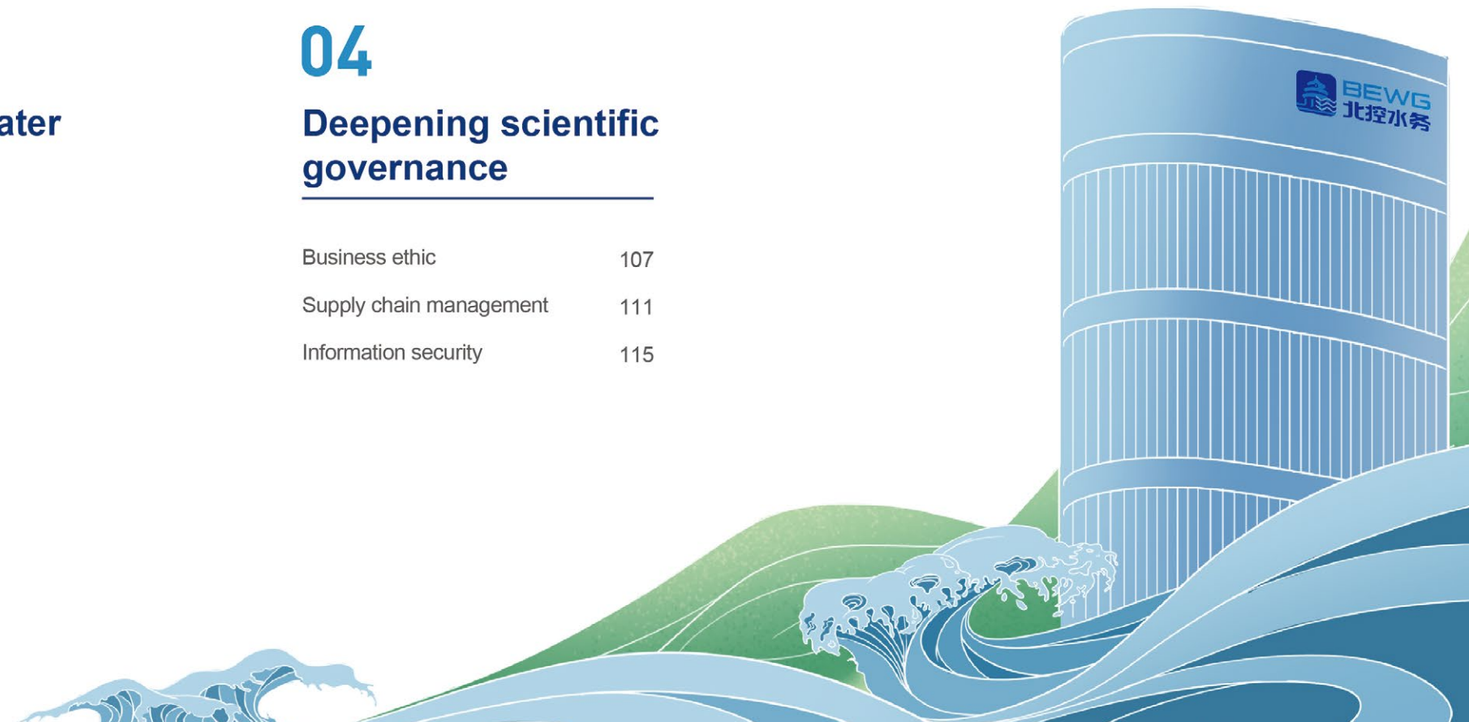
2022

Beijing Enterprises Water Group Limited

Sustainability Report

BEWG
北控水务

CONTENTS



About this report

This report is a non-financial report issued by Beijing Enterprises Water Group Limited. It aims to respond to the expectations of stakeholders and fully demonstrate the Group's concept, management, action and performance of environmental, social and governance ("ESG") and sustainable development. This report has been reviewed and approved by the Board of Directors, and there are no false records, misleading statements or major omissions in this report.

Reporting period

The reporting period is from January 1 to December 31, 2022. Information beyond this period is indicated in such sections.

Reporting scope

All information and data disclosed in this report are from Beijing Enterprise Water Group Limited and its subsidiaries. The data covers headquarters and subsidiaries as cited in the Annual Report and Consolidated Financial Statements (excluding Beijing Enterprises Urban Resources Group Limited[1]). Data outside of this scope is indicated in such sections.

Abbreviations

For ease of writing and reading, this report refers to Beijing Enterprises Water Group Limited as "the Company", Beijing Enterprises Urban Resources Group Limited as "BEUR" and Beijing Enterprises Water Group Limited and its subsidiaries as "BEWG", "the Group" or "We".

Data explanation

All information and data are from the Group's internal collection and statistics, and statistical reports provided by subsidiaries. Unless otherwise specified, the currency unit in this report is CNY.

Reporting guidelines

This report is in accordance with the requirements of *Appendix 27 Environmental, Social and Governance Reporting Guide* (*ESG Reporting Guide*) of the *Rules Governing the Listing of Securities on the Stock Exchange of Hong Kong Limited (the "Listing Rules")* with reference to the *GRI Sustainability Reporting Standards* (*GRI Standards*) issued by the Global Sustainability Standard Board (GSSB) and other standards.

Confirmation and approval

After confirmation by management, this report was reviewed and approved by the Board of Directors of the Company (hereinafter "the Board") on March 30, 2023.

Access to this report

This report is available in English and Chinese on the website of the Company (http://www.bewg.net). In case of any conflict or inconsistency between the Chinese and English versions, the Chinese version shall prevail; in case of any conflict or inconsistency between this report and the annual report of the Group, the annual report shall prevail.

[1] On June 27, 2022, the Group completed the acquisition of a 60.56% stake in Beijing Enterprises Urban Resources Group Limited (3718.HK, hereinafter referred to as "Beijing Enterprises Urban Resources"), and met the conditions to consolidate financial statements. However, due to the large volume of data involved and the complexity of the caliber, the Group did not manage the ESG work before the acquisition of Beijing Enterprises Urban Resources. Therefore, to ensure data reliability and validity, this report does not cover Beijing Enterprises Urban Resources. As a Hong Kong listed company, Beijing Enterprises Urban Resources has been disclosing its full ESG report independently every year, please refer to its official website (beur.net.cn) for more details.

Statement of the Board

BEWG embeds ESG concept deeply into corporate business development and daily operations and has established efficient ESG management architecture with clear division of responsibilities and obligations. In pursuit of the "corporate sustainability" goal, we make every effort to enhance our core competitiveness.

Supervision on ESG matters

The Board of Directors of BEWG is the highest decision-making body on ESG matters, participated in ESG governance throughout the process and assumes full responsibility for the ESG strategy and ESG disclosure of the Group. The Audit Committee under the Board of Directors is responsible for implementing the ESG resolutions of the Board of Directors, formulating ESG management systems and strategy, reviewing ESG risks, and overseeing the implementation and promotion of specific ESG issues. The Board of Directors regularly receives annual reports on the progress of ESG and sustainable development work of each functional department of the ESG Working Group and subordinate units to ensure the smooth implementation of ESG work and the effectiveness of ESG risk prevention and control.

ESG management guidelines and strategies

BEWG has put in place effective and sustainable development governance and management mechanisms. The Group constantly improves means of communication for stakeholder engagement, timely follows up the ESG priorities of the capital markets and the industry, regularly identifies and assesses material ESG issues. In 2022, the Board of Directors thoroughly followed up on the assessment of material ESG issues, determined the importance of each ESG issue based on the analysis and understanding of the external macro environment and the results of internal and external stakeholder communication results, and determined the ESG materiality matrix of the Group.

Review of ESG targets

In alignment with business characteristics, BEWG has set a series of ESG management targets regarding water conservation, energy conservation, emission reduction, quality, and safety, etc. The Board of Directors receives the work progress of ESG-related targets, oversees and evaluates their attainment, to ensure the advancement of ESG governance across the Group.

This report has fully and truly disclosed the ESG progress and achievements of BEWG in 2022. This report has been reviewed by the Audit Committee and approved by the Board of Directors on March 30, 2023.

Message from the Chairman

Chairman of the Board of BEWG

Mr. Xiong Bin

Seize opportunities to achieve high-quality development

Year of 2022 is an important year to embark on a new journey toward the second centenary goal of building a socialist modern country in all aspects. We are faced with unprecedented changes in the world, times and history. “14th Five-Year Plan” and “3060” dual carbon target in China have put forward higher requirements for high-quality development. With the wise leadership and great support of Beijing Enterprises Group, BEWG is in a position to meet national strategic needs and customer needs. Following the business purpose of “customer orientation through innovation capability”, we deepen regional reform and clarify the business mix. We also give weight to environmental performance and social responsibility in operation. By improving corporate efficiency and steadily advancing the asset-light transformation, we continuously optimized the profit structure and generated positive cash flow in 2022. Amid changes in the times and climate, the Group seized new opportunities to empower high-quality sustainable development.

Remain steadfast in pursuing sustainability

BEWG pursues corporate sustainability as the ultimate strategic goal. We take into account the sustainability of the Company and mankind while focusing on the present. In 2022, we delivered a string of remarkable achievements in sustainability -- being included in the Dow Jones Sustainability Emerging Markets Index for the first time; being upgraded to A in the MSCI ESG rating (among the top in the international water industry); retaining a B rating from CDP (above the global average). In the field of sustainable development, BEWG has won high recognition from the capital market, and will continue to enhance our presence among investors.

Adhering to the philosophy of “lucid waters and lush mountains are invaluable assets” proposed by General Secretary Xi Jinping, BEWG prioritizes green and low-carbon transition as the inevitable way to sustainability. In line with the development concept of “green priority, carbon reduction with efficiency improvement”, we practise green development through concrete actions. To promote low-carbon development through technological innovation, we keep investing in the Research and Development (R&D) of new low-carbon technologies, building customer-oriented product innovation capability and advancing the commercialization of technological achievements. In 2022, we launched two technology products: BEAOA and BESWIFT. To contribute to the goal of carbon peak and carbon neutrality, we further tap our potential for emission reduction, explore low-carbon construction technologies and optimize low-carbon and operation management. In addition, we proactively optimize the information security management system and establish a new top-down information security organizational structure, in a bid to safeguard group-wide information security.

Strive to turn the blueprint into reality

At the critical stage of comprehensively deepening reform and implementing the strategy, BEWG enjoys the full trust and support of Beijing Enterprises Group. In the future, we will further uphold the business purpose of “customer orientation through innovation capability”, and strive to become a trustworthy and world-class water and environment service provider. We will also open up a BEWG chapter in the construction of a beautiful China and the harmony between mankind and nature.

Message from the CEO

Chief Executive Officer of BEWG

Mr. Zhou Min

In 2022, we witnessed multiple challenges such as global warming, water shortage, intensifying industry competition and increasing demand for water supply and drainage. To promote construction of ecological civilization and support the 17 Sustainable Development Goals of the United Nations (SDGs), BEWG unswervingly integrates the ESG concept into corporate governance and operations. As a comprehensive and leading professional water and environment service provider, we put customers first and prioritize improving people’s well-being. While diving into water-related environmental protection, BEWG strives to create a comfortable and green environment. In terms of quality delivery, innovation-driven development, safe production and social contribution, we are committed to achieving whole-process sustainable management from construction to production, as part of our endeavor to facilitate the construction of a beautiful China.

As a practitioner of green development, BEWG stays true to environmental protection and water treatment, so as to promote harmony between mankind and nature. We actively explore the new path of high-quality development that prioritizes ecology and highlights green development advocated by General Secretary Xi Jinping. Besides, we take strategic actions to advance ecological progress and lead the low-carbon transition of the water industry. In 2022, we expedited synergetic efforts to reduce pollution and carbon emissions, facilitate the R&D of low-carbon technologies, and empower the low-carbon development of the water industry. In cooperation with Mr Peng Yongzhen, an academician of the Chinese Academy of Engineering, BEWG made breakthroughs in the sludge double recirculation-Ammonia/Oxic/Anoxic (SDR-AOA) and successfully realized the first 10,000-tonne engineering application of the AOA technology. By disposing of sludge from the source, we effectively support sewage treatment plants in achieving the goal of “carbon neutrality”.

As a promoter of harmonious society, BEWG adheres to people-oriented philosophy, product quality and innovation-driven development. In 2022, we focused on meeting the new talent demand to facilitate asset-light transformation and high-quality development. In order to strengthen supply, adjust the structure and improve human resources efficiency, we formulated a new talent strategy that is fundamental to sustainable development of the Group. We generously give back to society as a responsible corporate citizen. As a leading state-owned enterprise in the environmental protection industry, we continuously promote environmental education, engage in community services, and contribute to people’s well-being.

As an executor of scientific corporate governance, BEWG emphasizes responsible operations and delivers sustainable value to all stakeholders. In an attempt to promote digital transformation and asset-light transformation, we have developed digital operation and management platforms. In 2022, guided by the digital strategy, we comprehensively implemented information security protection, as well as assessed and prevented information security risks through such means as interviews & surveys, systematic inspections and penetration testing. We launched an anti-corruption education program at the Cloud Learning platform under the BEWG Education Center to integrate anti-corruption education into daily production and operations.

Facing the growing drain on global water resources in the foreseeable future, BEGW will continue to actively follow and respond to national policies and strategies. On the premise of expanding production and business, we will proactively assume social responsibilities, stay true to our original aspiration, and contribute to sustainable development by refining water treatment.

Topic 1

Exploring collaborative development and building a beautiful environment

In 2022, BEWG defined a new business portfolio, in which sanitation was identified as a new business with BEUR as the main body of development, providing regional integration of water, sanitation and hazardous waste in many cities across the country, and striving to explore a collaborative development path and build a beautiful living environment.

BEUR has accumulated rich operation and management experience in the field of environmental health services and hazardous waste treatment.

In the Environmental health sector

BEWG is committed to providing "one-stop" services in the field of environmental health investment, R&D, consulting, design, construction and operation, and strives to reduce waste of resources and maintain a beautiful environment.

In the Hazardous waste disposal sector

BEUR has advanced resource utilization and harmless treatment methods, which cover comprehensive technical roadmaps such as physical and chemical treatment, biological treatment, incineration heat treatment, and safe landfill, strictly control pollution emissions and improve quality and efficiency in multiple dimensions.

BEWG honors the mission of "Making the living environment better" and is committed to building itself as a trusted and industry-leading comprehensive service provider for digital and intelligent city operations.

BEUR has responded positively to the national strategic goal of "dual carbon" goals and has given full play to the business advantages to help improve the ecological environment quality. Adhering to the concept of sustainable environmental development, BEUR continuously optimizes the energy mix. In 2022, in alignment with the project development plan, BEUR continuously invested in upgrading new energy equipment, such as electric tricycles and LNG vehicles in multiple projects, promoting green and sustainable development of the enterprise. BEUR has attached great importance to resource conservation and sets water-saving and resource utilization targets. In 2022, BEUR also spared no effort to optimize the water resource configuration and reduce water resource consumption through its smart gardens and smart sanitation systems.

BEUR shapes a "people-oriented" concept, attaches great importance to on-site safety control, intensifies hazard investigation, and conducts over 3,800 safety and environmental inspections for hazardous waste businesses in 2022, thus ensuring a stable safety condition. BEUR cares for the physical and mental health of its employees, continuously builds a team with humanistic features, prioritizes employee training and provides employees with a platform to achieve their career dreams.

BEUR highly values supplier management to ensure the transparency, integrity and compliance of suppliers. BEUR also strengthened the environmental and social risk management of the supply chain, vigorously promoted the construction of a green supply chain, and integrated "green concept" into supplier management, striving to achieve long-term sustainable win-win cooperation between the two sides[2].

Case: BEUR serves the Winter Olympics to stage a grand event

In the Winter Olympics Project, BEUR is mainly responsible for comprehensive road cleaning, snow removal, ice shoveling, and garbage collection and transportation operations in a total area of 210,000 square meters in the Beijing Yanqing Winter Olympics area, including the National Alpine Skiing Centre, the National Sliding Centre, the Yanqing Olympic Village, folk towns, and park roads.

By adhering to the "Green Winter Olympics" concept and according to the requirements of "Meeting international standards, conducting operations delicately, supporting Beijing, and serving the Winter Olympics", BEUR constructs a smart waste management system that meets international standards and includes "Multi-form guided waste classification and placement, waste classification and environment-friendly waste collection and transportation at fixed points and fixed time, resource-oriented and harmless waste classification and treatment, full-coverage and combined cleaning, green modular snow removal and ice shoveling, and full-process visualization and real-time control"; widely purchases and uses environmentally friendly and pollution-free "Non-chlorine organic snow-melting agents" and other green and environmentally friendly materials; adopts the innovative combination mode of "Regional waste concentration + multi-waste mixing + decentralized waste treatment", builds complete sets of absorption facilities for the mixed treatment of organic wastes to achieve the harmless treatment and resource utilization of organic wastes.

In 2022, the team of BEUR completed the emergency support of snow removal for the Winter Olympic Games satisfactorily and surprisingly, which won unanimous praise from all walks of life and commendation from the operation team of the Winter Olympics venues.

[2] For detail ESG performance of BEUR, please refer to BEUR annual Environmental, Social and Governance Reports.

Topic 2

Bridging the “last mile” gap in the sewage treatment process to achieve the full-process low-carbon waste treatment

With the increase in the scale of urban sewage treatment in China, the yield of sludge as a byproduct of sewage treatment also increases accordingly. The sludge not being stabilized contains a large number of toxic components that are difficult to degrade, which may result in serious secondary pollution to the environment. To promote the harmless treatment and resource resourcization of the sludge, the national requirements for sludge treatment are gradually increased in recent years, shifting from “Focus on sewage treatment over sludge” to “Focus on sewage and sludge equally”. China has successively urged and emphasized the harmless treatment and resourcization of the sludge in policies such as the *Action Plan for Prevention and Control of Water Pollution* and the *Implementation Plan for Harmless Treatment and Resource Utilization of Sludge*. By relying on its rich industry experience and the basic principles of “sludge reduction, stabilization, harmless treatment, and resourcization”, BEWG, a comprehensive professional water and environmental service provider, actively explores solutions for the sludge treatment and disposal system and bridge the “last mile” map in the sewage treatment process, accomplishing its long-running high-quality and sustainable development.

Sludge reduction and harmless treatment

BEWG continues to optimize the sewage and sludge treatment process to reduce sludge from sources. We make use of pyrolysis carbonization, centralized incineration, collaborative incineration, biological treatment and other advanced technologies to increase the rate of harmless treatment of sludge. We also follow the principle of low carbon by effectively reducing carbon emissions of sludge treatment through process optimization, thus contributing to the national strategy of carbon peaking and carbon neutrality.

Case: Green Harbor Sludge Treatment Project in Qinhuangdao

Green Harbor Sludge Treatment Plant in Qinhuangdao is the first plant using the “trough high-temperature aerobic composting” (second-generation CBT) technology for reduction, stabilization and harmless treatment of municipal sludge in China. The designed sludge treatment capacity is 100 tonnes of sludge (moisture content: 80%) per day. Sludge is mixed with organic additives, followed by high-temperature aerobic fermentation according to the U.S. 503 Regulations, to effectively kill pathogenic bacteria, parasite eggs and weed seeds in sludge and remove most of odor. The generated humic soil is treated according to the *Control Standards of Pollutants in Sludge for Agricultural Use* (GB 4284-2018) to be used for landscaping and soil improvement.

The project features low energy consumption, high degree of automation, short fermentation cycle and stable compost quality, which is conducive to solving the problems of sludge discharge and pollution in the municipal sewage treatment plant of Qinhuangdao. The plant is the first one involved in biological fermentation of municipal sludge according to the municipal industry regulations and environmental standards (odor emissions) in China.

This project has been completed and put into operation, essentially solving the problem of sludge treatment in Qinhuangdao, and indicating that Qinhuangdao has a complete sewage and sludge treatment industry chain contributing to energy conservation, emission reduction and environmental protection. It is of great significance to improve the urban ecology, further promote the coordinated and sustainable economic and social development in Qinhuangdao.

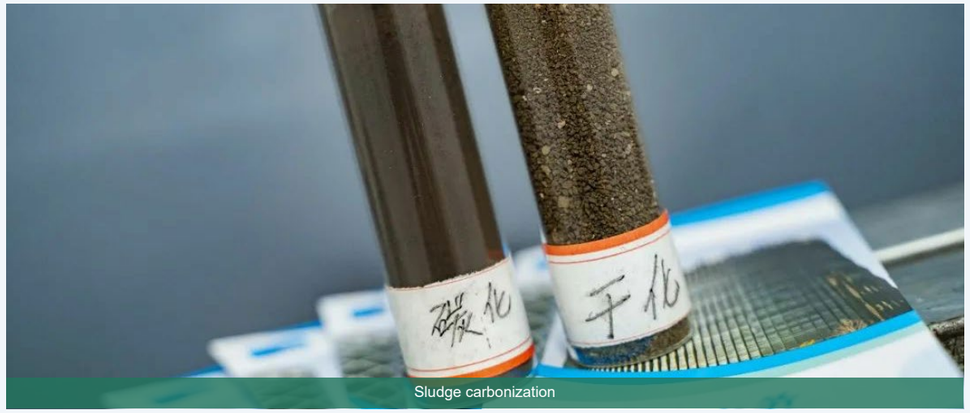
Sludge recycling

BEWG has been exploring the recycling of sludge treatment products and expanding industrial collaboration based on its technological innovation and practice over the years, in order to build an industry chain of circular economy based on sludge disposal.

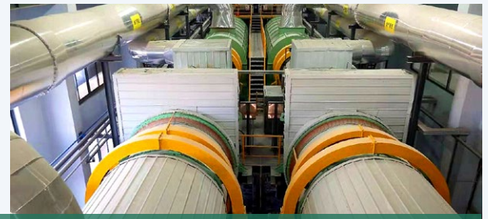
Case: Pyrolysis carbonization - sludge treatment in Jimo District, Qingdao (currently the largest single scale of sludge pyrolysis carbonization in China)

A combination of “deep dehydration + drying + carbonization + flue gas purification + building material utilization” is applied in Jimo Sludge Treatment Center of Qingdao, realizing the purpose of “reduction, harmless treatment, stabilization and recycling” of sludge. After sludge treatment, the moisture content of carbon residue is below 5%. Therefore, the treated sludge can be recycled in building materials, soil improvement and greening. This is particularly suitable at the last stage of sludge treatment, with ecological, economic and social benefits.

The project with the daily sludge treatment capacity of 200 tonnes boasts the largest treatment scale, longest continuous operation time and lowest direct operation costs in terms of sludge carbonization in China.



Sludge carbonization



Sludge disposal center in Jimo District, Qingdao

In the future, BEWG will continue to respond to national calls and goals for carbon peaking and carbon neutrality, guarantee and improve the environmental functions of sewage treatment plants, and increase the resource and energy recycling rate. BEWG also stick to environmental protection to make contribution to the high-quality development of water treatment industry and meet increasing needs of people for a better life.

01

Sustainability overview

About us

The Group has a presence in

31 provinces, autonomous regions, municipalities and special administrative regions (including Hong Kong and Taiwan)

Covering more than

100 prefecture-level cities

Overseas operations cover more than

30 cities in **8** regions and countries including Malaysia, Singapore, Australia, New Zealand, Portugal, Angola, Botswana and Saudi Arabia

Serving nearly

10 million customers

BEWG is a leading professional water and environment service provider, with businesses covering industrial investment, design, construction operation, technical services and capital operation. BEWG adheres to the business purpose of “customer orientation through innovation capability”, and applies technology and innovative models for new business growth to realize corporate sustainability

Focusing on water recycling and water-related environmental protection, the Group has built a “1+4+4” business portfolio, integrating water supply, sludge, plant and pipeline network integration, reclaimed water and derivative sectors based on its core municipal sewage treatment services. Meanwhile, we are actively developing our presence in the upstream and downstream of the industrial chain to establish ourselves as a leader in the domestic water treatment industry. And the scale of our water treatment ranks first in the domestic industry.

Taking into account the strategy, capital and innovation, the Group has set up headquarters in Beijing, Hong Kong and Hangzhou. It has a presence in 31 provinces, autonomous regions, municipalities and special administrative regions (including Hong Kong and Taiwan), covering more than 100 prefecture-level cities. Overseas operations cover more than 30 cities in eight regions and countries including Malaysia, Singapore, Australia, New Zealand, Portugal, Angola, Botswana and Saudi Arabia, serving nearly 10 million customers.

About us

Honors of BEWG in 2022

- Top China 500 enterprise ranked by the *Fortune* for 7 consecutive years
- Rank first place in the Top 10 influential enterprises in China's water industry by E20 environmental platform for 13 consecutive years
- "Top 50 environmental enterprises in China" by China Environment Service Industry Association for 4 consecutive years
- First prize of 2021 Beijing Science and Technology Progress Award
- Second prize of 2022 Guangdong Science and Technology Award
- First prize of Environmental Science and Technology Award of China Environmental Science Society 2022
- Three China Environmental Protection Enterprise industry Contribution Awards in 2021
- Title of Exemplary Organization for East-West Cooperation in Poverty Alleviation in 2021
- Third prize of the 2021 Shanghai Civil Engineering Award

- Second prize of 2021 SOE Management Innovation Achievement
- The "Best Sharing Platform Award" at the China Treasury Award 2022
- The "Best Infrastructure and Utilities Company" of Golden Hong Kong Stock
- "The Best Procurement Team - Chinese Enterprise " by PSA Asia Pacific Procurement Success Summit
- "Top 500 Chinese Brands" by Brand Alliance
- China's Industry-University-Research Cooperation and Innovation Demonstration Enterprise in 2021
- Industry-university Cooperation Collaborative Education Project of the Ministry of Education
- Second prize of the 35th Beijing Enterprise Management Modernization Innovation Achievements: *The First Star-Rated Enterprise Evaluation System in Water Industry*
- BEWG's ESG performance has been internationally recognized and has been selected into the Dow Jones Sustainability Index for the first time

Performance highlights of BEWG in 2022

Total revenue	Total design capacity of new projects	Total design capacity	Number of sewage treatment plants and village/town sewage treatment facilities	Number of water distribution plants	Number of reclaimed water treatment plants
25 billion HKD	**3,414,442** tonnes/day	**44,287,093** tonnes/day	**1,196**	**180**	**70**

About us

Industry contribution

BEWG actively responds to the national strategic plan, deeply participates in industry forums and industry research and analysis, and drives industrial development based on innovation. In 2022, the Group participated in a total of 161 industry associations and organizations to strengthen industry integration and industrial cooperation from the Group's headquarters to local governments, with an annual expenditure up to RMB 1.5552 million. The Group actively participates in and promotes the preparation and revision of national, industry and group standards and promotes the progress of the industry. In 2022, the national standards of *Water Reuse Guidelines ---Water Quality Management for Water Reclamation Plants* (GB/T 41016-2021), *Water Reuse Guidelines ---Wastewater Reclamation Technologies and Processes Evaluation Method* (GB/T 41017-2021) and other group standards, approved and released by the Standardization Administration of State Administration for Market Regulation, with the participation of BEWG in the development of such standards, have been implemented in succession.

BEWG's participation in the development of industry standards in 2022

Participation in compilation of 5 national standards

- *Water Reuse Guidelines -- Wastewater Reclamation Technologies and Processes Evaluation Method* (published)
- *Technical Requirements of Condition Survey for Urban Sewers Information System* (in preparation)
- *Technical Requirements of Operation Performance Assessment for Town Sewage MBR Treatment System* (in preparation)
- *Technical Specification for Evaluating the Aquatic Ecological Security* (in preparation)
- *Technical Specification for Monitoring and Evaluating the Aquatic Ecological Health* (in preparation)

Editing (participation) in compilation of 14 group standards

Editing of 2 group standards

- *Terminology of Urban Smart Water Services* (in preparation)
- *Technical Standard for Online Collection of Urban Water Service Information* (in preparation)

Participation in the development of 12 group standards

- *Technical Guideline for Construction of Rural Domestic Sewage Treatment Facilities* (T/CAEPI 50-2022) (published)
- *Technical Guideline for Operation and Maintenance of Rural Domestic Wastewater Treatment Facilities* (T/CAEPI 51-2022) (published)
- *Technical Guideline for Ecological Restoration of Seagoing Rivers* (published)
- *Technical Specification for In-situ Capacity Expansion and Upgrading of Membrane Bioreactor Process for Municipal Wastewater Treatment* (published)
- *Technical Specification for Low-carbon Operation Evaluation of Sewage Treatment Plant* (T/CAEPI 49-2022) (published)
- *Identification Rules for Urban Water Service IoT Equipment* (in preparation)
- *Specifications and Coding Rules for Electronic Toll Collection* (in preparation)
- *Requirements for Geographic Information System Dictionary of Urban Water Service* (in preparation)
- *Standard for Urban Water Industry Geographic Information Collection and Quality Control* (in preparation)
- *Technical Specification for Water Fee Payment* (in preparation)
- *Evaluation Standard for Smart Water Plants* (in preparation)
- *Technical Regulation for Survey and Transformation of Integrated Rain and Sewage Pipelines in Drainage Pipeline Network of Communities and Municipal Roads* (in preparation)

Ecological cooperation

Under the guidance of the ecological strategy, BEWG strongly supports multi-party cooperation, actively mobilizes industry resources, carries out external product and technical cooperation, and builds sustainable industry ecology to achieve mutual benefit and win-win results. The Group also plays a leading role by giving play to the advantages of universities and research institutes in scientific and technological cooperation channels, talent and platforms to explore new models of external scientific and technological cooperation and promote the deep integration of industry, academia and research.

