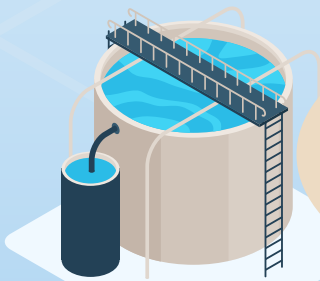




Sustainability Report 2023 Metropolitan Waterworks Authority



SMART SERVICE
ORGANIZATION TO
SUSTAINABILITY





SMART SERVICE
ORGANIZATION TO
SUSTAINABILITY

SMART SERVICE ORGANIZATION TO SUSTAINABILITY

Smart Service Organization

Become an organization that focuses on working to improve services through the adoption of digital technologies and innovations to develop quality and service models, in addition to heeding and preventing/correcting complaints. This includes providing comprehensive and diverse waterworks services to meet every customer need for a more convenient, faster, and easier access to services to ensure customer and stakeholder satisfaction.

To Sustainability

The organization strives to operate according to the sustainable enterprise development concept (ESG) covering 3 dimensions, namely, the environmental dimension through water resource conservation, campaigning/promoting for and raising awareness about the worthwhile use of water in addition to reducing paper, fuel, and electricity in the water production process in order to reduce greenhouse gas emissions, and promoting the use of renewable solar energy, etc.; the social dimension through building relationships with employees, customers, and all stakeholders and strengthening communities and society through various projects and developing personnel for greater effectiveness and capabilities; and governance through transparency and verifiability according to good governance principles along with clear risk management and the presence of an anti-corruption policy.



Vision

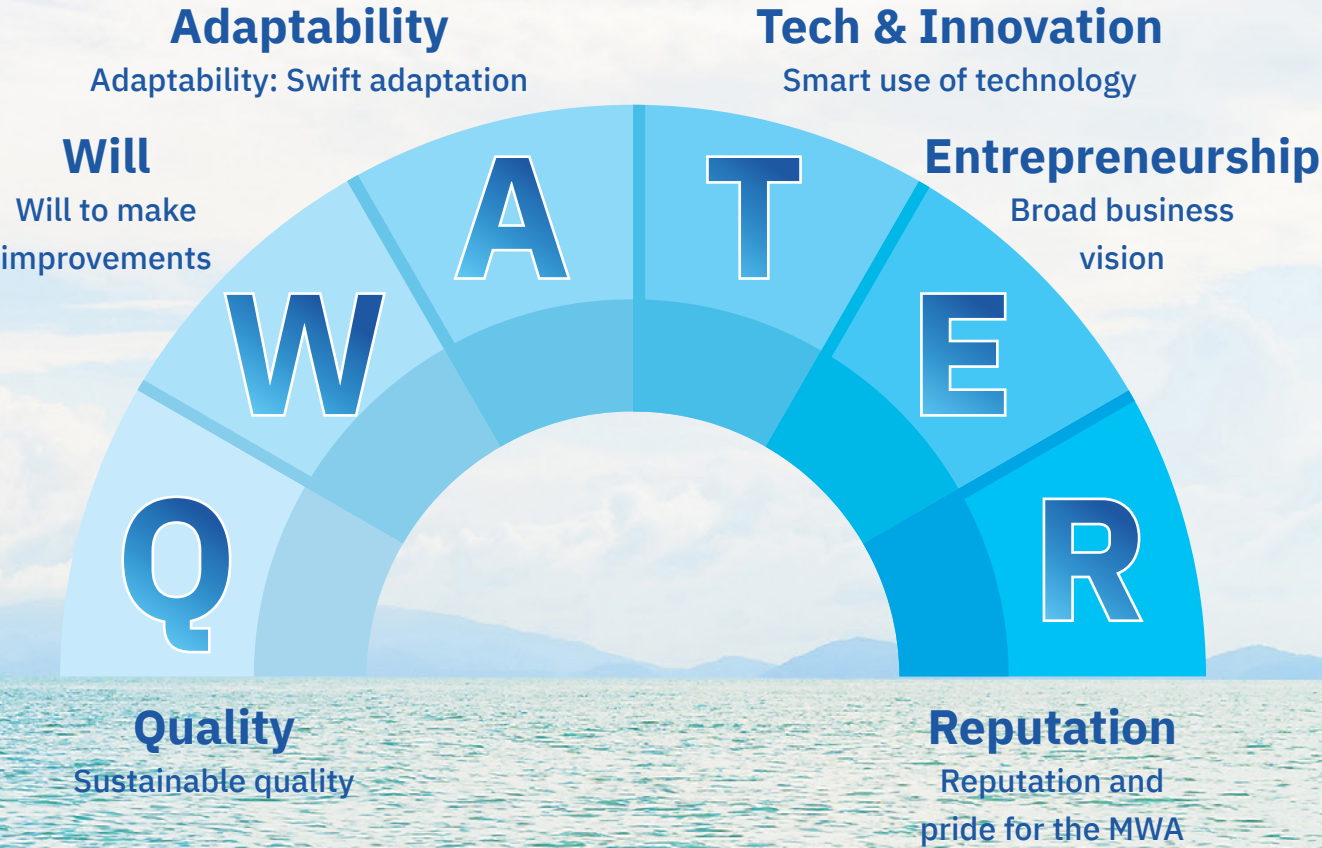
“
Quality Water
for Quality Living
”

Missions

1. Improve people’s quality of life by operating a comprehensive water business offering standard water quality service.
2. Be an enterprise capable of effectively dealing with crises.
3. Operate related businesses to create value for stakeholders and achieve sustainable growth for the enterprise

Values

“Sustainable quality, will to make improvements, adaptability, tech and technology competence, entrepreneurship, and reputation for the MWA.” (QWATER)



Contents



7

Message from
MWA Governor



18

MWA's Operating
Direction and Policy



32

Governance and
Economic
Performance

- Enterprise Management
- Transparency and Integrity
- Innovation and Digitalization
- Supply Chain Management and Sourcing
- Policy Involvement
- Economic Performance
- Indirect Economic Impacts



8

Sustainability
Reporting and
Materiality



19

MWA's Value Chain



66

Social
Performance

- Tap Water Quality
- Customer Relationship Management
- Business Cooperation and Coordination
- Occupational Health and Safety Management
- Local Community:
Participation in Community and
Social Development
- Training and Education:
Human Resources Development



11

About Metropolitan
Waterworks Authority



20

MWA Sustainable
Development Policy



104

Environmental
Performance

- Water Resources and
Wastewater Management
- Energy and Emissions
- Waste



16

Diagram of
Water Treatment



24

MWA's Stakeholders
Engagement



120

MWA Performance



129

GRI
Content Index



Message from MWA Governor (2-22, 2-23, 2-24)

Throughout the years, the MWA has always recognized our important role as a tap water service provider. Therefore, we always strive to develop our work and launch new projects to ensure extensive and continuous public access to clean water for use and consumption in our service areas and thereby enhance the quality of life of the people.

In the face of changes around the world, there are both challenges and opportunities that influence and impact the operation of the MWA, whether from the perspective of the demand for sustainable growth, rapid demographic changes, or leaping technological progress. All of these forces cause the MWA to commit to the development of new products and new things to respond to the changing demand of stakeholders in every sector, including society, the community, and the broader environment within the context of transforming into a smart service organization to sustainability. It is a vision that the MWA aims to substantially realize from the water sources to their destinations such as by enhancing services through technology to make life more convenient and comfortable, and faster, through applications and online channels; building positive relationships and increasing value for stakeholders through various CSR and CSV activities. The MWA has

set an enterprise stakeholder strategy to increase value through governance and good and sustainable partnerships with stakeholders with the goal of increasing the number of good relationships between stakeholders and the MWA. In doing so, we have set a clear direction for driving our effort over a five-year period from 2023 to 2027.

In the name of the Metropolitan Waterworks Authority, I would like to thank stakeholders from every sector for entrusting and cooperating with the MWA and for their valuable participation and recommendations, which drive the MWA toward excellence and effective service provision while improving the quality of life of consumers under good governance principles, transparency, and corporate social and environmental responsibility to ensure that our shared journey reaches the goal of sustainability.



Mr. Manit Pan-em

Governor, Metropolitan Waterworks Authority



Sustainability Reporting and Materiality^(2-3, 2-16)

The Metropolitan Waterworks Authority (MWA) Sustainability Development Report for the year 2023 discloses operational information for the period from 1 October 2022 - 30 September 2023. The reporting approach aligns with the requirements and principles of the GRI (Global Reporting Initiative) Standards under the "In accordance with" option based on material sustainability topics. It also includes other operational results that are significant to the organization.

In the 2023 fiscal year, the MWA reviewed the material topics of sustainability of the enterprise to dynamically keep up with changes in economic, social, and environmental contexts that impact work processes and the productivity and main services of the enterprise, not to mention the needs and expectations of stakeholders. The material topics of sustainability remain the same from the 2022 fiscal year, according to the work processes discussed as follows:

Process for evaluating materiality sustainability issues of the MWA⁽³⁻¹⁾



Step 1: Identify Material Issues

The MWA's material issues are identified in accordance with the Fifth MWA Enterprise Plan, aligned with the framework of the Global Reporting Initiative (GRI) standards and the United Nations Sustainable Development Goals (SDGs). This includes holding workshops to obtain feedback and opinions from all stakeholders, which consist of:

1. External stakeholders; and
2. Internal stakeholders such as executives and employees of the MWA. The purpose of these workshops is to gather information for further reviewing of the MWA's material issues from the previous year.



Step 2: Prioritize Material Issues

The MWA has prioritized material issues of the 2023 fiscal year by reviewing the material issues from the previous year alongside external factors that may affect its business and stakeholders at a workshop so as to listen to the opinions of stakeholder groups. Two criteria for prioritization are:

1. Importance level to MWA's operations;
2. Importance level to stakeholders.



Step 3: Review Results of Assessment

The panel in charge of preparing the MWA Sustainability Report has reviewed the comprehensiveness of the identification and prioritization of material issues for the Subcommittee on Corporate Governance and Corporate Social Responsibility to consider and present to the MWA Board of Directors for acknowledgment.

The MWA Materiality Matrix 2023⁽³⁻²⁾



Lists of MWA Materialities 2023



- Economic
 - Supply Chain Management and Sourcing
 - Economic Performance
 - Innovation and Digitalization
 - Transparency and Integrity
 - Policy Involvement
 - Indirect Economic Impacts



- Social
 - Occupational Health and Safety
 - Training and Education
 - Quality of Tap Water
 - Local Community
 - Customer Relationship Management
 - Partnership and Collaboration



- Environmental
 - Water and Effluents
 - Energy
 - Emissions
 - Effluent and Waste

For more information, please contact:

-  **Corporate Social Responsibility Management Department**
Metropolitan Waterworks Authority (Head Office)
400 Prachachuen Road, Thung Song Hong Subdistrict,
Lak Si District, Bangkok 10210
-  **Tel:** +66 2504 0123 ext. 1614-1615
-  **E-mail:** csr@mwa.co.th



About Metropolitan
Waterworks Authority

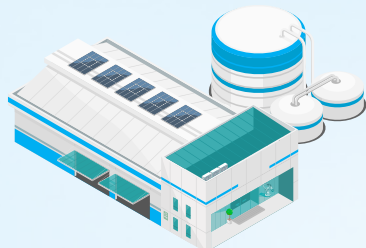


About Metropolitan Waterworks Authority (2-1, 2-6)

The MWA is a state enterprise under the supervision of the Ministry of Interior that began its operation on 16 August 1967, according to the MWA Act, B.E. 2510 (1967) as follows:



Explore and procure raw water sources for tap water production.



Produce, deliver, and distribute water supply within the service areas covering Bangkok, Nonthaburi, and Samut Prakan.



Conduct other businesses related to or useful for waterwork, such as identifying pipe leaks inside households, installing water pipes in developed housing projects, and providing professional training in waterworks.

The MWA has managed water supply based on the World Health Organization's water-quality standard. It has paid attention to water quality from upstream to downstream so as to comprehensively and adequately provide people with safe and clean water. The MWA has integrated innovations and technologies to continuously improve waterworks. Water Safety Plan (WSP) has been drawn up to assure our water supply safety and quality by launching new water pipe replacement projects in various areas while promoting positive relations with communities on the western and eastern sides of the river basin as part of the effort to conserve water resources to enhance the effectiveness of basic water supply infrastructure for sustainability.



MWA Annual Report 2023, Thai version
<https://www.mwa.co.th/about/operate-statistic/annual-report/>



MWA Annual Report 2023, English version
<https://www.mwa.co.th/en/about/operate-statistic/annual-report/>

Remark: For additional information about the organization's structure or contents beyond the scope of this report, you can read the Metropolitan Waterworks Authority's 2023 annual report.

Metropolitan Waterworks Authority (Head Office)

400 Prachachuen Road, Thung Song Hong Subdistrict, Lak Si District, Bangkok 10210
Phone: +66 2504 0123



Service Areas

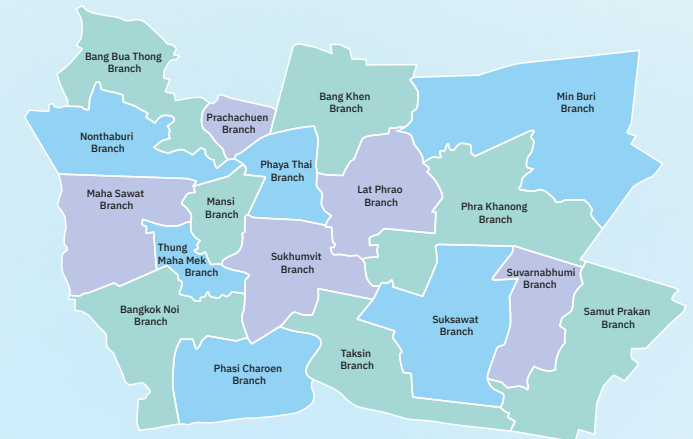
The water distribution areas of the MWA have covered the Bangkok Metropolis, Nonthaburi, and Samut Prakan regions, or a total of 3,195 square kilometers. Raw water is obtained from 2 sources, i.e. the Chao Phraya River and the Mae Klong River, for treatment, transmission, and distribution. Currently, the MWA has delivered tap water to all urban zones in the three provinces, giving their residents access to clean and safe tap water, which enhances their quality of life. MWA services are in line with the UN Sustainable Development Goal 6 (SDG 6) and the "Ease Sufferings, Nurture Happiness of People" policy of the Ministry of Interior, which supervises the MWA.

18 Branches, 4 Water Treatment Plants in 3 Provinces in Every Service Area

Regarding service provision, the MWA has 18 branch offices located in 3 different provinces and 4 water treatment plants in total.

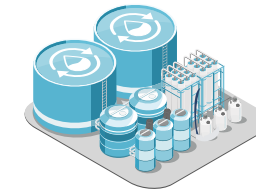
Water Supply Branch Offices

1. Sukhumvit Branch
2. Phra Khanong Branch
3. Samut Prakan Branch
4. Mansri Branch
5. Phaya Thai Branch
6. Thung Maha Mek Branch
7. Lat Phrao Branch
8. Prachachuen Branch
9. Bang Khen Branch
10. Min Buri Branch
11. Suvarnabhumi Branch
12. Taksin Branch
13. Suksawat Branch



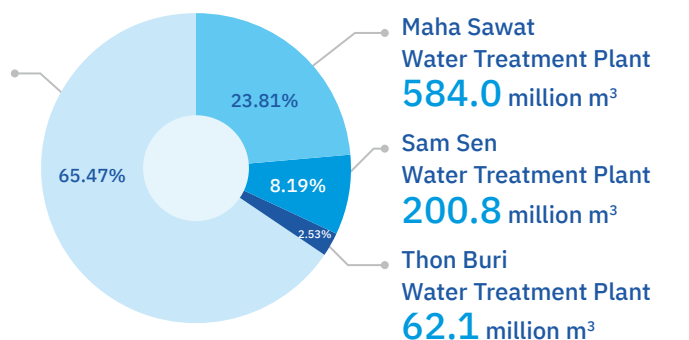
14. Bangkok Noi Branch
15. Phasi Charoen Branch
16. Nonthaburi Branch
17. Bang Bua Thong Branch
18. Maha Sawat Branch

Water Treatment Plants and Annual Water Production Capacity



Total Annual Water Production Capacity of All 4 Treatment Plants
2,452.9 million m³

Bang Khen Water Treatment Plant
1,606.0 million m³



Water Production and Distribution of All 4 Water Treatment Plants

Water Production Plant	Fiscal Year (million m ³)				
	2019	2020	2021	2022	2023
Total Water Distribution	2,075.2	2,121.1	2,116.5	2,080.3	2,042.4
Bang Khen Water Treatment Plant	1,402.3	1,410.0	1,427.6	1,394.0	1,386.4
Maha Sawat Water Treatment Plant	518.8	572.3	556.6	560.0	528.3
Sam Sen Water Treatment Plant	113.0	102.4	92.2	86.4	87.3
Thon Buri Water Treatment Plant	41.1	36.4	40.1	39.9	40.4
Total Water Distribution (million m³)	1,467.4	1,458.3	1,416.2	1,422.2	1,488.6

Major Operating Sites⁽²⁻²⁾

1. Headquarters

2. Control Buildings of Water Transmission and Distribution Systems

3. 18 MWA Branches

4. Training Center

5. Water Pumping Stations

6. Transmission Stations
7. 4 Water Treatment Plants (Bang Khen, Maha Sawat, Sam Sen, Thon Buri)

8. The Water Quality Department and the Water Treatment Plants

9. Control Room of Water Treatment Plants

10. Eastern Waterwork Canal and Western Waterwork Canal



Personnel (Fiscal year 2023)^(2-7, 2-8)



Customer Groups

In the 2023 fiscal year, the MWA reviewed the customer groups for the core business, i.e. the provision of water supply services for the entire water life cycle of customers today and in the future for the purpose of planning and setting goals and direction for effective marketing consistently with the important and varying needs and expectations of customers and to deliver positive customer experiences throughout the entire customer life cycle covering development, product and service innovation, and customer relationship management.



1.1 Current Customer

The current customers of the MWA are water consumers in the areas under MWA’s responsibility (Bangkok, Nonthaburi, and Samut Prakan) classified by water usage behaviors, business type or size (firmographics), and needs and expectations.

In addition, key accounts that are customers with a high average monthly water consumption of over 10,000 cubic meters per month have been identified for customer relationship management (CRM).

R

Residential
refers to a group of customers who consume water within households or residences, with peak usage mostly occurring in the morning hours and evening hours.

C

Commercial
refers to a group of customers who consume water for commercial or corporate purposes involving scheduled water uses according to the working hours of each business or corporation.

I

Industrial
refers to a group of customers whose major purpose is for industrial use involving continuous usage, with some industries using water for 24 hours daily.

1.2 Potential Customer

Potential Customers Analysis of strategic opportunities identified potential customers such as customers from pipe installations to expand water distribution areas and water sales to the people living in fringe areas in line with the government’s policy to give the public equal chance to access clean water. For future market growth targets, customers can be divided into 2 groups as follows:

Potential Customer
Customers in the areas under the MWA’s responsibility (Bangkok, Nonthaburi, and Samut Prakan) who lack access to water supply, such as water consumers in local administrative organization areas, including consumers of groundwater and other natural water sources.

Potential Area
Customers in areas that should have access to water in line with the Ministry of Interior’s policy, especially in fringe areas.

Number of Customers by Water Usage Behaviors, Business Type or Size, and Needs and Expectations for 2021-2023

	2021 (Customers)	2022 (Customers)	2023 (Customers)
R Customers	2,062,489	2,109,622	2,115,868
C Customers	450,332	444,371	444,771
I Customers	4,665	4,425	4,460
All Customers	2,517,486	2,558,418	2,565,099

Data as of 30 September 2023

14 Smart Service Organization to Sustainability

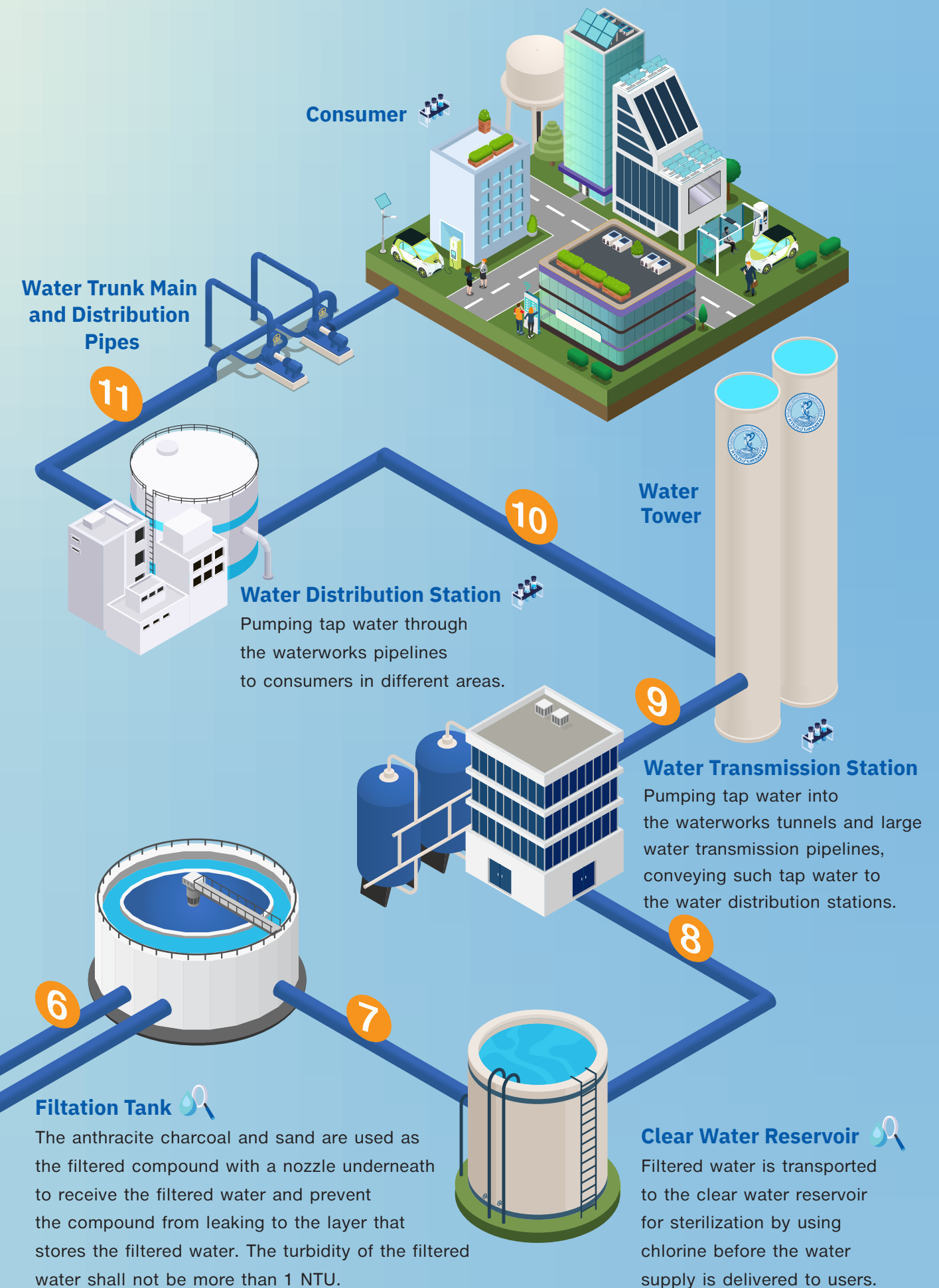
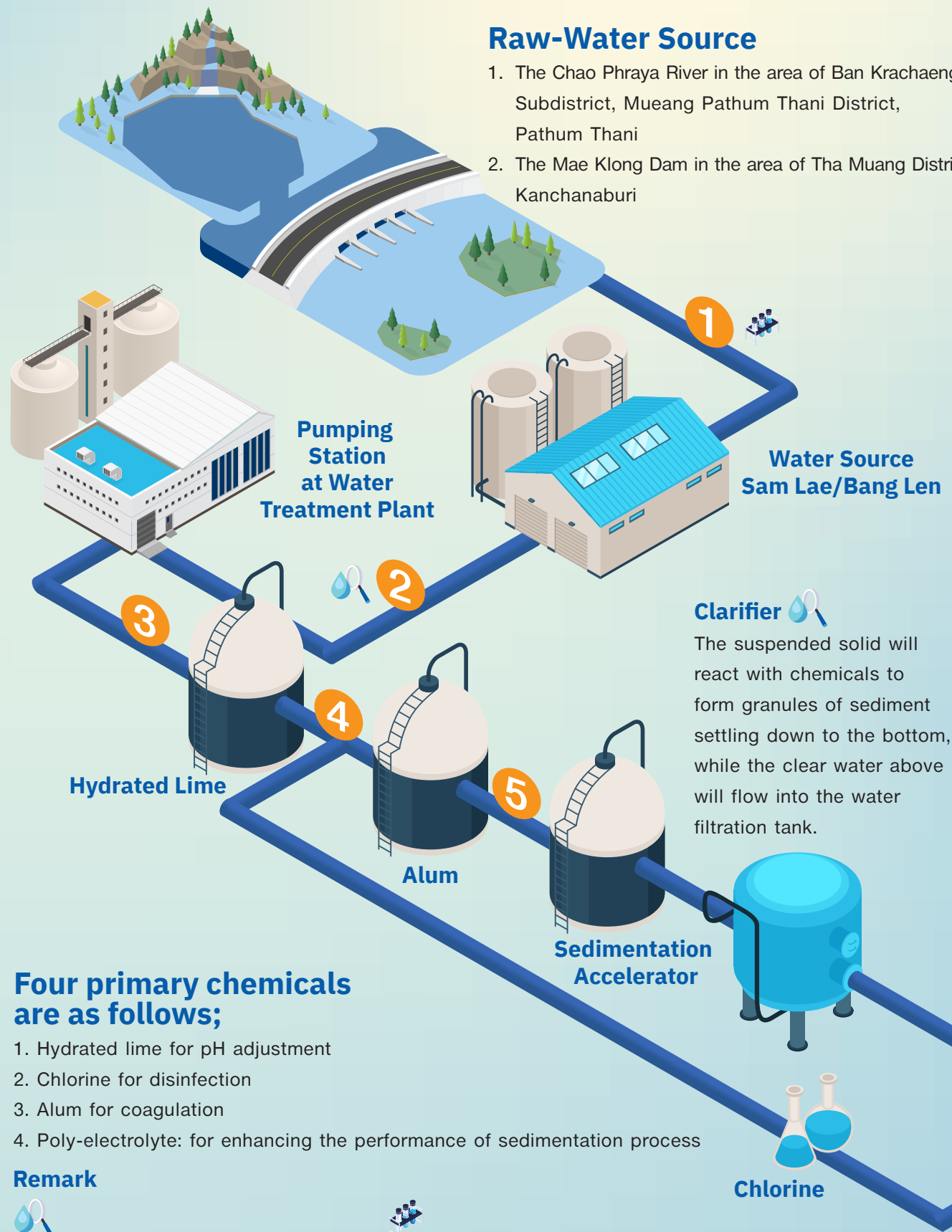
Sustainability Report 2023 Metropolitan Waterworks Authority 15



Diagram of Water Treatment (2-6)

Raw-Water Source

1. The Chao Phraya River in the area of Ban Krachaeng Subdistrict, Mueang Pathum Thani District, Pathum Thani
2. The Mae Klong Dam in the area of Tha Muang District, Kanchanaburi



The MWA is a state enterprise under the Ministry of Interior that was established under the Metropolitan Waterworks Authority Act, B.E. 2510 (1967) (MWA Act). Our primary mission includes conducting surveys to procure raw water and obtaining raw water supply to produce, deliver, and supply tap water in the Bangkok, Nonthaburi, and Samut Prakan areas while controlling standards related to private waterworks systems in the area. We also operate other businesses that are related to or beneficial to the MWA and we play an important role in driving government policies for developing the national economy and society consistently and in line with environmental changes.

