunities. It is of great significance for improving the livelihoods of the Cambodian people and accelerating the nation's economic development.*

—Hum Sen, Former Prime Minister of the Kingdom of Cambodia



### Tuas Power: Ensuring a Reliable Local Energy Supply



In 2008, CHNG acquired Tuas Power Ltd., one of Singapore's three major power generation companies. After 15 years of management and operation, Tuas Power has evolved from just a power generator into Singapore's most competitive integrated utility service provider. Its assets mainly include the Tuas Power Plant, the Dambusa Power Plant, and a seawater desalination plant, operating a total of seven generating units with an installed capacity of 2,010 MW, accounting for approximately 20.4% of the Singapore market, thereby ensuring a reliable local supply of electricity and thermal energy.

*Huaneng has changed the history of Singapore's energy development by relying on its world-leading technology and experience in power generation.*

— Official from the Singapore Economic Development Board

### Sahiwal Power Station: Injecting New Vitality into Local Development through Empowerment

The Sahiwal Power Plant in Pakistan produces around 9TWh of electricity each year, representing about 10% of the nation's total power output. This helps close over a quarter of the local electricity shortfall, supplying power to 4 million households and over 20 million people. The plant has received the honorary title of "Most Stable and Reliable Power Plant" from the state grid of Pakistan for four consecutive years. Adhering to the empowerment principle of "teaching a man to fish", CHNG has set up Huaneng Ruyi Technical Training School locally, providing vocational technical training to local youth free of charge. In 2023, the school held four training sessions in computer skills, secretarial work, electrical work, and welding respectively to enhance practical employment skills and continuously inject new vitality into local development, receiving high praise from participants. The Company has been recognized for its outstanding contributions to local economic and social development, receiving multiple awards including the "Best Vocational Training Award" "Best Social Responsibility Award," "Most Sustainable Development Award" and "Contributor to Common Prosperity" showcasing CHNG's commitment to deepening and solidifying the Belt and Road Initiative.



*The Sahiwal Power Plant project has not only greatly alleviated the current electricity shortage faced by Pakistan but also created thousands of job opportunities, earning recognition and respect from the Pakistani people.*

— Mansoor, Chief Engineer of the Central Power Purchasing Agency, Pakistan

### Minety Battery Storage Project: Charging for a Green Future

The Minety Battery Storage Project in the UK, as the largest battery storage project in Europe, has an installed capacity of 99.8 MW/99.8 MWh. It participates in peak shaving and rapid frequency response services for the UK grid, providing emergency backup power during grid incidents and offering valuable insights for global cooperation in addressing climate change.

The project site is located in a low-lying area surrounded by trees, and the battery containers were designed in a soft white color. Nestled among the greenery, the containers integrate seamlessly into the surrounding environment without negatively impacting the natural ecological landscape. CHNG has received several accolades, including the Outstanding Contribution Award for Green Cooperation from the China Chamber of Commerce in the UK and the Excellent Case Award for Coexisting with Nature. It has also been included in the *World Economic Forum's report of Advancing the Green Development of the Belt and Road Initiative*, gaining recognition from governmental agencies, business organizations, and media in both China and the UK.



*Minety Battery Storage Project in the UK plays a crucial role in enhancing the safety and stability of the local power grids, while also boosting the capacity of power grids to absorb electricity generated from renewable energy sources. This project demonstrates the benefits of mutually beneficial collaboration in the energy sector.*

—Zheng Zeguang, Chinese Ambassador to the UK

Building a high-standard socialist market economy. We must uphold and improve China's basic socialist economic systems. We must unwaveringly consolidate and develop the public sector and encourage, support, and guide the development of the non-public sector. We should give full play to the market as the decisive role in resource allocation, so that the government could better plays its role. We will deepen reform of state-owned capital and state-owned enterprises (SOEs); accelerate the optimization of layout of the state-owned sector and structure adjustment; boost the development of state-owned capital and enterprises; and enhance the core competitiveness of SOEs. We will improve the modern corporate system with distinctive Chinese characteristics, encourage entrepreneurship, and accelerate the building of world-class Chinese enterprises.

— Report to the 20<sup>th</sup> National Congress of the Communist Party of China by Xi Jinping

## Steady and Sustained Corporate Development through Modern Governance

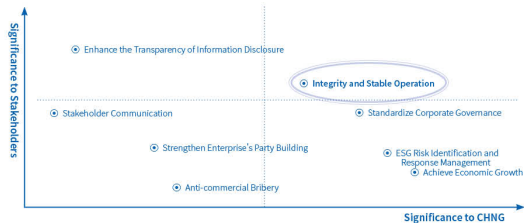
- 72 Operation with Integrity, Compliance with Laws and Regulations
- 74 Improving the Management Quality and Effectiveness of the Company
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- 81 Expanding the Information Disclosure Channels
- 84 Striving to Be a Doer in Building a World-Class Enterprise



# Governance

## RECOGNITION

Analysis of the Issue | Key Point Identification



## REQUIRE

Background of the Issue | Policy Requirements

On October 1, 2022, the SASAC implemented the *Measures for the Compliance Management of Central SOEs*. These measures stipulate that central state-owned enterprises (SOEs) should embed compliance reviews as a mandatory procedure into their operational management processes. The compliance review opinions on significant decision-making matters must be signed by the Chief Compliance Officer, who should provide clear opinions on the compliance of decision-making matters. Business and functional departments, along with compliance management departments, should refine review standards, processes, and key points according to their responsibilities and conduct regular post-evaluations of the reviews.

## RISK

Current Status of the Issue | Existing Risks

In 2023, CHNG continued its effective inspections and corrective actions against violations and illegal activities in its business operations. In the crucial area of engineering project bidding, on-site inspections uncovered 872 issues, which were promptly addressed by the relevant units, resulting in no significant operational risk events throughout the year. However, in areas where authority over personnel, finance, materials, and project approvals is overly centralized and capital-intensive, some key business processes still require sufficient oversight. For instance, personnel in critical positions remained static for extended periods, and there was a weak awareness of business compliance, creating rooms for vested interests and frequent regulatory violations.

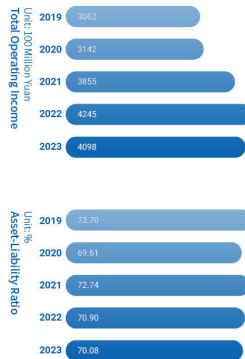
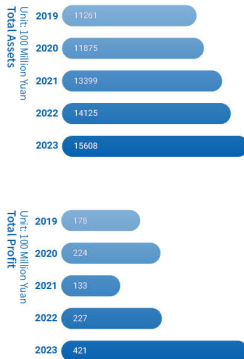
## RESPOND

Response to the Issue | Management Planning

- CHNG continued to reinforce its efforts to inspect and rectify violations and illegal activities in its business operations. The Company intensified investigations into key areas and critical processes, including procurement bidding, fuel purchasing and sales, engineering construction, finance, and trade, eliminating existing problems while adopting a zero-tolerance policy to prevent new occurrences.
- CHNG has adopted an approach of tackling major issues while enhancing governance capabilities, addressing both symptoms and root causes. Combining in-depth analyses of underlying problems and continual refinement of management systems in relevant areas, it aims to fundamentally resolve recurring common challenges.
- Additionally, CHNG has bolstered daily oversight and management of internal compliance, and improved the issue identification and alert mechanisms, to ensure that internal control measures are effectively integrated with compliance requirements within business processes.
- To tackle the excessive concentration of power and capital in areas like personnel, finance, materials, and project approvals, CHNG requires the rotation and exchange of key positions' personnel, and implements mechanisms for performance evaluations and facilitates the exit of underperforming personnel according to relevant regulations.

## PERFORMANCE

Enterprise Development | Performance Indicators



## PRACTICE

Enterprise Development | Fulfilling Commitments Through Action

- The Company actively carried out the mid-term self-inspection and self-evaluation activities in terms of Huangeng's Rule of Law during the "14" Five-Year Plan period, and 48 enterprises basically reached the relevant standard, accounting for 98%.
- The Company's all major industries achieved profitability and increased profits year-on-year. Several 10-billion-level industries including renewable energy, hydropower, thermal power and coal, and several 5-billion-level regional (industrial) companies including Huangeng Lancang River Hydropower, Huangeng Eastern Inner Mongolia Energy were created.
- The Board of Directors of the Company established some dedicated committees, including Strategy and Investment Committee, Remuneration and Appraisal Committee, Audit and Risk Committee, etc., to provide advice and suggestions to the Board of Directors on different ESG issues.
- All 5 listed companies affiliated to Huangeng Power International Inc., Huangeng Lancang River Hydropower Inc., Shandong Jinneng Taishan Power Generation Co., Ltd., Great Wall Securities Co., Ltd and Inner Mongolia Mengdian Huangeng Thermal Power Corporation Ltd. publicly released ESG related reports to the public, realize full coverage of ESG reports for affiliated listed companies.
- The Company continuously improved the integrated system of "special, daily, regular" communications to ensure comprehensive, timely and accurate disclosure of the Company's responsibility performance to the public.

## PRIZE

Enterprise Development | Continuing the glory

- The Company received an A-level evaluation (93.8 points) for compliance effectiveness from the SASAC, ranking among the top of the central state-owned enterprises under review.
- The Company was rated as "Excellent" in the assessment of the Board of Directors of central SOEs for the third consecutive year, and Huangeng Power International Inc. was selected as "Best Practice Case of the Board of Directors" by the China Association for Public Companies.
- The case of the Company, *Creating A World-class International Brand Image by Innovatively Building A Cross-cultural Communication Platform*, was selected as a typical case of brand building of central SOEs.
- The case of the Company, *Implementing ESG Concept and Continuously Promoting High-quality Development of Enterprises*, won the "2023 ESG Excellent Case Award of China Enterprises".
- The 3 listed subsidiaries (namely, Huangeng Power International Inc., Huangeng Lancang River Hydropower Inc. and China Great Wall Securities Co., Ltd.) have all been rated at Grade A for information disclosure evaluations by respective Exchanges.