Highlights of product and technology cooperation of BEWG in 2022

- Joint development of drying carbonization skid products for sludge disposal together with Zhejiang ECO Environmental Protection Technology Co., Ltd.
- Successful industrialization of BEAOA achievement (developed together with Mr. Peng Yongzhen, an academician of Chinese Academy of Engineering) in Pubei Sewage Treatment Project (20,000 tonnes/day) in Guangxi
- Development of cutting-edge technology of "MPC + RO" together with Tsinghua University and GreenTech Environmental Co., Ltd. (joint research cooperation project of Tsinghua University and BEWG)
- Development of "BELEBC low-carbon biochemical" control system together with Zhejiang Kaichuang Environmental Technology Co., Ltd. and engineering application of this technology in a project (80,000 tonnes/day) in Xuecheng, Zaozhuang, Shandong
- Development of ceramic membrane series products and processed together with Shandong Ceramic Research Institute of China Building Materials Academy and Hubei Dijie Membrane Technology Co., Ltd. for sewage treatment, water supply, industrial water and other applications
- Production verification of the technology for ultrasonic internal carbon source utilization of sludge (developed together with CSSC 715 Research Institute) in sewage plants (10,000t level)

To stakeholders

2022 is a crucial year of the 14th Five-year Plan. BEWG stays true to environmental protection and water treatment to serve national strategies, safeguard lucid waters and lush mountains, and contributes to the Beautiful China initiative by low-carbon management in the whole process from construction to operation and production. In 2022, BEWG expanded the scale and consolidated the foundation based on the "dual platform" model (capital platform and operation platform), to support its acceleration of asset-light transformation and comprehensively promote the transformation from an enterprise platform to a platform provider.

Mission

Vitalizing your life with our new water services

Vision

Becoming the world-class provider of reliable and leading water services and environmental services

Core values

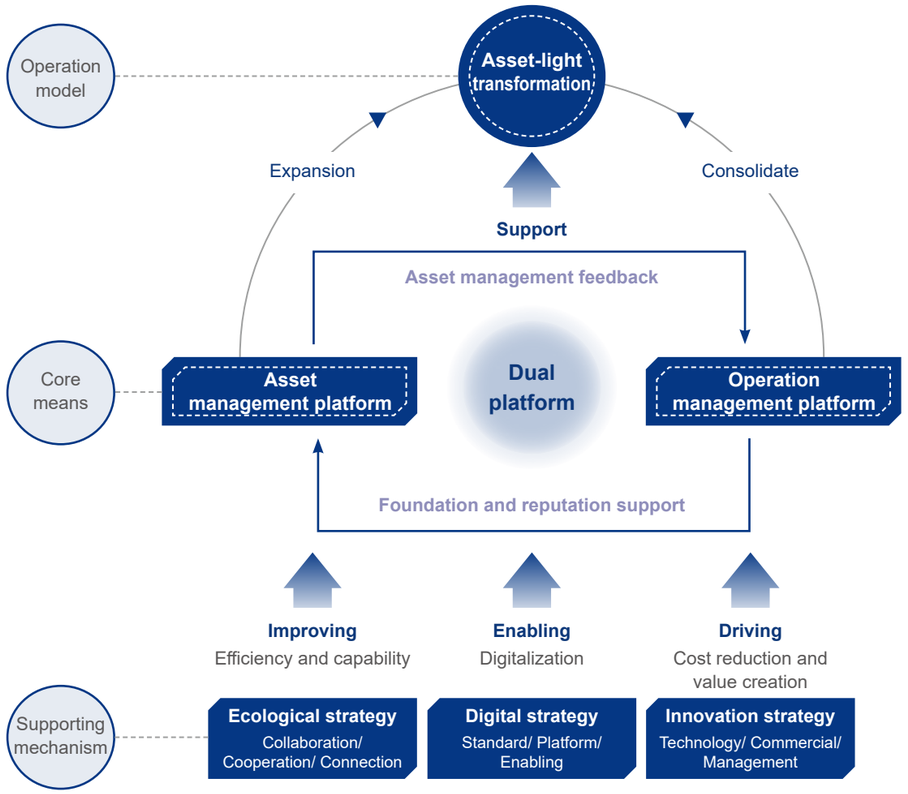
Responsible, valuable, sharing

Business purpose

Customer orientation through innovation capability

Strategic goal

Consistently acquire and manage assets in large amounts, apply technology and innovative models to new business growth, boost operational efficiency and realize corporate sustainability



Adhering to the business purpose of "customer orientation through innovation capability" and the principle of meeting customer needs, BEWG makes every effort from the perspective of customers, in order to build a new market development system. BEWG focuses on scientific R&D, constantly upgrades product quality, constructs smart water services comprehensively and constantly upgrades the excellent operation system. At the same time, as a leading professional comprehensive service provider of water environment in the industry, BEWG has always been committed to the vision of "becoming a trustworthy and leading world-class water environment service provider". Supported by the mechanism of ecological strategy, digital strategy and innovation strategy, driven by the concept of sustainable development, we continuously deepen the "dual-platform" strategic model to firmly promote the transformation of asset operation mode and strive to build a pan-centralized community of shared future with super vitality.

In 2022, focusing on the medium and long-term strategic objectives, the Group has defined the business portfolio of "1+4+4", that is, the large-scale asset business portfolio of "1+4" and the new business of "+4". The "1+4" large-scale asset business portfolio means that the Group will actively expand the water supply department, sludge, integrated pipeline in plant and pipeline integration and reclaimed water business around its core business, municipal sewage. At the same time, we regard sanitation, equipment, industrial water and new solid waste as four new businesses, gradually forming a new pattern of benign interaction and coordinated development.

To stakeholders

BEWG's Sustainability Highlights for 2022

Environment

Proportion of star-level water plants

For above one-star-level water plants: **≥97%**

For above three-star water plants: **≥35%**

Proportion of water self-supply: **1.6%**

COD reduction: **977,562** tonnes

Ammonia nitrogen reduction: **122,393** tonnes

Total phosphorus reduction: **16,563** tonnes

Suspended solids reduction: **749,361** tonnes

Social

Enrollments in safety training: **153,732** visits

Patents granted in the year: **462**

Governance

No major corruption-related complaint cases were received

No major concluded legal cases regarding corrupt practices

90% of qualified direct suppliers received ISO 45001 certifications

Sustainability management

ESG management

BEWG has always complied with the *Corporate Governance Code* set out in *Appendix 14 of the Listing Rules of The Stock Exchange of Hong Kong Limited* and the relevant domestic and overseas regulatory requirements in the places where it operates, and has continuously improved the ESG governance to safeguard shareholders' rights and better serve the interests of all stakeholders.

The Board, as the highest decision-making body of BEWG, identifies and determines material ESG issues, and puts forward suggestions on ESG targets, policies and structure. It also formulates overall strategic policies and monitors the work of management. The Audit Committee under the Board is responsible for managing and monitoring ESG-related issues and risks of the Group, and reporting to the Board on a regular basis. To ensure the deployment and implementation of daily ESG management of the group, an ESG Working Group comprising various business and functional departments has been set up to report regularly to the Audit Committee.

BEWG ESG governance framework[3]

Board of Directors of BEWG

- Identify and determine material ESG issues
- Advise on ESG objectives, policies and structures
- Monitor and evaluate ESG management guidelines, strategies, targets, etc.
- Identify and assess ESG risks and ensure effective ESG risks management and internal control systems in place to monitor climate-related risks in business operations
- Evaluate and review ESG performance and reports to the board of directors
- Review ESG reports

Audit Committee

- Develop ESG targets, policies and structures
- Develop work plans for ESG management, target attainment, etc.
- Materiality assessment on ESG issues
- Compile ESG reports
- Coordinate functional departments and subordinate units in managing and implementing relevant sustainable development issues
- Regular reporting to the audit committee / management, etc.

ESG Working Group

Functional departments and subordinate units

- Functional department: Responsible for the management and implementation of relevant ESG issues within their respective functions
- Subordinate units: Responsible for ESG practices and related data statistics and information collection

[3] To further enhance the management effectiveness of the sustainable development issues, the Board has adopted a resolution to establish the Sustainable Development Committee, which consists of three directors. The responsibility regarding sustainable development of the original Audit Committee will be officially transferred to the Sustainable Development Committee on April 1, 2023. For detailed responsibilities of the Sustainable Development Committee please visit the "Corporate Governance" section of the official website of the Group.

Effectiveness of the Board of Directors of BEWG

Board independence

- The Board of Directors consists of five independent non-executive directors.
- The position of chairman and chief executive officer of BEWG are held by different individuals. The Chairman takes lead of the Board, while the Chief Executive Officer (CEO) is responsible for business, operation and daily management.
- The Company confirms that each independent non-executive director complies with the independence guidelines under Rule 3.13 of the *Listing Rules*.

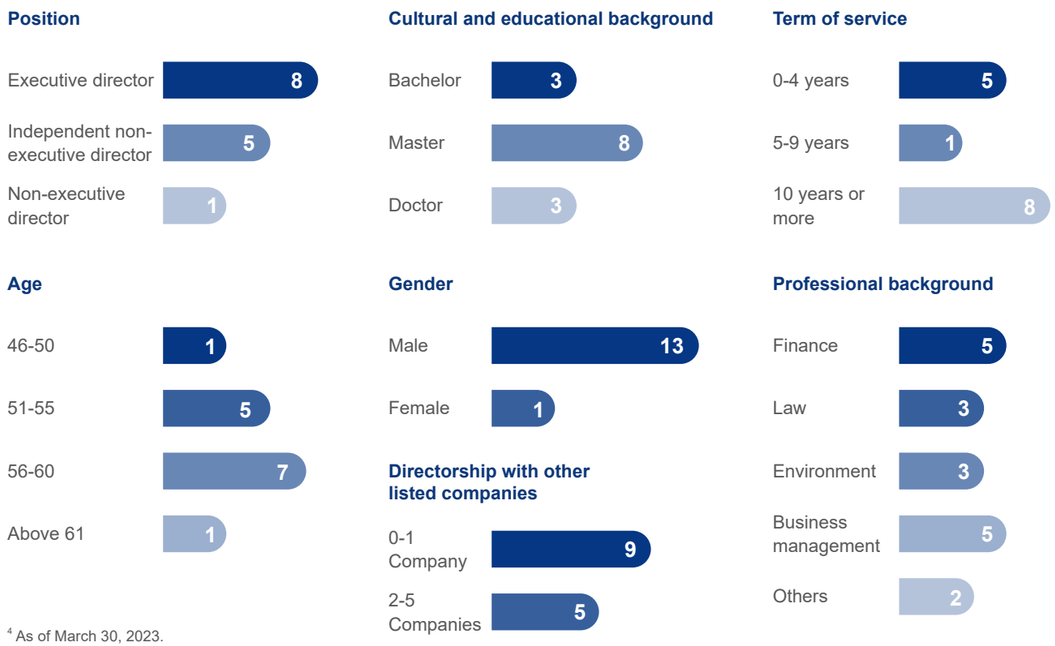
Board diversity

- The *Board Diversity Policy* has been developed.
- The board members are appointed based on merit to ensure they provide balanced skills, experience and diverse perspectives required by the Group.
- When nominating candidates, the Nomination Committee takes multiple factors into consideration, including but not limited to gender, age, cultural and educational background, professional experience, skills, expertise and length of service.
- The Nomination Committee conducts regular reviews on the implementation of board diversity.

Board involvement

- A total of four board meetings were held in 2022.

Diversity of Board of directors of BEWG[4]



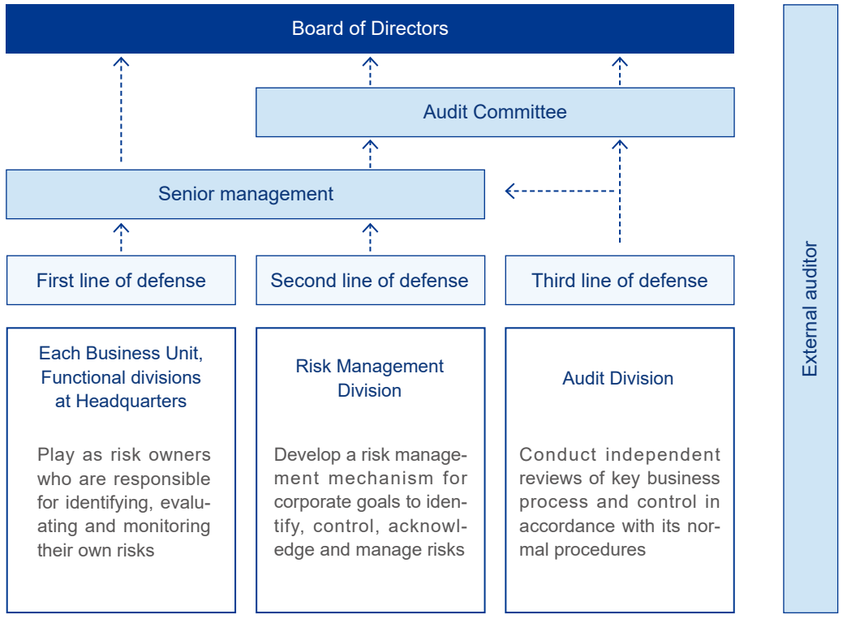
[4] As of March 30, 2023.

Sustainability management

Risk management

A sound risk prevention and control system is the basic guarantee for the long-term and stable operation of enterprises. The board of directors of BEWG shall be solely responsible for assessing and determining the nature and extent of the risks to which the Group may be exposed and ensuring the integrity and effectiveness of the risk management and internal control systems of the group. The Board of Directors authorizes the Audit Committee to supervise management in designing, implementing and monitoring risk management and internal monitoring systems. With reference to the comprehensive enterprise risk management framework formulated by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), BEWG has established the "Three Layers + Three Lines of Defense" structure to clarify risk management procedures such as risk identification, risk assessment and risk handling.

Risk management framework



In order to further standardize the Group's risk control and management, the Group has developed the *BEWG Overall Risk Management System* based on the Guidelines for Comprehensive Risk Management of Central Enterprises issued by the State-owned Assets Supervision and Administration Commission (SASAC), specifying the responsibilities and basic procedures for risk management. In order to effectively identify risks and assess risk levels, the Group makes full use of risk questionnaires, risk lists and risk maps to greatly improve the efficiency and accuracy of risk identification and assessment.

BEWG places weight on environmental and social risks. To better identify and avoid risks, we have established an evaluation system for sustainability risks, which is led by the Audit Committee. Emerging risks such as environmental and social risks in the construction and operation of our products, services and water plants are identified and dynamically tracked to ensure that risks are effectively controlled. Prior to project investment, BEWG proactively includes local environmental, social and governance risks in risk identification, identifies potential risks that the Group may face in accordance with ESG-related policies and regulations, and adopts targeted contingency plans to avoid risks.

In 2022, in order to improve the awareness of risk management, BEWG carried out risk publicity activities to functional centers and regional centers and branches. In addition, it conducted 42 sessions of training on compliance to key management personnel and positions of audited units, involving nearly 1,000 participants.

In 2022, the Group conducted
200 sessions of
specialized training on risk

Training hours up to
200 hours

Sustainability management

Sustainability commitments

In line with United Nations Sustainable Development Goals ("SDGs"), BEWG has identified nine most relevant SDGs based on business characteristics and pledged to support and implement SDGs in the pursuit of corporate strategies and business operations.

BEWG's actions and achievements in 2022

Chapters and sections

As a comprehensive service provider of water environment, it is our natural responsibility to protect water resources and ecological security of water. BEWG is committed to building a national "benchmark water environment project" and "benchmark water plant", and combined with the actual situation of the Group, BEWG has developed a star-level enterprise evaluation standard that is higher than the national standard and industry standard to achieve stronger scientific control on water-related projects of the Group.

Water resource management

Excellent quality

BEWG attaches great importance to product and technology innovation and comprehensively promotes the digital transformation and upgrading of the enterprise. BEWG issued the *Implementation Guidelines of BEWG for Promoting Technological Innovation* in 2022 to promote the transformation into a technology-based company and to further accelerate the transformation of technological achievements.

Innovation empowerment

BEWG actively responds to global climate change, develops a comprehensive risk management system, regularly identifies and evaluates risks and opportunities and realizes green operations within the business scope of the Group through measures such as water resources management and low-carbon actions to promote the development of low-carbon enterprises.

Addressing climate change

Environmental impact

Water resource management

Excellent quality

Low-carbon action

BEWG insists on strictly abiding by various integrity-related laws, regulations, policies and systems, requires employees and itself with the highest business ethics standards, and continuously improves the corporate governance system to achieve compliant governance and integrity in business. In 2022, we received no major corruption operation complaints and there was no concluded litigation.

Business ethics

BEWG upholds equal employment and ensures equal access to career development and promotion for female employees. In 2022, 36.29% of employees were women, and 23.80% of the management were women.

BEWG improves the welfare of female employees, adds paid breastfeeding leave, and provides mother and child care rooms to effectively solve the worries of female employees. In addition to planning of special activities for Women's Day on March 8, we also provide female employees with an online course on *Popular Science of Breast Cancer Prevention*, which benefits a total of 543 person-times.

Employment management

Employee care

BEWG continuously improves the employment system, promotes the digital transformation of human resources and establishes a labor union to organize employee activities on a regular basis. BEWG attaches great importance to the construction of the talent team, provides various types of training programs for employees at different levels, and promotes the experience of excellent managers in the Group to form a positive interaction with employees for common development.

Talent management

BEWG increases investment in the research, development and application of low-carbon new technologies and exercises our potential for emission reduction. We engage in emission reduction practices and research and exploration in multiple aspects and at multiple levels, and take the application of assembled water plant technology as an important way of low-carbon construction to further promote the implementation of low-carbon construction technology. At the same time, BEWG develops a series of low-carbon products with new technology, actively participates in the compilation of group standards related to low-carbon and helps the low-carbon transformation of the water industry.

Low-carbon action

Emission management

Supporting rural revitalization

BEWG attaches great importance to the protection of biodiversity, actively implements the protection, restoration and promotion of sustainable use of terrestrial ecosystems, and develops the *Biodiversity Protection Management Measures of BEWG*, which incorporates the consideration of biodiversity into the whole life cycle of the project. BEWG also, relying on professional background, researches and develops products and technologies that help promote biodiversity protection, and actively takes biodiversity protection and ecological restoration work, helps building an ecological and environmental protection community of shared future and protects lucid waters and lush mountains.

Biodiversity protection

BEWG attaches great importance to commercial cooperation, treats every supplier fairly with the principles of honesty, mutual trust and win-win cooperation. In 2022, we updated the supplier access review dimensions, compiled the *Supplier Access Audit Form*, and coordinated with suppliers to regulate growth. In addition, BEWG continues to deepen the integrated industry-education-research cooperation model, realizes the transformation from closed innovation of single enterprise to collaborative innovation of the whole industry chain to jointly promote technological research and development and the implementation of achievements in the water sector.

About us

Innovation empowerment

Supply chain management

Sustainability management

Communication with stakeholders

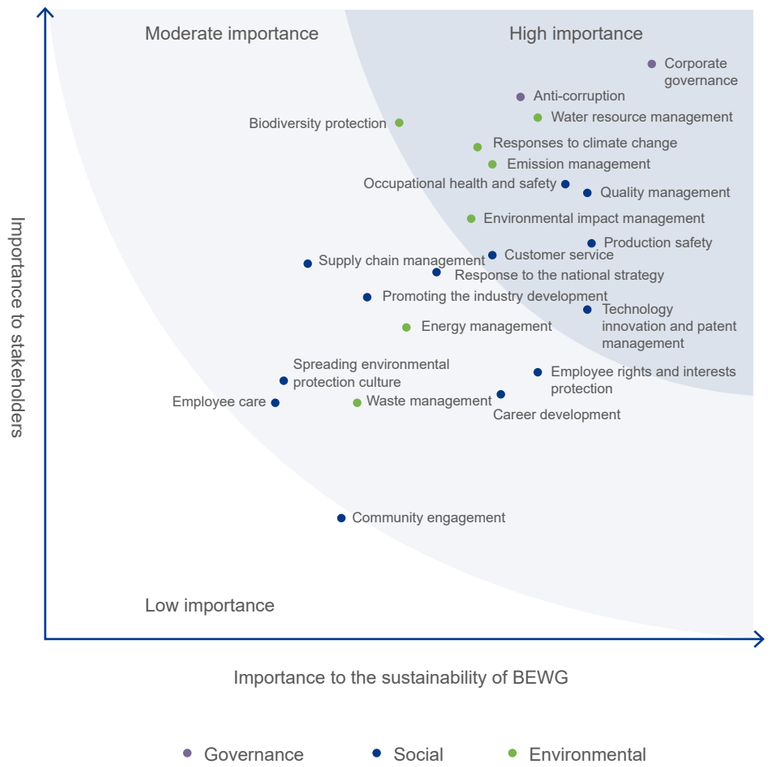
BEWG highly values expectations and demands of stakeholders, listens to the opinions and suggestions of stakeholders such as government, shareholders, customers, communities and employees through different channels to improve the ESG performance of the group in a targeted manner.

Stakeholders	Communication channels	Expectations and demands	Actions and measures	Location
Shareholders and investors	• General meeting of shareholders • Periodic reporting and announcements • Investor communication meeting	• Compliant operations • Continuous and stable investment return • Enhance product and service quality • Risk management • Addressing climate change • Corporate governance	• Accelerate the asset-light service transformation • Improve ESG management system and governance structure • Build customer service and quality assurance system • Establish risk prevention and control system to implement risk control work • Conduct climate-related risks identification and response	• To stakeholders • ESG management • Risk management • Addressing climate change • Quality assurance
Government and regulators	• Disclosure of information • Daily communication and reports • On-site investigation • Supervision and inspection • Visit and reception	• Compliant operations • Job creation • Response to national strategy • Enhance product and service quality • Production safety and operation compliance • Scientific and technological innovation • Energy conservation and emission reduction	• Set up Objectives and Key Results (OKR) incentive mechanisms for integrity and compliance • Implement industry and employment assistance • Respond to "dual carbon" goals to promote ecological civilization progress • Safeguard stable production and operation • Build intelligent control system • Pursue low-carbon operation and develop low-carbon technology	• Topic 2: Bridging the "last mile" gap in the sewage treatment process to achieve the full-process low-carbon waste treatment • Low-carbon action • Excellent quality • Innovation empowerment • Supporting rural revitalization • Code of business conduct
Customers	• Customer satisfaction survey • Visits and communication • Customer activities	• Enhance product and service quality • Disclosure of information • Win-win cooperation	• Optimize customer relation management and provide 24/7 service hotline • Disclose results of satisfaction surveys and carry out external product and technology cooperation	• About us • Customer service
Employees	• Labor contracts • Opinion solicitation • Communication channels for career development • Employee care activities • Tailor-made training • Anonymous communication channel	• Employee rights and interests protection • Occupational health and safety • Professional training and development • Employee care • Employee communication	• Create an equal and diverse working environment • Ensure safety and health of employees • Build multi-tier training system • Provide competitive salary and non-salary benefits	• Talent management • Safety and health
Industry	• Launch and participate in industrial activities • Sharing research results • Constructing communication platforms • Industry cooperation • Technical exchanges	• Leading industry development • Scientific and technological innovation • Enhance product and service quality	• Undertake major national special projects and key research and development projects • Participant in the formulation of national and industrial standards • Make industry-leading technological innovations	• Exploring collaborative development and building a beautiful environment • About us • Innovation empowerment
Suppliers and partners	• Public bidding • Contracts and agreements • Suppliers' meeting • Suppliers' training	• Contract compliance • Mutual benefits and win-win results • Supply chain management • Ecological cooperation	• Strengthen full lifecycle supplier management • Adopt strict supplier access evaluation and process evaluation • Conduct ESG risk assessment of suppliers	• Supply chain management
Community	• In-person visits • Charity activities • Charitable donations • Volunteer activities • Open day event	• Community communication • Community services • Community investment • Publicity of environmental protection ideas • Compliant operation	• Support local community construction • Conduct rural sewage treatment • Build environment protection bases • Conduct industry and donation assistance	• Contributing to society
The public	• Open day event • Charity activities	• Providing safe and reliable product • Stable employment • Publicity of environmental protection ideas	• Improve emergency response mechanisms and safeguard a stable water supply • Cultivate environmental protection talent for society • Conduct popularization and education of environmental protection science	• Talent development • Excellent quality • Continuous environmental education
Research and academic institutions	• Industry-university-research Integration • Talent cultivation	• Talent cultivation • Lead industry development • Scientific and technological innovation	• Build industrial talent pipeline • Build open science and technology innovation platforms and systems • Carry out external product and technology cooperation	• About us • Talent development • Innovation empowermen

Materiality assessment

In 2022, BEWG constantly followed capital market ratings, and sorted out the Group's material ESG issues by benchmarking the trends of international mainstream capital market ESG rating indices such as MSCI and DJSI as well as peer performance. Through in-depth ESG interviews and seminars with executives, employees and external stakeholders (suppliers, investors, among others), with reference to opinions of various stakeholders, we identified and assessed the material issues, and determined that there was no change in the material issues matrix in 2022 compared to last year.

Material ESG issues matrix of BEWG



02

Safeguarding lucid water and lush mountains

Addressing climate change

We understand that climate change can bring both risks and significant opportunities to our business, and climate risk identification, response and management are key drivers of sustainable operations. To actively respond to global climate change, BEWG has developed a sound risk management system based on the TCFD[5] framework, regularly identifying and evaluating risks and opportunities, and comprehensively optimizing resource allocation for business operations to ensure a timely and comprehensive understanding of the potential impact of business-related climate change risks and opportunities on the Company.

Risk management system

BEWG has integrated climate risk management responsibilities into the existing risk management framework, and clarified risk management procedures including risk identification, risk assessment, and risk handling (please refer to the section "Risk Management" for details). Based on the PDCA[6] principles, we have established an efficient, systematic, and standardized climate change risk assessment and management mechanism, and formed a closed-loop management system covering climate change risk identification, assessment, response, inspection, and update.

Scenario setting

With the global transition to a low-carbon economy, BEWG launched a special research program on climate change based on different climate scenarios and policies of international, national, and local governments. Having selected RCP4.5[7], a representative concentration pathway developed by IPCC[8], as the climate analysis scenario of the Group, and made full use of several international authoritative databases including Aqueduct[9], with the recommendations and literature studies by our own experts and independent experts, we have identified several opportunities and physical climate risks that may have a financial impact on BEWG's water business under this scenario.

[5] TCFD refers to Task Force on Climate-related Financial Disclosures.

[6] PDCA refers to Plan, Do, Check, Act, a four-step problem-solving iterative technique.

[7] The Representative Concentration Pathways (RCPs) are a toolkit of climate analysis scenarios developed to analyze and evaluate climate change and forecast climate change trends.

[8] The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988.

[9] Aqueduct is a tool launched by the World Resources Institute's Water Program to identify and assess water risks around the world.

https://www.wri.org/aqueduct

Addressing climate change

Risk identification and response

BEWG actively addresses the challenges posed by climate change. We carefully assess the significant physical and transition risks and opportunities posed by climate change on global assets and businesses, and adopt effective measures to adapt to and mitigate the impact of climate change on the Company's business operations and sustainable development.

Climate physical risks of BEWG

Risk categories		Risk impacts	Response measures
Acute physical risks	Flood	• Negatively affecting the water quality and volume, and bringing pressure to the water plants; • Causing the rising of water level of the drainage pipe network, and undermining the operation stability of the pipe network; • Interrupting the production and operation of the water plants and increasing the maintenance cost.	• Dynamically monitoring the pipe network in real time, expanding the maximum drainage threshold, and improving the forced drainage response capacity of temporary pumps; • Developing and applying water treatment technologies with stronger impact load toughness, adopting the excess water treatment load technology for brown field projects, and formulating emergency plans; • Establishing the plant-pipe network collaboration and forced drainage response mechanism; • Formulating monitoring and response systems for abnormal water quality during flood season, timely adjusting production process and allocating water sources based on water quality changes; • Formulating emergency plans for pipe network repair and water supply to ensure water use of residents.
	Extremely cold weather	• Causing the rupture of some water distribution pipes, water meters and sewage pipes; • Reducing the efficiency of the water treatment system and increasing the operating cost.	• Adopting more insulation measures or design for outdoor facilities (pipe network, water meters, and recirculating pools, etc.); • Adding insulation measures to the projects in operation period; • Developing water treatment process in cold regions and improving the water purification efficiency under low-temperature conditions.
	Extreme precipitation	• Affecting the quality so as to quantity of incoming water, and disrupting the production and operation of plants and stations; • Increasing the risk of water environment operation and maintenance in compliance with relevant standards; • Causing regional waterlogging, thus leading to the overload of the drainage system; • Increasing the flooding risk of water distribution facilities in low-lying areas.	• Applying treatment technologies with stronger load toughness to new sewage treatment facilities; • Formulating emergency plans for the excess water treatment load of existing projects; • Formulating emergency plans for the prevention and control of overflow pollution for water environment operation and maintenance projects; • Dynamically adjusting the pipe network mode to improve drainage capacity and establishing the forced drainage response capacity of temporary pumps; • Establishing the plant-pipe network collaboration and forced drainage response mechanism; • Formulating emergency plans for drainage and rescue, enhancing personnel training and drills, and formulating contingency water supply plans to ensure water use of residents.
Chronic physical risks	Drought	• Reducing the reserve of water resources and lowering the guarantee rate of water distribution; • Easily increasing the concentration of contaminants in water bodies.	• Promoting the alternative water source business to relieve water shortage, such as reclaimed water from wastewater and seawater desalination; • Developing and applying intelligent control of the whole-process sewage treatment, leveraging the smart water services of BEWG to offset the rising cost caused by the increase of water quality concentration, promoting external light-asset services, and expanding new business; • Strengthening production management of water plants, and reducing the proportion of self-supply water; • Researching and developing the enhanced removal technologies for emerging contaminants; • Formulating water source scheduling plans and drought emergency plans, and coordinating with the government to ensure water use for residents through water resource allocation, water rationing, and other measures during the drought.
	Deterioration in water quality	• The concentration of contaminants in water bodies is increasing, making it more difficult to carry out water treatment; • Emerging trace contaminants (such as endocrine disruptors, medicines, and personal care products) accumulate in water bodies, increasing water ecological security risks and affecting water distribution quality.	
	Rising sea level	• Causing the write-off and early retirement of existing assets, particularly the asset value of facilities located in high-risk coastal areas; • The deterioration of groundwater aquifers in coastal areas results in salt water intrusion, thus affecting the service life of equipment and facilities; • The tidal effects affect river water quality, increasing the operating cost of water environment projects.	• Strengthening the control of investment risk and making timely adjustments to investment strategies in areas with foreseeable sea level rise; • Researching and applying preventive maintenance technologies of equipment and facilities, conducting the regional intensive management of equipment and facilities, reducing marginal cost, and offsetting the impact of salt water intrusion.

