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

# 2024

## Environmental, Social and Governance Report (Social Responsibility Report)

**Concrete Actions · Steadfast Perseverance**

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



This report, the 19<sup>th</sup> consecutive sustainability-related report released to the public by CHNG since 2006, is the first special report named as "Environmental, Social and Governance Report (Social Responsibility 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" mission, 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 CHNG as a key state-owned backbone enterprise.

## About This Report

### Reporting Period

January 1, 2024 to December 31, 2024. 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 2024 in 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 (Trial)* by the Ministry of Finance

*Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era* by the State-owned Assets Supervision and Administration Commission of the State Council (SASAC)

*ISO 26000: 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 010-65226842 to request for the Report.

E-mail: [hshsr@chng.com.cn](mailto:hshsr@chng.com.cn)

Address: No. 6, Fuxingmennei Street, Xicheng District, Beijing

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Scan the QR code to access the video version of the Report.



## Strictly Enforcing Party Discipline to Ensure High-quality Development

### —Learning Discipline · Understanding Discipline · Internalizing Discipline · Abiding by Discipline

Approved by the CPC Central Committee, a campaign to learn Party discipline would be carried out among all Party members from April to July 2024. As a central state-owned enterprise (SOE), China Huaneng immediately held a work deployment meeting for Party discipline learning and education. The meeting aimed to thoroughly study and implement the guiding principles of General Secretary Xi Jinping's important speeches and instructions concerning Party discipline learning and education, align our thoughts and actions with the decisions of the CPC Central Committee, and educate and guide all Party members and cadres to learn, understand, internalize, and abide by Party discipline.



The Group's Deployment Meeting for Party Discipline Learning and Education

The Party organizations at all levels of the Company, in line with the specific conditions of different business sectors such as renewable energy, coal, and hydropower, adopted effective learning methods and adhered to the principles of "learning the original text meticulously, guiding grassroots units to learn collectively, and comprehending through practical application", and strove to enhance the effectiveness of learning the *Regulation of the Communist Party of China on Disciplinary Actions*, ensuring that Party discipline learning and education is internalized and translated into action.



Party Day Activity with the Theme of "Integrity" Held by Huaneng Renewables Corporation Limited



Exchange Seminar on Party Discipline Learning and Education Held by Huaneng Coal Industry Co., Ltd.



Party Discipline Learning and Education Reading Session of Huaneng Lancang River Hydropower Inc.

The Company thoroughly studied General Secretary Xi Jinping's important expositions on comprehensively strengthening the discipline enforcement within the Party, and throughout the learning and discussion, adhered to the "Three Questions" (what are the requirements of this item, have I fulfilled this item, and how to hold myself to higher standards) and the "Three Discussions" (discussions on thoughts, understanding, and gaps), promoting the internalization of Party discipline learning and education and its externalization in action.



Huaneng Aizang Yaliang Zangbo River Hydropower Development Investment Co., Ltd. and the Participating Construction Companies Work Together to Build a "Holistic Supervision" Defense Line



Party Discipline Knowledge Contest Held by Sichuan Huaneng Taipingqi Hydropower Co., Ltd.



Jiucuan Power Plant Applies the Outcomes of Party Discipline Learning and Education to Key Work during the Peak Summer Period

# CHNG in High Quality Development

## Mission-driven

Corporate Mission: To uphold the "Three-Color Concept" and serve the building of China into a great power in energy

A "red" company that serves the Party and the people, safeguards energy security, and contributes to the Chinese path to modernization

A "green" company that prioritizes ecology, facilitates energy revolution, and empowers people for a better life

A "blue" company that focuses on technological innovation, promotes energy cooperation, and contributes to building a community with a shared future for mankind

## Strategic Guidance

### Strategic Vision

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

### Strategic Orientation

The "National Team" in Technological Innovation | The "Leader" in Industrial Development | The "Pillar" in Energy Supply Guarantee

## Implement the "366" Development Strategy

### "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

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

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

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

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

## Taking on the "Six Weighty Responsibilities"

The Weighty Responsibility of Safeguarding National Energy Security  
The Weighty Responsibility of Accelerating Green and Low-carbon Development  
The Weighty Responsibility of Striving to be at the Forefront of Scientific and Technological Innovation  
The Weighty Responsibility of Deepening Reform of State Capital and State-owned Enterprises  
The Weighty Responsibility of Promoting High-quality and Stable Growth  
The Weighty Political Responsibility of Exercising Full and Strict Party Self-governance

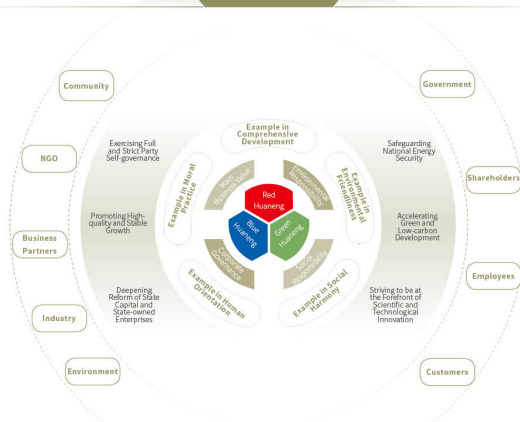
## Implementing the "Six Focuses"

Focusing on Enhancing the Capability to Ensure Secure Supply  
Focusing on Advancing the Green and Low-carbon Transition  
Focusing on Strengthening Independent Innovation Capabilities  
Focusing on Improving the Effectiveness of Reforms  
Focusing on Driving Value Creation  
Focusing on Deepening Party Building as the Guiding Force

## Achieving the "Six New" Goals

Breaking New Ground in Work Safety  
Achieving New Heights in Operational Performance  
Making a New Leap in Energy Transition  
Realizing New Breakthroughs in Scientific and Technological Innovation  
Attaining New Results in Deepening Reforms  
Strengthening Party Building with New Vigor

## 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



Wu Weizhang

External Board Director



Liu Yuezhen

External Board Director



Wang Yidong

External Board Director



Liu Zehong

External Board Director



Yan Xiaopeng

Employee Director

Management Team



Wen Shugang

Chairman of the Board of Directors



Zhang Wenfeng

Board Director, President



Hao Jinyu

Vice President



Si Weiguo

Vice President



LI Qizhao

Vice President



LI Ying

Chief Financial Officer



Zhang Jun

Chief Compliance Officer

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## Message from the Chairman



Chairman of the Board of  
Directors: Wen Shugang

The year of 2024 is a crucial year for achieving the goals and tasks set out in the 14<sup>th</sup> Five-Year Plan. Under the resolute leadership of the CPC Central Committee with Comrade Xi Jinping as its core, China Huaneng firmly grasped the theme of high-quality development, adhered to the guiding principles and requirements for annual work, promoted the overall advancement of inspection, rectification, reform, development and Party building, demonstrated greater self-consciousness in performing political responsibility, provided more effective services to the overall situation, and successfully accomplished the annual goals and tasks.

The Company adhered to the Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era to pool concerted efforts, thoroughly studied, promoted and implemented the guiding principles of the Third Plenary Session of the 20<sup>th</sup> Central Committee of the Communist Party of China, promoted the comprehensive implementation of the important instructions of General Secretary Xi Jinping, and ensured a greater role of Party-building as the guiding force and guarantee. Efforts were made to solidly carry out Party discipline learning and education, establish a normalized and long-term mechanism, and promote the positive results of the special action called "Year of Driving Efficiency Through Party Building". **Serving as a Central Pillar and Making Strategic Planning to Deepen the Advancement of Modern Governance.** Adhering to the bottom line of compliant operation, the Company achieved a total profit of RMB 51.181 billion and a net profit of RMB 40.024 billion. Our main operating indicators reached a new historic high, with our growth rate ranking among the top in central SOEs; Multiple measures were taken to enhance management efficiency, with over 80% of the main tasks in the action plan for deepening reforms and upgrades accomplished. The modern enterprise system with Chinese characteristics was continually improved, and market-oriented operation mechanism was increasingly refined, leading to a notable enhancement in the Company's endogenous driving force and vitality for development. By adhering to responsibility-oriented leadership, we prioritized enhancing ESG management efforts and promoted the deepening principles of ESG principles into the entire production and operation process, earning us the recognition as a role model enterprise in ESG in China. **Top Priorities of the Country, Mission-driven Responsibility, Pooling Strengths to Enhance Functional Value.** The Company insisted on optimizing our main business and actively addressed challenges such as load peaks, extreme weather, and natural disasters, generating a cumulative total of 855.2 TWh electricity and 524 million GJ heat within China, successfully fulfilling the task of guaranteeing energy supply during critical periods. Efforts were made to strictly adhere to the safety red lines and bottom lines, and achieve industry-leading levels in equipment reliability and power generation utilization hours, with no major or above safety accidents throughout the year, and network security risks controllable and under control through platforms such as "Huaneng Blue Shield". Adhering to the national strategy, we solidly promoted the construction of national-level innovation platforms, accomplished key annual tasks with high quality, achieved a series of significant scientific and technological achievements, established a batch of autonomous and controllable technology brands such as "HN Revival", and increased the revenue share of strategic emerging industries by more than 4 percentage points year-on-year. **Civilizations Converge in Splendor, Thrive in Harmony,**

**and Join Hands to Build a World of Universal Harmony.** The Company always regards employees, partners, and the public as our important stakeholders, creating value and sharing achievements with them. The Company further strengthened the building of our cadre and talent team, improved the position and rank system, ensured smooth talent development channels, and established Huaneng's strategic talent hierarchy. Efforts were made to support major regional strategies, deepen foreign cooperation, and continue to cooperate with local governments, upstream and downstream enterprises to achieve mutual promotion and win-win cooperation. Efforts were also made to actively exert driving effect, and give back to society through engaging in public welfare and charity, supporting rural revitalization, and deeply implementing the "Belt and Road" Initiative, which contributed to the winning of the highest evaluation in the national assessment for targeted poverty alleviation for the eighth consecutive year, demonstrating the Company's responsibility and commitment as a central SOE. **Energy Innovation, Green Transition, Painting an Eco-Civilization Blueprint.** The Company unwaveringly implemented the new strategy for energy security, took the carbon peak and carbon neutrality goals as the guide, focused on deepening the "Three Lines and One Belt" layout, and promoted carbon reduction, pollution mitigation, green expansion, and growth in a coordinated manner, taking the lead in the energy transition. The cumulative installed capacity of renewable energy surpassed 95,000MW, with approved and completed capacities reaching record highs. The projects with a total installed capacity of 9,640MW included in China's first batch of large-scale wind and solar power bases were all put into operation, and the development of hydropower and nuclear power was actively advanced in an orderly manner. The Company's installed capacity of low-carbon and clean energy historically surpassed a 50% share, representing a year-on-year increase of 4.8 percentage points, while the carbon emission intensity of electricity generation across the board decreased by 28.1 grams per kilowatt-hour compared to the same period last year.

The river of time surges forward, and the pace of the striving people never ceases. The year 2025 marks both the concluding year of the 14<sup>th</sup> Five-Year Plan and the Company's 40<sup>th</sup> anniversary, making our annual work profoundly significant. From top to bottom, the Company will further shoulder our responsibilities, strive to be the first, create better performance with a more proactive attitude, complete the goals and tasks of the 14<sup>th</sup> Five-Year Plan with high quality, lay a solid foundation for a strong start of the 15<sup>th</sup> Five-Year Plan, accelerate the Company's building into a world-class enterprise, and contribute greater strength to advance Chinese modernization.

Great truths are always simple, and action speaks louder than words. Let us unite more closely around the CPC Central Committee with Comrade Xi Jinping at its core, adhere to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, work diligently and proactively and make every effort to deliver satisfactory answers to the "double exams" concerning operational reform and development, and Party building, so as to make new and greater contributions to building China into a to a great modern socialist country in all respects and the great cause of national rejuvenation through the Chinese path to modernization.

## Reflecting on 2024 - Remaining True to Our Original Aspiration

March 24, China Development Forum

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that in order to tackle the challenges of global climate governance, it is necessary to uphold the concepts of a community of life for man and nature and a community with a shared future for mankind, and to establish a fair, just, and win-win global climate governance system. Huaneng is willing to work with all parties to accelerate the implementation of non-fossil fuel substitution, strengthen technological innovation in green and low-carbon areas, and jointly promote global green and sustainable development.

July 5, China Lanzhou Investment and Trade Fair

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that as one of the leading enterprises in China's power generation industry and also the largest power generation, heating, and coal enterprise in Gansu Province, Huaneng has taken root in and served Gansu for more than two decades. We have effectively guaranteed energy and power security, supported Gansu in accelerating the development of a modern industrial system, and continuously contributed to rural revitalization in Gansu. With practical actions, Huaneng has vividly demonstrated the responsibilities as a central SOE in this era.

September 26, New Power System Development (Chongli) Forum

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that General Secretary Xi Jinping's important exposition on building a new type of power system has pointed out the direction for high-quality development of Huaneng and provided fundamental principles to follow. Huaneng is willing to work with all parties to strengthen pragmatic cooperation and jointly build a new power system, demonstrating greater responsibility and actions in advancing Chinese path to modernization and realizing the great rejuvenation of the Chinese nation.

June 25, Summer Davos Forum

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that addressing global issues such as energy transition and climate change is a shared mission and responsibility for all mankind. As a practitioner of energy transition, Huaneng is committed to driving the overall development of the power industry through our own low-carbon transition, providing clean, low-carbon, and green power guarantees for economic and social development, and making greater contributions to building a clean and beautiful world together.

August 29, ESG China - Beijing-Tianjin-Hebei State-owned Enterprises Social Responsibility Release Conference

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that it is an inevitable trend and imperative for enterprises to deeply advance ESG efforts. Huaneng has thoroughly implemented SASAC's relevant work deployment by integrating ESG into our corporate development strategies, goals, production and operation. By embedding the ESG concept, Huaneng has endowed the "Three-Color" mission with new connotations, daring to serve as the "national team" in technological innovation, the "leader" in industrial development, and the "pillar" in energy supply guarantee.

October 11, Symposium on Central Enterprises Supporting the Development of New Quality Productive Forces and Accelerating the Construction of a Free Trade Port in Hainan

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that as the first central SOE engaged in power generation that entered Hainan, the largest power supplier and the largest industrial steam supplier in Hainan, Huaneng has thoroughly studied and implemented the guiding principles of the important speeches and instructions of General Secretary Xi Jinping concerning Hainan's work, actively participated in and contributed to the construction of the Free Trade Port, and fully supported the guarantee of energy and power supply and the development of new quality productive forces in Hainan.

October 16, Meeting on Nuclear and Radiation Safety Supervision

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that Huaneng will further consolidate our primary responsibility for nuclear safety, enhance the level of nuclear power safety management, ensure that nuclear power safety is "absolutely safe", comprehensively promote the high-quality and large-scale development of nuclear power, help build a new energy system and a new power system, and serve and ensure national energy security.

October 26, China Industrial Transfer and Development Matchmaking Event (Gansu)

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that Gansu Province is an important integrated energy base in western China, enjoying unique development advantages and strategic position in the overall situation of industrial transfer and development. Huaneng will fully support and serve Gansu in accelerating the industrial transfer and development matchmaking, and make contributions to building a modern socialist Gansu in all respects for a better and happier new life.

October 12, 90<sup>th</sup> Anniversary and 2024 Annual Conference of the Chinese Society for Electrical Engineering

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that over the past 90 years since its establishment, the Chinese Society for Electrical Engineering (CSEE) has made significant contributions to the development of China's power industry. As a vice chairman unit, Huaneng will continue to fully support CSEE's work, better leverage our academic, platform, resource integration, and internationalization advantages, promote sci-tech self-reliance at higher levels in the field of energy and power, and effectively serve and safeguard national energy security.

October 19, ESG China - Innovation Annual Conference (2024)

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that practicing the ESG concept is highly compatible with the new requirements for China's economic and social development in the new era, and is of great significance for accelerating the building of world-class enterprises and facilitating the Chinese path to modernization. Huaneng will resolutely fulfill our mission as a central SOE and our social responsibilities, accelerate the development towards becoming a world-class enterprise, and make greater contributions to building China in to a great modern socialist country in all respects and to the great cause of national rejuvenation through the Chinese path to modernization.

December 5, The Second "ESG Model" Grand Ceremony by China Media Group

Wen Shugang, Chairman of the Company, attended the event and pointed out in his speech that energy and power security is crucial to national economy and people's livelihood. Huaneng resolutely shoulders the political responsibility of safeguarding national energy security, and regards safeguarding energy security and enhancing people's well-being as top priorities in our work. In response to national requirements and people's livelihood needs, Huaneng will spare no efforts and serve as the national team and main force in ensuring the supply of energy and power.

December 21, Enterprise ESG Sustainability Conference

Zhang Wenfeng, President of the Company, attended the event and pointed out in his speech that energy security is a vital cornerstone for the sustainable development of a country. As an important and key central SOE engaged in the energy and power sector, Huaneng will adhere to the new strategy for energy security as our guide, always keep in mind China's most fundamental interests, thoroughly implement the ESG concept, and play a pivotal role during crucial periods such as the peak summer and peak winter periods.

Total Operating Income RMB

**401.203** billion

Total Profit RMB

**51.181** billion

Total Assets RMB

**1707.613** billion

Asset-Liability Ratio

**68.75** %

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21 Effectively Strengthening Responsibility-led Initiatives

24 Expanding the Communication and Dissemination Channels

28 [Actions Speak Louder] Striving to be a Pioneer in ESG among Central SOEs

To improve the modern enterprise system with Chinese characteristics, it is necessary to focus on giving full play to the institutional advantages of socialism with Chinese characteristics, strengthening Party leadership, improving corporate governance, promoting enterprises to establish and improve a modern enterprise system with clear property rights, well-defined rights and responsibilities, separation of government administration from enterprise management, and scientific management, and cultivating more world-class enterprises.

—Speech by General Secretary Xi Jinping at the 5<sup>th</sup> Meeting of the Central Commission for Comprehensively Deepening Reforms

*Serving as a Central Pillar and Making Strategic Planning to Deepen the Advancement of Modern Governance*

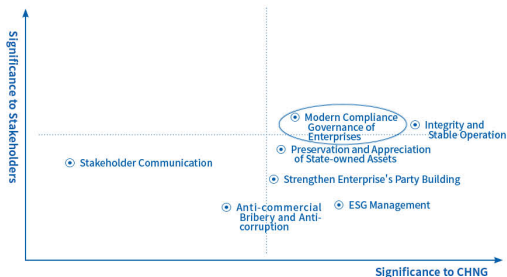


# Trace the Origin · Deepening the Advancement of Modern Governance



Hot Topics · International Focus

Focus · Issue Identification



Pain Points · Risk Assessment

- In recent years, significant changes have occurred in the market operating environment. Influenced by multiple factors such as the decline in market entities' performance capabilities and the concentrated maturity of debts, there has been a slight upward trend in the number of legal disputes involving the Company.
- In project development work, emphasis is placed on compliance management in key aspects such as handling of compliance requirements in the early stages of some projects, reviewing of contract terms, and infrastructure construction operations.

Key Points · Striving for Perfection

- The Company adhered to the case management principle of "unified management, classified guidance, and graded responsibility", and compacted the primary responsibility for legal dispute cases at all levels of units, with major cases headed by principals and led by chief legal advisors. Secondary units set up a legal affairs organization or were staffed with legal professionals, and strengthened the coordination between internal and external legal forces to ensure a rapid response to case handling needs.
- With a focus on reducing the existing caseload, continuous efforts were made to improve the "dual supervision" mechanism for key units and major cases. A regular legal dispute resolution team was established, equipped with legal professionals, to supervise units at all levels in fulfilling their responsibilities for managing legal dispute cases. A working mechanism of "one case, one strategy" was set up to intensify the handling of key cases, ensure high-quality case resolution, and effectively safeguard legitimate rights and interests.
- The Company continuously improved the mechanism of "promoting management through case handling", conducted in-depth comprehensive analysis of cases, strengthened the control over the sources of dispute cases, revised and improved relevant systems aiming at common legal issues, and "plugged loopholes" at the institutional level.
- The Company strengthened the compliance management at key stages in project development and construction, strictly conducted compliance reviews of procedures in the early stages, project investment decisions, contract drafting and signing, construction, and other processes, and promoted project development in accordance with laws and regulations.

Highlights · Benchmarking Practices

- Guidelines on the full lifecycle management of contracts were developed to continuously strengthen the standardization of legal management.
- The Company continued to build the "Constitution Publicity Week" as a high-quality brand for law publicity, and implemented tailored measures based on different categories to improve the pertinence and timeliness of law publicity activities.
- The Company revised the *Management Measures for Risk Internal Control*, to build a mutually integrated, coordinated and highly efficient "four-in-one" risk prevention and control system that merges risk management, internal control, compliance, and institutional framework.
- The Company advanced in an integrated manner three major initiatives on "Expanding and Upgrading the Reform", "Pursuit of Excellence", and "Value Creation" and issued 12 special sub-plans spanning new energy and treasury management.
- All five listed companies, namely Huaneng Power International Inc., Inner Mongolia Mengdian Huaneng Thermal Power Corporation Ltd., Shandong Xinneng Taishan Power Generation Co., Ltd., Huaneng Lancang River Hydropower Inc., and Great Wall Securities Co., Ltd., publicly released ESG reports to the public in high quality.

Focus · Praises and Honors

- The Board of Directors of the Group was rated as "Excellent" in the assessment of the board of directors of central SOEs.
- Huaneng Power International, Inc. was selected for the "Best Practice Case of the Board of Directors" by the China Association for Public Companies, while Shandong Xinneng Taishan Power Generation Co., Ltd. and Huaneng Lancang River Hydropower Inc. were selected for the "Excellent Practice Case of the Board of Directors" by the same association.
- The Company received an A-grade evaluation from the SASAC for our Value Creation Initiative for two consecutive years, and an A-grade rating in the SASAC's reform assessment for four consecutive years.
- At the scene of the Second "ESG Model" Grand Ceremony, China Huaneng Group won the title of "China's ESG Model Enterprise".
- Six ESG cases recommended by Huaneng Power International Inc., Huaneng Lancang River Hydropower Inc., China Huaneng Group Co., Ltd. Shandong Branch, China Huaneng Group Co., Ltd. Zhejiang Branch, Huaneng Gansu Energy Development Co., Ltd. and Huaneng Inner Mongolia East Energy Co., Ltd. were honored as "Outstanding ESG Sustainable Development Cases of Chinese Enterprises."

## Stable and Sustained Development based on Compliant Operation



We should unwaveringly follow the path of socialist rule of law with Chinese characteristics, providing a solid guarantee of the rule of law for building a modern socialist country in all respects.

—Xi Jinping's Speech at the Central Conference on the Work of Comprehensive Law-based Country Governance

## Giving Full Play to Institutional Advantages

The Company further improved the modern corporate governance of SOEs with Chinese characteristics, contributing to enhancing the level of governance and control. The Company implemented the relevant requirements of the *Company Law* and the *Guidelines on Articles of Association of Central State-owned Enterprises*, revised and improved our articles of association, and based on these articles, improved our internal corporate system. We continuously advanced institutional development efforts and continuously enhanced the systematicness, integrity, and coordination of our internal governance system.

In 2024, based on the adjustment of headquarters functions and in combination with actual work conditions, the Company comprehensively revised our decision-making management system for decision-making on major issues, appointment and removal of key personnel, decision-making on major project investments, and use of large-sum funds, optimized and improved the list of rights and responsibilities for decision-making on major issues, further clarified the interfaces of rights and responsibilities among various governance entities, specified the concrete matters for the Party organization to "determine" and "discuss", streamlined the advance research procedures for the Party organization to play a role in setting directions and conducting checks on major operation and management matters, integrated Party leadership into all aspects of corporate governance, and effectively transformed the advantages of the modern enterprise system with Chinese characteristics into governance efficiency.

## Building Huaneng's Rule of Law

The Company formulated and implemented the *Five-Year Plan for the Construction of a Rule of Law in Huaneng (2021-2025)*, further improving the leadership responsibility system for the rule of law. The primary persons in charge actively fulfilled the duties as the first person responsible for the construction of the rule of law, and the Audit and Risk Committee under the Board of Directors oversaw the work related to the construction of the rule of law. By the end of 2024, the Company had 333 full-time legal personnel, marking a significant increase compared to the beginning of the 14<sup>th</sup> Five-Year Plan period.

## 447

Renewable Energy Projects were Reviewed

**Continuously enhancing legal management capabilities:** Guidelines on the full lifecycle management of contracts were developed to continuously strengthen the standardization of legal management. The quality of contract review was consolidated and the ability to manage and control contract risks was continuously enhanced.

**Strengthening compliance management for investment projects:** The *Standardized Work Guide for Legal Compliance Management of Investment Projects* was prepared and issued to further enhance the standardization and normalization of legal compliance review for the Company's renewable energy projects. In 2024, a total of 93 renewable energy projects were examined, and 354 filed renewable energy projects were re-examined.

**Steadily advancing the construction of the rule of law concerning foreign affairs:** For foreign-related contracts, a legal advisor review process was added on top of the routine internal legal audit, with special attention given to anti-corruption, anti-monopoly, and other related risks, to continuously strengthen legal compliance control over foreign-related business.

**Enhancing the effectiveness of law publicity and education:** The Company continued to build the "Constitution Publicity Week" as a high-quality brand for law publicity, and implemented tailored measures based on different categories to improve the pertinence and timeliness of law publicity activities. In 2024, the Company organized legal lectures such as "Promotion and Education on the *New Company Law*" and "Interpretation of the *Regulation on Disciplinary Action Against the Managerial Professionals of State-owned Enterprises*", which recorded a total attendance of 6,100, effectively enhancing the professional competence of legal personnel and the legal awareness among all staff.

Law Publicity Activities Covered

## 6100

People

## Promoting Risk Control Compliance

The Company proactively built a holistic national security architecture by revising the *Management Measures for Risk Internal Control*, solidifying risk prevention and control responsibilities at all levels, and improving the long-term risk prevention and control mechanism featuring "annual evaluations, quarterly checks, monthly monitoring, and real-time tracking". We constructed a mutually integrated, coordinated and highly efficient "four-in-one" risk prevention and control system that merges risk management, internal control, compliance, and institutional framework, continuously enhancing our capacity and level to prevent and mitigate major risks while firmly adhering to the bottom line and red line of avoiding major risks.

The Company carried out risk assessment work in an integrated manner centering around the targets and tasks of guaranteeing safety and supply, achieving transformational development, and improving quality and efficiency. Through comprehensive analysis and judgment, six major risks and five significant risks were identified. Risk response strategies and prevention and mitigation plans were formulated, and overall and continuous follow-up on the disposal and mitigation of hidden risks were conducted. In 2024, the Company did not experience any major risk events, with all types of risks remaining controllable and under control. The treasury system received an "Excellent" rating during the acceptance inspection and rating conducted by the SASAC.

## Case

### Campaign on "Special Enhancement of Compliance Management" Organized by Huaneng Coal Industry Co., Ltd.

In October 2024, Huaneng Coal Industry Co., Ltd. conducted a special training campaign on enhancing compliance management, aiming to help participants gain a profound understanding of the importance of legal compliance. This campaign was designed to promote the integration of and sharing between core business operations and various fields such as law and finance through compliance management, thereby facilitating an improvement in the company's management efficiency and further strengthening its risk control capabilities.