## Operation with Integrity, Compliance with Laws and Regulations

### Standardizing the Regulation Management

CHNG has established a regulation management committee, revised the *Rules on Regulations Management*, strengthened the quality control of regulation establishment, and created a closed-loop mechanism for regulation review. It has set up three review procedures involving responsible departments, centralized management departments, and the Chief Compliance Officer to conduct self-inspections, reviews, and checks on the compliance, standardization, and coordination of regulations. In 2023, CHNG established 23 new regulations (procedures), filling existing gaps in the management of trade business and supplier blacklist management; revised 172 regulations related to comprehensive planning management and material procurement management; and abolished 42 regulations, steadily advancing the "establishing, revising, and abolishing" process.

### Adhering to Compliance Operations

#### A level

Evaluation for Compliance Effectiveness

CHNG has accelerated the implementation of compliance management, officially appointing a Chief Compliance Officer and issuing the *Compliance Management Regulations*, the *Key Position Compliance Responsibility List*, and the *Compliance Internal Control Process Management (Compliance Risk) List*. Additionally, the Company has developed specialized guidelines in nine areas, including production safety, environmental protection, human resources, and financial and tax management, further improving the organizational and institutional compliance framework. CHNG has strengthened compliance review as a mandatory procedure in operational management, achieving 100% substantive compliance review for regulations, major decisions, and important contracts. In 2023, CHNG received an A-level evaluation (93.8 points) for compliance effectiveness from the SASAC, ranking among the top of the central state-owned enterprises under review.

- Conducting Anti-monopoly and Other Specialized Compliance Training.
- Implemented the regulation publicity and compliance management training, with over 1,100 participants.
- Carried out on-line special training courses on compliance management, with 46,000 participants.

### Targeted Risk Prevention and Control

CHNG conducted risk assessments every six months using a blend of top-down and bottom-up approaches, along with daily monitoring, annual evaluations, comprehensive assessments, and specific case analyses. This methodology has enabled the Company to thoroughly evaluate significant risks across five key areas: production safety, ecological environment protection, coal power capitals, renewable energy investments, and financial operations, along with risks in 5 important aspects, namely, power market, fuel, overseas operations, cybersecurity, and regulatory compliance. The Company emphasized targeted prevention and control, proposing 70 specific risk response measures while actively implementing dynamic evaluation on major risks.

CHNG conducted quarterly rolling special actions for risk identification and control at all levels, evaluating the effectiveness of risk prevention and control using both qualitative and quantitative methods, focusing on key areas, and tracking hidden hazards of risk events. The Company paid close attention to areas prone to risk events, such as production safety, ecological environment protection, overseas operations, and financial business, urging all levels of the Company to strictly implement the two-channel step-by-step reporting procedure for risk events.

### Building Huaneng's Rule of Law

98%

of Enterprises Meet or Exceed the Basic Standards in the Mid-term Self-inspection and Self-evaluation Activities in Terms of Huaneng's Rule of Law

CHNG has developed and implemented the *Five-Year Work Plan for Huaneng Rule of Law (2021-2025)*, to further strengthen the foundation of the rule of law. The Company has established a comprehensive work system that involves the Party Leading Group, key responsible individuals, and the Board of Directors, to regularly hear reports on rule of law. This process incorporates the study of Xi Jinping's thoughts on the rule of law, along with relevant laws and regulations, into the core learning agenda of the Party Leading Group. Throughout the year, six reports have been presented, effectively promoting the responsibilities of the primary responsible person in advancing the rule of law. In 2023, the Company actively carried out the mid-term self-inspection and self-evaluation activities in terms of Huaneng's Rule of Law during the "14" Five-Year Plan\* period, and 48 enterprises basically reached the relevant standard, accounting for 98%.

The Company actively implemented the *Eighth Five-Year Plan for Publicity and Education on the Rule of Law (2021-2025)*, and adhered to the principle of making sure that leading cadres, though small in number, play a key role in implementing the rule of law, employees follow the rule of law, and dedicated team for the rule of law popularizes law (accounting for 30%, 30% and 30%, respectively). With Building Huaneng's Rule of Law as the main line, the Company took targeted measures based on different categories, combined online and offline methods, and provided precise legal education. This further enhanced the pertinence and effectiveness of publicity and education on the rule of law.

### The Company Provided a Training Course for Senior Legal Management Personnel to Improve Their Performance Ability



The Training Course for Senior Legal Management Personnel Performance Ability

In August 2023, the Company held a training course for senior legal management personnel to improve their performance ability. Experts were invited to give specialized lectures, focusing on the current development situation of the Company, hot and difficult issues in renewable energy development and construction, and practical management of legal compliance risk prevention. More than 70 people from relevant legal affairs positions participated in this training. The training emphasized the need to thoroughly study and implement the guiding principles of the 20th National Congress and Xi Jinping Thought on the Rule of Law, and to implement the guiding principles of the 2023 Work Conference on Rule of Law of Central State-owned Enterprises (central SOEs) held by the State-owned Assets Supervision and Administration Commission (SASAC), with the objective to effectively improve the ability of senior legal management personnel to perform their duties and contribute to building Huaneng's rule of law.

### Reinforcing Audit Supervision

RMB

7.2 Million Yuan

was Recovered Thanks to Audit Rectification

The Company fully implemented the Xi Jinping's important instructions on audit work, and faithfully implemented the audit requirements of the National Audit Office and the State-owned Assets Supervision and Administration Commission (SASAC) of the State Council. The Company always adhered to the centralized and unified leadership of the Party over audit work, emphasized the building of a comprehensive audit work framework, promoted the establishment of an authoritative and efficient audit operation mechanism, and focused on economic supervision and primary responsibilities. Furthermore, the Company also strengthened economic supervision, focused on the management of its primary responsibilities and core businesses, fulfilled its audit supervision duties by law, and continuously deepened the accountability for illegal business operation and investments, ensuring the high quality development of the Company via providing powerful and effective audit supervision services. In 2023, the Company completed 1,101 audit items of various types, found 5,447 problems, provided 3,643 audit opinions, and reviewed and saved RMB 234 million yuan project settlement fees. Internal control, supervision and evaluation were implemented, in which 1,235 supervision and evaluation units were included, 29 deficiencies were identified, and no major deficiencies were found. Thanks to audit rectification, RMB 720 million yuan was recovered whole year, and the economic loss amounting to RMB 280 million yuan was avoided or recovered.

## Improving the Management Quality and Effectiveness of the Company

### Board of Directors Management

The Company thoroughly studied Xi Jinping's important remarks on the establishment of a modern enterprise system with Chinese characteristics, actively explored the path to strengthen the Party's leadership and improve corporate governance in accordance with the guiding principles of documents such as *Opinions on Strengthening Party Leadership in Improving Corporate Governance by Central SOEs and Work Rules of the Board of Directors of Central SOEs (Trial)*, and comprehensively strengthened the Party's leadership in improving corporate governance. It was clearly required that the proposal on major business management matters submitted to the Board of Directors must present the opinions of the Party Leading Group based on pre-discussion and research, so as to effectively ensure correct direction for the enterprise development. In 2023, the Company was rated as "Excellent" in the assessment of the Board of Directors of central SOEs for the third consecutive year, and Huangeng Power International Inc. was also selected as "Best Practice Case of the Board of Directors" by the China Association for Public Companies.

The Company continuously improved a series of supporting regulations, including the management regulation for the Board's proposals and the management regulation for the Board meeting activities, to establish and improve a "1+N" system enabling the operation of the Board in a standardized and efficient manner. Each of these systems had its own focus but was also organically connected, forming a comprehensive Board system with distinctive Huangeng characteristics. This system provides institutional guarantees for the Board's performance of duties and exercise of powers from different dimensions and levels, ensuring that the Board plays a critical role in overseeing its strategic direction and its operation is effective and guaranteed.

**Mechanism for Soliciting Opinions from Outside Directors before Party Leading Group Meetings on Major Business Management Issues:** for effective interface between the pre-discussion by the Party leading group and the decision from the Board of Directors, and for major business management issues requiring pre-discussion by the Party leading group and decision from the Board of Directors, opinions from outside directors were solicited before the Party leading group meeting, taking into comprehensive consideration the specific circumstances of the proposals.

**Efficient Decision-making Mechanism:** the Company focused on the key points of communication meeting with outside directors, specialized committees, and the Board's agenda keypoints, continuously optimized the content of reports to ensure that they were targeted, inquiries were responded to, and requirements were implemented. This effectively addressed the issue of one proposal being repeatedly filed in multiple meetings.

**Multi-level Communication Mechanism:** the Chairman placed great emphasis on extensively soliciting opinions and suggestions from outside directors, and 7 formal communications with them took place throughout the year. The communication between the Board of Directors and the management team was conducted smoothly via the Board meetings, specialized committee meetings, joint research activities, and thematic reports, etc.. These interactions focused on topics such as reform, innovation and green transformation. The Board of Directors promptly informed risks, shared information and provided suggestions to the management team.

**Proactively Offering Opinions and Suggestions:** the Company established a system for outside directors' collective study, and held two collective study sessions and one theory-discussing meeting for outside directors annually. Based on in-depth learning of theoretical and industrial knowledge, outside directors actively offered opinions and suggestions for the Company's operation, reform and development, becoming an important force in driving high-quality development.

**Strengthening Investigation and Research:** the Company focused on the promotion of works in key areas and addressing difficult problems in enterprises, and completed joint research for 5 times throughout the year, vigorously advancing the implementation of annual key tasks.

**Promoting Problem Solving:** the outside directors leveraged their professional backgrounds based on their job responsibilities to actively play the gatekeeper role, helping the Company solve problems and promoting work in a timely manner.

### Improving the Supporting Regulations

### Improving the Three Major Operation Mechanisms

### Diligent Performance of Duties of Outside Directors

### Reinforcing the Role of Outside Directors in Fulfilling Their Duties

**Reinforcing information Support:** Monthly published the *Director's Work Newsletter* to give outside directors access to the Company's production and operation situation; Established a regular reading mechanism, through which outside directors get access to important documents. The Company, through institutional arrangement such as "Corporate Information Inquiry" and thematic communication, helped outside directors to promptly obtain supporting materials and relevant background information for decision making. The Company also set up iHN+account for outside directors, and fully opened its digital platform to facilitate their timely understanding of the Company's production and operation status.