Addressing climate change

Climate transition risks of BEWG

Transition risks	Risk categories	Risk impacts	Response measures
Policy and legal risks	Change of energy policies	• In response to the national policy for increasing the proportion of clean energy and non-fossil energy, BEWG needs to purchase and apply photovoltaic power generation devices on the roof and other sites within the plants, resulting in additional operating costs.	• Promoting technological innovation and improving photovoltaic utilization efficiency; • Making good use of favorable support from national new energy policies.
	Tightening of carbon emission policies	• The government is quite likely to impose the carbon tax and expand the coverage of industries that adopt carbon emission quota, affecting the cost of BEWG; • If the requirements of carbon trading and carbon tax become increasingly stricter, BEWG may face punishments for the inadequate completion and cooperation, which may damage brand reputation.	• Strengthening clean and efficient utilization of coal; • Strictly managing the approval of new projects and energy consumption indicators.
Technical risks	Upgrade and maintenance of the pipe network	• Reducing the leak rate of pipe network is particularly important in areas lacking water resources. More technical manpower, material resources, and financial resources should be devoted to refined pipe network management and smart pipe network construction.	• Developing and applying technology for rapid pipe network leak detection, rapid repair, and pipe network leak control; • Maintaining and upgrading the pipe network, replacing the old pipe network, and ensuring the quality of the newly reconstructed pipe network; • Strengthening pipe network inspection and emergency repair and maintenance management.
	Greenhouse gas capture, collection, and monitoring technology	• As the government and the water sector strengthen control over greenhouse gas management, BEWG will face stricter requirements of greenhouse gas capture, collection, and monitoring.	• Upgrading technology to reduce greenhouse gas emissions; • Recycling greenhouse gases generated by water treatment; • Monitoring greenhouse gas emissions in real time, and timely making adjustments when failing to meet emission standards.
	Improved resilience of sewage treatment system	• The noted variation of the coefficients regarding water quantity and quality between the rainy season and the dry season has a great impact on the original sewage treatment system, which makes it necessary to develop a treatment system with high tolerance, flexibility, and controllability.	• Developing treatment systems with high tolerance, flexibility, and controllability; • Monitoring the working conditions of the sewage treatment system in real time, and immediately responding and making an adjustment if being affected; • Improving the anti-impact load ability of the sewage system.
Market risks	The growing awareness of green consumption among users	• With the increasing emphasis on green consumption across all sectors, water service companies are directly facing more green transition and low-carbon demands from consumers.	• Accelerating green transformation; • Developing and promoting more environment- friendly green products and services.

Climate change brings both risks and opportunities to businesses. BEWG has not only identified and responded to the climate change risks mentioned above, but also paid close attention to climate change-related transformation opportunities and strived to integrate these opportunities into daily operations and strategies.

Climate opportunities of BEWG

Transition opportunities	Opportunity categories	Opportunity description
Policy and legal opportunities	Innovation of mainstream technologies	• Increasing investment in the R&D and operation of new low-carbon technologies such as energy conservation and consumption reduction, energy self-sufficiency, and resource regeneration, actively seeking and applying alternative technologies of clean energy, responding to energy policy requirements, and improving the competitiveness of BEWG.
	Development of rural water services	• The Chinese government continuously promotes the improvement of rural sewage treatment standards, policies, and regulations, and emphasizes the improvement of the rural living environment, including sewage treatment. BEWG leverages our leading water treatment technologies to build more high-standard rural water treatment facilities, which will help to increase the business revenue of the Group; • Actively responding to national standards and policies, advancing technological innovation, and solving the difficulties of rural sewage treatment will help to enhance the reputation and image of the Group.
Technical opportunities	Improvement of operational efficiency through smart water services	• The smart urban water system represents the megatrend of the water industry. The Group should rely on the technical advantages and operating experience of smart water services to improve water treatment efficiency and water resource utilization rate, narrow the gap between production and sale of water distribution, reduce the operating cost, and improve the revenue and industry competitiveness.
	Development and use of new energy (photovoltaic, sewage source heat pump, biogas power generation, and sludge resource)	• Implementing national policies, actively deploying the use of new energy, and reducing the cost of low-carbon transition; • Diversifying low-carbon business opportunities and business types.
	Resilient sewage treatment systems	• Promoting the R&D and application of new technologies with a strong anti-impact load ability, reducing investment costs, and improving operational flexibility and reliability.
Market opportunities	Green financing	• With the growing maturity of the green bond issuance market, the advantages of green financing are increasingly prominent. Through green financing, BEWG will continue to promote business expansion and upgrading, which will effectively increase the amount of financing and alleviate financing difficulties.
	Growing awareness of green consumption among users	• In the context of the “3060 carbon peak and neutrality goals”, the government has put forward stricter requirements for energy conservation and emission reduction in the water industry, and consumers show a growing preference for green and low-carbon products. By carrying out emission reduction throughout the whole life cycle and applying more eco-friendly technologies, BEWG meets the green transition and low carbon requirements of more consumers/ customers.

We keep researching and updating approaches to addressing climate change and strive to reduce the impact of climate change on our businesses. In future, BEWG will continue to improve the environmental management and supervision mechanism, explore opportunities for business development, management improvement, and product innovation brought about by climate change, and further improve policies and measures to address climate change. For our response measures and plans for climate change risks and opportunities, please refer to the sections of “Water resource management”, “Low-carbon action”, “Environmental impact”, and “Excellent quality” in this report.

Water resource management

Water resources underpin national development and people's livelihood. Actively responding to the *Action Plan for Prevention and Control of Water Pollution* issued by the State Council, we have formulated the *Measures for Water Resources Management of BEWG*[10] in accordance with relevant national laws and regulations, and continuously strengthened water resources management. We manage the water projects at the Group level, and scientifically control the entire process of water resource development, utilization, and protection. In 2022, with the highest goal of protecting water ecological safety, BEWG comprehensively carried out water resources management in such aspects as efficient utilization of water resources, reduction of water waste, and recycling of water resources. Meanwhile, making full use of industry-leading water treatment technology, we actively step in unconventional water resource development, and develop ecological restoration and purification systems formed by river and lake wetlands, to assist in the circulation of social and ecological water resources.

Efficient utilization of water resource

To improve the utilization rate of water resources, we strengthen water resources management from the source, improve water-use efficiency, and actively explore alternative water resource. In terms of improving water-use efficiency, BEWG has improved and optimized existing technologies, actively carries out R&D of new technologies, and continuously optimizes production process. We have established the assessment standard for star-level water treatment plants, which is even more stringent than the national standard, namely the *Code for Design of Outdoor Water Supply Engineering*, to manage the consumption of reclaimed water, and therefore efficiently utilize water resources.

Production water management objectives of BEWG

Water distribution plants

The proportion of self-supply water for plants that engage in process water reclamation should be **≤1%**

The proportion of self-supply water for plants that do not engage in process water reclamation should be **≤3%**

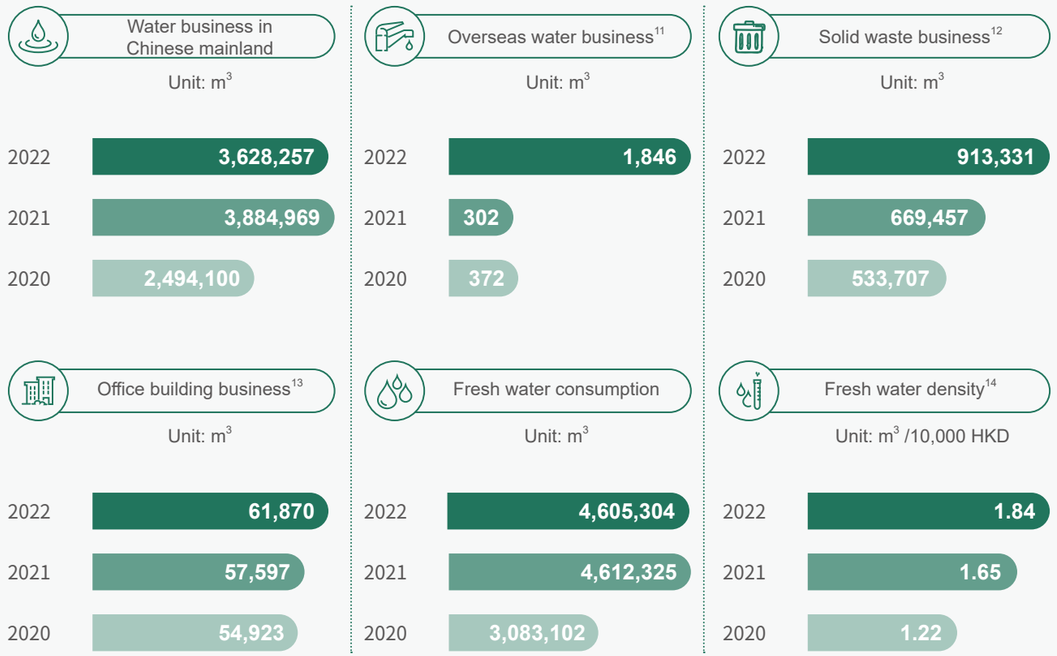
Sewage treatment plants

Water volume of internal circulation **≤3%**

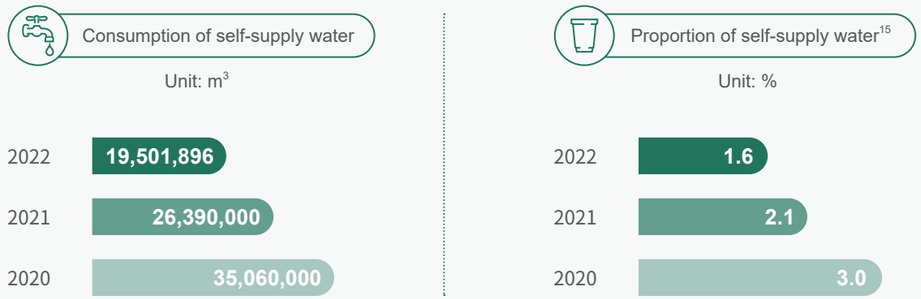
In 2022, the Group integrated water supply companies, including municipal water services, plant-network-integrated pipe networks, reclaimed water, and sludge business into a "1+4" business portfolio. Among them, reclaimed water is the strategic business to be expanded actively by the Group in the future. We understand that the prospects and development trend of the water treatment industry lie in wastewater recycling. While focusing on saving water resources, we help government customers achieve the goal of building a water-saving society, and actively improve the local governments' carrying capacity of water resources (CCWR).

[10] Public disclosure URL: https://www.bewg.net/uploadfile/2020/1020/20201020105627449.pdf

Fresh water consumption of BEWG in 2020-2022



The consumption and proportion of water self-supply by the water distribution plants of BEWG in 2020-2022



[11] In 2022, overseas water business had an accident of water pipe rupture and leakage caused by external construction. The construction party was responsible for the accident, which has been properly handled, causing no material losses.

[12] In 2022, new projects were involved in the solid waste business.

[13] In 2022, environmental data on business halls of water companies and BEWG Hong Kong offices have been added to the environmental data related to the office buildings in this report, compared to previous years.

[14] Fresh water density = Total fresh water consumption of the year ÷ Operating revenue of the Group of that year.

[15] In 2018, the *Code for Design of Outdoor Water Supply Engineering* (GB50013-2018) issued by the Ministry of Housing and Urban-Rural Development specifies 5-10% of the designed amount for proportion of water self-supply.

Water resource management

Leak control of pipe network

Targeted leak prevention and control of pipe network is an important way for BEWG to improve the quality of water supply operation and reduce water resource waste. BEWG is committed to creating a leak control system of pipe network throughout the whole life cycle, factoring into design, construction, and operation stages, to minimize the leak rate of pipe network.

In 2022, BEWG established a big data model for predicting the risks of water distribution pipe network damage, which can predict the probability of pipe network damage based on the basic information and operation and maintenance information of the pipe network. The model has such features as low application threshold, high accuracy, and strong adaptability, which can effectively assist project companies in implementing leak rate control. In future, we will focus on expanding the "plant-pipe network integration" pipe network business in combination with the Company's business characteristics and the advantage of large volume of stock resources, in a bid to continuously meet the increasingly upgraded customer demands.

Pipe network design management

- During the design phase of the pipe network project, comprehensive assessment should be conducted on the geographical and hydrological conditions of the construction area of the water distribution pipe network, and relevant national and regional industry standards and specifications shall be strictly implemented. Survey and analysis should be conducted on the construction site to ensure the accuracy and rationality of the pipeline layout.

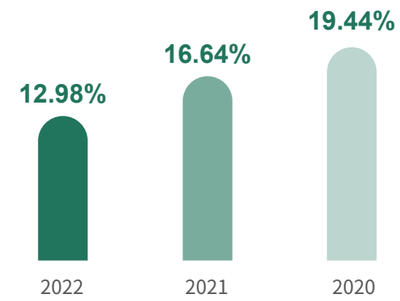
Pipe network construction management

- During construction, we strictly control the quality of pipe network and include water leaking and dripping in quality assessment.

Pipe network operation management

- During operation, the intelligent leak control is realized based on the intelligent water supply platform.
- Real-time monitoring and control of water distribution pipe networks is achieved with such information analysis tools as geographic information systems (GIS), hydraulic models, and district metering management systems.
- The big data model for predicting the risks of water distribution pipe network damage newly launched in 2022 is used to predict the probability of pipe network damage.
- We monitor the pressure distribution of the pipe network in real time and regulate water distribution pressure of water plants with the scheduling system. We continuously upgrade the leak detection equipment and improve the skills of the leak detection personnel.
- We regularly carry out leak inspection for pipe networks, and replace and maintain aging pipelines.
- We have controlled the loss caused by improper metering from aspects of water meter selection, installation, and evaluation through independently-developed metering and evaluation tools to accurately control the leak rate and reduce the NRW.

Leak rate of pipe network[16] from 2020 to 2022



To reduce pipe network leaks and improve water quality for users, BEWG has made ongoing efforts to renew the aged pipe networks. In 2022, the Group invested a total of RMB102 million in the renovation of some municipal pipe networks and pipe networks for old residential areas. As of December 31, 2022, the number of repaired water leaks decreased by 1,401; the number of leaks decreased by 3.76% year-on-year, and the leak rate decreased by 21.99% year-on-year.

Case: Pipe network renovation project of Danganling Water Plant in Hezhou

Hezhou Danganling Water Plant was built in 2003, and the main water distribution pipes of the water plant are DN800 fiberglass pipes. Due to uneven geological subsidence, and damage caused by external forces, on top of aging of the pipe networks, pipe explosion accidents have occurred frequently in recent years. After conducting a comprehensive assessment of the pipe network, Guangxi Hezhou BEWG Co., Ltd. decided to renew the pipe networks by replacing the old fiberglass pipes with ductile iron pipes. The project was commenced in November 2022 and is expected to significantly improve the of water supply security in the urban areas and mitigate insufficient water supply due to pipe network damage.

Case: Pipe network renovation project of Yongzhou central urban area

In 2022, Yongzhou Water Operation Development Co., Ltd. upgraded the water distribution pipe networks of more than 180 kilometers of pipelines in the Lengshuitan District (including the Economic Development Zone). The renovation of the water distribution pipe networks was expected to effectively improve the low water pressure in low-lying residential areas, improve the water supply capacity of the central urban area, and reduce the leak rate of the pipe networks.


Construction site of pipe network renovation project

[16] In 2022, Notice on Strengthening Leak Control of Public Water Distribution Pipe Networks jointly issued by the Ministry of Housing and Urban-Rural Development and the National Development and Reform Commission pointed out: by 2025, the leak rate of urban public water distribution networks across China should be controlled below 9%.

Water resource management

Alternative water resource development

BEWG greatly values water recycling, actively exploring the development and utilization of reclaimed water and rainwater recycling and promoting seawater desalination technology, in a bid to achieve sustainable utilization of water resources, and alleviate water shortage.

Reclaimed water production

We continue to build reclaimed water plants and launched a new water brand "AQENT®". We develop and improve water purification technology to further improve the quality of reclaimed water and improve water recycling efficiency. In 2022, BEWG produced 401 million tonnes of reclaimed water.

Utilization of rainwater resources

Rainwater recycling devices are added to all projects. We optimize rainwater filtration devices and use high-quality filtered rainwater for supplementing and conserving urban groundwater resources, replenishing landscape water, irrigating green space, and industrial purposes.

Seawater desalination

We explore and develop advanced seawater desalination technology, promote the application of seawater desalination in coastal cities, optimize seawater desalination systems, and improve the quality of the desalinated water to alleviate the water shortage in some areas.

In line with business characteristics, the Group, on the one hand, strengthens the recycling of reclaimed water within the sewage plants to save water; On the other hand, makes efforts to explore ways to use the reclaimed water externally for industrial production, ecological water replenishment, municipal water, and other ways to alleviate water shortage and help create a virtuous circle of water ecology.

Reclaimed water supply performance of BEWG in 2022

Number of reclaimed water plants

Unit: plants

Chinese mainland	41
Hong Kong, Macao, Taiwan, and overseas	5

Annual volume of water treated actually

Unit: tonnes

Chinese mainland	336,227,934
Hong Kong, Macao, Taiwan, and overseas	65,255,015

Case: Reclaimed water distribution project in Qingxu Economic Development Zone of Taiyuan

The advanced treatment project of reclaimed water in Taiyuan treats the effluent from the sewage treatment plants with the double-membrane technology into high-quality primary demineralized water, which is distributed to the water consuming enterprises in the park. The daily water supply capacity of the project will reach 60,000 tonnes in the near future, and the daily capacity of the phase II project will rise to 90,000 tonnes, with a maximum daily water supply capacity of 115,000 tonnes.

After the project is completed, it will effectively guarantee the high-quality water demand of industrial enterprises in the Qingxu Economic Development Zone, Jiaocheng Economic Development Zone, and Qingxu Environmental Sanitation Industrial Park, and improve the overall recycling rate of reclaimed water in Taiyuan. This project is a large-scale, high-water-quality, operationally effective, and exemplary highlight project for wastewater recycling in Shanxi Province and even in China.

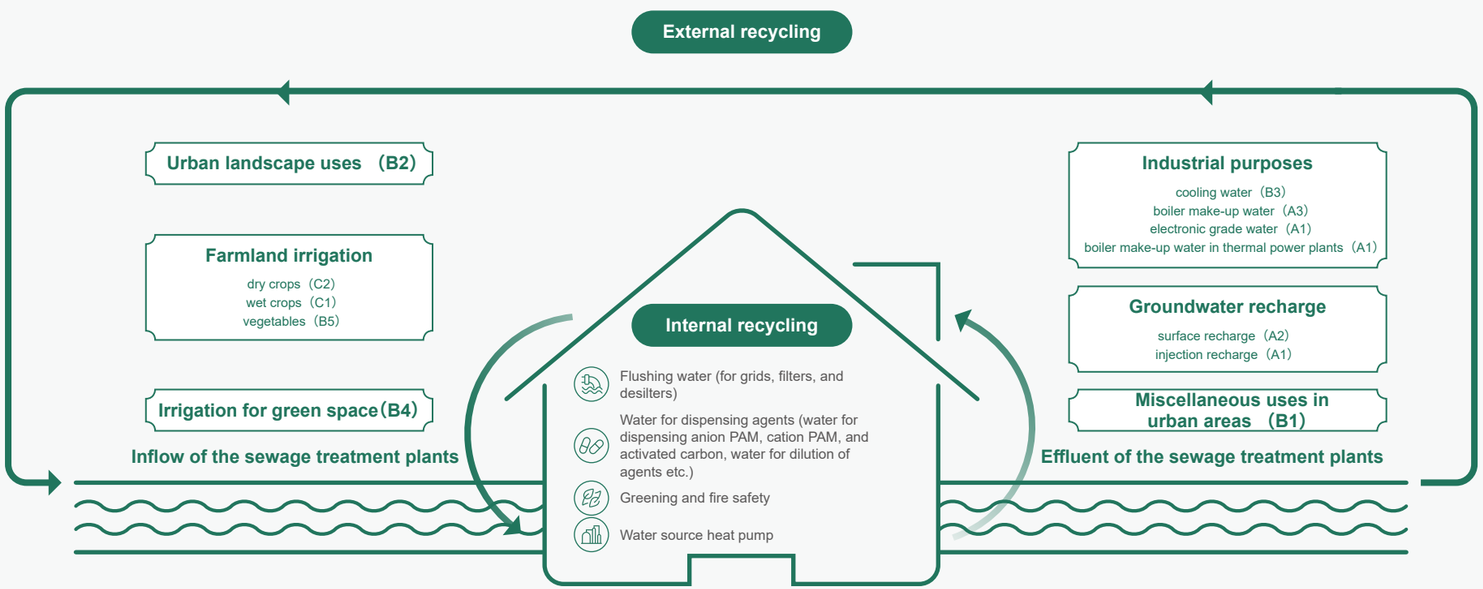


Diagram of reclaimed water recycling inside and outside the sewage treatment plants

In addition, following the principle of "Quality-based utilization, safety and economy", BEWG has proposed classification solutions with targeted core process and technology for reclaimed water based on the national standard *Water reuse guidelines—Reclaimed water classification*, in which the reclaimed water is classified into three categories, namely Grade A, Grade B, and Grade C, with Grade A being the highest level, which can be used for groundwater recharge, and Grade C being the lowest level, which can be used for farmland irrigation, in a bid meet the needs of customers in different application scenarios.

Water resource management

Water source conservation and protection

Faced with increasingly prominent challenges in water environment security, including water shortage in urban areas, deterioration of water ecology, and floods, BEWG actively carries out water conservation and protection to effectively address water security issues and improve the quality of water environment.

Surface water conservation

Surface water conservation plays an important role in purifying water, storing rainwater, and protecting biodiversity. In recent years, BEWG has constructed wetlands in multiple places according to local conditions to purify the water of polluted water bodies such as the tailwater from sewage treatment plants, rural sewage, polluted rivers and lakes, and conserve surface water.

To solve the problems with the tailwater wetlands, such as insufficient stability of effluent and not being able to realize the ecological landscape value, we have further improved wetland technology and have gradually formed intensive and ecological constructed wetland solutions with stable water quality.

Groundwater conservation

BEWG actively gets involved in the construction of sponge cities, effectively integrating water treatment with urban ecological construction. We actively apply the “low-impact development mode rainwater system construction” to effectively absorb, store, infiltrate, and purify surface rainwater to supply groundwater and adjust water circulation. While ensuring water safety and quality, we improved the construction of urban water environment and ecology, controlled urban runoffs, and relieved the waterlogging risk and pressure on municipal pipe networks.

Case: Yangtze River protection - Changde Tailwater Wetland

In Changde City, Hunan Province, located in the middle reaches of the Yangtze River, BEWG completed a tailwater advanced treatment project in the Sewage Purification Center with the treatment capacity of 150,000 cubic meters/day. With the application of constructed wetland technology in this project, we have enabled the main indicators of the tailwater from the sewage treatment plant to reach Class III, steadily improving the water quality and ecology in the river basin of Changde with Liuye Lake as the core, significantly enhancing the conservation capacity of high-quality water sources, and effectively improving the urban water environment. Thus, BEWG has contributed to the protection and high-quality development of Yangtze River.


Ecological Environment of Changde tailwater wetland

Case: Phase II project for tailwater ecological improvement by Dongying North District Sewage Treatment Plant in Shandong

To meet the requirements for tailwater treatment, BEWG has constructed the Phase II of wetland project on the west of Dongying North District Sewage Treatment Plant, the effluent quality of which meets the Class IV standard for surface water. During the design of the project, water purification and ecological diversity have been comprehensively considered, and the wetland ecological concept has been incorporated into the water environment renovation.

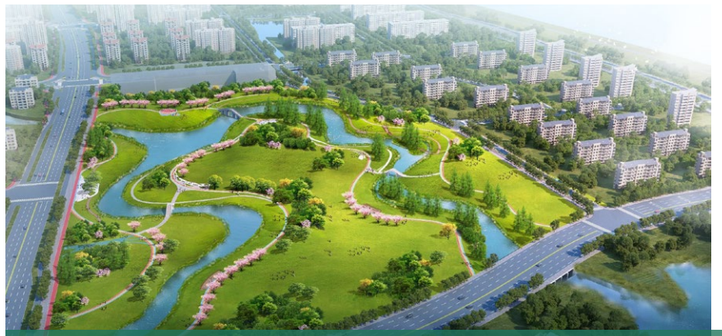
After the implementation of this project, the water quality of the overflowing river can be effectively improved. It plays a role in regulating water volume, ecological restoration, and supplementing groundwater.


Rendering of Dongying phase II wetland project

Case: PPP project for construction of integrated sponge city of plant-pipe networks, river, lakes, and park in Xinjiang New District, Yingtan City, Jiangxi Province

In 2022, to create healthy urban water environment and protect the urban water ecology, BEWG participated in the project of constructing integrated sponge city of plant-pipe networks, river, lakes, and park in Xinjiang New District.

The project construction had four priorities. In terms of water safety and water landscape construction, comprehensive renovation was conducted to waterlogging and water ecology in Xinjiang New District; In terms of water environment construction, ecosystem restoration was carried out for Huling Lake and Longtan Lake, and the misconnection of municipal rainwater and sewage pipes was rectified; In terms of water ecological construction, it mainly included sponge construction for roads, residential areas, public buildings, and green space in parks.



Rendering of PPP project for construction of integrated sponge city of plant-pipe networks, river, lakes, and park in Xinjiang New District

Low-carbon action

In the context of global climate change and the "3060" dual carbon policy, BEWG actively leads the carbon emission reduction and low-carbon transformation of the water industry. Adhering to the development philosophy of "prioritizing environmental protection, reducing carbon emissions and improving efficiency", we make every effort to achieve carbon peak and neutrality goals.

BEWG makes continuous inputs into the R&D and application of new low-carbon technologies, taps emission reduction potential, and carries out multidimensional, multi-level and in-depth emission reduction practice and research. Meanwhile, BEWG continuously optimizes low-carbon operation management approaches and continuously enhances efforts in energy, water, and materials conservation in offices. In addition, BEWG regards the application of prefabricated water plant technology as an important breakthrough point for low-carbon construction, further promoting the implementation of low-carbon construction technology.

Energy Consumption of BEWG in 2020-2022

Indicator	Unit	2022	2021	2020
Water business in Chinese mainland				
Non-renewable energy substitution	kWh	1,760,666,440	1,542,694,570	1,407,141,904
Renewable energy substitution	kWh	28,872,054	23,698,836	23,639,137
Gasoline consumption	tonne	482	376	384
Diesel consumption	tonne	401	150	355
Natural gas consumption	m^3	364,626	361,111	153,170
Purchased steam for heating	GJ	1,143	7,565	714
LPG consumption	tonne	203	335	74
Overseas water business				
Non-renewable energy substitution	kWh	127,413,922	131,938,317	129,402,978
Gasoline consumption	tonne	14	/	/
Diesel consumption	tonne	601	365	2
LPG consumption	tonne	0.48	/	/
Solid waste business				
Non-renewable energy substitution	kWh	19,324,147	19,844,874	16,991,199
Renewable energy substitution	kWh	22,617,494	15,877,260	7,006,520
Gasoline consumption	tonne	10	12	9
Diesel consumption	tonne	620	266	224
Natural gas consumption	m^3	1,172,065	1,658,287	1,105,021
LPG consumption	tonne	0.88	0.91	0.72

Indicator	Unit	2022	2021	2020
Office building				
Non-renewable energy substitution	kWh	5,478,478	4,544,184	5,368,748
Gasoline consumption	tonne	260	193	171
Diesel consumption	tonne	16	1	5
Natural gas consumption	m^3	9,436	/	/
Purchased steam for heating	GJ	3,605	2,440	3,407
LPG consumption	tonne	4.95	3.64	4.18
Total				
Comprehensive energy consumption	tce	241,187	214,414	195,223
Comprehensive energy consumption density[17]	tce/10,000 HKD	0.096	0.077	0.077

Note: Comprehensive energy consumption is calculated according to the *General Principles for Calculation of the Comprehensive Energy Consumption (GB/T 2589-2020)* by covering the consumption of gasoline, diesel, natural gas, electricity and purchased heat.

[17] Comprehensive energy consumption density = Total comprehensive energy consumption of the year ÷ Operating revenue of the Group of the year.

Low-carbon action

GHG emissions of BEWG in 2020-2022

Indicator	Unit	2022	2021	2020
Water business in Chinese mainland				
GHG emissions - Scope 1	tCO_2e	4,118	3,386	2,835
GHG emissions - Scope 2	tCO_2e	1,004,234	942,030	858,576
Total GHG emissions	tCO_2e	1,008,352	945,416	861,410
Overseas water business				
GHG emissions - Scope 1	tCO_2e	1,936	1,148	1,148
GHG emissions - Scope 2	tCO_2e	82,445	83,354	81,682
Total GHG emissions	tCO_2e	84,381	84,502	82,829
Solid waste business				
GHG emissions - Scope 1	tCO_2e	4,517	4,461	3,123
GHG emissions - Scope 2	tCO_2e	11,021	12,107	10,366
Total GHG emissions	tCO_2e	15,538	16,569	13,490
Office building				
GHG emissions - Scope 1	tCO_2e	878	603	549
GHG emissions - Scope 2	tCO_2e	3,526	3,041	3,650
Total GHG emissions	tCO_2e	4,403	3,644	4,199
Total				
Total GHG emissions	tCO_2e	1,112,674	1,050,131	961,929
GHG emissions intensity[18]	tCO_2e/10,000 HKD	0.45	0.38	0.38

Notes:

1. GHG emissions – Scope 1 are generated from stationary sources (diesel and natural gas) and fuel consumption (gasoline and diesel) from transport vehicles. The emission factors of natural gas, diesel and gasoline, refer to the *Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions from Enterprises in Other Industrial Sectors* issued by the National Development and Reform Commission, PRC on July 6, 2015.
2. GHG emissions – Scope 2 are generated from purchased electricity and purchased heat consumption. The emission factors of purchased electricity, refer to the *Notice on Doing a Good Job in 2023-2025 Reporting and Management of Greenhouse Gas Emissions of Power Generation Enterprises* issued by the Ministry of Ecology and Environment, PRC on February 7, 2023. The emission factors of purchased heat, refer to the *Guidelines for Accounting Methods and Reporting of Greenhouse Gas Emissions from Enterprises in Other Industrial Sectors* issued by the National Development and Reform Commission, PRC on July 6, 2015.

[18] GHG emissions intensity = Total GHG emissions in the year ÷ Group's operating revenue in the year.

