

Measures for Water Resources Management of BEWG

Chapter I General

Article I The measures are formulated to strengthen water resources management, comprehensively improve the utilization efficiency of water resources, and meet the development of the Group according to the *Water Law of the People's Republic of China*, the *Opinions of the State Council on Applying the Strictest Water Resources Control System* and other policies and regulations on water resources management, combined with the actual conditions of the Group.

Article II The measures are formulated for scientific control the whole process of water resources development, utilization and protection, and unified management of the water projects within the scope of the Group.

Article III It is designed to adhere to the policy of paying equal attention to income increase and expenditure reduction, putting water resources protection and water saving in a prominent position, strengthen the conservation, protection and scientific utilization of water resources, improve water reuse rate, vigorously promote the recycling of renewable water resources, and establish a water-saving water enterprise.

Article IV The measures are applicable to the headquarters of BEWG, the five major zones and subordinate business areas, project companies, etc., and the measures are for reference by foreign invested water environmental protection companies and overseas business. If there are conflicts with the local policy requirements during implementation of the measures, please follow the requirements of the country or region.

Chapter II Management Institutions and Functions

Article V Water resources management of the Group are subject to a three-level management system of the Group headquarters, the five major zones and affiliated companies.

Article VI To strengthen effective implementation of the water resources management measures, the Group has established a leading group for water resources management to guide and promote the implementation of related work of water resources management.

Article VII The water resources management team established by the Group shall be responsible for the specific work, with the participation of all functional departments of the Group. Its main responsibilities:

1. Implement the national laws and regulations on water resources management, formulate rules and regulations on water resources of the Group, implement the responsibilities and supervise the implementation.
2. Cooperate with relevant departments to formulate the water withdrawal goals, water consumption goals, and track and manage goal achievement, formulate the annual water resources management action plan to achieve the goals, adjust and report the goals, etc.
3. Establish the water resources management account and report the water data as required.
4. Promote comprehensive utilization of water resources, reclaimed water and new water utilization, seawater desalination and utilization, etc. Improve the water reuse rate.
5. Carry out water-saving measures, and promote the application of new water-

saving technologies and techniques.

6. Organize and carry out the publicity, education and training on water resources management.

7. Coordinate water resources management at all levels.



Chapter III Specific Measures

Article VIII Water Resources System Management

1. Phase of Scheme Consultation

(1) Water resources risk identification and countermeasures

At the phase of scheme consultation, water resources risk identification shall be performed, and a third-party professional organization may be invited to carry out water stability and sustainability assessment, including analyzing whether there is water shortage risk, flood disaster risk, water pollution risk, etc. Meanwhile, it is important to formulate a series of practical, feasible and comprehensive plans for measures to avoid risks according to the judgment based on the degree of risk, such as increasing water supply, improving water resource utilization, etc. In the areas where water resources are scarce, it is essential to strengthen communication with the stakeholders involved in water resources management, including polluters, professionals, authorities and other water users, meanwhile, relevant projects shall be carried out under the guidance of government water resources planning, water rights, water volume, water prices and other management work.

(2) Water resources argumentation of planned project

If the business of the Group, the five regions, and its subsidiaries involves such planning projects as water intake and use, it is important to organize the design unit to carry out water resources argumentation for planned projects, scientifically assess the water resources conditions for scheme implementation, analyze and demonstrate the scale of water demand, the allocation of water resources as required by the scheme, and the impact of scheme implementation on other industries' water use, water resources, and water function zones, comprehensively assess the water resources support conditions for scheme implementation and the rationality of the scheme elements such as objectives, scale, layout, and structure, and put forward

suggestions for water resources conservation and protection related to scheme optimization, adjustment and implementation to provide scientific basis for decision-making of water resources management of the project.

(3) Water resources argumentation of construction project

If individual new, rebuilt, and expanded construction projects within the business scope of the Group, the five major zones and affiliated companies involve direct water intake from rivers, lakes or underground and application of water-intaking permit, water resources argumentation of the construction project shall be made according to the measures, and water resources argumentation report of the construction project shall be prepared.