In setting its direction and operating policy, the MWA considers and gathers information from both internal and external sources that are related to the enterprise, including mega trends around the world, sustainability factors, stakeholders' needs and expectations, engagement with the MWA's board of directors, subcommittees, high-ranking executives and personnel, along with an analysis of strategic advantages and strategic challenges and the enterprise's core competencies in order to review and set the enterprise's direction.



The MWA's core mission is to distribute quality tap water and provide services in response to customers' needs, with operations that are in compliance with guidelines, standards, and good corporate governance, which are divided into three main categories:

 **Management Process**

It is related to executions that require the engagement of all executives to drive processes in order to meet requirements and targets. It also includes determination of the future direction, which focuses on creating growth and sustainability of the organization.

 **Support Process**

It is a process that supports and encourages the achievement of core processes which facilitate smooth corporate management, focusing on its efficiency and effectiveness.

 **Core Process**

The core process is vital and directly affects corporate achievement. It is a process that delivers value to customers and stakeholders. It consists of:

- **Waterworks business:** It is a process relating to water production and distribution that focuses on quality and efficiency.
- **Connected businesses:** It is a process relating to work system design and installation, one-stop waterworks services, and aggressive marketing and product/service sales with a focus on up-to-standard services that fulfill our commitments.

Every process is aimed at delivering valuable products and services to customers and stakeholders sufficiently and comprehensively in every service area in addition to supporting the sustainable economic and social development of the country.

Input	Management	M1 Organization Management		M2 Waterworks Infrastructure Development		M3 Research, Development, Innovation (RDI)		Output	
- Needs and Expectations of Customers and Stakeholders - Internal and External Environmental Changes		M4 Risk Management, Internal Control, and Internal Audit		M5 Good Governance and Stakeholder Responsibility		M6 Knowledge Management		- Clean and safe water supply with strong and adequate flow. - Service excellence. - One-stop waterworks service.	
		M7 Digital Technology Management							
		Core	Waterworks Business			Related Businesses			
	C1 Raw Water Management		C2 Water Production	C3 Transmission	C12 Systems Design and Installation	C14 Aggressive Marketing and Product/Service Sales			
	C4 Water Quality Monitoring/Control								
	C5 Waterworks System Maintenance			C13 One-stop Waterworks Service					
	C6 Water Meter Installation		C7 Water Meter Reading and Billing						
	C8 Payment Acceptance		C9 Customer Relationship Management		C10 Issue/Complaint Management	C11 Partner/Trade Partner Management			
	Support	S1 Human Resources Management		S2 Procurement and Supplies Management		S3 Budget and Finance Management		S4 Administrative Work	- People's good quality of life. - Sustainable water resource availability. - Enterprise growth and sustainability.



MWA Sustainable Development Policy



MWA Sustainable Development Policy

Criteria, Regulation, and Authority That the MWA Deploys as a Framework for Economic, Social, and Environmental Development ^(2-23, 2-24, 2-27)

The MWA is a state-owned enterprise under the supervision of the Ministry of Interior, which was established under the Metropolitan Waterworks Authority Act, B.E. 2510. Thus, our roles and duties are following the laws, regulations, and standards, which are summarized as follows:

Laws/Rules/Regulations	Details of Relevant Laws and Regulations
 Occupational Health and Safety	- Occupational Safety, Health, and Workplace Environment Act, B.E. 2554 (2011) - Ministerial Regulation on Assigning Safety Officers to the Work of Agency Personnel or Groups of Persons to Perform Safety Activities in the Place of Business, B.E. 2565 (2022). - Ministerial Regulation on Specifying Health Inspection Standards for Employees Working with Risk Factors, B.E. 2563 (2020). - Notification of the State Enterprise Labor Relations Board on the Minimum Standards for Employment Unions, B.E. 2549 (2006) - Notification of the Department of Labor Protection and Welfare on Determination of Personal Safety Equipment Standards, B.E. 2554 (2011) - Notification of the Department of Labor Protection and Welfare on warning signs, symbols of occupational safety, health, and working environment and messages showing rights and duties of employers and employees, B.E. 2554 (2011) - Announcement of the Department of Labor Protection and Welfare on the Training or Development of the Knowledge of Safety Officers in Performing Technical Work, Advanced Technical Work and Professional Work Related to Additional Work Safety. - Announcement of the Ministry of Public Health on Notification and Reporting of Encounters with People Who Have or Are Reasonably Suspected to Have Contracted Illnesses from Work or from Environmental Infections, B.E. 2565 (2022). - State Enterprise Labor Relations Act, B.E. 2543 (2000).
 Certification or Registration for License to Operate	- Metropolitan Waterworks Authority Act, B.E. 2510 (1967) - Codes of Conduct - Royal Decree on Criteria and Procedures for Good Country Administration (No. 2), B.E. 2562 (2019) - World Health Organization (WHO) - Electronic Transactions Act, B.E. 2544 (2001) - Electronic Transactions Act (Amendment), B.E. 2562 (2019) - Factory Act, B.E. 2535 (1992) - Arms Control Act, B.E. 2530 (1987) - Hazardous Substance Act (No. 3), B.E. 2551 (2008) - Government Administration and Services through Digitalization Act, B.E. 2562 (2019)

Laws/Rules/Regulations	Details of Relevant Laws and Regulations
 Industry Standards	- WHO's Guidelines for Drinking-water Quality, 4th Edition, Incorporating the 1st Addendum - Good Manufacturing Practice: GMP - Hazard Analysis and Critical Control Points: HACCP - ISO 9001:2015 Quality Management System - ISO/IEC 17025:2005 Operating Noise Quality Assurance System - ISO/IEC 27001:2013 Information Security Management System - ISO/IEC 29110 Diagnosis and Recommendation System to Guide in Enhancing the Software Development - ISO 26000 Social Responsibility Guidance Standard - Notification of the Department of Health on Criteria for Drinking Water Quality, Department of Health, B.E. 2563, dated July 13, 2020 - Notification of the Department of Health on Recommendation Criteria for Drinking Water Quality for Surveillance, Department of Health, B.E. 2563, dated July 13, 2020 - Notification of the Metropolitan Waterworks Authority on the Criteria for Determining the Water Quality of the Metropolitan Waterworks
 Environmental, Financial, and Product Management	- Budget Procedures Act, B.E. 2502 (1959) - Rule of the Office of the Prime Minister on Investment Budget of State Enterprises, B.E. 2550 (2007) - Rule of the Ministry of Finance on Accounting and Finance of State Enterprises, B.E. 2548 (2005) - Government Procurement and Supplies Management Act, B.E. 2560 (2017) - State Fiscal Discipline Act, B.E. 2561 (2018) - ISO 140001:2015 Environmental Management System - WHO's Guidelines for Drinking-water Quality, 4th Edition, Incorporating the 1st Addendum - Groundwater Resources Act (No. 3), B.E. 2546 (2003) - Facilitation of Government Authorization Act, B.E. 2558 (2015) - Public-Private Partnership Act, B.E. 2562 (2019) - National Environmental Quality Promotion and Conservation Act, B.E. 2535 (1992) - Energy Conservation Promotion Act, B.E. 2535 (1992) - Ministerial Regulation prescribing rules, methods, and forms for collecting statistics and data, preparation of detailed records and a performance report of the wastewater treatment system, B.E. 2555 (2012) - Notification of the Ministry of Natural Resources and Environment on Determination of Wastewater from Factory, Industrial Estate, and Industrial Zone - Notification of the Ministry of Industry, Subject: Determination of Standards for Controlling Wastewater Discharge from Factory, B.E. 2560 (2017) - Notification of the Ministry of Industry on Disposal of Sewage or Disused Material, B.E. 2548 (2005) - Announcement of the Ministry of Industry on the Management of Waste or Scrap Materials, B.E. 2566 (2023).
 Others	- Government News and Information Act, B.E. 2540 (1997) - Computer Crime Act, B.E. 2550 (2007) - Personal Data Protection Act, B.E. 2562 (2019) - Cyber Security Act, B.E. 2562 (2019) - Criteria for assessing the work processes and management (enablers) of the state enterprise - Government shareholder policy guidelines (state of direction: SOD) on the state enterprise - Announcement of the State Enterprise Policy Office on the State Enterprise Development Plan, B.E. 2566-2570 (2023-2027).

In addition to the primary missions in the extensive treatment, transmission, and service provision of water supply to consumers in service areas, the MWA is determined to operate according to sustainable development guidelines consistent with the Sufficiency Economy Philosophy and the Sustainable Development Goals that make up the direction framework for global development set by the World Health Organization and the action plans for driving the development of Thailand. We aim to do this by relying on the BGC economic model (2021-2027) and the MWA's Enterprise Roadmap by enhancing management effectiveness

and basic water supply infrastructure from upstream to downstream in order to create value and support the government's policies while meeting the needs and expectations of stakeholders in a balanced way. We also want to build confidence through working according to good corporate governance principles with fairness, transparency, responsibility, and continuous innovation. Therefore, on 19 August 2022, the board of directors of the MWA announced the MWA Sustainable Development Policy to provide a guideline for the enterprise to operate as follows:



Accordingly, the executives, employees, and contract workers of the MWA have the duty to support, push for, and take action consistently with the enterprise's Sustainable Development Policy in order to lay the essential foundation for the sustainable development of the enterprise. The MWA has also specified the **MWA Good Governance Policy and the MWA CSR Policy** to provide the operating framework to be adopted by personnel in working with consideration to social and environmental policy and according to the principles of good governance and transparency. We have also announced the **Stakeholder Management Policy** to establish a standard for the equitable treatment of all stakeholders.



Scan QR Code to view the MWA Good Governance Policy.



Scan QR Code to view the Stakeholder Management Policy.



Scan QR Code to view the MWA CSR Policy.



MWA's Stakeholders Engagement

MWA's Stakeholders Engagement

Identification of Stakeholders from Work Processes Across the Value Chain of MWA Identification of the Organization's Stakeholders

In the fiscal year 2022, The MWA reviewed the organization's stakeholder identification process in line with the international guideline AA1000:2015 by thoroughly examining work processes across the MWA's value chain to be implemented in the fiscal year 2023. The stakeholder identification review revealed that the MWA remains to categorize stakeholders into 9 groups as follows:



1. **Policy agencies and government shareholders** mean agencies responsible for governing and supervising state enterprises, including the Metropolitan Waterworks Authority, and various subcommittees appointed by the Metropolitan Waterworks Authority.
2. **Task-based related agencies** mean government agencies whose tasks are shared with us.
3. **Customers** – The MWA classifies customers based on water products that cover the customer life cycle, including existing and future customers, as follows:
 - **Existing customers** are water supply consumers in the MWA service areas under our responsibility (Bangkok, Nonthaburi, and Samut Prakan) divided by behavior, firmographics, and needs into 3 main groups as follows:
 - **Residential (R)** means customers who use water directly for utility and consumption purposes in residential areas, with peak usage mostly occurring in the morning hours and evening hours.
 - **Commercial (C)** means customers who use water commercially or in corporations with a scheduled water usage format according to the working hours of each business or corporation.
 - **Industrial (I)** means customers who use water industrially, such as in production involving continuous usage, with some industries using water for 24 hours daily.
 - **Future Customers** are specified according to the government's policy in favor of giving the public equal access to clean water and specified according to strategic opportunities for selling water in fringe areas. Therefore, these customers are divided into 2 groups as follows:
 - **Potential Customer** mean customers in the areas under the MWA's responsibility (Bangkok, Nonthaburi, and Samut Prakan) who lack access to water supply, such as water consumers in local administrative organization (LAO) areas, including consumers of groundwater and other natural water sources.
 - **Potential Area** mean customers in areas that should have access to water in line with the Ministry of Interior's policy, especially in fringe areas.



4. Employees and workers

- **Employees** refer to personnel working under permanent contract employment with the MWA who perform their duties according to each job description.
- **Workers** refer to personnel working under temporary contract employment who perform their duties as prescribed in employment contracts and supervised by the MWA, namely workers of private companies and agents.
 - **Subcontracted workers** refer to personnel hired by the MWA through MWA's contractors on an annual basis. It is divided into 4 groups: 1) Administrative, 2) Mechanic, 3) Automotive, and 4) Other groups-workers and welders.
 - **Representatives** refer to personnel hired by the MWA to provide service to water consumers under the rules and practices prescribed by the MWA. Each contract renewal shall not be more than 3 years, namely 1) Billing and payment services, 2) Wiring binding, and 3) Flow Meter reading.



5. **Trade partners** mean agencies or juristic persons or persons who receive remunerations for preparing products, services, lease contracts, and personnel for the MWA.



6. **Alliances** mean agencies, organizations, or groups of people who agree to work with the MWA to achieve mutual objectives. Partners are sub-divided into 2 groups as follows:

- **Business Alliances**, for example, from payment processor appointment contracts.
- **Academic Alliances**, for example, agencies/persons that receive funding from the MWA to conduct research.



7. Community & Society

- **Community** refers to
 - Upstream community areas (East and West).
 - Communities along the Waterworks Canal (west) located in Kanchanaburi, Ratchaburi, Nakhon Pathom, and Nonthaburi with a total distance of 107 kilometers, and communities along the Waterworks Canal (East) located in Pathum Thani, with a distance of approximately 30 kilometers.
 - Communities around raw water pumping stations (all 10 stations).
 - Communities in the service areas.
 - Downstream Communities along the Mae Klong and the Chao Phraya basins.
- **Society** refers to the people who are not directly affected by the operations of the MWA but those who live in the areas where there is potential for improving/promoting quality of life.

Remark: Key communities of the MWA include the communities in areas around the water treatment plant (all 4 plants) which are defined as the following criteria – it shall be a community with an area adjacent to the operating area and most likely to be affected by the operations of the MWA. Also, it shall be an area that has potential for improving quality of life by utilizing the expertise of the MWA.



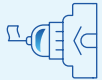
8. **Media** refers to a person who is a media professional, or a person or a group of persons, whether they are juristic persons or not, who operate the media. It acts as a medium for conveying communication content of all types to the public whether they are in the forms of print media, radio broadcasting, television, digital media, or any other forms of media that can convey such communication content to the public in general.



9. **Activists/independent organizations/civil society/academics** refer to individuals, groups of people, or non-profit organizations who have presented a variety of views toward society to improve quality of life. Such views may affect the directions or operations of the MWA.

Engagement Channels and Stakeholder Expectations (2-25, 2-26, 2-29)

In order to understand and know about the needs and expectations of every group of stakeholders of the enterprise, the MWA builds relationships with stakeholders through many channels below:

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/ Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Policy Agencies and Government Shareholders	• Meetings • Platform for expressing opinions • Participation in MWA's activities • Satisfaction surveys	• More than once per year • Once per year • More than once per year • Once per year	• Presence of projects/plans that correspond to the 20-year National Strategies and master plans under the National Strategies (on reduction of daily water consumption per capita) • Work integration between agencies • Water loss reduction performance according to targets • Needs/expectations for activities carried out at water distribution pumping stations to comply with enacted laws, acts, regulations, requirements, and announcements declared by each ministry • Financial reports (such as EBITDA, public debt administration plans, and GFMS-SOE data) to submit to the MWA's regulatory agencies in full and on time • Corporate environmental and social responsibility according to the 12th National Economic and Social Development Plan in Part 4, National Development Strategies	• Water and Effluents • Partnership and Collaboration • Policy Involvement • Customer Relationship Management • Economic Performance • Energy Emissions • Effluent and Waste	• Water-saving efficiency project (water-saving labels) • Involvement with policy agencies and government shareholders • Project to increase water pressure in low-pressure areas (VOS Pumping Station) • Wastewater management • Water recycling • Floating solar panel and solar rooftop projects • Energy conservation policy

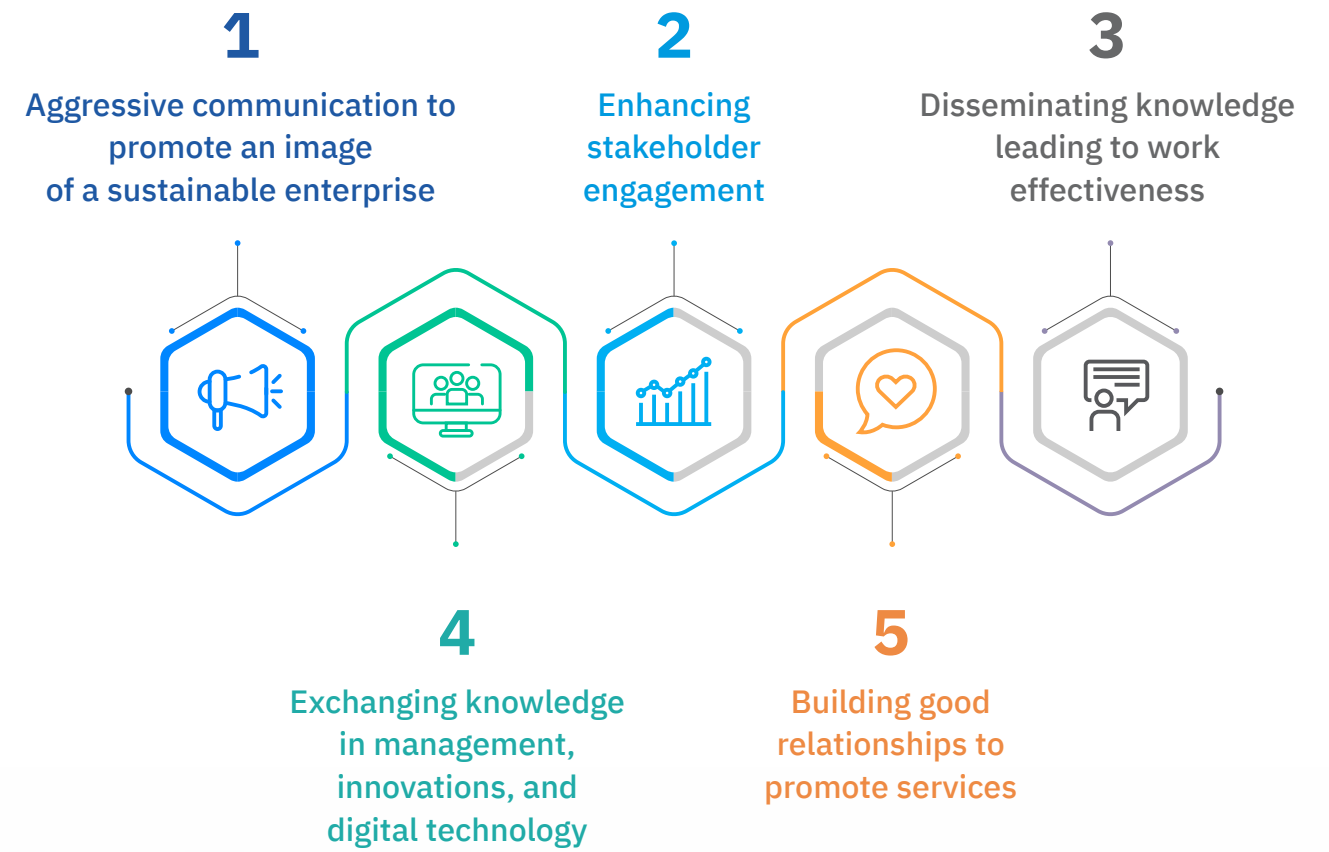
Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/ Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Mission-based Related Agencies	- Meetings - Participation in MWA's activities - Satisfaction surveys	2-4 times/month - Year-round - Once per year	- Construction and water pipe installation plans that correspond to mission-based related agencies - Problems related use of space for construction and water pipe installations - Management of raw water sources in crisis to alleviate water quality impact	- Partnership and Collaboration - Innovation and Digitalization - Water and Effluents	- Building and enhancing relationships with mission-based related agencies in order to reduce problems associated with water pipe constructions and installations - Project to develop salinity predictions and simulation mode
 Customer	- Touch point channels, such as: - MWA branch offices 1125 Call Center - CRM activities (MWA Meets the People/Top-Tier) consumer satisfaction surveys (surveys/ in-depth interviews/ focus groups), etc - Social media such as Facebook/X/ LINE@/Social Monitoring, etc. - Applications such as MWA onMobile	At all times	- Expectations for the MWA to create service efficiency-enhancing innovations - Needs for adequate and consistent water volumes and pressure - Adequate tap water flow to meet usage requirements - Fast and orderly pipe repairs and installations without causing impacts - Pipe installations to reach areas without tap water access - High-quality tap water	- Innovation and Digitalization - Indirect Economic Impacts - Quality of Tap Water	- Development of valuable innovations - Main water pipe pressure monitoring system project - Booster pump project for low-pressure areas - Project to raise construction standards according to engineering principles by using a camera intelligent alert system (CIA) 100% water coverage project - Water Safety Plan

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/ Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Employees and Contract Workers	- Progress performance announcements and opportunities for Q&A - Enterprise engagement survey	- Twice per year - Once per year	- Clarity about career path development - Management to increase knowledge and skills to ensure effective operation according to assigned strategies and tasks - Improvements to welfare in terms of medical care and accommodation and food expenses - Provision of a wide variety of additional channels/medical facilities for exercising medical treatment rights	Training and Education	- Projects to enhance employee potential - Personnel performance evaluations - Employee benefits and welfare
 Trade Partners	- Platform for expressing opinions - Satisfaction surveys	- Once per year - Once per year	- Transparent procurement processes - Needs on knowledge and understanding about construction before actual work	Supply Chain Management and Sourcing	- Fair market competition policies and practice guidelines - MWA contractor selection and evaluation process - Joint trade partner training for potential development
 Allies	Satisfaction surveys	Once per year	Service satisfaction needs	Partnership and Collaboration	Coordination and collaboration with partners to enhance services

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/ Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Communities and Society	- Platform for expressing opinions - CSR activities - Satisfaction surveys - MWA Meets the People activities	- Once per year - More than once per year - Once per year 72 times per year. (18 MWA branch offices hold 4 activities per year per branch)	- Need for the MWA to give greater care to the community - Need for the MWA to hear opinions and engage in various community activities in areas located along water supply canals and to share resources	Local Community	Project to participate in major community development activities
	 Media	- Performance announcements - Opening ceremonies for important events - Sponsorship and participation in media activities such as founding anniversary events - Giving interviews and information to the media - The MWA's social media - News for the media - Unofficial meetings with the media (individual outlets) - Opinion surveys	- Once per year - More than 6 times per year - Year-round - Year-round - Year-round - Weekly - Year-round - Once per year	- Transparency and Integrity - Accurate, fast, and timely access to news and information	MWA Information Center
 Activists/Independent Organizations/ Civil Societies/ Academics	The MWA's social media	Year-round	Access to accurate information from agencies	Transparency and Integrity	MWA Information Center

Annual Action Plan for Stakeholder Engagement Promotion in 2023

The MWA has created an annual stakeholder engagement promotion action plan under the MWA's Stakeholder Master Plan (for 2022-2027) with all department-level agencies operating according to the action plan under 5 themes as follows:



The implementation of this plan will lead to improved relations and satisfaction among stakeholders.