Low-carbon operation

The promotion of low-carbon operations is crucial to reducing project operating costs and energy consumption. BEWG has formulated internal management policies such as *Low-Carbon Operations Management Measures of BEWG* to carry out low-carbon operations from energy conservation during production, energy substitution and recycling, and continued to increase input in upgrading operational energy-saving technology to further improve carbon reduction efficiency.

Production energy conservation

In response to the national dual carbon goals and sustainable development strategy, BEWG continued to explore the field of low-carbon production, reducing carbon emissions during production through lean management of energy efficiency, process parameter optimization, energy-saving technology upgrading, and other methods.

BEWG adopts a lean management model for energy efficiency in the production, and has established a set of operational management standards to ensure safe, stable, and efficient operations. In terms of unit control, we have developed an overall intelligent control solution for the sewage business, which has been optimized and upgraded in 2022, achieving significant effects in energy saving and consumption reduction.

In addition, BEWG has established a system and equipment evaluation model to optimize equipment operation methods and working hours. Energy-efficient equipment operation has been achieved through multiple paths such as precise regulation, equipment selection, and frequency conversion control to reduce energy consumption. By learning from the mature experience of experts, we have developed online process control tools, transforming the most advanced process control methods into platform-based application tools to improve the stability and reliability of the system and promote energy conservation in production.

BEWG further reduced operational energy consumption in 2022 by upgrading high energy consuming equipment (such as fans, pumps, etc.) with energy-saving technology. We replaced the fans that were over-sized or energy-intensive with magnetic levitation fans of suitable model, replaced the submersible mixers with vertical shaft mixers to reduce energy consumption, and reduced the number of fans through simulating of airflow distribution. In addition, we advanced the low-carbon pump and valve substitution project by purchasing energy-saving pump and valve systems and improving pump and valve system solutions. It is estimated that the overall energy consumption of the pump and valve systems can be reduced by 5%. Overseas project companies also make continuous efforts to optimize energy conservation technologies during operation, and achieved significant results. In 2022, the energy consumption per unit of water production of the BEWG Singapore Changi II new water project (BEWGI-H_2O Pte. Ltd.) decreased by 3.4% year-on-year, and the cumulative power consumption saving reached 1,200 MWh. In 2022, a total of RMB18.85 million was invested in the technological upgrading projects for energy conservation.

Case: Application of intelligent submersible pumps with magnetic levitation motor in water plants

In August 2022, the underground water supply plant of BEWG Nanyang Co., Ltd. passed the trial verification of the "intelligent submersible pumps with magnetic levitation motor" in the water source wells, upgrading the existing traditional submersible pump units to improve the operating efficiency of the units whilereducing power consumption and production costs. The project has upgraded the submersible pumps for two water source wells, selecting more suitable pumps and improving overall efficiency, which has saved power consumption by 29.7%.

Case: Test of optimized ventilation design for phase II of Beijing Daoxiang Lake water purification plant

In 2022, BEWG applied the airflow simulation analysis method to optimize the number of ventilation fans in the underground sewage plant in the phase II of Beijing Daoxiang Lake water purification project. Meanwhile, we have increased induction fans in the underground space to enhance airflow circulation, and reduce the number of ventilation pipes needed. Compared to the conventional ventilation design for underground sewage plant, the installed power of the new ventilation system has been reduced by 24.87%.

Low-carbon action

Energy substitution and recovery

Increasing the use of clean energy and optimizing the energy consumption structure are important ways for the water industry to achieve the dual carbon goals. BEWG makes full use of the roofs of the water plants by installing distributed photovoltaic (PV) power generation devices in the sewage treatment plants to provide clean power for them. As of December 31, 2022, the Group had more than 50 water plants using PV power generation, with a total installed capacity of over 30 MW.

Case: PV project of the BEWGI-H_2O Pte. Ltd.

The BEWGI-H_2O Pte. Ltd. officially launched the PV project in September 2022, with a total deployed area of 9,000 square meters, and an estimated peak power of about 1,800 KW, which can save electricity about 6,000 KWh per day, and reduce carbon dioxide emissions about 850 tonnes per year. The project has been officially put into operation on March 14, 2023.

BEWG continued to promote energy recovery technologies such as water source heat pumps and anaerobic digestion to further reduce fossil energy consumption. In sewage treatment projects, water source heat pumps fully absorb the heat energy of reclaimed water generated after sewage treatment, providing cooling and heating energy for office buildings, production areas and residential areas in the plants, and reducing electric energy consumption. In sludge treatment projects, we use biogas generated during anaerobic digestion to provide energy for production, reducing the use of outsourced energy.

Low-carbon technology

With the national “3060” dual carbon goals, BEWG has been increasing investment in new low-carbon technologies, tapping the potential for carbon emission reduction, and promoting the R&D, and application of low-carbon technologies in the water industry. Currently, we have developed a series of products with new low-carbon technologies, and actively participated in the formulation of low-carbon related group standards to assist in the low-carbon transformation of the water industry.

Low-carbon technologies

BEWG has developed a series of green and low-carbon wastewater treatment technologies for its main businesses, including main technologies - BEAOA and BESWIFT, and low-carbon technologies - BE-Fenton and BECFBR to help modern water plants achieve low energy consumption and high standard treatment.

BEAOA

BEAOA is a new treatment process based on sludge double recirculation—Anaerobic/Oxic/Anoxic (AOA) technology for efficient and deep nitrogen and phosphorus removal jointly developed by BEWG and academician Peng Yongzhen of the Chinese Academy of Engineering. With such advantages as efficient nitrogen removal, energy saving and consumption reduction, BEAOA has become a highlight technology for carbon reduction and conversion in sewage treatment, and it can reduce excess activated sludge by over 30% during operation and reduce energy consumption of aeration units by over 20%.

Case: Application of BEAOA technology in phase II project of Jinan Zhongkecheng Water Purification Co., Ltd.

The phase II (design scale: 1 cubic meter/day) of BEWG Jinan Zhongkecheng Water Purification Co., Ltd. is located in north China, where there are objective factors such as significant temperature changes in four seasons, large fluctuations in inflow quality, and water volume during the day and night. It only took two months for the project to upgrade the production process from AAO[19] to BEAOA. Meanwhile, combined with efficient automatic control and multiple operational management methods, it can stably discharge compliant effluent, and the overall indicators are significantly better than the emission standards. Through this technological upgrading, the treatment capacity of the sewage treatment plant has been increased by 40%, the total nitrogen removal rate has been stabilized at over 85%, and the sludge output has been reduced by 40%.

Application of BEAOA technology in phase II project of Zhongkecheng Sewage Treatment Plant in Jinan, Shandong

[19] AAO is the short form of anaerobic-anoxic-oxic biological nitrogen and phosphorus removal process.

Low-carbon action

BESWIFT

BESWIFT technology is a new technical product independently developed by BEWG based on aerobic granular sludge technology according to the characteristics of low carbon nitrogen ratio sewage quality in China. It has core advantages in compactness, intelligence, and low-carbon performance. In terms of energy conservation and carbon reduction, it can save the operating energy consumption of sludge reflux and nitrifying liquid reflux pumps, and reduce the energy consumption of aeration (reducing energy consumption by over 20%) and the consumption of nitrogen and phosphorus removal agents.

Case: BEWG achieved a breakthrough in applying BESWIFT technology to a 10,000-ton-level project for the first time

The Sanshui Project in Foshan, Guangdong is the first project of ten-thousand-ton production scale using BESWIFT technology independently developed by BEWG, which was officially commissioned and put into production in July 2022. Compared with traditional processes, this technology has such advantages as short hydraulic retention time, improved treatment efficiency, and small footprint. Meanwhile, the built-in automatic control system of the process can be set according to the water quality changes and process requirements to flexibly adjust the operation duration and parameters of aeration fans and mixing facilities, achieving intelligent operation, and significantly reducing operating energy consumption.

The project of 10,000-tonne-level sewage treatment plant in Sanshui, Foshan

BE-Fenton

The BE-Fenton Advanced Oxidation Process Package is a technically improved new Fenton oxidation process package that is suitable for the treatment of refractory industrial wastewater. This technology has currently been applied in three projects of BEWG, with such advantages as stable operation, precise control, low costs, low carbon, and energy conservation.

BECFBR

BECFBR technology is developed after summarizing BEWG's operations and industry technologies, including unique core equipment, products, and technologies such as filler separation, systematic denitrification, and aeration optimization, forming a new generation of low-carbon, high-quality, and high-efficiency enhanced biological mud membrane composite treatment technology. This technology can reduce the energy consumption of filling fluidization by 30-50% and achieve near zero carbon source addition. From 2022 to 2023, seven projects have been put into operation or planned to be implemented, with a designed processing capacity of over 450,000 tonnes/day.

Low-carbon control technology

As the industry develops, there has been an increased demand for automation in modern water plants. In view of that, BECFBR has developed a series of low-carbon control technologies, such as BELEBC, BE-EMR, BE-CMR, and so on, to meet the demand of the industry and the Group for technological progress.

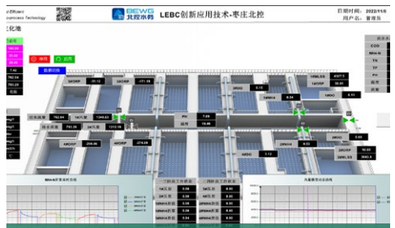
BELEBC

BEWG's Low-carbon and Efficient Bio-process Technology (BELEBC) aims to develop control technologies for biochemical processes in wastewater treatment, with the characteristics of energy consumption reduction, carbon sources saving, improved efficiency in biological denitrification, and reliable intelligent control. This technology can effectively reduce the power consumption of aeration and can reduce the power consumption of the aeration unit by over 10%.

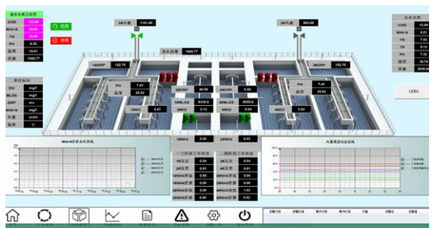
Case: Application of BELEBC system to the phase I and phase II of 10,000-tonne-level project in Zaozhuang, Shandong

The phase I and phase II of 10,000-tonne-level project in Zaozhuang, Shandong (40,000 tonnes/day) carried out application of the system for continuous production in 2022. The application of BELEBC technology in this project can reduce the costs of electricity consumption for aeration per tonne of water by 10%, and reduce the average daily unit consumption of carbon source application by 40%, achieving the goal of energy conservation and carbon reduction.

The site of applying the BELEBC system to 10,000-tonne-level project in Zaozhuang



Control System Main Interface of Zaozhuang Project (Phase I)



Control System Main Interface of Zaozhuang Project (Phase II)

Low-carbon action

BE-EMR

BE-EMR is BEWG's Engineering Management Robot (EMR), a biochemical treatment intelligent control solution exclusively designed for sewage plants. In 2022, we conducted comprehensive real-time control optimization for water, mud, gas, and agents in the biochemical system, deeply integrating fuzzy control, model algorithms, and big data to achieve adaptive adjustment of the biochemical system. This upgraded technology can reduce the power consumption of the biochemical system by 10% - 20%, reduce the carbon source consumption by more than 30%, and reduce the consumption of dephosphorization agents by more than 20%. In 2022, this technology was applied to 15 projects.

Case: Application of BE-EMR system to No.1 Reclaimed Water Plant project in Yinchuan, Ningxia

The BE-EMR system was applied to Yinchuan No.1 Reclaimed Water Plant project (300,000 tonnes/day) in 2022. Tests showed that with the application of BE-EMR technology to this project, power consumption per tonne of water can be reduced by 15%; the consumption of dephosphorization agents can be reduced by 88%, and zero carbon source application can be achieved, so that the goal of stabilizing water quality, saving energy, and reducing consumption can be achieved.


Aerial view of Yinchuan No.1 Reclaimed Water Plant project

BEWG's Engineering Management Robot and a screen of the system

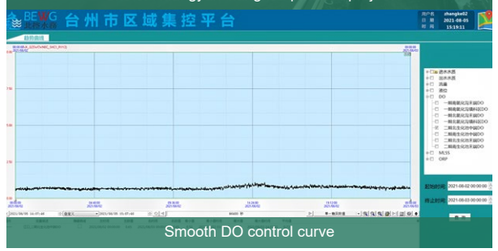
BE-CMR

BE-CMR is a biological treatment process product used in the biological treatment units for municipal and industrial wastewater. Unique tank design and equipment optimization can reduce hybrid energy consumption, and improve the convenience and stability of operation control. The effluent of the system can stably meet Class IV and Class III standards, and the system has strong impact resistance. This technology has broken away from the working principle of conventional aeration tanks that are agitated through oxygen aeration, achieving an ultra-low carbon/nitrogen ratio, and a stable, efficient, and energy-saving system.

Case: Application of BE-CMR to Huangyan Jiangkou project

After applying the BE-CMR technology, the Huangyan Jiangkou project has been in stable operation for two years, and the deviation between the actual value and the target value of DO[20] has reached ± 0.1 mg/liter, achieving precise regulation. The agitating energy consumption and carbon source costs of the project are significantly lower than those of conventional biological tanks, achieving low-carbon and energy-saving operations. The agitating power density can be reduced from 4-5 watts/m^3 to less than 2.5 watts/m^3, saving carbon source costs by over 75%, and saving power consumption by over 20%.


Site of Huangyan Jiangkou phase II project



Smooth DO control curve


Site of Huangyan Jiangkou phase II project

Contributions to the industry in low carbon

In 2022, BEWG participated in the formulation of the first low-carbon community standard in the field of sewage treatment, *Technical Specification for Low- carbon Operation Evaluation of Sewage Treatment Plant*. The standard specifies how to calculate carbon emission intensity and how to evaluate low-carbon operation level for sewage treatment plants, and clearly defines four categories and 12 sub-category of low-carbon behaviors.

[20] DO is short for Dissolved Oxygen.

Low-carbon action

Low-carbon construction

BEWG made continuous efforts to R&D and improve construction technology, respond to low-carbon construction requirements, and improve delivery quality and efficiency. Based on the ideas of low-carbon construction in 2021, BEWG increased its investment in low-carbon construction R&D in 2022. Aiming at the key and difficult points in the application of fabricated technology to the water industry, BEWG conducted in-depth cooperation with leading domestic testing and research institutions, conducted 1:1 full scale component assembly test in Changping, Beijing, and hired certified third-party institutions to conduct comprehensive carbon emission calculations for the tests.

Case: The first "prefabricated structural" water tank in the water industry was installed in Changping, Beijing

In 2022, BEWG signed a strategic cooperation and joint R&D agreement with Sany Construction Engineering Technology Co., Ltd. to carry out the first "prefabricated structural" water tank test in the water industry in Changping, Beijing. This test has overcome many technical challenges in the production, installation, waterproofing, and seepage prevention of large water service assembly components. Based on technical research, we monitored the carbon emission data throughout the process. The carbon footprint calculation results of the test tank (with a volume of 203.32 m^3) show that the carbon footprint value of the prefabricated test tank is 16.58% lower than that of the cast-in-place test tank.

We plan to apply for scientific and technological achievements appraisal, complete patent application, and implement the technologies in water plant projects in 2023. Through continuous innovation, we try to seek more diversified low-carbon construction methods, and continue to promote and expand the scale of projects using new technologies to make contributions to the achievement of sustainable development goals. In addition, BEWG has made evaluation requirements for project energy consumption and material consumption during the construction phase in the *Trial Administrative Measures for Engineering Products Appraisal of BEWG*, guiding the optimization of process design and equipment selection during the construction phase with low-carbon operation standards during the operation period to achieve low-carbon construction.

Low-carbon office

In 2022, BEWG continued to actively explore low-carbon office and tried to put it into practice, further reducing the consumption of various resources.

Energy conservation in the office

- Using energy-saving lighting fixtures: Lighting fixtures in the passenger elevator halls on the first floor of the office buildings of the Group's headquarters were replaced. The total power of the lighting fixtures has been reduced from 10.5 kWh to 5.8 kWh, and it is estimated that the annual power consumption can be reduced by 6,768 kWh.
- Optimizing the control of air conditioning units: Optimize the control system of the air conditioning facilities in the office buildings, and optimize the operation time based on outdoor temperature changes while ensuring personnel comfort. It is estimated that electricity consumption can be reduced by about 4,280 kWh in 2022.

Water saving in the office

- Use water saving appliances and faucets.
- Post signs on saving water in offices.

Material saving in the office

- Advocate and implement paperless office, adopting green office measures such as online meetings and cloud file storage, effectively reducing the use of paper resources and mobile storage media in the office.

Environmental impact

As the water industry turns to a high-quality development stage and advances steadily towards the "dual carbon" goals, BEWG, as a responsible corporate who greatly values environmental protection, strives to minimize the impact of business activities on the environment. Considering the characteristics of different projects, we have made continuous efforts to improve biodiversity protection, environmental system management, emission management, and chemical agent management to achieve high-quality green operations.

Biodiversity protection

Strictly following such laws and regulations as the *Regulations on the Administration of Construction Project Environmental Protection*, and based on the guidance documents such as the *China National Biodiversity Conservation Strategy and Action Plan (2011- 2030)*, BEWG has developed internal management systems such as the *Biodiversity Protection Management Measures of BEWG*[21]. We incorporate biodiversity protection into the entire life cycle of the project, develop products and technologies that promote biodiversity protection relying on our professional backgrounds, and actively engage in biodiversity protection and ecological restoration. In addition, overseas offices of the Group strictly comply with local biodiversity conservation policies and actively cooperate with local governments to meet relevant requirements.

Biodiversity protection throughout the life cycle of the project

Planning and design stage

- Conducting ecological basic research, assessing the environmental impact, mainly considering factors related to biodiversity protection, giving priority to the protection of local characteristic species and their habitats, and developing special protection and restoration plans;
- Organizing targeted publicity and education on biodiversity among employees to improve their awareness of biodiversity protection.

Construction stage

- Strictly abiding by various laws and regulations related to biodiversity protection, conducting regular supervision and inspection, and doing a good job in protection and restoration;
- Adopting materials, devices, and equipment that facilitate biodiversity protection;
- Focusing on efforts to prevent and manage pollutants that are prone to have significant impact on the surrounding ecological environment;
- Carrying out ecological restoration and maintenance of the areas affected during the construction process.

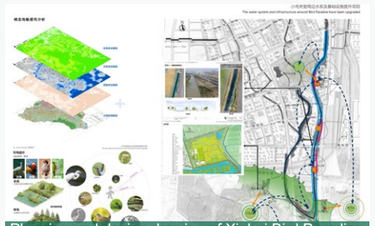
Operation and maintenance stage

- Monitoring changes in biological indicators during operation in real time with the smart water service system, timely identifying biological risks and responding to them promptly;
- Focusing on the monitoring and control of ecological conservation areas delineated within the scope of project operations;
- Adopting restorative measures, such as creating environments conducive to the survival of animals or plants on the food chain, and enhancing biodiversity on a small scale;
- Prohibiting employees from harming fish and other animals and plants protected by national laws;
- Conducting publicity and education on biodiversity protection to the public.

Case: Xinhui Bird Paradise water system and infrastructure improvement project

During the implementation of the project, the principle of giving priority to ecological protection shall be followed to minimize impact on birds. Shallow beaches and floating islands shall be built in the surrounding water system and floating wetland and ecological wetland landscape technology shall be used to purify water quality and create a bird watching and leisure area along the river.

The implementation of this project can effectively improve the aquatic ecological environment around the wetland park and provide a good breeding habitat for birds such as great egrets, achieving a balanced combination of bird attraction, viewing, and landscape, and building a green ecological chain of harmonious coexistence between humans and nature.



Planning and design drawing of Xinhui Bird Paradise for bird habitat protection

Case: Effluent polishing wetland project in Changde, Hunan

In the WWTP effluent advanced treatment project, BEWG has constructed a bio-diversified system with eel grass as the dominant species, with the technology of combining vertical flow wetland and meandering surface flow wetland. Some carnivorous and filter-feeding fishes are raised in the meandering surface flow wetland, and a stable ecosystem of submerged clear-water-type aquatic plant community is established to improve the appearance and transparency of water bodies, inhibit algal growth, and prevent eutrophication of water bodies. This project has facilitated the ecological balance of the nearby Liuye Lake, known as "the business card" of Changde City, providing high biodiversity protection value.

Subsurface flow zone of tailwater wetland in Changde, Hunan

Case: Wetland and ground park project of Yuhang sewage treatment plant

The phase IV project of Yuhang Sewage Treatment Plant is in an environmentally sensitive area, surrounded by commercial and office buildings. Therefore, even since the project design was started, BEWG and the government have been following the concept of "collaboration and co-construction", integrating the plant design into the specific environment of the surrounding urban planning, and minimizing the impact on the surrounding environment. In addition, we arranged plant varieties comprehensively in the hope of improving the surrounding air quality, and achieving the six major functions of a sponge city through grass planted ditches, green roofs, permeable pavement, purifying wetlands and landscape water bodies, in a bid to bring concepts of health and environmental protection to the public, as well as leisure venues, while bringing green and open nodes to urban space. In 2022, the project won the honor of Zhejiang Provincial High Quality Comprehensive Park, and was shortlisted as one of the best routes of "Water Tour" in Zhejiang Province, and was recommended by the government to apply for the China Human Settlements and Environment Award.

Wetland park in Yuhang Sewage Treatment Plant

[21] Public disclosure URL: https://www.bewg.net/uploadfile/2020/1020/20201020105644653.pdf

Environmental impact

Biodiversity protection products and technologies

In response to the severe challenges in water pollution control and comprehensive environmental renovation, BEWG has actively carried out multiple projects in green infrastructure construction and in-situ ecological restoration with professional advantages, and made continuous efforts to develop new ecological restoration technologies, in a bid to facilitate building a community of shared future in ecology and environment and safeguard lucid water and lush mountains.

Green infrastructure

- Developing and applying multiple green infrastructure products and technologies represented by constructed wetlands, combining sewage treatment with ecological protection to achieve coordinated development.

In-situ ecological restoration

- Promoting industry-university-research cooperation, advancing the R&D of in-situ water ecological restoration technologies, and applying relevant technologies to engineering practice;
- Restoring the ecological stability of rivers quickly, and improving biodiversity protection and ornamental value through the construction of the aquatic biological ecosystem.

Case: Ecological improvement project for tailwater treatment in Dongying, Shandong

High-load subsurface flow constructed wetland is used for advanced treatment of the effluent from Dongying North District Sewage Treatment Plant to meet the tailwater treatment requirements. In the design of wetland system, we fully considered the conservation of biodiversity in saline-alkali areas, and the plant selection is mainly Dongying native plants, so as to improve the treatment performance of the wetland system and the stability of the ecosystem and extend the service life of the wetland system by enriching plant varieties. We conduct wetland construction by following the concept of "being people-oriented, giving priority to ecology", integrating the concept of wetland protection into ecological governance, and implementing education and science popularization through public visits and other activities. The implementation of this project can effectively improve the water quality of the overflow river and create a great urban water ecological environment.

General layout of Dongying phase II tailwater wetland

Environmental system management

BEWG strictly complies with environmental laws and regulations such as the *Environmental Protection Law of the People's Republic of China*, and has developed internal environmental management systems including the *Environmental Index Assessment System*, the *Environmental Factor Identification, Evaluation and Control Procedures*, in accordance with the ISO 14001 the standard for an environmental management system. In 2022, the Group has passed ISO 14001 certification.

Having set the environmental goals of "saving energy, reducing consumption, reducing pollution, and increasing efficiency", we carry out feasibility assessments and environmental impact assessments in parallel with new projects, and strictly control environmental risks throughout the life cycle of the projects.

Investment stage

Environmental risks and environmental impacts are important factors in the assessment of investment projects. Investment projects with imperfect environmental protection procedures and emissions that do not meet emission standards emphasize the improvement of procedures and technological transformation operation guarantee as necessary conditions for investment.

Design stage

The impact of the project on the water environment, atmospheric environment, and acoustic environment during the construction and operation periods shall be analyzed together with the consulting agency from the aspects of environmental impact analysis, environmental protection strategies and measures, environmental management planning, and environmental impact assessment conclusions, and countermeasures shall be proposed.

Operation stage

Strictly implement plans and management actions to control the impact on the environment. Regularly supervise and inspect the environmental compliance of the projects during the operation stage, and establish corresponding reward and disciplinary mechanisms.

Construction stage

Before the project starts, the contractor is required to develop the EHS[22] management plan, green construction plan and other plans, strictly following the requirements of environmental protection, to strictly control the environmental impact during construction.

No major violations of environmental laws and regulations occurred within the Group in 2022

[22] EHS refers to Environment, Health and Safety.

Environmental impact

Emission management

In strict accordance with the requirements of the *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste*, the *Law of The People's Republic of China on the Prevention and Control of Water Pollution*, the *Law of The People's Republic of China on the Prevention and Control of Atmospheric Pollution*, and the *Law of the People's Republic of China on Noise Pollution Prevention and Control*, BEWG has formulated internal systems including the *BEWG Management Manual on Quality, Environment, and Occupational Health and Safety* and the *Quality, Environment, and Occupational Health and Safety Procedure Documents*. During the project construction, with precise control methods, the Group makes every effort to reduce the emissions of noise, dust, harmful gases, and solid waste at the construction sites, and strictly identify, classify, monitor, control, and dispose of the waste. Recyclable wastes such as scrap metal, plastic foam and other materials shall be recycled as much as possible.

In 2022, the Group did not have any major environmental pollution accidents.

Construction stage

BEWG requires that the contractors should attach great importance to the emission of environmental pollution sources such as wastewater, exhaust gas, and noise during construction, and improve the utilization efficiency of recyclable materials as much as possible.

Operation stage

Solid waste

The solid waste discharged by BEWG is mainly the sludge generated during operation, most of which is the sludge from municipal sewage treatment plants. Sludge contains bacteria, pathogens, organic and inorganic pollutants, of which the organic matter also contains a large amount of recyclable energy. In accordance with the local requirements of the projects, the Group vigorously promotes sludge reduction, harmless disposal, and resourceful utilization, speeds up the reduction of sludge landfill scale, and actively adopts innovative technologies to reduce the sludge from the source, promote the resourceful utilization of sludge, to reduce the impact on the environment.

Wastewater

BEWG has formulated the following measures to manage wastewater discharge from the plants:

- Keeping various pipes such as water pipes, rainwater pipes, and process pipes in the plants separated and operating independently to avoid mutual pollution;
- Treating wastewater from the laboratories in strict accordance with the management standards of the chemical laboratories, and prohibiting the discharge of wastewater into the sewer pipe without treatment;
- Strengthening daily inspection and maintenance of facilities and equipment, avoiding the overflow or discharge of sewage due to the mechanical failure of pipes and gates, which may have adverse impact on the surroundings.

Waste gas

In accordance with the relevant national laws and regulations, BEWG equips newly-built water plants with waste gas collection and treatment systems in the design and construction stage, and improves the waste gas collection and treatment systems of the water plants under operation. BEWG installs biological deodorization devices to treat the special gases generated by some production facilities during the operation of the water plants to ensure harmless emission in compliance with relevant standards. During operation, each project company shall strictly implement the inspection and maintenance of deodorization systems to prevent the odor from leaking out and affecting the staff and residents in surrounding areas.

Noise

The noise generated during the operation of the water plants mainly comes from the operation of mechanical equipment, vehicles for transport, and maintenance and construction activities on site. BEWG makes every effort to minimize the noise pollution of the water plants by adopting low-noise machinery, installing sound insulation facilities, prohibiting the honking of vehicles in the plants, and scheduling maintenance and construction properly.

Environmental impact

Waste discharge[23] of BEWG in 2020-2022

Indicator	Unit	2022	2021	2020
Water business in Chinese mainland				
Hazardous solid waste	tonne	326	198	205
Non-hazardous solid waste	tonne	2,704,446	2,525,025	2,033,760
Overseas water business				
Non-hazardous solid waste	tonne	30,146	30,608	17,517
Solid waste business				
Sulfur oxide emission	tonne	48	37	21
NO_x emission	tonne	337	305	194
Soot discharge[24]	tonne	7	3.05	/
Boiler residue discharge	tonne	87,156	64,723	/
Office building				
Hazardous solid waste	tonne	2.14	1.19	0.92
Non-hazardous solid waste	tonne	88.63	54.03	48.31
Total				
Hazardous solid waste	tonne	328	199	206
Hazardous solid waste density[25]	kg/10,000 HKD	0.13	0.071	0.081
Hazardous solid waste density	tonne	2,734,681	2,555,686	2,051,325
Non-hazardous solid waste density[26]	tonne/10,000 HKD	1.09	0.92	0.81

[23] In 2022, the statistical caliber of BEWG for waste was clarified and revised, resulting in changes in data on some indicators.

[24] In 2022, the Group sorted out the definition and caliber of the indicator, and reviewed the data of previous years. The 2021 indicator data is subject to the disclosure in this report.

[25] Hazardous solid waste density = Production of hazardous solid waste of the year ÷ Operating revenue of the Group of the year.

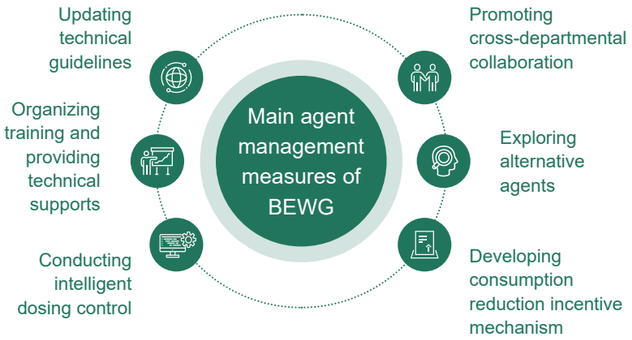
[26] Non-hazardous solid waste density = Production of non-hazardous solid waste of the year ÷ Operating revenue of the Group of the year.