2. Phase of Construction and Implementation

(1) Formulation of water-saving scheme for construction

It is required to assess the links with water resources risks during construction according to the national, industry norms and regulations, project technical plans, geological and hydrological data and other related research, for example, optimization of the construction technologies including on-site material mixing, mud treatment, foundation pit drainage, cofferdam and diversion works, river dredging, new buildings, etc.

(2) Water-saving control during construction

During construction, it is important to properly carry out water-saving process control, rationally use various water collection and processing systems and water-saving devices, and keep records of monitoring and measurement, inspection, rectification, etc.

(3) Water-saving evaluation of completion acceptance

After the project is completed, it is required to carry out self-evaluation of the water-saving measures, etc. to gradually improve the application efficiency of the

water treatment systems.

3. Phase of operation maintenance

(1) Continuous optimization of production link

It is essential to continuously monitor and evaluate the quality of quality of raw water in the water supply production process and the water discharged by each process unit, and carry out technical transformation and optimization of sedimentation tank, filter tank, deep processing and other processes when necessary to improve the treatment effect, reduce the amount of sludge and backwash water, and control the auxiliary water ratio of the water plant.

(2) Intelligent management

It is required to continuously monitor the utilization of water resources for the water supply system, drainage system and water environment system, and make full use of the intelligent water system to improve the water management and service level, form a water conservancy Internet of things, carry out intelligent management of the water system and ensure water safety and refined wastewater treatment.

(3) Education and publicity on water-saving

Without interfering with daily work, the Group, the five major zones and affiliated companies shall carry out publicity and education on saving water according to the water resources management measures, and advocate saving every drop of water to promote the formation of a good habit of water conservation.

Article IX Water Resources Protection and Conservation

1. Surface Water Resources Protection

1.1 Water source protection

Water source protection area refers to a certain area of water and land that is designed by the state and requires special protection to prevent pollution of drinking

water sources and ensure the environmental quality of water sources. According to the *Water Pollution Prevention and Control Law of the People's Republic of China*, the water sources for domestic and drinking water, water bodies in scenic spots, important fishery water bodies and other water bodies with special economic and cultural value may be classified as the water source protection areas. Among them, the water source protection area for drinking water includes the surface water source protection area for drinking water and the underground water source protection area for drinking water, which is divided into primary and secondary protection areas, and a certain area can be designated outside the water source protection area for drinking water when necessary.

During business development of the Group, the five major zones and affiliated companies, the projects involving water source protection mainly include but are not limited to the following three categories:

- (1) Water supply project construction.
- (2) Projects where water environment treatment involves river-type drinking water sources.
- (3) Project which is located within the water source protection area.

It is essential to strictly implement the laws, regulations and relevant provisions of the state and local government on water sources protection, including the *Law of the People's Republic of China on Water Resources Protection*, the *Law of the People's Republic of China on Prevention and Control of Water Pollution*, the *Administrative Regulations on Pollution Prevention and Control in Water Source Protection Areas for Drinking Water*, as well as the *Water Source Protection Regulations* issued by the provinces, municipalities and autonomous regions, etc. Meanwhile, the standby water sources shall be subject to relevant requirements for the water sources.



1.2 Water resources protection of general river and lake water systems

It is mainly for the protection, supervision and management of water function zone for surface water. The water function zone is divided into the first-level area and the second-level area. The first-level water function zone is designed to solve the problems of water resources development, utilization and protection at a macro level, mainly coordinate water relations between regions, and consider the needs of sustainable development in the long run, including protection zone, reservation zone, buffer zone, development and utilization zone. The second-level water function zone is designed to divide the development and utilization zone in the first-level water function zone, and mainly coordinate the relationship between the water sectors, including drinking water source area, industrial water area, agricultural water area, fishery water area, landscape recreation water area, transition area and sewage control area.

During business development of the Group, the five major areas and affiliated companies, it is required to determine whether the project involves the water function zone for surface water according to the *Standards for Division of Water Function Zone*, the *Water Environment Function Zoning*, the *Technical Guidelines for Water Function Zones*, etc. For the project that involves the water function zones for surface water, water resources management shall be strictly subject to the *Measures for Supervision and Management of Water Function Zones* formulated by the state and local governments to ensure that the water quality of the water function zones meets the standards and the water ecological safety, and maintain the water function and ecological service function.