Scan the QR code to see our performance in the Stakeholder Engagement Promotion plan in 2023



Governance and Economic **Performance**



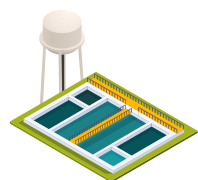
- Enterprise Management
- Transparency and Integrity
- Innovation and Digitalization
- Supply Chain Management and Sourcing
- Policy Involvement
- Economic Performance
- Indirect Economic Impacts



Enterprise Management

Risk Management

The Metropolitan Waterworks Authority (MWA) recognizes the importance of enterprise risk management. Thus, we have adopted as tools to manage the enterprise to ensure effective and efficient work results that achieve the enterprise's vision, mission, and goals by managing risks and internal control according to international principles (COSO) and operating according to the criteria for evaluating the operations and management (Enablers) of state enterprises in line with good governance principles and the enterprise's strategies. The enterprise's performance in different areas is summarized as follows:



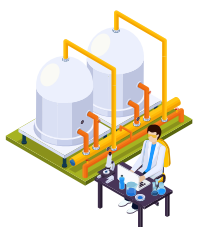
Raw Water Quantity and Quality

In 2023, the Thai Meteorological Department predicts that Thailand would experience less rainfall than in 2022 and that the El Niño phenomenon would increase in severity toward the end of the year, possibly extending up to 2024. Therefore, the MWA has effective and timely water management that minimizes impacts on users in the area of responsibility of the MWA. In doing so, subcommittee meetings are held to monitor and analyze the water situation regularly every Monday, except for holidays, in order to keep track of the water situation and coordinate with the Royal Irrigation Department and coordinate close collaboration with related agencies in the public and private sectors, including joint planning and water management to overcome crises in the long-term. Thus, the MWA has created projects to expand the production capacity of water production plants and maintenance while increasing the storage capacity of clear water storage tanks and improving canals to be able to hold more raw water in an effort to reduce impacts from potential crises and to support future water usage requirements. Furthermore, the MWA has specified key risk indicators (KRI) covering both the quality and quantity of raw water to let related agencies use as information to monitor and deal with situations in a timely fashion, in addition to providing information for executives for managing water resources in the most beneficial manner while delivering high-quality water supply according to the criteria and recommendations of the World Health Organization comprehensively to water consumers in line with the MWA's missions.



Stability in the Production, Transmission, and Distribution of Water Supply

In order to reduce risk and impacts on the stability of the production, transmission, and distribution system of water supply on the eastern and the western sides, the MWA has created machinery maintenance plans in the water production system to ensure that they are always ready for use in addition to having projects to expand the production capacity of water treatment plants and improving water system infrastructure to support increased water requirements stemming from future urban growth. In addition, the MWA has created its plan for managing the water treatment, and transmission, and distribution systems to be able to provide continuous water supply services. In 2023, the MWA successfully produced, transmitted, and distributed water to customers according to the objectives of our service plan.



Stakeholder Responsibility

The MWA considers its work management to ensure flexibility and to be able to deal with disasters, emergencies, and crises in the future in a timely manner. In 2023, the MWA was able to maintain its Business Continuity Management System (BCMS) according to ISO 22301: 2019 with its scope covering raw water management, water treatment, water transmission and distribution, service, and related support activities to ensure that the MWA's employees are prepared for dealing with potential disasters and successfully resolve situations in an effective, efficient, and timely manner while creating confidence in stakeholders that the MWA will be able to operate and provide high-quality water supply services to water consumers on a continuous basis, even as the organization faces potential future crises.



Finances

The management of the enterprise's financial status is important, especially in time periods when expenses are continuously rising while overall revenues are likely to remain stable. In addition, due to the Coronavirus 2019 (COVID-19) pandemic, water consumer behaviors have changed, particularly in industries, which significantly decreased their water consumption. As a result, the MWA faces challenges in planning financial management appropriately to the economic situation and financial status of the enterprise. Hence, our "statement of cash income and expenses" is a financial tool for aiding decision planning in effective liquidity management and financial risk management.

Thus, the MWA has improved its process for making its daily and monthly cash income and expense statements and added ways to present information with more diverse formats beyond mere tables and texts to facilitate appropriate use of information in processing, analyzing, and making financial plans. In doing so, the SAP Analytics Cloud (SAC) has been adopted as a work function, which was developed on the SAP HANA platform. SAC has key features such as comprehensive business intelligence (BI) functions and modern dashboard information presentation to allow executives to keep track of changes in the actual cash income and expenses and estimates over any given time period such as 1 month or 1 year in the future. The tool is able to analyze the current and future financial status of the enterprise to enable loan planning, excess liquidity management, and others for the best interest of the MWA while the enterprise has sufficient liquidity to continue operating sustainably.



Information Technology

To ensure effective public service, the MWA has implemented the "Security Operations Center" project. We have increased analysis of the causes of cyber security problems in addition to putting in place measures to prevent network intrusions and attacks by malicious actors. Moreover, we have adopted data governance measures and practice guidelines to manage data to ensure that enterprise data are used correctly and fully while remaining current and protecting privacy and facilitating effective and secure connections. At the same time, the MWA has made preparations to support the Cyber Security Act, B.E. 2562 (2019) by reviewing and updating our business continuity plan (BCP) in IT and holding drills continuously according to standards every year to prepare for dealing with undesirable situations.



Improving Water Loss Reduction Effectiveness

The MWA has hired people to undertake local water loss reduction projects (Performance Based Contracts: PBC) and studied ways to survey and identify routes for installing pipeline indication signs in order to reduce water loss according to set objectives. The related risk management plans include the water loss reduction target control plans based on local Performance Based Contracts (PBC) and a plan to reduce risk and impacts on the water transmission and water distribution systems due to damage caused by nearby construction. So far, activities according to the risk management plans have been carried out fully according to the plans, particularly the implementation of Performance Based Contracts (PBC), which must control repair works on broken and leaking water pipes and expedite pipe installations to promote performance monitoring according to set guidelines to appropriately achieve the enterprise's objectives.

Internal Control

The MWA engages in internal control according to the criteria of the Ministry of Finance concerning the practice standards and criteria for internal control in government agencies, B.E. 2561 (2018) and COSO 2013 practice guidelines while keeping with the criteria for evaluating operation and management processes (Enablers) of stake enterprises. Accordingly, the internal control activities are as follows:

Control Environment

The MWA has set internal control policies and practice guidelines about internal control along with a policy for integrating good governance, risk management, and operation control according to set criteria (GRC) as an operating guideline. We have described management powers duties and practices on various levels clearly and appropriately according to the enterprise's structure to promote checks and balances. In addition, executives create an atmosphere and culture that support risk management and internal control while acting as role models by operating transparently and ethically while exhibiting a sense of responsibility and instilling good conscience in personnel in their work along with a recognition of the need and importance of internal control.

Risk Assessment

We have created an internal control system adequately and appropriately according to the structure and mission of each agency covering the key work processes of the organization in every step of work while emphasizing knowledge-based internal control in work processes. We have also made knowledge evaluation part of the criteria for assessing agency-level risks to ensure that the enterprise has the required knowledge for conducting business and to ensure that related agencies can identify and assess risks covering every dimension.

Control Activities

We have specified control activities for every step of our work in order to reduce the risk of achieving our objectives, and we evaluate the adequacy and effectiveness of existing control activities and consider additional control activities as needed to ensure that the enterprise successfully achieves its objectives. At the same time, we support the development of new and beneficial innovations to undertake activities and create maximum benefits for the enterprise.

Information and Communication

We have a system in place to integrate internal control, risk management, and internal audit (GRC information system) to analyze risks and set control activities and risk management measures. In addition, we collect risk universe data by using past information to analyze data relationships and prepare various reports while also communicating, exchanging, and transferring knowledge related to control points through the KM Portal information system for personnel on every level.

Monitoring Activities

We monitor evaluation results regularly. Every agency performs an internal control satisfaction evaluation every year and reports its findings to the highest-ranking executive within the agency along with the board directors and related subcommittees. Furthermore, internal control evaluation reports are submitted according to the Ministry of Finance's criteria on the internal control practice standards and criteria for government agencies, B.E. 2561 (2018), fully and according to the specified timeframe.

In the 2024 fiscal year, the MWA focused on giving increased attention to creating added value for the enterprise by integrating risk management and internal control in the same direction as the enterprise's strategic plan in order to create reasonable confidence that the enterprise would be able to achieve its objectives according to set strategies.



Internal Audit

The Audit Office has the primary role of operating to provide assurance and consulting services fairly and independently by evaluating and improving the effectiveness of the risk management process, internal control, and good governance, in addition to auditing performance, financial reports, and compliance with laws, regulations, and policies. The roles and responsibilities of the Audit Office has been clearly specified in the charter of the Audit Office, which is reviewed and updated by at least once annually, and roles and responsibilities are communicated to the executives and employees of audit recipient agencies for acknowledgment. Furthermore, we have created policies emphasizing audit practices to ensure confidence and provide consultation in line with international professional standards for internal audits to enhance operational processes according to the evaluation criteria of the 7 enablers.

Audit Performance and Reporting

We have created a 5-year long-term audit plan (2022-2026) and the annual audit plan for 2023 based on risks (risk-based audit) by focusing on the critical risks of the enterprise and consistency with the vision, goals, and enterprise plan of the MWA. As part of this effort, we have adopted data analytic technology and techniques to support our activities. In 2023, we were able to fully perform our work according to the annual audit plan and gave recommendations to executives and audit recipient agencies in order to promote improvements in effectiveness and efficiency and add value to the enterprise. Audit results are reported to the executives of the recipient agencies of audits, the Governor of the Metropolitan Waterworks Authority, the Audit Committee, the Board of Directors of the Metropolitan Waterworks Authority, and supervisory agencies. In addition, audit topics are summarized into knowledge according to knowledge management processes and learning is exchanged inside the Audit Office and across the entire knowledge base of the Metropolitan Waterworks Authority. Accordingly, the Audit Office operates independently without any limitation to its ability to express opinions and without any unresolved conflict between the audit recipient agencies and the Audit Office.

Maintaining the Work Quality of the Internal Auditor

The internal auditor adheres to the practice guidelines in the Internal Audit Manual with quality assessments after performing audit report on an audit recipient agency, along with a self-assessment report (SAR) every quarter. In addition, the Audit Committee and high-ranking executives performs conducts an assessment once annually to produce evaluation results and recommendations in the form of feedback information for improving and enhancing audit and consultation effectiveness. Furthermore, actions are carried out according to the plan for developing and retaining audit personnel who are knowledgeable and competent by supporting for internal auditors to develop themselves to become certified internal auditors (CIA) or to receive other related professional certificates, leading to 43 percent out of all auditors having a professional certificate. Additionally, personnel are encouraged to receive in-house and external training by at least 40 hours per person per year.

Audit Fees: State Audit Office of the Kingdom of Thailand is the auditor of the MWA for fiscal year 2023 with an audit fee of 6.90 million baht.



Transparency and Integrity



Corporate Governance

To create sustainable business values, the MWA Board of Directors has attached great importance to good corporate governance principles by governing and monitoring the performance of the executives to achieve missions, objectives, and goals efficiently. Moreover, this requires it to be in response to government policies and to conduct its business ethically, apparently, and transparently, along with the environmental and social responsibilities, upholding respect for the rights of all stakeholders.



Legal and Regulatory Compliance (Compliance Unit)

The MWA provides oversight to ensure compliance with laws and regulations in the form of the "Compliance Unit", which has the Deputy Governor (Administration) serving as a chairman. The Assistant Governor (Internal Audit Office) is the committee's advisor, and executives on the deputy governor level from every section make up the rest of the committee, with the Director of the Legal Department serving as the secretary responsible for making compliance reports to the Governor according to the MWA's requirements.

The Committee has responsibilities and powers in supervising and monitoring the performance of the MWA according to laws and regulations and in proposing recommendations, working guidelines, and operating requirements. The Legal Department, as the secretary, works together with various other agencies to compile and create a database of laws and regulations related to the operations of the MWA to create work processes for performance reporting according to laws and regulations. Agencies responsible for processes (1st Line of Defense) provide assessment and reporting of performance,

while the Legal Department (2nd Line of Defense) of directors in order to set working guidelines or performance requirements in compliance with laws and regulations.

In the 2023 fiscal year, the Compliance Unit played a role in supervising and monitoring the operations of the MWA according to laws, regulations, and requirements and in making considerations in expressing opinions about problems arising from compliance to laws, regulations, and requirements and making practice guideline recommendations to related agencies for further action according to the law. The Compliance Unit also engaged in other important activities consistently with the enterprise's policy such as reviewing the Code of Ethics of the Governor and employees of the MWA, reviewing authorization of the list of laws, regulations, and requirements related to business continuity and making considerations to authorize risk and opportunity assessment results and assessments of compliance to laws, regulations, and requirements.

Structure, Roles, and Duties of the Board of Directors

Structure of the MWA Board of Directors (2-9, 2-11)



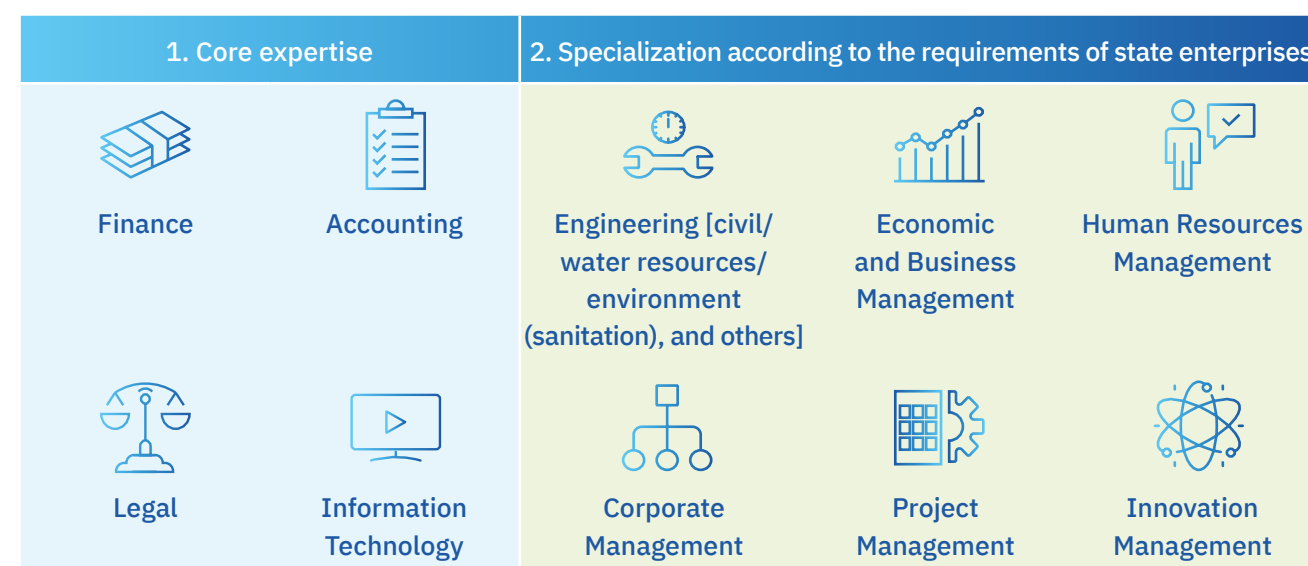
The Standard Qualifications of State Enterprise Directors and Employees Act, B.E. 2518 (1975), states that the board of directors of the state enterprise will consist of a chairman of the board and at least 9 other directors without exceeding 13 directors and that governors will be directors by virtue of their position. Accordingly, the board of directors of the MWA has the authority to appoint committees and subcommittees to assist in

screening work in different areas, whether economic, social, or environmental in nature. Furthermore, senior persons and executives of the MWA have been appointed to serve as directors, subcommittee directors, or secretaries to support, screen, and report on various performance areas. (For details about the various subcommittees, see the 2023 Annual Report.)

The MWA Board of Directors Selection Process ⁽²⁻¹⁰⁾

The MWA Board of Directors is appointed by the Cabinet.

- Each Director is required to be qualified and hold no prohibited characteristics as prescribed in the Metropolitan Waterworks Authority Act, B.E. 2510 (1967) and the Standard Qualification Act for State Enterprise Directors and Officials, B.E. 2518 (1975). This also includes other related laws, for example, holding a Thai nationality, age of not more than 65 years old, having qualifications and experiences that suit the MWA business, and having sufficient and skillful knowledge in waterworks, engineering, economics, law, political science, or business administration.
- The Chairman of the Board and other Directors are required to hold a three-year office term, except that the replacement can only hold office for the remaining term of the person he or she replaces, and the Governor is required to be under the employment contract. However, the retired Chairman of the Board and Directors may be reappointed.
- To be aligned with the corporate mission and strategic plan, the Skill Matrix Method is required to apply for consideration of nomination and appointment of the Committees, consisting of:



- At least one representative who is a full-time civil servant from the Ministry of Finance is appointed as the MWA Board member to maintain the government's interests as a state enterprise shareholder.
- One representative who is a full-time civil servant from the Ministry of Interior (MOI) and does not hold a position in the regulatory entity of the MWA is appointed as the MWA Board member to integrate the MOI policies into the MWA.
- At least one-third of other directors, who are not directors by position, are appointed and selected from the list of the Director's Pool prepared by the Ministry of Finance.
- At least one-third of other directors, who are not directors by position, are nominated by qualified persons who hold experience in the business sector.
- At least one-third of total directors are independent directors to comply with the principles and guidelines of good corporate governance for state enterprises.

Roles and Responsibilities of the MWA Board of Directors ^(2-12, 2-13, 2-14)

- Specify the enterprise's direction.
- Oversee activities in accordance with work plans comprising of the following:
 - Digital action plan;
 - Internal audit plan;
 - Human capital management plan;
 - Knowledge management plan.
- Specify enterprise management policies.
- Perform the roles assigned by the government.
- Promote good corporate governance.
- Oversee ethical conduct.
- Perform roles for fair marketing.
- Support the rights and equality of shareholders.
- Oversee stakeholder policies and management guidelines.
- Risk management and internal control.
- Oversee sustainability and innovation management policies and guidelines.
- Information disclosures: Oversee to ensure that the Metropolitan Waterworks Authority discloses financial and non-financial data and information through annual reports and the MWA's website as follows:

Information Disclosed in the MWA's Annual Reports	Information Disclosed on the MWA's Website
At least the following: - Organization structure/shareholder structure - History of the MWA Board of Directors - Background information of executives - Financial analysis reports, performance, and significant changes - Auditor-certified financial statements - Report of the board of director's responsibilities/ the Audit Committee's responsibilities concerning financial statements - Key business risks - Remuneration policy and pay information of the board of directors - Remuneration policy and pay information of high-ranking executives - Number of meetings attended by the board of directors and subcommittees by individual directors - Good corporate governance activities - Corporate social and environmental responsibility activities - Policies and performance in the management of connected transactions - Nature of business, business plans, and strategies	At least the following: - Policy direction of the MWA - Good corporate governance policy - Activities in line with government policies - Important work plans - Significant investment information - Procurement - Important financial and non-financial performance - Annual reports

- Performance monitoring.
- Activities related to the highest-ranking executives, high-ranking executives, and employees:
 - 1) Establishment of the Metropolitan Waterworks Authority (MWA) Governor's Remuneration Committee to evaluate the criteria and methods for recruiting suitably qualified persons to serve as the Governor of the MWA.
 - 2) Supervise and ensure that the MWA has a suitable structure for high ranking executives, work scope, and qualifications for high-ranking executives.
 - 3) Assess the performance of the Governor and high-ranking executives with clearly specified criteria, indicators, weights, and goals from the start of each year and performance evaluation taking place every 6 months, and connect evaluation results with an incentive system.
- 4) Ensure the existence of a succession plan for the governor, high-ranking executives, and key positions of the MWA.
- 5) Encourage and support Management and employees to receive training and development to gain useful work knowledge and experience.
- 6) Supervise to ensure that the Governor manages human resources consistently with the missions and objectives of the state enterprise while retaining competent state enterprise employees.
- Appointment of the board of directors and subcommittees.

Performance Assessment and Skill and Knowledge Development (2-17, 2-18)

The MWA requires an assessment to be conducted on the MWA's board of directors once per year in line with the good corporate governance principles for the state enterprise, by which a performance evaluation of the entire board of directors of the state enterprise and individual directors has to take place at least once annually every year in order to allow the board of directors to review work performance and issues and obstacles encountered in the past year and to enhance the board of director's work performance.

In the 2023 fiscal year, the MWA Board of Directors completed evaluation forms and approved 3 types of evaluation forms as follows: the director self-assessment form, the board evaluation form, and the MWA director's cross-evaluation form. After completing the evaluations, evaluation results were brought together for mutual consideration in order to seek ways to improve the different work activities of the board of directors and create plans to enhance the corporate governance effectiveness of the MWA Board of Directors in the 2024 fiscal year to improve performance effectiveness.



Board Performance Evaluation Results for the 2023 Fiscal Year

1. Individual MWA Director Self-Evaluation:

The mean evaluation score was 4.89 points out of 5 points total or 97.89 percent. This means that, on average, the work performance of the individual directors of the MWA was excellent.

2. MWA Board Performance Evaluation:

The mean evaluation score was 4.82 out of 5 points total or 96.46 percent. This means that, on average, the work performance of the entire MWA board was excellent.

3. Cross-Evaluation of MWA Directors:

The mean evaluation score was 4.89 out of 5 points total or 97.83 percent. This means that, on average, the work effectiveness of the MWA's individual board members as evaluated by other directors was excellent.

Accordingly, the MWA considered the key missions of the board of directors and the performance framework of the state enterprise on the issues of good corporate governance and corporate leadership as stated in the enterprise's evaluation criteria and brought issues that received evaluation scores below overall average score and recommendations from the evaluation for analysis and creation of plans to enhance the corporate governance effectiveness of the MWA Board of Directors in the 2024 fiscal year.



The MWA has a policy to support the board of directors to receive development and gain knowledge and experience through training/ seminars in related courses in order to promote the performance of duties in a manner that benefits the structured and continuous oversight of the strategic work of the MWA. This includes the Director Certification Program (DCP), Corporate Governance Program for the Boards of Directors and High-Ranking Executives of State Enterprises and Public Organizations Program (PDI), and other appropriate programs, and we also provide conduct work studies about other water supply business management activities and other work systems, held special meetings attended by only the independent directors of the MWA Board of Directors, organized visits to the MWA's actual work sites, etc. Furthermore, newly appointed directors have to undergo an orientation program that provides narration and summary of the overall operation of the MWA along with a director's manual, important documents about the enterprise and necessary information for maximizing the effectiveness and efficiency of the performance of directors.

Compensation for the MWA's Committee (2-19, 2-20, 2-21)

Compensation of the MWA's Committee are categorized into three types:



As a state enterprise under the supervision of the Ministry of Interior, the Committee holds the right to receive compensation according to criteria approved by the Cabinet. Compensation is paid during the period that the Committee's members are still in term of office, if in the case of retirement/out of office, no compensation is paid to those Committee's members. However, each

Committee's member holds the right to receive a compensation of not more than 10,000 baht per month, paid in proportion to the length of their tenure. The Chairman of the Board holds the right to receive compensation twice the amount of monthly compensation paid to each member of the Committee or 20,000 baht per month.

The payment of meeting allowance for the Committee's members is in accordance with the criteria for payment of monthly compensation and meeting allowance for State Enterprise Committee and other Committee's members in Subcommittees, Subcommittees, or other working groups in accordance with the Cabinet resolution dated on 24 April 2019. The Committee's member holds the right to receive a meeting allowance of not more than 20,000 baht per month, and the Chairman of the meeting holds the right to receive at a rate of 25 percent of the meeting allowance paid to each member of the Committee as a surplus.

1) In the case of the MWA's Committee meetings, the meeting allowance is paid once a month. In this regard, it shall consider paying more than once per month, but not more than fifteen times per year, when it is reasonable.

2) In case of a specific Subcommittee meeting, other Committee members or working groups who are appointed by law or regulations which are the central criterion, or the Cabinet resolution,

the State Enterprise Board, the MWA's Committee members, and other Committee members who attend the meeting and are not the member of the MWA's Committee, hold the right to receive an equal meeting allowance at the rate of 0.5 times of the amount paid to the MWA's Committee members. But it is not more than two different Committees, and each Committee is paid only once a month.

The MWA is required to pay bonuses to Committee members after submitting the net profits allocated as state revenues to the Ministry of Finance. The bonus allocation is according to the evaluation results and the limit under the criteria approved by the Cabinet resolution dated 2 July 2013, which has approved the improvement of the incentive program in the monetary compensation in accordance with the state enterprise performance evaluation system, according to the meeting resolution of the State Enterprise Policy Committee Meeting No. 4/2013, dated 17 June 2013.

Anti-Corruption

The Metropolitan Waterworks Authority (MWA) is committed to managing work while adhering to its good governance mission in line with good governance principles with emphasis on becoming a transparent enterprise that combats corruption while having in place ethical and moral standards with consideration to every group of stakeholders.