"Through this training, we have gained a deeper understanding of compliance. In the future, we will start from ourselves to promote legal compliance from being just a written concept to practical actions, shifting from passive response to active integration, in order to support enterprise development."

—Employee representatives participating in the training

## Case

## Special Training on Anti-monopoly Compliance in the Electric Power Market by Jiangxi Branch

In December 2024, the Jiangxi Branch conducted a special training session on anti-monopoly compliance in the electric power market, inviting external experts to deliver a lecture. A total of 120 employees participated in the training, including company management and staff in positions such as power marketing, legal compliance and risk internal control.

The training covered, among others, the significance of anti-monopoly compliance, analysis of main types of monopolistic behaviors, anti-monopoly investigations and liability for violations, and key points of anti-monopoly compliance among electric power enterprises. Through this training, participants gained a deeper understanding of anti-monopoly compliance among electric power enterprises and on how to regulate behaviors in the electric power trading market.

## Internal Audit Supervision

The Company fully implemented the audit work requirements of the National Audit Office and the SASAC, focusing on establishing a comprehensive audit work pattern. We promptly revised and improved four systems, namely, the *Overseas Audit Measures*, the *Post-evaluation Management Measures for Investment Projects*, the *Audit Rectification Management Measures*, and the *Management Measures for Submission for Approval, Reporting and Record Filing of Internal Audit Matters*, to establish and improve a consistent, scientific, complete, and effective audit system. The Company gave full play to the auditing function of the "holistic supervision system", anchoring our work in economic supervision and focusing on core responsibilities and principal businesses. The collaborative coordination mechanism was further improved to ensure "aligned efforts and joint problem-solving" with other forms of supervision.

Conducted

1099

Audit Projects of Various Types

In 2024, the Company conducted 1,099 audit projects of various types. Through audit rectifications, we promoted the improvement of 1,458 institutional and normative documents, recovered funds amounting to RMB 629 million, and avoided or retrieved losses of RMB 105 million.

## Upholding Integrity, Discipline, and Anti-corruption Measures

The Company attached great importance to anti-corruption efforts, organizing and convening annual working conferences on Party conduct, clean governance and anti-corruption, focusing on key areas such as procurement tendering, engineering construction, and new energy, conducting in-depth special initiatives, and continuously promoting the implementation of primary responsibility for Party conduct and clean governance.

The Company deeply engaged in cultivating an incorruptible culture for the new era, actively promoting the virtuous trend of respecting integrity and despising greed, as well as striving for progress and goodness, by convening warning education sessions and issuing notifications on typical cases, among other forms. These initiatives aimed to illustrate morality, discipline, laws, and responsibilities through cases.

## Comprehensively Enhancing Management Effectiveness



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.

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

## Board of Directors Management

The Company was committed to establishing a scientific, rational, and efficient board of directors, focusing on the three core functions of "strategy formulation, decision-making, and risk prevention". Efforts were made to establish and improve a work system that supports the efficient operation of the board, and continuously optimize the "Three Mechanisms" including the special research mechanism for external directors on major issues, the follow-up and implementation mechanism for important opinions and suggestions, and the multi-level communication mechanism. These efforts aimed to promote more standardized board operations and a more effective role of the board. In 2024, the Board of Directors of the Group was rated as "Excellent" in the assessment of the board of directors of central SOEs.

The Company meticulously ensured the performance support for external directors by organizing collective research activities for them, continuously improving the reporting mechanism for normalized updates on production and operation to external directors, and regularly publishing the *Board Bulletin*, which effectively supported the performance of external directors. In 2024, the Company's full-time board of directors and supervisors experienced a notable enhancement in strength, with significant improvements in age and specialty structure, and an effective improvement in their ability to perform their duties.

The Company deepened the setup of the board of directors in subsidiaries, continuously improved the management system, delegation of authority, and operational evaluation system, and clarified the access and exit criteria for the dynamic adjustment of the list of subsidiaries that should set up the board of directors where conditions permit. A board of directors was set up in each of the 124 subsidiaries, with the majority of the board being external directors. The Company focused on enhancing the performance capability of external directors. The proportion of full-time external directors to the total number of external directors was 8.8%, which was 1.32 percentage points higher than the average for central SOEs. In 2024, Huaneng Power International, Inc. was selected for the "Best Practice Case of the Board of Directors" by the China Association for Public Companies, while Shandong Xinneng Taishan Power Generation Co., Ltd. and Huaneng Lancang River Hydropower Inc. were selected for the "Excellent Practice Case of the Board of Directors" by the same association.



## Expanding and Upgrading the Reform

The Company integrated the implementation of the guiding principles of the *Decision of the Central Committee of the Communist Party of China on Further Comprehensively Deepening the Reform and Advancing the Chinese Path to Modernization* with our initiative on expanding and upgrading the reform. By keeping to reform objectives, we formulated three schemes, i.e. the *Plan for Implementing the Initiative on Expanding and Upgrading the Reform*, the *Key Points of Reform Work in 2024*, and the *Key Tasks for Implementing the Guiding Principles of the Third Plenary Session of the 20<sup>th</sup> CPC Central Committee and Further Comprehensively Deepening the Reform*. These schemes guided the implementation of various reform tasks in a detailed and thorough manner, forming a new landscape of reform work characterized by vertical coherence, phased continuity, and comprehensive momentum. The completion rate of the main tasks of the initiative on expanding and upgrading the reform reached over 80%. In 2024, the Company's five reform achievements were selected for inclusion in the *Thousand Sails Racing: Case Collection of Initiatives on Expanding and Upgrading the Reform of Grassroots State-owned Enterprises* published by the SASAC. The Company received an A-grade rating in the SASAC's reform assessment for four consecutive years. Xi'an Thermal Power Research Institute has become the only "Scientific Reform" in China's power generation industry to be rated as a "benchmark" for five consecutive times. In the "Double Hundred Enterprises", Huangeng Renewables Corporation Limited was rated as the "benchmark" level, and China Huangeng Group Co., Ltd. Jilin Branch and Huangeng Capital Services Co., Ltd. were rated as the "excellent" level.

The Company advanced in an integrated manner three major initiatives on "Expanding and Upgrading the Reform", "Pursuit of Excellence", and "Value Creation". By referencing the *Plan for Accelerating the Development of World-Class Enterprises and the Special Plan for the Initiative on Value Creation*, the Company issued 12 special sub-plans spanning renewable energy and treasury management, and established a "1+M+N" first-class enterprise management evaluation system encompassing 10 industrial sectors, i.e. wind power, photovoltaics, nuclear power, hydropower, thermal power, coal, technology, supply chain, IT, and finance. On this basis, the Company received an A-grade evaluation from the SASAC for our Value Creation Initiative for two consecutive years.

## Value Maintenance and Appreciation of Assets

The Overall Labor Productivity RMB

**151.18** Million Per Person

The Company's main operating indicators such as profits, net profits, net profits attributable to the parent company, and economic value added reached new historic highs, with growth rates ranking among the top in central SOEs. The Company's "One Profit and Five Ratios" all outperformed the assessment targets set by the SASAC. Specifically, the total profit amounted to RMB 51.181 billion, surpassing the RMB 50 billion mark, maintaining the first position in industry benchmarking, achieving the goals of the 14<sup>th</sup> Five-Year Plan one year ahead of schedule, and registering a year-on-year increase of over 21%; the asset-liability ratio was 68.75%, a decrease of 1.3 percentage points from the beginning of the year, hitting a new low in nearly two decades; the overall labor productivity was RMB 1,511.8 million per person, an increase of RMB 145,700 per person compared with the same period last year. In 2024, the profitability of the Company's various segments continued to improve, with a new landscape emerging across our industrial segments. Four ten-billion-yuan-level industries, thermal power, renewable energy, hydropower, and coal, rose to prominence. The profits of the thermal power, renewable energy, and hydropower industries increased by RMB 5.98 billion, RMB 1.27 billion, and RMB 860 million, respectively, on a year-on-year basis. Notably, the coal industry surpassed the ten-billion-yuan profit mark for three consecutive years.

## Reducing Cost, Improving Quality and Increasing Efficiency

The Company deepened the implementation of special actions to improve quality and efficiency, continuously strengthened top-level design, formulated a "1+H+2" scheme system, established a working mechanism characterized by "annual assessment, quarterly notification, monthly supervision and real-time monitoring", and implemented listed supervision for key loss-making enterprises to ensure that all measures were implemented earnestly and all losses were reduced year-on-year. The Company continuously carried out cost control, with the unit purchase price of standard coal decreasing by RMB 81.8 per ton year-on-year, the largest decline in the industry, was ranked first in benchmarking of prices of standard coal transported via waterway, and innovatively created a "green co-chain" bill product to support the construction of large energy bases.

## Effectively Strengthening Responsibility-led Initiatives



The environmental, social, and corporate governance (ESG) efforts should be effectively strengthened. We should integrate the ESG efforts into the overall management of social responsibility work, and actively seize and address the opportunities and challenges brought about by ESG development.

—Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era by the SASAC

## ESG Cultural Concept

The Company established a "Three-Color" cultural concept system, centering around the corporate mission "To uphold the 'Three-Color Concept' and serve the building of China into a great power in energy". With the strategic vision of "Leading China's Electric Power and Striving for World Class Excellence", and the strategic positioning as the "national team" in technological innovation, the "leader" in industrial development, and the "pillar" in energy supply guarantee, the Company focused on the core responsibilities in the energy sector and showcased the corporate functional values. Meanwhile, the Company adopted a multidimensional ESG concept to facilitate the mutual complementarity, co-existence and co-development between ESG efforts and the Company's operation, promote all cadres and employees to perform our due responsibilities, and advance the high-quality development of the Company in the new era.

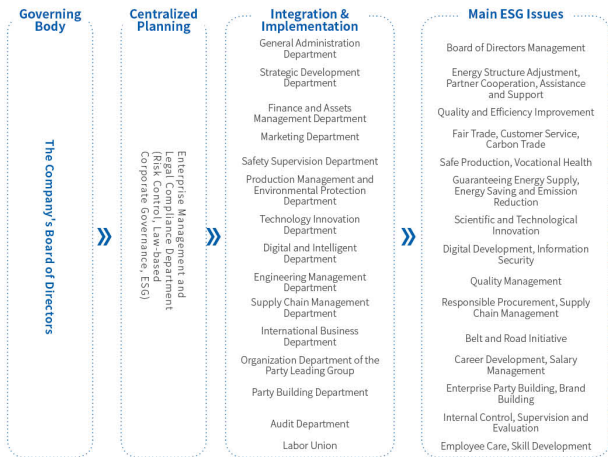
Consistently enhancing our cultural brand building efforts, the Company issued the *Three-Color Bloom Brand Strategic Plan*, participated in the China Brand Value Evaluation Rankings, and achieved an assessed brand value of RMB 126.05 billion, ranking 7<sup>th</sup> among China's energy and chemical industry brands in terms of brand value. In 2024, two venues were awarded the title of Patriotism Education Bases of Central SOEs, one grassroots enterprise was included in the Inventory of Industrial Cultural Heritage of Central SOEs (Mining Industry), and four units were selected as "Innovative Achievements of Chinese Enterprise Brands and Practical Application Cases of Brand Innovation of Power Enterprises".

<b>Enterprise Value Guidelines</b>	Loyalty, Creation, Leadership and Sharing		
<b>Enterprise Spirit</b>	Reform, Innovate, Strive and Lead	<b>Service Concept</b>	Energize Where You Are
<b>Enterprise Style</b>	Bold to Explore, Courageous to Take Responsibility, Capable to Deliver, and Willing to Contribute	<b>Work Concept</b>	Act Promptly, Deliver Excellence
<b>Development Concept</b>	Green and Low-Carbon, Innovation-Driven, Collaborative and Efficient	<b>Integrity Concept</b>	Fulfill the "Three-Color Concept", Foster a Life of Integrity
<b>Safety Concept</b>	All Risks Can be Controlled, and All Accidents Can be Prevented	<b>Talent Concept</b>	Bring Out the Best in Everyone
<b>Management Concept</b>	Corporate Governance in a Law-abiding, Scientific and Strict Manner	<b>Team-work Concept</b>	Collaboration, Healthy Competition and Mutual Success
<b>Operation Concept</b>	Integrity as Foundation, Value as Principle, Thrift as Discipline	<b>Employee Concept</b>	Love Our Country, Company and Post; Be Dedicated, Passionate and Professional

## ESG Management System

The board of directors of the Company is the highest level supervisory body for ESG, with an ESG leading group composed of the 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 every year.

Enterprise Management and Legal Compliance Department is assigned to take charge of ESG-related work. 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 Regulations and Planning

### 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*

### 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 Safe Production, Measures for Management of Ecological Environment Protection, Supplier Management Measures, Measures for Management of International Development Strategic Planning, etc.*

## 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 Encouraging report release	Establishment of reporting system Implementation of proposal survey Regular information disclosure	Participation of industry activities Communication arrangement Publicity of ESG practices

## ESG Performance Evaluation

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 form a "1+2+4+N" assessment system, and assist in the comprehensive improvement of ESG management level.

The Company held the 3<sup>rd</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 "2024 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, so as to establish a pioneering model, better showcase our ESG management and practice, and comprehensively promote the integration of ESG concepts into the company's production and operation.

## ESG Capability Building

### 40

Participants Attend ESG Senior Management Talent Training and Qualification Evaluation Program

The Company attached great importance to enhancing our own ESG capabilities, strove to raise awareness of social responsibility among all staff, and popularized professional knowledge on ESG. Externally, the Company organized a total of 40 participants from the headquarters' business departments, subordinate secondary units, and listed companies to attend a four-phase ESG senior management talent training and qualification evaluation program hosted by China Enterprise Reform and Development Society and China Business Executives Academy, Dalian. This effectively enhanced employees' understanding of ESG. Internally, the Company has conducted embedded ESG special training for eight consecutive years during the report preparation process. The company updates training content in a timely manner based on internal and external policies and situational changes. The scope of trainees covers the group company, secondary units, and key grassroots enterprises. 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 kept participating in and conducting ESG research in an in-depth manner. The Company participated in the formulation of two association standards led by the China Electricity Council: the *Guidelines for Environmental, Social, and Governance (ESG) Information Disclosure of Electric Power Enterprises* and the *Guidelines for Environmental, Social, and Governance (ESG) Evaluation of Electric Power Enterprises*. Taking hydropower sector as a pilot, we carried out research on "Building an ESG System with Huaneng Hydropower Characteristics", and creatively proposed the "ESG Responsibility Value Model of Huaneng Hydropower" and its supporting indicator system. This model is composed of five ESG areas, and covers 17 ESG issues and 95 indicators.

## Expanding the Communication and Dissemination Channels

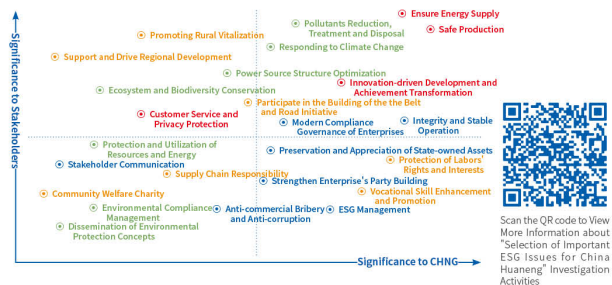


Central SOEs should enrich the forms and content of social responsibility dissemination, strengthen the dissemination of domestic and international responsibility performance, deepen communication with stakeholders, and establish a responsible corporate image.

—Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era by the SASAC

## ESG Issues Selecting

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 (Trial)* 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 "Selection of Important ESG Issues for China Huaneng" survey activities 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 Information Disclosure

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 featuring daily, regular, and special communications to ensure comprehensive, timely and accurate disclosure of the Company's responsibility performance to the public.

### 148

Pieces of Information were Submitted Throughout The Year

The Company continuously strengthened information submission, adhering to the goal of "reflecting the situation externally and showcasing the image, while solving problems internally and promoting work". Throughout the year, 148 pieces of information were submitted, 80 of which were adopted by the General Office of the CPC Central Committee, the General Office of the State Council, and the SASAC. In 2024, the Company was honored with the titles of "Outstanding Information Submission Unit" by the General Office of the CPC Central Committee and "Excellent Information Work Unit" by the SASAC.

The Company continuously strengthened the management over ESG information disclosure of our listed companies. The affiliated listed company shall complete the non-financial information disclosure of the enterprise in accordance with the requirements of the exchange and actively carry out regular communication with stakeholders. In 2024, all five listed companies, namely Huaneng Power International Inc., Inner Mongolia Mengdian Huaneng Thermal Power Corporation Ltd., Shandong Xinneng Taishan Power Generation Co., Ltd., Huaneng Lancang River Hydropower Inc., and Great Wall Securities Co., Ltd., publicly released ESG reports to the public in high quality. Among them, Huaneng Power International Inc., Huaneng Lancang River Hydropower Inc., and China Great Wall Securities Co., Ltd. received an A-grade rating for information disclosure from their respective stock exchanges, while Inner Mongolia Mengdian Huaneng Thermal Power Corp. Ltd. won the "Excellent Practice in Annual Report Performance Presentation" award presented by the China Association for Public Companies.

### Daily Communication

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

### Regular Communication

- Preparation of Annual ESG Report by the Group and Its Affiliated Listed Companies
- Conducting annual online stakeholder surveys to understand the genuine needs of stakeholders
- Establishing a regular consultation mechanism, meticulously planning information topics, and continuously strengthening information submission

### Special Communication

- Preparing and Releasing Special Reports on Overseas Businesses Accountability and Rural Revitalization
- Founding the China-Cambodia Cultural Exchange Network and Hosting China-Cambodia Cultural Exchange Forum
- Organizing Stakeholders to participate in open day activities and conduct ESG special research in enterprises

## Stakeholders Participation

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 (GEICO), 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.

The Company actively established a platform for communication with stakeholders, continually innovated communication models, and organized grassroots power plants to conduct "State-owned Enterprise Open Day" activities on a regular basis. We invited employee families, local students, the general public, news media, and other groups to visit the enterprise, fully demonstrating our ESG management and practices, listening comprehensively to stakeholders' expectations for the Company, and building an image of a responsible enterprise.

### Case Themed Open Day of Lower Sesan II Hydropower Station in Cambodia

In June 2024, the Lower Sesan II Hydropower Station in Cambodia held an open day event with the theme of "Connecting the Lancang-Mekong Region with Energy, Illuminating the Life with Electricity". Over 50 participants, including primary school students from the resettlement village who are recipients of the Company's scholarship donations and university student representatives from the Royal Academy of Cambodia, attended the event. This event was led by two Cambodian young social media influencers with millions of followers, who guided students to visit the power station and learn about the principles of hydropower generation. The entire event was live-streamed on the Company's official Cambodian account, serving as a platform for stakeholders to interact with the Company, enhancing public participation enthusiasm, and contributing to mutually beneficial development between the power station and the host country of the project.



An Open Day Event with the Theme of "Connecting the Lancang-Mekong Region with Energy, Illuminating the Life with Electricity"

"The Lower Sesan II Hydropower Station is very spectacular. Thank China Huaneng for bringing clean energy to the Cambodian people, which has truly improved our quality of life."

—Cambodian young "internet celebrity" with millions of followers: Sea Neang Gaming

### Case Visit by A Media Delegation to the Shidao Bay Nuclear Power Base

In April 2024, a media delegation organized jointly by the SASAC and China Huaneng visited the Shidao Bay Nuclear Power Base during the event themed on "Entering the New State-owned Enterprises - Marching Forward with Innovation, Creating the Future with Smart Technologies". The delegation aimed to explore the new quality productive forces within the "Great Strength", convey the power of "Intelligent Manufacturing in China", and showcase the charm of "China Brand".



A Media Delegation's Visit to the Huaneng Shidao Bay Nuclear Power Base

During the event, the media delegation gained in-depth access to the production line of the world's first fourth-generation nuclear power station. Through watching promotional videos, listening to on-site explanations, visiting the project site, and other activities, they gained a detailed understanding of Huaneng's strategic planning for nuclear power and technological innovation challenges faced by high temperature reactor - pebble-bed module (HTR-PM). They also engaged in in-depth discussions with staff at the power station on hot topics of public concern, such as technological breakthroughs in HTR-PM and future pathways for its commercial application.

### Stakeholders



## Actions Speak Louder

## Striving to be a Pioneer in ESG among Central SOEs

The Company firmly fulfilled our economic, political, and social responsibilities as a central SOE by integrating ESG into our development strategies, goals, production and operation. We endowed the "Three-Color Concept" with new connotations based on the ESG concept, continuously strengthened the guiding role of ESG in corporate governance, production and operation, and achieved numerous remarkable results in the field of ESG.

ESG Report 2023 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 thirteen consecutive years.

On December 5, 2024, the Second "ESG Model" Grand Ceremony was held by China Media Group in Beijing. China Huaneng Group won the title of "China's ESG Model Enterprise", and Wen Shugang, Chairman of the Board and Secretary of Party Leadership Group of the Company, shared the Company's excellent ESG practice cases at the event.

At the scene of the Second "ESG Model" Grand Ceremony, Wen Shugang, Chairman of the Board and Secretary of Party Leadership Group of the Company, stated, "Energy and power security is crucial to national economy and people's livelihood. China Huaneng will firmly shoulder the political responsibility of safeguarding national energy security, and prioritize safeguarding energy security and enhancing people's welfare as the top priorities of our work. On the one hand, we will increase the supply of green, efficient, and high-quality energy. On the other hand, we will strengthen the clean and efficient utilization of traditional energy sources, give full play to their role as a backup guarantee, and continuously improve the quality of energy and power supply. As the world's second largest power generation group and China's largest public heating service provider, Huaneng currently generates about one tenth of the country's total electricity and provides heating for an area covering over 1.06 billion square meters. Where the nation has demands and the people have needs, Huaneng will spare no effort to safeguard national energy and power security, serving as the national team and main force in ensuring stable energy and power supply."



Scan the QR Code to Watch the CCTV Report Titled the Second "ESG Model" Grand Ceremony

The Company has continuously participated in various ESG-related projects organized by the SASAC for many years. In 2024, the Company's case study titled *Full Completion and Commissioning of the Longdong Coal Base Contributes to Continuous Robust Capacity for Production Increase and Supply Assurance* was selected for inclusion in the *Blue Paper on Social Responsibility of Central Enterprises (2024)*; The *Huaneng Power International, Inc.: Adhering to the Concept of High-Quality Development and Continuously Enhancing the ESG Level of Listed Companies* has been selected for inclusion in the *Blue Book on Environment, Social and Governance (ESG) of Listed Companies of Central Enterprises (2024)*, and Huaneng Power International has also been listed in the "ESG - Pioneer 100 Index of Listed Central Enterprises (2024)". The *Huaneng Lower Sesan II Hydropower Station Fulfills Huaneng's Overseas Social Responsibilities to Promote the People-to-People Bond between China and Cambodia* has been selected for inclusion in the *Blue Book on Overseas Environment, Social, and Governance (ESG) of Central Enterprises (2024)*.

The Company actively organized our subsidiaries to jointly participate in ESG-related selection activities initiated by various social sectors, including the SASAC and the China Enterprise Reform and Development Society. These selection activities stimulated the enthusiasm of all units, and promoted the deep integration of the ESG concept into the entire production and operation process of our regional companies, listed companies, and overseas projects. This effectively enhanced the Company's brand reputation in local markets, capital markets, and overseas markets.

In December 2024, at the Corporate ESG Sustainable Development Conference, six ESG cases recommended by Huaneng Power International Inc., Huaneng Lancang River Hydropower Inc., China Huaneng Group Co., Ltd. Shandong Branch, China Huaneng Group Co., Ltd. Zhejiang Branch, Huaneng Gansu Energy Development Co., Ltd. and Huaneng Inner Mongolia East Energy Co., Ltd were honored as "Outstanding ESG Sustainable Development Best Practice Cases among Chinese Enterprises."



### Listed Company ESG Honors for 2024

#### Huaneng Power International Inc.

- The "Best Sustainable Development Practice Case of Listed Companies" by the China Association for Public Companies (CAPCO).
- The case titled *Continuous Optimization of Power Generation Structure to Advance Low-Carbon Clean Energy - Huaneng Power International Inc.'s High-Quality ESG Implementation Through "Three-Color Culture"* was honored with dual accolades: the "ESG China - Excellence in Practice Award" and the "Outstanding ESG Sustainable Development Case of Chinese Enterprises" awarded by the China Enterprise Reform and Development Society.

#### Huaneng Lancang River Hydropower Inc.

- The case titled *Huaneng Lancang River Hydropower Inc.'s ESG Practices and Applications* was recognized as an "Outstanding ESG Sustainable Development Case of Chinese Enterprises" by the China Enterprise Reform and Development Society.

#### Shandong Xinneng Taishan Power Generation Co., Ltd.

- Awarded the "China Securities Journal 2<sup>nd</sup> Guoan Cup - ESG Golden Bull Award - Top 50 Central SOEs".
- Honored with the "ESG Value Communication Award" by Shenzhen Value Online for the outstanding performance as a listed company.

#### Great Wall Securities Co., Ltd.

- Awarded the "Most Socially Responsible Securities Company" honor by Securities Star.



### Overseas Projects ESG Honors for 2024

#### The Sahihai Power Plant in Pakistan

- Awarded Pakistan's "Best Corporate Social Responsibility Award" and "Most Sustainable Development Award" for six consecutive years.

#### The Lower Sesan II Hydropower Station in Cambodia

- Honored with the "Social Responsibility Award" by Cambodia's Slung Treng Provincial Government for six consecutive years.

#### The Minety Battery Storage Project in the UK

- Awarded the "Outstanding Corporate Governance Case Award" at the inaugural Frankfurt China-Europe ESG Corporate Summit.



Domestic Power Generation

**855.2** TWh

Heating Capacity

**524** Million GJ

Coal Production

**111.04** Million Tons

R&D Investment Intensity

**3.21** %

Energy security and supply are vital to the national economy and people's livelihoods, representing a top priority of the country that demands unwavering attention. We must accelerate the iterative upgrading of key technologies and core products, empower innovations with smart technologies, and enhance the nation's energy security and supply capacity.

— Speech by General Secretary Xi Jinping during his inspection tour in Jiangsu Province

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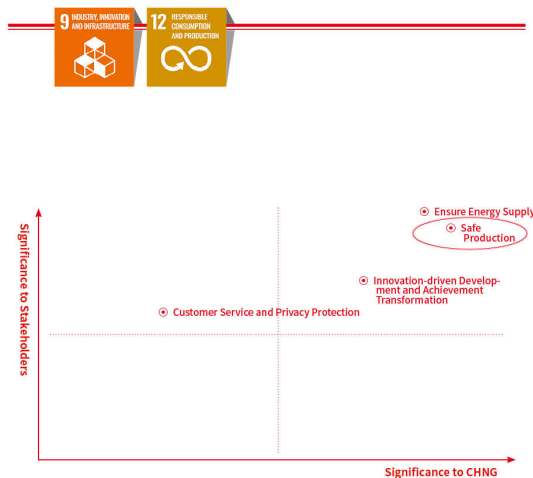
**Top Priorities of the Country,  
Mission-driven Responsibility,  
Pooling Strengths to Enhance  
Functional Value**

# Trace the Origin · Pooling Strengths to Enhance Functional Value

Hot Topics · International Focus

Focus · Issue Identification

Pain Points · Risk Assessment



- Potential Safety Hazards on Site: Certain safety risks exist in field operations including production infrastructure construction, repair and technical upgrades, necessitating heightened attention to potential safety hazards in critical areas such as boilers, coal handling systems, and hazardous chemical storage facilities.
- Potential Hazards of Non-compliant Operations: To prevent work safety accidents, priority must be given to identifying and eliminating violations including unauthorized operations on energized equipment, non-compliant maintenance practices, and improper operation of transport vehicles.
- Hazards from Management Deficiencies: Production and infrastructure enterprises exhibit varying degrees of issues including "excessive and frequent turnover of contractors, along with large but unstable workforces of contractors." These conditions contribute to weakened safety awareness and demand heightened vigilance from relevant enterprises.