Pollutant reduction of BEWG in 2020-2022

Indicator	Unit	2022	2021	2020
Water business in Chinese mainland				
Suspended solids reduction	tonne	749,361	683,108	613,211
COD reduction	tonne	961,112	904,218	774,353
Ammonia nitrogen reduction	tonne	121,839	104,595	87,261
Total phosphorus reduction	tonne	16,463	14,717	13,336
Total pollution reduction	tonne	1,848,775	1,706,638	1,488,161
Overseas water business				
Ammonia nitrogen reduction	tonne	16,450	16,426	22,615
Total phosphorus reduction	tonne	554	562	700
Total pollution reduction	tonne	100	84	45
Ammonia nitrogen reduction	tonne	17,104	17,072	23,360

Chemical agent management

In strict accordance with the *Environmental Protection Law of the People's Republic of China* and the *Law of The People's Republic of China on the Prevention and Control of Water Pollution*, and other relevant laws and regulations, BEWG has formulated the systems, such as the *Production and Operation Management Measures* and the *Chemical Agent Management Measures*. BEWG also set up a special working group responsible for reducing the chemical agent consumption, implementing strict and precise control over the supply, use, and emission of chemicals throughout the life cycle of projects.



Consumption of chemical agents of BEWG in 2020-2022[27]

Indicator	Unit	2022	2021	2020
Water business in Chinese mainland				
Consumption of carbon source	tonne	110,412	84,386	77,768
Consumption of dephosphorization agents	tonne	291,217	224,346	205,973

[27] The statistical scope of the usage of the chemical agents mainly covers sewage treatment plants/reclaimed water plants under the subsidiaries of the Group.

03

Building a harmonious society

Talent management

We released the *Statement on Employee Rights*[28]. We pledge to implement anti-discrimination and diversified employee management, and attach great importance to developing strategies and systems for talent development, so as to support employees' career development and ensure talent quality. At the same time, we provide welfare and healthcare for each employee to promote better work and life balance.

Employment management

BEWG continues to improve the *Recruitment Management System*, strictly complies with lawful employment and clearly prohibits any form of violence against child labor. We offer jobs to candidates based on their competencies, ensure equal employment opportunities, equal pay, and oppose to all workplace discrimination on the basis of race, nationality, gender, among others.

In 2022, BEWG placed emphasis on expanding the recruitment system. We updated and revised the *Management Measures for Campus Recruitment of BEWG*, worked to strengthen the employer branding efforts, expanded our talent recruitment network, and improved our talent management system. We added the resume evaluation functionality to our campus recruitment channels, utilizing our recruiting system to perform standardized screening at the entry point for candidates. We aimed at new graduates in the 2023 recruitment. BEWG attracted a record-breaking number of over 87,000 applicants.

We adhere to a management philosophy that is inclusive and diverse, respecting the basic human rights of our staff and encouraging democratic management among our employees. BEWG strictly complies with labor laws in all of our business regions worldwide and actively supports international human rights norms and standards such as the *Universal Declaration of Human Rights*. Meanwhile, the labor union organizations at all levels of the group companies regularly conduct employee communication activities, encouraging employees to express their personal grievances and safeguard their legitimate rights and interests.

BEWG has been actively building a digital blueprint for human resources and implementing specific plans to promote digital transformation in human resources. In 2022, we fully launched a digital human resources management system that includes organization and personnel management, attendance tracking, and salary management. By planning and integrating our talent resources, we aim to improve the efficiency of our human resources operations.

As of December 31, 2022, BEWG had a total of 20,606 employees, including 19,537 employees in Chinese mainland and 1,069 employees in China's Hong Kong, Macao, Taiwan and overseas regions.

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BEWG had a total of **20,606** employees

19,537 employees in Chinese mainland

1,069 employees in China's Hong Kong, Macao, Taiwan and overseas regions

[28] Public disclosure URL: https://www.bewg.net/uploadfile/2020/1020/20201020105605708.pdf

Total number and proportion of BEWG employees by category in Chinese mainland in 2022[29]

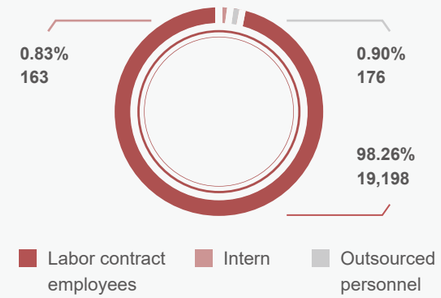
Number of new contract hires in the year

2,734 person

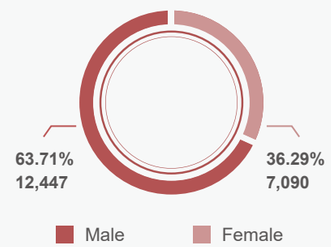
Proportion

13.99%

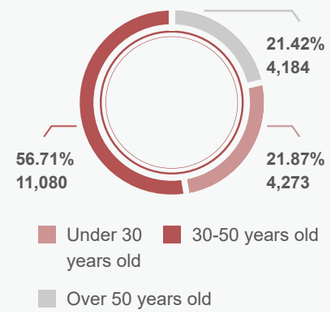
Total number of employees by type of employment



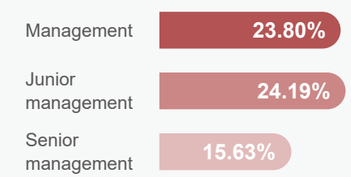
Number of employees by gender



Total number of employees by age group

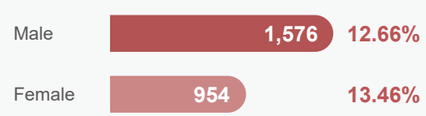


Proportion of female employees by rank

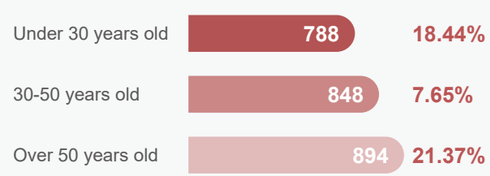


Total Number of employees leaving[30] and turnover rate[31] by gender and age of BEWG in Chinese Mainland in 2022

Number of employees by gender



Total number of employees by age group



[29] Considering that the business of BEWG is mainly concentrated in Chinese mainland, so only the information of employees in Chinese mainland is disclosed.

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[31] Turnover rate is calculated as: Turnover rate for each category = number of employees in that category leaving / total number of employees in that category * 100%

Talent management

Talent development

BEWG values human resource development and attaches great importance to building a talented workforce. Based on specific job requirements and different types of talent categories, we have established a multi-dimensional talent training system and launched systematic talent development programs.

In 2022, BEWG prioritized key positions by focusing on the cultivation and evaluation of operational and innovative talents. We carried out talent competency assessments and established the Core Talent Warehouse 1.0. We labeled the development direction, strong skills, thinking style advantages, and other characteristics of core talents. From this, we selected outstanding talents for our key positions, and created a reserve talent pool to strengthen our talent pipeline and optimize talent supply.

BEWG is committed to meeting the personal development needs of its employees by creating customized training plans for different types of learners and continuously improving its internal employee training system. We encourage employees to take the initiative to learn and have established an internal learning and sharing platform called the "Upgrading Learning Academy", which integrates learning resources and accumulates internal experience. We are also dedicated to strengthening our talent reserve in the industry, sharing our talent development practices with our peers, and actively creating an environment for talent development in the industry.

The key talent development programs for this year are as follows:

In 2022, a total of three offline training sessions were held for the "China Environmental Industry Senior Manager Training Program", with a total of 176 participants and 108 hours of training. The training program not only contributed to the Group's transition from "Tactics of the masses" to "Talent strategy", but also enhanced the management talent reserve for the environmental protection industry, effectively strengthening the core competitiveness of the environmental protection industry, and gathering new momentum for the next development of the ecological industry.

In August 2022, the Project Financial Manager Empowerment Training hosted by BEWG's Financial Resources Center and organized by BEWG Education Center was launched in Guiyang city, Guizhou province. The training lasted for a total of 3 days and was attended by 117 participants. Having invited external experts to share their successful experiences in integrating finance and business, this training aimed to promote the comprehensive development of financial business partners' capabilities, and support BEWG's financial digital transformation.

Note: Finance business partner refers to financial staff sent to business frontlines, serving as communication bridges between financial departments and business departments.

In 2022, We carried out three external training projects for industry talents. These projects include providing live streaming training on "Online Water Supply Professional Empowerment" for BEWG Guiyang, teaching courses in the "Cadre Training Class and Business Capability Enhancement for Investment and Marketing Personnel" training project by China Construction Eco-Environmental Group, and hosting the "Youth Cadre Training Program" by Henan Urban Construction Development Environment Protection Co., Ltd. These external training projects not only helped other companies in the industry to empower their talents, but also created a bridge for deep communication and mutual learning between BEWG and other enterprises, laying the foundation for jointly exploring and developing new opportunities in the future.

From March to November 2022, a total of 5 online 1+X vocational skills certificate for teacher and examiner training sessions were held. This training fully implemented the requirements of the "Notice on Organizing Training for Teachers in Pilot Colleges and Universities to Carry Out the 1+X Certificate System" (Teacher Department Letter [2019] No. 43), and improved the teaching and assessment quality of the "Intelligent Water Plant Operation and Control" and "Water Environment Monitoring and Governance" vocational skills certificates in pilot colleges and universities. A total of 321 teachers from 66 colleges and universities across the country completed the teacher training, and 337 teachers from 67 colleges and universities completed the examiner training and assessment.

BEWG emphasizes the integration of new forces in talent development and carefully cultivates each batch of management trainees. Through internal rotations, we help management trainees clarify their development directions and adapt to their work roles.

Case: BEWG 2022 management trainee program

BEWG held an online orientation meeting for the 2022 class of management trainees, introducing them to departmental information and job responsibilities. This helped the trainees choose their career paths based on their professional strengths and interests. We also conducted an induction training for the 2022 class and designed the training course from three dimensions - culture, skills, and actions, aiming to familiarize the trainees with the corporate culture, industry trends, and their own roles. Additionally, we held a reporting meeting for the 2020 class and "+ Plan" management trainees to assess their training outcomes, proven to be highly efficient in assessing the effectiveness of the management trainee programs.

Group photo of the induction training of BEWG 2022 class of management trainees



Photo of the BEWG 2020 class & "+ Plan" management trainee graduation reporting meeting

Talent management

Overview of BEWG employee training in 2022

Management
- China Environmental Industry Senior Manager Seminar
- Finance Manager Empowerment Training
- Seminar for Managers of Water Supply Companies
- Seminar for General Managers of Regional Organization
- Seminar for Heads of Sewage Water Treatment Plants

Frontline employees
- Enterprise Self-assessment of Skill Level Certification
- Skill Assessment Test for Frontline Production Workers

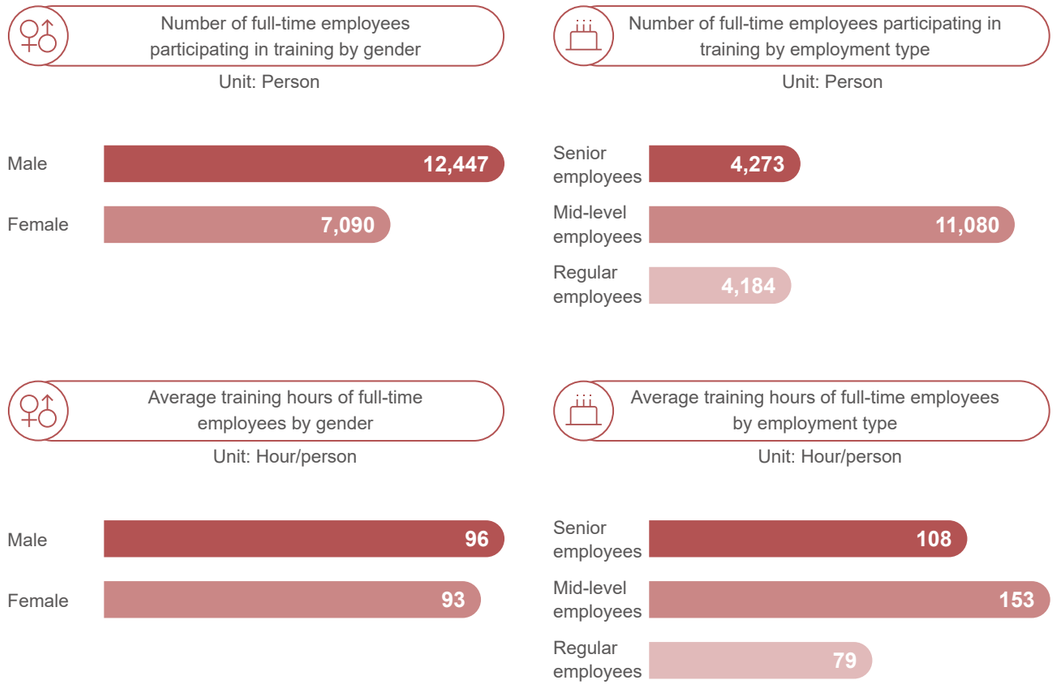
New hires
- Growth Enhancement Training for New Hires
- Management Trainee Training

External industry talents
- Joint Industry Academy (Open Educational Certification)
- China Ecological Environment Industry-Education Integration Alliance
- Small and Medium Enterprise Empowerment Training

Others
- Safety training for all employees
- Environmental Protection Teacher Project
- Integrated training

BEWG provides its employees with an unimpeded and effective communication channel to facilitate two-way communication between employees and management, helping employees clarify their personal values, and fostering their sense of mission and responsibility.

BEWG employee training performance in 2022[32]



Case: BEWG holds the event of "Starry Sky Dialogue - Group Executives and Management trainees Discuss the New Workplace for Post-95s"

In September 2022, BEWG held an event named "Starry Sky Dialogue - Group Executives and Management trainees Discuss the New Workplace for Post-95s" in Beijing. Senior executives such as CEO Zhou Min and COO Li Li attended the event in person, and over 120 of the 2020 class ("+Plan") and 2022 class of management trainees participated through a combination of on-site and video attendance. At the event, the executives and trainees engaged in in-depth discussions on topics such as personal goals, career development, corporate culture, and group strategy. The executives conveyed the Group's culture and philosophy to the trainees, enabling them to have a deeper understanding of their mission and responsibilities.

Photo of "Starry Sky Dialogue - Group Executives and Management Trainees Discuss the New Workplace for Post-95s" Event

[32] Considering that the business of BEWG is mainly concentrated in Chinese mainland, so only the information of employees in Chinese mainland is disclosed

Talent management

Employee care

BEWG is committed to enhancing employees' sense of work happiness and belonging, and strives to provide comprehensive support for their work and life, while enriching their spiritual and cultural lives. We provide our employees with a diverse and well-structured non-monetary welfare package, including commercial medical insurance, mutual aid insurance, supplementary pension annuity, catering and transportation subsidies, summer heat protection allowance, and healthy afternoon tea, among others, in accordance with the *Headquarters Employee Welfare System*. We have also developed the *Management Measures for Organization and Implementation of Corporate Culture Activities of BEWG*, and actively organized team-building activities to help employees open their hearts, integrate into the team, and enhance their sense of collective belonging.

We care about our employees' leisure time, therefore, regularly and irregularly organize various cultural and sports activities, such as executive luncheons, BEWG Thinking-sharing sessions, fun games and themed photography competitions. We provide our employees with fitness equipment, reading spaces, and other hardware facilities to enrich their daily lives.

At the same time, BEWG attaches great importance to the physical and mental health of its employees, committed to providing considerate and practical health care. We have established partnerships with 6 hospitals and medical examination institutions, and purchased annual health examination packages for all employees to choose from according to their needs. We pay for work-related injury insurance for all full-time employees and purchase commercial insurance to ensure that employees who suffer from work-related accidents or illnesses can receive medical relief and economic compensation. In addition, we have upgraded employee insurance to expand coverage for their parents and spouses without premium increase. We provide preventive measures for major diseases, such as tumor marker screening, offline and online health lectures, for employees. We always adhere to the "people-oriented" concept, work to strengthen safety and health awareness and actively improve working conditions and medical security. We have set up a "staff medical kit" to respond to emergencies and ensure timely medical support for employees who experience physical discomfort or other urgent situations. We have launched a series of science outreach activities for employees to address psychological health problems and emergency health issues that may arise in the workplace, safeguarding the long-term physical and mental health of employees.

We provide full care for female employees. Based on careful study of the *Decision on Amending the Regulations on Population and Family Planning of Beijing,* we have added paid breastfeeding leave for female employees. During the period when the breastfeeding infant is less than one year old, female employees are entitled to one hour of fully paid leave per day. In addition, each level of companies under our Group has set up a mother and infant care room where conditions permit. In addition to planning special activities for International Women's Day, we have designed an online course on breast cancer prevention for female employees, with a total of 543 participants and a course completion rate of 100%.

Beijing Enterprises Group, the parent company of BEWG, has established a "Sunshine" special fund under the account of Warm Foundation of Beijing General Federation of Trade Unions. The fund aims to provide assistance to union members and other employees of the group who are facing difficulties, with a focus on helping those in need to solve their daily living difficulties and children's education problems.

Case: BEWG conducts public training on workplace mental health and first aid knowledge

In 2022, the Human Resources Center of BEWG, in collaboration with the Group Office, invited external experts to conduct public training on workplace mental health and first aid knowledge. By offering lectures on mental health and providing guidance on first aid operations, the training aims to help employees maintain their mental health in a positive and scientific manner, and handle emergencies in an orderly and efficient way.

Photo of Mental Health Lecture Hall event

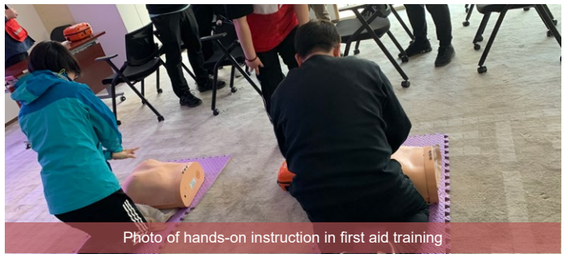


Photo of hands-on instruction in first aid training

Safety and Health

BEWG has comprehensively strengthened its subject responsibility for safety production. By implementing the concept of governance in accordance with laws and regulations, we have made the production site the focus of safety management, identified and addressed potential safety hazards. We have built consensus on safety to strengthen management before, during, and after incidents, so as to prevent all types of production safety accidents, and ensure the safety and health of all relevant personnel in the operation site.

Safe production

BEWG has set up safety production committees at headquarters and first-tier business units, to comprehensively build a unified and effective safety management mechanism, conduct systematic and standardized safety management, and strictly implement the subject responsibility for safety production. We strictly comply with the requirements of the *Production Safety Law of the People's Republic of China* (Revised in 2021) and other relevant laws and regulations, and in reference to *ISO 45001 - Occupational Health and Safety Management System*, updated and published internal management systems such as the *BEWG Identification List of Laws, Regulations and Standards for Safety Production*, *BEWG Responsibility System for Safety Production*, *BEWG Regulations on Production Safety Accident Reporting and Investigation* and *BEWG Comprehensive Emergency Plan for Unexpected Incidents,* to ensure that responsibilities for safety production are implemented effectively. All overseas companies of BEWG strictly abide by local safety production laws and regulations, and incorporate safety production-related indicators into KPI assessments to ensure the implementation of safety production responsibilities and compliance with safety production requirements. In 2022, the headquarters of BEWG passed the ISO 45001 Occupational Health and Safety System certification.

In 2022, the headquarters of BEWG passed the

ISO 45001

Occupational Health and Safety System certification

BEWG's investment in safety production totaled RMB

29.41 million

the safety inspection coverage of BEWG's star-level water plant projects is

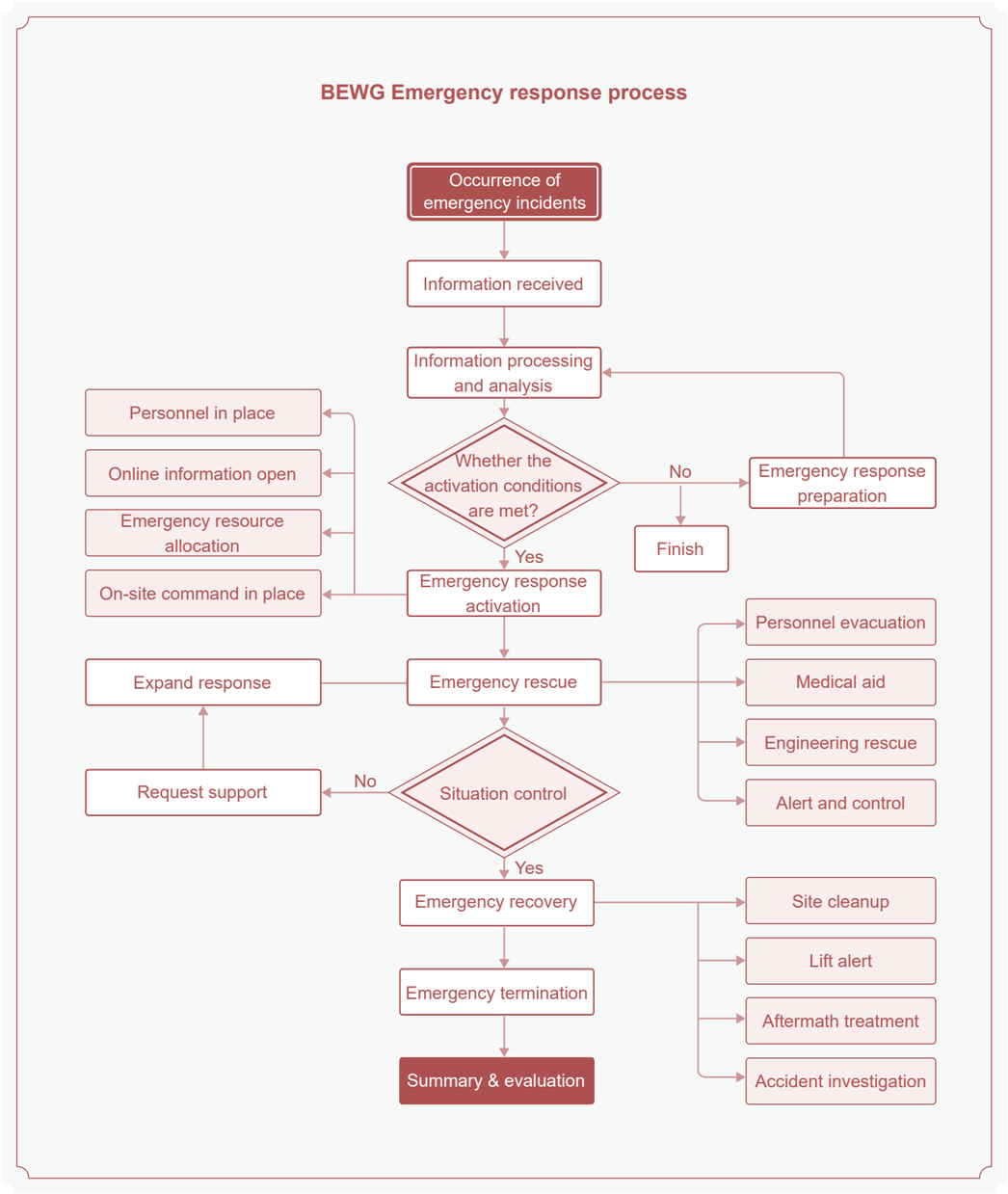
100%

We continue to increase investment in labor protection, safety facility maintenance, and special equipment testing, and regularly examine the operation of production equipment to ensure that safety facilities are always available, safeguarding the occupational health and safety of employees through hardware facilities. In 2022, BEWG's investment in safety production totaled RMB 29.41 million.

BEWG never slackens its efforts in safety inspections. In addition to conducting safety spot checks, in 2022, BEWG integrated safety inspections with the acceptance of star-level water plants, to comprehensively upgrade the mode of safety inspections. The new mode focuses on on-site safety management, and through the safety inspection model, comprehensively evaluates the production safety situation of project companies from three dimensions: on-site - ledger -personnel, expanding the coverage of safety inspections. In 2022, the safety inspection coverage of BEWG's star-level water plant projects is 100%.

We adhere to relevant systems such as the *BEWG Hazardous and Harmful Factor Evaluation and Management Regulations, BEWG Major Hazard Source Management Regulations, and BEWG Hazardous Material Safety Management Regulations,* and regularly carry out identification and evaluation of hazardous and harmful factors, evaluate major hazard sources, and strengthen hazardous material safety management. By strictly implementing the whole-process management of hazardous materials and all-round regulation of hazardous operations, we maximize the prevention of safety accidents.

For safety emergency events, BEWG continuously improves the *BEWG Comprehensive Emergency Plan for Unexpected Incidents* and *BEWG Special Emergency Plan for Production Safety Accidents* and other systems and mechanisms, establishes a three-level emergency plan system consisting of headquarters, first-level business units and project companies, clarifies emergency response processes, and strengthens response capabilities and efficiency for various emergency incidents. In 2022, BEWG added the *BEWG Dangerous Incident Management Regulations*, which set out specific management requirements for the classification, grading, reporting, and assessment of dangerous incidents, reducing the probability of unexpected incidents from the perspective of accident risk prevention.



Safety and Health

We have released the *BEWG Guidance Manual on Safe and Civilized Construction Standards for Project Delivery* and the *BEWG Guidance Manual on 5-4-1 Safety Management for Project Delivery*. Based on the concept of "pre-control, in-process control, and post-review", we have implemented safety production management for contractors. We have specified the safety production qualification requirements for contractors and signed safety production management agreements with them. We consider their safety management responsibilities and standard actions as important components of their performance obligations. These have been included in the *BEWG Performance Management System for Engineering Construction* and written into the standard contract templates, guiding contractors to enhance their safety production management capabilities.

In 2022, we conducted 179 inspections of construction projects, achieving 200% coverage of our Group's construction projects. We identified over 2,000 hidden dangers, with a 100% rectification rate. Our safety management work during construction has yielded significant results, with seven ongoing projects receiving honors for being safe and civilized construction sites at or above the city level.

No.	Project Name	Honor Received	Awarding Unit	Award Date
1	Guangxi Guigang Domestic Waste Incineration Power Plant Phase III	Guangxi Safety and Civilization Standardized Construction Site	Guangxi Engineering Construction Quality and Safety Management Association	January 2022
2	Yixing Urban Sewage Treatment Plant Phase III	Jiangsu Province Civilized Construction Site	Department of Housing and Urban-Rural Development of Jiangsu Province	December 2022
3	Linyi Liuqing River No.2 Sewage Treatment Plant Expansion and Supporting Pipe Network	Linyi City Civilized Construction Site	Linyi City Housing and Urban-Rural Development Bureau	April 2022
4	Jiangmen Pengjiang Water Environment Comprehensive Management (Dalin Drainage Pumping Station)	Jiangmen City Water Conservancy Project Civilized Construction Site	Jiangmen City Water Conservancy Bureau	November 2022
5	Jiangmen Pengjiang Water Environment Comprehensive Management (Nanchong Electric Drainage Station)"	Jiangmen City Water Conservancy Project Civilized Construction Site	Jiangmen City Water Conservancy Bureau	November 2022
6	Jiangmen Pengjiang Water Environment Comprehensive Management (Jiangmen Bidao)"	Jiangmen City Water Conservancy Project Civilized Construction Site	Jiangmen City Water Conservancy Bureau	November 2022
7	Heshan No.3 Water Plant Project	Jiangmen City Civilized Construction Site	Jiangmen Construction Industry Association	May 2022

We provide on-site safety training for all parties involved in construction projects, including contractors. At least two all-staff training sessions are conducted before the project begins and during the project process. Through on-site communication, we clarify the safety management requirements for each stage of the project construction. We inspect the contractor's safety and civilized construction dedicated special expenses, implementation of mandatory items for safety and civilized construction, identification and treatment of hidden dangers, etc., to eliminate safety hazards at the construction site and ensure the personal safety of contractors.

Case: Guangxi Guigang Domestic Waste Incineration Power Plant Phase III Project won the honorary title of "Provincial Safety and Civilization Standardized Construction Site"

In April 2022, the Domestic Waste Incineration Power Plant Phase III project of our regional organization in Guangxi Guigang was awarded the title of "Provincial Safety and Civilization Standardized Construction Site for the second half of 2021 in Guangxi Province". The project started in April 2021, and the plan for creating excellence was clearly defined during the project planning phase. We implemented multi-level safety management requirements throughout the entire project cycle and achieved effective on-site supervision.

Guangxi Guigang Domestic Waste Incineration Power Plant Phase III Project won the honorary title of "Provincial Safety and Civilization Standardized Construction Site for the second half of 2021"

Safety culture

BEWG actively fosters a culture of safety production and raises the safety awareness of all employees through a series of activities such as safety awareness publicity and safety skills training.

We continuously publish high-quality articles on our internal cultural communication platform "Safety Outlook" to promote the concept of safety production. We also regularly organize safety education and training, and activities such as the "Safety Production Month" and "Ankang Cup" knowledge competition to enhance employees' safety emergency response skills. In 2022, BEWG published an article titled *Safeguarding the High-Quality Development of BEWG with a Focus on Safety* in the safety production theme journal *Beijing Safety Alliance,* sharing our safety management practices with various industries. We also adopt new means such as online interaction and experiential learning in safety education and training to enrich training forms and content, effectively enhancing employees' safety production awareness and consolidating their safety production skills. In 2022, BEWG conducted 6,410 safety training sessions in all units for 153,732 person-times.

In 2022, BEWG conducted **6,410** safety training sessions in all units for **153,732** person-times

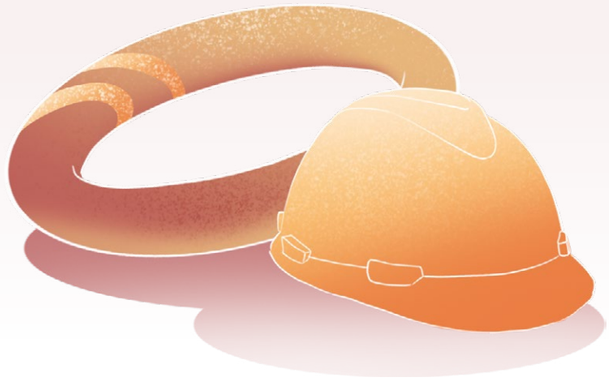
Safety and Health

"Safety Production Month" Campaign

In June 2022, BEWG carried out the "Safety Production Month" campaign with the theme of "Complying with the Production Safety Law and Being the First Person Responsible". Each business unit tailored its activities to its specific locations, including warning campaigns, education and training, hazard investigation and control, emergency drills, and so on. This campaign firmly established the concept of safe development and improved the safety production level of the group.

During the campaign, BEWG conducted a total of 324 on-site and online safety training sessions for 18,723 person-times, conducted 517 emergency drills for 6,731 person-times, and organized 234 special activities for 5,633 person-times.