In doing so, we have specified policies and practice guidelines for promoting morals and ethics and created the MWA Anti-Corruption and Misconduct Plan and reported performance according to the plan to the Anti-Corruption Command Center, Ministry of Interior (ACCC, MI) according to set timeframes.

Anti-Corruption Policy

The MWA has set in place guidelines and measures according to the National Strategy on Anti-Corruption and Anti-Corruption Action Plans in State Enterprises (2023-2027) for use as our operating framework by promoting participation in monitoring and instilling conscience and promoting understanding about anti-corruption in addition to reporting wrongdoings to prevent corruption to duties. Furthermore, in cases where corruption is discovered, investigations are conducted to prosecute and administer disciplinary punishments to create examples to deter others.

In 2023, the MWA signed in a memorandum of cooperation on driving governance and corporate governance involving Office of the National Anti-Corruption Commission, the State Enterprise Policy Office, the Securities and Exchange Commission, the Thai Institute of Directors, and state enterprises with the objective of promoting and supporting enhancement of integrity and transparency in the operation of state enterprises (Integrity and Transparency Assessment: ITA) while also supporting for members of the private sector that have contracts with state enterprises to develop corporate management according to good governance principles.



Declaration of Intention

The MWA is committed to operating in a transparent, verifiable, and effective manner without corruption. In doing so, we sign in a declaration of the intention of the MWA Board of Directors, executives, and employees every year to demonstrate our commitment and obligation to perform our duties with honesty, integrity, transparency, and governance according to the principles of good governance with the intention to achieve work effectiveness and efficiency to drive the MWA's work toward sustainable growth while building confidence among stakeholders about our transparent work operations, which will lead us to become a quality organization.

In fiscal year 2023, the MWA upgraded the declaration of intention from document signing into signing via the "MWA CG Commitment" system for convenience, cost reduction, and speed while allowing signing to occur at any place and time.

Conflict-of-Interest Prevention Policy and Guideline⁽²⁻¹⁵⁾

The MWA gives importance to conflict-of-interest prevention and has issued the Board of Directors of the Metropolitan Waterworks Authority's Announcement on the Policies and Guidelines for Prevention of Conflicts of Interest, Use of Internal Information, and Connected Transactions and issued orders, criteria, and work procedures about reporting of conflicts of interest, use of internal information, and connected transactions in order to have the board of directors, Governor, executives, and employees along with other contract workers such as subcommittees, directors, consultants, and work committees established by the MWA Board of Directors that are not members of the MWA Board of Directors, the Governor or employees of the MWA to use as clear criteria and practice guidelines in

order to raise awareness about conflict-of-interest prevention, which is the duty and responsibility that everyone must understand and practice. Moreover, we have instructed the Internal Audit Office to summarize reports on conflicts of interest, use of internal information, and connected transactions that take place throughout the year to report to the Governor in order to present to the MWA Board of Directors.

In the 2023 fiscal year, the MWA's contract workers, including the MWA Board of Directors (including the Governor), the MWA's employees, and other contract workers, **there were 4,232 people who had no conflicts of interest.**

Assessment of Enterprise Corruption Risk and Criteria Used⁽²⁰⁵⁻¹⁾

The MWA prepares a corruption risk management plan every year. In fiscal year 2023, we took the following actions:

1. We provide training in the topic "Corruption Risk Assessment" for 164 personnel to promote knowledge and understanding about the principles for managing and assessing corruption risks. The knowledge and comprehension assessment result after the training was 91.67 percent.
2. We created an enterprise corruption risk management plan. In fiscal year 2023, the Office of Public Sector Anti-Corruption Commission (PACC) stipulated for state enterprises to conduct risk assessments for 1 procurement project with the highest monetary value. Accordingly, the MWA chose the procurement project with the highest monetary value, namely, **the project to construct the 2nd Lat Krabang water distribution pumping station with a storage capacity of 50,000 cubic meters** along with related works in the GES-LK-9 contract for the assessment.

Information was reported as follows:

1. A report presenting agency corruption risks.
2. A report identifying corruption risks.
3. A report of corruption risk management planning.
4. A report on procurement project budget estimates.

3 Step Method for Assessing Corruption Risk:



Step 1
Specify corruption risk assessment criteria.



Step 2
Assess corruption risk.



Step 3
Create corruption risk management plan.

These were an analysis of the risk factors for corruption according to the Fraud Triangle Theory, which comprised the following:

- Pressure/Incentive to take action.
- Opportunity arising out of systematic loopholes, control quality, and weak enterprise internal control.
- Rationalization to seek reasons to support actions.

The risk assessment of the aforementioned project found no complaints about risk of corruption through the Anti-Corruption Command Center of the Metropolitan Waterworks Authority (MWA ACCC), since the MWA has measures in place to control corruption risks and observes to cover every process in addition to carrying out procurement correctly. The MWA has also added a system for monitoring work via a dashboard to enable executives to understand each work operation according to set timeframes.

3. We reported performance according to the enterprise corruption risk management plan to the ACCC, MI to submit to the Office of Public Sector Anti-Corruption Commission.



Enterprise Corruption Risk Management Plan for Fiscal Years 2018-2023

- 2018: Water supply connection requests.
- 2019: Supply requisitioning process (equipment/ pipe requisitioning)
- 2020: Meter and equipment replacement during meter and equipment requisitioning.
- 2021: Construction work supervision.
- 2022: Procurement project with the highest value in water treatment named the Maha Sawat Water Treatment Plant Capacity Expansion Construction Project to a size of 800,000 cubic meters per day, along with associated work in the contract number GE-MS5/6-9.
- 2023: The project with the highest procurement budget is the project to construct the 2nd Lat Krabang water distribution pumping station with a storage capacity of 50,000 cubic meters along with related works in the GES-LK-9 contract.

Communication and Education about Anti-Corruption⁽²⁰⁵⁻²⁾

The MWA prepares public relations media to raise awareness and consciousness in various ways such as the following: A video clip on lessons learned from creating news, posters, infographics, etc. Preparation and dissemination of public relations media via communications channels, such as circular notices, intranet, internet, Facebook: MWA CG Club, and various other activities, such as the following:

- Topic "An Enterprise of Good People" to Create "Good, Skilled, and Bold" Personnel.
- Topic "No Gift Policy: Simple Integrity Values Start with Us".

- Topic: Jointly Drive and Empower a Council of Governance While Presenting the Concept of "Leaders and Anti-Corruption."
- Topic "Dharma and Work."
- Topic "Integrity and Ethics Work Concepts of the Governor of the MWA and Deputy Governors in Every Line of Work."
- Topic "The Types of Corruption Risk Assessments."
- Topic "Dharma and the Rice Plant"
- Topic "The Regulations of the Metropolitan Waterworks Authority (MWA) Regarding the Code of Ethics for Executives and Employees of MWA, B.E. 2566."

Furthermore, we communicated and promoted the participation of stakeholders in enterprise corruption via various activities such as the following:

- **Participation in organizations, groups, or projects that support anti-corruption.** The MWA Corporate Governance Council attended the International Anti-Corruption Day event on 8 December 2023 under the concept “Break the Corruption: Thai People Combating Corruption through Aversion to, Standing Up, and Taking Action Against Corruption”, held by the Office of the National Anti-Corruption Commission.
- **We attended the event “Integrity and Ethics Promotion Campaign to Prevent Conflicts of Interest”,** organized by the Office of the National Anti-Corruption Commission.
- **The Deputy Governor (Executive) and the MWA Chairman of MWA Anti-Corruption and Ethics Promotion Committee (MWA ACCC) signed in a memorandum of cooperation on “driving governance and corporate governance”** involving the Office of the National Anti-Corruption Commission, the State Enterprise Policy Office, the Securities and Exchange Commission, the Thai Institute of Directors, and state enterprises.

- **The members of the Corporate Governance Council** attended a training session to develop lecturers to serve as multiplying forces in instilling concepts on how to distinguish personal benefits from collective benefits at the Royal River Hotel, Bangkok, in order to promote knowledge and expand knowledge to personnel in the agency to create new processes and strengthen the enterprise culture according to the STRONG model: a sufficiency mindset against corruption.
- **The members of the Corporate Governance Council participated in a work-study at the Secretariate of the Senate** and exchanged learning in the topic “Empowering a Network of Integrity.”
- **The Corporate Governance Council** participated in a workshop seminar project to enhance anti-corruption and anti-misconduct efforts under the Ministry of Interior at the Royal City Hotel, Bangkok, organized by the Ministry of Interior.
- **The members of the Corporate Governance Council participated in the “MWA Meets the People” activity** together with various waterworks branch offices on the 56th anniversary of the founding of the MWA to promote knowledge about the council and receive opinions about the MWA’s operation.

In fiscal year 2023, the MWA held training sessions to provide knowledge about anti-corruption for personnel within the organization as follows:

- Course “Corruption Risk Assessment”.
- Course “Adopting the Idea of Separating Personal Interest from Collective Interest”.
- Course “Happy at Work; Happy in Life”.
- Course “The Sufficiency Economy Philosophy covering 3 concerns and 2 conditions, namely, the middle way, knowledge, and integrity”.
- Course “Governance Culture”.
- Course “Governance and Ethical Standards” during new employee orientation for fiscal year 2023.



The Anti-Corruption Operations Center of the Metropolitan Waterworks Authority (ACOC MWA)

The MWA has established the Anti-Corruption Operations Center of the Metropolitan Waterworks Authority (ACOC MWA) with the following roles and duties: 1) integrity and ethics promotion; and 2) anti-corruption. Upon the discovery of any corruption or misconduct, complaints can be filed by using the channels shown below. The MWA will protect informants and maintain the confidentiality of personal information belonging to informants according to the Whistleblowing Policy to build confidence that whistleblowers are protected from negative consequences stemming from their actions.



Channels for Reporting Corruption Complaints:

- **Secretary of the MWA's Anti-Corruption Operations Center:** 8th Floor, Sutthi Uthakakorn Building, the MWA Headquarters, 400 Prachachuen Road, Thung Song Hong Subdistrict, Lak Si District, Bangkok 10210. Phone: 0 2500 2518 or 0 2504 0123 ext. 2518
- **Morality Box (Complaint Box):** Information Center, 1st Floor, Sutthi Tharakorn Building, the MWA Headquarters, 400 Prachachuen Road, Thung Song Hong Subdistrict, Lak Si District, Bangkok
- **E-mail:** anticor@mwa.co.th
- **Intranet:** <http://intra.mwa.co.th>. Select “Complaints”, then choose “Corruption and Misconduct Complaints”.
- **Internet:** www.mwa.co.th. Select “MWA Services”, then “MWA Anti-Corruption Operations Center”, then “Problem Complaints”, and finally “Report Corruption and Misconduct Complaints”.

Overview of Anti-Corruption Performance for Fiscal Year 2023 ^(205-2, 205-3)

Item	Unit	Total
Total Number of Departments in the Organization	Department	66
Number of Departments Assessed for Corruption Risk	Department	1
Percentage of Departments Assessed for Corruption Risk	Percent	1.51
The Board of Directors (BOD), Executives, and Employees of the MWA Who Received Training in the Anti-Corruption Policy and Processes		
Members of the MWA Board of Directors	People	15
Members of the MWA Board of Directors who received training	People	15
Percentage of members of the MWA Board of Directors who received training	Percent	100
Number of Executives (section supervisor or equivalent and above)	People	1,499
Number of Executives (section supervisor or equivalent and above) who received training (6-10)	People	921
Percentage of Executives who received training	Percent	61.44
Number of employees (excluding contract workers)	People	2,654
Number of employees who received training (excluding contract workers) (1-5)	People	921
Percentage of employees who received training	Percent	34.70
The Board of Directors (BOD), Executives, Employees, and Trade Partners of the MWA Who Received Communication Media in the Anti-Corruption Policy and Processes		
Number of members of the MWA Board of Directors who received communication	People	15
Percentage of members of the MWA Board of Directors who received communication	Percent	100
Number of Executives (section supervisor or equivalent and above) who received communication	People	1,499
Percentage of Executives (section supervisor or equivalent and above) who received communication	Percent	100
Number of employees (excluding contract workers) who received communication	People	2,654
Percentage of employees who received communication	Percent	100
Number of trade partners (suppliers and contractors) ^a	People	174
Number of trade partners (suppliers and contractors) who received communication ^b	People	0
Percentage of trade partners (suppliers and contractors) who received communication	Percent	0
Corruption Incidents (If any by employees and trade partners)⁽²⁰⁵⁻³⁾	case	0
No. of Legal Cases Related to Corruption in the Enterprise or Employees during the Reporting Cycle⁽²⁰⁵⁻³⁾	case	1

- a. Trade partners who made contracts with the MWA valuing five hundred thousand baht and up for 3 consecutive years.
- b. In the 2023 fiscal year, the MWA did not directly communicate its anti-corruption policies and processes to its partners. Instead, communication was carried out through various channels to the public.

Survey Results on Perceived Governance and Transparency by Stakeholders (5 points total)

Fiscal Year	Policy Agencies	Mission-based Agencies	Media	Community and Society	Trade Partners	Allies	Activists	Customers	Employees and Contract Workers	Total Average
2022	4.63	3.60	3.69	4.11	4.05	4.22	2.63	3.05	3.85	3.76
2023	4.33	4.18	4.42	4.20	5.00	4.40	4.02	3.67	4.12	4.26

The Metropolitan Waterworks Authority (MWA) Official Information Center

The Metropolitan Waterworks Authority Official Information Center was founded in 2019 to comply with the Official Information Center Act, B.E. 2540 (1997), with the aim of allowing the public to have access to news and information about the government’s activities such that the public can observe transparency in the work of the government as well as view or study information.

The MWA is a state enterprise that provides water supply services to the people and operates according to the vision of “Quality Water for Quality Living”. With the determination and willingness to perform various activities with good governance, the MWA Official Information Center has adopted the aforementioned guidelines as principles to serve the public with emphasis on providing transparent information services to the point that it won the Distinguished Official Information Center Award for the 5th consecutive year from 2019 to 2023.

The physical location of the Official Information Center is the 1st floor of the MWA Head Office Building. It is staffed permanently by center personnel who are responsible for providing information and responding to inquiries made by the public about services. The center also has an information display cabinet according to the Official Information Act, B.E. 2540 (1997), along with computer devices for the convenience of the public seeking services, who can search for the information that they want.

Additionally, an electronic information center provides another channel to aid the public in conveniently accessing news and information while reducing their travel time. It is an effort to respond



to the digital lifestyle, and the information center is accessible via the MWA’s website www.mwa.co.th or the website www.oic.go.th. On the front page of the MWA’s electronic information center, up-to-date information is shown completely and correctly according to the Official Information Act, B.E. 2540 (1997) and in compliance with Section 7 and Section 9, by which the public has 24-hour access to the aforementioned information.

Innovation and Digitalization

The MWA reviews its enterprise direction consistently with the current situation every year. For the year 2023, the MWA Board of Directors and high-ranking executives prioritized environmental conservation according to the BCG Model, reduced energy consumption, and use of renewable energy, leading to a review of the innovation policy.

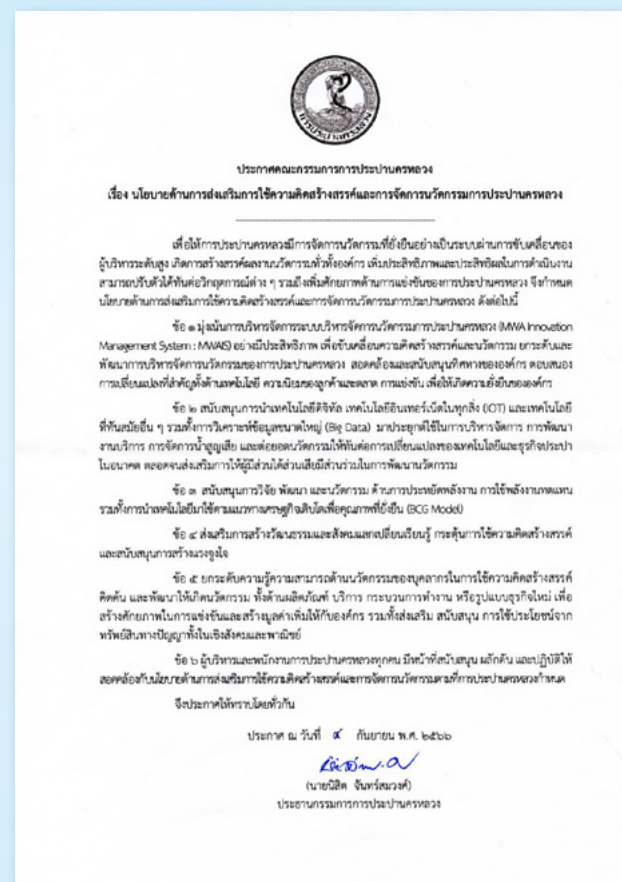
Creativity Promotion and Innovation Management Policy

The Enterprise Innovation Department is an agency in charge of overseeing all the overall innovations of the MWA. The department has included the enterprise's future direction in innovation in 2023 as an input factor in the review and preparation of the policy to promote use of creativity and innovation management. In addition to innovation management, the MWA focuses on having an enterprise-wide innovation management system (MWAIS) to drive innovation to be able to respond to changes and the enterprise's direction in a sustainable manner. In addition, digital technology and big data are supported to be used in managing the enterprise in different areas while expanding innovation to keep up with future technological and business changes and prioritizing the development of a society of knowledge exchanges, creativity, and innovation development. Moreover, we enhance individual knowledge and ability in innovation personnel and support for both social and commercial use of innovations.

The MWA has also added research, development, and innovation in energy conservation and use of alternative energy, and adoption of technology

for use according to the economic guideline for sustainable growth and quality (BCG Model) to be part of the creativity promotion and innovation management policy.

After reviewing and creating the revised innovation policy, the MWA proposed it to high-ranking executives and the Board of Directors of the Metropolitan Waterworks Authority for approval according to the chain of command and announced it for use as a guideline for innovation management in fiscal year 2024.



Innovation Theme Toward Sustainability

The new innovation policy has been disseminated to lead to the development of an innovation theme. In the development of innovations, the MWA has specified the innovation theme based on the enterprise's factors, including the external environment of the enterprise, government, and enterprise policies, operating direction, and internal indicators, and we analyzed various environmental information related to the enterprise and external factors such as the voice of customers and voice of stakeholders by using information from both factors to summarize, analyze, and specify the innovation theme in order to improve performance covering the creation/development of product and service innovations and work process/new mission innovations that respond to the needs of customers and stakeholders.

In the year 2023, the MWA reviewed the innovation theme to ensure consistency with the current innovation policy and situation and has included the topic of innovation for environmental conservation according to the BCG Model, reduced energy consumption, and use of alternative energy in the innovation theme of year 2024, in addition to communicating and disseminating it to employees and external people to allow interested parties to make innovation project proposals to receive research funding, as well as to use it as an important topic for choosing ideas or work results from training and competitions in order to develop innovations for use in the enterprise or develop them commercially or for society. Hence, it can be claimed that the innovation themes are important in determining the direction of our corporate innovation in response to the needs of customers and market demands.

Six Innovation Themes for the MWA include:

 1. Smart Water System: The goals of innovation development include: - To improve the stability and efficiency of water treatment systems. - Water pressure management. - Reduce water loss. - Safe water supply plan. - To control water quality to be efficient.	 2. Resilient Water Supply: The goals of innovation development include: - To manage water resources in a sustainable manner. - To enhance a personnel's competence to anticipate the upcoming changes.	 3. Seamless Service Experience: The goals of innovation development include: - To increase the satisfaction levels. - Reduce complaints. - Enhance services with technology toward establishing virtual branches.
 4. BCG Model: Guideline for economic growth for sustainable quality with innovation development goals covering the following: - Worthwhile resource utilization. - Energy conservation technology. - Reduce CO₂ emissions. - Resource recycling.	 5. Data-driven Organization: The goals of innovation development to become a data-driven organization include: - Data-driven enterprise management by analyzing/processing big data to present/accompany operating decisions. - Digital technology development according to the enterprise architecture (EA).	 6. Business Redesign: The goals of innovation development include: - To develop new business and service models. - Enhanced effectiveness through improving regulations and processes in the enterprise. - Reduction in cost and operating expenses. - Creating income for the enterprise.

The aforementioned innovation themes show that we have focused on Environmental, Social, and Economic performance through the integration of innovations towards sustainability whether it is a responsible water consumption program by developing an innovation of efficient effluent management or by developing new business

and service models into virtual office platform in response to the needs of customers and the market which has been completely transformed into a digital age. The MWA also supports the adoption of digital technology to develop innovations and the economy according to the BCG Model.

Innovation for Environmental Conservation and Reduced Energy Consumption

Energy Conservation Project in the Water Pumping System

The energy conservation project in the water pumping system is a joint operation between the Planning and Production Engineering Department and various agencies in the Water Treatment and Pumping System Energy Conservation Work Committee since electricity is the primary energy used to drive the water treatment and distribution processes. Accordingly, we use water pumps as key machinery that use the most electricity in the water distribution pumping process. Thus, in order to ensure appropriate energy consumption in the water distribution pumping system, with emphasis on energy conservation and efficient use of energy in the water distribution pumping process and to control and reduce energy expenses in the water pumping system, a management process has been designed to increase energy efficiency and conservation without utilizing any budget. This helps promote efficient management of the water pumping system and the energy consumption of water pumps to effectively meet water consumers' needs.

In terms of operation, we started the operation of Water Pumping Distribution 1, Bang Khen Water Treatment Plant, as the model agency by using data on the operation of the water pumps of Water Pumping Station 1, Bang Khen Water Treatment Plan, from October to November 2022 to analyze the point of operation of water pumps and analyze information about the relationship between specific energy value and the amount of water pumped for distribution, and we have recommended measures for changing the operation of water pumps in 3 time periods, namely, 1) **off-peak** hours, 2) **morning peak** hours, and 3) **post-morning-peak** hours.

Regarding performance from analyzing the points of operation under the recommended measures in comparison with existing points of operation by using the **Level-up Pump (LVP) model**, which had been developed by the agency since fiscal year

2019, it was found that the points of operation under the recommended measures over the 3 time periods have become more suitable with water pumps becoming more effective and successfully reducing electricity consumption. Thus, the details about the aforementioned measures were presented at a meeting of the energy conservation committee, and the meeting passed a resolution to test the operation of the water pumps according to the recommended measures, and the energy conservation team has coordinated with related agencies to provide support in reducing the lowest boundary for the existing water pump speed from 70 percent to 50 percent and then running the test by monitoring the operation of the water pumps according to all 3 recommended measures, which has been ongoing since 20 January 2023.

After analyzing specific energy values or the value of electricity consumption per 1 cubic meter of water pumped for distribution of Water Pumping Distribution 1, Bang Khen Water Treatment Plan, before the start of the measures (data as of 1-19 January 2023), the value was 0.08561 kWh/cubic meter when compared to the specific energy value after implementing the measure (data as of 20 January - 31 May 2023), which had a value of 0.06188 kWh/cubic meter. Thus, it was found that the value decreased by approximately 28 percent and that the estimated cumulative savings since the start of the implementation until 31 May 2023 totaled 43,000 baht/day or approximately 15,000,000 baht/year.



Reducing the Lower Speed Limit of Water Pumps from 70 percent to 50 percent

Energy Reduction Through Reducing Condenser (Hot Coil) Temperature

Because most of the climate of Thailand is “tropical savanna”, summer temperatures rise rapidly, with current average summer temperatures ranging from 35-39 degrees Celsius, which values exceeding 40 degrees Celsius on certain days. As a result, air conditioners have to work harder and consumer more energy, leading to increased energy cost (Ft) value today. Therefore, it is highly essential to make the most efficient use of air conditioners in order to reduce electricity consumption. Hence, the Thon Buri Water Treatment Plan launched a project to lower air temperature before entering the condenser in order to enhance split type air conditioning system efficiency by spraying water around condensers, which reduces condenser temperature and reduces the energy consumption of air conditioners.

After installing water spray equipment, electricity consumption decreased significantly. Thus, for the electricity fees in 2022 from January to June 2022, a total of 21,311 units of electricity were used, while from July to December 2022 a total of 17,728 units of electricity were used. As a result, 3,583 units of electricity cost was saved. Since the average electricity cost in 2022 was 4.09 baht per unit, the calculated total savings was 14,654 baht. In addition, after December 2022, the team installed additional water meters to measure the water consumption of the project, which had a monthly average of 12.5 units per month.