**Reinforcing Decision-Making Support:** The Company strictly adhered to the relevant rules of procedures for submitting Board meeting notices and proposal materials, ensuring that directors had a full understanding of the proposals before the meeting, and established a decision-making communication mechanism of the Board of Directors (including before, during and after the meeting) to ensure that the Board would make scientific and prudent decisions.

**Reinforcing Organizational Support:** The secretary of the Board of Directors routinely provided support services to the Board of Directors and communicated with outside directors. A dedicated position, Director of Office of the Board of Directors, was established to provide coordination services for the construction of Group's Board of Directors. Additionally, the Division of Directors Works was set up to be responsible for meeting arrangement and research support. By strengthening the workforce of the Board of Directors, the level of support services for the Board of Directors was effectively improved.

### Establishing Subsidiaries' Board of Directors

The Company continued to deepen the construction of the Board of Directors of its subsidiaries, studied and formulated the *Work Plan for Deepening the Construction of the Board of Directors of Subsidiaries*, carried out dynamic evaluation of the scope of the Board of Directors which should be established, realized the objective that outside directors were in the majority, thus to comprehensively advance the reform and extension to subsidiaries. The Company strengthened the supervision of the Board of Directors of its subsidiaries, attended 18 general meetings, Board of Directors meetings and Board of Supervisors meetings held by its subsidiaries throughout the year, assisted its subsidiaries in sorting out matters considered at the meetings, proposed 53 amendment and improvement opinions to its subsidiaries and directed their implementation, so as to improve the operation quality of the Board of Directors.

The Company improved the performance evaluation system, carried out annual evaluation of the Board of Directors of its affiliated enterprises for three consecutive years, organized grassroots enterprises to carry out evaluation work simultaneously, and further standardized the construction of the Board of Directors of its affiliated enterprises by establishing excellent models and summarizing experiences and practices. In 2023, Inner Mongolia Menglian Huangeng, a listed subsidiary of the Company, won the "Outstanding Board Award" of the 18<sup>th</sup> "Gold Prize of Round Table" for Boards of Listed Companies in China.

### Reducing Cost, Improving Quality and Increasing Efficiency

Focusing on the general requirements of "serving the overall interests, prioritizing stability while pursuing progress, actively seeking higher goals and striving for excellence", the Company issued an overall plan which emphasized difficulties and shortcomings, e.g. loss reduction in thermal power sector, lean management in renewable energy sector, EVA-specific upgrading, etc., and issued five sub-plans to form a "1+N" working system and achieve quality and efficiency elevation as a whole. In October 2023, the Company overfulfilled the overall target of improving quality and efficiency ahead of schedule, and the operating efficiency reached a record high.

- For grass-roots enterprises with prominent loss problems in thermal power sector, 18 measures for reducing loss were set and implemented, special steering meetings were held, and 6 enterprises turned loss into gain. As a result, the scale of loss of coal-fired power plants decreased by 28.1% year-on-year.
- In virtue of adjusting procurement strategies and creating fuel benchmark power plants, the unit price of standard coal decreased by RMB 123 yuan/ton year-on-year, the largest decrease in the same industry, with saved fuel cost of RMB 22 billion yuan.
- Furthermore, the Company also completed high-cost debt replacement, with saved financial cost of RMB 4 billion yuan.

## Information Building

The Company made efforts to establish the "golden" brand of Huaneng Informatization, issued the Detailed Rules for the Implementation of Company Information Work, established and improved the three-level management system of "Headquarters Department-Regional (Industry) Company-Grootsroots Enterprise", thus to form a comprehensive "Big Information" working system. The Company attached great importance to the improvement of information work quality and efficiency, promptly reflected the prominent problems existing in the industry and the progress of its key projects, and completed 141 information documents throughout the year. 32 of which were adopted by the General Office of the CPC Central Committee and SASAC. With leading rank of its information work in the industry, the Company was awarded the title of "Excellent Enterprise on Information Work of Central SOEs".

## Value Maintenance and Appreciation of Assets

The Company made efforts to retain and increase the value of state-owned assets. All major industries achieved profitability and increased profits year-on-year. Several 10-billion-level industries including renewable energy, hydropower, thermal power and coal, and several 5-billion-level regional (industrial) companies including Huaneng Lancang River Hydropower, North United Power, Huaneng Capital Services, Huaneng Renewables and Huaneng Eastern Inner Mongolia Energy were created. In 2023, the Company achieved a profit of RMB 42.11 billion yuan, ranking first in the industry, with a year-on-year growth of 85.3%, and its growth rate ranked first among central SOEs. The Company reached a net profit of RMB 31.19 billion yuan, net profit attributable to the shareholders of the parent company of RMB 11.54 billion yuan, and EVA of RMB 11.456 billion yuan, up 33%, 52.63% and 85.26% year-on-year, respectively. In addition, the Company had an operating cash ratio of 25.4%, up 2.3% year-on-year, and an asset-liability ratio of 70.06%, down 0.82%. The main indicators of the Company were better than the assessment target of SASAC, and profit, net profit, net profit attributable to the shareholders of the parent company, EVA, etc. reached the best level in history.

- In the renewable energy sector, the profit reached RMB 16.48 billion yuan, accounting for nearly 40% of the total profit.
- In the hydropower sector, the profit reached RMB 8.039 billion yuan by accelerating power generation and controlling cost.
- In the coal sector, the profit reached RMB 10.781 billion yuan in the whole year, which hit a new high and maintained the 10-billion level for two consecutive years.
- In the thermal power sector, the loss of RMB 18.403 billion yuan was reduced year-on-year.
- In the finance sector, the risks were effectively controlled, and the profit of RMB 6.384 billion yuan was achieved.
- The income from investment in overseas power projects was RMB 5.62 billion yuan, of which Tus Power made a profit of a record high of RMB 4.355 billion yuan.

## Advancing the Reform of SOEs

The Company regarded high-level promotion of SOE reform as a major political task, insisted on fully leveraging the crucial move of reform, further strengthened the management and improved the vitality, and reinforced the results from the three-year action plan for SOE reform. Additionally, the Company developed the *Action Plan for Implementation of Deepening and Upgrading Reform*, clarified 106 reform measures, continuously improved the work promotion mechanism, defined responsible leaders and liaison personnel of each department, and strengthened horizontal coordination and vertical follow-up. Consequently, the action of deepening and upgrading reform led to active effectiveness. The Company was rated as Grade A in the annual reform evaluation by the SASAC for three consecutive years, and selected as a "Comprehensive Model" for central SOE reform. Its reform achievements were also included in the "Leading and Demonstration" case set.

- Organizing and participating in the special training on demonstration action of scientific and technological enterprise reform and plan formulation of SASAC.
- 545 people participated in the special promotion meeting with regard to the action of deepening and upgrading reform.
- Regularly participating in the SOE reform lectures for 4 times, and training more than 900 person accumulatively.
- More than 7,600 people participated in the online training on "deepening reform and striving for excellence".

# High Level Promotion of Responsibility Layout

## ESG Governance

The Board of Directors of the Company established some dedicated committees, including Strategy and Investment Committee, Remuneration and Appraisal Committee, Audit and Risk Committee, etc., to provide advice and suggestions to the Board of Directors on different ESG matters. The Company established a social responsibility leading group composed of key leaders of the Company and key persons in charge of relevant departments, to lead the consideration and decision-making of major issues, and direct key issue identification and risk analysis. Enterprise Management and Legal Compliance Department is assigned to take charge of ESG-related work promotion. A person in charge of social responsibility is assigned under every functional department, and the ESG liaison person is assigned in every subsidiary. This mechanism forms a top-down, horizontally and vertically combined ESG work system with clear division of labor.



## ESG Planning

### ESG Planning of Huaneng (2021-2025)

	Within the Company		Outside the Company	
<b>Development Goals</b>	Advancement of ESG management	Promotion of ESG integration	Creation of communication platform	Improvement of ESG image
<b>Path of Implementation</b>	Improvement of system of rules and regulations Enhancement of capability/development Promotion of ESG appraisal	Execution of ESG study and survey Construction of demonstration base Advocation of report release	Establishment of reporting system Implementation of proposal survey Regular information disclosure	Participation of industry activities Communication arrangement Make the voice of ESG



## ESG Regulations

### Basic Management Regulations

Implementation Plan for Fulfilling Social Responsibility with High Quality in the New Era, Opinions on Actively Fulfilling Social Responsibility and Promoting the Construction of Harmonious Society, Guidelines for Action of Fulfilling Social Responsibility, Assessment and Evaluation Measures for the Party Building Work Responsibility System

### Regulations of Related Issues

Measures for Management of Assistance Work, Regulations on Compliance Management, Measures on Staff Skill Competition, Measures for Management of Scientific and Technological Innovation Performance Assessment, Regulations on Safety Production, Measures for Management of Ecological Environment Protection, Supplier Management Measures, Measures for Management of International Development Strategic Planning, etc.

## ESG Concepts



In 2023, the Company launched the "Lianxinqiao" brand, a public communication brand in nuclear power industry, and took the lead in launching the HTR-PM science education and application promotion manual in the industry.

The Company has integrated ESG with the cultural concept of "Three-Color Huaren" to create the enterprise's ESG brand image, promote all cadres and employees to perform their due responsibilities of being a great power, and promote the high-quality development of the Company in the new era.

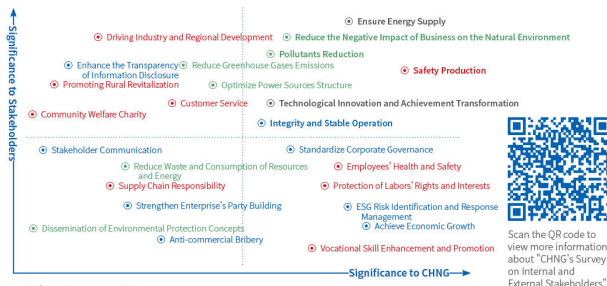
According to the requirements set forth in the Notice on Carrying out Brand-Leading Actions of Central SOEs issued by SASAC, the Company developed the Implementation Plan for Brand-Leading Actions, established a three-level brand management system, held brand management and communication business training, and promoted the implementation of the "1+4" brand management system. The Creating A World-class International Brand Image by Innovatively Building A Cross-cultural Communication Platform case was selected as a typical case of brand building of central SOEs. The Company's brand was incorporated into the list of "2024 China Brand Value Evaluation Information", with brand value of RMB 126.05 billion yuan, ranking 7<sup>th</sup> in the brand value list of China's energy and chemical industry.