BEWG 2022 "Safety Production Month" campaign



Online safety training for all staff

In May 2022, BEWG held a "Safety Production Lecture Hall" at the Cloud Learning platform under the BEWG Education Center. We hired external safety experts to provide video lectures on safety production knowledge to employees, and organized all employees to complete the course learning and online assessments. The online safety training lasted for three months and covered 16,714 employees.

BEWG 2022 Online safety training for all staff

"Ankang Cup" competition

From November 28 to December 1, 2022, BEWG held the fourth "Ankang Cup" competition online. The competition consisted of three competition units and six competition projects, including safety knowledge assessment, limited space operations and emergency rescue drills, and safety knowledge competition. The competition continued the spirit of "big competition" with full participation of all staff, and all participants were selected by drawing lots to promote the improvement of business capabilities among various units.

This event aims to promote learning through competition. It has fully mobilized the enthusiasm of all participants, strengthened their awareness of safety red lines, promoted the spirit of craftsmanship, set up role models, and effectively improved the safety awareness and emergency response skills of all staff.

The Fourth BEWG Ankang Cup Competition

Safety and Health

Training for safety management personnel in all major regions

In April 2022, in order to implement the concept of empowerment organizational management, BEWG organized empowerment training for its safety management personnel at all levels in accordance with the requirements of *Production Safety Law of the People's Republic of China* (revised in 2021). The training covered more than 100 safety management personnel at all levels, aiming to enhance their professional abilities and effectively improve the safety management level of the Group.

Safety training for regional organization principals

In March 2022, BEWG organized a training session for principals at the regional level to jointly explore the approaches and solutions to new safety production issues under organizational changes. The purpose of the training was to strengthen the safety management awareness of regional leaders and effectively implement the subject responsibility of regional safety production. The training covered more than 100 people, including the principals at the regional level and safety management leaders.

Occupational health

BEWG strictly implements internal regulations and processes such as the *BEWG Regulations on Occupational Health Management* and the *BEWG Regulations on Labor Protection Equipment Management*, to ensure that employee occupational health and safety management is fully implemented. Each business unit equips employees with labor protective equipment with applicable effects according to their specific operation methods and working conditions, signs a safety responsibility agreement with employees, and continuously update safety equipment and facilities, so as to comprehensively safeguard the occupational health and safety of employees.

We attach great importance to the occupational health and safety of employees in special positions, providing special health education and training for employees in special positions, and ensuring that new employees complete the training plan 100%. In addition, we regularly organize occupational disease physical examinations, establish occupational health files and employee health monitoring files for all employees in special positions.

BEWG 2022 key performance indicators for safety and health[33]

In 2022, BEWG

Employees' work-related injury cases in 2022[34]	Employees' work-related injury rate in 2022[35]
21 Piece	0.10 %

Number of lost working days due to work-related injury in 2022[36]	Injury rate per million working hours[37]	Rate of work-related accidents per thousand people[38]
18,674.5 day	0.54 %	1.07 %

Number of fatalities due to production safety accidents in the past three years

2022	2021	2020
0 Person	0 Person	1 Person

[33] Considering that the business of BEWG is mainly concentrated in Chinese mainland, so only the information in Chinese mainland is disclosed.

[34] In 2022, BEWG had no production safety accidents above a general accident level in mainland China. The 21 incidents that occurred during the reporting period were defined as occupational injuries and did not involve production safety accidents. Among these incidents, there were three work-related fatalities that were caused by sudden accidents or illnesses that occurred while employees were on duty. After the three work-related fatalities occurred, the Group's various units immediately implemented rescue measures, including sending employees for medical treatment at the first possible moment, actively helping employees' families to apply for insurance compensation or other relevant compensation, and providing care and condolences to employees' families, such as condolence money and donations. Adhering to the "people-oriented" philosophy, the Group has taken various measures to further promote occupational injury prevention and occupational health protection, effectively avoiding and reducing occupational accidents and diseases. These measures are detailed in the "Employee Care" section.

[35] Employee work-related injury rate = Number of injured employees / Total number of employees

[36] It involves three non-production safety work-related deaths. According to the Classification Standard for the Casualty Accidents of Enterprise staff and workers (GB6441-86), it is calculated at 6,000 day/person, resulting in an additional 18,000(6000*3) days.

[37] Work-related injury incident rate per million working hours = Number of work-related injury cases * 1,000,000/Actual total working hours

[38] Rate of work-related accidents per thousand people = 1,000 * Number of work-related injury cases / Total number of employees

Quality assurance

Service and quality are the cornerstones of sustained and efficient development for BEWG. We always adhere to quality as the foundation, remain customer demand-oriented and innovation-driven, and implement a full-cycle customer service and quality management system, in order to continuously improve service efficiency and consolidate product quality.

Customer Service

BEWG always adheres to the business philosophy of “customer as the source and innovation as the way”, and has hired a third-party consulting company to systematically upgrade BEWG’s customer service system, laying a good foundation for continuously improving the quality of customer service.

Upgrading Customer service system

In 2022, with the help of the hired third-party consulting company and through benchmarking well-known peers based on the unique characteristics of the industry, we have optimized our customer service systems and developed a professional and customized overall customer service framework that is more in line with the conditions of BEWG, renewing all aspects of the customer service, including processes, systems, and tools, thus fully upgrading the customer service system of the Group. The upgraded customer service system will be gradually implemented across the entire Group starting in 2023.

Executive Roadshows

In 2022, based on the business philosophy of “customer as the source and innovation as the way”, BEWG carried out a series of executive roadshows. Through direct dialogue between executives and local government customers, we fully understood the requirements and level of satisfaction of our customers in various regions.

Comments and feedback

During the process of executive roadshows, BEWG recorded customer demands, positive and negative comments truthfully and forwarded them to the corresponding departments for research on solutions. Furthermore, BEWG promptly arranged a second communication with customers to provide efficient feedback, which was well received by all customers.

Excellent Quality

BEWG adheres to the philosophy of “serving the business, serving the front line, and serving customers”, continuously promoting transformation of technological products and comprehensively improving product quality. Anchoring on fast turnover and high quality, we steadily implement a “large delivery management” system that is customer-oriented and product-based, through deepening reforms, innovating models and production, and updating management. BEWG is committed to creating nationwide “benchmark water environmental projects” and “benchmark water plants”. In 2022, the BEWG headquarters passed the ISO 9001 Quality Management System certification.

In 2022, the BEWG headquarters passed the
ISO 9001
Quality Management System certification

Product design

BEWG continues to promote the transformation of technological products in 2022, so as to promote and facilitate the technological innovation in R&D and comprehensively improve product performance and product quality.

Based on the standardized development and intelligent design of core product modules, BEWG completed 15 water plant product units and 46 universal standard modules, 11 proprietary process packages and product development in water plant design. These supported the modular design of the entire plant, achieving the transformation from technology to product development. Currently, the overall application rate of standardized technological products in new projects exceeds 90%. Furthermore, BEWG has developed the first holographic design platform in the industry, which is unique in the water industry and design industry. This platform enables online automatic design for the first time, significantly improving design efficiency compared to traditional institute design + professional review approach.

10 comprehensive solutions

Meanwhile, to better support the quality of design and strengthen product quality control, BEWG has released the first set of detailed visualization standards, including five series of plant public spaces, complex building construction, interior decoration, electrical automation, and gate walls, with a total of 26 detailed visualization standards covering nearly 200 product nodes.

Based on the subdivision of the environmental protection business, BEWG has launched eight product series and iteratively updated 10 comprehensive solutions to make our product design more closely aligned with business scenarios and achieve the goal of customer-oriented product development.

BEWG product development in water plant design,

completed
15 water plant product units

46 universal standard modules

11 proprietary process packages

Quality assurance

Quality delivery

BEWG has implemented a high-quality delivery strategy, to continuously advance the construction of a product quality control system centered on standard systems, control systems, and guarantee systems. It aims to promote quality lean management that is knowable, visible, and controllable.

Full implementation of BEWG quality control system

Standard system

- BEWG released the *BEWG Manual on Sewage Treatment Plant Delivery Quality Standards,* to provide a detailed description of the general standards for each unit and module of the sewage treatment plant with visual qualitative and quantitative standards, in order to promote comprehensive quality delivery of the project.
- BEWG formulated and released three core systems: the *BEWG Performance Management System for Engineering Construction*, the *BEWG Implementation Rules for Quality Control Points of Urban Water Construction Projects* and the *BEWG Handbook of Key Points for Lean Management of Engineering Quality in Urban Water Construction Projects.* These systems clarify project management standards and urge all suppliers to improve their delivery and performance capabilities through proactive prevention, in-process management, and post-evaluation. Through a focus on technology, management, and acceptance, the delivery quality is made specific, tangible, and systematic.
- BEWG released the *BEWG Guidance Manual on 5-4-1 Safety Management for Project Delivery*, which requires proactive control beforehand, in-process management, and post-evaluation to provide a foundation for safety management.
- BEWG established a delivery quality control evaluation mechanism, and a delivery quality evaluation index system to promote quantitative evaluation and process evaluation of delivery quality achievements, and realize dashboard control and real-time control of the delivery quality.

Control system

- BEWG established a performance inspection team, and innovatively adopted the dual combination of “online + offline” and “inspection + empowerment” to determine the performance inspection mechanism and achieved 100% coverage of performance inspection for all projects under construction. In 2022, BEWG completed 55 performance inspections, identified 3,041 issues of various types, and rectified 2,824 issues, with a completion rate of 92.8%.
- Through business process reengineering, BEWG solidified the delivery quality control system (standards, controls, guarantees) into the delivery project business process in order to ensure project delivery quality.
- A three-tier quality control point system (A/B/C) has been established for hierarchical control, to ensure that high-quality products are produced on the first attempt, reducing rework rate, thereby achieving process control for project delivery quality.

Guarantee system

- BEWG has provided publicity and training on the quality standards, and incorporated them into the concepts of all participating suppliers, which are then reflected in the quality delivery process of all participating suppliers.
- Through the establishment of a digital delivery platform, the standards are integrated into the process which is then digitized, to ensure that the quality standards are implemented with platform monitoring, resulting in the improvement of delivery efficiency.
- Through organizational standardization, we ensure that the project personnel are sufficient and capable to provide strong support for the implementation of the quality control system.

To improve delivery efficiency, we coordinate the construction of a digital platform for delivery, as detailed in the “Technological innovation achievements” section of this report. We set annual goals for the overall digital delivery project and its various sub-projects, and leverage social resources and introduce major platform suppliers to rapidly advance the implementation of the digital delivery platform, to promote operational efficiency through digitization.

Quality assurance

Excellent operation

BEWG adheres to the star-level rating evaluation system as the key driver, continuously improving its operational management level from five dimensions. By relying on standardized water plant construction and implementing standardized operational management from data standards to business process standards, BEWG is shaping a replicable and promotable standardized management model. At the same time, BEWG promotes regional intensification through the "1+N" cluster mode, and continuously establishes and improves its risk control system and emergency response mechanism to ensure safe and stable operations.

Star-level rating operation management

Star-Rated Enterprise Evaluation System of BEWG is the first systematic operational rating evaluation standard in the industry. This evaluation system comprehensively evaluates enterprises from five dimensions: process management, operational quality, results of operation, personnel capabilities, and digital operational capabilities. Based on the comprehensive rating score, the evaluated enterprises are divided into five levels from one-star level to five-star level, with the five-star level being the highest.

In 2022, BEWG focused on its digital strategy and customer-oriented business philosophy to promote the quality of its operational projects through iterative updates of the star-level rating standards, with dedicated funding support. We have also formulated the star-level rating evaluation standards for water environment and drainage network operations to provide a benchmark for continuous improvement from normalized operation to standard operation, and to lean operation. In addition, we have revised relevant normative support documents such as the *Guidelines for Inspection and Acceptance of Star-Level Enterprises*, continuously improving the guidelines, data models, and acceptance tools for star-level inspections. We clarify seven key inspection stages, including inspection planning, review & communication, major rectification implementation, and typical case promotion, etc. We actively organize the revision and training of star-level inspection models to enhance the quality and efficiency of star-level inspections.

In 2022, all BEWG water plants completed the star-level rating operation evaluation and acceptance work. More than 97% of the water plants met the one-star level or higher standards, and over 35% of the plants met three-star or higher standards. The percentage of plants that reached three stars or higher has significantly increased, and the star-level structure has been further optimized.

More than **97%** of the water plants met the one-star level or higher standards

More than **35%** of the plants met three-star or higher standards

The development of star-level rating system has continuously improved the quality of BEWG's operation projects and gained industry recognition. Following the inclusion of five water plants in the first "Historical Leaps over Two Centenary Years" benchmark water plant selection in 2021, in November 2022, our Group was again selected with three plants in the second "Historical Leaps over Two Centenary Years" sewage treatment benchmark competition:

- Beijing Daoxianghu Water Quality Purification Plant was awarded the benchmark sewage plant for recycled water utilization.
- Xuzhou Longting Sewage Treatment Plant was awarded the benchmark sewage plant for operation and management.
- Hangzhou Yuhang Sewage Treatment Plant (Phase IV) was awarded the benchmark sewage plant for smart control.

We actively explore the transformation of the star-level enterprise management model and innovate the water plant operation and management model, as we strive to achieve the transformation of star-level management from normalized to lean management, and build a nationwide "efficient water plant". We start with promoting process operation automation and explore methods to achieve fewer or no personnel on duty for each process unit based on automatic operation functions, so as to lay the foundation for digital and platform-based management.

Standardized water plant construction

To carry out the Group's digital transformation and smart operation strategies, we continue to deepen our standardized water plant construction, fully standardizing our operation management from data standards to business process standards, and shaping a replicable and scalable standardized management model. The construction of standardized water plants is deeply combined with the ISO 9001 quality management system, fully incorporating the long-term high-quality operation and service experience of BEWG, creating an operational standardization management system. We have achieved the overall goal of improving quality and efficiency, with a dual increase in performance and efficiency. In addition, we have effectively enhanced the stability of production management, and continuously improved the level of customer service and iteration on operational technology, providing high-quality standardized paradigms for frontline operational management businesses.

as of the end of 2022, **26** water plants of BEWG have completed the implementation of standardized system documents

By continuously refining the operational standardization management system, as of the end of 2022, 26 water plants of BEWG have completed the implementation of standardized system documents. We have combined the standardized system to form a unified data source standard, data analysis standard, and business process standard. Through our independently developed sewage operation management platform (SED), we have completed the integration of standardized business processes, providing a more effective and high-quality approach to promote standardized water plants. Through continuous deployment and application of the system, we have gradually achieved refined management in multiple aspects including production operation, equipment and facilities, laboratory testing, data recording and analysis, etc. Each plant has achieved different degrees of energy-saving and consumption reduction results and has been recognized by local governments and regulatory authorities. In addition, the platform will continuously empower standardized water plants through the development of modules such as early warning alerts, fundamental analysis, and multi-dimensional queries. This will establish a high-density link from the platform to the water plant, creating a more efficient operational management mode.

Quality assurance

Intensified management

We continue to promote the "1+N" cluster model and combine intensive management practices to build an intensive management system for water plants. We formulated three guidelines including the *1+N Cluster Construction Process Guidelines*, the *1+N Cluster Operation and Management Guidelines*, and *1+N Regional Cluster Model Organization Structure and Job Positioning*, and three technical standards, including the *BEWG Guidance Manual for Sewage Plant Auto-control System Hardware Defect Elimination,* the *BEWG Guidance Manual for Sewage Plant Auto-control System PLC Programming* and the *BEWG Guidance Manual for Sewage Plant Auto-control System SCADA Development*. These guidelines and standards have laid a solid foundation for moving from standardized management to intensified management for individual plants.

Emergency response

To further ensure the safety and stability of production and operation, BEWG conducts regular monitoring of water quality changes and periodic safety hazard inspections to prevent accidents and risks from the source and create a reassuring and safe water environment. In 2022, we optimized emergency plans for extreme water quality situations such as floods and droughts, and further improved our ability to prevent and control environmental emergencies, ensuring that water supply and drainage facilities can operate in an orderly and stable manner.

Flood

- All water supply plant is required to develop emergency plans for ensuring water quality and production operations during flash floods, and to have corresponding emergency supplies on hand, such as sufficient water purification chemicals, sandbags, drainage pumps, water hoses, etc.

Drought

- All water supply project is required to develop emergency plans and water supply measures to address the potential water quality issues caused by drought.
- Minimize the impact of water shortages caused by droughts from the source, by actively cooperating with local governments and promoting the establishment of backup/emergency water sources.
- Strive to reach agreements with water source management units to prioritize water supply during drought conditions.
- Connect our water supply pipe network with that of the external water supply units to realize mutual supplement and increase guarantee, and establish plans for emergency water withdrawal when the water level is low.
- Strengthen the management of self-use water and reduce the leak rate, so as to conserve water resources.

Innovation Leadership

BEWG has always adhered to the business principle of “customer as the source and innovation as the way”, attaching great importance to the innovation and iteration of products and technologies. We insist on technology as the core competitiveness and innovation as the cohesion for development, to comprehensively promote the digital transformation and upgrading of the enterprise. We continuously improve the innovation organization system with great emphasis on the protection of intellectual property rights, aiming to build a smart water service system, deepen the integration of industry and education, and promote the vigorous development of the water industry with the power of technology.

Innovation Competition Platform

To meet the demands for technology innovation and solutions in the ecological environment industry and accelerate the construction of a market-oriented green technology innovation system, BEWG continues to deepen a series of scientific and technological innovation activities. This includes, jointly with major colleges and enterprises, launching the BEWG Cup China "Internet+" Ecological Environment Innovation and Entrepreneurship Competition, as well as the Science and Technology Venture Capital Competition, aiming to deeply explore high-quality ecological environment innovation and entrepreneurship projects, and cultivate the main force of "mass entrepreneurship, mass innovation". All of these serve to promote the transformation of scientific and technological achievements in the ecological environment field, and advance the sustainable development of the whole industry with the power of technology.

The competition brings together top experts, well-known scholars, and senior investors in the ecological environment field, to jointly build a service platform for the exchange and matching of ecological environment innovation and entrepreneurship projects and industrial resources in colleges and universities. It comprehensively displays the innovation and entrepreneurship achievements of the industry, promotes innovation and entrepreneurship as well as talent development, and creates an innovation and entrepreneurship ecosystem for the industry.

Case: The 5th BEWG Cup China "Internet+" Ecological Environment Innovation and Entrepreneurship Competition and the 2nd China “Internet+” Technological Venture Capital Competition of Ecological Environment

In June 2022, the 5th BEWG Cup China “Internet+” Ecological Environment Innovation and Entrepreneurship Competition was launched in Beijing, in the form of on-site and online interaction. Since the launch of the competition, a total of 455 universities, 9,011 students and 2,248 teachers have submitted 1,722 innovation and entrepreneurship projects. In addition, the 2nd China “Internet+” Technological Venture Capital Competition of Ecological Environment received a total of 202 projects from 112 companies, 82 teams and 1,206 participants.

This year’s competition has established an overseas group, with 6 overseas projects each participating in the innovation and entrepreneurship competition and the venture capital competition. This event comprehensively promotes the establishment of a cooperation platform between industry innovation technology achievements and industrial resources, widely stimulates the enthusiasm of talent exchange and industry technology display, and continuously promotes the transformation of technological achievements in the ecological environment field.

Launching ceremony of the 5th BEWG Cup China “Internet+” Ecological Environment Innovation and Entrepreneurship Competition

At the same time, adhering to the business philosophy of “customer as the source and innovation as the way”, BEWG continues to cultivate an innovative environment to enhance its innovation capabilities. It establishes the “Beidou Award” innovation competition brand for the whole Group, providing a continuous source of momentum for the high-quality and sustainable development of the Group.

Case: The Fourth BEWG “Beidou Award” Innovation Competition[39]

On December 9th, 2022, the fourth “Beidou Award” Innovation Competition, themed “Innovation Knows No Boundaries, Moving Together towards the Future”, successfully concluded in Hangzhou. This year’s competition attracted a total of 625 innovative achievements from BEWG and its member companies, setting a new record for the number of entries. After multiple rounds of selection, 56 innovative achievements were ultimately selected.

The final of the Fourth BEWG “Beidou Award” Innovation Competition in 2022 at the main venue

This event has sparked the innovation enthusiasm of BEWG and its member companies, unearthing a large number of innovative practitioners who are eager to explore and progress. It has incubated many innovative projects in management, technology, and production, promoting the exchange of innovative ideas among the Group and its member companies, and continuously improving the level of innovation and service.

Technological Innovation Achievements

BEWG actively responds to the national scientific and technological development strategy, taking technology as the guide to promote innovation and development of the company. We comprehensively advance the construction of the technological innovation organization system, optimize the top-level design of R&D systems, establish a technical decision-making committee and a technical expert committee as the top-level decision-making body for technological innovation. Under the technical expert committee, we have set up a digital professional committee, so that the two committees can coordinate the implementation of the Group’s technological innovation management work, and gradually realize the continuous transformation of R&D achievements into products, as well as the commercialization of these products.

In 2022, BEWG continued to improve the *BEWG Science and Technology Development Plan Outline (2021-2025)*, integrating the overall goal, key areas, and development directions of technological development with its own business status. We continuously strengthened the construction of independent R&D capabilities with increased innovation investment, and worked to stimulate the innovation enthusiasm of all staff. In addition, we released the *BEWG Implementation Guidelines for Promoting Scientific and Technological Innovation*, to comprehensively enhance technological innovation capabilities, stimulate organizational vitality, accelerate the transformation of technological achievements, and promote the Group’s technological transformation.

Categories of Technological Innovation Awards in BEWG

Category of technological innovation achievement	Category of technological attribute enhancement
Mainly rewards technological process packages, equipment, materials, digital and intelligent achievements, as well as intellectual property rights. The achievements are classified and graded according to the level of technological readiness, and intellectual property rights are classified and graded according to their categories.	Mainly rewards national and provincial-level awards, as well as the chief editor or co-editor of international standards, national standards and group standards, according to the award levels, rankings, etc.

[39] Public disclosure URL: https://mp.weixin.qq.com/s/_CKHf6c4ORD-GzDsQSR1pQ

Innovation Leadership

Cutting-edge technology

BEWG actively pursues independent innovation and continues to explore the development path of collaborative innovation. We focus on our main business and actively develop new cutting-edge technologies such as ceramic membranes, membrane pre-concentration (MPC), and targeted flocculants, to deeply promote technological innovation and advance the application of scientific and technological achievements to realize the iterative upgrading of industrial technologies.

Membrane-based pre-concentration (MPC) technology

Membrane-based pre-concentration (MPC) technology is a cutting-edge technology jointly developed BEWG, Tsinghua University and Green Tech. It is designed to meet the future market and social development needs. The MPC-RO process based on the MPC technology, can achieve pre-concentration and pollution separation of urban sewage directly by the filtering and separation function of the membrane, which has multiple advantages. MPC technology is at the forefront of international technology and its application will change the treatment processes limited by traditional methods, and promote technological innovation in the membrane production field, which will have a positive impact on the rational utilization of natural resources, energy recovery, and environmental protection.

Ceramic membranes technology

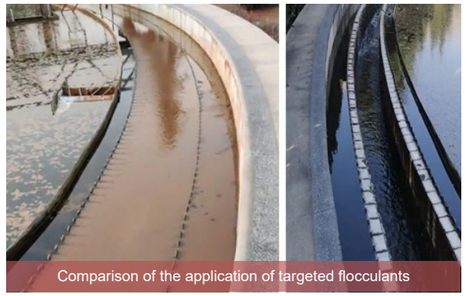
Our Group's technology personnel, in collaboration with the National Industrial Ceramic Engineering Technology Research Center and other research and production units, have achieved a comprehensive breakthrough in core technology and process based on the product and system advantages of traditional ceramic membranes. We have developed the BeCeram series of process packages, which use new ceramic membranes as the key components. This series includes the BeCeram-Unimpeded series for the water supply field, the BeCeram-Fine series for water reuse, and the BeCeram-Solid series for sludge and sewage treatment. Ceramic membrane technology is a cutting-edge technology for the industry, and its products cover membrane elements, components, operating systems, and integrated equipment.

Targeted flocculant series technology

BEWG Reserach Institute has cooperated with the Institute of Chemistry of the Chinese Academy of Sciences to develop a series of highly efficient targeted flocculants for different scenarios. We have also developed technologies such as BEHOBN (control of high-load operation in sewage treatment), rapid stabilization to meet standards, and overflow pollution control to enhance the processing capabilities of the system. The targeted flocculant technology at the forefront of the industry, and its products and related technologies have been applied in 10 projects of the Group, with a total design capacity of 1.26 million tonnes per day.

Case: Application of targeted flocculant products in Shanxi Jincheng Qingyuan project to improve compliance rate

The Shanxi Jincheng Qingyuan project is an example of using targeted flocculant products to improve compliance rates. The Qingyuan Water Company in Jincheng City, Shanxi Province, with a project scale of 120,000 tonnes/day, is located in the north of China and often experiences sludge overturning in the autumn and winter seasons, which poses a risk of exceeding the Suspended Solids(SS) standard for effluent. By using targeted flocculant control technology, the project has solved the problem of insufficient load in the secondary sedimentation tank, significantly improved and ensured the effluent quality, therefore minimized the risk of sludge expansion and achieved stable and compliant operation.


Comparison of the application of targeted flocculants

Innovative delivery

BEWG actively explores the potential innovation opportunities in the delivery stage, and strives to stimulate the business vitality in various aspects such as construction technology, cost management, supervision of safe and civilized construction through the introduction and integration of new technologies.

In 2022, we selected 12 projects to promote digital management based on the pilot projects in 2021. We have developed a multi-party online control platform based on the Building Information Model (BIM) to facilitate the flow of tasks, record of key meetings, and the fulfillment of related obligations among multiple project stakeholders on the same platform. By extracting and aggregating the execution data of each project, we have achieved unified monitoring of construction projects throughout the Group and digital management of the entire construction process. In addition, we have confirmed the solutions to the delivery and business analysis system, plan control system, cost management system, and engineering management system, and strives to achieve quality recording and control from multiple perspectives through a composite approach. The platform is planned to be applied to all new construction projects in 2023.

Case: Development and launch of the delivery platform, BIM5D

In January 2022, the delivery platform BIM5D was deployed and launched. In May, the first batch of updated functions were launched. Training on promoted projects began in June, and the function review during the promotion phase was completed in October, successfully achieving the digital development goal of that phase. The BIM5D platform has received positive feedback on its function evaluation. We have completed the development of multiple proprietary embedded functions, and designed and developed customer interaction pages, creating a "toolbox" for applying BIM to construction projects.


The delivery platform of BIM5D

Innovation Leadership

In 2022, BEWG started the work of historical data governance. A system of cost data standards and indicators that can support the full cycle of water construction projects including estimating project costs, conducting budgetary estimate, working out a budget plan, settlement, and final settlement has been initially formed with unified rules, subjects and precision through the collection, cleaning, and induction of cost data since the establishment of the Company. At present, the system has gradually been used to improve the efficiency of corporate internal management. We have planned to discuss with cost management organizations at all levels in 2023 to form a reusable system of cost standards and indicators, to set an example for industry data governance and help improve management.

Case: BEWG, in deep cooperation with Glodon Group, has been awarded as "Advanced Enterprise in Practice of Database"

Starting from 2021, BEWG has been deeply cooperating with Glodon Group to conduct research on historical data cleaning, industry indicators collection, and dynamic data calculation, and has been awarded as the "2021-2022 Advanced Enterprise in Practice of Database".

Awarded as "Advanced Enterprise in Practice of Database"

Smart water

BEWG focuses on the fields of smart water and smart water environment, creating a smart enterprise through digital management, and promoting smart operations through digital business. We have established the BEWG Yuehui Digital Technology Platform to enhance the digital professional capabilities at the Group level and provide digital technology product R&D and consulting services in the field of environmental protection infrastructure. Driven by dual engines of "business+intelligence" and relying on the R&D achievements of smart water, we aim to enhance professional services in the field of smart water and provide high-quality and intelligent water solutions.

As of December 2022, the BEWG Yuehui Digital Technology Platform had obtained 12 corporate qualifications, including China's High and New Technology Enterprise (HNTE), CMMI Level 3, ISO 9000, ISO 14000, ISO 20000, etc. In terms of independent intellectual property application, BEWG Yuehui has obtained 10 utility model patents, 29 software copyrights, and 10 trademark copyrights, and has been awarded multiple honors such as "Well-known Brand Enterprise in Environmental Protection in 2021 by the Ministry of Ecology and Environment of the People's Republic of China".

BEWG Yuehui AI algorithm platform for water services and water environment obtained software copyright

BEWG makes continuous efforts to promote the construction of innovative achievements in smart water, trying to achieve more efficient operations, more scientific management, and higher-quality services. Based on the guidance of digital strategy, we have been upgrading the R&D of related products in combination with the application of R&D technology. We have upgraded the operation and management mode to ensure the safe operation of water facilities through the data resource utilization, precise management, intelligent control, and intelligent decision-making of the water business system.

Product lineups of smart water

Intelligent management products	Core algorithm products	Intelligent hardware products
Sewage operation management product	Intelligent identification of microorganisms	AI robot BE-EMR
Water distribution and marketing management product	Intelligent control platform BESOC	Intelligent public interaction billboard
Water environment-plant-network-river integration product	Sewage process simulation system BEThink	
Rural operation management product	IoT platform of BEWG	

Case: Upgrading of sewage management system of BEWG

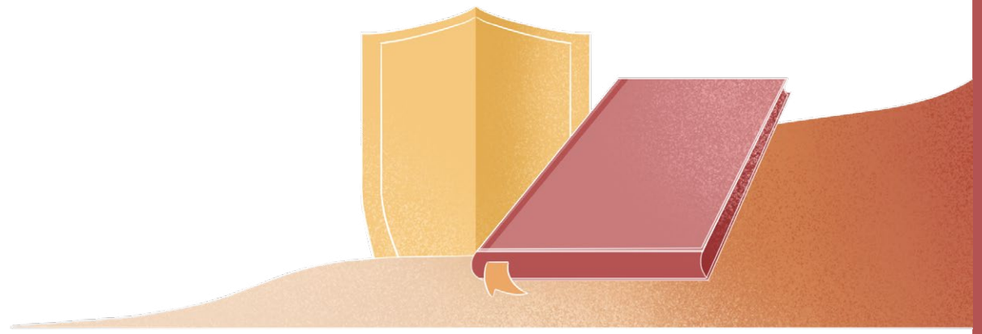
In 2022, the BE-EMR, one product of the sewage management system series of BEWG, optimized and upgraded the intelligent control algorithms of the process units such as the inlet water purification of the sewage treatment plants, blast aeration of the biochemical tanks, etc., and provided a variety of control modes through the integration of mechanism models, empirical models, and big data models, achieving better energy conservation and consumption reduction effects.