Reducing Condenser Temperature by Spraying Water



Graph Showing Reduction in Electricity Consumption

Air Conditioner Management to Conserve Energy in the Enterprise

Air conditioner management devices focus on solving the electricity consumption of air conditioners. It is well-known that air conditioners are heavy consumers of electricity and account for an average of 70-80 percent of the electricity cost of offices, office buildings, and temperature-controlled electrical rooms. Since the FT value of the enterprise's electricity supply has increased, it became necessary to seek ways to reduce expenses, especially the electricity consumption of air conditioners. In doing so, IOT technology and devices can be used to control and manage reduction in unnecessary waste with the ability to make changes seasonally or according to agreements with service users without falling below government



Device for Managing Air Conditioner Usage

measures. The IOT devices used are in the form of remote controllers that can be locked to air conditioners with exclusive rights granted for when turning air conditioners on for the first time to confirm employees' arrival for work on a particular

day. It also has a feature to apply settings and adjust work modes, for example, by staying in the cool mode for 55 minutes followed by being in the fan mode for 5 minutes. This is to allow the compressor to rest and to make use of residual coolness. Upon entering the next hour, then the air conditioner would be adjusted to the cool mode for 55 minutes (also called 55+5 mode). If needed, the setting can be adjusted to 50+10, which would increase energy savings. In addition, there is a timer to repeat air conditioner shutdown to prevent people from unintentionally forgetting to turn the air conditioner off. Accordingly, a test was conducted by installing the device for use with compared results before and after use, and it was found that it was possible to save electricity during office work in an office building (from 8:30 am to 4:30 pm) by more than 20 percent and that it was possible to cut electricity cost by 9 percent in electrical or server room (24 hours). Meanwhile,

the relative humidity before and after the adjustment was measured, and it was found that its value was in the comfort zone in both cases.

After measuring the above innovations, it can be seen that the MWA gives importance to comprehensively reducing energy consumption from reducing energy consumption in the production system to the water treatment equipment control room and the office building, which creates benefits beyond reduced electricity consumption since enterprise expenses are also reduced. In addition, the MWA has digital innovations to promote environmental conservation by reducing paper consumption in the enterprise, such as by using electronic **app sheets** for applying for permission to work in water treatment plants via mobile phone or using an **e-meeting** system to reduce the consumption of paper used to prepare meeting documents and to reduce document delivery time, etc.

Enhancing Technology Service Capabilities

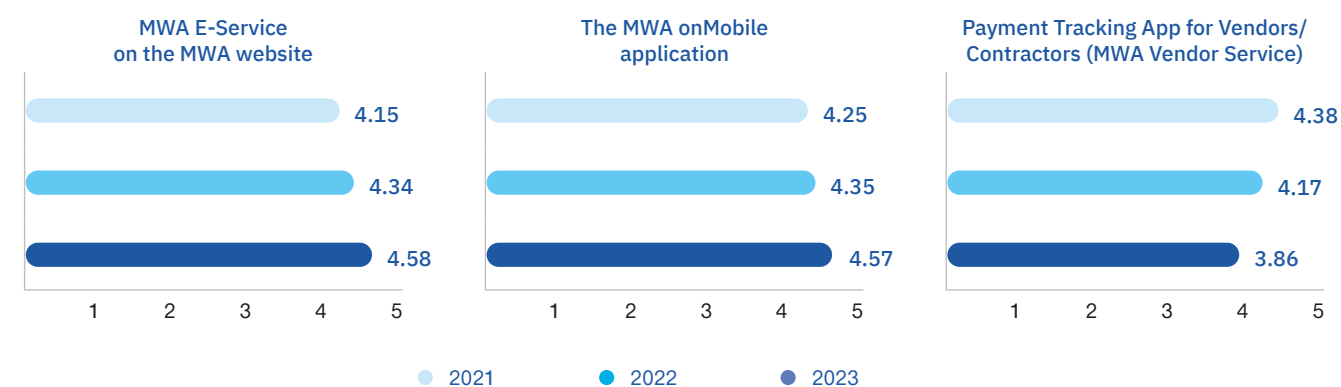
The MWA is determined to enhance services to improve living, convenience, comfort, speed, and accessibility by improving service quality in every area by integrating every process through innovation and online service technologies such as the following:

- Web-based **MWA e-Service** (<https://eservicesapp.mwa.co.th>) to provide waterworks services similarly to the MWA's branch offices (**virtual branch**) with 24-hour availability.
- **MWA LINE Connect** (@MWThailand) and **MWA onMobile application** that helps water users have greater convenience in every waterwork service on smartphones.
- **MWA Vendor Service** application to facilitate information access to monitor spending by vendors/contractors. The application is downloadable for free via **App Store** and **Play Store**, etc.



monitor, inspect, correct, and oversee problems that cause public suffering in a swift manner in addition to using complaint information and public incident reports to analyze decisions, and set policies and plans on different levels to be able to systematically manage work and effectively facilitate public convenience.

Overall Satisfaction on DT System Use and Service of the MWA, Comparison of Years 2021-2023



Creating a Society of Learning with Stakeholders

The development of innovations requires the internal knowledge of the enterprise as a starting point. Therefore, the MWA encourages employees to exchange knowledge between the MWA's employees and external agencies, such as the Government Pharmaceutical Organization (GPO), Thailand Science Research and Innovation (TSRI), Thai Health Promotion Foundation (ThaiHealth), the Government Savings Bank, and international water supply agencies, etc. At the same time, the MWA has a KM portal system that functions as a knowledge management system for use in gathering knowledge and information across

the entire value chain that can share knowledge to various media for viewing by stakeholders such as the KM Stakeholder Site Facebook Page and Nam Kok Magazine, etc. The knowledge that we share includes useful information and good practices along with beneficial knowledge about collaborative work with the MWA such as (not so) secret information about how to register to become the MWA's contractor, Standard Equipment for Preventing Sand Falling into Water Drainage Pipes during Pipe Installation Construction (Sand Protection) as Part of Construction Projects, and the MWA's Online Service and Payment Channels, etc.



Supply Chain Management and Sourcing



The MWA manages its supply chain and sourcing by integrating ethical practice guidelines in social and environmental responsibility with operations across the entire supply chain of the MWA to promote awareness about economic, social, and environmental impacts, which enables the MWA to deliver products and services to customers without affecting society and the environment by operating according to different policies such as the following:

- Fair market competition policy and practice guidelines.
- Stakeholder management policy and practice guidelines.
- MWA anti-corruption policy that prohibits giving, acceptance, and payment of benefits.
- Supplier Code of Conduct.
- Communication/training for contractors, work studies and joint meetings with trade partners, and annual trade partner evaluations.



The MWA has contract partners registered as juristic persons pursuant to civil and commercial laws that operate in Thailand according to the following information:

Table Showing the Procurement Value of Products and Services (Unit: million baht) ⁽²⁰⁴⁻¹⁾

Fiscal year	2023	2022	2021	2020
In the country				
Projects	5,289,138,170.42	869,987,096.29	3,703,536,799.10	498,835,504.76
Work outside of projects (purchases, hirings)	14,629,977,653.36	11,057,781,749.19	9,985,697,774.41	9,875,415,180.56
Total	19,919,115,823.78	11,927,768,845.48	13,689,234,573.51	10,374,250,685.32
Abroad				
Projects	-	-	-	-
Work outside of projects (purchases, hirings)	-	-	-	-
Total	-	-	-	-
Total procurement value of products and services in the country and abroad	19,919,115,823.78	11,927,768,845.48	13,689,234,573.51	10,374,250,685.32

Guidelines for Contractor’s Selection and Evaluation

We have established procurement standards with a systematic process to select contractors and evaluate their performance. This is to ensure efficiency and effectiveness toward all actions as defined. Moreover, we have applied various rules and regulations into the practice so as to develop the organization in all aspects, alongside operating its business based on good corporate governance principles.

As processes of water production and distribution require contractors to complete the construction of various projects. Therefore, contractors’ selection and evaluation are considered one of our core missions under the MWA’s regulations on registration and evaluation of contractor’s performance to obtain contractors who hold quality and potential to operate construction works of various projects to be completed within the specified time and with orderliness.

The purpose of this action is to control the quality of construction work in various projects to achieve the objectives as defined and create satisfaction for users to consume water that meets quality and is sufficient for consumption, and does not create negative impacts on the people and communities. The details of these processes are described below:

1. Contractors submit application forms for registration of contractors.
2. The MWA selects the contractors.
3. The MWA proceeds registration of contractors and categorizes them by types of work as defined by the MWA.
4. Contractors who have already registered and have been completely qualified will be invited to submit the proposal for bidding on each project.
5. The successful contractor commences the construction work.
6. The MWA will evaluate contractors during the project construction work and after the project completion. The results will be used to rank those contractors whether to be promoted or demoted with penalty.

Joint Trade Partner Potential Development

The MWA believes that providing knowledge, improving the capabilities, and expanding the production and service capacities of trade partners are essential in supporting the effective delivery of tap water and services to the MWA’s consumers according to quality standards. As such, we communicate with and train our contractors and hold work studies and meetings with our trade partners in addition to conducting annual trade partner evaluations in order to provide recommendations and improve the quality of raw materials and deliveries consistently with the MWA’s needs, and we monitor, verify, and assess our trade partners to achieve sustainable mutual business development and is beneficial for providing effective customer service.



Policy Involvement



The MWA has been involved with the public sector in creating water supply policies from the very beginning by expressing opinions, taking part in policy setting, and planning decisions and operations according to the direction of water resource management and the MWA's work plans/projects, and we gave stakeholders the opportunity to contribute through discussions about the MWA's 6th Enterprise Plan (2023-2027) and various master plans on 11 July 2023 and 27 July 2023 for the MWA Board of Directors. Accordingly, this participation ensures that the operational direction and action plans of the MWA move toward long-term success in line with the direction of the country.

Not only the matters mentioned above, we have also visited external agencies with shared missions to discuss material issues, exchange ideas, and listen to opinions towards our policies, as well as to get involved with various working groups from the government sector. The regulatory

agencies and relevant authorities with shared missions are required to engage in our processes of formulating policies and operational directions, such as the New Policy and Planning Bureau, the Ministry of Interior, the Office of the National Economic and Social Development Council, the State Enterprise Policy Office, the Provincial Waterworks Authority, the Office of the National Water Resources, the Royal Irrigation Department, and the Thai Water Works Association (TWWA). The purpose of this action is to create engagement and build relationships among interagencies which requires it to be conducted on a regular basis and more than one time in the forms of both formal meetings and informal visits at a specified time as mutually agreed by both parties. Moreover, certain entities from the MWA are required to attend those meetings on a weekly basis to jointly engage in the formulation of policies and action plans at the strategic and operational levels to create efficient synergy platforms among all of us.

Economic Performance (201-1, 201-2, 201-3, 201-4)



(201-2)

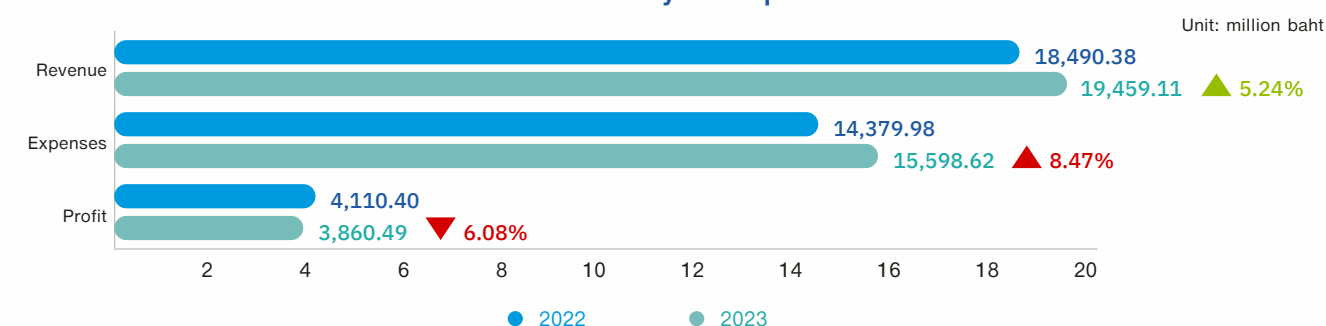
For year 2023, the overall Thai economy was recovering after Thailand faced internal and external obstacles, not to mention geopolitical conflicts occurring in many places that have affected global energy prices and contributed to domestic inflation. While the Coronavirus 2019 (COVID-19) pandemic is resolving, it is still necessary to closely monitor risks of new disease outbreaks. The Thai economy this year receives major supporting forces from the tourism and private consumption sectors due to rising numbers of foreign tourists. This is a factor that is supporting tourism businesses and for service sector employment to continuously increase. At the same time, there are also additional supporting forces from the government's measures to stimulate the economy, which contributed to the water fee revenues that are the primary revenues of the MWA in fiscal year 2023. The recovery has reached a level that is similar to the pre-pandemic situation, with water sales continuously increasing when compared to the previous year. The increases have been ongoing since the start of the fiscal year and continued along the same trajectory toward the latter half of the year. This signals a major recovery after an extended period of economic downturn during the pandemic. Water sales have clearly increased among businesses and organizations (Commercial: C) such as companies, stores and restaurants, hotels, shopping center, and airports, which is consistent with the recovery of the Thai economy. The same is also true for the residential category (Residential: R), particularly in high-rise residences like condominiums, flats, and dormitories as a result of the labor sector

returning to the main economic zones of the Bangkok Metropolitan Region. Meanwhile, for the industrial sector (Industrial: I), although water sales somewhat increased in the manufacturing sector, sales are still decreasing overall due to the economic slowdown of main trade partner countries like China and the United States.

As for expenses, the MWA's tap water production and distribution cost significantly increased when compared to the previous year. This largely resulted from uncontrollable external factors such as rising electricity cost due to the Energy Regulatory Commission increasing the feed-in tariff rate (Ft) following the global energy price situation, combined with an increase in the raw water fees on the eastern side being collected by the Royal Irrigation Department since 4 January 2022, and expenditures in an effort to quickly reduce water loss. Although the water fee revenues for this year have recovered and are heading in a positive direction, the significant increase in expenses has caused the operating profits in fiscal year 2023 to decrease when compared to the previous year. In any case, the MWA is currently operating projects under the 9th Master Plan Improvement Project, which require heavy financial investments that will impact the enterprise's future financial situation if the MWA cannot avoid bearing the increased expenses. Regardless, the MWA remains committed to produce, transmit, and distribute clean and safe tap water that is suitable for use and consumption in line with international standards to extensively ensure the good quality of life of the people.

In view of the aforementioned factors, the MWA is making preparations to deal with impacts that the enterprise might have to face by increasing work effectiveness through improving the management and manpower structure to correct the problems in the existing structure of the enterprise to be consistent with the enterprise's future direction while also adopting digital knowledge and technology to enhance work processes. Moreover, we have established additional business units (BUs) to drive

connected businesses in providing comprehensive waterworks services with a focus on delivering value to customers beyond their expectations and according to their needs. Accordingly, the MWA has also taken actions according to its effective cost management plan while managing asset utilization for maximum benefits and managing liquidity to ensure financial security such that the enterprise can stand strong despite situational changes and continue to achieve sustainable growth.

Financial Analysis Report ⁽²⁰¹⁻³⁾

For the overall performance for fiscal year 2023, the MWA's water fee revenues are recovering back to a level similar to before the COVID-19 pandemic with primary supporting factors coming from the tourism sector. At the same time, however, expenses have increased by more than the increase

in revenues, largely due to many government agencies issuing laws to collect fees from the MWA. This has led the net profit in fiscal year 2023 to amount to 3,860.49 million baht, which is 249.91 million baht or 6.08 percent less than the previous year.

Indirect Economic Impacts ⁽²⁰³⁻¹⁾



The MWA is committed to operating business by producing and delivering clean and safe tap water services to the consumer alongside the development of a good quality of life in society. We instill a culture within our enterprise that promotes participation in community and social development and improves and supports infrastructure projects that drive sustainable social development in addition to supporting the public in having extensive and equitable access to clean water. Therefore, our project to expand service scope to fully cover urban communities or the Extensive, Adequate, and Secure Water Supply Service Expansion Project is a project meant to provide service in non-commercially viable areas by proactively installing water supply systems. This project has been ongoing since 2006 and continues up to the present with the aim of making preparations for future service and keeping up with the leaping growth and development of

urban communities to give people in every locality equitable access to clean and safe water supply while sustainably improving the quality of life of the people and responding to the government's policy to reduce social inequality and increase access to government services to ensure that every member of the public has equal, extensive, and fair access to good services.

In addition to enabling the public to have extensive and equitable access to clean water for use and consumption, the project can also reduce household expenses in procuring water from other sources (such as groundwater and bottled water) and improve quality of life while actively promoting community relations and reducing soil erosion problems. If the MWA can expand its services to cover all service areas and all communities switch over to use tap water, soil erosion problems can be mitigated by as much as 9 centimeters over 20 years.



(203-2)

Fiscal Year	Total Number of Routes Along Water Distribution Pipelines	Distance (kilometers)	Total Investment Budget (million baht)	Total Number of Direct Beneficiaries (by Households)	Total Number of Direct Beneficiaries (by Persons)*	Total Household Expenses Saved From Procuring Water of Other Sources (baht)**
2006-2007	170.00	210.00	314.00	10,045.00	32,144.00	1,627,792.25
2008	111.00	124.00	141.00	3,700.00	11,840.00	599,585.00
2009	93.00	118.00	193.00	3,540.00	11,328.00	573,657.00
2010	127.00	201.00	276.00	5,950.00	19,040.00	964,197.50
2011	189.00	230.00	331.00	6,930.00	22,176.00	1,123,006.50
2012	419.00	344.00	674.00	8,315.00	26,608.00	1,347,445.75
2013	55.00	70.00	153.00	2,284.00	7,308.80	370,122.20
2014	96.00	138.00	250.00	2,610.00	8,352.00	422,950.50
2015	186.00	178.83	320.33	4,160.00	13,312.00	674,128.00
2016	238.00	273.44	389.27	4,886.00	15,635.20	791,776.30
2017	113.00	157.87	296.16	2,367.00	7,574.40	383,572.35
2018	162.00	198.03	422.24	1,620.00	5,184.00	262,521.00
2019	123.00	116.93	78.245	1,679.00	5,372.80	272,081.95
2020	88.00	108.53	206.09	1,040.00	3,328.00	168,532.00
2021	98.00	89.74	178.05	1,490.00	4,633.90	241,454.50
2022***	121.00	97.49	160.63	1,403.00	4,489.60	227,356.15
2023	122.00	101.54	200.22	1,458.00	4,534.38	236,268.90
Total	2,511.00	2,757.40	4,583.23	63,477.00	202,861.08	10,286,447.85

Remarks:

- * Thailand's average household size is 3.11 people per household according to the basic household information survey of 2020 by the National Statistical Office of Thailand under the Ministry of Digital Economy and Society.
- ** Household expenses in the procurement of water for use and consumption were reduced by 162.05 baht/month/household. (Source: Survey results of household samples along water distribution pipe installation routes that benefited from the project in fiscal year 2013.)
- *** The data figures for fiscal year 2022 were revised due to the previous figures that were disclosed in the MWA's Sustainable Development Report 2022 consisted of data figures from the operation of MWA branch offices. However, this project is operated by the Office of MWA Branch Offices and the Project Administration Department. Thus, it was necessary to use the figures from both agencies in the report.



- Tap Water Quality
- Customer Relationship Management
- Business Cooperation and Coordination
- Occupational Health and Safety Management
- Local Community:
Participation in Community and Social Development
- Training and Education:
Human Resources Development



Tap Water Quality



To produce safe water that meets the quality, Metropolitan Waterworks Authority (MWA) therefore has considered all water production and distribution systems as crucial factors whether they are processes relating to raw water source management, water treatment, water pipe installation, water distribution, and customer service. The MWA has adopted the principles of the Water Safety Plan (WSP) based on the World Health Organization (WHO) to the entire water production and distribution

processes since 2012, along with the various quality management systems such as GHP, HACCP, ISO 9001, ISO 14001, etc.

WSP is considered a risk management plan that controls the tap water quality as a whole from a process of raw water catchments to water distribution for customers. It comprises of three basic principles as follows:

Protect

To prevent an occurrence of contamination in raw water sources.

Remove

To reduce and remove contaminants from water.

Prevent

To prevent a recurrence of contamination.



The steps in the preparation of the MWA's safe water supply plan consist of policy setting, work committee appointment, water supply system information preparation, identification of hazards and risk assessment, preparation of control measures and solutions, improvement/enhancement planning, and safe water supply plan verification and review. The following are examples of critical risk management in the water supply system:

- **Raw water system:** the MWA has reduced contamination arising from the excretion of animals in raw water sources by constructing a protective fence around the waterworks canals. Moreover, to reduce the severity caused by seawater contaminated in raw water, we have adopted a management system that avoids pumping raw water into the waterworks canals during a period that contains high salinity.
- **Water production system:** the MWA has adopted the GHP and HACCP systems for water production processes to ensure the continuity of producing quality and safe water for customers. This system also includes real-time monitoring to control water quality (such as turbidity and residual chlorine values in tap water) in the entire system sedimentation, filtration, and disinfection to be efficient. Additionally, we have established corrective measures in case the water quality does not reach the required criteria and maintenance measures to ensure the availability and stability of tools, machines, and equipment.

Not only those measures as aforementioned, but we have also established measures on chemical use in the production process as well. Thus, all of these actions are to ensure that our water supply is produced sufficiently to the fluctuating demands at all times.

- **Water transmission and distribution systems:** the MWA has established measures to maintain the clear water tank in good conditions-free from sediment and biofilm. This measure requires cleaning the clear water tank at least every 5 years. In order to meet MWA's quality requirements, we have established a quality monitoring measure to control the independent chlorine remaining in the water distribution system by installing a chlorine supply system at water distribution stations to reduce the risk arising from water contaminated with germs. Not just those measures, there are measures to prevent corrosion of the main water pipes, to monitor the water pressure in the water distribution system, and to inspect water leakage in the water pipeline system as well.
- **Water user service system:** the MWA repair and maintenance of the water pipeline system will follow standard guidelines to reduce the risk of contamination by pathogens. Additionally, water quality will be inspected to meet the criteria after the repair operation to ensure that the tap water is safe.



Water Quality Monitoring ^(416-1, 416-2)

To ensure safe tap water for everyone, the MWA therefore has conducted water quality monitoring in every process of the entire system, starting from the quality of raw water received from both eastern and western watersheds and the water quality used in water production processes of every plant. This action also covers all water distribution stations and water pipeline systems in all service areas. In order to monitor the quality of tap water in its distribution system, we have coordinated with external agencies to verify the quality of tap water as well. Furthermore, the MWA has released water quality data from automatic monitoring system and lab tests via its website so that water users can check water-quality data anytime.

For the monitoring guidelines of raw water quality, we have assessed its quality by comparing the results with the water quality standards of surface water sources, category 3, according to the Notification of the Eight National Environment Board, B.E. 2537. Regarding the water quality from production plants, distribution stations, and pipeline systems, we have assessed by comparing

the results with the Criteria for Determining the Tap Water Quality of the Metropolitan Waterworks Authority, B.E. 2565, based on recommendations from the World Health Organization (WHO). If water quality doesn't meet the MWA standard criteria, work process improvements are required to be conducted as soon as possible. However, if the chloride level soars above proper limits due to seawater intrusion into the Chao Phraya River, the MWA's conventional water treatment system cannot solve the issue. The system is not capable of eliminating chloride or salinity.

As for data for complaints about water supply quality problems through the MWA Call Center in the 2023 fiscal year, it was found that 1,733 customers complained about turbid/odorous water (non-chlorine smell).



Scan QR code for MWA website info
<https://twqonline.mwa.co.th/map.php?type=cl>

Table showing the average daily monitoring of water quality for the fiscal years 2021-2023

Key parameters of tap water quality monitoring	Fiscal year			Criteria
	2021	2022	2023	
Nephelometric Turbidity Units (NTU)	0.30	0.33	0.25	Less than 1.0 NTU
pH Value	7.35	7.24	7.36	6.50-8.50
Residual Independent Chlorine (mg/L)	0.78	0.71	0.68	0.20-2.00 mg/L
Number of samples (cases)	2,702	3,504	3,061	



Results of MWA water quality monitoring in every process, compared with the set criteria for the fiscal year 2023 (October 2022 - September 2023)

Water Quality Standards of Surface Water Sources, Category ^{3a}	Criteria for Water Quality of the Metropolitan Waterworks Authority (MWA) B.E. 2566 Based on the Guidelines of the World Health Organization (WHO)							
	Raw Water		Water Treatment Plants				Water Pumping Station	Along Water Pipeline
	Eastern Watershed	Western Watershed	Bang Khen	Maha Sawat	Sam Sen	Thon Buri		
Number of samples	12	12	12	12	12	12	120	3,601
The number of samples that did not meet the criteria (One sample may not meet the criteria in more than one area.) ^b	7	1	0	0	0	0	1	166

Source: Water Quality Monitoring Division, Water Quality Department

Remarks: a. Water quality standards of surface water sources, category 3 according to the Eight Notification of the National Environment Board, B.E. 2537 issued under the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535, re: Determination of water quality of surface water sources.
 b. Descriptions of non-conforming parameters
 1) Raw water on the eastern side: dissolved oxygen (DO) from 4 samples, dissolved oxygen (DO) and BOD from 1 sample, and dissolved oxygen (DO) and fecal coliform bacteria from 1 sample.
 2) Raw water on the western side: BOD from 1 sample.
 3) Water distribution stations: turbidity from 1 sample.
 4) Water distribution pipes: turbidity from 161 samples and E. coli from 5 samples.

According to the table on the results of MWA water quality monitoring in every process compared with the set criteria for the 2023 fiscal year, the non-compliant samples that were found in the eastern and western raw water sources were compared with the standard water quality of surface water Type 3 according to an announcement made by the National Environmental Board, and the details about the non-compliant parameters were stated in the remarks. The cause for non-compliance was the fact that the raw water from the Chao Phraya River and Mae Klong River used for water treatment was contaminated by communities and agricultural areas located near the rivers, thus making it necessary to pre-treat the raw water before producing water supply. Accordingly, the water supply of the water treatment plant met the water supply quality specifications of the MWA, and the WSP principle was used in the water treatment process. Applied in every step, ensuring that the produced tap water meets the MWA's water quality.