Key Points · Striving for Perfection

- Reinforcing Safety Accountability. We should strictly implement the principle of "Three Mandatories" (safety oversight is mandatory for sector supervision, mandatory for operational management, and mandatory for production and business operations), refine the all-employee work safety accountability system, improve the work safety responsibility list and task list, achieve full coverage of positions, full coverage of organizations, and "one position, one list", and promote the implementation of responsibilities level by level.
- Standardizing Contractor Management. We should strengthen safety management accountability for contractors' workforce and personnel, strictly enforce contractor qualification requirements, rigorously crack down on illegal subcontracting and qualification lending, streamline and consolidate contractor teams, and promptly remove non-compliant teams and personnel.
- Deepening Source Control. We should continuously strengthen the development of the dual prevention mechanism, rigorously carry out risk investigation and management for high-risk operations, critical equipment, and key components in accordance with the newly revised *Major & Significant Hazard Identification Checklist*, and promptly take corrective actions for identified deficiencies.
- Strengthening Governance of Violations. We should thoroughly carry out self-examination and self-correction against habitual violations, strengthen safety controls for high-risk operations including confined space work, working at heights, lifting operations, electrical work, and hot work, and continuously foster a work environment that emphasizes compliance with rules and regulations.

Highlights · Benchmarking Practices

- We resolutely shoulder our primary responsibility for ensuring energy supply, and spares no effort to guarantee power generation, heating supply, people's livelihoods, and operational safety, ultimately accomplishing all electricity and heating supply missions with excellence.
- The Company organizes "Quality Month" activities for key projects, actively develop high-quality demonstration projects and mastercrafted benchmark projects.
- Throughout the year, it conducted maintenance on 352 thermal power units and 200 hydroelectric units, achieving an 83% excellence rate for outage-maintenance consistently high-performance standards.
- We accelerated the establishment of a "1+5+N" innovation management system that ensuring comprehensive innovation across key sectors including renewable energy, nuclear power, hydropower, thermal power, and coal.
- The new member of HN Revival family, the "Safe and Trusted DCS," was successfully put into service at Unit 3 of Weihai Power Plant. This milestone marks a significant breakthrough in the field of power generation control safety in China.

Focus · Praises and Honors

- In 2024, four projects—Dongjiakou Thermal Power Plant, Wunonglong Hydropower Station, Jilu Da'an Wind Farm, and Shanyan Solar PV Plant—were awarded China's High-Quality Electric Power Engineering Prize.
- Six hydroelectric units and fourteen thermal power units were awarded the "National Reliability Benchmark Power Generation Unit" title by the China Electricity Council, ranking among the industry's top performers in award achievements.
- The Company became the only central SOE in the power generation sector to be selected for the List of 26 Annual Outstanding Enterprises in Science and Technology Innovation released by SASAC.
- The Company received 2 second prizes of National S&T Progress Award and 51 provincial and ministerial-level science and technology awards.
- The project titled "Next-Generation Low-Energy Post-Combustion Carbon Capture Key Technology and Applications" earned the first prize for electric power technology invention, making it the sole achievement in the industry to receive this prestigious recognition.

## Ensuring Robust and Reliable Energy Supply



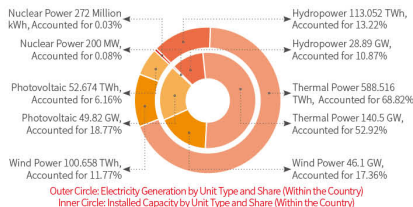
We should guarantee energy supply and achieve multi-object balance by increasing energy supply through multiple channels, and, as a large enterprise, especially a state-owned enterprise, taking the lead in ensuring supply and stabilizing prices.

—Speech by General Secretary Xi Jinping at the Central Economic Work Conference

### Ensure Energy Supply

We resolutely shoulder our primary responsibility for ensuring energy supply, actively responds to multiple challenges including peak seasonal demand in both winter and summer, extreme weather events, and natural disasters such as earthquakes, rigorously takes measures during critical periods including the “Two Sessions” and National Day holidays, and spares no effort to guarantee power generation, heating supply, people’s livelihoods, and operational safety. All available generating units were brought online at full capacity with stable output, while heating units operated at maximum load to ensure uninterrupted supply, ultimately accomplishing all electricity and heating supply missions with excellence.

As the world’s second largest power generation group, the Company has a controllable installed capacity of 269 GW, including 265 GW within China. In 2024, the Company generated a total of 855.2 TWh of electricity domestically, marking a year-on-year increase of 2.96%, accounting for approximately 1/10 of the total output throughout China, with industry-leading comprehensive utilization hours.



The Company firmly upholds the principle that “energy security must be safeguarded through self-reliance.” We actively contribute to building a new energy system and modern power grid, undertake national key R&D projects, continuously enhance high-quality development, and safeguard the fundamental priorities of power supply, people’s livelihoods, and heating services—making significant contributions to securing China’s energy future.

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

As China’s largest residential heating provider, the Company supplies heating services across 1.06 billion square meters, operates the country’s longest heating pipeline project, and is consistently the first utility nationwide to begin the heating season annually when winter arrives—demonstrating “Huaneng Pace” and delivering “Huaneng Warmth.” In 2024, the Company accumulated 524 million GJ of heat supply, with a year-on-year growth of 2%.

### Case

#### China Huaneng Group Co., Ltd. Hainan Branch (hereinafter referred to as Hainan Branch) Actively Responded to Super Typhoon Yagi to Ensure Stable Power Supply

Typhoon Yagi, the 11th super typhoon of 2024, made landfall in Wenchang, Hainan Province on September 6, becoming the most powerful autumn typhoon to hit China since meteorological records began. Hainan Branch mobilized all resources to combat Typhoon Yagi, promptly establishing a Post-Disaster Recovery Task Force that deployed personnel and materials to repair damaged power infrastructure, achieving the fastest possible restoration of electricity and heating supply. Following Typhoon Yagi’s passage, Hainan Branch achieved full grid reconnection of centralized photovoltaic systems within 3 days and restored all 12 thermal power units within 5 days. With only 25% of the grid’s installed capacity, it supplied 40% of the total electricity demand—maximizing equipment safety protection, minimizing economic losses, and delivering peak power support. These efforts made vital contributions to Hainan Province’s post-disaster reconstruction and economic recovery, earning high commendations from Hainan Provincial Government, National Energy Administration, Ministry of Emergency Management, and affected communities.

### Optimizing Electricity Marketing

The Company participated in major research initiatives including *National Unified Electricity Market Development*, *New Market Entities Participation in Electricity Trading*, and *Auxiliary Services Fundamental Rules*, while revising the Electricity Procurement and Sales Management Regulations in accordance with national power sector reform requirements, continuously strengthening risk prevention and compliance management in electricity marketing operations.

The Company, market demand-oriented and customer service-centered, continuously improves service levels and implements refined user service management. For users of different scales, industries, and electricity consumption characteristics, the Company fully utilizes both online and offline channels to develop tailored customer acquisition strategies according to local conditions, designs personalized electricity procurement solutions, meets users’ growing green power demands, and provides efficient, precise, and convenient electricity retail services. In 2024, the total contracted electricity volume on the sales side of the Company reached 299.2 TWh, with 27,219 contracted users, accounting for a market share of 8.74%. Notably, our green power transactions surged to 25.8 TWh, representing a 150% year-on-year increase.

### Case

#### China Huaneng Group Co., Ltd. Northeast Branch (hereinafter referred to as “Northeast Branch”) Powered the Summer Davos Forum with 100% Green Electricity

In June 2024, Northeast Branch actively participated in the 15<sup>th</sup> Summer Davos Forum, completing a green certificate trading of 1,300 certificates (equivalent to 1,300 MWh of renewable electricity) with the Dalian International Conference Center, the forum venue. This achievement corresponds to saving 416 t of standard coal and reducing CO<sub>2</sub> emissions by 1,092 t. In addition, Northeast Branch provided 10,000 t of CER (Certified Emission Reduction) carbon credits to offset emissions generated by forum attendees and staff, enabling the Summer Davos Forum to achieve 100% renewable electricity supply through green certificate trading for the first time—a milestone in low-carbon event hosting.

The Company is a pivotal actor in advancing green energy utilization, clean development, and energy technology innovation. The Forum highly values its partnership with us and looks forward to its continued support in jointly making greater contributions to global energy transition, climate change mitigation, and low-carbon socioeconomic development.

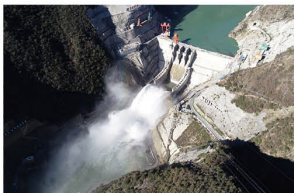
—Founder of Davos Forum: Klaus Schwab

## Crafting Projects of Excellent Quality

The Company rigorously controls engineering quality by implementing a comprehensive talent and institutional framework, establishing a high-standard infrastructure quality management system that ensures coordinated development across all business sectors. The Company strengthens infrastructure management teams by deploying qualified personnel and rigorously implementing regular training and qualification authorization mechanisms, further enhancing the capabilities of its infrastructure workforce. The Company completed the revision of six fundamental regulations, including the *Basic Construction Management Regulations*, and 16 specialized systems. We also developed sector-specific project management guidelines for renewable energy, thermal power, and hydropower sectors, thereby strengthening the foundation of its quality management framework.

The Company focuses on strengthening quality control throughout the entire infrastructure construction process. We intensify the preliminary design review, and continuously carry out design benchmarking and optimization; We strictly control the selection of equipment technical solutions and the review of technical specifications to enhance quality control in equipment and process management. We conduct thorough phased inspections at critical project milestones, implement a robust self-assessment mechanism for quality control, and ensure full compliance with all quality requirements. The Company fully leverages the group-wide professional synergies in lifecycle quality control by mobilizing specialized teams—including Huaneng Clean Energy Research Institute for preliminary design review, Xi'an Thermal Power Research Institute for equipment design quality supervision and Huaneng Quality Supervision Station for quality supervision—to ensure coordinated efforts that effectively eliminate quality defects.

The Company continuously carries out engineering excellence initiatives and organizes "Quality Month" activities for key projects. Focusing on the application of innovative technologies, processes, equipment, and materials, we actively develop high-quality demonstration projects and mastercrafted benchmark projects. In 2024, four projects—Dongjiakou Thermal Power Plant, Wunonglong Hydropower Station, Jilu Da'an Wind Farm, and Shanyan Solar PV Plant—were awarded China's High-Quality Electric Power Engineering Prize. Huaneng Northern Shengli Power Plant (2×660MW) won the Second Prize for Excellent Survey in Power Industry, the *Research on Single-Blade Hoisting Technology for Wind Farms in High-Altitude Mountainous Regions* won the First Prize for Innovation Achievements in Engineering Construction Management in the National Power Industry; Yangpu Thermal Power (2×495MW) and Dalian No.2 Thermal Power Plant's "Replacing Small Units with Large Ones" project won the second and third prizes for Excellent Engineering Design in the power industry, respectively; Eight application cases of the New Energy Smart Infrastructure System were awarded the CEC Power Construction Smart Engineering Exemplary Case Prize by the China Electricity Council, with both the quality and quantity of awards ranking among the top tier of participating power enterprises.



Wunonglong Hydropower Station



Shanyan Solar PV Plant

## Strictly Guaranteeing Work Safety



We should fully implement workplace safety responsibilities, establish a long-term safety management mechanism, continuously enhance safety control capabilities and intrinsic safety levels, and prevent all types of industrial accidents.

—Guiding Opinions on the High-standard Fulfillment of Social Responsibility by Central SOEs in the New Era by the SASAC

## Work Safety Management

The Company strictly observes the requirements of the *Work Safety Law of the People's Republic of China*, adhering to the principles of "safety first, prevention-focused, addressing both symptoms and root causes with emphasis on root-cause solutions." We have revised 10 regulatory documents including the *Work Safety Management Evaluation Measures and Safety Performance Assessment Management Measures*, establishing a clearly-defined, operationally effective, strictly supervised, and accountability-enforced work safety responsibility system. We continuously strengthen work safety funding guarantees and rigorously enforce the organization-wide work safety responsibility system.

The Company diligently implemented the "Three-Year Fundamental Improvement Campaign for Work Safety", continuously strengthened foundational safety management, significantly enhanced intrinsic safety standards, and successfully completed the safe and reliable power supply missions during the 75<sup>th</sup> anniversary of the PRC's founding, the Third Plenary Session of the 20<sup>th</sup> CPC Central Committee, as well as peak summer demand and flood season periods. Throughout the year, no major or severe safety incidents occurred. In 2024, 11 cases from the Company were included in the *Case Compilation of Chinese State-Owned Enterprises Implementing the New Energy Security Strategy of "Four Revolutions, One Cooperation"* compiled by the State-owned Assets Supervision and Administration Commission of the State Council.

### Strengthening Safety Supervision and Guidance

The Company conducts "penetrating" safety inspections for units where accidents have occurred, evaluates the safety management of secondary units, carries out safety management rectification at grassroots units, ensuring all units strictly, substantively, and meticulously take work safety measures.

### Making Every Effort to Eliminate Potential Safety Hazards

The Company promotes the proactive prevention of accidents by shifting the focus from "safety management" into "prior prevention", making all-out efforts to eliminate existing major and above-level potential risks, and substantially improving the quality of risk tiered control and potential hazard investigation and rectification.

### Proactively Responding to Extreme Weather Events

In response to the frequent occurrence of natural disasters such as typhoons, floods, mudslides and earthquakes in 2024, the Company intensified efforts to enhance disaster warning systems for key projects and critical areas. It took measures including strengthened on-duty monitoring and emergency preparedness rigorously to minimize property damage while ensuring zero casualties.

### Special Action for Safety Improvement

**Grassland, Forest Fire Prevention, and Fire Safety:** For over 500 projects located in forest and grassland areas, as well as key fire-prone sites and crowded public places, the Company conducted fire hazard inspections to ensure the proper implementation of measures including "guard against accidents with workforce", "guard against accidents with technology", and "guard against accidents with materials".

**Advancing Dam Safety Enhancement:** In strict compliance with the "Two Lists" (Problem List and Measure List), the Company rigorously implemented corrective actions with a 100% completion rate. The online safety monitoring systems of all 38 dams under the supervision of the National Energy Administration were completed and put into operation as scheduled.

**Transformation of Major Hazard Installations:** The technical transformation of replacing liquid ammonia with urea for major hazard installations in 77 thermal power enterprises was completed.

### Promoting Standardization of Work Safety

Efforts were made to strengthen the construction of safety standardization, and two national standards including the *Technical Regulations for Safety Evaluation of Offshore Wind Farm Operation* were issued.

## Lessons Learned

## Course of the Accident

On September 3, 2024, prior to the landfall of Super Typhoon Yaji, Hainan Branch promptly initiated emergency responses of corresponding levels based on the typhoon warning and response information issued by Hainan Province. All subordinate units swiftly took action and conducted typhoon preparedness inspections. Wenchang Wind Farm conducted comprehensive inspections on 13 newly installed, non-energized wind turbine towers, and organized technical experts along with turbine manufacturer technicians to implement typhoon preparedness measures including yaw system and pitch control adjustments. At about 16:20 on September 6, the super typhoon Capricorn landed in Wenchang, Hainan Province. The maximum wind force near the center reached 17 or above when landing, resulting in the safety accident of 8 typhoon towers falling down and 5 typhoon engines being damaged to a large extent in Wenchang Wind Farm, causing economic losses and certain potential safety hazards.

## Causes of the Accident

- This typhoon represents the strongest autumn typhoon to make landfall in China since meteorological records began, characterized by exceptional duration and intensity. It maintained super typhoon status for over 56 hours during its impact on Hainan Island, constituting a historically rare disaster event that exceeded the emergency typhoon preparedness standards established for wind farms.
- During the typhoon event, Wenchang Wind Farm's 13 turbines were not yet commissioned. Compared to operational turbines, these units faced significantly higher damage risks due to: absence of dynamic adjustment capabilities, failure of protection mechanisms, and adverse static load conditions.

## Handling of the Accident

- Following turbine damage, Wenchang Wind Farm immediately restored unaffected turbines to normal operation and prioritized power supply stabilization measures.
- In October 2024, Wenchang Wind Farm organized a special demonstration meeting for the capacity expansion and repowering project, where it was determined that the wind turbines would be designed to withstand a 50-year recurrence typhoon with a maximum 10-minute average wind speed of 65 m/s and a 3-second gust wind speed of 91 m/s.
- In accordance with the requirements established during the special demonstration meeting, a comprehensive study was conducted to develop upgrade solutions for 16 typhoon-resistant wind turbines—including 13 units damaged during the typhoon—with specific retrofit measures determined.
- In June 2025, the upgrading and renovation of 16 wind turbines were successfully completed, achieving full capacity production.

## Ensuring Equipment Safety

The Company places high priority on equipment safety assurance and continuously enhances operational reliability. Throughout the year, it conducted maintenance on 352 thermal power units and 200 hydroelectric units, achieving an 83% excellence rate for outage-maintaining consistently high-performance standards. In 2024, the Company maintained a perfect equipment safety record with zero accidents. Six hydroelectric units and fourteen thermal power units were awarded the "National Reliability Benchmark Power Generation Unit" title by the China Electricity Group, ranking among the industry's top performers in award achievements.

The Company rigorously implemented the "Unplanned Shutdown Control" campaign, recording 87 full-scope unplanned shutdowns (both hydro and thermal units) – a year-on-year reduction of 2 incidents – with 79 thermal power plants and 60 hydropower stations achieving zero unplanned shutdowns.

The Company's equivalent availability factor (for hydropower and thermal power) was 94.03%, up 0.13 percentage points year-on-year. The average availability rates of wind power and centralized photovoltaic inverters were 91.6% and 99.1%, up 0.1 and 0.7 percentage points year-on-year, respectively. The average monthly failure rates were 0.26 failures/unit-month and 0.039 failures/unit-month, representing year-on-year decreases of 43.47% and 32.76%, respectively. This exceeded the annual target of "20% reduction in failure rate".

## Key Area Safety

## Safety in Coal Industry

The Company consolidated the foundation of safety management in its coal operations by formulating the Comprehensive Rectification Plan (Coal Mine Safety Protection), with the goal of achieving "zero fatalities" and "zero injuries". We have rigorously implemented initiative initiatives including the "100-Day Intensive Campaign on Coal Mine Safety and Environmental Protection" and the "Zero-Harm Workplace Safety Competition", driving continuous improvement in safety management performance. In 2024, the Company's coal mining operations maintained stable safety performance, with 17 mines achieving "zero harm" and 11 mines surpassing 3,000 accident-free days. Among them, the Matigou Coal Mine achieved over 7,300 days of work safety, while the Kichuan Coal Mine exceeded 6,000 days of work safety.

The Company has thoroughly established a standardized management system for coal mine safety production. In 2024, the Weijiamao, Lingdong, Tiebei, and Huating coal mines successfully passed the first-level assessment and acceptance of the standardized management system for coal mine work safety by the National Mine Safety Administration. The Tiebei Coal Mine was named a "Double Top Ten" model coal mine by the China National Coal Association, while the Lingtu Coal Mine was honored with the title of "Advanced Coal Mine." By the end of 2024, the Company had passed the acceptance of 6 Class I standardized mines, 7 Class II standardized mines, and 3 Class III standardized mines, with 18 mines being awarded the title of "Super Safe and Efficient Mines" in the coal industry.

## Safety in Nuclear Power Industry

The Company formulated the *Implementation Plan for Nuclear Power Safety and Quality Improvement (2022-2025)*, thoroughly implementing the Special Campaign on Comprehensively Strengthening Nuclear Safety Management in the Nuclear Power Industry jointly launched by three national ministries and commissions of China. It completed issue rectification with high quality while integrating the campaign to strengthen safety risk control and hidden hazard investigation and management, promoting the dynamic clearance of major risks and hazards, thereby effectively enhancing nuclear safety management capabilities.

The overall safety situation in the Company's nuclear power sector remains stable, with the initial output of the high-temperature reactor unit being launched. The quality of engineering construction and the operational safety of the units are controllable and under effective control. Since the commencement of the high-temperature reactor project on December 9, 2012, the Company's nuclear power division has maintained a continuous work safety record of 4,405 accident-free days by the end of 2024.

## Safety in Outsourcing Engineering and Construction Sector

The Company has rigorously strengthened the standardized management of contractors' construction safety by formulating the *Safety Management Measures for Contracted Projects in Power Enterprises and the Guidelines for Process Evaluation and Outcome Assessment of Contractors*, continuously improving the institutional framework for infrastructure construction conducted by contractors. The Company adheres to the principles of "strict qualification, enhanced training, and mandatory assessment" and implements "Four identical" homogeneous management for contractors, including screening, streamlining, and standardizing contractor forces. These measures have further clarified and reduced the number of contractors. The Company has optimized infrastructure project management by focusing on critical construction processes such as heavy lifting and major risks like falls from height. It strengthens risk anticipation and control to mitigate potential hazards at the source.

## Safety in Overseas Projects

The Company continuously improved workplace safety regulations and emergency response protocols for its overseas projects. We rigorously implemented the "Anti-Three Violations Campaign" and conducted thorough safety hazard investigations, identifying and rectifying 487 violations and 1,198 potential hazards with a 92.38% correction rate. These measures have ensured the stable operation of the power station and effectively enhanced the level of safety management for overseas projects.

The Company attaches great importance to the safety of personnel involved in overseas projects, effectively utilizes the safety guarantee mechanism for jointly building the Belt and Road Initiative, formulates special security plans, maintains active communication with relevant departments, and successfully completed the safe rotation of 218 personnel in 7 batches throughout the year.

## Network Information Security

The Company continuously improves its cybersecurity governance mechanisms by issuing a dedicated cybersecurity master plan and formulating key management documents including the *Cybersecurity Work Plan for Critical Information Infrastructure and the Data Security Management Measures*. The Cybersecurity Operations Center maintains 24/7 normalized operations, effectively leveraging the "Huangren Blue Shield" system to establish comprehensive cybersecurity protection capabilities and a self-operated maintenance system centered on the Network Situational Awareness and Security Operations Platform. It has independently implemented an integrated group-wide cybersecurity operations platform, achieving centralized management for 30 internet access points and 6 key grassroots units. All cybersecurity risks remain under effective control.

The Company successfully hosted the "Blue Shield Cup" National Cybersecurity Vocational Skills Competition, which achieved record highs in both participation scale and impact, securing outstanding results including one first prize and two excellence awards in the individual competition, and a third-place prize in the team competition. It participated in the China Industrial Internet Security Competition and won the first prize in the enterprise category.

## Enhance Safety Awareness

The Company has fully implemented the requirements outlined in the *Emergency Response Plan Management Measures*, striving to foster a robust workplace safety culture. Through comprehensive initiatives including safety education and training programs, emergency response drills, and safety culture development activities, The Company has adopted multi-pronged approaches to enhance all employees' emergency preparedness and continuously elevate organizational safety awareness.

In 2024, The Company strengthened safety awareness education by organizing case study sessions and rigorously taking accident prevention measures to prevent the recurrence of similar incidents. The Company organized two training sessions for work safety supervisors from grassroots enterprises, effectively enhancing the safety management competencies of key personnel, with over 170 participants attending. The Company organized two further education training sessions for certified safety engineers, providing training to 231 participants. Through this initiative, the total number of certified safety engineers has increased to 2,745, representing a 7% year-on-year growth. The Company advanced the development of model enterprises in safety culture, with a cumulative total of 26 subsidiaries/units being recognized as "Safety Culture Demonstration Enterprises".

## Achieving Self-Reliance and Strength in Science and Technology



Setting our sights on the global frontiers of science and technology, national economic development, the major needs of the country, and the health and safety of the people, we should speed up efforts to achieve greater self-reliance and strength in science and technology.

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

## Management of Technological Innovation

### Case

#### Shidao Bay Nuclear Power Co., Ltd. Organized a Work Safety Training Session in the form of the "First Lesson upon Commencement"

In February 2024, shortly after the Spring Festival, Shidao Bay Nuclear Power Co., Ltd. organized a work safety training session in the form of the "First Lesson upon Commencement". The session was delivered by its Party Committee Secretary, who gave a themed lecture titled "Strengthening Work Safety Responsibility and Fortifying the Ideological Line of Defense for Safety". During the training, the spirit of the National Work Safety Video Conference was conveyed to all employees. Participants also watched the Warning Educational Film on *Power Safety Accidents and Natural Disasters*, which provided a profound analysis of the safety challenges faced by the company. Additionally, key tasks across all fields were redeployed and reinforced, effectively enhancing the safety awareness of all staff.



A Work Safety Training Session in the form of the "First Lesson upon Commencement"

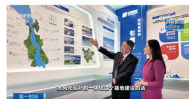
### Case

#### Nuozhadu Hydropower Station Held a Special Earthquake Emergency Drill for Hydropower in Yunnan Province

In September 2024, to improve staff emergency response capabilities and coordination in earthquake disasters, Nuozhadu Hydropower Station successfully organized China's first provincial-level special emergency drill for hydropower earthquakes. The drill adhered to problem orientation, practical simulation, and command coordination, featuring modules including earthquake evacuation, unit shutdown procedures, and emergency barrier lake management. It comprehensively tested and demonstrated the comprehensive capabilities of large hydropower stations in command coordination, rapid response, emergency handling, and disaster prevention/reduction when facing sudden earthquake disasters. The drill accumulated practical experience for the power industry in dealing with major earthquake emergencies and received high praise from the National Energy Administration and local governments.



"Anlan-2024" Yunnan Hydropower Earthquake Special Emergency Drill



Scan the QR Code to Watch the CCTV Report Titled *Innovation in Action - Visiting China Huaneng: Green Energy Surge Powers New Growth Path*, Chairman Explains Tech Innovation Progress

The Company consistently prioritized technological innovation, addressing national needs, challenges faced by both supply and demand chains, and industry trends. We focused on the forefront of global energy technology, aiming to support the development of renewable energy systems and power systems. By leveraging the pivotal role of enterprises, we intensified independent innovation and accelerated breakthroughs in key technologies and smart solutions through new technologies. We continually deepened the cooperation, innovation, and integrated development among upstream and downstream enterprises, universities, research institutions and consumers. Our goal was to build a national strategic technological strength and tackle significant scientific and technological challenges that impact national security, development, and long-term interests, promoting greater self-reliance and strength in science and technology.

The Company was committed to deepening reforms in our scientific and technological innovation management system and mechanisms. We strengthened top-level design and comprehensively plan our overall development. We accelerated the establishment of a "1+5+N" innovation management system that covered the entire process of R&D investment, project management, and achievement application, ensuring comprehensive innovation across key sectors including renewable energy, nuclear power, hydropower, thermal power, and coal.