In addition, the inventory management module of the sewage management system has realized the management of production chemicals, equipment and other materials through the design and R&D of core functions such as warehousing management, outbound management, inventory counting and statistics, providing a powerful support tool for material management, as well as analysis and decision-making.

In addition, in recent years, BEWG has made a series of core scientific and technological achievements, and gradually carried out industrial applications by undertaking major scientific and technological projects of the Ministry of Housing and Urban-Rural Development of the People's Republic of China, the Ministry of Ecology and Environment of the People's Republic of China, and the Ministry of Science and Technology of the People's Republic of China, industry-university-research collaboration projects, and independent scientific and technological projects of the Group, on top of the accumulated experience in the main business fields of municipal water and water environment management.

Major provincial and ministerial awards of BEWG for scientific and technological innovation, management, and achievements in 2022

- **Beijing Youth Model Unit Award:** carrying out extensive university-industry cooperation and promoting the industrial application of scientific and technological advances with technology platforms, and sharing technology platforms to assist the scientific research institutes in making breakthroughs in R&D of original technologies and improving application efficiency.
- **First Prize of Beijing Science and Technology Progress Award:** led by Tsinghua University and jointly completed by water enterprises and scientific research institutions including BEWG, the achievement of the project "Key Technologies and Applications for Joint Operation and Optimization Control of Plants and Networks of Urban Drainage System" won the first prize of 2021 Beijing Science and Technology Progress Award.
- **First prize of Environmental Science and Technology Award of China Environmental Science Society:** led by Beijing Normal University, jointly completed by the Chinese Academy of Environmental Sciences, BEWG and other scientific research institutions, water enterprises and environmental protection enterprises, the achievement of the project "Theoretical Technology and Application of Joint Regulation and Ecological Restoration of Water Quality and Quantity of Urban Small and Micro Water Bodies" won the first prize of Environmental Science and Technology Award of China Environmental Science Society 2022.



Intellectual property management

BEWG firmly holds that effective management of intellectual property rights can ensure the safety of business operations. We strictly abide by the *Patent Law of the People's Republic of China*, the *Trademark Law of the People's Republic of China* and other relevant laws and regulations. We revise and improve the internal system such as the *BEWG Intellectual Property Management System*, standardize and sort out the processes of application and approval, transfer and transformation, management and use, confidentiality, rewards and punishments of various intellectual property rights, improve the intellectual property management system and improve intellectual property management. In 2022, the Group obtained 462 new authorized patents, with a cumulative number of 1,282[40], which has effectively protected the Group's technological innovation achievements and enhanced our intellectual property advantages.

During the reporting period, a total of **216** projects of BEWG were eligible for incentives

We actively carry out special incentives for intellectual property rights, include the rewards for intellectual property rights and standard compilation results in the scope of rewards in the *BEWG Guidelines for Promoting Technological Innovation Implementation*, and set up special incentives for intellectual property rights for patents, software works, trademarks, as well as national, industry and local standards for four consecutive years. in 2022, we added special incentives for innovative technologies to effectively protect the Group's technological innovation achievements and enhance the advantages of intellectual property rights. During the reporting period, a total of 216 projects of *BEWG* were eligible for incentives.

Intellectual property rights performance of BEWG in 2022

Number of new authorized patents	The cumulative number of authorized patents
462	**1,282**

[40] BEWG has changed the patent-related collection caliber in 2022: the collection caliber for patent-related indicators in 2022 covered subsidiaries and joint ventures, which lead to significant difference in indicators compared with 2021.

Innovation Leadership

Innovating the integration of industry and education

BEWG deepens the integration cooperation mode of production, education and research, realizes the transformation from the closed innovation of a single enterprise to the collaborative innovation of the whole industry chain, and jointly promotes the research and development of technology and achievement commercialization in the field of water services.

We have set up the "Eco-environmental Industry and Education Alliance" to explore the long-term mechanism of cooperation between enterprises and universities by uniting industry associations, key enterprises, higher education institutions and scientific research institutions in the spirit of voluntariness, equality, cooperation and win-win results. This move also aims to create a three-dimensional talent value chain of "industry, university, research, application and innovation", and cultivating high-quality talent suitable for the future development of China's environmental protection industry. In 2022, the upgrade of the Alliance website version 3.0 was completed, effectively integrating the Alliance's resources, focusing on in-depth development and promoting the development of the Alliance, 1+X certificate and "Internet+" competition. The Alliance has now convened 332 environmental protection enterprises and colleges[41], and established a total of 57 school-enterprise cooperation colleges and 6 industry colleges.

In 2022,

convened **332** environmental protection enterprises and colleges

established **57** school-enterprise cooperation colleges

established **6** industry colleges

Case: The 4th Industry-education Integration Forum

On July 25, 2022, the 4th Industry-education Integration Forum of Ecology and Environment was held in Qingdao. The forum was hosted by Eco-environment Industry-Education Alliance and the BEWG Education Center, and co-organized by Qingdao University of Technology (QUT) - Beijing Enterprises Water Group Limited (BEWG) College of Modern Industry and the Eastern Region. In addition, the forum held the third industrial college dean - Laoshan Round Table Ideas Sharing, ecological and environmental large-scale public training base seminar and the sixth education and teaching seminar of North Water Education at the same time.

The Forum aims to deepen the integration of industry and education, school-enterprise cooperation, promote "attracting enterprises into education", coordinate multiple subjects, integrate multiple resources. It is also designated to improve the collaborative mechanism of talent training, cultivate a large number of high-quality application-oriented, compound and innovative talent needed by industry, and promote the close match between the supply side of talent training and the demand side of industry.

The 4th Industry-education Integration Forum

Case: Supporting the professional construction of Shandong Water Conservancy Vocational College - BEWG College of Industry

In 2022, according to the professional talent training program and to meet the actual need of students for career development, BEWG set up a team of high-level enterprise teachers consisting of technical experts of the Group, management of regional project companies, senior engineers, front-line technicians and managers, and jointly developed two professional core courses, namely "Instrumentation and Automation Control" and "Operation and Maintenance of Water Treatment Equipment". Achievements have been scored in the construction of new majors, talent training program development, core professional curriculum development, practical training base construction and employment guidance services of the Shandong Water Conservancy Vocational College - BEWG Industry College, and was successfully selected as an excellent typical case of industry-education integration in vocational education in 2022.

Teaching of Shandong Water Conservancy Vocational College - BEWG Industry College

[41] Among 332 environmental protection enterprises and colleges,171 are companies and 161 are universities.

Contributing to society

BEWG actively fulfills social responsibility by engaging in environmental science popularization, community service and helping rural revitalization. We are committed to contributing to social welfare for a good brand reputation and improving people's well-being.

Continuous environmental education

As an environment-friendly enterprise, BEWG gives full play to business advantages to assume environmental responsibility. The Group partners with local communities to sponsor environmental protection publicity and education campaigns in the form of live streaming, community publicity and cooperation between enterprises and schools. These initiatives aim to raise public awareness of environmental protection and engage them in ecological and environmental protection.

Case: Online publicity of environmental protection knowledge by BEWG Education Center

BEWG has registered the official account of BEWG Education, which aims to cultivate talent, contribute to the industry, serve society and build an ecology, and export environmental protection knowledge to the public in the form of tweets and live streaming. The online "Cloud Academy" is an online course platform launched by BEWG, which currently provides nearly 100 professional courses, general courses and skills courses for external groups such as environmental protection enthusiasts and school students to learn relevant content.

As of November 30,2022, the number of followers of BEWG Education WeChat reached **19,089** with **367** articles posted

Home page of "Cloud Academy"

University-enterprise online training on the BEWG education platform

Engaging in community service

BEWG actively maintains community harmony by carrying out public welfare services in the community, to contribute to building a better planet. In 2022, we were deeply involved in environment protection, charitable donations, community assistance and other charitable campaigns. We also value relations with communities at overseas locations to promote the preservation of indigenous culture and care for vulnerable groups in the community to continually practice community services. In 2022, the Group's charitable and other donations amounted to approximately RMB1,123,160, with 418 hours of volunteer services by overseas employees.[42]

Case: Kai Fat Harbour Cleaning Services Limited <Hong Kong>'s charitable donations contribute to the society

Mr. Wong Kai Chi, CEO of Kai Fat Harbour Cleaning Services Limited <Hong Kong>, has actively participated in local voluntary organizations and donated to the disadvantaged groups in the district, promoting the enthusiasm of local voluntary organizations to participate in charitable activities. In 2022, Mr. Wong received the "Outstanding Volunteer Leader" award from the Hong Kong SAR Government, which was personally presented by former Chief Executive Carrie Lam.

Mr. Wong Kai Chi makes donations

Group photo of presentation of the "Outstanding Volunteer Leader" award

[42] Overseas employees include employees of Kai Fat Harbour Cleaning Services Limited <Hong Kong> and Portuguese employees.

Contributing to society

Case: BEWG (PT) S.A. <Portugal> make donations to an elementary school in Bié, Angola

In April 2022, the BEWG (PT) S.A. <Portugal> organized three water, environment and energy forums in Angola, calling on the Angolan government to carry out integrated and comprehensive planning and management of water resources to address water shortage and security in Africa. During the event, representatives of the BEWG (PT) S.A. <Portugal> visited an elementary school in Bié at the invitation of its mayor. After learning about the financial difficulties of the school, the lack of teaching materials and campus infrastructure, two representatives of the BEWG (PT) S.A. <Portugal> immediately donated 2,000 euros and organized local staff to carry out voluntary work such as repairing tables and chairs, painting and maintaining the walls of the school.


Representatives from the BEWG (PT) S.A. <Portugal> were invited to one of the elementary schools in Bié, interacting with the students

Case: Kai Fat Harbour Cleaning Services Limited <Hong Kong> participates in lecture of Hong Kong Sea School

On 1 December 2022, Kai Fat Harbour Cleaning Services Limited <Hong Kong> participates in lecture of Hong Kong Sea School to introduce the local shipping industry and attracts young people to join the marine cleaning business. The event was defined by exciting interactions and successfully aroused the interest of the students in the environmental protection industry.


Lecture scene


Group photo of employees of Kai Fat Harbour Cleaning Services Limited <Hong Kong> and students of Hong Kong Sea School

Supporting rural revitalization

BEWG actively honors social responsibility as a state-owned enterprise. The Rural Business Unit of BEWG focuses on comprehensive governance of rural sewage by conducting rural sewage treatment. These can improve rural living environment and fully implement rural revitalization.

Case: Rural sewage treatment project for rural revitalization in Chongming District, Shanghai

The rural sewage treatment project of BEWG in Chongming District, Shanghai, is known as a world-class eco-island rural sewage treatment project. The project serves five surrounding townships, with treatment capacity covering 42,000 households, serving a total of 106,000 residents.

The operation and maintenance of Chongming project witnessed active exploration in the “town, village, household and enterprise” four-in-one model. The agricultural sewage operation and maintenance center has been established at close range, with village-based maintenance staff hired to provide all-round services, including efficient operation and maintenance and rapid response to farmers’ repair request, to achieve the “people-oriented operation and maintenance”. In 2022, the rural sewage project in Chongming has been has been well received by customers for its high-quality service of “delivery within half an hour”.



Rural sewage treatment project in Chongming District

In addition, BEWG consolidates and expands the national poverty alleviation achievements by implementing industrial assistance and donation, contributing to rural revitalization.

Case: BEWG provides assistance through purchasing agricultural products

In response to the call of higher-level labor unions, the labor union of Beijing Enterprises Water Group (China) Investment Limited engaged in consumption assistance. By the end of 2022, a total of RMB 531,300 was spent on the purchase of agricultural products to help 18 households (45 farmers) in Inner Mongolia to help rural revitalization.

a total of RMB
531,300
was spent on the purchase of agricultural products

04

Deepening scientific governance

Business ethic

Adhering to the highest business ethics standards for its employees and itself, BEWG makes continuous efforts to improve the internal integrity management system, consolidate the achievements of the integrity culture construction, and enhance the moral quality of employees, in a bid to realize governance compliance and business integrity.

Code of business conduct

BEWG strictly abides by laws and regulations related to the prevention of bribery, extortion, fraud and money laundering, and has developed the *BEWG Code of Business Conduct* applicable to all employees in accordance with the relevant regulations of the country or region where we conduct business[43].

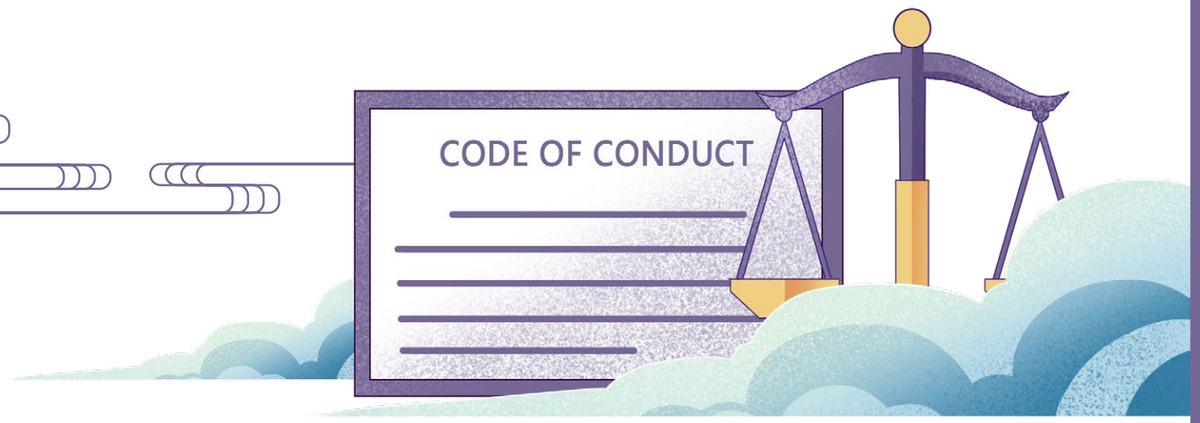
We have set up a Leadership Group for Ethics and Compliance to supervise employees at all levels to exercise professional ethics in accordance with regulations and disciplines, and to handle employees' violations of professional ethics. Meanwhile, we have formulated the OKR incentive mechanism[44] for integrity and compliance, with no major corruption lawsuits as one of the main goals and advocating honest management. We are also committed to building a new type of "honest and upright" political and business relationship with the government, building a benign cooperation mechanism with suppliers, ecological partners, customers, etc. and jointly establishing an honest and clean business environment.

Anti-corruption and bribery

In strict accordance with the *Law of the People's Republic of China Against Unfair Competition*, the *United Nations Convention against Corruption* and other relevant laws and regulations, we continuously improve BEWG *Anti-bribery and Anti-corruption System*[45] *and BEWG Overseas Anti-corruption System*[46], and adopt zero tolerance for all corrupt practices. In 2022, BEWG developed the *Implementation Rules for Supervision and Inspection at Critical Milestones*, improved the handling process of complaint letters and visits and accusations, and put in place a long-term mechanism for integrity risk prevention and control.

To implement the requirements of anti-corruption, the Discipline Inspection Commission of the Group has established the Disciplinary Committee Office as a permanent office, which is responsible for implementing the assignments of the higher authorities. The Commission for Discipline Inspection of the Group consists of five senior management employees, which supervises and guides the follow-up work according to the feedback from the regular work report of the Disciplinary Committee Office. The Discipline Inspection Commission of the Group signs *Integrity Practice Commitment Letter* with all centers and regions every year, urging all employees to keep the bottom line of clean practices. In order to better play the role of supervision and accountability, the Discipline Inspection Committee of the Group conducts business training for discipline inspection staff, combining various forms of training with cases, explaining cases, discussions and exchanges, etc., focusing on improving the business skills of the trainees and strengthening the "strictness and meticulousness" work style. In 2002, BEWG joined forces with the Fourth Supervision and Inspection Office of the Beijing Discipline Inspection Committee and the Municipal Supervisory Committee and the School of Government of Peking University to explore the work of building a clean and honest governance for mixed-ownership enterprises in the new era. In 2022, the Discipline Inspection Committee of the Group organized viewing of warning educational footages such as "Trust Cannot Replace Supervision", and reiterated to more than 300 discipline inspection staff the discipline requirement that "it takes hard work to do a good job", and sounded the alarm for them to practice honestly and exercise power impartially.


Warning education for BEWG's discipline inspection staff



In 2022, BEWG received

No major corruption-related complaint cases

No major concluded legal cases regarding corrupt practices

[43] Public disclosure link: https://www.bewg.net/uploadfile/2020/1020/20201020105537427.pdf
[44] Objective and Key Results
[45] Public disclosure link: https://www.bewg.net/uploadfile/en/fanhuilu.pdf
[46] Public disclosure link: https://www.bewg.net/uploadfile/en/overseas.pdf

Business ethic

Reporting mechanisms and whistleblower protection

The group abides by the relevant provisions of the *Rules for Disciplinary Inspection and Supervision Organs Handling Reports and Accusations* and *Provisions of the Supreme People's Procuratorate on Protecting Citizens' Right to Report* and has developed and updated *BEWG Confidentiality System for Accusation and Prosecution*[47], *BEWG Informant Protection System*[48], *BEWG Investigation System for False Accusation and Frame-up Behavior*[49], and other internal prosecution management system in a timely manner in accordance with changes in laws and regulations. BEWG will never tolerate any violation of laws and regulations and encourage every individual and organization to strictly supervise, actively report and provide feedback on any violation of the laws and regulations of the Group, and promise to protect the legitimate rights and interests of the whistleblowers.

BEWG has set up an "Instructions for Reporting" section under the "Integrity and Compliance" section of the official website, which clearly states the firm position of the Group to strictly prohibit all violations of laws and regulations. It also provides an open and transparent reporting channel for whistleblowers, and promises to handle complaints and reports in accordance with regulations, discipline and laws.[50]

We require all relevant personnel involved in handling the complaint to sign a *Confidentiality Commitment*, strictly implement confidentiality measures, and strictly protect the personal information of whistleblowers and the reported content. The Group ensures that all aspects of the work are carried out fairly and impartially and are completed in compliance with the law through the division of responsibilities such as acceptance, disposal, investigation and accountability of complaints and reports.

[47] Public disclosure link: https://www.bewg.net/uploadfile/en/jianju.pdf
[48] Public disclosure link: https://www.bewg.net/uploadfile/en/baohu.pdf
[49] Public disclosure link: https://www.bewg.net/uploadfile/en/wugao.pdf
[50] Public disclosure link: https://www.bewg.net/en/gywm/ljhg/

Business ethics training

BEWG relentlessly builds a brand campaign of "integrity and dedication from the heart", actively carries out anti-corruption publicity to all employees, improves employees' moral standards and compliance awareness, to wholly create a honest workplace, fostering a culture of "honoring those who upholds honesty and integrity" at BEWG.

In 2022, BEWG launched an "alarm bells ringing" column under the Cloud Academy section of BEWG Education Center, which dynamically updates more than 20 warning cases in the form of pictures, texts, videos, etc., and reminds domestic and foreign employees of integrity education. More than 120,000 person-times have visited and learned from that. In addition, we also integrate integrity reminders into daily production and operation, promote discipline and rules into the mind of everyone and make detailed and normalized integrity reminders.

BEWG pays close attention to key dates before the festivals such as Spring Festival, the Dragon Boat Festival, the Mid-Autumn Festival, adhere to the monitoring of hazards in advance, and put an end to corruption and malpractices during festivals. We have developed the *Implementation Rules for Supervision and Inspection at Critical Milestones*. By issuing notices on the observance of integrity on holidays, pushing reminder messages on honesty, and taking supervision and inspection measures, we have implemented the Party's eight-point frugality code, strictly preventing the "Four Malfeasances" from reoccurrence, persevering in improving and enforcing disciplines, and further consolidating the atmosphere of clean and honest workplace.

In 2022, BEWG organized three anti-corruption training sessions for the Board, totaling 26 hours; and 10 anti-corruption training sessions for senior management, with more than 20 hours. In 2022, online training on integrity education for BEWG employees exceeded 21,600 hours.

In 2022, BEWG organized

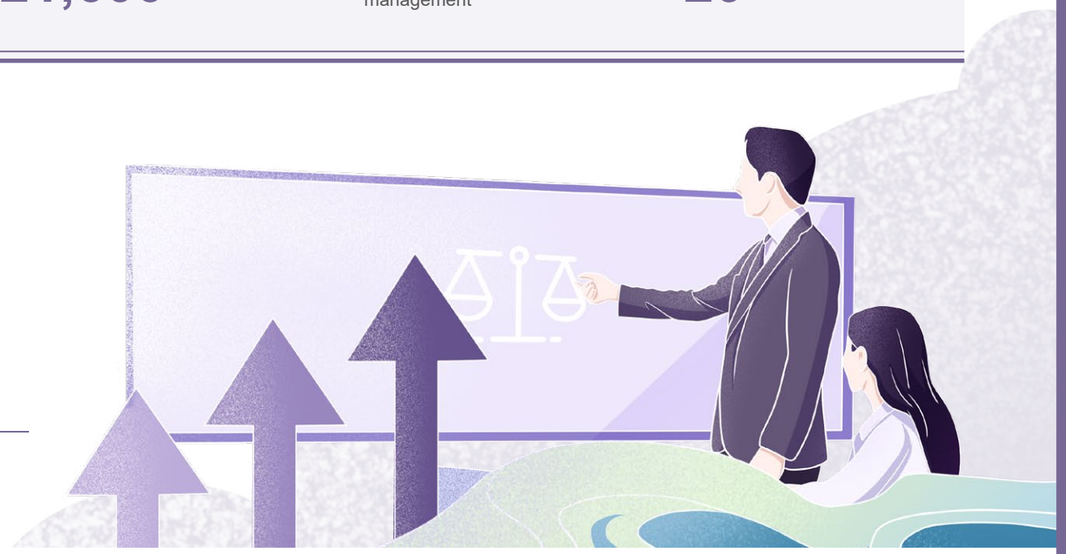
3 anti-corruption training sessions for the Board

Total training hours of the Board was **26** hours

Online training on integrity education for BEWG employees exceeded **21,600** hours

10 anti-corruption training sessions for senior management

Training hours of senior management exceeded **20** hours



Supply chain management

BEWG adheres to concepts of honesty, mutual trust and win-win cooperation, building a whole-chain, high-quality and sustainable supply chain. We strictly comply with relevant laws, regulations, and labor policies such as the *Civil Code of the People's Republic of China*, the *Tendering and Bidding Law of the People's Republic of China*, and continue to strengthen lifecycle management of supplier admittance, audit, evaluation, and elimination. We actively carry out sustainability risk assessment of the supply chain, review suppliers' ESG performance, minimize environmental and social impacts, and build a sustainable development future.

As of December 31, 2022, the Group had a total of 691 domestic qualified suppliers.

Procurement from BEWG's direct suppliers in 2022

Indicator	Number	Percentage of procurement costs（%）
Total tier-1 suppliers	429	100
Critical tier-1 suppliers	278	95

Number of direct supplier by region in 2022

Suppliers from Chinese mainland

381

Suppliers from China's HongKong, Macao, Taiwan regions and oversea

48

Note:

The total number of domestic suppliers in 2022 is the number of the qualified suppliers. Among the 691 suppliers, there were 429 direct suppliers and 262 indirect suppliers (Direct procurement: productive procurement, such as water treatment and environmental protection facilities directly used for processing water; Indirect procurement: non-productive procurement, such as procurement for administrative purposes; Potential suppliers: suppliers who have not been included in the qualified supplier pool of BEWG).

Supplier lifecycle management

In order to further standardize supplier management, BEWG revises and improves the internal policies and systems such as the *Supplier Management Policies of BEWG*[51] and the *the Quality Management Rules for Suppliers*, thus realizing the close-loop management of supplier admittance, screening, audit and evaluation, elimination and rectification. In the daily management of suppliers, we attach great importance to the communication and exchange with suppliers, and regularly hold special communication meetings for suppliers of different levels and different cooperative relationships, so as to help suppliers continuously improve their abilities to fulfill their responsibilities and achieve shared development with them.

In 2022, we updated and improved our supplier access review dimensions, developed the *Supplier Access Audit Form*, conducted access and process audits on suppliers, and conducted a comprehensive evaluation and investigation on ten modules, including supplier management, product audit, procurement management, quality management, technology research and development, service capability and ESG, of which ESG accounts for 5% of the total score. In addition, we invite auditors to conduct two-way audits on the suppliers newly included in the system and carry out audit verification in the stages of admittance approval and supplier selection to ensure compliance of the procurement process. In 2022, the coverage of Group's audits on ESG terms of new suppliers reached 100%.

In 2022, the coverage of Group's audits on ESG terms of new suppliers reached

100%

Standard Terms of ESG Audits on Suppliers

ESG system certification

ESG management system has been established and environmental, health and safety system certifications have been obtained, such as ISO 9001, ISO 14001, ISO 45001 certification, etc.;

ESG management system

ESG-related management systems have put in place in compliance with relevant laws and regulations, such as the prohibition of child labor, business ethics and other provisions;

Hazard identification and management measures

The hazards in the equipment and process are systematically identified and handled, and the management signs and measures to identify the hazards can be seen on the site;

Corrective and preventive measures

Cause analysis of environmental, health and safety accidents are conducted, corrective measures are developed and implemented, with objective evaluation on their effectiveness and closed-loop tracking management;

Management of waste and hazardous substances

Management processes or relevant management standards for identifying and controlling hazardous substances such as the three wastes (wastewater, waste gas and solid waste) have been established and strictly implemented.

[51] Public disclosure URL: https://www.bewg.net/uploadfile/2020/1020/20201020105719128.pdf

Supply chain management

For the non-conformities found in the on-site audits, we require the supplier to prepare and implement the rectification plan for the non-conformities within 15 days after receiving the rectification notice from BEWG, and the rectification plan shall be completed within one to three months according to the difficulty of rectification. The rectification plan shall be subject to document review or on-site review to ensure the enforceability and effectiveness. In 2022, 100% of suppliers signed the *Integrity and Self-discipline Commitment Letter*.

In addition, we adhere to the concept of "green first". In terms of low-carbon procurement, we have set a procurement target of reducing the overall energy consumption of the pump valve system by 5%, and developed improvement plans for the pump valve system to reduce the system acquisition cost. We also encourage our suppliers to continuously optimize the use of natural resources, reduce emissions of environmental pollutants, properly manage and dispose of waste, and minimize the environmental impact of production activities and products across the supply chains. For pharmaceutical raw material suppliers, we require them to use standard industrial products, and prohibit the unauthorized or illegal use of waste acid, waste alkali and other hazardous waste products that are harmful to the environment. We require suppliers to provide certification documents for the use of environmental protection materials and inspect the arrival of goods.

In 2022, **100%** of suppliers signed the *Integrity and Self-discipline Commitment Letter*

Case: VAVE project of the pump valve system

In 2022, BEWG promoted the Value Analysis/Value Engineering (VAVE) project of pump valve system. For example, in Jinxia project, BEWG developed improvement plans for seven major systems including the pump system and pump sump, such as replacing the check valve with electric valve. By rational design of pump sump volume, checking the head, adding service for impeller replacement and increasing the frequency conversion of the lifting pump, BEWG finally realized 3.92% reduction in system purchase costs and 5% reduction in energy consumption. The project promotion has achieved cost reduction and efficiency increase, energy saving and consumption reduction, increased operating profit and comprehensive competitiveness.

We place emphasis on the supply chain culture of integrity, require all suppliers to strictly abide by the *Code of Conduct for Suppliers* and sign the *Integrity and Self-discipline Commitment Agreement*. We send anti-corruption email notices to suppliers before auditing suppliers, carry out business ethics-related publicity and training for suppliers in daily work, and resolutely put an end to all kinds of anti-corruption behaviors.

BEWG constantly strengthens the digital building of the supply chain, and make overall planning of the five business systems, namely demand planning, procurement sourcing, supply service, supplier and material master data management. In 2022, the material master data management system was launched for trial operation, which realized the normalization and standardization of material master data management of pharmaceutical materials and effectively improved the efficiency of supply chain management.

ESG risk assessment of suppliers

We attach great importance to the sustainable risk management in the supply chain of the Group, enhance ESG risk assessment of the supplier in each link, identify the suppliers with high sustainable risk actively, and conducts regular sustainability risk assessment of suppliers with high sustainability risk and key suppliers. For suppliers that have caused certain negative social impacts in terms of ESG, BEWG imposes different penalties on such suppliers according to the degree of social impact and supplier management system, such as warning of risks, downgrading, suspension of cooperation, blacklisting, etc.

Suppliers with ISO certifications in 2022

Note:
Among 429 qualified direct suppliers admitted by BEWG in 2022, 100% passed ISO 9001 certification and 95% passed ISO 14001 certification. 90% of critical suppliers obtained ISO 45001 certification.

Information security

BEWG highly values the protection of information security. To strengthen information security and privacy protection efforts in alignment with the changes of the time, we have continuously optimized our information security management systems to improve information security management across the Group from three fronts, namely information security management, information security technology and operations, and information security awareness education.

Information security management

We strictly abide by *Data Security Law the People's Republic of China* and other laws and regulations related to data and personal information security protection. In accordance with ISO27001 and relevant national laws and regulations, focusing on 15 areas such as information security strategy and governance organization, system operation, information asset security and data security, and adopting a unified security strategy and orderly management process, we have developed a set of integrated information security management system that are manageable, controllable and trustworthy, which consists of security policies, management systems, operating procedures and record forms. We have formulated 60 management documents, including *BEWG Information Security Management System* and *BEWG Information Security Policy System*. In 2022, BEWG successfully passed ISO 27001 Information Security Certification.