Core Value	Strategic Orientation	Enterprise Style	Enterprise Spirit	
Adhere to integrity, and focus on cooperation Constantly innovate, and be proactive and enterprising Deliver results, and serve the nation	Power as the core business, synergy among various energy sectors, innovation as the leading force, finance as the supporting business, global layout	Entrepreneurship, Efficiency, Trustworthiness, Frugality	Professional dedication despite hardship Pioneering spirit to overcome challenges Entrepreneurial spirit in pursuit of excellence Initiative spirit of daring to be the first	
Development Strategy	Development Concept	Management Concept	Safety Concept	Integrity Concept
Focus on the "3 Guidelines" Achieve the "6 Adheres" Realize the "6 New Leadings"	Growing stronger, staying ahead	People-oriented, pragmatic and efficient	Safety contributes to efficiency, safety benefits from credibility, safety serves as competitiveness	Practicing the "Three Colors" mission, fostering an honest and self-disciplined life

## Striving to Deepen Integration of Ideas

### Core ESG Topics

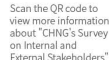
Pursuant to the requirements of The 2030 Agenda for Sustainable Development by the United Nations, Unified Standard for the Sustainability Reporting by the Global Reporting Initiative (GRI), Guidelines for Sustainable Disclosure of Enterprises - Basic Guidelines (Draft for Comments) by the Ministry of Finance, Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era by the SASAC, etc., we carried out the "China Huaren ESG Voting" activity (survey internal and external stakeholders) to understand the key concerns of stakeholders, identify and analyze the Company's operational risks based on national policies, industry, and enterprise actual situations, ultimately define the substantive issues of ESG, and scientifically determine the boundaries of the report content.



### ESG Process

The Company attached great importance to ESG integration, encouraged subsidiaries to release ESG related reports, and especially promoted listed companies to strictly disclose non-financial information in accordance with the requirements of the Exchanges to facilitate engagement in stakeholder communication. All 5 listed companies affiliated, namely, Huaren Power International Inc., Huaren Lancang River Hydropower Inc., Shandong Xineng Taishan Power Generation Co., Ltd., Great Wall Securities Co., Ltd. and Inner Mongolia Menglian Huaren Thermal Power Corporation Ltd, publicly released ESG related reports to the public, realize full coverage of ESG reports for affiliated listed companies.

As a major state-owned backbone energy company of China, the Company has joined the activities of a number of domestic and foreign industry organizations including the International Electrotechnical Commission (IEC), Global Sustainable Electricity Partnership (GSEP), Global Energy Interconnection Development and Cooperation Organization (GEIDCO), Central Enterprise ESG Alliance, Chinese Society for Electrical Engineering, China Electricity Council, etc. to effectively interact with the stakeholders, and actively promote the fulfillment of ESG management and practice in China's power industry.



Scan the QR code to view more information about "CHNG's Survey on internal and External Stakeholders"

## ESG Performances

The Company incorporated ESG management into Assessment and Evaluation Measures for the Party Building Work Responsibility System to expedite the improvement of ESG management level of affiliated enterprises. Besides, the Company revised and improved the performance assessment system, including 1 regulation (assessment regulation), 2 main measures (annual and tenure) and 4 sub-measures (safety, operation, development, and science and technology), and formulated relevant detailed rules to initially form a "1+2+4+N" assessment system. Driven by the assessment system, the integration of ESG practices into the daily activities of the Company was promoted in all-around manner.

The Company held the 2<sup>nd</sup> Selection & Appraisal of Excellent ESG Cases and Selection Event of the Most Beautiful ESG Pictures, with cases and pictures submitted by subsidiaries. Through online voting and expert scoring, ultimately, the "2023 Annual Excellent ESG Cases and the Most Beautiful ESG Pictures" were selected, with the list of award winners included in the Company's ESG report for public disclosure, promoting subordinate units to better fulfill their ESG management and practice.

Huaneng actively participated in different ESG-related selection & appraisal activities in the society, with a lot of awards won for its outstanding performance in responsibility management and practice.

### China Huaneng • Responsibility 2023

- ESG Report 2022 of China Huaneng Group Co., Ltd. was rated five-star (the highest level) by China Corporate Social Responsibility Report Rating Expert Committee, and thus the Company became the only domestic power generation company that has obtained five-star rating for twelve consecutive years.
- The Company's overseas responsibility performance case, *Lower Sesan II Hydropower Station Promotes Internationalization Development of Enterprise through Cross-cultural Communication*, was included into the Blue Book on Overseas Social Responsibility of Central SOEs (2023), a guidance subject result of the Bureau of Social Responsibility of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC).
- The case of the Company, *Implementing ESG Concept and Continuously Promoting High-quality Development of Enterprises*, won the "2023 ESG Excellent Case Award of China Enterprises" selected by China Enterprise Reform and Development Society, ESG Alliance of Central SOEs and other institutions.
- A total of 8 cases of the Company were selected as "2023 Excellent Cases of Social Responsibility and ESG of Electric Power Enterprises of China Electricity Council".
- Huaneng Power International Inc. won the "Special Contribution to Corporate Governance Award" of the 18<sup>th</sup> Gold Prize of the 18<sup>th</sup> "Gold Prize of Round Table" for Boards of Listed Companies in China, and the "Listed Company Award of Excellence" and "Best Listed Company" of the 13<sup>th</sup> China Securities Golden Bauhinia Awards\*.
- Inner Mongolia Mengdian Huaneng won the 14<sup>th</sup> "Tianma Award for Investor Relations of Listed Companies in China", the "ESG Golden Bull Award Carbon Neutral Top 50" of the First Guoxin Cup, the Excellent Practice Award of the Annual Reports Performance Briefing, and the 17<sup>th</sup> "Excellent Management Team Award" of the "Value Selection Award" of Listed Companies in China.
- Huaneng Lancang River Hydropower Inc. won the "China Top 100 Enterprises" Award of Listed Companies in China.

## ESG Capability

The Company attached great importance to improving its ESG capabilities by taking appropriate measures in the preparation of ESG reports. It has been conducting special training for six consecutive years from 2018 to 2023. The Company has adjusted and updated the training content and scope in a timely manner to adapt to changes in the internal and external environment. The special training, attended by employees from the headquarters and the secondary units to grassroots enterprises was conducted to be more focused on the ESG field. This training has effectively enhanced the ESG awareness among all employees, created an ESG work atmosphere, and further promoted the implementation of ESG management and practices in various departments and units across the Company.

The Company continuously strengthened ESG research, and developed thematic materials, e.g. *Preliminary Analysis on ESG System Construction, Thinking and Suggestions on Promoting ESG Management System of the Company, Concept of ESG Core Indicator System of the Company*. For ESG work in hydropower sector, Huaneng Lancang River Hydropower Inc., as a pilot, carried out research on "Building A Characteristic ESG System of Huaneng Lancang River Hydropower Inc.", and creatively proposed "ESG Responsibility Value Model of Huaneng Lancang River Hydropower Inc." and supporting indicator system. This model is composed of five ESG areas, i.e. responsibility management, environmental protection, contribution to the society, corporate governance and value creation, and covers 17 ESG issues and 95 indicators.

## Expanding the Information Disclosure Channels

### ESG Report

The Company has innovated in communication methods, deepened communications with stakeholders, built a mechanism for ESG communication, expanded communication channels, and continuously improved the integrated system of "daily, regular, and special" communications to ensure comprehensive, timely and accurate disclosure of the Company's responsibility performance to the public.

In accordance with the relevant requirements of the SASAC, the Company has created a brand management and news publicity management system to continuously promote the construction of information disclosure system and mechanism, build the innovation information disclosure platform carriers, continuously improve corporate transparency, and push ahead the construction of a "Sunshine central SOEs". The 3 listed subsidiaries, namely, Huaneng Power International Inc., Huaneng Lancang River Hydropower Inc. and China Great Wall Securities Co., Ltd., have all been rated at Grade A information disclosure evaluations by the respective Exchanges.

#### Daily Communication

Building an All-Media Communication System  
Providing a Social Responsibility Column on the Company's Official Website  
Actively Participate in ESG related Communication Activities

#### Regular Communication

Preparation of Annual ESG Report by the Group and its Affiliated Listed Companies  
Participate in the Report Issuance Conference of Central SOEs Organized by SASAC  
Organize Internal and External Stakeholders to Participate in Power Plants' Open Day Activities

#### Special Communication

Preparing and Releasing Special Reports on Overseas Businesses Accountability and Rural Revitalization  
Founding the Sino-Cambodia Cultural Exchange Network and Organizing a Cultural Exchange Forum  
Organize Internal and External Stakeholders' Special ESG Investigations and Research Activities

## Stakeholders Participation

The Company has continued to strengthen communication with stakeholders, actively built communication platforms, and regularly organized grassroots power plants to carry out "SOEs Open Day" activities. The employees' families, local students, the public, etc. were invited to visit, fully demonstrating the Company's excellent ESG management and practice.

In 2023, the Company made continuous innovation in the mode of communication in some key business segments attracting the stakeholders' attention, such as renewable energy, nuclear power, overseas business, etc. For this end, we carried out various types of communication activities to listen to the expectations of stakeholders, and thus create a responsible corporate image.

### Open Day Event of Electric Power Science Education in Haimen Power Plant



The Open Day Event of Electric Power Science Education

In December 2023, Haimen Power Plant, as an electric power science education base, held the open day event of electric power science education. This event invited over 90 students from Longtai Primary School and their families to visit the plant, allowing them to get up close and personal with the modern, clean, efficient and comprehensive energy service enterprise. During the event, the plant's employees led the students on a tour of the corporate culture exhibition hall, the electric power science education exhibition hall, and the coal transportation wharf. They explained the theories and processes of thermal power generation in simple and easy-to-understand terms, and shared basic knowledge about safe electricity usage in daily life. This event allowed the public to gain a deeper understanding of the power plant, which enhanced the image of Haimen Power Plant as a green and environmentally friendly enterprise and boosted its ESG brand influence.