2. Groundwater resources protection

Groundwater resources refer to the water resources that are buried below the surface and can be exploited and utilized (including geothermal water, mineral water),

and the management of groundwater resources shall be subject to the principles of comprehensive planning, protection-oriented, rational development, balanced exploitation and replenishment, and pollution prevention to give full play to the comprehensive benefits of groundwater resources.

During business development of the Group, the five major zones and affiliated companies, for the projects involving groundwater intake, it is important to strictly implement the provisions of the *National Groundwater Pollution Prevention and Control Plan 2011—2020*, the *Implementation Plan for Groundwater Pollution Prevention and Control*, etc., and monitor the groundwater sources based on the range of prohibition and limit on groundwater collection checked and issued by the people's governments of various regions to know the trend of changes in water level, water volume and water quality.

3. Guarantee of ecological flow of rivers and lakes

Ecological flow of rivers and lakes refer to the flow (water volume, water level) and its process that needs to be kept in the rivers and lakes and meets the water quality requirements to maintain the structure and function of water ecosystems like rivers and lakes. Ensuring the ecological flow of rivers and lakes is an important indicator for controlling the intensity of water resources development, and is also an important foundation for coordinating living, production and ecological water utilization, and optimizing the allocation of water resources.

The Group, the five major zones and affiliated companies shall strictly comply with the requirements of series of documents including the *Ecological Flow Guarantee Target for Key Rivers and Lakes* issued by the Ministry of Water Resources when developing the ecological flow guarantee target for the rivers and lakes in the *List of National Key Rivers and Lakes of Ecological Flow Guarantee (2020-2022)*. Meanwhile, for rivers and lakes not included in the *List of National Key Rivers and Lakes of*



Ecological Flow Guarantee (2020-2022), it is important to choose appropriate calculation methods, carry out water balance and accessibility analysis, and comprehensively determine the ecological environmental protection goals and guarantee schemes of urban rivers and lakes according to the *Guidelines for Calculation of Water Demand for Ecological Environment of Urban Rivers and Lakes (The First Edition)* (No. 53 [2020] of BEWG) published by the Group in May 2020, and based on the river and lake water resources conditions and ecological protection needs of the project, under the premise of abiding by the principles of the Ministry of Water Resources on the basis for establishing the ecological flow guarantee target of rivers and lakes.

Article X Production and Transportation of Water Resources

1. Optimization of Water Supply Production Process

Water supply production is a key link in water resources utilization, and is the main part to meet user needs and guarantee water quality and quantity. During water supply production, since the water consumption caused by self-use demand of process operation is huge, there is still considerable space of water-saving. It is an effective way to reasonably develop and save water resources by strengthening the management of production and operation of urban water plants, and optimizing the production process and reducing the self-water consumption of the water plants under the premise of guaranteeing the safety and quality of water.

In the water supply projects, the Group, the five major areas and affiliated companies shall properly optimize and manage the water supply production process, establish a sound optimized management network system for the Group, major zones, project companies, water plants, sections and teams, and formulated the specific measures. As the first person responsible for optimizing process management, the director of each water plant is responsible for overall work of the water plant process

operation management. The water plants shall draw relevant curves according to actual process operating parameters, jointly determine whether to adjust the key purification process, ensure the accuracy of the operating parameters, and gradually reduce self-water consumption under the premise of ensuring the quality of finished water.

2. Pipeline transportation process control

During pipeline transportation, pipeline damage caused by aging or other reasons will result in leakage of the pipeline. Pipeline burst and leakage may cause water loss, which not only results in economic losses of the water plants and water management departments, but also leads to waste of the urban water resources. To carry out refined pipeline transportation process control, effectively reduce pipeline leakage and relatively increase water supply capacity is not only an important and feasible approach to save water resources and alleviate the contradiction between supply and demand, but also an objective requirement to improve economic efficiency and ensure safe water supply.

In the water supply projects, the links involving pipeline transportation of the Group, the five major zones and affiliated companies mainly include but are not limited to the following three categories:

- (1) Planning and design of the water supply network ;
- (2) Construction management of the water supply network;
- (3) Operation and maintenance of the water supply network.