- The Company optimized our R&D investment structure with total research expenditure reaching RMB 12.87 billion (3.21% of revenue, +0.1% YoY). We increased the share of basic research in applied sciences in our R&D investments, allocating RMB 460 million to support both basic research and basic research in applied sciences, thereby ensuring the fulfillment of national scientific research objectives.
- The Company strengthened the management of technology projects and fully implemented an intelligent technology information management platform. This initiative has enabled comprehensive status control throughout the project lifecycle, significantly improving management efficiency and standardization.
- The Company established a technology innovation collaboration work group and created a collaborative control mechanism for technology innovation. This group organized the refinement of major technology projects and cutting-edge technology directions, effectively addressing key challenges in the execution of major projects and the application of achievements.
- The Company developed the *Special Implementation Plan for Scientific and Technological Innovation to Promote the "9+6" Industrial Development*, which established a matrix covering key support areas such as renewable energy, large base construction, hydropower, nuclear power, digital intelligence, and future industries.
- The Company prioritized the cultivation of high-level technology innovation talent, adopting a "customized policy for each individual" approach to nurture leading figures in key fields, top technology experts, young scientific elites, and innovative teams, thereby systematically enhancing technological innovation capabilities.

## Research and Development of Core Technologies

Lead

9

National Key Research and Development Program Projects

The Company continued to strengthen national strategic technology capabilities, leading and undertaking several national major scientific and technological initiatives. 53 national major scientific and technological breakthroughs have progressed as planned, and the Company undertook 1 national science and technology project (HTR-PM project). We also received approval to lead 9 national key research and development program projects, with 2 of our achievements recognized in the National Energy Administration's fourth batch of major first-of-a-kind technological equipment in the energy sector. Significant breakthroughs have been made in core technological research, resulting in a steady stream of innovations that drive industry advancement.

- ① The world's first rapid assessment system for high dams during strong earthquakes was successfully established.
- ② The industrial validation of next-generation phase-change carbon capture technology was completed, achieving the lowest energy consumption globally.
- ③ The construction of the world's largest carbon capture facility for coal-fired power, with a capacity of 1.5 million tons per year, was successfully finalized.
- ④ The world's first COAP technology, independently developed by the Company, has achieved a full-flow engineering demonstration for a 135MW unit.
- ⑤ The Company developed the world's most compact and power-dense key equipment for a direct current transmission system.
- ⑥ The Company independently developed and created an efficient perovskite photovoltaic material system, energy equipment and process packages, with silicon-perovskite tandem solar cell efficiency exceeding 26%.
- ⑦ The Company developed and demonstrated "Yellow Sea No. 1", China's first wave-resistant floating photovoltaic (FPV) platform.
- ⑧ The world's first dual-rotor wind turbine, independently developed by the Company, has achieved application demonstration.
- ⑨ China's first fully domestically produced digital turbine supervisory instrumentation system (TISI) was recognized as one of the top ten digital technology achievements by SASAC, marking it as the only achievement from a central SOE in the power sector.
- ⑩ 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 of China Association for Science and Technology.

## Commercialization of Scientific and Technological Achievements

The Company actively advanced the application and industrialization of technological achievements. We formulated the *Management Measures for the Application of Scientific and Technological Achievements and the Management Measures for Demonstration Application Projects of the First (Set of) Major Technical Equipment*, creating a "Platform for the Release, Display, and Transaction Operations of Technological Innovation Achievements." This initiative has laid a solid foundation for the effective application of technological achievements.

The Company accelerated the swift conversion of technological achievements into productive forces, identifying 8 first (set of) major technical equipment throughout the year. We published the 2024 Advanced Technology Application Promotion Catalog, which included 7 achievements recognized in the *Recommended Catalogue of Technological Innovation Achievements of Central SOEs (2023 Edition)*. Xi'an Thermal Power Research Institute, Huamei Clean Energy Research Institute, and Huangling Lancang River Hydropower Inc. were recognized as leading enterprises by SASAC. Suzhou Xire Energy Conservation and Environmental Protection Technology Co., Ltd. was acknowledged as a national-level "Little Giant" enterprise that uses sophisticated technologies to produce novel and unique products, further enhancing the industry's core competitiveness.

3

Companies

were Recognized as Leading Enterprises by SASAC

The Continuous Carbon Dioxide Monitoring System was Demonstrated and Deployed Across

71 Coal-fired Power Units



Pengzhou Hydrogen Production Demonstration Station

- ① Promoted and applied the pre-drying carbonization machine in a total of 16 units (sets).
- ② The continuous carbon dioxide monitoring system was demonstrated and deployed across 71 coal-fired power units.
- ③ The demonstration project for integrated frequency regulation, peak shaving and secure heat supply enhancement based on molten-salt thermal energy storage was commissioned at Haimein Power Plant. This project features China's first fully domestic core equipment for 60 MW/120 MWh frequency regulation and peak shaving of molten-salt thermal energy storage coupled coal-fired power units operating in the spot market.
- ④ China's first combined steam-electric molten-salt thermal energy storage project was successfully launched at Jining Huayuan Thermal Power Plant.
- ⑤ The world's largest commercial-scale megawatt-scale perovskite module photovoltaic demonstration project was completed and is now operational at Yiming Photovoltaic Power Station, achieving a localization rate of over 90% for domestic equipment.
- ⑥ The first domestic "Endogenous Immunity-Enabled Secure and Trustworthy Distributed Control System (DCS)" was successfully implemented at Weihai Power Plant.
- ⑦ For the first time in China, the industrial production of domestically developed 650° C-grade superalloys for large-scale valves was successfully achieved, with successful trial forging of 10-ton-class components.
- ⑧ The highest altitude and largest scale HV direct-chain energy storage system in the world, the Hainan Prefecture 150 MW/600 MWh Energy Storage Project, was successfully connected to the grid.
- ⑨ The 30MW high-efficiency heterojunction battery module demonstration platform in Jiayuguan was successfully connected to the grid, marking the official launch of the Company's first large-scale advanced photovoltaic technology demonstration application base.
- ⑩ China's largest cluster-type battery-swapping mining truck project - Weijiamao battery-swapping mining truck project in commercial operation, was successfully implemented.
- ⑪ The first large-scale water electrolysis hydrogen production project in the southwest region - Pengzhou hydrogen production demonstration station, officially commenced commercial operations.

## Build a Platform for Technology Research and Development

The Company made significant strides in advancing the construction of innovation platforms and actively participated in establishing the Huirou National Laboratory. We successfully developed the Efficient and Flexible Coal Power and CCUS National Key Laboratory and the National Engineering Research Center for Clean and Low-Carbon Thermal Power System Integration and Operation & Maintenance, achieving substantial breakthroughs in national-level innovation platform construction.

The Company has continuously deepened the cooperation, innovation, and integrated development between upstream and downstream enterprises, universities, research institutions and consumers. An academician and expert workstation was established in the offshore wind power sector. The Company developed the most autonomous and controllable new energy smart operation and maintenance platform in China, characterized by extensive data integration and comprehensive application scenarios. This platform provided services to 14 central SOEs and local SOEs, connecting over 90GW of new energy installed capacity, significantly enhancing the management efficiency and economic benefits of new energy projects for central SOEs. By focusing on the critical strategic needs of CCUS industry development, the Company unified our strengths, integrated resources, tackled key core technologies, and accelerated the marketization and commercialization of CCUS. The Company established 3 technology research and development centers under the National Energy Administration and 5 "Striving to be the First" Innovation Platforms.

Renewable Energy Smart Operation and Maintenance Platform Connecting over

90

GW of Renewable Energy Installed Capacity

## Nurturing Strategic Emerging Industries

Strategic Emerging Industries Revenue Exceeds RMB

**87.6** Billion

The Company took significant steps in developing our strategic emerging industries by developing and implementing the Action Plan for *Accelerating the Development of Strategic Emerging Industries (2024-2027)*. This plan outlined clear development directions and goals for various sectors and technical services, fostering closer integration between technological and industrial innovations. In 2024, the Company focused on enhancing revenue from these strategic emerging industries, achieving an operating income exceeding RMB 87.6 billion, which accounted for 21.9% of total revenue—a remarkable increase of 4.9 percentage points compared to the previous year, thereby surpassing the performance targets set by SASAC.

The Company actively nurtured new forms of productivity by establishing a project reserve pool dedicated to strategic emerging industries. We concentrated on key areas such as comprehensive energy services, green hydrogen production, geothermal energy, compressed air energy storage, smart power plants, and virtual power plants. This focused approach enabled several strategic emerging projects to achieve significant breakthroughs, allowing the Company to explore new markets and create a "second curve" of growth while fostering a supportive environment for industry development. In 2024, the Longdong Base, Lanshang Base, and Zhejiang Offshore Wind Power projects were recognized as part of the inaugural "Top 100 Projects" in strategic emerging industries by SASAC. The Shanghai e-commerce company's case, *Riding the Cloud, Harnessing Data, Empowering Intelligence – Building New Quality Productive Forces in Clean Energy Supply Chains*, was selected as one of the *2024 New Quality Productive Forces Development Cases*. Huajiang Storage and Innovation Technology Co., Ltd. and Huajiang Optoelectronic Technology Co., Ltd. have been selected as Starter Enterprises by SASAC.

## Digital and Intelligent Transformation and Upgrading

The Company made significant progress in advancing the "Digital and Intelligent Huaneng" initiative, establishing a comprehensive three-level digital and intelligent management system that ensured effective communication from top to bottom. We enhanced the "1+M+N" digital and intelligent management system and published the *Huaneng's Digital & Intelligent Transformation Action Plan (2025-2027)* as well as the *Huaneng's 128 Major Digital-Intelligent Transformation Initiative Outline (2025-2027)*. The focus was on building one unified brand for digital and intelligent transformation, consolidating three core platforms (infrastructure, cybersecurity, and R&D), and deploying nine key project categories, effectively integrating digitalization with production and operation. The Company organized the application and implementation of major digital and intelligent projects. The Company issued the *Guidelines for Regional Cloud Infrastructure Construction and the Artificial Intelligence Planning and Design Plan*, along with other specialized plans and technical specifications for digital and intelligent transformation, to facilitate the orderly development of related businesses. By 2024, the Company's key industries achieved a consistent operation of digital platforms.

- ⑥ The Company was approved as a first-batch pilot for the SASAC's "One Enterprise, One Dashboard" data visualization system for state-owned asset supervision), and has been advancing the project in an orderly manner.
- ⑥ The R&D and Demonstration Project for AI Hybrid Large Models in Production and Operations within the Power Generation Industry, Specifically Designed for a New Type of Power System, has been successfully approved as part of the NDRC's "AI Plus" National Dual-Priority Initiatives (Major Projects and Key Programs).
- ⑥ The first batch of 11 regional operation centers achieved full connectivity with Huaneng Cloud.
- ⑥ A unified smart energy management platform was established to monitor thermal power unit data across all scenarios and conduct benchmarking analysis.
- ⑥ The Company accelerated the development of smart green mines, unmanned operations now cover all fixed areas, eight intelligent mines have been completed, and Hetaoyu Mine has been recognized as a national-level intelligent demonstration mine.
- ⑥ Our 5G smart mine project, "Shared Core for Multiple Mines", was selected as a benchmark case by both the China 5G+ Industrial Internet Conference and the national coal industry.

## Encourage Employees to Innovate in Technology

Total Funding for Mass Innovation Projects RMB

**64.54** Million

The Company made significant progress in advancing mass innovation initiatives by formulating a range of institutional documents, including the *Management Measures for Mass Innovation Projects*, *Management Measures for Innovation Workshops in Grassroots Enterprises*, *Management Measures for the Promotion and Application of Employee Technological Innovation Achievements*, *Management Measures for the Review of Employee Technological Innovation Achievements*, and *Management Measures for the Innovation Workshops Alliance of Employees (Model Workers, Makers, and Craftsmen)*. This effort fostered a vibrant atmosphere for "Mass Entrepreneurship and Innovation", effectively stimulating employees' innovative potential and vitality. In 2024, the Company launched 339 mass innovation projects, with total funding reaching RMB 64.54 million. The Company recognized 238 outstanding employee technological innovation achievements, with 122 of these receiving awards from higher-level labor unions and industry associations. The third batch included the recognition of 10 Huaneng Maker Workshops and 6 Huaneng Craftsman Workshops; cumulatively, over 160 grassroots enterprise technological innovation studios were acknowledged, and 204 Huaneng craftsmen and 50 Huaneng makers were cultivated and recognized.

The Company concentrated on enhancing the promotion and application of employee technological innovation achievements, releasing two batches of 83 achievements for promotion and application. The first batch comprised 16 employee technological innovation achievements that were applied across 56 organizations, generating over RMB 35 million in commercialization value. The second batch included 35 directly commercialized employee innovations and 25 innovations in pilot verification. The incubation entities have secured 50+ adoption agreements with potential end-users.

### Huaneng Technology Innovation·Abundant Achievements in 2024

The Company became the only central SOE in the power generation sector to be selected for the List of 26 Annual Outstanding Enterprises in Science and Technology Innovation released by SASAC.

The Company received 2 second prizes of National S&T Progress Award and 51 provincial and ministerial-level science and technology awards.

The project titled "Next-Generation Low-Energy Post-Combustion Carbon Capture Key Technology and Applications" earned the first prize for electric power technology invention, making it the sole achievement in the industry to receive this prestigious recognition.

The Longdong CCUS project was successfully chosen as one of the first advanced technology demonstration projects for green and low-carbon development by NDRC.

#### Standard Release and Formulation

Throughout the year, the Company led the publication of four international standards, initiated seven international standards, and was honored with the ISO Excellence Award.

The Company took the lead in issuing 6 national standards, 27 industry standards, and 19 group standards.

The Company also took the lead in establishing a national-level standardization platform.

#### Intellectual Property Protection

In the whole year, the Company secured a total of 5,498 patent grants, including 4,932 domestic patents (3,031 invention patents, accounting for 61.49%), with 1 patent winning China Patent Gold

Award, 566 overseas patents, of which 548 were granted in the U.S., Europe, and Japan (339 invention patents, accounting for 61.86%), and 1 patent awarded Geneva Patent Gold Award.

In the patent quality evaluation ranking of central SOEs published by SASAC, the Company consistently achieved a Class A for three consecutive years, entering the top ten for the first time and securing the leading position in the industry.

By the end of 2024, the Company held 8,242 valid invention patents, marking an impressive increase of 8.8 times compared to the end of the 13<sup>th</sup> Five-Year Plan.

#### Employee Technological Innovation

3 achievements awarded the 12<sup>th</sup> Golden Bridge Prize by China Technology Market Association.

21 achievements honored with the 2024 Power Industry Employee Technological Achievement Award by China Electricity Council.

29 achievements recognized as Outstanding Employee Innovations in the National Energy-Chemical-Geology System.

55 achievements granted the Employee Technological Innovation Excellence Award by China Workers' Technical Association.

14 projects won the 4<sup>th</sup> Innovation & Efficiency Award for Power Enterprise Workgroups.

16 workshops certified as Innovation Workshops by China Workers' Technical Association.





## Cross-Industry Synergy for Collective Empowerment



Developing a modern industrial system. The Company consolidated our leading position in advantageous industries while accelerating efforts to address shortcomings in areas critical to security and development, thereby enhancing our capacity to ensure the supply of strategic resources.

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

### Focusing on the Development of Power Sector



The Company's power industry adhered to the principles of green development, continuously accelerating structural adjustments and establishing a new transformation framework supported by renewable energy, hydropower, and nuclear power. We vigorously promoted the high-quality development of wind and solar energy, actively advanced hydropower projects, and pursued safe and orderly nuclear power expansion, consistently increasing the share of low-carbon clean energy in our installed capacity while optimizing thermal power development to maintain our power supply guarantee role.

In 2024, the Company achieved a significant breakthrough in growth, with the total installed capacity of wholly-owned and controlling power plants, both domestically and internationally, reaching 269 GW. Among this, low-carbon clean energy accounted for 139 GW, representing 51.6%, marking a historic milestone of surpassing 50%. This reflected an increase of 4.8 percentage points year-on-year and a rise of 15.1 percentage points compared to the end of the 13<sup>th</sup> Five-Year Plan.

The Company further clarified our development principle for thermal power as "increase electricity, reduce proportion", Dalat Phase V and Suzhou Gas Turbine projects were completed and put into operation, Unit 1 of Zhengming Phase II Peak-Shaving Project successfully connected to the grid, and the construction of Units 5 and 6 in Haimen and the Manzhouli expansion project commenced. Additionally, 3 integrated projects in Yushe, Shanguo, and Weijiamiao were included in the first batch of "Dual Joint Operators" demonstration projects.

### Driving High-Quality Development Through Scientific and Technological Innovation



The Company 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 the Company, internal and external coordination, and full coverage of main business. 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 2024, the Company's science and technology sector achieved an operating revenue of RMB 1.54 billion, representing a year-on-year growth of 1.7% and an average annual growth rate of 14.6% since 2021. The total profit was RMB 400 million, an increase of RMB 34 million year-on-year.

### Strengthening Financial Support Functions



The Company optimized and adjusted our financial industry structure, promoting the orderly development of key financial services, including securities, insurance, trust, and leasing. The industry and finance synergy platform achieved comprehensive coverage by establishing archives for 49 industrial and regional companies. Through "Digital & Intelligent Empowerment", the Company enhanced the role as a central hub for industry and finance collaboration, actively supporting our core business and the real economy. By the end of 2024, the total assets of the Company's financial sector reached RMB 258.692 billion, generating operating income of RMB 14.212 billion and a net profit of RMB 4.589 billion for the year.

- The Company facilitated the installation of 3177 MW of renewable energy capacity through various avenues, including funds, leasing, and investment consulting.
- Providing financing of RMB 47.832 billion to the Company and our upstream and downstream enterprises through bond underwriting and asset securitization.
- The Company revitalized renewable energy subsidies totaling RMB 424 million through the rolling issuance of ABCP.

- The Finance Company implemented a comprehensive strategy combining "Bills + Credit + Settlement" to ensure energy supply, issuing RMB 3.8 billion in special loans for fuel procurement to support enterprises in increasing their winter coal inventories.
- Great Wall Securities and Guicheng Trust focused on promoting green finance, issuing RMB 28 billion in REIT-like products, achieving interest rates that set new lows in multiple markets.
- Alltrust Insurance proactively addressed extreme weather conditions by establishing a green claims channel, effectively ensuring the Company's stable operation.
- The "Huaneng Cloud Link" project of Cloud Financial was recognized as a standout example in the inaugural "Typical Cases of Digital Technology Applications in Digitalization and Green Transition" by China Electricity Council.

### Optimizing the Development of Coal Sector



The Company continued to improve our coal industry development strategy, preparing an implementation plan for clean and efficient coal utilization from 2024 to 2027, alongside a large-scale equipment renewal plan. We actively advanced project construction and expedited approval and release of advanced coal production capacity. By the end of 2024, the Company's total coal production capacity reached 124.7 million tons per year, reflecting an increase of 5.9 million tons year-on-year. Coal output was recorded at 111.04 million tons, up by 3.04 million tons year-on-year. Both capacity and output surpassed 100 million tons for three consecutive years, with coal production ranking third among central SOEs. In 2024, the total profit from the coal industry reached RMB 11.3 billion, an increase of RMB 700 million year-on-year, marking the third consecutive year of exceeding RMB 10 billion.

- The construction of the Xinzhuang Coal Mine infrastructure was nearing completion, and the Xinzhuang mine and Mijiagou coal preparation plant successfully passed project acceptance.
- The optimization project for the ventilation system at the Hetaoyu Coal Mine progressed steadily, achieving a monthly average advance of over 200 meters for the main return airway TBM, with a single-day advance of 16 meters setting a new historical record.
- Construction at the Diandong Coal Mine proceeded safely and smoothly, with the Yuwang Coal Mine successfully entering its third phase of development, and the Ballongshan Coal Mine Surface-Underground Integrated Gas Drainage Project being implemented as planned.
- The orderly execution of the "1-Optimization & 3-Reductions" initiative commenced, with transformation projects at the Huating and Yanbei Coal Mines beginning construction, and the return air shaft at the Lingquan Coal Mine being excavated ahead of schedule.

### Building a New Supply Chain System



The Company 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, our collective ability to withstand market risks was significantly enhanced. In 2024, the Company supplied a total of 104 million tons of coal, achieving a freight volume of 63.18 million tons and a port throughput of 76.53 million tons. The average benchmark price for coal transported via waterway was RMB 1,033.41 per ton, reflecting a year-on-year decrease of RMB 138.45 per ton, which resulted in a reduction of RMB 7.77 billion in fuel procurement costs for power plants; the total profit reached RMB 175 million.

- The Company continued to optimize the layout of port nodes and logistics networks, establishing strategic reserves exceeding 1 million tons and enhancing regular coal distribution capabilities at key coal-exporting and transfer ports, including Caofedian, Taicang, Haimen, and Luoyuan.
- By strengthening reserve allocation and transportation, the Company completed 1,667 coal transport voyages, totaling 74.79 million tons, with the peak summer strategic reserve reaching 1.1 million tons.
- Efforts to optimize the overall allocation of resources and transportation capacity led to a year-on-year reduction of 7.63 hours in average port detention time for shipments from the four major mines, and a 6.77-hour decrease for "Huaneng Premium" shipments.
- The Changing Power Plant participated in developing a new type of green electric-driven vessel, Dongxing 100, which successfully completed its maiden voyage at Taicang Port, saving 100,000 liters of fuel and reducing carbon emissions by 2.6 million tons annually.
- Fujian Port Company's shore power system delivered full compatibility with all standard vessel power interfaces and complete coverage across berths, further enhancing its shore power service capabilities. Throughout the year, 39 vessels were connected to shore power, resulting in a total electricity supply of 16,000 kilowatt-hours.
- Caofedian Port attained the four-star standard for China's Green Port, successfully passing the expert evaluation for green ports.

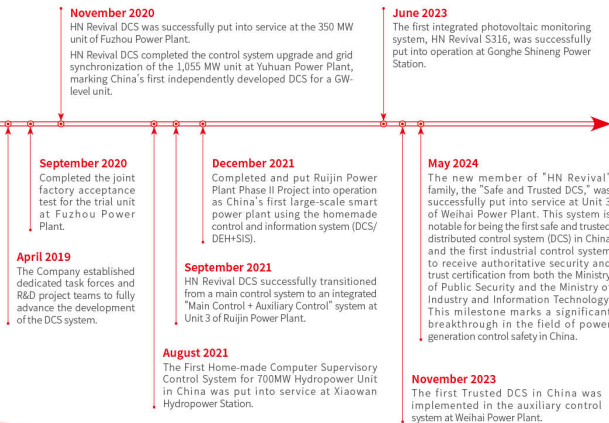
## Actions Speak Louder

## Leading Through Self-Driven Innovation

If the power generation industrial control system is the "Nerve Center" that ensures the smooth operation of power plants, then the "HN Revival" family of industrial control systems is the first in China to hold complete independent intellectual property rights, serving as the true "Nerve Center" for these facilities. The latest member of the HN Revival family, the "Safe and Trusted DCS", acts as a "Nerve Center" equipped with a genetically embedded immune protection system, effectively injecting "Safety Genes" into the stable operation of power plants.

The development story of the "HN Revival" family dates back five years. In 2019, the Company took the initiative to embrace our mission of achieving high-level technological independence and self-reliance by launching the research and development of domestically produced power plant industrial control systems. From the release of the first fully independent DCS in 2020 to the realization of large-scale industrial applications and, ultimately, the operation of the "Safe and Trusted DCS" in 2024, the Company has successfully established self-sufficiency in this previously "barren field," positioning China's "Smart Manufacturing" among the world's leaders.

### Key Milestones in the Development of the "HN Revival" Family



While "From 0 to 1" signifies the initial breakthrough in technological innovation, the transformation of these achievements into market applications exemplifies the evolutionary journey of "From 1 to Infinity." Enhancing the transformation of scientific and technological achievements is the critical "gateway" linking innovation in science and technology with industrial innovation, as well as the key to converting them into new quality productive forces.

As of the end of 2024, the "HN Revival" family series products have been successfully deployed across over 60 thermal power units, 40 hydropower units, and 200 offshore/onshore wind turbines in China. This widespread adoption has driven the industrial application of more than 1 million domestically produced chips, demonstrating the product's growing market competitiveness. Its system functionality and performance have gained industry-wide recognition.

We have successfully completed large-scale deployment across over 60 units/sets, including several groundbreaking domestic DCS implementations in China's power industry: the nation's first fully localized DCS system at Fuzhou Power Plant, the first fully domestic DCS for a GW-level generating unit at Yuhuan Power Plant, and the first fully integrated (main+auxiliary systems) domestic DCS solution for a GW-level power plant at Ruijin Power Plant.



Thermal Power

We have successfully developed the HN Revival fully home-made hydropower computer monitoring system and achieved the first domestic deployment of a 700MW-class fully home-made hydropower control system at Xiaowan Hydropower Station.



Hydro-power



New Energy

We have independently developed the HN Revival renewable energy integrated monitoring platform, enabling unified deployment across stations and regional control centers, along with integrated monitoring of high-capacity multi-systems. Its photovoltaic version (S316) was put into operation in Gonghe Shining Photovoltaic Power Station.

Nuclear Power

Building upon the proven technological framework of HN Revival Control System, the Company will strategically target nuclear power as a key emerging industry for continuous innovation and R&D, with a focus on developing nuclear safety-grade DCS solutions.

Paid Taxes RMB

**40.6** Billion

External Donations RMB

**211** Million

Total Amount of Assistance  
Funds RMB

**139** Million

Total Amount of Overseas Full  
Caliber Assets RMB

**99.345** Billion

- 54 Warm-hearted Commitment to Employee Growth
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- 63 Enhancing Public Wellbeing and Livelihoods
- 67 Continue to Deepen "the Belt and Road" Cooperation
- 70 [Actions Speak Louder] Striving to be a Global Practitioner in Poverty Alleviation

We must prioritize people's livelihoods in economic development and foster an inclusive, equitable environment for growth. We should pursue a people-centered, more balanced, and opportunity-equal model of economic globalization, enabling nations, social strata, and all people to share in the fruits of development.

—Written Speech by President Xi Jinping at APEC  
CEO Summit

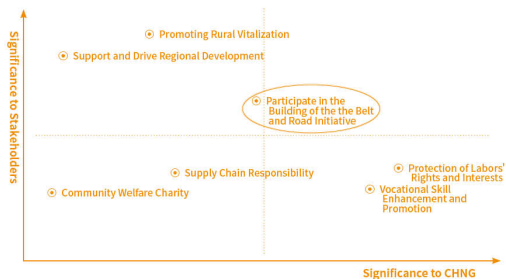
**Civilizations Converge in  
Splendor, Thrive in Harmony, and  
Join Hands to Build a World of  
Universal Harmony**

# Trace the Origin · Join Hands to Build a World of Universal Harmony

## Hot Topics · International Focus



## Focus · Issue Identification



## Pain Points · Risk Assessment

- The international landscape has undergone profound changes, with traditional and non-traditional risk factors converging and transforming. Our company's overseas projects now face growing complexity, severity, and uncertainty in the operating environment.
- The Sahiwal Power Station in Pakistan operates in a region with an unstable security situation. The Chinese Embassy in Pakistan has issued a security advisory, indicating elevated safety risks for the power station's personnel and assets.
- The Shweli River I Hydropower Station in northern Myanmar faces complex security risks due to ongoing military conflicts in the region, impacting operation management, personnel rotations, and material transportation/supply chains.