Case

### Media Open Day Event of Sahiwal Power Plant



Media Open Day Event in the Sahiwal Power Plant

In August 2023, the Sahiwal Power Plant in Pakistan hosted a Media Open Day Event, which was attended by a press journalists delegation consisting of 14 local mainstream media outlets, including The Nation and GeoTV. During the event, the journalists visited key production areas of the power plant, such as the top layer of the boiler, centralized control room, etc. The plant's employees introduced the Company's overseas layout, construction history of the plant, honors it had received, and efforts it had made in environmental protection, creating job opportunities and fulfilling social responsibilities. Members of the delegation expressed that the event gave them a new understanding of the plant and further strengthened the bond between China and Pakistan.

Case

*Sahiwal Power Plant has changed my perception of coal-fired power plants. Not only does it have top-notch environmental protection measures, but its excellent construction quality and advanced equipment also make it stand out.*

—Member of the Press Delegation

Stakeholders

Government

Shareholders

Employees

Customers

Environment

Industry

Business Partners

NGO

Community

Expectations for the Company

Responding to National Strategies  
Conducting Operation in Compliance with Laws and Regulations  
Securing Power Security

Preserving and Increasing the Value of Assets  
Avoiding Economic Risks  
Keeping Smooth Communication

Increasing Welfare Benefits  
Guaranteeing Personnel Safety  
Promoting Employees' Career Development  
Balancing Work and Life

Guaranteeing Project Quality  
Improving Customer Services  
Innovating Engineering Technology

Supplying Clean Energy  
Building Green Plants  
Tackling Climate Change  
Spreading Green Philosophy

Carrying out Technical Exchanges  
Sharing Professional Experience

Complying with Business Ethics  
Achieving Mutual Benefits and Win-Win Results

Participating in Social Groups  
Abiding by Association Charters

Supporting Community Building  
Carrying out Public Welfare Activities

The Response of the Company

Serving the National Strategies  
Persisting in Steady Operation  
Securing Power Supply

Increasing Economic Benefits  
Strengthening Risk Prevention and Control  
Conducting Regular Communications

Guaranteeing Basic Rights and Interests  
Ensuring Production Safety  
Carrying out Employee Training  
Caring for Employees' Lives

Strengthening Quality Management  
Improving Service Systems  
Encouraging All-involvement Innovation

Adjusting Energy Structure  
Carrying out Clean Production  
Mitigating Greenhouse Gas Emission  
Carrying out Environmental Public Welfare Campaign

Attending Industry Conferences  
Strengthening Regular Liaison

Implementing Transparent Procurement  
Building Cooperation Platforms

Actively Participating in Activities  
Voluntarily Offering Advice and Suggestions

Promoting Rural Revitalization  
Building Public Welfare Brand Image



## Striving to Be a Doer in Building a World-Class Enterprise

As a central SOE, the Company continued to study and implement Xi Jinping's important instructions on accelerating the building of world-class enterprises, actively carry out initiatives to create world-class enterprises, benchmark world-class to take actions for management improvement, strengthen strategic guidance, and deepen reform and innovation, to make great strides towards becoming a world-class enterprise. In 2023, Huaneng Group was included in the SASAC's list of demonstration of building the world-class enterprises. In the evaluation of value creation actions by benchmarking world-class enterprises, Huaneng Group was rated as Grade A, ranking in the forefront of SOEs and the power generation industry. Three subsidiary companies, i.e. Xi'an Thermal Power Research Institute, Clean Energy Research Institute and Lancang River Hydropower Inc. were selected as "Demonstration of Building World-Class Professionalized, Refined, Specialized, and Innovative Enterprises" and "Leading Professional Demonstration Enterprises", further consolidating the demonstration creation efforts.

The Company officially issued the *Guiding Opinions on Accelerating the Construction of World-class Enterprises and the Improvement Plan of Benchmarking the World-class Management*, providing direction for the next stage of work in building a world-class enterprise. To accelerate the implementation of the plan for building a world-class enterprise, the Company promptly convened a meeting to promote the building of a world-class enterprise. The meeting disseminated the guiding principles of the document on accelerating the building of world-class enterprises, interpreted the Company's plan for accelerating the building of world-class enterprises, and detailed the deployment of the work to achieve this goal.

### Strengthening Communication and Training, and Improving Awareness

The Company's leadership introduced the Company's goals, measures and progress in building a world-class enterprise on the platforms of the "SOE Reform Lecture Series" and the "Special Seminar on Accelerating the Building of World-Class Enterprises" organized by the SASAC. The Company also established a learning and publicity platform, organized an online training session on "Deepening Reform and Striving for Excellence" and launched a column dedicated to striving for excellence in the corporate newsletter, to promote the initiative of "Striving for Excellence" among all employees.

### Strengthening Demonstration and Leading by Example

The Company organized an expert review meeting to guide seven pilot units in improving their plans for striving for excellence. The Company also convened a promotion meeting for the pilot units, supervising them to optimize their plans for striving for excellence and promoting them to produce results and share experiences.

### Enhancing Supervision and Evaluation to Drive Implementation

The Company gradually detailed its work plan, focused on key tasks for striving for excellence and formulated promotion plans for specific professional fields. The Company tracked the implementation of measures, established a work ledger for striving for excellence, and reported progress on a quarterly basis, to ensure the effective implementation of the initiative. The Company also improved the "1+M+N" evaluation system, initiated quarterly assessment for striving for excellence, and reviewed the achievement of key indicators and the progress of key tasks.

### Enhancing Communication and Learning, and Extracting Typical Experiences

The Company actively participated in SASAC's exchange activities for building world-class demonstration enterprises, focusing on the theme of "Promoting the Construction of World-Class Demonstration Enterprises through Digital Development" for learning and experience sharing. The Company also took the lead in organizing exchanges for professional leading demonstration enterprises and hosted SASAC's events for building world-class professional leading demonstration enterprises. The Company conducted specialized research on topics such as "Value Creation", "Lean Management" and "Artificial Intelligence" to support its efforts in striving for excellence. The Company organized a work exchange and promotion meeting for these initiatives and hosted SASAC's special seminar on "Visiting World-Class Enterprises", to continuously drive the achievement of new results in the pursuit of excellence.

## Plan for Accelerating the Construction of A World-Class Enterprise by China Huaneng Group Co., Ltd. (Summary)

### Overall Requirements

#### Guiding Ideology

Guided by the Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the Company thoroughly implements the guiding principles of the 20<sup>th</sup> CPC National Congress, grounds the efforts in the new development phase, and integrally, precisely and comprehensively follows the new development concept and led the industry to foster a new development paradigm. The Company resolutely implements major decisions and plans, e.g. renewable energy security strategy featuring Four Reforms and One Cooperation, Carbon Peaking and Carbon Neutrality, building of new electricity system and renewable energy system, etc. Focusing on green and low-carbon transformation in the pursuit of high-quality development, the Company firmly implements the "3-6-6" development strategy, and continuously promotes a change in quality, change in efficiency and change in growth drivers to enhance the Company's core competitiveness and functions. By fully leveraging the role in scientific and technological innovation, industrial control and safety support in the construction of a modern industrial system and a new development paradigm, the Company accelerates the construction of a world-class enterprise characterized by "Excellent Products, Outstanding Brands, Leading Innovation and Modern Governance" with the aim of making greater contributions to realizing the Second Centenary Goal of building China into a great modern socialist country in all respects.

#### Basic Principle

Uphold Party Leadership and Strengthen Party Building  
Uphold Green Development and Maintain Firm Strategic Resolve  
Pursue Innovation and Strengthen Reform-driven Development Strategy  
Put Quality First and Improve Efficiency and Benefit

#### Create Goals

**Recent goal:** Initially Building A World-Class Enterprise Featuring Excellent Products, Outstanding Brands, Leading Innovation and Modern Governance  
**Mid term goal:** The Construction of A World-Class Enterprise Reaches A New Level  
**Long term goal:** Building A World-Class Enterprise in An All-Round Manner

### Main Measures

Comprehensively Improving Energy and Power Security Capability  
Comprehensively Enhancing Brand Leading Capability  
Comprehensively Improving Scientific and Technological Innovation Capability  
Comprehensively Improving Governance Capability of A Modern Enterprise  
Comprehensively Improving Value Creation Capability

### Implementation Steps

Fulfilling and Implementing Responsibilities  
Benchmarking and Continuous Advancement  
Summarizing Achievements and Deepening Creation

### Organizational Support

Strengthening Organization and Solidly Promoting  
Benchmarking and Continuous Improvement  
Creating A Good Atmosphere and Striving for Excellence

## Looking Forward to 2024, ESG Leading the Future



In the future, the Company will thoroughly implement the guiding principles of the 20<sup>th</sup> CPC National Congress, and uphold the comprehensive leadership of the Communist Party. Guided by the new development concept, the Company will firmly adhere to the "Three Generals", always focus on the "Two Ways", and give full play to "Three Roles", resolutely implement the "3-6-6" development strategy, and put the emphasis on "Five Better Coordinations". By working harder and taking solid steps to deliver outcomes, the Company will resolutely accomplish all annual targets and tasks. By working together and striving for excellence, the Company will continuously make solid strides in exploiting new opportunities and opening up new vistas, to march in confident strides toward the goal of becoming a world-class enterprise, contributing more significantly in building China into a great modern socialist country in all respects and advancing the rejuvenation of the Chinese nation.

### Performance Goals

Renewable Energy

Installed Capacity Added

**20** GW

Renewable Energy Power Generation

Exceeds

**159.7** Billion Kilowatt Hours

Heating Capacity Exceeds

**525** Million GJ

R&D Investment Exceeds

**3.2**%

Eliminating

Personal Fatality  
Accidents

Preventing Safety and

Environmental Protection  
Accidents at Major or  
Above Level



## Appendixes

### Selected outstanding corporate ESG cases in 2023

In January 2024, the Company launched the 2<sup>nd</sup> Selection and Appraisal of Excellent ESG Cases. Secondary companies and grassroots units actively participated and submitted nearly 120 cases, involving various issues such as excellence in main business, scientific and technological innovation, the Belt and Road, rural revitalization, public welfare and charity, green production, ecological and environmental protection, career development, health and safety, corporate governance, etc. After the initial review and two rounds of expert scoring, 20 outstanding cases reached the final. In the final session, the Company made the "ESG Poll of China Huaneng" open to the public. After a week of fierce competition, the results of excellent cases were finally obtained via voting.