It is required to strictly implement relevant national and industry standards and regulations, including the *Code for Urban Water Supply Engineering Planning* (GB 50282-2016), the *Code for Design of Outdoor Water Supply Engineering* (GB 50013-2019), the *Code for Design of Building Water Supply and Drainage* (GB50015-2019), the *Code for Construction and Acceptance of Water Supply and Sewage Pipelines* (GB

50268-2008), the *Technical Regulations for Operation, Maintenance and Safety of Water Supply Pipes in Cities and Towns* (CJJ 207-2013), the *Technical Specification for Leak Detection of Water Supply Pipe Nets in Cities and Towns* (CJJ 159-2011), etc. to properly carry out macro-control of operating conditions of the pipeline network and micro-survey of pipeline network leakage detection on the basis of establishing a modern pipeline leakage detection system, combined with intelligent application, and improve the level of leakage control in the pipeline transportation process by paying equal attention to technology and management.

For information management of pipelines, Geographic Information System (GIS), database technology, etc. are adopted to establish an asset management system for water supply management to carry out comprehensive and effective management of relevant data of urban water supply network, and achieve inspection and maintenance of pipe network, emergency maintenance management based on the pipe network spatial attribute data and real-time monitoring data.

It is designed to carry out real-time assessment of the operation, maintenance and leakage of the water supply network based on all-round perception of the monitoring instruments such as pipe network, meters, and water quality and through the application of the technologies including District Metered Area (DMA) management, online monitoring, data analysis, etc. It is to control and manage the leakage rate of the water supply network by combing technology and management, with the integration of the management measures to reduce leakage rate such as corresponding organizational structure adjustment, business process reshaping, reasonable performance appraisal, etc.

Article XI Efficient Utilization of Water Resources

The effective utilization of water resource shall follow the principle of “giving preference to high-quality water, efficient configuration”, and giving preference to high-quality water and efficient configuration shall be achieved based on overall and long-term development, overall consideration, scientific planning, taking well-targeted steps, and by means of scientific and systematic top-level design and establishing a new pattern of water resources utilization based on reclaimed water reuse and optimal allocation of water resources.

1. Intelligent Water Supply System

To establish an intelligent water supply system, it is required to cover the business links of production, supply and sales, and achieve automatic acquisition, information interconnection and fusion analysis of the production factors such as infrastructure and equipment of the water supply industry with the water supply network as the link and through the Internet of Things perception technology, cloud computing technology, Geographic Information System, hydraulic and water quality model, etc. The construction of an intelligent water supply system includes operation management of water plants, water supply network management, customer service, scientific scheduling management, etc. After completion, a one-stop management and service system of “monitoring, control, operation & maintenance, and service” can be achieved to improve the utilization rate of water resources and guarantee the security of water resource.

Therefore, during the construction of an intelligent water supply system of the Group, the five major zones and affiliated companies, the specific requirements are as follows:

(1) Water plant operation management

It is designed to achieve the acquisition and monitoring of real-time operating data of water plants based on the Internet of Things technology, as well as refined

management of equipment maintenance in the water plants, generate various special reports for the operation of water plants, and provide basic data for scientific scheduling, cost analysis, etc.

(2) Water supply network management

For the renovation of old community, the renovation agricultural and drinking water of urban and rural integration, water supply for mountain scenic area and other temporary water supply needs, it is important to provide secondary water supply solutions characterized by small floor space, fast and convenient installation, simple maintenance, and the integration of remote platform management to improve the service capacity of secondary water supply and guarantee the quality of water supply.

(3) Customer service management

Customer service is designed to achieve the service and management of users in all links of water sales process, including installation management, operation management, customer service hotline, meter management and other professional business systems. Through the revenue customer service system, full business chain management of “user-account-water location-water meter”, refined management of bills, as well as multi-person, cross-department business operation process may be achieved to improve the service efficiency and service quality.

(4) Scientific scheduling management

It is to make each water plant run at the optimal water supply by making use of the scientific scheduling system, combined with the water plant operating conditions and pipe network operating pressure and flow, etc., as well as the hydraulic model and mathematical simulation prediction model, and under the premise of ensuring the safety of residential water and pipe network, thus allowing the pump station equipment to run under the optimal working conditions to improve the working efficiency of the pump station and solve the problem of uneven water supply.