## Key Points · Striving for Perfection

- Strengthen security assessment for overseas projects, conduct regular risk evaluations, implement tiered and categorized risk management, and develop tailored risk prevention and contingency plans for each project ("One Project, One Policy").
- Implement the SASAC's requirements on joint security protection for central SOEs' overseas operations, continuously increase security investments abroad, and rationally reduce the number of dispatched personnel.
- Shandong Branch and the Sahiwal Power Station shall closely monitor the evolving security situation in Pakistan, implementing on-site security measures, enhancing counter-terrorism and emergency response plans, maintaining sufficient emergency supplies, and ensuring orderly evacuation procedures for personnel if incidents occur.
- Huaneng Lancang River Hydropower Inc. and the Shweli River I Hydropower Station have strengthened their analysis of the armed conflict situation in Myanmar while enhancing operational management at production sites. Through appropriate real-time adjustments to power unit operations and emergency response measures, they have ensured stable and orderly production operations.

## Highlights · Benchmarking Practices

- The Company formulated the *2024-2030 Human Resource Planning* to coordinate the top-level design of talent development planning and establish a strategic talent echelon pattern of "ten-hundred-thousand".
- The Company issued the Position & Grade Management Regulations, establishing a "Five-Track, Six-Tier" career development framework to build a comprehensive, science-driven promotion system that spans all functions and employees, energizing organizational innovation.
- The Company actively participated in 17 national and industry-level employee skills competitions and organized 8 "Huaneng Craftsman Cup" vocational skill contests in specialized fields, cultivating a workforce that meets the demands of developing new quality productive forces.
- The principal leaders and members of the leadership team conducted six on-site inspections in the three targeted assistance counties (districts), while functional departments carried out eight supervisory visits to oversee and evaluate progress.
- The Company had participated in the CIE for seven consecutive years, signing a total of 100 import procurement agreements with a cumulative contract value of approximately \$7.6 billion.

## Focus · Praises and Honors

- The Group and eight of its subsidiaries have been awarded the title of "National Advanced Unit for Open Factory Affairs and Democratic Management (2021-2023)".
- Eight collectives and individuals received the National May 1 Labor Certificate, National May 1 Labor Medal, and National Workers' Pioneer Award, maintaining industry leadership for multiple consecutive years.
- The company was awarded a Grade A rating in the SASAC benchmarking evaluation for procurement and supply chain management among central SOEs.
- The Company's targeted assistance efforts were rated as "Excellent"—the highest evaluation level—for the eighth consecutive year in the assessment by the Central Rural Work Leading Group.
- The Minety Battery Energy Storage Project recognized as a "Small and Smart" Best Practice in International Energy Cooperation (Intelligent Innovation Category) at the third Belt and Road Energy Ministerial Conference.

## Warm-hearted Commitment to Employee Growth



We will speed up efforts to build a contingent of personnel with expertise of strategic importance and cultivate greater numbers of master scholars, science strategists, first-class scientists and innovation teams, young scientists, outstanding engineers, master craftsmen, and highly-skilled workers.

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

## 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*, the *Guiding Opinions on Improving Market-oriented Labor Management* to lay a solid institutional foundation for safeguarding employee rights and interests.

The Company strictly standardizes employment practices to ensure equal opportunity policies are implemented throughout the entire employee's career. The Company was committed to providing equal employment opportunities and labor security for employees of different nationalities, races, genders, religious beliefs, and cultural backgrounds, upholding equal pay for equal work regardless of gender. The Company strictly implemented national laws and regulations regarding the minimum working age and worked to eliminate forced labor, employment discrimination and child labor, while continuously improving fundamental labor management systems. As of the end of 2024, the Company had 122,468 employees, with an employee turnover rate of 0.34%.

## Guaranteeing Remuneration and Welfare

The Company adhering closely to the *Interim Measures for the Salary Management of Central SOEs Leaders* and the *Interim Measures for the Salary Management of Full-time 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 tenure assessment results, while aligning it with the risks and responsibilities undertaken.

The Company set up 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 allocation.

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 front-line positions.

## Deepening Democratic Management

The Company has advanced the implementation of the "1+6" Workers' Congress system, open factory affairs, and worker directors mechanisms to further standardize and improve democratic management through transparent workplace governance.

The Group and eight of its subsidiaries have been awarded the title of "National Advanced Unit for Open Factory Affairs and Democratic Management (2021-2023)", ranking first among power generation groups in the number of recognition.

The Company successfully convened the 2<sup>nd</sup> Session of the 5<sup>th</sup> Workers' Congress, achieving full implementation of post-conference resolutions and 100% satisfaction rate in handling proposal responses.

## Building the Home for Employee

The Company has made continuous progress in building Home for Employee initiatives, with 5 enterprise labor unions awarded "National Model of Home for Employee", 3 branch labor unions recognized as "National Model of Home for Employee Units", and 4 employees honored as "National Outstanding Labor Union Workers".

The Company is accelerating the construction of Phase II of our "Smart Union" system, which will provide high-quality, inclusive services to employees through a points-based incentive mechanism, ensuring tangible, accessible benefits that workers can try experience and obtain.

The labor union systematically delivers employee care services through standardized programs for festival celebrations, illnesses and hospitalization and retirement caring.

## Caring Female Employees

The Company has issued the *Guidelines on Strengthening Female Employee Work in the New Era* and convened symposiums for female employees and women's committee members to further implement gender-specific initiatives.

The Company participated in the 12th National "Scholarly Women's Day" Reading Activity to inspire female employees' enthusiasm for reading.

Grassroots units organized a series of "Women's Day Celebration" featuring baking classes, sand painting workshops, handicraft sessions, and spring outings.

## Safeguarding Health & Safety

According to the *Law of the People's Republic of China on 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.

The Company has established a sound occupational disease prevention and control responsibility system, along with files for monitoring, testing, and evaluating occupational hazard factors affecting employees. The Company has also created occupational health monitoring management files and personal occupational health records for workers, enabling real-time dynamic maintenance, ensuring the health and safety of employees during their work processes. In 2024, the Company launched comprehensive employee health initiatives, including medical check-ups, critical illness screening, mental health counseling, and "Doctors-on-Site" programs, to actively build a "Health Home" for our workforce.

## Case

### Detection of Occupational Hazards by Xi'an Thermal Power Research Institute

In August 2024, Xi'an Thermal Power Research Institute engaged a third-party professional testing agency to conduct occupational hazards detection at key facilities including the Yanliang Base boiler laboratory and workshops. The comprehensive test results delineated the distribution, concentration, intensity, and current control measures of occupational hazards, providing scientific data to optimize the work environment, safeguard employee health, and mitigate occupational health risks. In December 2024, the "Occupational Health and Safety" management system of Xi'an Thermal Power Research Institute passed the external audit of China Quality Certification Center (CQC).

## Facilitating Career Development

### Optimizing Talent Team Development

The Company continuously optimizes our talent development efforts by formulating the 2024-2030 *Human Resource Planning*. It aims to build a talent team characterized by "high quality, optimal structure, and excellent efficiency," with "capabilities in innovation, research, and tackling challenges", referred to as the "Three Excellence and Three Competence" framework. The goal is to coordinate the top-level design of talent development planning and establish a strategic talent echelon pattern of "ten-hundred-thousand." The Company has deepened reforms to cultivate a reserve industrial workforce, implementing the *Industrial Workforce Development Reform Action Plan (2024-2026)*. Our innovative practices in workforce reform were recognized as a national exemplary case by the All-China Federation of Trade Unions and awarded the top prize for Power Industry Innovation by the China Electricity Council.

The Company actively develops a systematic talent growth framework to streamline career progression pathways. In 2024, the Company issued the *Position & Grade Management Regulations*, establishing a "Five-Track, Six-Tier" career development framework to build a comprehensive, science-driven promotion system that spans all functions and employees, expanding growth opportunities and energizing organizational innovation.

- The Company adopts a dual approach of internal cultivation and external recruitment, refining talent attraction mechanisms through newly introduced policies that have successfully brought in 16 nationally recognized high-level experts.
- The Company has strengthened our high-level talent hub by implementing the Central SOE's "Hundred-Thousand-Million" S&T Talent Development Initiative, establishing a key research talent pool with two experts selected as top-tier scientists under the "Hundred Elite" program. The Company has expanded our elite talent pool with the addition of 1 Yangtze River Scholar and 9 experts receiving the State Council Special Government Allowance.
- The Company has strengthened our strategic talent reserve and R&D workforce in key sectors, sponsoring 21 technical experts to pursue part-time engineering doctorates at universities, bringing our total engineering master/PhD cohort to over 200 professionals; The Company has recruited 252 graduates for strategic sectors including nuclear power and renewable energy, while attracting 119 critically needed senior professionals in the nuclear energy field.

Attracting

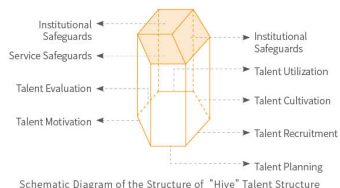
119

Critically Needed Senior Professionals in the Nuclear Energy Field

## Case

### Fostering a "Hive" Talent Team Development Model by Huaneng Lancang River Hydropower Inc.

Huaneng Lancang River Hydropower Inc. has been vigorously implementing the "Talent-Driven Enterprise" strategy, innovatively establishing a "Hive" talent development mechanism. The framework features "six 3" initiatives, focusing on Six Talent Pillars (talent deployment, cultivation, acquisition, planning, motivation, and evaluation) and Three Safeguard (organizational, institutional, and service), to provide robust talent support for building a world-class modern green power enterprise. In September 2024, the "Hive" mechanism was recognized as an Outstanding HR Innovation Case by the China Human Resource Development Council.



### Enriching Talent Training Content

The Company is pioneering the development of an intensive, large-scale training system featuring "centralized management, standardized frameworks, resource sharing, and collaborative efficiency." This comprehensive system delivers training across four key domains - theory, management, expertise, and competency - vertically encompassing talent at all levels while horizontally covering nearly all industrial sectors within the corporation. In 2024, the Company successfully delivered 8 live-streamed "Huaneng Technical Skills Cloud Lectures," attracting over 14,000 participants; The Company has coordinated and advanced the construction of practical training bases (workshops), increasing the number of Corporate-level training facilities to 17.

#### Theoretical Training

The Company organized theoretical training programs including rotational studies on the spirit of the Third Plenary Session of the 20<sup>th</sup> CPC Central Committee and online courses on Party discipline education, effectively integrating the Party's innovative theories into curricula, teaching materials, and minds.

#### Management Training

Focused on enhancing the core competencies of frontline supervisors, the Company revised the Training Outline for Team Leaders in the Power Industry and conducted 25 management training sessions throughout the year, benefiting 2209 participants.

#### Professional Expertise Training

The Company intensified training programs focusing on renewable energy systems and technological innovation to support our transformation and development needs. Throughout the year, 19 professional technical training sessions were conducted, benefiting 1331 participants.

#### Production Skills Training

The Company continuously enhanced the relevance and effectiveness of training for production technicians specializing in renewable energy and nuclear power sectors. Throughout the year, 130 hands-on skill development programs were conducted, benefiting 3647 participants.

### Employee Skills Competitions

To accelerate the growth of knowledge-based, skilled, and innovative industrial workforce, the Company actively participated in 17 national and industry-level employee skills competitions. Additionally, it hosted 8 "Huaneng Craftsman Cup" vocational skill contests in specialized fields including supercritical coal-fired unit control operators, relay protection technicians, and carbon emission managers. Through these initiatives, the Company has recognized 70 Huaneng Master Craftsman and 116 Technical Experts, cultivating a workforce that meets the demands of developing new quality productive forces.

#### 17 National and Industry-level Employee Skills Competitions

June 11	National Power Industry Wind Power Operation & Maintenance Championship Skills Competition	September 12	The Power Industry Financial Professional Vocational Skills Competition
June 24	National Energy Industry Thermal Power Plant Centralized Control Operator Skills Competition	September 24	The 15 <sup>th</sup> National Power Industry Vocational Skills Competition (Photovoltaic Operation & Maintenance)
July 30	National Energy Industry Heating Skills Competition	October 14	The 15 <sup>th</sup> National Power Industry Vocational Skills Competition (Power Plant Centralized Control Operator)
August 20	1 <sup>st</sup> National "Red Banner Cup" Finals for Front-line Supervisors	October 16	National Coal System "Kaiyuan Cup" Coal Quality Testing & Sampling Vocational Skills Competition
August 27	The 24 <sup>th</sup> National Coal Industry Vocational Skills Demonstration Competition	October 17	National Power Industry Hydropower Operation Technician (Position Category) Skills Championship Competition
September 3	The 16 <sup>th</sup> National Coal Industry Vocational Skills Competition (Hulunbuir Division)	October 24	"Blue Shield Cup" National Cybersecurity Employee Vocational Skills Competition
September 4	The 15 <sup>th</sup> National Power Industry Vocational Skills Competition (Carbon Emission Manager I)	November 5	Power Industry Vocational Skills Competition - Welding Technician Contest
September 5	National Coal Chemical Industry Vocational Skills Competition	November 11	The 18 <sup>th</sup> "Zhensheng Cup" National Youth Vocational Skills Competition (National Finals)
September 10	The Power Industry Vocational Skills Competition (Power Engineering Cost Professionals)		

The Company has strategically deployed four key labor competitions to maximize their catalytic effect on core business operations, driving both green transition initiatives and record-breaking operational performance.

- ④ **Labor Competition for 80+ GW Renewable Energy Capacity Installation:**The initiative has driven significant progress in renewable energy project development, with 49.08GW approved/filled, 23.36GW construction commenced, and 16.76GW newly put into operation.
- ④ **Renewable Energy Power Generation Labor Competition:** The initiative has driven 125.3TWh of renewable electricity output, representing a 28.2% year-on-year increase and exceeding the scheduled target by 2.34%.
- ④ **High-Quality Patent Creation & High-Efficiency Application Labor Competition:** The initiative has significantly boosted both the volume and proportion of invention patent grants, while maintaining rapid growth in overseas patent authorizations.
- ④ **Coal Industry Scaling New Heights Labor Competition:** The initiative has driven coal production to reach 111.04 million tons.

### Model Worker Selection and Recognition Initiative

In the evaluation of outstanding collectives and model workers among central SOEs, five companies and collectives were awarded the title of 'Outstanding Collective of Central SOEs,' while eight individuals were honored as 'Model Workers of Central SOEs,' further enhancing the recognition of exemplary workers and craftsmen. Additionally, eight collectives and individuals received the National May 1 Labor Certificate, National May 1 Labor Medal, and National Workers' Pioneer Award, maintaining leading positions in the industry for multiple consecutive years; One unit was awarded the National March 8<sup>th</sup> Red Flag Collective, one collective received the China Youth May 4<sup>th</sup> Medal, while six collectives were recognized as National Youth Safety Production Demonstration Teams.

### Work-Life Balance

The Company implemented the requirements outlined in the *Guidelines on Building a Higher-Level Public Service System for National Fitness* by establishing 12 cultural and sports associations, including calligraphy and painting, photography, yoga, basketball, and cycling. It organized a variety of recreational activities, such as employee cultural exhibitions, the first staff sports games for Beijing-based units, and the "Scholarly Huaneng" reading-sharing event. These initiatives enriched employees' leisure time, fostered interaction among staff, and strengthened the Company's cohesion and unity.



The Company held the First Staff Sports Games for Beijing-Based Units



Group Staff Culture Exhibition

### Collaborative Partnership for Mutual Success



We will promote coordinated development in the Beijing-Tianjin-Hebei region, the development of the Yangtze Economic Belt, the integrated development of the Yangtze River Delta, and ecological conservation and high-quality development in the Yellow River basin.

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

### Supporting Major Regional Development

The Company swiftly formulated implementation plans in response to the major regional strategies proposed by the CPC Central Committee, identifying key collaboration opportunities and focal points for central SOEs. It has vigorously advanced the execution of 41 strategic cooperation agreements. By strengthening partnerships across regions, the Company has closely integrated our industrial strengths with local resource endowments, achieving mutually reinforcing progress in project development, energy services, and other areas.

In the **Beijing-Tianjin-Hebei Region**, the Company has vigorously supported the Xiongan New Area in relocating non-capital functions from Beijing; it accelerated the relocation of our headquarters and built the Huaneng Headquarters Area integrated energy service project to high standards, while advancing renewable energy projects in the area. To date, the Company has secured government approvals for projects totaling 870MW.

In the **Hainan Free Trade Port**, the Company is accelerating the development of a resilient, multi-energy complementary power supply system across the island, with Changjiang Nuclear Power Plant and supporting gas-fired power stations in Yangpu and Nanshan as the backbone, supplemented by clean energy sources such as wind and solar power.

In the **Guangdong-Hong Kong-Macao Greater Bay Area**, the Company is advancing the development and construction of offshore wind power projects, selectively deploying supporting power supply facilities, and accelerating efforts to build a 10GW-level clean energy base in eastern Guangdong.

In the **Yangtze River Delta Region**, the Company is building an integrated energy supply system centered on offshore wind power and onshore renewable energy, supported by clean thermal power and energy storage—an integrated wind, solar, and thermal power with energy storage.

In **China's Western Region**, the Company has adopted a coordinated approach to advance desertification control alongside integrated wind-solar power projects, while actively planning large-scale clean energy bases in Xinjiang, Inner Mongolia, and the upper Yellow River basin.

In **China's Northeast Region**, the Company has seized the opportunities presented by the region's revitalization and development strategy. We have prioritized the development and construction of offshore wind power projects and multi-energy complementary bases, achieving remarkable progress in collaborative energy development initiatives.



Huaneng Headquarters in Xiongan New Area

## Expanding Strategic External Cooperation

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.

In 2024, the Company established a follow-up and implementation mechanism for cooperative agreements, reinforcing the primary responsibility of all units to ensure the effective delivery of project resources outlined in the agreements.

**Enterprise-Local Government Collaboration:** The Company has entered into strategic cooperation agreements with local governments in Xinjiang, Gansu, Tibet, Shandong, Shanxi, and Guangxi, collaborating across multiple domains including large-scale renewable energy bases development, offshore wind power projects, strategic emerging industry deployment, and corporate social responsibility initiatives.

**Inter-Enterprise Cooperation:** The Company has entered into strategic cooperation agreements with leading enterprises and institutions including the China Meteorological Administration, China National Coal Group, China State Railway Group, Huawei Technologies, and IFITEX, focusing on project collaboration, technological innovation, and digital transformation. These partnerships have facilitated several mutually beneficial collaborations, such as establishing the Energy Meteorology Key Open Laboratory under the China Meteorological Administration, integrating China Coal Group's new energy projects into the Company's intelligent new energy operation and maintenance platform, developing synergistic "computing-power" integration projects, etc.

As an important state-owned backbone energy and power central SOE, Huanshi is at the forefront in energy supply guarantee, scientific and technological innovation, etc. The two sides have a good foundation for cooperation in coal transportation and other fields. It is hoped that both sides will give full play to their respective industrial advantages, further strengthen cooperation in direct power purchase transactions, scientific and technological innovation, etc., and jointly create a new situation of win-win cooperation.

—Chairman and Party Secretary of China State Railway Group: Guo Zhuxue

## Case

### Yingcheng's New Energy GW-Level Base Project Listed among "Outstanding Central-Local Cooperation Cases"

Yingcheng Thermal Power and Yingcheng municipal government signed a strategic cooperation agreement on renewable energy development for the construction of a GW-level new energy base project, promoting synergistic growth in environmental and economic benefits. The project is expected to save approximately 210,000 tons of standard coal and reduce CO<sub>2</sub> emissions by about 516,000 tons annually, effectively contributing to the local energy structure transition. During the project construction, the Company adopted a localized approach by collaborating with the government to build a "Beautiful Countryside" initiative. Aligned with regional development plans, supporting facilities were developed around the project site. The integrated development combines photovoltaic power generation with research-education and cultural tourism, creating additional economic value. This innovative model has pioneered a new path to prosperity for local residents.



Yingcheng's Renewable Energy GW-Level Base Project

In December 2024, Yingcheng's Renewable Energy GW-Level Base Project was selected as an "Outstanding Central-Local Cooperation Case" by the China Enterprise Reform and Development Society.

## Integrated Procurement and Supply Management

The Company has thoroughly implemented the *Guidelines on Strengthening Supply Chain Management for Central SOEs in Building World-Class Enterprises* by formulating and executing both the *Work Plan for Strengthening Supply Chain Management in Building World-Class Enterprises* and the *Procurement and Materials Supply Chain Management Plan (2023-2025)*. With the vision of "building a top-tier modern supply chain to facilitate the development of a world-class enterprise", we have fully leveraged the pivotal roles of our "Two Centers" (Procurement Center and Materials Supply Center) to implement the "Two Expansions and One Upgrade" initiative - encompassing large-scale procurement expansion, comprehensive supply expansion, and significant management enhancement - thereby continuously strengthening our core competencies and competitive edge in procurement and supply chain management. In 2024, the company was awarded a Grade A rating in the SASAC benchmarking evaluation for procurement and supply chain management among central SOEs.

The Company revised the *Management Measures for Bidding Procurement, the Management Measures for Non-bidding Procurement, the Implementation Measures for Procurement Management Assessment* and other systems, this aimed to conduct responsible procurement in a standardized manner throughout the entire process, effectively improving the overall quality of procurement work. In 2024, the Company completed a cumulative procurement amount of RMB 206.573 billion throughout the year, saving RMB 50.396 billion compared to the estimated budget, with a capital saving rate of 19.63%. The three quantitative indicators of centralized procurement rate, open procurement rate, and electronic procurement rate required by the SASAC have all maintained an "advanced level".

## Special Improvement Initiative for Procurement Management

### Risk Prevention and Control in Bidding and Procurement

- The Company has established a Procurement Technology and Quality Committee to enhance the tiered review mechanism for procurement plans, while developing three fundamental procurement manuals covering practical operations, standardized procedures, and comprehensive process guidance.
- The Company has issued the *Notice on Regulating Procurement and Bidding Management and Strictly Prohibiting Illegal and Non-compliant Procurement and Bidding*, which clearly defines the "Ten Prohibitions" for procurement and bidding, serving as a warning against negative practices in procurement and bidding activities.
- The Company has conducted regular oversight and inspections on issues such as supplier collaboration function development, price control, and procurement agency services, and provided recommendations for process improvements.



### Bid Evaluation Expert Management

- The pool of bidding evaluation experts has reached 16,802 members, marking a 27.27% year-on-year increase, with 1,362 specialized professionals from central state-owned enterprises (SOEs) in renewables and nuclear power sectors newly added.
- The automatic tracking of bid evaluation experts' review time has been implemented, shifting from daily tracking to actual hour-based evaluation for enhanced precision.



### Supplier Management

- Annual comprehensive supplier evaluations were conducted, effectively assessing 16,248 suppliers.
- Supporting SME development, a procurement platform for integration of large, medium and small sized enterprises collaboration has been established, with 435 registered SME suppliers, providing one-stop bidding and procurement services for small and medium enterprises.





### Improving Supply Chain Management

The Company has clarified the division of responsibilities among relevant headquarters departments, directly-affiliated units and specialized institutions across all stages of the supply chain management process, with the focus on establishing a sustainable supplier collaboration mechanism featuring "integrated coordination, unimpeded information flow, synergistic cooperation, and joint supervision".

The Company has intensified efforts to develop a green supply chain by issuing the Green Supply Chain Guidelines, which promote the sustainability integration, green logistics, material management, and green recycling to continuously enhance green development.

### Integration of Ideas

- The Company has incorporated green, low-carbon, and environmentally-friendly criteria into our tendering, procurement, and supplier management systems, embedding green and low-carbon principles across all purchasing operations.

### Green Logistics

- The Company has adopted widely recyclable, biodegradable, and non-toxic disposable packaging materials across our storage and distribution operations.
- The Company has systematically increased the deployment of new energy vehicles (NEVs) across our transportation network, with 1,868 deliveries completed using NEVs deployed at central warehouses in Yunnan, Shandong, and Western Inner Mongolia.
- The Company has optimized logistics operational efficiency by integrating diversified transportation resources through inter-modal solutions including rail-truck coordination, barge-truck cooperation, and last-mile delivery networks.

### Material Management

- The Company successfully redeployed idle materials worth RMB 85,964 million by listing them on Huaneng Mall and enhancing cross-regional material allocation, effectively revitalizing stranded assets.

### Green Recycling

- The Company is exploring the disposal and recycling methods for end-of-life renewable energy units, as well as the material recovery and utilization models for green disassembly and sorting.
- The Company is developing a proprietary industrial-scale wind turbine blade recycling technology featuring "high-precision cutting - eco-friendly fragmentation - high-value recycling" with full intellectual property rights.

In November 2024, Huaneng Leading Energy Shipping hosted the Import Coal Transportation Cooperation Symposium, bringing together multiple international coal suppliers to establish a dedicated platform for supplier-corporate dialogue and partnership development.



While fulfilling the core mission of serving the power generation sector and ensuring coal supply security, Huaneng Leading Energy Shipping has rigorously implemented the latest IMO (International Maritime Organization) regulations, continuously optimized vessel operations, and provided us with reliable shipping capacity and premium services, thus laying the foundation for even stronger and more productive collaboration.

—Supplier Representatives

## Enhancing Public Wellbeing and Livelihoods



We will continue to put agricultural and rural development first, pursue integrated development of urban and rural areas, and facilitate the flows of production factors between them. We will move faster to build up China's strength in agriculture and steadily promote the revitalization of businesses, talent, culture, ecosystems, and organizations in the countryside.

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

### Committed to Public Welfare & Philanthropy

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 emergency rescue, community service, caring student and other public welfare fields to promote the spirit of Lei Feng, spread the concept of charity, convey the Company's love and warmth to the society. In 2024, the Company contributed a total of RMB 211 million in external donations, including RMB 25.7833 million dedicated to disaster relief efforts. These funds supported critical initiatives, such as earthquake relief in Aheqi County, Kinjiang, post-typhoon reconstruction after Typhoon Yagi in Hainan; The Company allocated RMB 18.41 million to social philanthropy programs, supporting local ecological conservation and socio-economic development, thereby demonstrating the social responsibility of a central state-owned enterprise.

### Case

#### Kangding Company Mobilizes Full-Scale Response to Catastrophic Flash Flood and Debris Flow Disaster

At dawn on August 3, 2024, when a catastrophic flash flood and debris flow suddenly struck Kangding in Sichuan's Ganzi Tibetan Autonomous Prefecture, Kangding Company launched immediate emergency response measures, mobilizing all available resources to support local government disaster relief operations – demonstrating the exemplary social responsibility expected of central state-owned enterprises.

- Kangding company established "8.03" disaster response command center, mobilized 480+ emergency supplies for 500+ rescue personnel to ensure full logistical support for relief efforts.
- Kangding Company's Lengzhuguan and Xiaotiandu Hydropower Stations, impacted by the disaster with complete loss of external power supply and severed transportation access, mitigated downstream flood risks through controlled water diversion via drainage tunnels, achieving full operational recovery within 48 hours while maintaining turbine stability and sustaining daily power generation exceeding 10GWh.