Scan the QR code to view more information about the 2<sup>nd</sup> Excellent ESG Case Selection and Appraisal Event of CHNG

#### NO.1 Dynamic Monitoring and Early Warning System for Berthed Vessels China Huaneng Group Fuel Co., Ltd.



Investigating the Use of Dynamic Monitoring and Early Warning System for Berthed Vessels



Scan the QR Code, View the Full Text of the Case

#### NO.2 Building A 1,000 MW-level renewable energy Base to Advance Green and High-Quality Development of Huaneng Group China Huaneng Group Co., Ltd. Central China Branch



Aerial Photo of PV Project Site



Scan the QR Code, View the Full Text of the Case

#### NO.3 Gold Award of the 24<sup>th</sup> China Patent Award "A Carbon Dioxide Capture System and Process with Multi-stage Split Regeneration" China Huaneng Group Clean Energy Research Institute Co., Ltd.



Carbon Capture System of Shanghai Shidongkou Power Plant



Scan the QR Code, View the Full Text of the Case

NO.4	The Management Innovation Project <i>Cross-Field Integration Management to Realize the "Safe and Efficient" Operation of China's First IGCC Demonstration Power Plant</i> Won the Award	China Huaneng Group Co., Ltd. North China Branch
NO.5	Innovation and Practice of "Talent Sailing Plan" The Construction of Zero Waste Water Discharge Project Promotes the Ecological Protection of Yellow River Basin	China Huaneng Group Co., Ltd. East China Branch Huaneng Yangtze River Environmental Technology Co., Ltd.
NO.6	Artificial Intelligence Drives Intelligent Heating to Help Achieve the "Dual Carbon" Goal	China Huaneng Group Co., Ltd. Heilongjiang Branch
NO.7	Developing and Building An Independent and Controllable Huaneng Cloud Link Supply Chain Finance Platform, Creating A Digital Industry and Finance Ecology of the Supply Chain of Central SOEs in Electric Power, and Assisting the Group to Play the Main Role of the Chain	Huaneng Capital Services Co., Ltd.
NO.8	All Longdong Coal Bases Have Completed Construction and Put into Operation, and the Capacity to Increase Production and Ensure Supply Has Been Continuously and Steadily Improved	Huaneng Coal Industry Co., Ltd.
NO.10	Building the First Unattended Wind Farm in the Industry and Promoting the Construction of Digital and Lean O&M Management System	Huaneng Renewables Corporation Limited
NO.11	Developing Carbon Capture Technology for Flue Gas to Help Achieve Carbon Neutrality Goal	China Huaneng Group Co., Ltd. Hainan Branch
NO.12	Developing, Building and Operating the Country's First Large-Scale "Wind-Thermal-Storage" Energy Base with Integrated Power Transmission to the Outside Region, to Help the Country Accelerate the Realization of the "Dual Carbon" Goal	North United Power Co., Ltd.
NO.13	Building Huaneng Jiangsu Offshore Wind Power Technology Brand and Enabling the Sustainable Development of First-Class Clean Energy Enterprise in the Region	Huaneng Jiangsu Energy Development Co., Ltd.
NO.14	Lower Sesan II Hydropower Station Fulfills China Huaneng's Overseas Social Responsibility and Strengthens People-to-People Ties Between China and Cambodia	Huaneng Lancang River Hydropower Inc.
NO.15	Science and Technology Enable Mine Transportation to Create Zero-Carbon Intelligent Working Face	Huaneng Eastern Inner Mongolia Energy Co., Ltd.
NO.16	UAV Inspection Technology Innovation Promotes the Industry Development	Huaneng Shaanxi Power Generation Co., Ltd.
NO.17	Practicing the Concept of Ecological Environment Protection and Building A Commanding Height of Ecological Civilization	Huaneng Xizang Yarlung Zangbo River Hydropower Development Investment Co., Ltd.
NO.18	Ensuring Safety by Emergency Drill Reinforcing the ESG Management Culture of the Enterprise to Promote the Innovation Breakthrough of High-Quality Development	Huaneng Gansu Energy Development Co., Ltd. Inner Mongolia Mengdian Huaneng Thermal Power Corporation Ltd.
NO.20	Strengthening and Optimizing the Board of Directors, and Enhancing New Advantages for High-Quality ESG Development	Shandong Xinneng Taishan Power Generation Co., Ltd.

## Excellence works selected in the appraisal of the Company's Most Beautiful ESG Pictures in 2023

In January 2024, the Company launched the second selection and appraisal of the most beautiful ESG pictures. All secondary companies and grassroots units actively participated and submitted over 300 pictures. After three rounds of internal review and one round of external expert scoring, 15 outstanding pictures reached the final. In the final session, the Company made the "ESG Poll of China Huaneng" open to the public. After a week of fierce competition, the results of the most beautiful ESG pictures were finally obtained via voting.



Scan the QR code to view more information about the 2<sup>nd</sup> Most Beautiful ESG Pictures Selection and Appraisal Event of China Huaneng.



Huaneng Renewables Corporation Limited  
Mountains Are Like Dynamic Silver Snakes (by Lv Jie)



China Huaneng Group Co., Ltd. Zhejiang Branch  
Developing Towards the PV Power (by Chen Yiqin)



China Huaneng Group Co., Ltd. Shanxi Branch  
Sunset (by Ren Jiening)



China Huaneng Group Co., Ltd. Zhejiang Branch  
Phoenix Nirvana (by Zhou Yun)



Huaneng Coal Industry Co., Ltd.  
PV-related Personnel (by Lu Shengmin)



China Huaneng Group Co., Ltd. Fujian Branch  
Personnel in the "Circle" (by Fan Chenlong)



China Huaneng Group Co., Ltd. Zhejiang Branch  
Security "Guard" (by Chen Bin)



China Huaneng Group Co., Ltd. Shandong Branch  
Setting Sail with the Wind (by Ye Haili)



North United Power Co., Ltd.  
PV Power in the Desert (by Liu Haijun)



China Huaneng Group Co., Ltd. Jiangxi Branch  
Sodding (by Zhu Juntao)



North United Power Co., Ltd.  
Green PV (by Miao Ze)



Huaneng Lancang River Hydropower Inc.  
The Pillars of A Great Power (by Zhang Dexuan)



China Huaneng Group Co., Ltd. Chongqing Branch  
Take-off (by Zhao Peiyue)



Huaneng Eastern Inner Mongolia Energy Co., Ltd.  
Protect "Lucid Waters and Lush Mountains" in Mine Area (by Li Wenchao)



China Huaneng Group Co., Ltd. Qinghai Branch  
Harmony Between Humanity and Nature (by Zhou Yalu)

## About China Huaneng

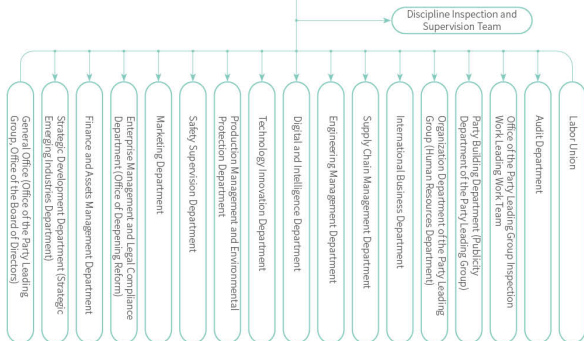
China Huaneng Group Co., Ltd. (referred to as China Huaneng) is a key state-owned enterprise established with the approval of the State Council, established in 1985. China Huaneng has emerged and grown up amid the reform and opening up. China Huaneng has a registered capital of 34.9 billion yuan, with the main business scope covering: power development, investment, construction, operation and management; electricity (heat) production and sales; development, investment, construction, production, sales of industries and products related to coal, finance, transportation, technology and environmental protection; and industrial investment, operation and management, continuously leading the progress of the power generation industry.

China Huaneng deeply implements the decisions and deployments of the Party Central Committee and the State Council, and promotes the continuous strengthening, optimization, and expansion of the company. Since the 18<sup>th</sup> National Congress of the Communist Party of China, China Huaneng has adhered to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for the New Era, firmly shouldered the mission and responsibility of central SOEs, and continuously took solid steps on the path of high-quality development.

The Company has a total of 120,000 employees, owns 57 secondary units, more than 480 tertiary enterprises, and 5 listed enterprises (namely, Huaneng Power International Inc., Inner Mongolia Mengdian Huaneng Thermal Power Corp. Ltd., Shandong Xinneng Taishan Power Generation Co., Ltd., Huaneng Lancang River Hydropower Inc., and China Great Wall Securities Co., Ltd.). At the end of 2023, the company's total asset was 1.56 trillion yuan. The total installed capacity of wholly-owned and majority-owned power plants was over 240 GW, heating area reaches 1.03 billion square meters, and the production capacity of coal was nearly 120 million tons per year. The Company was first to enter the Fortune Global 500 in the power generation industry, ranked 238<sup>th</sup> in 2024. SASAC has awarded the Company A-level performance assessment results for 19 times, and A-level tenure assessment results of the person-in-charge of central SOE for 6 times, being the top among comparable power generation enterprises in China.