DNV

管理体系认证证书

证书号码: 570653-2022-AIS-BGC-UKAS
重述签发日期: 2022年11月21日
有效期限: 2022年11月21日 – 2025年11月20日

兹证明

北控水务（中国）投资有限公司

中国北京市朝阳区望京东园七区保利国际广场T3 北控水务大厦
地址见附页

信息安全管理体系符合:
ISO/IEC 27001:2013标准

此证书对下列产品或服务范围有效:
水务行业管理与生产应用系统规划、设计、开发、运维及其数据管理服务相关的信息安全管理活动。与1.0版本适用性声明相一致

证书初始生效日期: 上海，2022年11月22日
DNV – Business Assurance
中国上海市长宁区凯旋路555号9楼
邮编 200336 电话: +86 21 32799000

UKAS 0013 IAF

主席理事
安思杰

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate No.: 570653-2022-AIS-BGC-UKAS
Initial certification date: 21 November, 2022
Valid: 21 November, 2022– 20 November, 2025

This is to certify that the management system of

Beijing Enterprises Water Group (China) Investment Limited

BEWG Building, Poly International Plaza T3, Zone 7, Wang Jing East Garden, Chaoyang District, Beijing, P.R. China
and the sites as mentioned in the appendix accompanying this certificate

has been found to conform to the Information Security Management System standard:
ISO/IEC 27001:2013

This certificate is valid for the following scope:
Water Affairs Industry Management and Production Application System Planning, Design, Development, Marketing, Data Management Services Related to Information Security Management Activities. This is in Accordance with the Latest Version of the Statement of Applicability (Version 1.0)

Place and date:
Shanghai, 29 November, 2022

For the issuing office:
DNV – Business Assurance
Suite A, Building 9, No.1591 Hongqiao Road, Changning District, Shanghai 200336, P.R. China
TEL: +86 21 32799000

UKAS 0013 IAF

Zhu Hai Ming
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV Business Assurance UK Limited, 4th Floor, Vivo Building, 30 Stamford Street, London, SE1 9LQ, United Kingdom. TEL:+44(0) 203 816 4000. www.dnv.co.uk/assurance

Figure: BEWG's ISO 27001 Certificate

BEWG set up a top-down information security organizational structure led by senior executives, consisting of executives, management and junior employees, with information security management responsibilities of each level clearly defined.

Decision-making

Information Security Leadership Group

- Coordinate the overall strategic planning of the Group's information security;
- Make decisions on major issues related to the information security of the Group;
- Review and monitor information security within the Group;
- Coordinate and promote the daily safety work of the Group;

Management

Information security management team

- Daily management of the information security, implementation of the information security planned by the information security leadership team, overall maintenance and continuous optimization of the information security;
- Provide professional support and guidance to the information security of the Group;
- Responsible for the Group's information security risk assessment;
- Organize the supervision and inspection on the Group's information security;

Execution

Digital Research Institute

- Implement the Group's information security policies and objectives, develop future plans for information security construction, and continue to carry out information security construction of the Group;

Information security specialist of all business units and regions

- Cooperate with the information security management team to complete work related to information security, such as communication and tracking on implementation of security system requirements, coordination and promotion of continuous management of information assets in the department, timely reporting of security incidents and cooperation in response, etc.;

Information security

Information security technology and operations

We unceasingly improve information security technology and operation management systems, intensify data security management and protect the data security and user privacy of the Group. In 2022, the Group conducted a risk assessment on information security through interviews and research, system verification, penetration testing, etc., and developed corresponding rectification measures for information security risk points. In 2022, no major information security accidents occurred in the Group and no complaints about user privacy were received.

In 2022,

No major information security accidents occurred in the Group

No complaints about user privacy were received

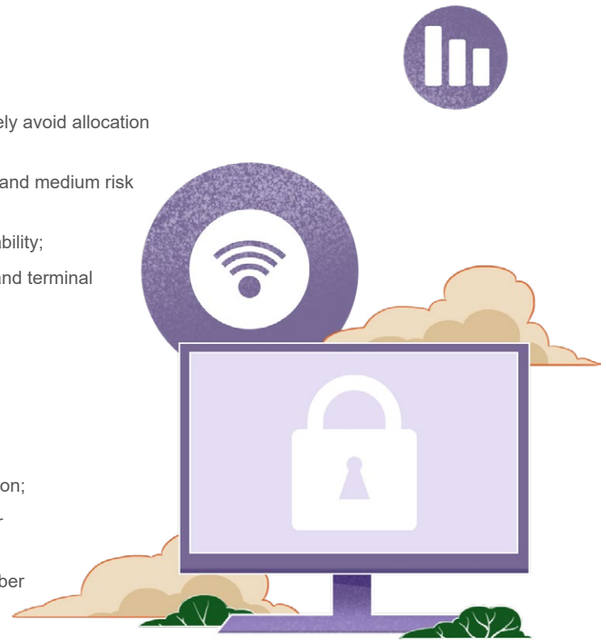
Information security technology

Equipment and server security

- Establish infrastructure resource allocation management baselines to effectively avoid allocation security risks;
- Improve the patch management mechanism, unified check and repair of high and medium risk vulnerabilities in the system;
- Strengthen audit capabilities for infrastructure O&M security to improve traceability;
- Unified installation of malicious code prevention software for server systems and terminal computers.

Access permission

- System and network O&M to achieve account classification and decentralization;
- Strengthen the complexity of network and system user passwords and regular replacement of policies to ensure account security;
- Strengthen the prevention and control of system network access to reduce cyber security risks.



Data security

- Improve the unified backup policy for operating systems, databases and key files;
- Develop and implement remote data disaster recovery policy of key business systems and complete remote backup of real-time data of core systems;
- Develop and implement database audit policy for key business systems to improve O&M and data management efficiency;
- Plan and develop data governance policies and complete data center construction to effectively improve the data quality and data consistency across systems.

Cyber security

- Improve the cyber security technology framework, application of technical means, such as firewall, IPS, bastion host, vulnerability scanning, virus protection, online behavior management, WAF, etc., to meet the requirement for three-level information security prevention and control;
- Unified sorting and improving the WAF, IPS, firewall and other security policies of the business system to strengthen the prevention of intrusion behavior.

Information security

Information security operations

Cybersecurity Compliance Management

- The BEWG Holographic Design Platform, BEWG Mall Platform and the Industry-Education Alliance System passed the graded protection evaluation;
- Obtained the *Cybersecurity Level Assessment of BEWG Holographic Design Platform*, *Cybersecurity Level Assessment Report of BEWG Online Store* and *Cybersecurity Grade Assessment Report of BEWG Industry-Education Alliance System*.

Operation and maintenance service management

- Establish the process system of sustainable O&M management and design of core processes, including service request, event management, problem management, change management, release management and demand management;
- Defined organizational responsibilities, standardized the mechanism of O&M to promote and improve O&M efficiency;
- Establish a process management platform that meets the requirements of the process system and conforms to the agile delivery of technology, effectively manage the operation and maintenance service, and improve the quality and work efficiency of the operation and maintenance service.

Disaster recovery simulation drill

- Establish a disaster recovery system to ensure business continuity and prevent and resolve the operational security risks of the information system;
- Carry out disaster recovery simulation drills of the financial system;
- The drills have verified the reliability of the system, the recovery ability from disaster and the feasibility of emergency plan for important information systems. The level of disaster recovery and safe operation of information system are improved. At the same time, the ability of the organization's emergency response, crisis communication and coordination among departments have also improved.

Information security awareness education

In 2022, in order to improve all employees' awareness of information security, BEWG cooperated with external professional organizations to conduct information security awareness training and information security drills in the form of live and recorded broadcasting. A total of more than 10,000 employees participated in the training. The training sessions and drills help all employees to understand the concepts and behavioral norms related to information security, enhance their awareness of information security to avoid information security incidents.

Appendix

Key ESG performance

Environmental				
Indicator	**Unit**	**2022**	**2021**	**2020**
Environmental management				
Major environmental pollution accidents	/	0	0	0
Pollutants emissions and discharge				
Total COD abatement in sewage plants	tonne	977,562	920,644	796,968
Total ammonia nitrogen abatement in wastewater plants	tonne	122,393	105,157	87,961
Total reduction of total phosphorus in wastewater plants	tonne	16,563	14,801	13,381
Total suspended solids reduction	tonne	749,361	683,108	613,211
Total pollutant abatement	tonne	1,865,879	1,723,710	1,511,521
Total Sulphur Oxide Emissions	tonne	48	37	21
Total nitrogen oxide emissions	tonne	337	305	194
Total fly ash emissions	tonne	7	3.05	/
Total discharge of boiler residues	tonne	87,156	64,723	/
Total discharge of hazardous solid waste	tonne	328	199	206
Density of hazardous solid waste	kg/10,000 HKD	0.13	0.071	0.081
Total discharge of non-hazardous solid waste	tonne	2,734,681	2,555,687	2,051,325
Density of non-hazardous solid waste	tonne/10,000 HKD	1.09	0.92	0.81
Resource and energy consumption				
Non-renewable energy substitution	kWh	1,912,882,987	1,699,021,945	1,558,904,829
Renewable energy substitution	kWh	51,489,548	39,576,096	30,645,657
Gasoline consumption	tonne	767	581	564
Diesel consumption	tonne	1,638	782	586
Natural gas consumption	m^3	1,546,127	2,019,398	1,258,191
Purchased steam for heating	GJ	4,748	10,005	4,121
LPG consumption	tonne	210	340	79
Total Fresh water consumption	tonne	4,605,304	4,612,325	3,083,102
Fresh water intensity	tonne/10,000 HKD	1.84	1.65	1.22
Pipe network leak rate	%	12.98	16.64	19.44
Proportion of self-supply water of water distribution plants	%	1.6	2.1	3.0
Agent consumption – Total consumption of carbon source	tonne	110,412	84,386	77,768
Agent consumption – Total consumption of dephosphorization agents	tonne	291,217	224,346	205,973
Comprehensive energy consumption & GHG Emission				
Comprehensive energy consumption	tce	241,187	214,414	195,223
Comprehensive energy consumption intensity	tce/10,000 HKD	0.096	0.077	0.077
Total GHG emissions	tCO_2e	1,112,674	1,050,131	961,929
GHG emissions intensity	tCO_2e/10,000 HKD	0.45	0.38	0.38

Social				
Indicator	**Unit**	**2022**	**2021**	**2020**
Employment				
Total workforce	person	20,606	17,888	19,763
New contract employees	person	2,734	2,318	/
Number of employees by region				
Chinese mainland	person	19,537	16,768	18,694
Overseas, China's Hong Kong, Macao and Taiwan	person	1,069	1,120	1,069
Number of employees by employment type				
Contract employees	person	19,198	16,565	18,694
Intern	person	163	77	71
Outsourced personnel	person	176	126	224
The proportion of employees by employment type				
Contract employees	%	98.26	98.79	98.4
Intern	%	0.83	0.46	0.4
Outsourced personnel	%	0.90	0.75	1.2
Number of employees by gender				
Male employees	person	12,447	11,028	12,230
Female employees	person	7,090	5,740	6,464
Proportion of employees by gender				
Male employees	%	63.71	65.77	65.4
Female employees	%	36.29	34.23	34.6
Number of employees by age				
Under 30 years old	person	4,273	4,033	2,878
30-50 years old	person	11,080	10,365	11,736
Over 50 years old	person	4,184	2,370	4,080
Proportion of employees by age				
Under 30 years old	%	21.87	24.05	15.4
30-50 years old	%	56.71	61.81	62.8
Over 50 years old	%	21.42	14.13	21.8
Proportion of female employees by rank				
Management	%	23.80	23.20	/
Junior management	%	24.19	24.04	/
Senior management	%	15.63	15.15	/

Social				
Indicator	Unit	2022	2021	2020
Employee turnover				
Number of employees leaving by gender				
Male employees	person	1,576	1,310	1,336
Female employees	person	954	652	590
Number of employees leaving by age group				
Under 30 years old	person	788	669	380
30-50 years old	person	848	924	915
Over 50 years old	person	894	369	631
Turnover rate by gender				
Male employees	%	12.66	11.88	10.9
Female employees	%	13.46	11.36	9.1
Turnover rate by age group				
Under 30 years old	%	18.44	16.59	13.2
30-50 years old	%	7.65	8.91	7.8
Over 50 years old	%	21.37	15.57	15.5
Employee development and training				
Total number of employees trained	person	19,537	16,768	18,694
Percentage of employees trained in Chinese mainland	%	100	100	100
Regular employees trained by gender				
Male employees	person	12,447	11,028	12,230
Female employees	person	7,090	5,740	6,464
Regular employees trained by rank				
Management	person	32	33	213
Junior management	person	686	618	5,201
Senior management	person	18,819	16,117	13,280
Average training hour of regular employees by gender				
Male employees	hour	95.93	102.00	97.64
Female employees	hour	92.66	102.00	97.87
Average training hour of regular employees by rank				
Management	hour	108.00	115.00	108.03
Junior management	hour	153.33	163.00	111.90
Senior management	hour	79.23	86.00	84.26

Social				
Indicator	Unit	2022	2021	2020
Employee health and safety				
Employees' work-related injury cases	case	21	7	1
Rate of employee work-related injury rate	%	0.11	0.04	0.00006
Number of lost working days due to work	day	18,675	659	6000
Injury rate per million working hours	/	0.54	0.21	0.03
Rate of work-related accidents per thousand people	/	1.07	0.42	0.06
Cumulative input in safety production	RMB	29,410,000	22,300,000	21,875,628
Enrollments of safety training	person	153,732	153,034	115,384
Work-related fatalities	person	0	0	1
Supplier management				
The cumulative number of domestic qualified suppliers	/	691	601	/
The number of critical suppliers by region				
Chinese mainland	/	381	283	/
China's Hong Kong, Macao and Taiwan regions and oversea	/	48	48	/
Procurement from direct suppliers				
Total Tier-1 suppliers	/	429	331	1,257
Critical Tier-1 suppliers	/	278	217	92
Certification of suppliers				
ISO 9001 certified	%	100	100	100
ISO 14001 certified	%	95	95	100
ISO 45001/OHSAS 18001certified	%	90	90	/
Research and innovation				
Number of new authorized patents	/	462	229	135
The cumulative number of authorized patents	/	1,282	772	553
Intellectual property and external standards that fell within the scope of rewards	/	216	64	29
Community welfare				
Total amount of charitable donations	10,000 RMB	112.32	183.92	/
Employee volunteer service	hour	418	63,555	/

List of key ESG policies

Category	Name
Environmental	
Environmental management	*Environmental Yardstick Assessment System*
	Environmental Factor Identification, Evaluation and Control Procedures
	Interim Administrative Measures for Engineering Products Appraisal of BEWG
	Production and Operation Management Measures
Emissions	*BEWG Management Manual on Quality, Environment, and Occupational Health and Safety*
	Quality, Environment, and Occupational Health and Safety Procedure Documents
	BEWG Water Management Measures
	Technical Specification for Low- carbon Operation Evaluation of Sewage Treatment Plant
	Chemical Agent Management Measures
Ecological protection	*Biodiversity Protection Management Measures of BEWG*
Social	
Employment	*Recruitment Management Mechanism*
	Management Measures for Campus Recruitment of BEWG
Employee rights and benefits	*Statement of Employee Rights and Benefits*
	Headquarters Employee Welfare System
	Management Measures for Organization and Implementation of Corporate Culture Activities of BEWG
Occupational health and safety	*BEWG Manual on Safe and Civilized Construction Standard for Project Delivery*
	BEWG Management Manual on Quality, Environment, and Occupational Health and Safety
	BEWG Management Regulations for Dangerous Materials Safety
	Supplier Management Policies of BEWG
	BEWG Regulations on Occupational Health Management
	BEWG Regulations on Labor Protection Articles Management
	BEWG Manual on Sewage Treatment Plant Delivery Quality Standards
	BEWG Identification List of Laws, Regulations and Standards for Safety Production
	BEWG Responsibility System for Safety in Production
	BEWG Regulations on Production Safety Accident Reporting and Investigation
	BEWG Comprehensive Emergency Plan for Unexpected Incidents
	BEWG Hazardous and Harmful Factor Evaluation and Management Regulations
	BEWG Major Hazard Source Management Regulations
	BEWG Special Emergency Plan for Production Safety Accidents
	BEWG Dangerous Incident Management Regulations

Category	Name
Social	
Quality management	*BEWG Guidance Manual on 5-4-1 Safety Management for Project Delivery*
	BEWG Performance Management System for Engineering Construction
	BEWG Implementation Rules for Quality Control Points of Urban Water Construction Projects
	BEWG Handbook of Key Points for Lean Management of Engineering Quality in Urban Water Construction Projects
	Guidelines for Inspection and Acceptance of Star-Level Enterprises
	1+N Cluster Construction Process Guidelines
	1+N Cluster Operation and Management Guidelines
	1+N Regional Cluster Model Organization Structure and Job Positioning
	BEWG Guidance Manual for Sewage Plant Auto-control System Hardware Defect Elimination
	BEWG Guidance Manual for Sewage Plant Auto-control System PLC Programming
	BEWG Guidance Manual for Sewage Plant Auto-control System SCADA Development
Intellectual property rights protection	*BEWG Intellectual Property Management System*
	BEWG Guidelines for Promoting Technological Innovation Implementation
	BEWG Science and Technology Development Plan Outline (2021-2025)
Supply chain	*Quality Management Rules for Suppliers*
	Customer Satisfaction Management Measures
	Supplier Access Audit Form
	Code of Conduct for Suppliers
	Integrity and Self-discipline Commitment Agreement
Information and data security	*BEWG Information Security Management System*
	BEWG Information Security Policy System
Governance	
Risk management	*BEWG Overall Risk Management System*
Business ethics	*BEWG Business Code of Conduct*
	BEWG Overseas Anti-corruption System
	BEWG Anti-bribery and Anti-corruption System
	Integrity Commitment
	BEWG Confidentiality System for Whistleblowing and Accusation
	BEWG Whistleblower Protection System
	BEWG False Accusation Investigation and Punishment System
	Confidentiality Commitment
	Implementation Rules for Supervision and Inspection at Critical Milestones

HKEX ESG Content Index

Disclosure indicators			Location
Environmental			
Aspect A1: Emissions	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to air and greenhouse gas emissions, discharges into water and land, and generation of hazardous and non-hazardous waste.		P61-P62
	A1.1	The types of emissions and respective emissions data	P63
	A1.2	Direct (Scope 1) and energy indirect (Scope 2) greenhouse gas emissions (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	P47
	A1.3	Total hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	P63
	A1.4	Total non-hazardous waste produced (in tonnes) and, where appropriate, intensity (e.g. per unit of production volume, per facility).	P63
	A1.5	Description of emissions target(s) set and steps taken to achieve them.	P64
	A1.6	Description of how hazardous and non-hazardous wastes are handled, and a description of reduction target(s) set and steps taken to achieve them.	P61
Aspect A2: Use of Resources	General Disclosure Policies on the efficient use of resources, including energy, water and other raw materials.		P37, P42, P55
	A2.1	Direct and / or indirect energy consumption by type (e.g. electricity, gas or oil) in total (kWh in '000s) and intensity (e.g. per unit of production volume, per facility).	P45-P46
	A2.2	Water consumption in total and intensity (e.g. per unit of production volume, per facility).	P38
	A2.3	Description of energy use efficiency target(s) set and steps taken to achieve them.	P48
	A2.4	Description of whether there is any issue in sourcing water that is fit for purpose, water efficiency target(s) set and steps taken to achieve them.	P37
	A2.5	Total packaging material used for finished products (in tonnes) and, if applicable, with reference to per unit produced.	Not Applicable
Aspect A3: The Environment and Natural Resources	General Disclosure Policies on minimising the issuer's significant impact on the environment and natural resources.		P37, P57, P60-P61
	A3.1	Description of the significant impacts of activities on the environment and natural resources and the actions taken to manage them.	P37-P44, P48-P64
Aspect A4: Climate Change	General Disclosure Policies on identification and mitigation of significant climate-related issues which have impacted, and those which may impact, the issuer.		P24, P31, P33-P36
	A4.1	Description of the significant climate-related issues which have impacted, and those which may impact, the issuer, and the actions taken to manage them.	P33-P36

Disclosure indicators			Location
Social			
Employment and Labour Practices			
Aspect B1: Employment	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to compensation and dismissal, recruitment and promotion, working hours, rest periods, equal opportunity, diversity, anti-discrimination, and other benefits and welfare.		P67
	B1.1	Total workforce by gender, employment type, age group and geographical region.	P67-P68
	B1.2	Employee turnover rate by gender, age group and geographical region.	P68
Aspect B2: Health and Safety	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to providing a safe working environment and protecting employees from occupational hazards.		P75-P77, P82
	B2.1	Number and rate of work-related fatalities occurred in each of the past three years including the reporting year.	P82
	B2.2	Lost days due to work injury.	P82
	B2.3	Description of occupational health and safety measures adopted, how they are implemented and monitored.	P75-P77, P82
Aspect B3: Development and Training	General Disclosure Policies on improving employees' knowledge and skills for discharging duties at work. Description of training activities.		P69-P72
	B3.1	The percentage of employees trained by gender and employee category (e.g. senior management, middle management)	P123
	B3.2	The average training hours completed per employee by gender and employee category.	P72
Aspect B4: Development and Training	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to preventing child and forced labour.		P67
	B4.1	Description of measures to review employment practices to avoid child and forced labour	P67
	B4.2	Description of steps taken to eliminate such practices when discovered.	P67
Operating Practices			
Aspect B5: Supply Chain Management	General Disclosure Policies on managing environmental and social risks of the supply chain.		P112
	B5.1	Number of suppliers by geographical region.	P111
	B5.2	Description of practices relating to engaging suppliers, number of suppliers where the practices are being implemented, how they are implemented and monitored.	P112
	B5.3	Description of practices used to identify environmental and social risks along the supply chain, and how they are implemented and monitored.	P112-P114
	B5.4	Description of practices used to promote environmentally preferable products and services when selecting suppliers, and how they are implemented and monitored.	P113

Disclosure indicators			Location
Aspect B6: Product Responsibility	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to providing a safe working environment and protecting employees from occupational hazards.		P83-P90, P117-P120
	B6.1	Percentage of total products sold or shipped subject to recalls for safety and health reasons	Not Applicable
	B6.2	Number of products and service-related complaints received and how they are dealt with.	P83
	B6.3	Description of practices relating to observing and protecting intellectual property rights.	P98
	B6.4	Description of quality assurance process and recall procedures.	P84-P86
	A6.5	Description of consumer data protection and privacy policies, and how they are implemented and monitored.	P116-P118
Aspect B7: Anti-corruption	General Disclosure Information on: (a) the policies; and (b) compliance with relevant laws and regulations that have a significant impact on the issuer relating to bribery, extortion, fraud and money laundering.		P107-P110
	B7.1	Number of concluded legal cases regarding corrupt practices brought against the issuer or its employees during the reporting period and the outcomes of the cases.	P107-P108
	B7.2	Description of preventive measures and whistle-blowing procedures, and how they are implemented and monitored.	P107-P110
	B7.3	Description of anti-corruption training provided to directors and staff.	P110
Community			
Aspect B8: Community Investment	General Disclosure Policies on community engagement to understand the needs of the communities where the issuer operates and to ensure its activities take into consideration the communities' interests.		P101-P104
	B8.1	Focus areas of contribution (e.g. education, environmental concerns, labour needs, health, culture, sport).	P101-P104
	B8.2	Resources contributed (e.g. money or time) to the focus area.	P102

GRI Content Index

Statement of use	BEWG has reported in accordance with the GRI Standards for the period [January 1, 2022 to December 31, 2022].
GRI 1 used	GRI 1: Foundation 2021

GRI standard	Disclosure	Chapters Page
GRI 2: General Disclosures 2021	2-1 Organizational details	P01, P11-12
	2-2 Entities included in the organization's sustainability reporting	P01
	2-3 Reporting period, frequency and contact point	P01
	2-4 Restatements of information	P01
	2-6 Activities, value chain and other business relationships	P11-12
	2-7 Employees	P67-68
	2-8 Workers who are not employees	P67-68
	2-9 Governance structure and composition	P21
	2-10 Nomination and selection of the highest governance body	P22
	2-11 Chair of the highest governance body	P21-22
	2-12 Role of the highest governance body in overseeing the management of impacts	P21-22
	2-13 Delegation of responsibility for managing impacts	P21
	2-14 Role of the highest governance body in sustainability reporting	P02
	2-15 Conflicts of interest	P22
	2-16 Communication of critical concerns	P27-28
	2-17 Collective knowledge of the highest governance body	P22
	2-18 Evaluation of the performance of the highest governance body	P22
	2-22 Statement on sustainable development strategy	P17-18
	2-26 Mechanisms for seeking advice and raising concerns	P109
	2-27 Compliance with laws and regulations	P60, P107
	2-28 Membership associations	P15
	2-29 Approach to stakeholder engagement	P27-28
	2-30 Collective bargaining agreements	P67
GRI 3: Material Topics 2021	3-1 Process to determine material topics	P28
	3-2 List of material topics	P28
	3-3 Management of material topics	P28
GRI 201: Economic Performance 2016	201-2 Financial implications and other risks and opportunities due to climate change	P33-36
	201-3 Defined benefit plan obligations and other retirement plans	P73-74
GRI 203: Indirect Economic Impacts 2016	203-1 Infrastructure investments and services supported	P05-08, P15-16, P104
	203-2 Significant indirect economic impacts	P15, P104

GRI standard	Disclosure	Chapters Page
GRI 205: Anti-corruption 2016	205-1 Operations assessed for risks related to corruption	P107
	205-2 Communication and training about anti-corruption policies and procedures	P107-110
	205-3 Confirmed incidents of corruption and actions taken	P107-110
GRI 302: Energy 2016	302-1 Energy consumption within the organization	P45-46
	302-2 Energy consumption outside of the organization	P45-46
	302-3 Energy intensity	P45-46
	302-4 Reduction of energy consumption	P48
	302-5 Reductions in energy requirements of products and services	P48-56
GRI 303: Water and Effluents 2018	303-1 Interactions with water as a shared resource	P37
	303-2 Management of water discharge-related impacts	P41-44, P61-64
	303-3 Water withdrawal	P37-42
	303-4 Water discharge	P39-46, P61-64
	303-5 Water consumption	P37-38
GRI 304: Biodiversity 2016	304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	P57
	304-2 Significant impacts of activities, products and services on biodiversity	P57-59
	304-3 Habitats protected or restored	P57-59
GRI 305: Emissions 2016	305-1 Direct (Scope 1) GHG emissions	P47
	305-2 Energy indirect (Scope 2) GHG emissions	P47
	305-3 Other indirect (Scope 3) GHG emissions	P47
	305-4 GHG emissions intensity	P47
	305-5 Reduction of GHG emissions	P35, P47-56
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	P63
GRI 306: Waste 2020	306-1 Waste generation and significant waste-related impacts	P61-62
	306-2 Management of significant waste-related impacts	P61-62
	306-3 Waste generated	P61-63
	306-4 Waste diverted from disposal	P61-62
	306-5 Waste directed to disposal	P61-62
GRI 308: Supplier Environmental Assessment 2016	308-1 New suppliers that were screened using environmental criteria	P112-113
GRI 401: Employment 2016	401-1 New employee hires and employee turnover	P67
	401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	P73-74
	401-3 Parental leave	P74
GRI 403: Occupational Health and Safety 2018	403-1 Occupational health and safety management system	P75-76, P82
	403-2 Hazard identification, risk assessment, and incident investigation	P75-77
	403-3 Occupational health services	P82

GRI standard	Disclosure	Chapters Page
GRI 403: Occupational Health and Safety 2018	403-4 Worker participation, consultation, and communication on occupational health and safety	P73, P82
	403-5 Worker training on occupational health and safety	P73-74, P78-81
	403-6 Promotion of worker health	P73-74, P78-82
	403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	P82
	403-8 Workers covered by an occupational health and safety management system	P73-75, P82
	403-9 Work-related injuries	P82
GRI 404: Training and Education 2016	404-1 Average hours of training per year per employee	P72
	404-2 Programs for upgrading employee skills and transition assistance programs	P69-71
	404-3 Percentage of employees receiving regular performance and career development reviews	P69-72
GRI 405: Diversity and Equal Opportunity 2016	405-1 Diversity of governance bodies and employees	P22, P68
GRI 406: Non-discrimination 2016	406-1 Incidents of discrimination and corrective actions taken	P67
GRI 408: Child Labor 2016	408-1 Operations and suppliers at significant risk for incidents of child labor	P67, P112
GRI 409: Forced or Compulsory Labor 2016	409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor	P67, P112
GRI 413: Local Communities 2016	413-1 Operations with local community engagement, impact assessments, and development programs	P102
GRI 414: Supplier Social Assessment 2016	414-1 New suppliers that were screened using social criteria	P112-113
GRI 416: Customer Health and Safety 2016	416-1 Assessment of the health and safety impacts of product and service categories	P86
GRI 418: Customer Privacy 2016	418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data	P117-118

Reader's Feedback

Dear readers,

Thank you for reading the Beijing Enterprises Water Group Limited Sustainability Report (2022). We expect to listen to your feedback on our report and work. Your opinions and suggestions are the important basis for us to improve our sustainability management and practice.

We are looking forward to your reply.

Optional questions (please mark √ on your answer)

1. Which of the following stakeholder type your employer belongs to?

☐ Shareholder ☐ Employee ☐ Supplier ☐ Customer ☐ Government

☐ Community ☐ Academic institutions ☐ Others (Please specify)

2. Is the information you are concerned about disclosed in the report?

☐ Yes ☐ Maybe ☐ No

3. Your comprehensive evaluation on the Beijing Enterprises Water Group Limited Sustainability Report (2022):

· Readability (understandable presentation, attractive design and easy information search)

☐ Yes ☐ Maybe ☐ No

· Credibility (true and reliable information)

☐ Yes ☐ Maybe ☐ No

· Information integrity (positive and negative information that meet your needs)

☐ Yes ☐ Maybe ☐ No

4. Can the information you are concerned about be easily searched in the report?

☐ Yes ☐ Maybe ☐ No

5. Do you prefer electronic version or hard-copy version of the future report?

☐ Electronic Copy ☐ Hard Copy

6. Please give your opinions and suggestions on the Beijing Enterprises Water Group Limited Sustainability Report (2022).

_____

Your contact information

Name: _____ Employer: _____

Correspondence Address: BEWG Mansion, T3, Poly International Plaza,
7th zone of Wangjing Dongyuan, Chaoyang District, Beijing

Tel:+86-10-64138000

Fax:+86-10-64138100