"8.03" Disaster Response Command Center

## Case

## Luohuang Power Plant's 17-Year Commitment to Educational Philanthropy



"Three-Sail - Little Dreamers" Outreach Program

In May 2024, on the eve of International Children's Day, Luohuang Power Plant carried out its 17-year tradition by dispatching employee volunteers to Bodong Primary School in Youyang County, Chongqing for the "Three-Sail - Little Dreamers" outreach program.

The volunteers meticulously rehearsed performance programs to send holiday blessings to the teachers and students of Bodong Primary School. They prepared popular science lessons on electricity knowledge and brand-new power plant work clothes, allowing everyone to learn in a joyful atmosphere. Additionally, they donated a batch of teaching and office equipment to help the school improve its educational environment, demonstrating the responsibility of a central SOE through the power of youth.

## Promoting Rural Vitalization

The Company has thoroughly implemented General Secretary Xi Jinping's important directives on "agriculture, rural areas, and farmers" (the "Three Rurals"), carrying out targeted assistance programs in three designated counties (districts)—Hengshan District in Yulin City, Shaanxi Province; Aheqi County in Kazilsu Kyrgyz Autonomous Prefecture, Xinjiang Uygur Autonomous Region; and Jianzha County in Huangnan Tibetan Autonomous Prefecture, Qinghai Province—as well as in regions such as Yunnan and Tibet. These efforts aim to consolidate and expand the achievements in poverty alleviation, firmly prevent large-scale relapse into poverty, and effectively promote the comprehensive vitalization of rural areas across five key dimensions: industry, talent, culture, ecology, and organization. In 2024, the Company's targeted assistance efforts were rated as "Excellent"—the highest evaluation level—for the eighth consecutive year in the assessment by the Central Rural Work Leading Group. Additionally, the industrial assistance project in Aheqi County, Xinjiang, was recognized as a "Global Best Poverty Reduction Practice", while the "Northern Shaanxi Hengshan" regional public brand was included in the SASAC's *Central SOEs' Brand-Building Efforts in Rural Revitalization Report*.

**Strengthening Organizational Leadership:** 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.

**Providing Supervision and Inspection:** The primary leaders and members of the leadership team conducted six on-site inspections in the three targeted assistance counties (districts), while functional departments carried out eight supervisory visits to oversee and evaluate progress.

**Stepping up Input:** In 2024, the Company invested a total of RMB 139 million in poverty alleviation and assistance funds, including RMB 29.17 million dedicated to targeted assistance programs in Yunnan and the "Strengthening Foundations and Benefiting People" initiative in Tibet. In targeted assistance areas, it directly provided RMB 64.94 million in non-repayable funds and RMB 442.06 million in repayable funds, along with introducing RMB 17.05 million in non-repayable funds, and RMB 49 million 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.

Directly Provided RMB

**64.94** Million

in Non-repayable Funds in Targeted Assistance Areas

## Industrial Vitalization

In Shaanxi's Hengshan District, the Company has established a conservation and breeding base for Northern Shaanxi white cashmere goats along with standardized breeding and farming facilities, while also creating a mutual support fund for the goat industry. These initiatives are driving the high-quality development of Hengshan's white cashmere goat sector and further expanding the influence of the "Northern Shaanxi Hengshan" regional agricultural public brand. In Aheqi County of Xinjiang Uygur Autonomous Region, the Company has supported the construction of agrovoltaics (animal husbandry-solar solutions) projects and established a complete industrial chain for sea buckthorn production, while continuously building the regional public brand of "Aheqi Tianshan Sea Buckthorn." In Jianzha County, Qinghai Province, the Company has enhanced the quality of local cultural tourism development by introducing Suzhou KieZhu Hotel Management Company to improve the operation and management of Deqian Village's "Beautiful Villages" project, while actively promoting the "Lingxiu Jianzha" cultural tourism public brand. In Youyang District, Shaanxi Province, a total of RMB 4.85 million in assistance funds has been allocated to support industrial poverty alleviation efforts in Fengshan Village. These funds have facilitated the construction of 100 vegetable greenhouses and established a 1,350-mu (approximately 90 hectares) demonstration base. In Zhenming County, Guizhou Province, the Company has developed distinctive agricultural industries by introducing high-quality seedlings and advanced cultivation techniques. A 15-mu smallholder smart agriculture demonstration park was established, generating an annual increase of approximately RMB 100,000 in collective village income.

## Talent Vitalization

Carried Out

**6636** Person-times

of Training for Officials and Talents in Designated Assistance Areas

Integrated with rural revitalization initiatives, specialty industry development, and energy/power infrastructure projects, we have implemented targeted training programs to cultivate grassroots cadres, entrepreneurial leaders and technical professionals. In 2024, CHNG carried out 6636 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 2189 grass-roots cadres, 1015 entrepreneurial individuals in rural revitalization and 3432 person-times of various special technical and employment skills training. In Sulichuan County (Jiangxi), Tuanfeng County (Hubei), and Xinhua County (Hunan), we organized "Financial Knowledge Training for Rural Revitalization Leaders", leveraging Great Wall Securities' professional expertise to enhance participants' financial literacy capabilities in driving rural development. During the construction of the Yari Photovoltaic Power Station project in DaoFu County, Sichuan Province, employment was provided for over 1,060 local residents. The project adopted a "learning-by-doing and training-through-practice" model to enhance the skills and technical capabilities of the local workforce, thereby increasing their employment income. In 2024, the per capita income of the local population reached RMB 15,906.98, marking a 21.75% year-on-year increase.

## Culture Vitalization

In Hengshan District, Shaanxi Province, efforts were made to explore and promote the Loess Plateau culture, grassland culture, frontier folklore culture, and the revolutionary red culture of the old revolutionary base areas. To support intangible cultural heritage, the "Hometown of Hengshan Yangge" (a traditional folk dance) and inheritance and preservation activities for the Hengshan Waist Drum were held. In Aheqi County, Xinjiang Uygur Autonomous Region, opened the county cinema, screening patriotic films during holidays to strengthen the sense of community among the Chinese nation. In Jianzha County, Qinghai Province, the Company organized the Maolan Cultural Festival, supporting diverse activities such as the Rainbow Divine Arrow Archery Competition, Highland Triathlon, and cultural performances to promote regional traditions.

## Ecological Vitalization



The Mengjiawan Photovoltaic Project

In Hengshan District, Shaanxi Province, the Company completed a total investment of RMB 42.5 million (out of the gross RMB 920 million) during the year to develop wind power and photovoltaic projects, significantly increasing the share of renewable energy in the local energy mix; promoted the development of household courtyard economies to optimize the local living environment in Majialiang Village. In Aheqi County, Xinjiang Uygur Autonomous Region, the Company facilitated the successful commissioning of two wastewater treatment plants, with all operational metrics meeting national environmental discharge standards. The facilities passed inspection by the national environmental supervision team. In Jianzha County, Qinghai Province, the Company completed an investment of RMB 759 million (a total investment of more than RMB 3.2 billion) throughout the year to build distributed photovoltaic projects throughout the county, introducing 700MW of photovoltaic power generation projects optimizing the local energy structure; supported the planning and construction of electric vehicle charging stations and distributed clean heating systems, significantly improving living standards for farmers and herders by ensuring easier access to water supply and heating. The Company has actively leveraged our core strengths in the power sector to pioneer a



The "Tea+PV Co-Development" Photovoltaic Power Generation Project in Pu'er City

distinctive assistance model that integrates rural revitalization with new energy development. Across multiple regions in China, it has implemented "PV+" projects, which not only generate clean energy but also stimulate socio-economic development in surrounding areas. These initiatives effectively contribute to the ecological revitalization of rural areas. In **Yuyang District, Shaanxi Province**, the Mengjawan Photovoltaic Project has pioneered an innovative "PV+Ecology+Agriculture" development model. The project designates 330mu of land for desert soil restoration trials, establishing both ecological rehabilitation zones and cash crop pilot cultivation areas. This initiative simultaneously enhances land productivity and demonstrates synergistic development between clean energy infrastructure and environmental restoration. In **Tongchuan, Shaanxi Province**, the completion of the 100MW agrovoltaics PV power station project in **Huangbao Town** has created a model of solar-agricultural synergy. The project utilizes the spacing between PV module racks for cultivating medicinal herbs, achieving dual benefits of soil improvement and water conservation while contributing to the preservation of local biodiversity. In **Pu'er City, Yunnan Province**, the "Tea+PV Co-Development" photovoltaic power generation project solves leasing rural tea plantation land to achieve "multi-purpose use of a single piece of land." While receiving land rental income from the photovoltaic project, local residents can maintain their original agricultural activities such as tea picking, creating a win-win situation of "land rental income + tea economy." In **Lingao County, Hainan Province**, the 100MW agrovoltaics PV power generation project has been completed, establishing a "modern eco-agriculture + clean energy industry" model. Under the photovoltaic panels, leafy vegetables are cultivated, effectively integrating solar power generation with modern high-efficiency agriculture. The annual production of leafy vegetables exceeds 2,000 tons, meeting the daily vegetable consumption needs of 7,000 people.

### Organizational Vitalization

In **Hengshan District, Shaanxi Province**, the Party branch of the Finance and Assets Department at the company headquarters partnered with Majialiang Village Committee for a pairing and co-construction initiative. This collaboration aims to enhance the capabilities of rural grassroots cadres in carrying out Party affairs and serving the community. In **Aheqi County, Xinjiang Autonomous Region**, the Party branches of the Planning Departments from Fujian Branch and Southern Branch partnered with the local Water Resources Bureau Party branch and the Science, Technology, and Industry Information Bureau Party branch, respectively, in a pairing and co-construction initiative. Together, they completed the first phase of a distributed photovoltaic power station in **Biedeli Village**, which is expected to generate an average annual income of RMB 100,000 for the village collective. In **Jianzha County, Qinghai Province**, the Party branches of **Jinling Power Plant's New Energy Project** Department and **Qinghai Branch's Fiscal Department** have partnered with the local Development and Reform Bureau Party committee in a pairing and co-construction initiative to advance the county-wide rooftop distributed photovoltaic project and promote new energy development. In **Shaoguan, Guangdong Province**, the comprehensive advancement of rural revitalization pilot programs at the county level has led to continuous innovation in rural governance models. The Company has actively explored and implemented an "integrated points system" initiative, which empowers grassroots Party building, social customs reform, and daily village affairs through a points-based incentive mechanism. This approach has significantly enhanced the cohesion and effectiveness of village Party branches. In **Méidōng County, Tibet Autonomous Region**, a RMB 3.6 million donation has been allocated to establish Tibet's first rural revitalization workstation, serving as an integrated platform for government, enterprises, and universities to drive sustainable development in rural social and livelihood initiatives.



Tibet's First Rural Revitalization Workstation (Sketch Map)

### Consumption-based Poverty Alleviation

The Company has consistently deepened our consumption-based poverty alleviation efforts by formulating and implementing the "2024 Consumption Assistance Action Plan". On our proprietary e-commerce platform, the Company has listed 3,349 products from formerly impoverished regions, representing a nearly fourfold year-on-year increase in product categories. These offerings now cover 176 national-level poverty-stricken counties across 22 provinces, effectively promoting increased income for farmers; the Company organized procurement of poverty-alleviation products and supported enterprises from assisted counties in establishing flagship stores and experience outlets in first-tier cities. In 2024, the Company procured and facilitated the sales of agricultural products totaling RMB 126 million from designated poverty-alleviation counties, while additionally purchasing and assisting in the sales of RMB 121 million worth of farm produce from other formerly impoverished regions. The Company has actively supported the development of southern Xinjiang's textile industry through consumption-based poverty alleviation initiatives. Since the launch of the "14" Five-Year Plan" (2021-2025), we have consistently intensified our workwear assistance program, with cumulative purchases reaching approximately 459,000 sets valued at RMB 134 million. In 2024 alone, our procurement volume amounted to RMB 89.98 million, ranking third among all central state-owned enterprises.

Cumulative Purchases Reaching Approximately

459,000 sets

## Continue to Deepen "the Belt and Road" Cooperation



The Company advances high-quality Belt and Road Cooperation, actively participates in global industrial division and cooperation, and endeavors to preserve the diversity and stability of the international economic landscape and economic and trade relations.

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

## Expanding International Exchanges and Cooperation

The Company continues to strengthen international exchanges and actively broaden the global network, engaging in high-level dialogues and technical collaborations with world-leading enterprises such as EDF Group (France), Siemens Energy (Germany), TotalEnergies (France), Orano (France), SK Group (ROK), and GE (US). This initiative has built bridges for global collaboration.

The Company consistently adheres to the principle of "corporate diplomacy serves national diplomatic strategy," providing high-quality support for the nation's flagship diplomatic events and major foreign affairs activities. Senior executives have participated in key forums such as the Belt and Road Energy Ministers' Conference, 5<sup>th</sup> China-Finland Innovation Committee Meeting, Summit of Forum on China-Africa Cooperation (FOCAC) and China-Africa Entrepreneurs Forum, World Economic Forum, and Boao Forum for Asia. By actively engaging in global energy governance, the Company has fully demonstrated our international profile as a key state-owned backbone enterprise.

### Case

#### Company's Success in Involvement of the 7<sup>th</sup> China International Import Expo (CIIE)

In November 2024, the Company participated in the 7<sup>th</sup> China International Import Expo (CIIE) and signed 8 procurement agreements with Siemens, Ansaldo, Mitsubishi and other enterprises, with a total contract value of approximately RMB 4.245 billion. The purchased gas turbine technology, equipment, and services will be used for the construction and development of key clean energy projects, advancing the transition toward green energy. By the end of 2024, the Company had participated in the CIIE for seven consecutive years, signing a total of 100 import procurement agreements with a cumulative contract value of approximately \$7.6 billion.



The Company Participated in the 7<sup>th</sup> China International Import Expo (CIIE)

## Overseas Project Operation Management

The Company actively engage in China's dual circulation development paradigm, strengthening its "Trunk with Two Wings" global platform. It has established 7 overseas representative offices in the UK, Pakistan, Myanmar, Cambodia, Singapore, Australia, and Kazakhstan, continuously deepening its international development. By the end of 2024, the total assets amounted to RMB 99.345 billion, including RMB 54.469 billion in total electricity assets. The capacity of overseas investment and management projects was 5,792 million kilowatts, the equity installed capacity was 1,952.1 million kilowatts, and the profit was RMB 3,987 billion, the Company provided technical services and technology exports to more than 20 countries and regions.



The Sahiwal Power Plant

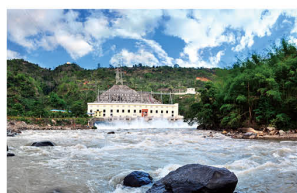
The Sahiwal Power Station in Pakistan generates approximately 9TWh of electricity annually, accounting for 10% of the country's total power production. It helps bridge over 25% of the local electricity supply-demand gap, providing reliable electricity to 4 million households (serving more than 20 million people).

As of the end of 2024, the Lower Sesan II Hydropower Station in Cambodia has maintained a "Zero-Safety-Incident" record and achieved 2580 consecutive days of safe and stable operation since commissioning. The power station has cumulatively generated 11,984TWh of electricity.



The Lower Sesan II Hydropower Station

As of the end of 2024, the Shweli River I Hydropower Station in Myanmar has maintained a zero-safety-incident record for four consecutive years, achieving 5959 days of continuous safe and stable operation since commissioning. The station has cumulatively generated 55,437TWh of electricity.



The Shweli River I Hydropower Station

## Win-Win Community Engagement

The Company places high importance on overseas ESG initiatives, adhering to the principle of "Building a power station to boost local economy, protect the environment, benefit communities, and foster shared harmony." We proactively integrate into host countries, embrace compatibility and inclusiveness, and pursue win-win cooperation, creating a sustainable ecosystem of mutual integration and harmonious development with local stakeholders.

In Pakistan, the Company established a vocational training school offering courses in computing, electrical engineering, welding, and other technical fields. To date, it has trained over 6,000 locals, serving as a vital hub for China-Pakistan cultural and technological exchange. In 2024, the Sahiwal Power Station has clinched four prestigious awards for the sixth consecutive year: the *Most Ethical Promotion Award*, *Best Vocational Training Award*, *TOP Corporate Social Responsibility (CSR) Performance Award* and *Most Sustainable Project Award* in Pakistan, and won the title of "Outstanding" in Health, Safety and Environment (HSE) rating from Pakistan National Electric Power Regulatory Authority (NEPRA). The case *May the Light of Our Ironclad Friendship Shine on China-Pakistan Economic Corridor* was awarded as *Excellent Case of International Image Construction of China Enterprises*.



In September 2024, Sahiwal Power Station held the "Basa Artisan Cup" skills competition, with over 130 enthusiastic participants including Chinese and Pakistani employees as well as contestants from external cooperative units.

In Singapore, the Jurong Island Desalination Plant was successfully completed, capable of meeting 7% of water demand throughout the country. This project was honored with the Desalination Plant of the Year at the 2024 Global Water Awards by the Global Water Intelligence (GWI). Additionally, Tuas Power was awarded the *Best Payment & Collection Solution Award* by OCBC Bank Singapore, making it the sole energy utility winner in Singapore.



Jurong Island Desalination Plant Was Completed

In Cambodia, the project facilitated the largest hydropower resettlement initiative in the country's history, involving 840 households and 3,690 villagers. By introducing China's poverty alleviation management experience, schools, hospitals, roads, power grids and other infrastructure were built in the resettlement villages to ensure that the relocated residents could settle down and thrive. From 2019 to 2024, the Lower Sesan II Hydropower Station was awarded the "Social Responsibility Award" by Cambodia's Stung Treng Provincial Government for six consecutive years.



In November 2024, the centralized water supply project of "Lancang-Mekong Sweet Spring Action" resettlement village was handed over to local government. This project may help over 20,000 villagers to avoid health risks associated with drinking untreated river water, significantly improving living standards.

In the UK, an annual public benefit contribution is made to the local council where the project is located, used for the maintenance of community facilities, thereby fostering stronger relationships with the surrounding community. In 2024, the Minety Battery Energy Storage Project was honored with the "Outstanding Case Award in Corporate Governance" at the first Frankfurt Sino-European Corporate ESG Conference and recognized as a "Small and Smart" Best Practice in International Energy Cooperation (Intelligent Innovation Category) at the third Belt and Road Energy Ministerial Conference.



Minety Battery Storage

## Actions Speak Louder

### Striving to be a Global Practitioner in Poverty Alleviation

In October 2024, the Company participated in the parallel forum "2024 Seminar on Global Poverty Reduction Partnerships" at the High-Level Forum on Poverty Reduction and Development, hosted by the Ministry of Agriculture and Rural Affairs and organized by the International Poverty Reduction Center in China. At the event, the Company's targeted poverty alleviation case, "Green Development of Southern Xinjiang's Natural Resources, Transforming Desert into Wealth", stood out from over 1,000 submissions and was honored with the Global Best Poverty Reduction Case (5<sup>th</sup> Edition). This recognition provides valuable poverty reduction models and implementation strategies for global institutions and individuals dedicated to poverty alleviation.

#### Green Development of Southern Xinjiang's Natural Resources, Transforming Desert into Wealth



Aheqi County, located in the remote heartland of the South Tianshan Mountains in western Xinjiang, sits in a high-altitude alpine zone where barren mountains and vast Gobi Deserts dominate the harsh landscape, creating an extremely challenging environment for industrial development. The Tuoshigan River system runs through the entire Aheqi County, providing abundant water resources. However, constrained by the difficult terrain and lack of supporting infrastructure, development opportunities remain limited. As a result, the region's vast hydropower potential has yet to be properly utilized.

The Company leveraged the strengths in the energy sector to actively develop large-scale hydropower projects during the targeted poverty alleviation efforts in Aheqi County. By capitalizing on the enhanced irrigation capacity brought by the hydropower projects, the Company vigorously expanded the seabuckthorn industry, to transform "barren deserts" into "wealth". This effectively promoted the integration and sustainable development of industrial and agricultural sectors, achieving mutually beneficial progress for both the enterprise and the local community.

#### Hydropower Development Facilitates Resource Transformation in Southern Xinjiang



During the "12<sup>th</sup> Five-Year Plan" period, the Company invested RMB 2.145 billion to construct the Biedieli Hydropower Station on the Tuoshigan River. With an installed capacity of 248 MW, this station has a cumulative power generation of 11,056 GWh, an output value of RMB 2.436 billion and tax contribution of RMB 389 million to local finances. The project has created over 1,000 jobs, facilitated the settlement of more than 900 nomadic households, and effectively alleviated seasonal electricity shortages in southern Xinjiang. Additionally, it has provided robust support for local water conservancy, agricultural development and mineral resource exploitation. Through this sustainable "capacity-building" assistance, Aheqi County has bid farewell to its backward past - where "heavy industry meant horseshoeing and light industry meant baking naan" - ushering in a new era of development.

#### Cultivating Industries, Planting "Trees of Prosperity" in the Tianshan Gobi



Seabuckthorn, with its exceptional resilience to cold, drought and saline-alkali conditions, thrives perfectly in the natural environment of the Tuoshigan River Valley. Not only does it help prevent wind erosion, stabilize sand dunes and protect precious soil, but it also serves as a unique industrial resource for Aheqi County, generating substantial economic income for local farmers and herders.

The Company invested 500,000 RMB to introduce large-fruited seabuckthorn across 100 mu of trial plantations tailored to local conditions. Within two years, the yield per plant reached about 10 kg. Following this success, the Company partnered closely with local authorities to leverage newly added irrigation capacity from the Biedieli hydropower project to systematically develop the seabuckthorn industry across the Gobi Desert. A "reward-based subsidy" model was implemented to support seedling cultivation, field management and harvest operations. With guidance from the Company's resident work teams, local farmers and herders established over 10,000 mu of seabuckthorn plantations.

The seabuckthorn industry has significantly boosted local employment for farmers and herders. The county harvests approximately 1,500 tons of seabuckthorn annually, involving over 2,300 workers, with an average income increase of RMB 2,824 per person.

#### Building the Nest to Attract Phoenixes - Breaking Bottlenecks in Industrial Development

To establish seabuckthorn as a pillar industry for poverty alleviation, the Company invested RMB 23.2 million to build an integrated seabuckthorn industrial park featuring fresh-keeping storage, processing facilities, and R&D capabilities, and completed the construction of standardized workshops and supporting infrastructure. With the efforts of the Company, Aheqi County successfully introduced external capital and registered the establishment of Xinjiang Zhongke Seabuckthorn Technology Co., Ltd.

At the end of 2020, the Zhongke Seabuckthorn Deep-processing Project was put into operation in the Company-funded industrial park. Utilizing internationally advanced technologies such as supercritical CO<sub>2</sub> extraction and freeze-drying, the project achieved 100% procurement of seabuckthorn berries across the county. Its products - including seabuckthorn oil and flavonoids - have earned certifications from multiple domestic professional institutions and consecutive industry gold awards, with annual sales exceeding RMB 40 million.

To local cadres and residents, seabuckthorn has become Aheqi County's "economic tree" for prosperity.



*I plant trees in every spring. I can earn RMB 3 per sapling. In a single spring season, I can earn RMB 6,000 to 7,000. By late August, when the seabuckthorn ripens, I return for the harvest, adding another RMB 6,000 to 7,000 in the fall. Now, I also work as a forest ranger for the seabuckthorn groves, with a monthly salary of RMB 1,271. In the past, I never imagined trees could survive in the Gobi Desert, let alone that these "little golden berries" would become a source of income for me.*

—Representatives of Local Common People Engaged in the Seabuckthorn Industry



Total Investment in Environmental Protection RMB

**1.85** Billion

Low-carbon Clean Energy Installed Capacity Accounted for

**51.8** %

Installed Capacity for Renewable Energy Exceeding

**95000** MW

The Carbon Emission Intensity for Full-caliber Power Generation Reflecting a Decrease of

**28.1** g/kWh

Year-on-year

We must plan development from the perspective of harmonious coexistence between humanity and nature, take resource and environmental carrying capacity as the fundamental constraint, and consciously keep economic activities and human behavior within the limits of what natural resources and ecological environment can sustain.

— General Secretary Xi Jinping's Important Article  
*Promoting Ecological Civilization Construction Requires Navigating Several Critical Relationships*

**Energy Innovation, Green Transition, Painting an Eco-Civilization Blueprint**

76 Anchoring the "Dual Carbon" Goals

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85 Building An Environmentally Friendly Enterprise

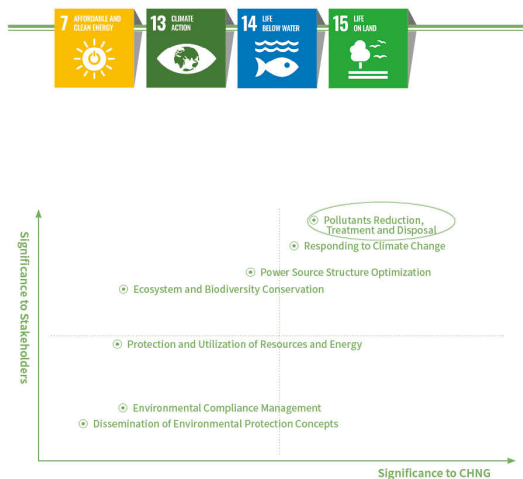
88 [Actions Speak Louder] Striving to be a Pioneer in Protecting Green Mountains and Clear Waters

# Trace the Origin · Painting an Eco-Civilization Blueprint

Hot Topics · International Focus

Focus · Issue Identification

Pain Points · Risk Assessment



- Operation risks of environmental protection facilities. Certain units require strengthened standardization in the operation and maintenance of environmental protection facilities, as well as enhanced rigor in routine monitoring and incident response. Some coal mining enterprises require to improve emergency response capabilities for sudden water inflow, mine water monitoring and disposal, etc.
- Environmental protection risks of infrastructure projects. Some new energy infrastructure projects exhibit compliance risks due to untimely fulfillment of environmental protection formalities. Some coal mine infrastructure projects require improved hazardous waste management, while some hydropower infrastructure projects need to address rock debris discharge into rivers.
- Transportation-related environmental protection risks. The clean coal transportation rate for coal-fired power enterprises has reached 86%, while the clean transportation proportion of materials such as limestone still needs further improvement, and the transportation methods need to be upgraded.

Key Points · Striving for Perfection

- Continue to strengthen the reliability management of environmental protection facilities, ensure the operation and maintenance of real-time emission monitoring systems, and promptly adjust pollutant emission control strategies in response to unit startup/shutdown, load fluctuation, etc.
- Enhance the whole-process environmental protection management of infrastructure projects, strictly implement the Three Simultaneities environmental protection measures during the project development and construction, and simultaneously advance the construction of supporting environmental protection facilities. Expedite the completion of water and environmental protection-related procedures and coordinate to ensure timely approval. Strengthen the management of wastewater, hazardous waste and solid waste at construction sites by standardizing wastewater recycling and treatment, and implementing measures such as categorized storage of hazardous/solid waste and dust suppression through covering, etc. Immediately carry out the "Three Simultaneities" independent acceptance after the project is put into operation.
- Against the Eco-Environmental Risk Inspection Checklist, address environmental hazards and rectify identified issues, with a focus on resolving key challenges such as wastewater treatment during load fluctuation in thermal power plants and mine water disposal during sudden water inflow incidents in coal mines, with the aim of ensuring full compliance to prevent any penalties from environmental regulators.