## Headquarters Organization

### CHINA HUANENG GROUP CO., LTD.



## Member Companies

Huaneng Power International Inc.	Huaneng Renewables Corporation Limited	Huaneng Nuclear Power Development Co., Ltd. (Nuclear Power Business Unit)
Huaneng Coal Industry Co., Ltd. (Coal Business Unit)	Huaneng International Power Development Corporation	China Huaneng Group Hong Kong Limited
Huaneng Capital Services Co., Ltd.	Huaneng Energy & Communications Holding Co., Ltd.	China Huaneng Group Fuel Co., Ltd.
China Huaneng Finance Co., Ltd. (China Huaneng Group (Hong Kong) Treasury Management Holding Limited)	China Huaneng Group Clean Energy Research Institute Co., Ltd.	Huaneng Yangtze River Environmental Technology Co., Ltd.
Xi'an Thermal Power Research Institute Co., Ltd.	Huaneng Nuclear Energy Technology Research Institute Co., Ltd.	Huaneng Properties Co., Ltd. (Huaneng Integrated Industry Co., Ltd.)
China Huaneng Group Co., Ltd. Xiong'an Branch (Huaneng Xiong'an Urban Comprehensive Energy Service Co., Ltd.)	China Huaneng Group Co., Ltd. North China Branch (GreenGen Co., Ltd.)	China Huaneng Group Co., Ltd. Northeast Branch
China Huaneng Group Co., Ltd. East China Branch (China Huaneng Group Co., Ltd. Maintenance Center)	China Huaneng Group Co., Ltd. Central China Branch	China Huaneng Group Co., Ltd. Southern Branch
China Huaneng Group Co., Ltd. Hebei Branch	China Huaneng Group Co., Ltd. Shanxi Branch	China Huaneng Group Co., Ltd. Jilin Branch
China Huaneng Group Co., Ltd. Heilongjiang Branch	China Huaneng Group Co., Ltd. Zhejiang Branch	China Huaneng Group Co., Ltd. Anhui Branch
China Huaneng Group Co., Ltd. Fujian Branch	China Huaneng Group Co., Ltd. Jiangxi Branch	China Huaneng Group Co., Ltd. Shandong Branch
China Huaneng Group Co., Ltd. Henan Branch	China Huaneng Group Co., Ltd. Hunan Branch	China Huaneng Group Co., Ltd. Guangxi Branch
China Huaneng Group Co., Ltd. Hainan Branch	China Huaneng Group Co., Ltd. Chongqing Branch	China Huaneng Group Co., Ltd. Guizhou Branch
China Huaneng Group Co., Ltd. Qinghai Branch	North United Power Co., Ltd.	Huaneng Jianguo Energy Development Co., Ltd. (China Huaneng Group Co., Ltd. Jianguo Branch)
Huaneng Lancang River Hydropower Inc. (Yunnan Branch, Huaneng Lancang River Upstream Hydropower Co., Ltd.)	Huaneng Eastern Inner Mongolia Energy Co., Ltd.	Huaneng Sichuan Hydropower Development Co., Ltd.
Huaneng Shaanxi Power Generation Co., Ltd. (Northwest Branch)	Huaneng Ningxia Energy Co., Ltd.	Huaneng Gansu Energy Development Co., Ltd.
Huaneng Xizang Yarlung Zangbo River Hydropower Development Investment Co., Ltd. (Xizang Branch)		Huaneng Xinjiang Energy Development Co., Ltd.
Huaneng Tendering Co., Ltd.		Huaneng Information Technology Co., Ltd.
China Huaneng Group Party School (Education and Training Center)	China Huaneng Group Co., Ltd. Energy Research Institute	China Huaneng Group Co., Ltd. Digital Intelligence Center
China Huaneng Group Co., Ltd. Enterprise Management Shared Service Center	China Huaneng Group Co., Ltd. News and Brand Management Center	China Huaneng Group Co., Ltd. Engineering Technical Economy Management Center
China Huaneng Group Co., Ltd. Operations Monitoring and Emergency Command Center		China Huaneng Group Co., Ltd. Finance Sharing Center



As of December 31, 2023, the installed capacity of the Company's wholly-owned and controlled power plants amounted to

**243.12** GW

including 239.39GW domestically and 3.73GW overseas

In 2023, the Company achieved a cumulative power generation of

**845,974** GWh

including 830,553GWh domestically and 15,421GWh overseas

■ Installed Capacity (10MW)  
■ Power Generation (100 GWh)



Industrial Distribution Map

## Key Performance

	Indicator Name	Unit	2019	2020	2021	2022	2023
Main Business Value	Installed Capacity	10 MW	18278	19564	20592	22111	24312
	Thermal Power Installed Capacity	10 MW	13185	13712	14006	14224	14246
	Power Generation (domestic)	100 GWh	7057	7083	7744	7911	8305
	Coal Production Capacity	10,000 Tons/Year	8260	8500	8770	11380	11880
	Coal Production	10,000 Tons	7450	7607	8664	10108	10800
	Total Number of Personnel in Science and Technology	People	2388	1381	1493	1746	2100
	National Authorized Patents	Item	777	1785	6307	11629	8815
	Among Them: Patents for Invention	Item	121	135	251	1217	1982
	Scientific and Technological Achievements Award at Provincial/Ministerial Level and above	Item	21	39	66	63	68
	Total Investment in Environmental Protection	100 Million Yuan	24.82	10.20	13.00	16.95	16.80
	Total Investment in Energy-saving Technological Upgrading	100 Million Yuan	4.50	4.88	5.09	2.52	2.60
	Low Carbon Clean Energy Installed Capacity	10MW	6163	7192	7849	9203	11431
	Low Carbon Clean Energy Proportion	%	33.72	36.61	38.12	41.62	47.02
	Hydropower Installed Capacity	10MW	2697	2756	2756	2759	2759
	Wind Power Installed Capacity	10MW	1996	2530	2917	3393	3929
	Photovoltaic Installed Capacity	10MW	400	645	912	1735	3358
Coal Consumption for Power Supply	g/kWh	297.55	295.34	294.04	292.02	294.91	
Auxiliary Power Ratio	%	3.78	3.73	3.71	3.65	3.53	
Ash Comprehensive Utilization Rate	%	75.92	75.64	77.10	73.69	73.60	
Sulfur Dioxide Emission Performance for Thermal Power Generation	g/kWh	0.072	0.072	0.070	0.068	0.069	
Nitrogen Oxide Emission Performance for Thermal Power Generation	g/kWh	0.141	0.139	0.137	0.137	0.137	
Smoke and Dust Emission Performance for Thermal Power Generation	g/kWh	0.011	0.010	0.009	0.009	0.009	
Installed Capacity of Ultra-low Emission Units	10MW	11526	11605	12300	12400	13165	
Proportion of Ultra-low Emission Units	%	96.0	97.0	99.0	99.5	99.5	
Fresh Water Consumption for Power Generation	10,000 Tons	57396	54021	59980	62847	57673	
Unit Water Consumption for Power Generation	kg/kWh	1.06	1.00	1.02	1.08	0.99	
Carbon Emissions	10,000 Tons	44798	47569	52436	52600	53720	
Carbon Emission Intensity	g/kWh	650.00	634.99	635.35	623.00	613.60	
Wastewater Discharge Amount	10,000 Tons	4561.37	4485.81	3655.84	3382.24	3164.33	
Total Coal Consumption	10,000 Tons of Standard Coal	16734	16828	18404	18211	18870	

	Indicator Name	Unit	2019	2020	2021	2022	2023
Social Responsibility	Paid Taxes	100 Million Yuan	267	297	278	356	372
	Number of In-Service Employees	People	131579	124628	120927	121264	120304
	Number of New Employment throughout the Year	People	4222	4196	4366	5371	5737
	Number of Female Employees	People	30319	28783	27096	26054	25358
	Female Employees Ratio	%	23	23	22	21	21
	Female Manager Ratio	%	32	31	30	29	30
	Labor Contract Signing Rate	%	100	100	100	100	100
	Collective Contract Coverage	%	100	100	100	100	100
	Social Insurance Coverage	%	100	100	100	100	100
	Labor Union Membership Rate	%	100	100	100	100	100
	Employee Health Check and Health File Coverage	%	100	100	100	100	100
	Training Time per Employee	Hour	70	86	82	83	84
	Employee Training Coverage	%	79	80	76	79	82
	Total Amount of Donation	Ten Thousand Yuan	73120	28205	16062	21687	22037
	Employee Volunteers	Person-times	80710	80055	78593	79012	79356
	Number of Corruption Lawsuits Filed against Companies and Concluded	Item	0	0	2	2	0
Number of Suppliers Reviewed during the Reporting Period	Item	18377	24138	15653	17040	17040	
Investment in Production Safety (Technological Upgrading)	100 Million Yuan	11.00	9.80	5.97	8.50	25.76	
Major Equipment Accident	Case	0	0	0	0	0	
General Equipment Accident	Case	0	0	1	0	0	
General Accidents of Personnel Injury and Casualties	Case	6	10	7	7	7	
Category I Obstacle	Case	14	9	4	2	5	
Number of Unplanned Outages (hydro & thermal power)	Case	130	97	91	75	89	
Unit Equivalent Availability Factor (hydro & thermal power)	%	94.22	94.49	93.90	93.93	93.90	
Number of People who Died due to Work	People	4	6	5	4	1	
Proportion of People who died due to Work	%	0.03	0.04	0.04	0.03	0.01	
Lost Working Days due to Work-related Injuries	Workday - People	24000	36000	30000	24000	6000	
Per Capita Duration of Safety Production Training	Hour	40	40	40	40	40	
Number of People Covered by Safety Production Training	People	125401	123710	120751	120056	119735	
Economic Contract Performance Rate (Group-level)	%	100	100	100	100	100	
Total Assets	100 Million Yuan	11261	11875	13399	14152	15608	
Total Operating Income	100 Million Yuan	3062	3142	3855	4245	4098	
Total Profit	100 Million Yuan	178	224	133	227	421	
Asset-Liability Ratio	%	73.70	69.61	72.74	70.90	70.08	