For water tap water samples from water treatment plants, and water distribution pumping stations and water pipelines that do not meet the quality specifications of MWA, a parameter that failed to meet requirements was turbidity, which was set to not exceed 1.0 NTU. Accordingly, the WHO's requirement for this value is 4 NTU, so the turbidity of the tap water will not affect health, but it can affect usage appeal. At the same time, the chlorine parameter saw a decrease to below 0.2 mg/L. This was found in the outer water distribution areas, and the MWA has already started supplying chlorine at the water distribution pumping station to raise the local chlorine levels to match the WSP specifications.



Customer Relationship Management

The MWA has created a process for hearing and heeding customers' voices (customer listening) in order to appropriately and effectively respond to the needs and expectations of customers by creating service value through promotion of good quality of life and sustainable availability of tap water in order to obtain customer and market knowledge in terms of customer classification, target customer identification, and customer group information preparation to allow related agencies or people to make effective further use thereof, for example, as input factors for creation enterprise plans and related master plans or for developing innovative products and services, improving work systems and processes, and internal and external communications of the enterprise, etc.

Figure Showing Customer Listening Process

Voice of Customer Management Process					
Guidelines	Duration	Input	Procedure	Output	Agency/Person in Charge
 Empathize & Care	October-November	- Customers throughout the customer life cycle stages (CLC) and customer journey (CJ & TP) - VOC related to listening channels - Enterprise policy direction	1. Specify/review customer listening channels.	Customer listening channels (covering offline and online channels)	Customer Information Management Section
	October-November	- Customer opinion channels - Guideline effectiveness	2. Create/review manual and propose for approval and communication.	Approved VOC management manual (stored in the Infoma Webform and KM Portal systems)	Customer Information Management Section
	Year-round	VOC Management Manual	3. Listen to the voice of customers.	VOC from various channels	Related persons according to designated channels
	Year-round	VOC from various channels	4. Take actions according to complaints/work requests.	Customers receive service according to complaints/work requests.	Branches and other related agencies
	Monthly	VOC from various channels	5. Gather, summarize, analyze, and manage VOC on the branch level.	Monthly VOC reports and information record in the system (Sending to Customer Information Management Section)	Branches
	Quarterly	- Monthly VOC report - VOC data analytics - Annual survey report (3rd quarter)	6. Summarize overall VOC issues and report to executives and related agencies and monitor result reporting.	Quarterly VOC report (Sending to executives/ agency responsible for corrections/improvements/ agency responsible for creating enterprise plans and master plans)	Customer Information Management Section and Market Planning Section

Voice of Customer Management Process					
Guidelines	Duration	Input	Procedure	Output	Agency/Person in Charge
 Define	Annually (January-February)	- Quarterly VOC report - VOC data analytics	7. Summarize needs and expectations and order them by importance.	Summarize key requirements according to customer expectations and customer groups	Customer Information Management Section and Market Planning Section
		- Key requirement report - Information in marketing and products and services - Paired customer groups	8. Review customer groups and target customers and prepare customer group information report and propose for approval.	Approved customer segment profile (CSP).	Customer Information Management Section and Market Planning Section
 Deploy	Annually (January-February)	Approved CSP report	9. Disseminate customer group information for further use.	- Preparation/review of state enterprise plans and other related master plans (CM, DT, KM & INNO, HR, SM, CG, CSR, Loss, Infrastructure) - Design/review of related processes - Customer relationship management and support - Internal enterprise communication (Store in the Infoma Webform and KM Portal systems) - Customer satisfaction evaluation	Customer Information Management Section and Market Planning Section
 Assess	July-September	Process Indicators: - Customer satisfaction score per listening channel - Customer group perception surveys and employee listening channels - Timeliness of CSP delivery - Overall satisfaction score by customer group	10. Evaluate the effectiveness of guidelines and collect knowledge to lead to improvements/ development/ innovations	- Guideline effectiveness review results - Knowledge/ improvement results/ development/ innovations, with results stored in the digital system	Customer Information Management Section and Market Planning Section

In order to enhance services and provide an operating framework for services covering promotion of satisfaction and income generation for the enterprise, the MWA has created a master plan to manage customers, marketing, finances, product development and related business services for years 2023-2027. Known as the MWA Customer Management Master Plan (CM), it was created to meet the needs and expectations of all customer groups and raise the level of relationship management and good experiences of customers while providing clear practice guideline for customer, marketing and financial management in terms of products and services, the core business and connected business. The strategic framework and strategy under the Customer Management Master Plan were specified consistently and in an integrated manner in connection with the Metropolitan Waterworks Authority Enterprise Plan Volume 6 for 2023-2027 by analyzing input obtained from inside and outside the enterprise by using marketing tools to acquire information for use in creating

the Customer Management Master Plan and action plans under the master plan in the short term and the long term.

The results from the aforementioned activities led to the setting of our direction and vision under the Customer Management Master Plan for 2023-2027 and that is to be a “highly capable leader in providing quality and comprehensive waterworks services” with emphasis on operating to enhance product and service quality in the core business and connected businesses while meeting the needs and expectations of all customer groups, enhancing satisfaction and creating sustainable income for the enterprise. This is our direction for setting strategies under the Customer Management Master Plan, which has 3 phases, namely, the short-term or 2023: Smart & Service, medium-term from 2024-2026: Speed & Span, and the long-term from 2027 onward: Sustain & Superior. We will drive all 12 strategies under Customer Management Master Plan according to the Customer Management Objectives (CMOs) covering 4 dimensions as follows:

CMO 1

Enhance products consistently with customers' needs.

- CMO1-T1 Strategy to reduce risk and impacts from water supply disruptions.
- CMO1-T2 Strategy to control and maintain tap water quality standards.
- CMO1-T3 Strategy to increase water pressure in low-pressure areas.

CMO 2

Enhance services to meet customers' needs.

- CMO2-T1 Strategy to pursue data-driven marketing.
- CMO2-T2 Strategy to enhance customer services through traditional channels.
- CMO2-T3 Strategy to enhance customer services through digital channels.
- CMO2-T4 Strategy to enhance complaint and incident reporting management.
- CMO2-T5 Strategy to enhance marketing and customer relations.

CMO 3

Enhance products consistently with customers' needs.

- CMO3-T1 Strategy to add value to the core business.
- CMO3-T2 Strategy to expand the tap water business.

CMO 4

Enhance products consistently with customers' needs.

- CMO4-T1 Strategy to increase the value of connected businesses.
- CMO4-T2 Strategy to expand the scope of connected businesses.

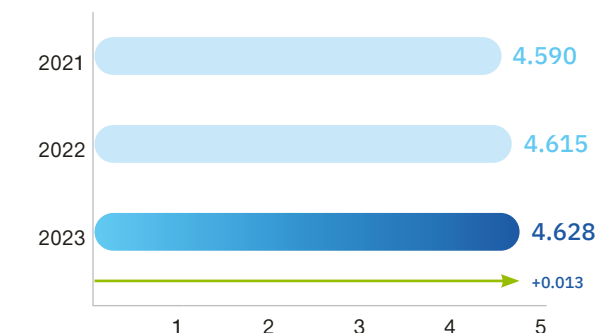
Accordingly, the implementation of the strategies under the Customer Management Master Plan will involve supporting action plans that cover 17 projects in total, and priority will be given to integration and connection with other master plans to facilitate the enterprise toward achieving its set objectives under the 6th Metropolitan Waterworks Authority Enterprise Roadmap (2023-2027) in the most effective and efficient manner possible.

Customer Service Satisfaction Survey Results for the Fiscal Year 2023

The MWA has continuously surveyed the satisfaction of customers for the MWA's services overall in order to understand the needs, expectations, and attitudes of all customer groups and then to develop and improve product and service quality along with work processes in addition to setting the direction to build relationships with all of the MWA's customers.

In the fiscal year 2023, the overall customer satisfaction survey, which was conducted by an external surveyor, found that the MWA continuously improved its service quality over the past several years, with the mean customer satisfaction score at 4.628 (out of 5 total), which increased by 0.013 when compared to the fiscal year 2022 when the mean overall satisfaction was 4.615.

Overall Customer Satisfaction in the Enterprise



Overall customer satisfaction survey results for the fiscal year 2023

Projects/Activities to Enhance Customer Relationships

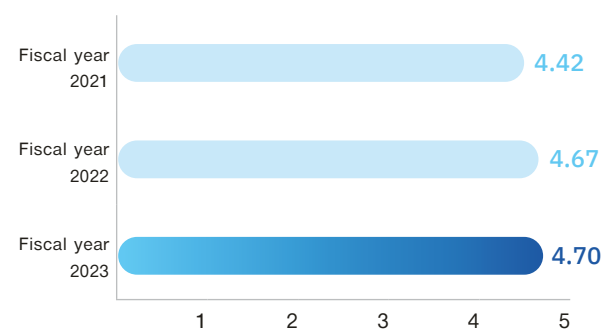
In addition to taking action according to the action plans under the Customer and Marketing Strategy to deliver satisfaction and meet the expectations of customers, the MWA also continuously and proactively operated projects and activities in order to build good relationships with various customer groups as follows:

MWA Top-Tier Activity

MWA Top-Tier is a project for looking after key accounts (customers that are sensitive to the MWA's products and services). This project was established to provide ongoing customer relationship management with the MWA's key accounts by using target group recommendations to develop services to ensure that customers receive services that correspond to their needs and expectations, in addition to being accurate, precise, and fast. It is a way to enhance customer relationships through continually visiting and promoting good relations with customers through various services such as early notifications about suspension of water supply in all cases, water delivery vehicle services in cases of supply suspension, water quality information, and notification service for activities that might affect customers.



Customer satisfaction survey results for MWA
Top-Tier activities in the fiscal years 2021-2023
(5 points total)



Remarks: MWA Top-Tier Project Customers refer to

1. Key accounts whose average monthly water consumption is at least 10,000 cubic meters that affect branch revenues (as calculated based on the average water consumption for the past 12 months of the previous fiscal year).
2. Sensitive accounts that affect the MWA's products and services, whose monthly average water consumption is below 10,000 cubic meters that require close care and attention in order to prevent complaints and dissatisfaction that might affect the enterprise's image without regard to water consumption, i.e. hospitals, dialysis centers, ice factories, etc.



Government Easy Contact Center (GECC): Enhancing Service for the Best Interest of the People

The MWA enhanced services for **convenience, speed, and accessibility** by striving to develop quality water supply services with cleanliness and safety for the best interest of the people. In doing so, the MWA branch offices applied for the certification of Government Easy Contact Centers (GECC) that have been continuously providing convenient and effective services to the people. The standard certification period is up to 3 years from the certification year.

In 2023, the MWA applied for the certification of 11 Government Easy Contact Centers (GECC) (12 branches), of which all 11 have been certified according to government easy contact center service standards. They are divided as follows: Advanced Level (Silver): 10 centers as follows: Taksin and Suksawat MWA Branch Office (1 center) Samut Prakan, Thung Maha Mek, Bangkok Noi, Bang Bua Thong, Prachachuen, Phaya Thai, Min Buri, Mansri, and Suvarnabhumi Branch, Primary Level (Blue): 1 center as follows: Nonthaburi MWA Branch Office



The MWA has Government Easy Contact Center (GECC) certification for all of its 18 service branches and is eager to serve as an agency that gives advice and conveniences to members of the public who contact us to swiftly and easily access waterworks services, and we continuously raise and uphold our service standards for the best interest of the people.

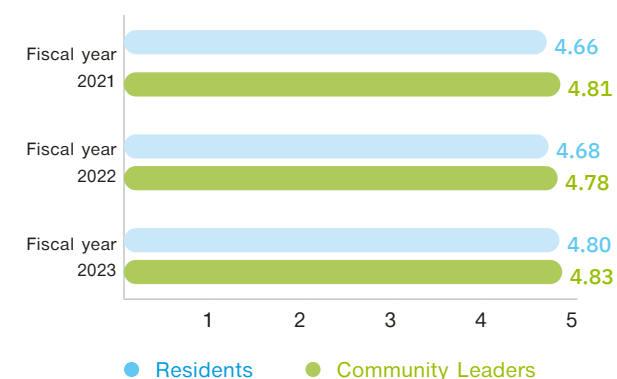


MWA Meets the People Activities

All 18 MWA branch offices hold these activities at least 4 times per year/branch in order to build positive relations with R (residential) customers and hear their comments about water supply needs in order to continuously improve services in addition to providing assistance and problem corrections. The activities included water supply services and basic water pipe inspections and repairs.

In the 2023 fiscal year, activities were organized a total of 72 times.

Customer Satisfaction Survey Results on MWA Meets the People for the Fiscal Years 2021-2023 (5 points total)



Complaint Management Policy

In order to deal with the diverse requirements of both customers and all groups of stakeholders, the MWA has therefore formulated a policy to manage complaints from those who have been affected by our operations in terms of water works (product). This policy also covers all activities conducted by our subcontracted workers and contractors who work on behalf of the MWA in terms of service. As the above reasons, this policy also provides complainants with opportunities to receive quick responses that are reasonably fair and effective. Moreover, to comply with our good corporate governance policy, we have managed and treated all complaints with transparency, integrity, fairness, and equality. For enforcement of the PDPA, an emerging Act to protect individual personal data, we have established measures to confidentially maintain and protect personal data of all parties involved, along with measures to protect the complainants in good faith, including witnesses involved with all complaints proceedings to be effective. Meanwhile, the information obtained from such complaints is used for conducting strategic analysis to improve our operations, with an aim to provide our customers with clean and safe tap water as well as deliver excellent and consistent services.

Complaint channels include:

- Telephone** through a call center at 1125 and direct lines to all MWA branches.



- Online services** through the MWA onMobile application, MWA social media: Facebook, X, LINE OA: @MWAThailand, Website: www.mwa.co.th, E-mail: mwa1125@mwa.co.th, Web Chat, etc.

- Direct contact** through the eighteen MWA branches, one stop service centers at four department stores.

- Postal** to Metropolitan Waterworks Authority 400 Prachachuen Road, Thung Song Hong, Lak Si, Bangkok 10210.

Business Cooperation and Coordination (2-28)



Cooperation for Effective Operation

Apart from driving an organization that requires the cooperation of personnel at all levels within the organization, it is also important to build partnerships and collaboration with external agencies to ensure continuous and efficient work processes. Thus, we work together with other agencies, and details are described as follows;

Coordination and Cooperation in Enterprise Operational Capability Enhancement and Standard Specification

Pipe Installations/Permission Requests for Pipe Installations

The MWA uses areas belonging to other agencies to install water pipes to distribute water from treatment plants to residential households. Thus, we coordinated efforts to request permission to install water pipes in local areas and cooperation in carrying out construction together at the same time as road and footpath renovation construction projects carried out by other agencies.



Ministry of Interior

Bangkok Metropolitan Administration (BMA), Nonthaburi, Samut Prakan, Local Administration Organizations (Provincial Administrative Organization, Municipality, Subdistrict Administrative Organization), Metropolitan Electricity Authority



Ministry of Transport

Department of Highways, Department of Rural Roads, Marine Department, State Railway of Thailand, Mass Rapid Transit Authority of Thailand, Airports of Thailand Public Company Limited, Expressway Authority of Thailand



Ministry of Agriculture and Cooperatives

Royal Irrigation Department



Academic, Technological, and Standard Specification Cooperation

- World Health Organization (WHO): Water Safety Plan
- Ministry of Public Health, Department of Health: Academic affairs related to health, water quality, and the water safety plan
- Ministry of Industry, Thai Industrial Standards Institute: Pipe and pipe accessory engineering standards
- Ministry of Defence, Royal Thai Navy, Hydrographic Department: Sea level and tidal data
- Asian Waterworks Utilities Network of Human Resource Development (A1-HRD), Japan
- Water Quality Asian Cooperation Network (WaQuAC-Net), Japan
- International Water Association (IWA)
- American Water Works Association (AWWA)
- Thai Water Works Association

Coordination and Cooperation with Partners to Enhance Services

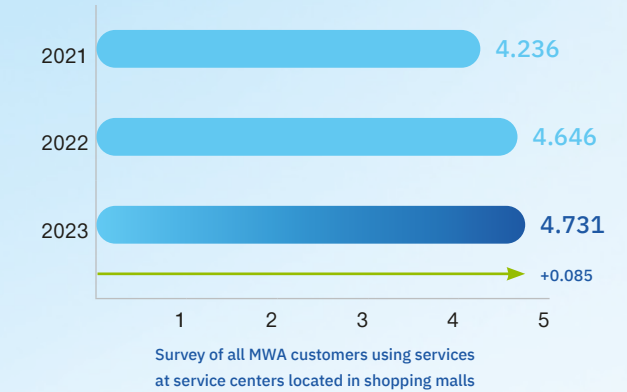
Public Service Cooperation

In order to enhance services for speed, the MWA has made joint contracts with banks and payment processors such as Counter Service, 7-11, Big C, Lotus's, and CenPay in order to provide additional channels and conveniences to customers in paying water bills.

In addition, we cooperated with department stores in operating government easy contact centers at Central Westgate, Central Chaengwattana, and The Mall Lifestore Ngamwongwan and Bangkok Express Service at The Mall Lifestore Bangkae in receiving water bill payments and water supply service complaints.

The results of a survey into the quality of all 4 mall service points of the MWA found that in the fiscal year 2023 the service satisfaction score among customers with prior service experience was 4.731 or an increase from the previous year.

Overall satisfaction with the services provided by the service centers located in shopping malls



Public Service and Operations Cooperation of Technology Organizations

The Metropolitan Waterworks Authority and the Metropolitan Electricity Authority (MEA), as state enterprises responsible for critical public utilities like electricity and water supply in the Bangkok, Nonthaburi, and Samut Prakan area, have integrated cooperation to maximize service capabilities for the public to improve public service work by jointly developing technological advances such as by issuing electricity and water bills together in the same bill, providing smart meters to measure electricity and water consumption to facilitate effective online control and management, developing the Metro Application to help electricity users and water users have access to the services of both agencies via seamless online connection, and integrating big data to promote innovations to meet the needs of the public.

Recently, both agencies have continuously worked together in different areas, such as in



the development of a system to accept water and electricity payments on behalf of each other either online or via service counters at different branches and connecting public data with government agencies to reduce document requests from various government agencies. Our cooperation is an important step for the installation of a digital work system based on cyber security and efficient resource utilization and promotes knowledge exchanges and personnel competency development for the best interest of the public.

Cooperation to Promote Values for Society, Communities, and the Environment

The Metropolitan Waterworks Authority and the National Housing Authority (NHA) have signed a memorandum of understanding (MOU) to “enhance public service and promote values for society, communities, and the environment” with the objective of jointly creating a plan to enhance public service and promote the creation of values for society, communities, and the environment with emphasis on water utilities to reduce indoor plumbing system construction or maintenance expenses, reduce water consumption and water fees due to waste inside of buildings, in addition to providing maintenance to ensure the cleanliness of water storage tanks, to lead to good quality of life and satisfaction in residents. Accordingly, we have launched a pilot project to enhance the quality of life of people living in 2 community housing projects, namely, Huai Khwang Community Housing and Bang Chan Community Housing projects by providing training and development on how to clean small water storage tanks to the residents to create jobs and providing water



storage tank cleaning and water supply system maintenance services inside of buildings to promote good and sustainable quality of life in residents, communities, and society, and this includes an activity to promote the use of water-saving equipment with the MWA's water conservation labels along with others to support collaboration between agencies that share the ideal of bettering the quality of life of the people in the area of water supply, as well as an activity to raise awareness about the importance of water resources to advocate for mindful water consumption and care to ensure that water resources remain sufficiently and sustainably available for use.

Occupational Health and Safety Management (403-1, 403-3, 403-8)



The MWA's occupational health and safety management occurs in accordance with related laws such as the Occupational Safety, Health, and Workplace Environment Act, B.E. 2554 (2011), along with various ministerial regulations related to safety, occupational health, and work environment management standards. We have used these as the framework for setting our **Safety, Security, Health, and Environment Policy (SSHE)**, which was issued on 3 April 2023, that requires all employees and contractors to follow all legal requirements in order to support improvements in the work environment to ensure safety while striving to protect the environment and promote participation in effective safety management.

The MWA has a process to systematically create and promote safety, security, health, and environment (SSHE model), which is implemented under the Human Capital Master Plan HCMO2-T2-P3 along with a project to enhance security, safety, health, and environmental management (SSHE-excellence) under the Hygiene, Safety, Welfare, Occupational Health, and Work Environment Committee, which is responsible for policy-setting and plan implementation with the Safety, Security, and Health Division operating functioning as the central agency for planning the enterprise's safety management system.



Hygiene, Safety, Welfare, Occupational Health, and Work Environment Committee

The MWA has appointed occupational health personnel to be employees in the position of professional safety officers in all 21 establishments to have them staff each OSHEC, and we have also appointed employees who completed training on different levels and who are awarded certificates from the Safety and Health at Work Promotion Association (Thailand) Under Her Royal Highness Princess Maha Chakri Sirindhorn Patronage to have them serve as work safety officers (SOs) in the management and supervisory level with

the Governor signing their appointments. The Occupational Safety, Health, and Environment Committee and SOs will work together to drive plans and carry out health measures along with safety, occupational health, and environmental measures in every area that might impact employees and communities. This includes preparing employees, for example, through firefighting drills, disease prevention, landscaping, health promotion exercises, annual health check-ups and more.

Hygiene, Safety, Welfare, Occupational Health, and Work Environment Committee of the MWA, as per Order No. 2984/2023

Governor	Chairman
Deputy Governor (Administration)	Director
Deputy Governor (Water Production and Transmission)	Director
Deputy Governor (Engineering)	Director
Assistant Governor (Human Resources)	Director
MWA Expert Level 9 under the Governor	Director
Chairman of the Occupational Safety, Health, and Environment Committee No. 1-21	Director
Director of the Legal Department	Director
Director of the Budget Department	Director
Chairman, MWA State Enterprise Labor Union	Director
Director of the Safety, Welfare, and Occupational Health Division	Director and Secretary

Occupational Safety, Health, and Environment Committee (OSHE Committees No. 1-21)

Professional Safety Officer (Director and Secretary)

(Occupational health personnel appointed to become the professional safety officers by the Governor)

Directors representing the employer (supervisory level employees)

- Division director employees or above (Executive level safety officers)
- Section supervisor employees or equivalent (Work supervisor safety officers)

Directors representing employees (Employees Level 1-5)

- Remarks: (1) OSHEC means the Occupational Safety, Health, and Environment Committee.
- (2) OSHEC is appointed in accordance with the Ministerial Regulations on an annual basis. Each enterprise consists of representatives of the employers (executive level) and employees (operational level). The meetings on Safety shall be held on a monthly basis, to discuss matters relating to safety. It also includes defining the communication channels for communicating the policies to employees/subcontracted workers in each entity, as well as organizing activities that create understanding and awareness regarding the safety and environment in the workplace.

6-Step to Develop and Promote SSHE



Incident Investigation Process for the Work-Related Risk ⁽⁴⁰³⁻²⁾

The MWA's entity in charge performs duties in investigating safety according to the designated procedure. If a potential risk to safety is found, it is required to prepare a corrective report with a definite timeframe to complete. Also, a progress summary report is required to be presented in the monthly meeting. The Safety Committee is required to supervise all operations according to the procedures in reporting unsafe incidents. If one of the employees/operatives witnesses an unsafe incident, it is required to report it in accordance

with the designated procedures, along with the accident reporting process. Each MWA entity is required to prepare a report on work-related hazards and illnesses Form No. 001 for Employees and Form No. 002 for Operatives. Moreover, the Safety, Welfare and Occupational Health Division is also required to collect those data and investigate the incidents before presenting it to the Meeting of the Safety Committee to determine the workmen's compensation.



Work-Related Risk and Hazard Management ⁽⁴⁰³⁻⁷⁾

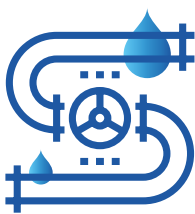
Currently, the MWA conducts an assessment of work-related risks and hazards, but it does not cover all entities. Initially, the preparation of the Master Plan on the Occupational Health and Safety Management Standard Systems (ISO 45001:2018) has been piloted at the Maha Sawat Water Treatment Plant and the Bang Khen Water Treatment Plant. The Maha Sawat Water Treatment Plant received ISO 45001 certification for its occupational health and safety management system from the Management System Certification

Institute (MASCI) on 5 July 2023, and the Bang Khen Water Treatment Plant received certification on 8 September 2023. Such a system consists of the Hazard Identification, Risk and Opportunities Assessment according to the nature of routine and non-routine operations. It also includes a risk management plan for occupational health and safety management in alignment with the principle of Hierarchy of Controls to prevent and minimize the risks at the workplace.



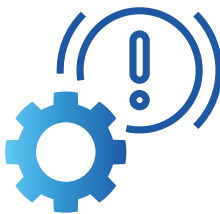
Elimination

Substitution with materials, processes, guidelines or equipment with a lower degree of hazards, for example, originally, the MWA used paints containing hazardous chemicals (Toluene) to spray the flow meters. Later, it switched to a new generation of watercolors that did not contain harmful chemicals (Toluene).