Highlights · Benchmarking Practices

- With a commitment to leadership, the Company rigorously promoted the standardization of environmental management across all sectors. Throughout the year, the Company completed the standardization of environmental management in 294 enterprises.
- Xi'an Thermal Power Research Institute was selected as one of the first 38 National Standard Verification Sites (Thermal Power Units) and the only approved institution in the thermal power generation industry.
- The Company made all-out efforts to advance the commencement and construction of new energy base projects, set up special task forces for each base project to solidify primary responsibilities.
- The world's highest-capacity single wind turbine - the 18MW distributed wind power project led by Xianrendao Power Station - has successfully commenced power generation.
- We conducted third-party verification of carbon emissions for 122 thermal power companies, with no reported issues regarding data quality.

Focus · Praises and Honors

- The Company's coal-fired units received 72 awards in the Coal-Fired Power Unit Efficiency Competition organized by China Electricity Council, achieving an award rate of 33.3% - ranking first in industry benchmarking.
- 16 units were honored as "Best in Coal Consumption for Power Supply" and "Best in Auxiliary Power Consumption Rate", securing the top industry position.
- The "Water Use Process Cycle Model" of Huaneng Guilin Gas Distributed Energy Co. Ltd. was included into the "List of Typical Cases of Industrial Wastewater Recycling" of the Ministry of Industry and Information Technology.
- The Jiacha Hydropower Station was honored as a "Zero-Waste Factory" in Shannan City, Tibet Autonomous Region.
- The independently developed intelligent fish recognition technology for fish passage facilities in hydropower projects was awarded the Second Prize of Technological Invention by the Chinese National Committee on Large Dams.

## Anchoring the "Dual Carbon" Goals



"We will work actively and prudently toward the goals of reaching peak carbon emissions and carbon neutrality. Based on China's energy and resource endowment, we will advance initiatives to reach peak carbon emissions in a well-planned and phased way in line with the principle of building the new before discarding the old.

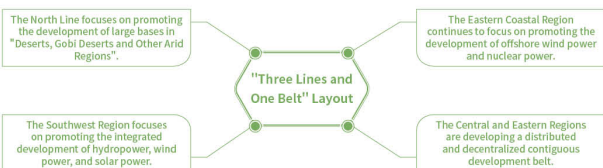
—Report to the 20th National Congress of the Communist Party of China by Xi Jinping

## "Dual Carbon" Top-Level Design

The Party Leading Group of the Company conducted in-depth thematic studies on carbon peaking and carbon neutrality, and thought deeply its development direction under the "Dual Carbon" framework. It gained a profound understanding that "green and low-carbon transformation is the fundamental path to addressing China's energy, resource and environmental constraints and ensuring national energy security; the Company must firmly grasp the momentum of energy transition and unwaveringly adhere to the green and low-carbon development path". In 2024, Wen Shuang, Secretary of Party Leading Group, authored a signed article titled *Strengthening the Construction of Carbon Emission Standard System* in People's Daily and another article titled *Enhancing China's Foundational Capabilities for Dual Control of Carbon Emissions* in Economic Information Daily.

The Company resolutely implements the new energy security strategy. Based on the "Dual Carbon" goals and in accordance with the *Work to Achieve Carbon Peaking and Carbon Neutrality Goals, the Action Plan for Carbon Peaking Before 2030*, and the *SASAC's Guidelines for Preparation of the Carbon Peaking Plan of Central SOEs*, the Company has developed the *Action Plan for Carbon Peaking*. The Plan emphasizes that the Company will prioritize clean energy for incremental capacity, vigorously advance the development of low- and zero-carbon energy technologies, and leverage scientific and technological innovation to position itself as a pioneer and exemplar in achieving carbon peaking and carbon neutrality goals.

According to the Plan, the Company will focus on building a new-type power system. Guided by the development principles of vigorously expanding new energy, actively developing hydropower, advancing nuclear power in a safe and orderly manner, optimizing coal power and selectively deploying peaking gas power, the Company will prioritize large-scale base development as the main strategy, deepen the layout of "Three Lines and One Belt", accelerate the establishment of a new transformation and development framework supported by three pillars - new energy, hydropower and nuclear power - and collaboratively promote carbon reduction, pollution control, ecological expansion, and economic growth. This approach ensures the Company stays at the forefront of the energy transition and transformation.



## Environmental Management System

The Company continued to enhance the environmental management system, and methodically advanced the development and revision of regulations and standards. In 2024, the Company established the *Management Rules for Standardized Ecological and Environmental Protection in Enterprises* and revised the *Environmental Protection Management Regulations*, etc. These efforts ensure that energy conservation, carbon reduction, industrial waste control and ecological protection align with the new requirements and evolving landscape of new-type power system. This strengthens the integration and coordination between policies and practical operations, laying a solid institutional foundation for environmental management.

With a commitment to leadership, the Company rigorously promoted the standardization of environmental management across all sectors. Throughout the year, the Company completed the standardization of environmental management in 294 enterprises, driving the modernization of environmental governance systems and capabilities across hydropower, new energy, coal, nuclear power, and other industries.

In 2024, Xi'an Thermal Power Research Institute was selected as one of the first 38 National Standard Verification Sites (Thermal Power Units) and the only approved institution in the thermal power generation industry. The National Standard Verification Site (Thermal Power Units) granted to Xi'an Thermal Power Research Institute falls under the environmental protection and low-carbon sector, and it is established to address climate change, pollution prevention and energy conservation. This accreditation will significantly enhance the Company's influence in the low-carbon and environmental protection sector.

## Environmental Risk Prevention

The Company strictly implements the requirements set forth in the *Law of the People's Republic of China on Environmental Protection* and the *Measures for the Supervision and Administration of Energy Conservation and Ecological and Environmental Protection by Central SOEs*. The Company has formulated internal management documents such as the *Measures for the Administration of Ecological Environment Protection* and the *Measures for the Selection of Outstanding Environmental Protection Entities*, and actively carries out ecological and environmental risk investigation and rectification. To continuously strengthen the primary responsibility for environmental risk prevention and control, the Company has launched a special campaign titled "Year of Environmental Risk Remediation and Enhancement" focusing on institutionalization and checklist-based management, and intensified risk remediation efforts for key enterprises in the Yangtze River and Yellow River basins, etc., to further consolidate the achievements in standardized environmental management.

In 2024, the Company completed full-coverage environmental inspections across 26 coal mining enterprises, established dedicated environmental management partitions, and effectively advanced the remediation of eco-environmental risks in the coal industry.





## Building a New Type of Power System



We will speed up the planning and development of a system for new energy sources, properly balance hydropower development and ecological conservation, and develop nuclear power in an active, safe, and orderly manner. We will strengthen our systems for energy production, supply, storage, and marketing to ensure energy security.

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

## Vigorously Promoting the High-quality Development of New Energy

New Energy Power Generation Reaching

**1535 TWh**

The Company achieved dual improvement in both scale and quality of new energy development, with power generation reaching 153.5 TWh. Within a single year, the new energy installed capacity successively surpassed two major milestones of 80 GW and 90 GW, reaching a total installed capacity exceeding 95 GW, accounting for over 35% of the Company's total capacity and representing a 5.7% increase year-on-year. The Company approved 56.87 GW of new energy capacity and commissioned over 23 GW, ranking No.1 in industry benchmarking and achieving a record high in the history.

The Company made all-out efforts to advance the commencement and construction of new energy base projects. Guided by the principles of coordinated planning, forward-looking deployment, responsibility reinforcement and industry leadership, the Company established a robust supervision mechanism for base development featuring "monthly oversight and quarterly reporting", and set up special task forces for each base project to solidify primary responsibilities. In 2024, the Company achieved significant progress in the development of base projects.

- ④ The 9.64 GW of projects incorporated in the first batch of national solar and wind power base projects were all put into operation.
- ④ The 6 GW of new energy projects in the Longdong Base commenced construction, of which 1 GW was put into operation.
- ④ The 12 GW of new energy projects in the Kubuqi Base were approved.
- ④ The 400 MW wind power base project in Alxa, western Inner Mongolia, achieved full-capacity operation, becoming the first grid-connected project in the first batch of national large-scale wind power bases in the Gobi Desert.
- ④ Three GW-level wind and solar power bases were established: 2 GW wind and solar power base in Chuxiong Prefecture, Yunnan; 1.6 GW wind and solar power base in Baoshan City, Yunnan; and 1.7 GW wind and solar power base in Dali Prefecture, Yunnan.



Scan the QR Code to Watch the CCTV Report Titled *World's Largest Single-Capacity Wind Turbine Begins Power Generation*



Scan the QR Code to Watch the CCTV Report Titled *World's Highest-Altitude PV Project Begins Grid-Connected Power Generation Today*

The Company has built an integrated offshore wind power development belt, with a total of nearly 14.1079 GW offshore wind power projects approved, under construction and operational, firmly placing the Company in the top tier of the industry.

- ④ The construction of Shandong Peninsula North L Site offshore wind power project (China's deepest-water offshore wind power project to date) commenced.
- ④ The offshore wind power projects in Lemen (Guangdong), Daishan (Zhejiang), Shandong Peninsula North, and Zhuanghe (Liaoning) were fully completed.

The Company has vigorously developed onshore wind power and PV projects, with multiple projects progressing steadily and achieving numerous "World Records" and "National Firsts". These efforts have contributed to ensuring power supply and effectively increased the proportion of new energy.

- ④ The world's highest-capacity single wind turbine - the 18MW distributed wind power project led by Xianrendao Power Station - has successfully commenced power generation. With 99% domestic content in the complete turbine system, this project features the world's largest rotor diameter and highest single-unit capacity, representing the global cutting-edge in wind turbine technology development and operation & maintenance.
- ④ China's first wind power project utilizing breakwaters - the Tianjin Port Breakwater Wind Power Project - has completed the installation of all seven turbines, advancing the construction of a "Zero-Carbon Port Zone".
- ④ The world's highest-altitude PV project - Phase I of Nagu Solar Power Station in Diqing, Yunnan - has achieved grid connection, with its highest altitude exceeding 5,240m.
- ④ The Company's self-designed and constructed Tongshan Nanlin Flexible Bracket PV Project - the largest mountain-based flexible bracket PV project - has achieved grid connection with an installed capacity of 127 MW.



18MW Distributed Wind Power Project Led by Xianrendao Power Station



Tianjin Port Breakwater Wind Power Project



Phase I of Nagu Solar Power Station



Tongshan Nanlin Flexible Bracket PV Project

## Actively Promoting Hydropower Development

The Company has accelerated the integrated development of hydropower, wind and solar energy in river basins. The planning of the Lancang River (Tibet Section) Hydropower-Wind-Solar Base has been included in China's national energy policy guidelines, with the basin-wide environmental impact assessments (EIA) and planning adjustments successfully completed. In 2024, the Company added 1,706 MW newly-operational hydropower capacity, bringing the total installed hydropower capacity to 28.89 GW.

- ① The first batch of units (306 MW) of Sichuan Yingliangbao Hydropower Station - China's largest tunnel-diversion hydropower station - begins operation.
- ② Xinjiang Aheqi Water Control Project achieves milestone with main river closure.



Sichuan Yingliangbao Hydropower Station



Scan the QR Code to Watch the CCTV Report Titled *China's Largest Tunnel-Diversion Hydropower Station Begins Operation*

## Actively Developing Nuclear Power in a Safe and Orderly Manner

The Company steadily advanced the development of nuclear power projects, with operational, under-construction and approved projects reaching a total capacity of 5 GW, and the total nuclear power generation completed throughout the year was 272 GWh. In 2024, Huaneng High-Temperature Reactor Technology Research Center was put into service, and the nuclear heating project of Shidao Bay HTR-PM Demonstration Project achieved grid connection, leading to increased 190,000m<sup>2</sup> heating area which met the clean heating needs of 1,850 households. The Shidao Bay HTR-PM Demonstration Project was selected as one of the "Top10 Global Engineering Achievements" by the Chinese Academy of Engineering.

- ① The Expansion Project Phase I of Shidao Bay Nuclear Power Plant (Company's first PWR nuclear power project) with a capacity of 2.4 GW commenced its construction officially.
- ② The construction of Changjiang NPP Project Phase II was steadily advanced and fully transferred to the equipment installation stage.
- ③ Xiapu NPP PWR Project was successfully included in the 2025 national approval plan.



Shidao Bay HTR-PM Demonstration Project



Scan the QR Code to Watch the CCTV Report Titled *Construction of the Expansion Project Phase I of China's Advanced Nuclear Power Base Begins*

## Solidly Carrying out Clean Production



We will continue to control pollution in a lawful, targeted, and science-based way, and we will make further efforts to keep our skies blue, waters clear, and lands clean.

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

## Promoting Energy Conservation and Carbon Reduction

### Energy Management

Coal Consumption for Power Supply

**298.08** g/kWh

The Company placed high importance on energy management, strictly implemented the requirements specified in the *Energy Conservation Law of the People's Republic of China*, adhered to industry standards such 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, and developed internal management documents including the *Energy Conservation Management Measures* and the *Acceptance and Assessment Measures for Efficient and Eco-friendly Coal-Fired Power Plants*. Additionally, the Company prepared and issued the annual *Key Energy-Conservation Work Guidelines* to define priorities and directions. The Company continuously strengthened the supervision and management efforts. Throughout the year, energy conservation inspections were conducted at 20 grassroots power plants, energy-saving diagnostics were performed at 12 plants, and 13 plants underwent "Energy-efficient and Environmentally-friendly Enterprise" review and acceptance. The Company also held centralized meetings with relevant units to address identified issues, causing significant rectification effect. In 2024, the Company achieved a coal consumption rate of 298.08g/kWh for power supply, 5.1g/kWh lower than the industry average level.

The Company actively implemented the relevant requirements described in the Notice of the National Development and Reform Commission and the National Energy Administration on the *Implementation of the Transformation and Upgrading of Coal-fired Power Units*, prepared the *Work Plan for Large-scale Equipment Upgrading and Transformation*, continued to upgrade and transform coal-fired power units. Throughout the year, the Company invested RMB 724 million to implement 41 "Three Transformation Linkage" projects (focusing on energy-saving and carbon reduction, operational flexibility, and heating supply upgrading), with a total transformation capacity exceeding 29 GW. These efforts further strengthened the supporting and regulating role of clean coal-fired power in the energy system. For regional subsidiary companies with relatively high energy consumption indicators, the Company allocated a special fund of RMB 735.1 million for energy-saving transformation. These investments supported efficiency improvements, e.g. cooling tower air-water flow optimization, boiler air preheater sealing upgrades, circulating water pump performance enhancements, etc., delivering significant effect.

In 2024, the Company's coal-fired units received 72 awards in the Coal-Fired Power Unit Efficiency Competition organized by China Electricity Council, achieving an award rate of 33.3% - ranking first in industry benchmarking. Among these, 16 units were honored as "Best in Coal Consumption for Power Supply" and "Best in Auxiliary Power Consumption Rate", also securing the top industry position.

### Carbon Emission Management

The Company advanced the dual control of carbon 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 Guideline 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)*, which focused on strengthening carbon emission data quality management, actively participating in the development of national carbon market, and intensifying professional capacity-building efforts to continuously improve carbon emission management level. In 2024, the Company's carbon emissions totalled 530 million tons, reflecting a decrease of 6.88 million tons year-on-year, and the carbon emission intensity for full-caliber power generation was 545.7g/kWh, reflecting a decrease of 28.1g/kWh year-on-year.

Carbon Emissions  
Reflecting a Decrease of

**6.88** Million Tons

Year-on-year

- ④ Steadily advanced the online monitoring of 36 units in the second batch of continuous CO<sub>2</sub> monitoring pilot projects, and carried out the *Research on the Application of Continuous Emission Monitoring Technology and Policy for Thermal Power Plants*, to effectively improve the data quality.
- ④ We conducted third-party verification of carbon emissions for 122 thermal power companies in 2023, with no reported issues regarding data quality, lay a solid foundation for carbon market participation.
- ④ Organized three carbon emission management training sessions, comprehensively enhancing the expertise of carbon emission management personnel of grass-roots enterprises and achieving a certification rate of approximately 90% among these personnel.

### 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 0.073g/kWh and 0.14g/kWh respectively. The emissions of sulfur dioxide and nitrogen oxides per 10,000 yuan of output value were 1.16kg and 2.21kg respectively. In 2024, the Company's proportion of ultra-low emission units will reach over 99%.

### Wastewater Management

The Company focusing on controlling water ecological pollution, 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. In 2024, the Company discharged 63,158.3 million tons of wastewater, along with 1056.56 tons of chemical oxygen demand (COD) and 63.33 tons of ammonia nitrogen.

### Case Trial Run of COAP+ CO<sub>2</sub> Capture Pilot Plant



COAP Project Pilot Platform

In August 2024, the Company's self-developed thousand-ton-scale COAP+ CO<sub>2</sub> capture pilot plant for coal flue gas successfully completed a 72-hour trial run at Yueyang Power Plant, producing the first batch of industrial-grade liquid CO<sub>2</sub> products. During the trial run, the CO<sub>2</sub> capture rate reached 95% with a regeneration heat consumption of 0.96 GJ/tCO<sub>2</sub>, representing over 50% reduction compared to conventional carbon capture technologies.

The deployed COAP+ CO<sub>2</sub> capture technology - an innovative extension of the Company's proven COAP technology for integrated flue gas treatment - enables synergistic removal of both pollutants and CO<sub>2</sub>, demonstrating Huaneng's technological contribution to China's "Dual Carbon" goals.

### Case Huaneng Guilin Gas Distributed Energy Co. Ltd. Was Included into the List of Typical Cases of Industrial Wastewater Recycling



Huaneng Guilin Gas Distributed Energy Co. Ltd.

Huaneng Guilin Gas Distributed Energy Co. Ltd. utilizes recycled water from municipal wastewater treatment plants as its primary production water source, instead of tap water. Recycled water accounts for 97.87% of total water consumption of Guilin Power Plant. The wastewater generated in the production process is discharged back to municipal treatment plants for reprocessing and reuse, which achieves 100% wastewater recycling. This closed-loop system significantly reduces the emissions of organic and ammonia nitrogen pollutants, delivering measurable improvements to urban water environment.

In December 2024, the "Water Process Recirculation Model" of Huaneng Guilin Gas Distributed Energy was listed among "Exemplary Cases of Industrial Wastewater Recycling" by the Ministry of Industry and Information Technology.

## Strengthening Management and Control of "Three Wastes"

The Company intensified the pollution prevention and control initiatives, strictly implemented the requirements set forth in 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*, and the *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes*. The Company developed several corporate management documents, including the *Accountability Measures for Ecological Conservation and Pollution Prevention Campaigns and Real-time Pollutant Emission Monitoring Platform Management Procedures* etc., adhering to the principles of targeted, science-based, and law-based pollution control. In 2024, the Company invested RMB 1.85 billion in environmental initiatives, carrying out 106 pollution control projects covering wastewater treatment and ash disposal site remediation.

### 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. In 2024, the Company safely disposed of 20,500 tons of hazardous wastes.

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. The Company's smoke and dust emission performance was 0.009g/kWh, per 10,000 yuan of output value were 1.16kg. The Jinghong Hydropower Station completed its pilot development as a "Zero-Waste Enterprise", while the Jiacha Hydropower Station was honored as a *Zero-Waste Factory* in Shanann City, Tibet Autonomous Region.

### Case Ruijin Power Plant Domestic Sludge Co-firing for Power Generation Project Was Officially Put into Operation

In December 2024, the mixed combustion power generation project utilizing municipal sludge at Ruijin Power Plant was successfully put into operation upon final acceptance. With a designed sludge processing capacity of 100 tons per day, the project enables direct coal-sludge co-combustion without requiring technical modifications to existing systems, significantly reducing operational costs. This advances the resource recovery, volume reduction, and harmless treatment of urban sludge, and assists the enterprise to coexist harmoniously with local community.



Ruijin Power Plant Domestic Sludge Co-firing for Power Generation Project

### Circular Economy Construction

The Company actively carries out the construction of circular economy by optimizing production processes and driving technological innovation and industrial upgrading, improves the utilization rate of industrial wastes and waste heat and energy, and achieves a balance between economic benefits and environmental responsibility to support long-term sustainable development.

### Case Beijing Thermal Power Plant Leverages "Waste Heat" to Initiate New Track for Green Development

Beijing Thermal Power Plant steadily advances the R&D of its "large-capacity flue gas waste heat deep utilization system in an F-class gas turbine". This system introduces an innovative partition wall deep heat transfer technical route with an integrated boiler layout, where heat exchangers are installed in the tail flue of the waste heat boiler. This system first recovers waste heat from flue gas via intermediate water circulation, and reduces flue gas temperature from 80°C to 30°C. The captured heat is then transferred by heat pump units to water in the heating network for urban heating.

This system was commissioned during the 2023 heating season at Huaneng Beijing Thermal Power Plant's Gas Turbine Flue Gas Waste Heat Utilization Project. By the end of 2024, it had cumulatively recovered 2,308,400 GJ of thermal energy, saved 73,550,300 standard cubic meters of natural gas, reduced CO<sub>2</sub> emissions by 142,600 tons, and reclaimed 500,000 tons of condensed wastewater - delivering substantial economic and environmental benefits. In April 2024, this project was selected as *Pilot Project of Advanced Low-Carbon Technology in Beijing*, marking a new milestone in the Company's green and low-carbon development.



Beijing Thermal Power Plant's Gas Turbine Flue Gas Waste Heat Utilization Project

### Building An Environmentally Friendly Enterprise



We will develop the national park-based nature reserve system and carry out major biodiversity protection projects. Large-scale greening programs will be rolled out in a well-planned way.

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

### Green Ecological Engineering

To avoid impacts on aquatic ecosystems such as "Fish Migration Corridors" during hydropower project construction and disturbances to terrestrial ecosystems like vegetation and wildlife habitats during other power project constructions, the Company prioritizes ecological civilization as a cornerstone of green development. Upholding a firm awareness of ecological red lines, the Company strictly implements the "Three Synchronizations" environmental policy, continuously strengthens biodiversity conservation for both aquatic and terrestrial species, actively implements ecological protection measures, and strives to develop green energy projects that harmoniously coexist with surrounding environments.

### Case Yangluo Power Station Built the First Plant Factory Highly Coupled with Thermal Power Plant in China



Wuhan Plant Factory

Yangluo Power Station pioneers China's first vertical Wuhan Plant Factory project fully integrated with thermal power plant, with a cultivation area of 228m<sup>2</sup>. This project utilizes the thermal power plant's electricity, steam, purified water, waste heat, and carbon dioxide or other energy to produce high-quality fruits and vegetables - adding a touch of "new green" to traditional thermal power operations while achieving both industrial transformation and ecological benefits. In July 2024, the Wuhan Plant Factory successfully harvested 60kg of organic vegetables, marking an innovative step toward harmonious coexistence between engineering projects and ecological environment.

### Aquatic Biodiversity Conservation

- ⑥ The independently developed intelligent fish recognition technology for fish passage facilities in hydropower projects was awarded the Second Prize of Technological Invention by the Chinese National Committee on Large Dams. Additionally, new achievements have been made in the operational management of fish collection and transportation systems.
- ⑥ The independently developed smart ecological environment monitoring platform for the Lancang River Basin was put into trial run, becoming China's first demonstration project for data-driven environmental monitoring throughout the entire process of cascade hydropower development in a river basin.



"World Environment Day Joint Fish Stocking Initiative in the Hydropower Industry" at Huaneng Xizang Yarlung Zangbo River Hydropower Development Investment Co., Ltd.

## Terrestrial Biodiversity Conservation

- ④ The Lower Sesan II Hydropower Station in Cambodia invested approximately RMB 10 million to construct a bionic fishway, in order to ensure unimpeded passage for migratory fish and effectively maintain regional biodiversity. In 2024, after four consecutive years of monitoring the bionic fishway, Cambodia Fisheries Administration released a monitoring report to confirm its effectiveness.
- ④ To address the issue of downstream flow disruption during shutdowns of existing units, Suzhe Hydropower Station installed a compact horizontal hydro-generator, ensuring an "Ecological Flow Releases" during dry seasons and fish spawning periods to maintain unaffected aquatic habitats.
- ④ Huaneng Xizang Yarlung Zangbo River Hydropower Development Investment Co., Ltd. organized a sub-venue event for the "World Environment Day Joint Fish Stocking Initiative in the Hydropower Industry", releasing a total of 231,000 rare and endemic fish species, including Schizothorax waltoni and Schizothorax macropogon, into the Yarlung Zangbo River waters. This effort contributes to the protection of fish biodiversity.
- ④ The research achievement of "Research and Application of A Soil Reconstruction Technology for Ecological Restoration of Major Engineering Wounds in High-Altitude Regions" was awarded the Second Prize of the Green Mine Science and Technology Progress Award.
- ④ The temporary land reclamation project at Jiacha Hydropower Station was completed, leading to establishment of a thousand-mu high-standard farmland demonstration zone with remarkable achievements in ecological restoration.
- ④ The open-pit coal mine of Maijiamao Coal-fired Power Company adopted an Ecological Restoration with "Parallel Production, Rehabilitation and Reclamation". By the end of 2024, the cumulative investment reached approximately RMB 78.65 million, with 635 hectares of land reclaimed and revegetated.
- ④ The Yimin Open-pit Mine greened 410.57 hectares throughout the year, achieving high-quality maintenance of over 300 hectares of wetland landscape area, 70 hectares of ecological restoration core area and more than 800 hectares of regular greening area, significantly increasing the proportion of ecological restoration.
- ④ The Zhangwu Photovoltaic Desert Control Demonstration Project was successfully connected to the grid for power generation. By adopting a three-dimensional approach of "power generation above panels, sand fixation under panels, and inter-panel planting", the project achieved "agrivoltaic synergy harnessing solar power to combat desertification". The organic matter content in the soil increased threefold compared to previous levels, and stable herbaceous plant communities formed in the inter-panel planting zones, equivalent to adding 150,000 mu (approximately 10,000 hectares) of new forest carbon sink area. In October 2024, the project was included in the first batch of the "Energy Transition for Biodiversity Conservation Listings" by the Global Energy Interconnection Development and Cooperation Organization (GEICO).



Yimin Open-pit Mine



Zhangwu Photovoltaic Sand Control Demonstration Project

## Green Office Environment

Through a series of green office measures, the Company guides the employees to start from small things to reduce energy consumption in daily life, to build a green office environment together.

**Energy Efficiency for Electrical Appliances:** Use energy-efficient office equipment, properly regulate indoor temperature and lighting duration, and reduce standby power consumption of computers, printers and other devices.

**Green Travel:** Encourage employees to use public transportation, fully utilize video conference systems, significantly reduce business travel, and cut transportation-related carbon emissions.

**Eco-Friendly Habits:** Reduce single-use items by encouraging reusable alternatives (e.g., water bottles, containers). Implement categorize, and erect categorized waste bins for recycling paper, ink cartridges and other materials.

**Paperless Office:** Promote the use of electronic documents and double-sided printing to minimize paper waste.

**Office Environment:** Improve indoor air quality and create a healthier office environment by incorporating greenery in office areas.

## Promotion of Green Concepts

The Company continues to strengthen the promotion of green concepts, through environmental training, knowledge competitions, public welfare activities, etc., to popularize environmental knowledge, cultivate environmental behavior, enhance environmental awareness, and promote the integration of green concepts into employees' lives and enterprise production.