Social Responsibility

Corporate Governance

Environmental Responsibility

## Indicator Index

Contents	GRI Standard	SASAC ESG System	CASS-ESG 6.0	Page	
<b>About This Report</b>	GR11, GR12		P1	Inside Front Cover	
<b>Studying Guiding Thought, Opening a New Chapter</b>		GL1		P01	
CHNG In High Quality Development	GR12			P02	
Message from the Chairman	GR12		P2	P08	
Reflecting on 2023, ESG Showing Its Commitment to Responsibility				P10	
[Responsibility Mission] Seizing the Opportunity to Write a Splendid Chapter	Aligning with Demand, Serving the Strategy, and Deeply Committed to Technological Innovation	S2.3	S2.1	P14	
	Aggregating Momentum and Empowering Others in an Open and Integrated Manner, Boldly Leading the Development of the Industry			P18	
	Optimizing the Core Business, Strengthening the Foundation, and Bravely Serving as the Pillar of Energy Supply		S3.3	P22	
With the aspiration for a low-carbon transition	Environmental (Chapter Page)	GR12, GR1302, GR1306		P28	
	Building a New Type of Power System		S4.4	P30	
	Effectively Saving Resources and Energy	GR1301-GR1303	E5.2	E3.1, E3.2, E3.3	P34
	Strict Control of Industrial Pollution	GR1301, GR1306	E2.1, E2.2, E2.3	E2.1, E2.2	P36
	Reduce Greenhouse Gases Emissions	GR1305	E3.1, E3.2, E3.3, ES.1, ES.3, ES.4	EL.1	P38
	Strengthen Ecological and Environmental Protection	GR1304	E4.1, E5.4, E5.6	E2.3, E2.4	P39
[Story of Original Aspiration] Striving to Be the Architect of a Beautiful China				P42	

Contents	GRI Standard	SASAC ESG System	CASS-ESG 6.0	Page	
Pioneering in the Writing of the Report for the First Time with Bold and Resounding Footprints	Society (Chapter Page)	GR12, GR1404	E2.1	P46	
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	Firmly Holding the Bottom Line of Work Safety	GR1403	S2.1	S4.2	P52
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	Building a Harmonious Relationship between Enterprises and Local Communities	GR1203, GR1413	S4.2, S4.3	S1.2	P60
	Achieving Comprehensive Rural Revitalization	GR1203, GR1413	S4.4	S1.1	P63
	[Story of Original Aspiration] Taking Actions to Contribute to the Belt and Road Initiative		S4.4		P66
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	Striving to Deepen Integration of Ideas	GR12		G1.1	P79
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## Rating Report

### Rating Report for 2023 Environmental, Social and Governance Report of China Huaneng Group Co., Ltd.

Entrusted by China Huaneng Group Co., Ltd., experts have been selected from China Corporate Social Responsibility Report Rating Expert Committee to form a rating group to rate the 2023 Environmental, Social and Governance Report of China Huaneng Group Co., Ltd. (hereinafter referred to as the Report).

**I. Basis of Rating**  
Guidelines for Corporate Social Responsibility Reporting (CASS-CSR4.0) of the Chinese Academy of Social Sciences and China CSR Report Rating Standards (2020) of China Corporate Social Responsibility Report Rating Expert Committee.

#### II. Rating Process

1. The rating team reviews and verifies the Confirmation of Processes of the Corporate Social Responsibility Report and relevant evidential documents submitted by the team that compiled the Report;
2. The rating team evaluates the process for writing the Report and the content of the Report, and drafts and finalizes this rating report;
3. The Vice Chairman of the Expert Committee, the team leader and experts of the rating team jointly review and sign the rating report.

#### III. Conclusion

##### Process (★★★★★)

The Company set up ESG management committee with the President and Deputy Secretary of the Party Leading Group as the person-in-charge to coordinate ESG work, the Enterprise Management Department and Legal Compliance Department took the responsibility to coordinate the preparation of the Report. Each functional department provided materials and relevant content, and the Company's Board of Directors was responsible for the final review. The Report's functional role and values were explicitly defined as an important instrument to disclose duty performance information in line with relevant requirements, improve ESG governance system, and build the corporate brand image. The substantive issues were identified according to international and domestic social responsibility standards, industry-wide benchmarking analysis, actual development of the company, stakeholder investigations, etc. The Report elaborates on the company's ESG planning, ESG issues, ESG reports, etc., highlighting the top-level design planning, and systematic promotion of the CHNG's ESG work from "High Level Promotion of Responsibility Layout" "Striving to Deepen Integration of Ideas" and "Expanding the Information Disclosure Channels". The Report will be published on the Company's official website and incorporated into the "Collective Issuance of Social Responsibility Reports of Central SOEs" and "Social Responsibility Report of 300 Excellent Enterprises" for general releases. It will be presented in different forms including electronic file, printed version, Chinese and English versions, and new media video edition. All these prove its outstanding process performance.

**Materiality (★★★★★)**  
The Report systematically discloses key topics for discussion in the power industry, such as implementing macro policies, ensuring power supply, safety production, developing green electricity, building a responsible supply chain, saving energy resources, developing circular economy, reducing "three wastes" emission, factory and surrounding environmental governance etc. with detailed narration and excellent materiality performance.

**Integrity (★★★★★)**  
From the perspectives of "With the Aspiration for Lucid Waters and Lush Mountains, Firm Steps Towards Low-Carbon Transition", "Bearing in Mind the Wellbeing of the People, Forging Ahead Toward Prosperity with Bold and Resounding Footsteps", and "Steady and Sustainable Corporate Development through Modern Governance", the main body of the Report discloses 88.24% of the core indicators of the power production industry with remarkable integrity performance.

**Balance (★★★★★)**  
The Report discloses negative data including "number of corruption lawsuits filed against companies and employees and concluded", "number of major equipment accidents", "number of general equipment accidents", "number of safety production accidents", "number of employee casualties", etc., and elaborates on the response measures for the abnormal fluctuation of carbon monoxide in Yuwang Coal Mine No. 1 Well with excellent balance performance.

**Comparability (★★★★★)**  
The Report discloses the comparative data for 5 consecutive years of 64 indicators, such as "Installed Capacity" "Coal Production Capacity" "Total Investment in Environmental Protection" "Coal Consumption for Power Supply" "Auxiliary Power Ratio" "Carbon Simulators" "Female Manager Ratio" "Total Amount of Donation", etc., comparing horizontally the situation of "The total labor productivity was RMB1.137 million yuan per person, maintaining the industry's leading position", making an excellent comparability performance.

**Readability (★★★★★)**  
The Report is themed on "Responsibility, Original Aspiration", presents in three chapters a systematic display of CHNG's responsibility actions and achieve results. Cover design continues to use hand drawn illustration style, the cover creatively integrates the elements of main businesses such as wind power, PV, nuclear power and hydro power into special responsibility performance scenarios, highlighting industry characteristics, which contributes to an increased identification of the Report. Each chapter concludes with "Story of Original Aspiration", echoing the theme of the report and enhancing the storytelling and appeal of the report content. The report has concise language, rich case studies, and diverse forms of expression. QR codes are printed in the Report for extended reading of in-depth interpretation, third-party testimony is referred to as support of effective performance of corporate responsibilities, achieving better readability.

**Innovativeness (★★★★★)**  
The Report has set up special chapters of "Reflecting on 2023, ESG Showing its Commitment to Responsibility" at the beginning, which concentrate on showcasing major social responsibility events of the year, and echo each other with "Looking Forward to 2024, ESG Leading the Future". The thematic sections named "Seizing the Opportunity to Draw a Blueprint, Making Great Achievements to Write a Splendid Chapter" manifests CHNG's sense of responsibility as a centrally administered state-owned enterprise in terms of technological innovation, industrial development, energy supply guarantee, etc. Each chapter begins with a detailed disclosure of topic management methods, action and performance using "Analysis of Topic" "Background of Topic" "Current Status of Topic" "Performance Indicators" "Fulfilling Commitments Through Action". Continuing the glory, which is convenient for stakeholders to quickly grasp. The Company facilitated its subsidiaries including Huaneng Power International Inc., Huaneng Lancang River Hydropower Inc., Shangri Generation Co., Ltd., Great Wall Securities Co., Ltd and Inner Mongolia Mengdian Huaneng Thermal Power Corporation Ltd., to publish their respective reports, compiled and distributed special reports on overseas accountability and rural revitalization etc., and build a multi-level and multi-form reporting system. These four features contribute to the Report's excellence in innovativeness.

**Overall Rating (★★★★★)**  
According to the rating team, the 2023 Environmental, Social and Governance Report of China Huaneng Group Co., Ltd. was rated five-star as an excellent corporate social responsibility report.

#### 1. Suggestions for Improvement

1. Add more disclosure information about core industrial indicators to improve the Report's integrity.
2. Strengthen the disclosure of information on deficiencies in fulfilling responsibilities to further improve the Report's balance.

中国石化社会责任报告  
评级专家委员会  
China Huaneng's Environmental, Social and Governance Report Received Five-Star Rating for the Thirteenth Consecutive Year

董国栋  
Vice Chairman of the Expert Committee

邵国栋  
Leader of the Rating Team

张永华  
Expert of the Rating Team

Date of Issuance: November, 2024

Scan the QR Code to View Enterprise Rating Files

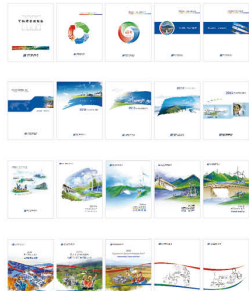
## Feedback

Dear Readers:

Thank you for reading the 2023 Environmental, Social and Governance Report of China Huaneng Group Co., Ltd. We would like to improve the quality of both our ESG work and report. Scan the QR code below and send us any comments or suggestions you may have, which will be of great help for us. Thank you!



## Sustainability (ESG) Report System



## Interpretation of the Creativity of the Sustainability (ESG) Report 2021-2025

CHNG's five sustainability (ESG) reports to be released during the "14th Five-Year Plan" period are of continuous integrated design, with content presented with the aid of triple creative design techniques, i.e. "abstract vector lines + aerial photos of large scenes + warm hand-painted illustrations". As main elements running through the whole picture, the two ribbons in red, green and blue connect together five landforms, i.e. snow mountains, grasslands, fields, seas and cities. Besides, the picture also integrates elements such as wind power, PV, nuclear power, hydro power and electrical workers. These imply that CHNG, under the guidance of "Three-Color Culture", makes all-out efforts to develop new energy, nuclear power and hydro power, CHNG continuously creates high-quality power projects in China, turning energy into a "beacon of light"; CHNG will continue moving forward on the road of high-quality and sustainable development, and devote wholeheartedly to the successful conclusion of the "14th Five-Year Plan".