(5) Others

It is important to perfect the construction of the project management system and the Laboratory Information Management System (LIMS) in the intelligent water supply system. For important or large-sum projects of the water supply company, it is required to provide the management functions in terms of processes, contracts, schedules, files, materials, personnel, etc. based on the project management system to achieve tracking, recording and process management of the projects.

It is required to carry out comprehensive management of the inspection process, analysis data, test report, laboratory inventory resources, etc. of the water sample based on the Laboratory Information Management System (LIMS), establish a quality system consistent with laboratory business processes and control laboratory workflow according to the standardized laboratory management practices to form a transparent and traceable laboratory business management platform, and provide real-time water sample data trend analysis and quality review to relevant personnel.

2. Water resources dispatching and efficient allocation of water environment project

Since the water environment project involves ecological flow guarantee of rivers and lakes, the Group, the five major zones and affiliated companies shall, during project execution, shall carry out joint scheduling of water quality and quantity to guarantee the balance of water quality, water quantity, and water ecology and better achieve the project goals.

Joint scheduling of water quality and quantity is based on the coupling of river network model and pipe network model. It can be used to formulate a set of schemes including the optimal allocation scheme of ecological water volume in urban inland river systems, the guarantee scheme of joint dispatching for complex gate dams, as well as the management tools including the map of visualized water system water environment operation scheduling control, etc. through simulation of multi-scenario

scheduling scheme. The system can be applied to the whole life cycle of the project (planning-design-construction-operation), which mainly includes 6 steps of basic research, target analysis, model construction, scheduling plan collections, operation control tools, feedback adjustment. It can be used to systematically solve the problems of low ecological basic flow of urban inland river system, unstable water quality, etc. to provide support for maintaining the balance between river water system ecology and water quality and guarantee efficient use of water resources.

Therefore, during the whole life cycle of the project (planning-design-construction-operation) of water environment projects of the Group, the five major zones and affiliated companies, the specific requirements are as follows:

(1) Project planning period

In the event of carrying out planning and design of technical plans, it is required to simultaneously carry out joint scheduling of water quality and quantity to provide a quantitative decision-making basis for the analysis of rationality of project objectives and accessibility of design schemes, etc.

(2) Project construction period

If joint scheduling of water quality and quantity has been established in the early stage, the system shall be updated in a timely manner according to the project boundary conditions at this stage; if research on joint scheduling of water quality and quantity has not been carried out in the early stage, it is important to establish a joint scheduling system for water quality and quantity based on the project construction schedule to dynamically evaluate the implementation effect of project construction, correct the deviation of the scheme and guarantee the effect of the construction project.

(3) Project operation period

If joint scheduling of water quality and quantity has been established in the early stage, it is important to carry out online joint scheduling of water quality and quantity

in a timely manner, and develop a practical and scientific operation scheduling manual as soon as possible in this stage to effectively improve the operation and maintenance capabilities and management level, reduce the operating costs, and improve the operating performance; if research on joint scheduling of water quality and quantity has not been established in the early stage, it is required to establish a water quality and quantity joint scheduling system as soon as possible, carry out comprehensive assessment of the project, and develop an operation and scheduling manual.

3. Water-saving and efficient use of water resources in other scenarios

(1) For the scenarios involving water-saving in the water treatment process, such as filter chamber backwashing, sewage pretreatment, sewage tertiary treatment, etc., it is important to consider replacing the fresh water commonly used at present with reclaimed water sources to improve water resource utilization rate without affecting the water treatment effect. Meanwhile, it is better to install a reclaimed water reuse system in the new water plant, and old water plants are encouraged to provide a reclaimed water reuse system.

(2) In the event of building, renovating and maintaining the workplace by the Group, the five major zones and affiliated companies, it is required to thoroughly implement the water resources management measures of the Group, steadily promote water conservation, actively use unconventional water, promote the use of water-saving appliances, etc. to comprehensively improve utilization efficiency of water resources.