## Case

### Taishan Electric Power Co., Ltd. Participates in "Yellow River Afforestation Campaign"



2024 "Yellow River Afforestation Campaign" at Taishan Electric Power Co., Ltd.

In March 2024, to celebrate the 46<sup>th</sup> National Tree-Planting Day, Taishan Electric Power Co., Ltd. organized a large-scale voluntary tree-planting activity under the theme "Greening the Yellow River's Banks in Qilu, Co-Creating a Beautiful Ecological Landscape". Over 800 employees and volunteers from various sectors gathered at Tianping Lake in Tai'an City to participate in the 2024 "Yellow River Afforestation Campaign", demonstrating their commitment to environmental protection through concrete actions.

This campaign further inspired employees to actively engage in ecological and environmental protection, demonstrating the strong sense of social responsibility and service commitment of Huaneng's "Three-Color Sail" Volunteer Service Team.

—Volunteer representatives participating in the campaign

## Actions Speak Louder

### Striving to be a Pioneer in Protecting Green Mountains and Clear Waters

In 2014, the Company officially set sail in the offshore wind power sector. Over the past decade, the Company steadfastly implemented the national strategy for energy security, spared no effort in promoting green energy development, and actively engaged in offshore wind power construction. The Company has enabled offshore wind power projects to take root along the coastline of China and continuously delivered clean energy across the country, demonstrating Huaneng's responsibility through concrete actions.

#### China Huaneng · Offshore Wind Power Over the Past Decade

January 2014

The Company's first offshore wind power project, the Jiangsu Rudong Baxianjiao Offshore Wind Power Project, obtained the preliminary work approval letter.

April 2015

The Company-led National 963 Program project, "Construction of Technical Specifications and Testing and Certification Systems for the Design, Construction, Operation and Maintenance of Offshore Wind Farms", passed the acceptance inspection conducted by the Ministry of Science and Technology.

September 2017

The Company's first offshore wind power project, the Rudong Baxianjiao Offshore Wind Power Project in Jiangsu Province, was fully put into operation.

June 2021

The Company took the lead in establishing the Offshore Wind Power Industry Technology Innovation Consortium.

May 2021

The Company took the lead in establishing the Offshore Wind Power Technology Professional Committee under the Chinese Society for Electrical Engineering.

September 2020

The Company's first offshore wind power smart operation and maintenance platform was put into operation.

September 2019

The Company established the offshore wind power technology R&D center.

November 2021

The Company's first offshore wind power project in Zhejiang Province, the Jiaxing No.2 Offshore Wind Power Project, achieved full-capacity grid connection.

December 2021

The Company successfully lead-developed China's first 7MW direct-drive offshore wind turbine with fully independent intellectual property rights developed under the leadership of the Company.

The Company's first offshore wind power project in Shandong Province, the Shandong Peninsula South No.4 Offshore Wind Power Project, was fully commissioned and put into operation.

China's largest single-capacity and highest-latitude offshore wind power project in northern regions, the Dalian Zhuanghe Offshore Wind Power Project Phase II & IV1, achieved full-capacity grid connection.

November 2023

The 18 MW direct-drive offshore wind turbine, jointly developed by the Company and Dongfang Electric, officially rolled off the production line. This represents the world's most powerful wind turbine in both single-unit capacity and rotor diameter for direct-drive offshore models.

December 2024

The Dalian Zhuanghe Offshore Wind Power IV2 Project achieved full-capacity grid connection, marking the beginning of the "grid-parity era" for offshore wind power in Liaoning.

September 2024

Shandong's first self-selected offshore wind power project developed outside the planned site - the Shandong Peninsula North BW Site Offshore Wind Power Project - achieved full-capacity grid connection for power generation.

August 2024

The Zhejiang Daishan No.1 Offshore Wind Power Project achieved full-capacity grid connection for power generation.

July 2024

The Company's first offshore wind power project in Guangdong Province, the Shantou Lemen (Phase II) Offshore Wind Power Project, was successfully connected to the grid for power generation.



In the future, the Company will continue to uphold the green development strategy, with a focus on deepening the "Three Lines and One Belt" layout. The Company will accelerate the establishment of a new transformation framework supported by three pillars - new energy, hydropower and nuclear power - while promoting the integrated development of offshore wind power along a dedicated belt. The Company will prioritize the development and construction of offshore wind power bases in key provinces including Guangdong, Jiangsu, Zhejiang, Shandong and Liaoning, with the aim to create a world-class offshore wind power model that integrates "Five Key Dimensions": turbine optimization, foundation optimization, power system, smart O&M and international standards.

## Looking Forward to 2025- Working Together

In the future, guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the Company will uphold the general principle of "pursuing progress while ensuring stability", always bear in mind the "National Priorities". Guided by the new energy security strategy and driven by reform and innovation, the Company will focus on strengthening core functions and enhancing core competitiveness. With a commitment to pragmatic action, quality-driven innovation, and striving for excellence, the Company will adopt a more proactive and determined approach to achieve even greater performance. The Company will be dedicated to high-quality completion of the "14<sup>th</sup> Five-Year Plan" goals, embracing a "If I can't do it, who can?" sense of responsibility to demonstrate greater leadership in advancing high-quality development and contributing to Chinese modernization.

### Performance Goals

- Breaking New Ground in Work Safety
- Achieving New Heights in Operational Performance
- Making a New Leap in Energy Transition
- Realizing New Breakthroughs in Scientific and Technological Innovation
- Attaining New Results in Deepening Reforms
- Strengthening Party Building with New Vigor

## Appendixes

## Results of the 2024 Corporate Outstanding ESG Case Awards

In February 2025, the Company launched the 3<sup>rd</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 Corporate governance, ESG management, career development, supply guarantee, scientific and technological innovation, safe production, regional development, public welfare and charity, rural revitalization, "the Belt and Road", green operation, ecological environment protection, 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 through "China Huaneng" official account, the results of excellent cases were finally obtained via voting.



Scan the QR code to view more information about the 3<sup>rd</sup> Excellent ESG Case Selection and Appraisal Event of CHNG

1

## NO.1 Huaneng Power International, Inc. Implements High-Quality ESG Practices Through "Three-Color Culture"

Huaneng Power International Inc.  
Authors: Wang Kui, Qin Haifeng, Wang Yu, Huang Lei, Jia Guanyu, Li Junke



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

2

## NO.2 Lower Sesan II Hydropower Station, the Belt and Road Initiative Project Electrifies Cambodia's New Development Journey

Huaneng Lancang River Hydropower Inc.  
Authors: Wang Hallong, Wang Jiseng



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

3

## NO.3 Empowering Green Energy Transition, the World's Largest-Capacity Wind Turbine Was Completed and Commissioned

China Huaneng Group Co., Ltd. Northeast Branch  
Author: Zhang Qian



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

4

## Virtual Power Plant Embarks on New Journey, Green &amp; Low-Carbon Development Writes Splendid Chapter - Huaneng Zhejiang Virtual Power Plant Sets Benchmark for Energy Transition

China Huaneng Group Co., Ltd. Zhejiang Branch  
Authors: Chen Wenjie, Wu Kejun, Chen Haofei, Liu Bei, Wang Chunlin

5

## Sharing "Core" Achievements and Creating a "Brighter" Future: Intelligent Construction Practices in Deep Mine Operations of Hetaoyu Coal Mine

Huaneng Coal Industry Co., Ltd.  
Authors: Lian Kaiguo, Liu Sunjie

6

## ESG Management for Resource Utilization in Waste-to-Energy Enterprises Aiming to Contributing to "Waste-Free Cities"

Huaneng Jiangsu Energy Development Co., Ltd.  
Authors: Zhang Ye, Zhuang Chengbin, Li Qihe

7

## Riding the Winds of Zero-Carbon Dreams, Wind Turbine Paints the Future

China Huaneng Group Co., Ltd. North China Branch  
Authors: Liang Yixin, Wu Shiwen

8

## Carbon Footprint Intelligent Management System for Green Procurement

Huaneng Yangtze River Environmental Technology Co., Ltd.  
Author: Li Jinpei

9

## Leading with Green Energy to Power Xiongan New Area's High-Quality Development

China Huaneng Group Co., Ltd. Xiongan Branch  
Author: Sun Xin

10

## Yimin Open-pit Mine Advances High-quality "Upgrading" of Green Mine Construction

Huaneng Eastern Inner Mongolia Energy Co., Ltd.  
Authors: Jiang Wentao, Zhu Yongliang, Li Wenchao

11

## Winds Rise over South China Sea, Green Energy Charts the Future, Huaneng Lingao Offshore Wind Farm Project Construction

China Huaneng Group Co., Ltd. Hainan Branch  
Authors: Zhang Xuofeng, Liu Qingwen, Huang Baixue

12

## Implementing the Concept of Green Development and Igniting A New Engine for Rural Revitalization

China Huaneng Group Co., Ltd. Central China Branch  
Author: Liu Jiejin

13

## "1+N" Photovoltaic Approach, Boosting Industrial Development in Poverty-Stricken Areas

Huaneng Sichuan Hydropower Development Co., Ltd.  
Author: Bai Zheyin

14

## Protecting the Pristine River, Hunan Branch Rushes to the Frontline of Flood Prevention and Disaster Relief Urgently

China Huaneng Group Co., Ltd. Hunan Branch  
Authors: Zhu Ruijing, Chen Kai, Li Lexin, Huang Xinqi

15

## Pioneering Key Technologies for Rare Fish Conservation, Fortifying the Ecological Barrier on the Plateau

Huaneng Xizang Yarlung Zangbo River Hydropower Development Investment Co., Ltd.  
Authors: Xu Dinghui, Zhao Jining, Liu Songming, Tan Qiqwen, Xiao Jikai

16

## "1+6" Care Program for Left-behind Children

China Huaneng Group Co., Ltd. Jiangxi Branch  
Authors: Mi Weiye, Peng Gangyu

17

## China Huaneng Headquarters Project, Whole-Life Carbon Reduction Technology System for Buildings

Huaneng Properties Co., Ltd.  
Authors: Sun Shaojie, Liu Xuan, Li Lei, Wu Runye, Zheng Xinyao

18

## Industrial Wastewater Recycling at Huaneng Gullin Gas Distributed Energy Co. Ltd.

China Huaneng Group Co., Ltd. Guangxi Branch  
Author: Zhang Jimong

19

## Exploring the Integration of Party Building Leadership Into ESG Governance, Huaneng Youth' Participation in Community Co-construction

Shandong Xinneng Taishan Power Generation Co., Ltd.  
Authors: Ma Ping, Xiong Yanyan

20

## Innovation and Practice of Carbon Lean Information Management in Thermal Power Enterprises

Huaneng Gansu Energy Development Co., Ltd.  
Author: Dou Huaiwu



## Results of the 2024 Corporate Best ESG Photo Awards

In February 2025, the Company launched the 3<sup>rd</sup> Selection and Appraisal of the Most Beautiful ESG Pictures. All secondary companies and grassroots units actively participated and submitted over 500 pictures. After the initial review and two rounds of 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 through "China Huaneng" official account, the results of the most beautiful ESG pictures were finally obtained via voting.



Scan the QR code to View more Information about the 3<sup>rd</sup> Most Beautiful ESG Pictures Selection and Appraisal Event of China Huaneng



**NO.1** Huaneng Nuclear Power Development Co., Ltd.  
Daybreak - March of Nuclear Power Construction (by Huang Yukun)



**NO.2** China Huaneng Group Co., Ltd. Southern Branch  
Ride the Wind, March Toward Green (by Liu Ming)



**NO.3** North United Power Co., Ltd.  
Kubuqi New Energy Base (by Lian Peng)



**4** North United Power Co., Ltd.  
Shangdu GW-level Wind Power Base (by Miao Ze)



**5** Huaneng Lancang River Hydropower Inc.  
Nuozhazu Hydropower Station (by Cai Shan)



**6** China Huaneng Group Co., Ltd. Central China Branch  
Fishing Boat in the Evening (by Zhu Xiuyuan)



**7** China Huaneng Group Co., Ltd. Hebei Branch  
Spectacle of Wind, Solar and Animal Husbandry (by Ning Hao)



**8** Huaneng Coal Industry Co., Ltd.  
Masterful Craftsmanship (by Meng Zhiqiang)



**9** Huaneng Gansu Energy Development Co., Ltd.  
March Toward the Light (by Wang Shixia)



**10** China Huaneng Group Co., Ltd. Anhui Branch  
Luminous and Colorful (by Zha Yingsong)



**11** China Huaneng Group Co., Ltd. Shandong Branch  
Huangtai Power Plant's Speed on the Green Track (by Wang Zhenzhe)



**12** Huaneng Jiangsu Energy Development Co., Ltd.  
Vibrant Musical Dots (by Han Wule)



**13** China Huaneng Group Co., Ltd. Guangxi Branch  
Energy Supply Assurance (by Liu Peng)



**14** China Huaneng Group Co., Ltd. Fujian Branch  
Luoyuan Power Plant (by Jia Hongjiang)



**15** China Huaneng Group Co., Ltd. Jilin Branch  
Cogeneration (by Dong Chang)

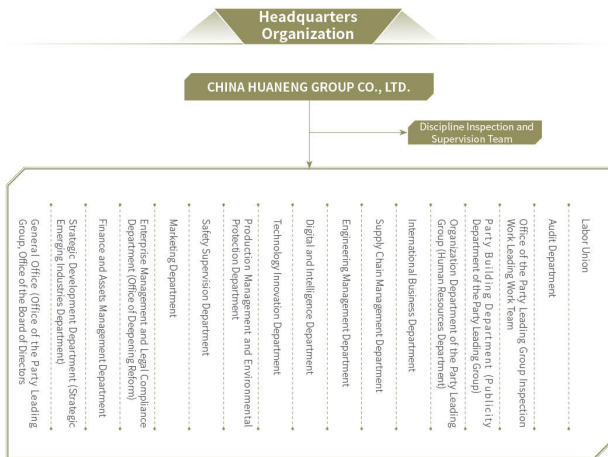
## About China Huaneng

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 RMB 34.9 billion, 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 122,000 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 2024, the Company's total asset was RMB 1.71 trillion. The total installed capacity of wholly-owned and majority-owned power plants was over 269 GW, heating area reaches 1.06 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 256<sup>th</sup> in 2024. SASAC has awarded the Company A-level performance assessment results for 20 times, and A-level tenure assessment results of the person-in-charge of central SOE for 7 times, being the top among comparable power generation enterprises in China.



## 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. Huanan 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 Jiangsu Energy Development Co., Ltd. (China Huaneng Group Co., Ltd. Jiangsu Branch)
Huaneng Lancang River Hydropower Inc. (Yunnan Branch, Huaneng Lancang River Upstream Hydropower Co., Ltd.)	Huaneng Eastern Inner Mongolia Energy Co., Ltd.	Huaneng Sichuan Energy 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

## Industrial Distribution Map

As of December 31, 2024, the installed capacity of the Company's wholly-owned and controlled power plants amounted to

**269.26** GW

including 265.53GW domestically and 3.7294GW overseas

In 2024, the Company achieved a cumulative power generation of

**871,000** GWh

including 855,200GWh domestically and 15,800GWh overseas

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



## Key Performance

	Indicator Name	Unit	2020	2021	2022	2023	2024
Modern Governance	Economic Contract Performance Rate (Group-level)	%	100	100	100	100	100
	Total Assets	RMB 100 Million	11875	13399	14152	15608	17076
	Total Operating Income	RMB 100 Million	3142	3855	4245	4098	4012
	Total Profit	RMB 100 Million	224	133	227	421	512
	Asset-Liability Ratio	%	69.61	72.74	70.90	70.08	68.75
	Number of Corruption Lawsuits Filed against Companies and Employees and Concluded	Item	0	2	2	0	0
	Installed Capacity	10 MW	19644	20592	22111	24312	26926
	Thermal Power Installed Capacity	10 MW	13712	14006	14224	14246	14050
	Power Generation (Domestic)	100 GWh	7083	7744	7911	8305	8552
	Safety Investment (Technological Upgrading)	RMB 100 Million	9.80	5.97	8.50	25.76	30.15
Functional Value	Major Equipment Accident	Case	0	0	0	0	0
	General Equipment Accident	Case	0	1	0	0	0
	General Occupational Injury/Fatality Accident	Case	10	7	7	7	8
	Class I Operational Disturbance	Case	9	4	2	5	2
	Unplanned Outage Frequency (hydro & thermal power)	Case	97	91	75	89	87
	Equivalent Availability Factor (hydro & thermal power)	%	94.49	93.90	93.93	93.90	94.03
	Number of Work-Related Fatalities	Person	6	5	4	1	4
	Work-Related Fatality Rate	%	0.04	0.04	0.03	0.01	0.03
	Lost Workdays due to Work-related Fatalities	Workday·Person	36000	30000	24000	6000	24000
	Average Safety Training Hours per Employee	Hour	40	40	40	40	40
Number of Employees Covered by Safety Training	Person	123710	120751	120056	119735	112950	
Total Number of R&D Personnel	Person	1381	1493	1746	2100	2618	
National Authorized Patents	Item	1785	6307	11629	8815	4932	
Among Them: Patents for Invention	Item	135	251	1217	1982	3031	
Provincial/Ministerial-Level and above Science and Technology Achievements Awards	Item	39	66	63	68	51	
R&D Expenditure	RMB 100 Million	66.09	101.60	130.02	127.44	128.70	
R&D Intensity	%	2.10	2.64	3.06	3.10	3.21	
Coal Production Capacity	10,000 Tons/year	8500	8770	11380	11880	12470	
Coal Production	10,000 Tons	7607	8664	10108	10800	11104	

	Indicator Name	Unit	2020	2021	2022	2023	2024
A World of Great Harmony	Paid Taxes	RMB 100 Million	297	278	356	372	406
	Number of In-Service Employees throughout the Year	Person	124628	120927	121264	120304	122468
	Number of New Employment throughout the Year	Person	4196	4366	5371	5737	5125
	Number of Female Employees	Person	28783	27096	26054	25358	24567
	Female Employees Ratio	%	23	22	21	21	20
	Female Manager Ratio	%	31	30	29	30	30
	Number of Ethnic Minority Employees	Person	8624	8295	8343	8398	8389
	Ethnic Minority Employees Ratio	%	6.92	6.86	6.88	6.98	6.85
	Labor Contract Signing Rate	%	100	100	100	100	100
	Collective Contract Coverage	%	100	100	100	100	100
Painting an Eco-Civilization Blueprint	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	86	82	83	84	85
	Employee Training Coverage	%	80	76	79	82	85
	Total Amount of Donation	RMB 100 Million	2.82	1.61	2.17	2.20	2.11
	Employee Volunteers	Person-times	80055	78593	79012	79356	79653
	Number of Suppliers Reviewed during the Reporting Period	Item	24138	15653	17040	17040	16248
	Total Investment in Environmental Protection	RMB 100 Million	10.20	13.00	16.95	16.80	18.50
	Total Investment in Energy-saving Technological Upgrading	RMB 100 Million	4.88	5.09	2.52	2.60	3.66
Painting an Eco-Civilization Blueprint	Low Carbon & Clean Energy Installed Capacity	10MW	7192	7849	9203	11431	13893
	Low Carbon & Clean Energy Percentage	%	36.61	38.12	41.62	47.02	51.80
	Hydropower Installed Capacity	10MW	2756	2756	2759	2759	2889
	Wind Power Installed Capacity	10MW	2530	2917	3393	3929	4610
	Photovoltaic Installed Capacity	10MW	645	912	1735	3358	4982
	Coal Consumption for Power Supply	g/kWh	295.34	294.04	292.02	294.91	298.08
	Auxiliary Power Consumption Ratio	%	3.73	3.71	3.65	3.53	3.54
	Comprehensive Utilization Rate (Fly Ash & Slag)	%	75.64	77.10	73.69	73.60	75.31
	Sulfur Dioxide Emission Intensity for (Thermal Power)	g/kWh	0.072	0.070	0.068	0.069	0.073
	Nitrogen Oxide Emission Intensity for (Thermal Power)	g/kWh	0.139	0.137	0.137	0.137	0.140
Painting an Eco-Civilization Blueprint	Smoke and Dust Emission Intensity for (Thermal Power)	g/kWh	0.010	0.009	0.009	0.009	0.010
	Installed Capacity of Ultra-low Emission Units	10MW	11605	12300	12400	13165	13225
	Proportion of Ultra-low Emission Units	%	97.0	99.0	99.5	99.5	99.5
	Fresh Water Consumption for Power Generation	10,000 Tons	54021	59980	62847	57673	60073
	Water Consumption per Unit Power Generation	kg/kWh	1.00	1.02	1.08	0.99	1.02
	Carbon Emissions	10,000 Tons	47569	52436	52600	53720	53033
	Carbon Emission Intensity	kg/kWh	634.99	635.35	623.00	573.80	545.70
	Wastewater Discharge Volume	10,000 Tons	4485.81	3655.84	3382.24	3164.33	6315.83
	Total Coal Consumption	10,000 Tons of Standard Coal	1.68	1.84	1.82	1.89	1.84

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## Rating Report

### Rating Report for 2024 Environmental, Social and Governance Report (Social Responsibility 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 2024 Environmental, Social and Governance Report (Social Responsibility Report) of China Huaneng Group Co., Ltd. (hereinafter referred to as the Report).

#### I. Basis of Rating

General Framework of Guidelines for Corporate Sustainable Development Reporting (CASS-ESG 6.0) of China Enterprise Reform and Development Society and Responsibility Cloud Institute. Also known as Chinese Corporate Sustainable Development Report Rating Standards (2025) of China Corporate Social Responsibility Report Rating Expert Committee.

#### II. Rating Process

1. The rating team receives the Confirmation letter for Process Assessment Materials and Supporting Evidence submitted by the reporting team for the Corporate Sustainability Report.
2. The rating team evaluates the reporting process and content, and drafts the 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 (★★★★)

Enterprise Management and Legal Compliance Department (Office of Deepening Reform) coordinates and advances the Report preparation. Functional departments and subordinate units provide report materials and review relevant contents, while the Board of Directors oversees the overall process and conducts the final review of the Report. The Report's functional role and values were explicitly defined as an important instrument to disclose duty performance information in line with relevant requirements, build the corporate brand image, improve responsibility management and strengthen communication with stakeholders. 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 Company promotes all five listed enterprises of Huaneng Power International Inc., Inner Mongolia Mengtiansi Huaneng Thermal Power Corporation Ltd., Shandong Xinning Taishan Power Generation Co., Ltd., Huaneng Lancang River Hydropower Inc., and Great Wall Securities Co., Ltd., as well as secondary companies such as Huaneng Renewables Corporation Limited, Huaneng Capital Services Co., Ltd. and Xi'an Thermal Power Research Institute Co., Ltd. to issue ESG (social responsibility) reports, compile and publishes a special report on overseas social responsibility to build a multi-level and multi-form reporting system. The Company plan to hold an offline press conference to release reports from the group, its listed companies, and secondary companies. 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, technological innovation, 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 "Serving as a Central Pillar and Making Strategic Planning to Deepen the Advancement of Modern Governance", "Top Priorities of the Country, Mission-driven Responsibility, Pooling Strengths to Enhance Functional Value", "Civilizations Converge in Splendor, Thrive in Harmony, and Join Hands to Build a World of Universal Harmony" and "Energy Innovation, Green Transition, Pioneering an Eco-Civilization Blueprint", the main body of the Report discloses 89,44% of the core indicators of the power production industry with remarkable integrity performance.

##### Balance (★★★★)

The Report discloses negative data including "employee turnover rate", "major equipment accident", "number of concluded corruption lawsuits filed against companies and employees" etc. and elaborates on the process, cause analysis, and follow-up measures of safety accidents for the super typhoon "rag"'s landfall in Wenchang, Hainan Province, causing "collapse of a wind turbine towers and significant damage to 5 wind turbines" in Wenchang Wind Farm with excellent balance performance.

##### Comparability (★★★★)

The Report discloses the comparative data for 5 consecutive years of 66 indicators, such as "Installed Capacity", "Coal Production", "Employee Training Coverage", "Total Amount of Donation", "Carbon Emissions" etc., comparing horizontally the situation of, "achieved an assessed brand value of RMB 126.05 billion, ranking 1<sup>st</sup> among China's energy and chemical industry brands in terms of brand value", making an excellent comparability performance.

##### Readability (★★★★)

The Report is themed on "Concrete Actions - Steadfast Perseverance", the abbreviation of the enterprise, "Zhong", "Guo", "Hua" and "Neng", is hidden in the titles of each chapter. While systematically displaying the actions and achievements of the enterprise in fulfilling their responsibilities, it is highly distinctive and highlights the enterprise brand. The cover design incorporates elements of the Company's main business, with high-definition real-life images featuring the Company's characteristics across chapters, enhancing the Company's recognition. Incorporate the spirit of speeches by important national leaders or important policy documents into various topics, and enhance the political and social responsibility. The report has concise language, rich case studies, exquisite design, and multiple references to relevant evidence, achieving better readability.

##### Innovativeness (★★★★)

The Report has set up special chapters of "Reflecting on 2024-Remaining True to Our Original Aspiration" at the beginning, concentrate on presenting the key points and highlights of annual accountability, highlighting the responsibility of central enterprises in fulfilling their duties. Innovate the way the report is written, with "visual report starting", "International Focus", "Core Focus - Issue Identification", "Risk Challenges - Sustainability Analysis", "Excellence Pursuit - Optimization Pathways", "Highlights - Benchmarking Practices" and "Focus - Praises and Honors" and ending with [Actions Speak Louder] strengthening responsibility management. Multiple embedded QR codes are used to extend the interpretation of the report content, enhancing its dissemination and communication power. These features contribute to the Report's excellence in innovativeness.

##### Overall Rating (★★★★)

The independent review panel designates the "China Huaneng Group 2024 ESG Report as a Five-Star Report, recognizing it as an excellent corporate sustainability disclosure.

#### IV. Suggestions for Improvement

More disclosure about core industrial indicators to further improve the Report's integrity.



China Huaneng's Environmental, Social and Governance Report (Social Responsibility Report) Received Five-Star Rating for the Fourteenth Consecutive Year

董树忠 隋永辉  
Vice Chairman of the Expert Committee      Leader of the Rating Team      Expert of the Rating Team

Date of issuance: July 2025



Scan the QR Code to View Enterprise Rating Files

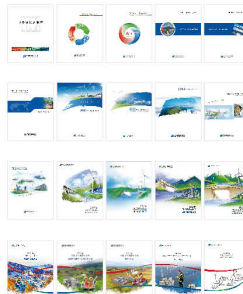
## Feedback

#### Dear Readers:

Thank you for reading 2024 Environmental, Social and Governance (ESG) Report (Corporate Social Responsibility Report) of China Huaneng Group. To further enhance our ESG management practices and report development quality, please scan the QR code below to submit your comments and suggestions online.



## Sustainability-related Report System



## Interpretation of the Creativity of the Sustainability-related Report 2021-2025

CHNG's five sustainability-related reports to be released during the "14<sup>th</sup> 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, hydropower and electrical workers. These imply that CHNG, under the guidance of "Three Colors" mission, makes all out efforts to develop new energy, nuclear power and hydropower. CHNG continuously creates high-quality power projects in China, turning energy into "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 "14<sup>th</sup> Five-Year Plan".