Engineering Controls

Such as the installation of neutralization vaporizers to prevent chlorine gas leakage.



Warnings

Such as the installation of chlorine gas leakage detectors/ fire alarms and hazard warning signages according to the nature of each job.

Safety Training for Employees and Subcontracted Workers ^(403-4, 403-5)

The MWA provides safety training through various courses in line with the specifications of the law and provides safety and occupational health training for employees on each level and related parties and other training in special operations such as work in confined spaces, work involving

electricity, and work involving the use of a forklift, etc. Training is provided to related employees and contract workers before the start of work with knowledge measurement before and after training. In the 2023 fiscal year, we provided the following training:



Occupational Health and Safety Training Program

Courses	Number of training	Persons
1. Safety Officer (Supervisor level): The participants were section heads or equivalent.	2	91
2. Safety Officer (Executive level): The participants were the division directors or equivalent.	1	49
3. Review of Occupational Health, Safety, and Environmental Regulations in Effect The participants were Occupational Health Professionals and MWA Employees	1	31
4. Safety at the Workplace Relating to the Electrical Works and the Rescuing Methods for Electrical Hazard Victims: The participants were employees who were members of the Safety Committee and employees related to electrical work.	3	113
5. Fire Evacuation Drills: The participants were employees and contract workers from all MWA entities.	22	3,221
6. Primary Fire Extinguishing: The participants were employees in every place of business of the MWA.	9	430
7. Occupational Health, Safety, and Environment for the General Employees and New Employees in Accordance With the Occupational Safety, Health, and Environment Act, B.E. 2554 (2011): The participants were new employees who had not yet been trained.	4	164
8. Basic First Aid and Resuscitation: The participants were members of the Safety Committee and employees on every level.	2	94
9. Leaders, Supervisors, Rescuers, and Workers in Confined Spaces: The participants were workers who worked in confined spaces.	2	60
10. Crane Controller-High Tower Cranes, Cars, Boats, Cranes, Trucks With Cranes (Mobile): The participants were workers involved in related work activities.	3	50
11. Overhead Crane Controllers-High-Gantry Cranes, and Other Stationary Cranes: The participants were workers involved in related work activities.	5	148
12. Use of Forklifts, Inspection, and Maintenance for Safety at the Workplace: The participants were workers involved in related work activities.	1	25
13. Review of Safety Procedures for Working in Confined Spaces The participants were Employees Engaged in Related Work	1	21

Communication and Development of Understanding about Occupational Safety, Welfare, Occupational Health, and Environment

In addition to providing safety knowledge through various training courses in accordance with the law, each Safety Committee (21 committees total) also held activities to promote knowledge, understanding, and awareness in employees and contract workers extensively about safety and how to create a good work environment with a contest held about the performance of each Safety Committee (21 committees total) as a tool to encourage efforts to continually drive safety,

welfare, occupational health, and environmental policies. Accordingly, a competition evaluation sub-committee evaluated the committees according to 2 competition criteria, i.e. documents and on-site evaluations, and the competing agencies were divided into 2 types, namely factories and offices. On 16 August 2023, the Governor of the MWA gave 17 shield honor awards to entities with Safety Committees that excelled in occupational safety, health, and environment in 2023.

Statistics Table Showing Work-Related Injuries and Deaths During the Fiscal Years 2019-2023 (403-9, 403-10)

	Fiscal Year				
	2019	2020	2021	2022	2023
Injury Frequency Rate: I.F.R.					
• Target (not over)	0.39	0.24	0.20	0.20	0.2
• Result	0.30	0.15	0.15	0.30	0
Injury Severity Rate: I.S.R.					
• Target (not over)	3.18	3.18	1.50	1.50	0.75
• Result	0.15	0.59	2.65	0.45	0
Recordable Work-Related Injuries					
• Number of work-related injuries (up to 3 days off) (case)	2	0	0	2	0
• Number of work-related injuries (more than 3 days off) (case)	0	1	1	0	0
High-Consequence Work-Related Injuries	0	0	0	0	0
Number of Work-Related Deaths	0	0	0	0	0

- Notes:
1. Data collection process refers to the collection of work hours from the HR systems resulting from taking leave, working overtime, and shifting operations, applying the American National Standards Institute for calculating the I.F.R. and I.S.R. In the fiscal year 2023, there were 7,373,447 work hours, with a reference of 1,000,000 work hours. However, the MWA currently collects data on work-related injury statistics from the contracted workers systematically.
 2. High-Consequence Work-Related Injuries refer to the number of workers who have been injured at the workplace and required to take more than six months off, but do not include work-related deaths (as defined in accordance with the requirements of GRI 403-9: Work-related injuries).

According to the statistics table of injuries and fatalities from work operations, there were no employees who experienced work-related accidents in the fiscal year 2023.

Even though, the MWA provides an annual medical health check-up based on risk factors for employees and subcontracted workers to prevent and minimize occupational health impacts and new employees whose works are exposed to risk factors, to undergo the medical health check-ups before the commencement date of work (Baseline) as required by law. However, the MWA still does

not collect data on such work-related or monitoring of employees whose health check-up results indicate risk factors or abnormalities, since we currently have a shortage of knowledgeable personnel in occupational medicine. That being said, in the fiscal year 2024, the MWA has a plan to hire occupational doctors to provide check-up and consultation services and have employees who have risks for abnormal health conditions to visit the doctors for follow-ups, and we expect to be able to collect work illness statistics in the next fiscal year.

Health Support (403-3, 403-6)

The MWA launched various health promotion projects and provided care for the mental health of employees such as through the “Mobile Stress-Relief Service Vehicle” Project to boost employee mental health and by holding the lecture under the title “Simple Stress-Relief Methods during COVID-19”, etc. Moreover, the MWA provides treatment and medical services along with disease diagnosis and consultation services for employees and their families, including retirees, spouses of retirees, covering medical, dental, pharmaceutical, and clinical pathological care. In cases where illness symptoms are beyond the capacity of management, employees are also referred to or recommended to receive treatment at other hospitals with better capabilities.

Moreover, the Medical Service Division analyzes the annual health check-up results of employees to create projects to correct health problems. For example, health knowledge training was provided to employees about diabetes and easy stress relief during COVID-19 (New Normal) along with heart disease screening in working age and elderly people and measures and practice guidelines for dealing with COVID-19, which has become an endemic disease, etc.

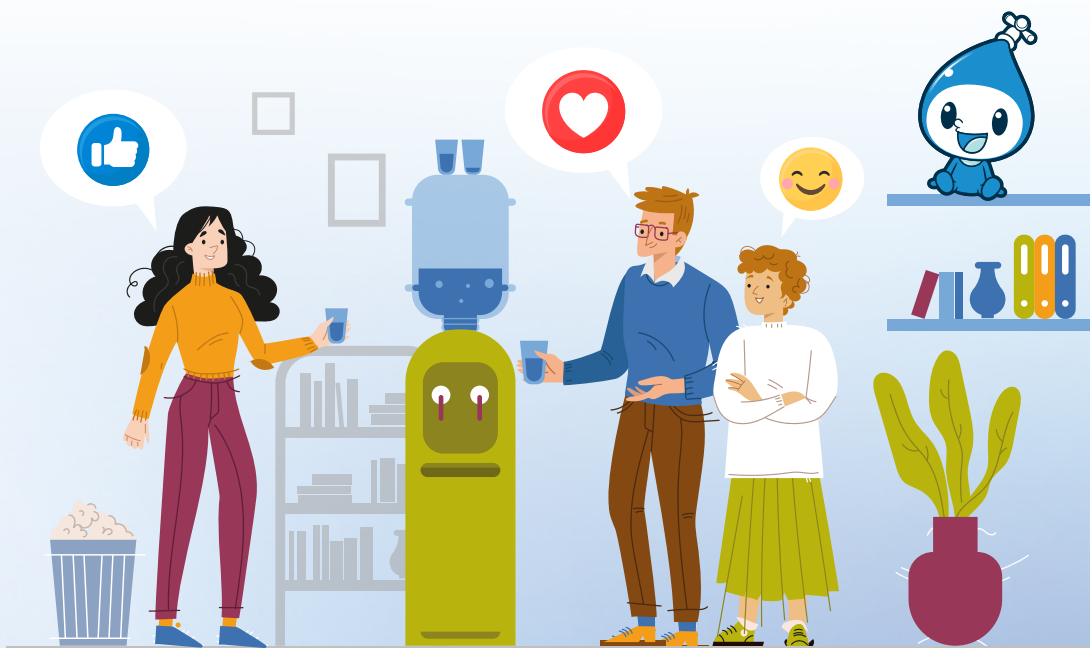


Local Community: Participation in Community and Social Development (413-1, 413-2)



The MWA gives importance to participating in community and social development, because communities are the MWA's stakeholders. We started by surveying community areas to implement our projects at the start of the fiscal year and to build a network of relationships to give communities the opportunity to participate in expressing their opinions and recommendations. We heeded the needs and expectations of these communities and used these needs to create activities to be carried out together, and we also monitored our performance in the past year when the MWA cared for communities in many related areas through

many projects to improve the people's quality of life while concurrently promoting community progress in multiple dimensions, including water resource conservation and natural resource conservation. Additionally, we renovated water supply systems in community areas, provided lectures to educate the public about water systems, which are the enterprise's primary area of performance and expertise, and organized activities to develop closer ties between the enterprise and communities while strengthening communities in a sustainable manner.



School Plumbing System Project

The purpose of the **School Plumbing System Project** is to improve communities' good quality of life by accessing clean water to ensure that communities have clean water for use and consumption in order to have better health and quality of life. We have created and renovated school plumbing systems, developed water well systems, water filtration systems, water pump systems, and water pipe systems, and procured tall water storage reservoirs for holding rainwater and well water. We also carried out other activities that benefited schools. In fiscal year 2023, we operated this project to assist 1 school located along the water supply canal on the eastern side near Bang Khen

Water Treatment Plant, namely Pracha Uppatham School in Tha Sai Subdistrict, Mueang Nonthaburi District, Nonthaburi Province, by renovating the plumbing system inside the school, along with the school's water filters and water coolers. In addition, we held the "Mi Nam Mi Chiwit" learning activity to promote consciousness about water resource conservation for youths after completing the project. This has led to teachers and students having access to clean water according to sanitation standards for both use and consumption while reducing their expenses in buying drinking water bottles and expenses stemming from water leaks inside the school.



Plumber Vocational Program for the People (Communities Around Water Treatment Plants)

The **Plumber Vocational Program for the People** has the purpose of sharing knowledge as part of its primary performance along with the enterprise's expertise to the general public. Project participants received training on how to be plumbers and how to provide basic maintenance to pipe systems. In addition, we encouraged plumbers to form groups to exchange knowledge through a collaboration network with the MWA. This project enabled the training participants to apply their knowledge to repair the plumbing systems inside their homes or to assist communities in different places in addition to engaging in additional occupations as professional plumbers to earn income.

In fiscal year 2023, the MWA provided training on basic plumbing work in 2 batches. A total of 28 people completed their training in the first batch,



while 29 people completed training in the second batch. We also brought people who completed training to repair plumbing systems for temples and schools in the Plumbing for the People CSR Activity in 2 locations, namely (1) Wat Noi Noppakhun School, Dusit District, Bangkok; and (2) Khlong Kluea School, Khlong Kluea Subdistrict, Pak Kret District, Nonthaburi Province.

In addition to sharing professional plumbing knowledge to create jobs and income for the general public, the MWA also created the course **“Basic Plumbing for Employees and Retirees”** for employees who were due to retire in the fiscal years 2022-2024 and ordinary employees to promote knowledge in employees about how to maintain plumbing systems and sanitary ware and how to repair household plumbing equipment to enable the employees to take care of themselves and their families. In total, 50 people participated in the training activity.



Furthermore, in order to expand the opportunity to develop plumbing skills and occupations in society, in fiscal year 2023, the MWA built upon the project by working together with the Department of Corrections to provide vocational training to well-behaved inmates on how to become plumbers. This provides a way for inmates participating in the project to prepare themselves before returning to live in society and is a way for them to be able to take care of themselves without burdening their families or creating social problems. Importantly, it helps to prevent them from committing future offenses while enabling them to start new lives as good members of society. Thus, we launched the **“Create Opportunities Create Jobs”** Project on the occasion of the 130th anniversary of the founding of the Ministry of Interior in 2022 at Min Buri Remand Prison for 2 batches of inmates, namely 30 male inmates in the first batch and 30 female inmates in the second batch. We also provided a basic plumbing course for the inmates of Nonthaburi Prison.

Ruam Jai Rak Nam Project

For the past several years, the Samlae Raw Water Pumping Station, which is located adjacent to Wat Samlae, Ban Krachaeng Subdistrict, Mueang Pathum Thani District, Pathum Thani Province, has served as the point for receiving raw water from the Chao Phraya River Basin and is a major source of water of the MWA such as at Khlong Ban Phrao, Khlong Om, and Khlong Bang Luang Chiang Rak. Due to rapid growth in residential areas, agriculture and industrial factories, the original canal lines have become shallower, with large quantities of water hyacinths gathering to fill the waterways, making it difficult for water to circulate conveniently. As a result, the quality of the water in the canals has been deteriorating. Thus, the MWA urgently needs to take care to appropriately maintain the quality of water by promoting and instilling consciousness in the public to care for their rivers and canals, in addition to restoring dilapidated waterways, so they can be in good quality once again. This led to the development of the **“Ruam Jai Rak Nam”** Project, which focuses on ensuring that communities, students, and youths have knowledge and understanding



about how to care for their environment and share their knowledge with their families on how to sustainably preserve the environment. This will benefit the surrounding environment, especially on both sides of the canals, while also creating a network with good relationships among the various agencies to facilitate the collaboration of the public sector, private sector, and the people in the joint effort to develop and restore water quality and improve people's quality of life.

In fiscal year 2023, the MWA operated the project in 2 schools in Pathum Thani Province as follows:

1. Chumchon Wat Bang Kadi School, Bang Kadi Subdistrict: The MWA took actions to renovate and install dishwashing sinks and grease traps in addition to improving the overall scenery around the dishwashing area of the school. We also organized learning stations and helped students sort their trash in addition to replacing damaged bathroom faucets and toilet washer hoses for the school and donating funds to help provide lunches to students. The MWA also gave dolls donated by the MWA's employees to the students.

2. Wat Prem Prachakon School, Bang Phun Subdistrict: The MWA renovated the water drainage gutters of the school to help alleviate flooding during times of heavy rainfall and installed dishwashing sinks with grease traps at the school's common dishwashing area and also organized learning stations on how to prepare grease traps, on the Clean Water Clinic, and on proper waste sorting before discarding for students and donated funds to contribute to the lunches of students.

“MWA Rak Pa Ton Nam” Project

The MWA is an organization whose primary mission is to use raw water obtained from natural water sources to produce clean and safe tap water with a high-quality standard that is suitable for both use and consumption in order to serve over two million households in the area of Bangkok, Nonthaburi, and Samut Prakan. As such, we recognize the importance of conserving watershed forests and restoring natural resources in an integrated manner. We have been continuously operating water and environmental resource conservation projects since 2011, and in the 2023 fiscal year, the MWA continued its model of implementing natural resources and environmental conservation projects through the **“MWA Rak Pa Ton Nam”** Project to promote conservation of water resources, forests, and soil and to continuously encourage the participation of communities and the MWA's employees in supporting the enterprise's primary mission of producing high-quality tap water from sufficient and sustainable raw water sources.

Performance in Fiscal Year 2023

1. Community Quality of Life Development Activity: The activity occurred at Ban Rin Luang School, Mueang Na Subdistrict, Chiang Dao District, Chiang Mai Province, where MWA volunteers installed water drainage pipes to solve flood problems



at the school in addition to renovating a tall water storage reservoir, constructing a utility building and renovating dining tables. In addition, the MWA partnered with Chindasook Group to renovate the teachers' accommodations inside the school.

2. Watershed Forest Conservation Activity – The executives and volunteers of the MWA joined together in an activity to construct check dams and forest fire barriers in collaboration with the Electricity Generating Authority of Thailand at Srinagarindra Dam, Kanchanaburi Province.

Training and Education: Human Resources Development (404-2)



The MWA is committed to managing and developing human resources to create quality personnel and effectively managing the enterprise while ensuring the well-being of employees under the vision of the Human Capital Master Plan of “quality personnel to deliver service excellence” and the MWA’s Human Resources Management and Development Policy that was announced on 1 October 2022.

In order to prepare personnel to have capabilities and multiple skills to support changes and keep up with rapid changes in the internal and external environments of the enterprise, the MWA has created the HR Strategy Map to serve as a guideline for developing capabilities and driving human resources management (HRM) and human resources development (HRD), which form the major factors for driving the enterprise toward its objectives and promoting the sustainable growth of the enterprise in the future.

Personnel Enhancement Projects for Operational Excellence

Projects to develop the performance and required future skills of personnel are divided as follows:

- Operate 2 courses under the new course development guidelines, namely “Future Skill for BU” for employees who are driving the establishment of subsidiaries (business units) and “Future Skill for Driving Change” for employees in tiers 5-7 in the wastewater management, digital technology, and legal affairs groups.
- Operate 28 courses under the personnel development plan for 2023, divided into 18 in-house training courses and 10 public training courses.



“Future Skill for BU” Course

Percentage of trainees who adapted acquired knowledge in work after training

= 82.60%
(Target ≥ 80%)



“Future Skill for Driving Change” Course

Percentage of trainees who adapted acquired knowledge in work after training

= 80%
(Target ≥ 80%)

Water Loss Management Knowledge Development and Enhancement Plan:

We have 7 courses, namely courses on how to use a system and choose pipe renovation routes via asset management, basic knowledge about DM systems, basic knowledge about wastewater reduction and basic pipe leak surveying, advanced pipe leak surveying, advanced wastewater management, WLMA 2.0 system use for pipe system maintenance and civil works, and advanced pipe system design via the Epanet software.



Percentage of trainees who adapted acquired knowledge in work after training

= 91.44%
(Target ≥ 80%)

Safe Tap Water Knowledge Development and Enhancement Plan:

We have 5 courses, namely courses on how to review GHP and HACCP quality system specifications, internal audit techniques including effective prevention and correction, plant hygiene and personal hygiene, control and prevention of disease carriers, and surface coating of water pipes and accessories.



Percentage of trainees who adapted acquired knowledge in work after training

= 94.34%
(Target ≥ 80%)

Digital Competency Development and Enhancement Plan:

We have 10 courses, namely courses on advanced Microsoft Excel skills, professional PPT presentation techniques, basic knowledge about the Personal Data Protection Act, B.E. 2562 (2019), basic Power BI usage, basic governance information and consciousness, Business Analyst Bootcamp, Awareness of Data Driven Organization, importance of enterprise architecture (EA) on operating the enterprise’s business, SAP usage techniques for checking, and controlling budgets and cyber security awareness.



Percentage of trainees who adapted acquired knowledge in work after training

= 93.79%
(Target ≥ 80%)

Personnel Innovation Competency Enhancement Plan:

We have 4 courses, namely courses to enhance creative thinking and innovation management competency in Classes 1-3, courses on how to write project proposals to receive funding, design thinking in action, and innovation facilitator.



Percentage of trainees who adapted acquired knowledge in work after training

= 92.89%
(Target ≥ 80%)

Customer Experience Creation Plan

The employee training plans in fiscal year 2023 stipulated for there to be courses to provide personnel training and development to imbue them with appropriate knowledge, skills, and competence according to the needs of the enterprise and various agencies according to the training needs as part of the action plans under the Human Capital Master Plan for fiscal year 2023 and projects to enhance personnel competency for excellence. There are 6 courses total for implementing the Customer Experience Creation Plan with the course contents divided into 2 groups as follows:

- 1. Product and service enhancement courses consistent with customers' needs.
- 2. Courses to add value to the core business and expand connected businesses for the security and sustainability of the enterprise through new digital market developments.



Retiree Development Project

The MWA prepares employees before they leave their regular duties by providing knowledge about health and how to live happily in addition to providing guidance about supplementary occupations after their departures as follows:

- Happy Retirement Course: Trainees consisted of employees who were retiring in fiscal year 2023.
- Retirement Benefits and Entitlements Course: Trainees consisted of MWA employees who were retiring in fiscal year 2023.
- A course to create value and pride in employees before retirement: Trainees were suitably qualified employees according to the enterprise's specifications, and training was provided in 2 classes.

Development Projects for Employees (Retiring in 3 Years)

This course aims to provide trainees with academic knowledge and work techniques under their responsibility to develop “work knowledge” and “transfer” knowledge and experience to later generations of employees. The knowledge transfer activity is meant to enhance work quality continuously. Its trainees consisted of 23 suitably qualified employees according to the enterprise's specifications.



Line Manager Competency Development Project to Create People Managers

The MWA has created a development plan to promote leadership in executives on every level (Leadership Development Roadmap) with the purpose of enhancing the competency of line managers for them to become people managers by enhancing skills and learning with a focus on learning through diverse activities and actual practice (activity-based learning) to develop and increase the effectiveness of new leaders. From the evaluation of the knowledge and understanding and management competency and leadership of executives, it was found that the mean satisfaction score toward training under the Leadership Development Model in fiscal year 2023 was 4.69 and that 83.95% of trainees were able to adapt acquired knowledge in their work, while executives underwent an LC 360-degree evaluation and met the enterprise's expectations with a score of 98.45%.

Furthermore, we also develop and enhance competency to prepare personnel who pass their evaluations and screening to join our Successor & Talent Management project, which provides additional development beyond progressing according to the normal career path. We have expanded the recruitment of additional talents (inclusive talents) under a project to develop personnel to support work according to the enterprise's strategy: MWA Expert Plan, which supports the utilization of experts and talents in each process of the MWA.

Table Summarizing the Average Number of Training Hours for Employees Classified by Genders and Position Levels in Fiscal Year 2023 ⁽⁴⁰⁴⁻¹⁾

Average Training Hours ⁽⁴⁰⁴⁻¹⁾						
Position Level	Total Number of Employees			Average Training Hours/Person		
	Male	Female	Total	Male	Female	Total Average
10	6	6	12	33.17	61.83	47.50
9	21	12	33	70.67	59.75	66.70
8	47	45	92	96.18	109.87	102.88
7	222	253	475	68.54	68.18	68.35
6	401	450	851	50.65	55.54	53.24
5	739	620	1,359	38.82	47.40	42.73
4	619	196	815	37.77	50.92	40.94
3	195	97	292	35.74	53.92	41.78
2	159	71	230	26.74	41.52	31.30
1	-	-	-	-	-	-
Total	2,409	1,750	4,159	43.59	54.76	48.29

Scholarship Program as Human Resources Development

In fiscal year 2023, the MWA also provided scholarships to 2 employees of the Metropolitan Waterworks Authority for fiscal year 2022, and the MWA accepted applications from 8 MWA employees to undergo selection for scholarships in the 2023 fiscal year on the bachelor, master, and doctoral levels, although no employees applied for a scholarship in fiscal year 2023.



Performance Evaluation (404-3)

The MWA has conducted employees' performance evaluation in various aspects. Those results are used for review and analysis in the preparation of competency development plans to enhance their potential and the organization. It is divided into 3 categories as follows:



Core Competency: (CC)



Functional Competency: (FC)



Leadership Competency: (LC)

Results from MWA Performance Evaluation in Fiscal Year 2023 Percentage of Total Employees Evaluated by Core Competency (CC) No. 1/2023

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	447	49.45	457	50.55	904	100.00
Level 6-10: holding an equivalent position	255	45.21	309	54.79	564	100.00
Level 1-5	1,707	63.55	979	36.45	2,686	100.00
Total	2,409	57.99	1,745	42.01	4,154	100.00

Remarks: The number of employees used in the calculation is from data as of 1 January 2022.

Percentage of Total Employees Evaluated by Core Competence (CC) No. 2/2023

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	445	49.39	456	50.61	901	100.00
Level 6-10: holding an equivalent position	274	45.74	325	54.26	599	100.00
Level 1-5	1,697	63.82	962	36.18	2,659	100.00
Total	2,416	58.09	1,743	41.91	4,159	100.00

Remarks: The number of employees used in the calculation is from data as of 1 January 2022.

Percentage of Total Employees Evaluated by Functional Competency (FC) No. 1/2023

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	447	49.45	457	50.55	904	100.00
Level 6-10: holding an equivalent position	255	45.21	309	54.79	564	100.00
Level 1-5	1,707	63.55	979	36.45	2,686	100.00
Total	2,409	57.99	1,745	42.01	4,154	100.00

Remarks: 1. The number of employees used for calculation is from data as of 1 December 2022.
2. The MWA conducts a core competency (CC) assessment twice a year, while the functional competency (FC) and leadership competency (LC) assessments are conducted once a year.

Percentage of Total Employees Evaluated by Leadership Competency (LC) in Fiscal Year 2023

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	447	49.45	457	50.55	904	100.00
Level 6-10: holding an equivalent position	255	45.21	309	54.79	564	100.00
Total	702	47.82	766	52.18	1,468	100.00

Overall Employee Performance Results in 2023 That Correspond to or Exceed Expectations

Item	2021	2022	% Higher-Lower	2023	% Higher-Lower
CC No. 1/2023	99.69	99.29	-0.40	99.69	0.40
CC No. 2/2023	99.81	99.55	-0.26	99.54	-0.01
FC for the 2023 Fiscal Year	97.98	98.56	0.58	98.63	0.07
LC for the 2023 Fiscal Year	99.79	99.05	-0.74	98.05	-1.00

Employee Rights and Welfare

Employees on every level are important driving forces for the enterprise to securely move ahead. Therefore, the MWA has specified a policy to comprehensively take care of employees through various rights and welfare to allow them to work happily while growing together with the enterprise such as by providing financial support for water fees, scholarships, employee training, scholarships for children of operators, air-conditioned passenger vehicles to pick up and drop off employees, annual health check-ups, etc.