Article XII Water Resources Recycling

1. Recycling Utilization of Sewage (Reclaimed Water, New Water)

Sewage resourcing refers to harmless treatment and resource utilization of sewage according to the standards of surface water resources, which is an important measure to implement the national water control policy of “giving high priority to saving water”. It has dual significance of reducing pollution, protecting the environment, increasing water resources, and alleviating the water shortage crisis with respect to urban development.

The Group, the five major zones and affiliated companies shall strengthen the utilization of reclaimed water, new water, etc., and the specific measures are as follows:

According to domestic and foreign experience, the main method of sewage resourcing is to use treated wastewater as reclaimed water, which is mainly used for industrial circulating water, regional non-potable water supply, agricultural irrigation, replenishment of underground aquifers, urban greening, sanitation water, etc.

AQENT[®] is the Group’s own technology brand. It adopts advanced independent core technology, the produced water has passed 189 tests, the water quality is significantly better than the standards of the World Health Organization, the U.S. Environmental Protection Agency and China for drinking water, and it can be used to supplement most industrial production water and tap water sources like semiconductor industry water.

2. Rain and flood resources utilization

In the context of global climate change, the intensity and frequency of rainstorm will increase the risk of urban flooding, therefore, comprehensive management (utilization, development and protection) of rainwater resources is the key to solving the problems of urban water shortage, urban waterlogging, and water pollution. Rain and flood resources shall be utilized by integrated, comprehensive and

multi-objective solutions and by following the principle of “adjusting measures to local conditions” to achieve direct, indirect and comprehensive utilization of rainwater resources.

In water environment projects of the Group, the five major zones and affiliated companies, the specific methods of using rain and flood resources are as follows:

(1) Direct utilization. It is designed to use the collected and treated rainwater for green land irrigation, road spraying, landscape watering, etc. by means of rainwater collection and conservation, etc. to effectively alleviate the pressure of urban water supply .

(2) Indirect utilization. It is designed to regulate, purify and recharge the storm water runoff underground through various artificial or natural water bodies, ponds, wetlands or low-lying land, infiltration facilities, etc. to supplement and conserve the urban groundwater resources.

(3) Comprehensive utilization. It is designed to make the rain and flood resources infiltrate into the ground by various artificial or natural infiltration facilities to supplement groundwater resources, increase the urban wetland area and the habitat of living things, and improve urban landscape and ecological environment, etc.

3. Seawater or seawater desalination

Sea water desalination is to produce fresh water by means of seawater desalination, which is an open-sourcing and quantity-increase technology to achieve water resources utilization. Sea water desalination technology can increase the total amount of fresh water, and is not affected by time, space and climate, so that stable water supply such as drinking water for coastal residents and industrial boiler water supply can be guaranteed. The technology has become a strategic decision for the development of new water sources in many countries around the world, and it is also an important way to alleviate the shortage of water resources in China and promote

sustainable economic development.

The Group, the five major zones and affiliated companies can actively participate in comprehensive water projects in coastal cities and islands at home and abroad, and provide comprehensive solutions for water systems including supply and drainage system, rainwater collection, groundwater (brackish water) treatment, reclaimed water reuse and sludge disposal, etc. of the island in view of the environmental conditions of high humidity and high salt on the island by aiming at ensuring water safety, comprehensive utilization of clean energy such as solar energy and wind energy and taking reverse osmosis technology as the main process.



Chapter IV Reward and Punishment

Article XIII Those who have made outstanding achievements in water resources management shall be commended or rewarded, and those who fail to complete or implement relevant goals shall be criticized or punished as required.

Article XIV In the case of violation of the laws, regulations, guidelines, policies and these measures on water resources management, the Water Resources Management Team of the Group shall have the right to supervise, examine, criticize and warn, and the Group will hold the Group leader or the troublemaker to undertake administrative responsibility and economic responsibility in the event of major accidents or major economic loss.

Article XV The Group, the five major zones and affiliated companies may formulate corresponding rules for implementation, rewards and punishment according to national regulations and these measures.

Chapter V Supplementary Provisions

Article XVI The measures shall explained by the Water Resources Management Team of the Group.

Article XVII The measures shall come into effect as of the date of issuance.

(The English translation of the system is for reference only and the Chinese version shall prevail in case of any inconsistency between the Chinese version and English translation thereof)