In fiscal year 2023, the MWA operated a project to promote welfare by studying important factors such as welfare expenses and analyzing employee engagement and satisfaction survey results and found that medical expenses have been rising while employees wish to receive promotion of activities that support the health of employees in addition to having facilities to provide convenience to employees who have children. Thus, we reviewed our operation to put greater emphasis on health promotion by opening a fitness center and a mothers and children room to serve employees and contractors at the Sutthiutthakakon Building (100 Years Thai Waterworks Commemorative Building).

The MWA has also established a Metropolitan Waterworks Authority Relations Affairs Committee to serve as a medium for promoting good labor relations between the employer and employees in addition to promoting unity and reducing conflict and facilitating participatory management through a bilateral mechanism to ensure effective labor

relations management and compliance with the State Enterprise Labor Relations Act, B.E. 2543 (2000), and good governance and social responsibility guidelines.

Moreover, we have also established the MWA State Enterprise Labor Union to protect the rights and welfare of employees and serve as a medium for monitoring employment conditions and employee welfare in addition to receiving complaints and providing employee consultation.

From continuously improving and managing remunerations and benefits and continuously building positive relations with the MWA State Enterprise Labor Union, the MWA was given the “Excellent State Enterprise Labor Relations Award”, which is given out by the Department of Labor Protection and Welfare to establishments with labor relationship management systems that meet international standards.



Family Welfare Support

The MWA also values human rights protection for women and children by supporting for welfare to be provided to mothers and children along with families by giving the right to employees to take maternity leave to care for their children after taking such leaves for childbirth to ensure that children are appropriately given the right to be cared for and raised by both their fathers and mothers since birth to conform to the Children’s Rights and Business Principles of UNICEF.

Data on Maternity Leaves and Return to Work After Maternity Leaves of Employees in Fiscal Years 2021-2023 (401-3)

Leave Type/ Fiscal Year	No. of Leaves Taken	No. of Employees Who Returned to Work After Leaves During the Fiscal Year	No. of Employees with Leaves Due to Expire in the Next Fiscal Year	Rate of Return to Work of Employees After Their Leaves (%)	Rate of Retention of Employees After Their Leaves (%)	Remarks
1. Maternity Leaves for Childbirth (women)						
2021	41	33	8	100	100	
2022	42	32	10	100	100	
2023	35	28	7	100	97.14	1 person resigned (15 Dec 2023)
2. Maternity Leaves for Ongoing Care After Birth (women)						
2021	6	5	1	100	100	
2022	3	3	-	100	100	
2023	7	5	2	100	85.71	1 person resigned (15 Dec 2023)
3. Paternity Leaves (men)						
2021	32	30	2	100	93.75	Resigned 2 cases (1 Aug 2021 and 1 Jan 2022)
2022	32	32	-	100	100	
2023	30	28	2	100	100	



Preparations Before the Retirement

For retiring employees, the MWA also has plans/activities for employees retiring in the 2023 fiscal year as follows:

Pre-retirement

- We have organized training for retirees to apparently recognize the incomes that are going to be received after their retirements, to understand the terms of withholding tax, to define the payment dates of those incomes, to remain the deposits in the provident fund, to understand the process to request payments from the provident fund by installments, and to consider selecting payout interval of each type of income to minimize the burdens of personal income tax expenses.

Post-retirement

- Payments of the provident fund, pension, compensation for employment preferences, and compensation in case of not exercising the right to take an annual leave as requested by the retirees.
- Providing advice on filing personal income tax (PND 90, 91) for the incomes received from retirement.

In order to ensure that the MEA is able to pay all retirees on retirement days and for those who are members of the MWA Employee Pension Fund, the following actions are required to be taken;

- 1) To make payments to the MWA's employee pension fund with an amount equaling to 10 percent of the basic salary on the last day of every month, as prescribed by the MWA's regulations on the Employee's Pension, B.E. 2543 (2000).
- 2) To conduct an estimation of the employee's benefits obligated to pay in the future. This is to ensure that the MWA is able to pay employees adequately on the date of retirement according to the 19th Accounting Standards.



Percentage of Salary Receiving from the Employee or Employer

Provident Fund for MWA's employees

- Percentage of salary receiving from the employee: 3-15% (on voluntary basis)
- Percentage of salary receiving from the employer: 9-11% (on employment period)

Pension Fund for MWA's employees

- Percentage of salary receiving from the employee: 0% (Employees are not required to contribute to the Pension Fund.)
- Percentage of salary receiving from the employer: 10% (on equal basis)

MWA's Employee Engagement and Satisfaction for Fiscal Year 2023 (Voice of Employee)

The MWA surveyed the satisfaction of employees covering 6 dimensions, namely Corporate, Career, Workforce, Work-life, Compensation, and Work. In fiscal year 2023, the overall satisfaction score was 4.2031, which increased from 4.1428 in fiscal year 2022.

As for employee engagement via the 6 dimensions, namely positive sayings about the enterprise (Say), staying with the enterprise (Stay), striving for the enterprise (Strive), pride in the enterprise (Pride), and protecting the enterprise (Protect), the mean overall employee engagement score was 4.3518 or increased from 4.2945 in the previous year.



Number of New Employees, Retired Employees, Resigned Employees, and Terminated Employees by Other Reasons (Data as of 30 September 2023)

1. Number of new employees by age and gender (persons)

Age	Fiscal Year 2021			Fiscal Year 2022			Fiscal Year 2023		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
21-30 years old	-	-	-	14	3	17	11	5	16
31-40 years old	-	-	-	19	28	47	3	-	3
41-50 years old	-	-	-	15	13	28	-	-	-
More than 51 years old	-	-	-	-	1	1	-	-	-
Total			-			93			19

Note: In fiscal year 2021, there is no new staff due to the epidemic situation of the Coronavirus Disease 2019 (COVID-19). The employment of new employees has been postponed.

2. Number of retired employees, resigned employees, and terminated employees by age and gender (persons)

Age	Reasons for Employment Termination	Fiscal Year 2021			Fiscal Year 2022			Fiscal Year 2023		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
21-30 years old	Resigned	6	2	8	1	2	3	1	6	7
	Deceased	1	-	1	-	-	-	-	-	-
31-40 years old	Resigned	3	2	5	11	3	14	5	4	9
	Deceased	-	-	-	3	-	3	1	-	1
	Dismissed due to the actions of guilty	1	-	1	-	-	-	-	-	-
41-50 years old	Resigned	-	-	-	2	-	2	-	3	3
	Deceased	-	-	-	3	-	3	2	-	2
	Dismissed due to the actions of guilty	-	1	1	1	-	1	1	-	1
	Terminated due to the actions of guilty	-	1	1	-	-	-	-	-	-
More than 51 years old	Resigned	1	1	2	2	-	2	1	-	1
	Deceased	7	-	7	2	-	2	4	3	7
	Terminated without guilty	-	-	-	2	1	3	1	1	2
	Retired	30	33	63	22	37	59	39	45	84
Total		49	40	89	49	43	92	55	62	117

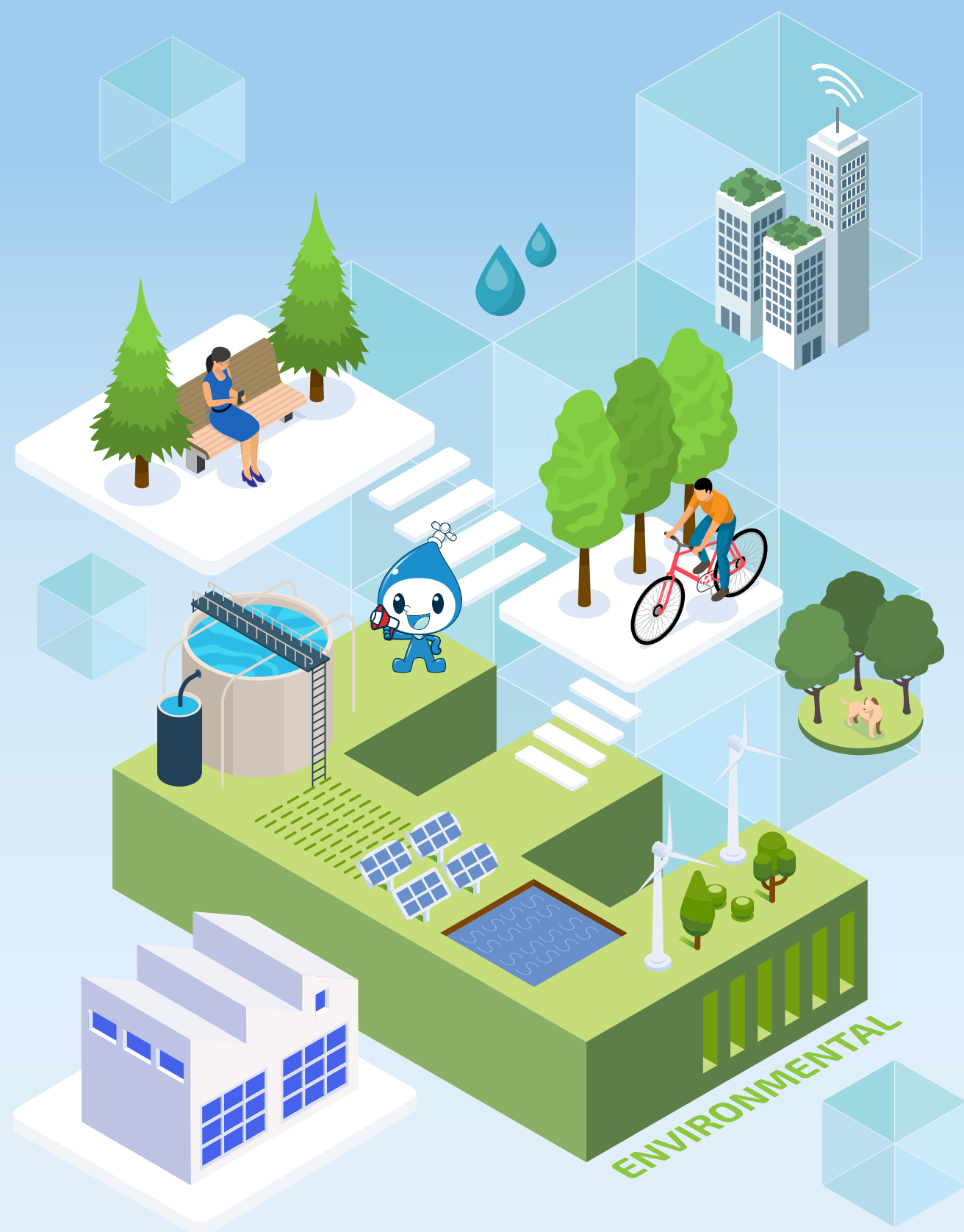


Human Rights Activities of the MWA

In addition to operating while keeping in mind the rights of its personnel, the MWA also values and respects human rights by having set the following practice guidelines:

1. Give equal rights while adhering to the principles of equality and justice in human resource management covering recruitment, development, promotions, and benefit allocations and fair consideration of remunerations based on work performance according to the frameworks of related laws, requirements, regulations and orders, such as the State Enterprise Labor Relations Act, and never discriminate on the basis of ethnicity, sex, religion or other barriers.
2. Give personnel the opportunity to express opinions and access news and information in addition to promoting their right and freedom of congregation and assembly without interference, such as in relation to the MWA's state enterprise union membership and MWA Governance Council.
3. Provide amenities to support work operations and encourage employees to learn continuously to develop their competence alongside good quality of life.
4. Support and oversee contractors and trade partners to treat their workers according to labor laws without support for forced labor, illegal migrant workers, and child labor.
5. Give consumers equal rights to access services.
6. Give opportunities to stakeholders to have the right to access and receive information transparently and fairly along with wide-ranging channels for inquiries and complaints, such as 1125 Call Center, social media, and the Damrongtham Center of the Ministry of Interior.
7. Give importance to protecting personal data by announcing the personal data protection policy.
8. Provide support to disabled persons in accordance with the law such as in obtaining employment and having facilities for selling products and conveniences for disabled persons.
9. Announce policies that demonstrate value for human rights, such as a social and environmental responsibility policy by following a management system covering the 7 topics of the ISO 26000 international standard, sustainable development policy, good corporate governance policy, stakeholder policy and guideline, and safety, welfare, occupational health and environmental policy, etc.





Environmental Performance

- Water Resources and Wastewater Management
- Energy and Emissions
- Waste



Water Resources and Wastewater Management



Water Management for Tap Water Production (303-1, 303-2, 303-3)

The Metropolitan Waterworks Authority (MWA) recognizes the importance of water resources to the agricultural, industrial, and household sectors. Therefore, we have created effective raw water management guidelines for use in tap water production in collaboration with agencies responsible for overseeing water issues in a systematic manner in order to allocate raw water for tap water production. We closely coordinate with the Office of National Water Resources and the Royal Irrigation Department during the dry season. While doing so, the MWA assesses the quantity of raw water needed for the production of tap water in advance for the dry season each year by making predictions based on multiple factors such as the water usage behaviors of the population, water usage trends in various sectors and production plans that are updated at different time periods, etc. Next, we send the estimated figure of raw water required for use during the dry season to the Royal Irrigation Department by October of each year in order to use the information as a guideline for setting the overall water drainage plans of the country

and cultivation plans in each river basis suitably according to the amount of water capital available at the end of the rainy season.

The MWA obtains raw water from 2 main sources for tap water production. For the eastern side, raw water is sourced from the Chao Phraya River (Bhumibol Dam, Sirikit Dam, Khwae Noi Bamrung Daen Dam, and Pa Sak Chonlasit Dam), while raw water for the western side is obtained from the Mae Klong River (Srinakarin Dam and Vajiralongkorn Dam). In the 2023 fiscal year, the MWA used raw water by a total of 1,680,460 megaliters on the eastern side (1,680 million cubic meters) and 562,567 megaliters (562 million cubic meters) on the western side. The raw water collection point on the eastern side is located in an area with a moderate to high level of water stress, while the raw water collection point on the western side is located in an area with a low to moderate level of water stress. The raw water from both sources is freshwater with total dissolved solids (TDS) below 1,000 mg/l, with the total annual average value on the eastern side and western side at 225 and 136 mg/l, respectively.

Quantity of Raw Water Used by the MWA for Water Production in the Fiscal Years 2019-2023

		2019	2020	2021	2022	2023
Chao Phraya River	Bhumibol Dam, Sirikit Dam, Kwae Noi Bamrung Daen Dam, and Pa Sak Chonlasit Dam	1,722,077	1,694,761	1,738,889	1,722,572	1,680,460
Mae Klong River	Srinakarin Dam and Vajiralongkorn Dam	558,109	559,728	582,455	601,567	562,567

Remark: Data as of 30 September 2023

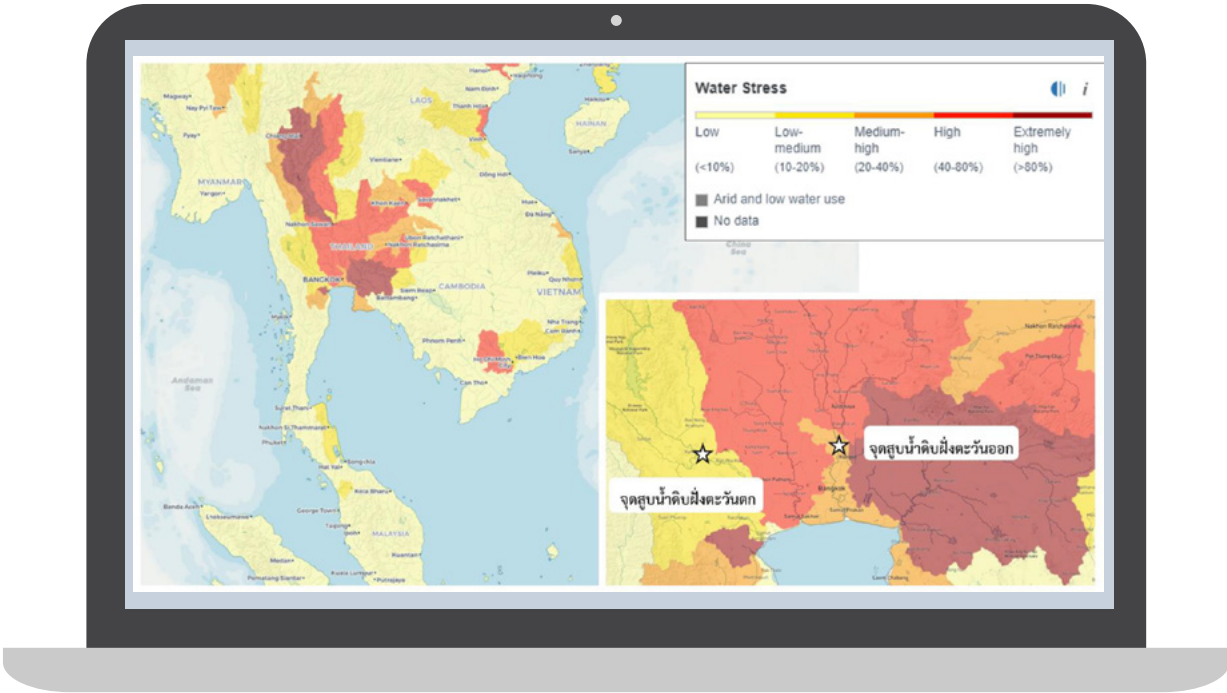
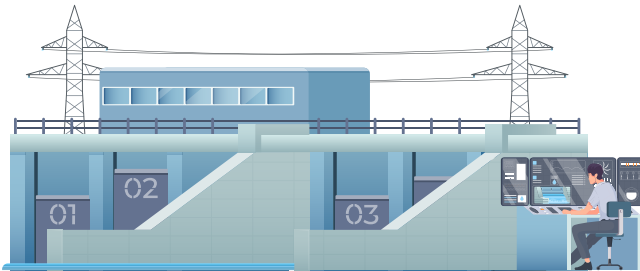


Figure Showing the Raw Water Collection Points of the MWA Compared with the Water-Stressed Area Map
Reference: <https://www.wri.org/applications/aqueduct/water-risk-atlas/>

The raw water the MWA uses to produce tap water is allocated under the “Irrigation Zone Water Management and Dry Season Crop Cultivation Plan” of the Royal Irrigation Department, which is a plan that was evaluated based on the volume of usable water and water already allocated for various water use activities in the river basins. For the dry season, the Chao Phraya River Basin has 6 months lasting from January to June.

The amount of raw water that the MWA is allocated in the 2022/2023 dry season in the Chao Phraya River basin was 900,000 megaliters (900 million cubic meters) or 6.39 percent of the total usable water volume as of 1 November 2022 [The total volume of usable water was 14,074,000 megaliters (14,074 million cubic meters.)]. Meanwhile, for the Mae Klong River Basin, the MWA was allocated 360,000 megaliters of water (360 million cubic meters) or 4.28 percent of the total volume of usable water as of 1 January 2023 [The total volume of usable water was 8,417,000 megaliters (8,417 million cubic meters.)].



Table Showing the Total Raw Water Allocated by the Royal Irrigation Department and Total Usable Water Received from the Chao Phraya Basin and the Mae Klong Basin During the Dry Season in Fiscal Year 2020-2023

Unit: Megaliter

Fiscal year	2019	2020	2021	2022	2023
Chao Phraya Basin					
Allocated raw water by the Royal Irrigation Department	890,000	900,000	900,000	900,000	900,000
Allocated raw water	843,000	844,000	877,564	859,541	841,691
Percentage	96	94	98	95.50	94
Mae Klong Basin					
Allocated raw water by the Royal Irrigation Department	320,000	360,000	360,000	360,000	360,000
Allocated raw water	289,000	302,000	286,416	300,626	275,967
Percentage	87	84	80	84	77
Total raw water received from 2 water sources					
Allocated raw water by the Royal Irrigation Department	1,210,000	1,260,000	1,260,000	1,260,000	1,260,000
Allocated raw water	1,132,000	1,146,000	1,163,980	1,160,167	1,117,658
Percentage	94	91	92	92	89



Remark: Data as of 30 September 2023

Table Showing Raw Water Used for Production and Tap Water Produced for Distribution by Location Water Treatment Plants ⁽³⁰³⁻⁵⁾

Water Treatment Plant	Amount of Raw Water and Water Produced for Distribution (2023 Fiscal Year) (Unit: Megaliter)		
	Raw Water	Water Produced for Distribution	Difference between Raw Water and Water Produced for Distribution
1. Bang Khen	1,537,311	1,438,952	98,359
2. Sam Sen	100,159	87,232	12,927
3. Thon Buri	42,989	40,392	2,597
4. Maha Sawat	562,567	440,938	121,629

Remark: Data as of 30 September 2023

Effluent Management ⁽³⁰⁶⁻²⁾

To respond to sustainable goals of the organization, we therefore have established guidelines for effluent management in response to standards and in compliance with laws. These guidelines are used as a control framework for effluent generated by our operations. In general, effluent has been generated from two main sources as follows:



- 1. Effluent generated by water treatment processes:** Most of them are generated by the processes of sedimentation and water filtration. The MWA collects and treats all effluent in the sediment removal system to meet the standards before being drained into public water sources. Moreover, samples of effluent are collected according to the frequency of drainage as required by law. The results from the laboratory are reported to relevant regulators on an ongoing basis.
- 2. Effluent generated by activities within office buildings:** The MWA collects and treats effluent in central effluent treatment systems or on-site effluent treatment systems to meet the standards as required. Effluent that may be contaminated with hazardous substances arising from the Water Quality Analysis Laboratory is collected and treated by the appropriate treatment method any further.

Total Effluent from the Four Water Treatment Plants (Unit: Megaliter) ^(303-4, 306-1, 306-2, 306-5)

Water Treatment Plant	Total Effluent (Fiscal Year)					Source to Receive Effluent ²	Types of Effluent	Results of Effluent Quality Analysis
	2019	2020	2021	2022	2023			
1. Bang Khen	29,061	40,538	32,812	30,577	31,791	Khlong Bang Talat	Fresh water ¹	Up to standard ³
2. Sam Sen	6,596	10,856	10,319	10,901	11,063	Khlong Sam Sen	Fresh water	Up to standard
3. Thon Buri	4,411	2,938	715	943	1,125	Khlong Bang Khun Non	Fresh water	Up to standard
4. Maha Sawat	8,313	8,138	3,334	3,648	2,701	Khlong Plai Bang	Fresh water	Up to standard
Total	50,943	65,033	49,744	46,069	46,680			

- Remarks:
1. Freshwater refers to water with a TDS value of less than 1,000 mg/L.

2. Source to receive effluent is a whole freshwater source and it can be defined as the water stress area as shown in the photo on page 107.

3. As for the quality of wastewater released by the Bang Khen Water Treatment Plant, most of the water is up to standard, except in May 2022 when the value of suspended solids exceeded the standard value (153 mg/l from the standard value of 50 mg/l). Accordingly, the Bang Khen Water Treatment Plant put in place corrective measures through construction to improve the sediment removal system (by constructing an additional thickener and filter press) to ensure that the quality of wastewater meets all standard requirements.

4. The laws related to the MWA's wastewater and discarded water are as follows:

 - The Ministry of Natural Resources and Environment Announcement on Setting Control Standards for Wastewater from Industrial Factories, Industrial Estates, and Industrial Zones issued on 29 March 2016.
 - The Ministry of Industry Announcement on Setting Control Standards for Wastewater from Factories issued on 30 May 2017.
 - Ministerial Regulation on Specifying the Criteria, Procedures, and Formats for Compilation of Statistics and Data and Information Recording and Summary Reports on Wastewater Treatment System Performance, B.E. 2555 (2012), issued on 3 April 2012.

Reuse of Effluent Generated by Water Production Processes

We realize the importance of being responsible for our water resources. The Maha Sawat Water Treatment Plant therefore has formulated a method for reusing effluent generated by the water production process (Reuse: filtration reservoir cleaning) with turbidity in the normal standard. The amount of recycled effluent for fiscal year 2023 is shown in the table below.

Table Showing Total Recycled Effluent for Fiscal Year 2019-2023 of the Maha Sawat Water Treatment Plant

(Unit: Megaliter)

Fiscal Year	Month												Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
2019	484	463	545	504	389	468	480	516	482	562	551	472	5,916
2020	430	420	475	444	397	497	504	569	493	466	497	455	5,647
2021	214	458	438	450	443	490	511	523	528	561	502	438	5,556
2022	556	464	446	430	424	504	478	478	538	526	557	532	5,932
2023	259	437	519	474	384	472	433	484	530	628	566	557	5,743

Water Loss Management in the Tap Water Distribution System

The MWA is committed to providing clean and safe water services to over 12 million people in the Bangkok, Nonthaburi, and Samut Prakan areas to ensure that they have access to clean and safe water according to the criteria of the WHO to enable extensive and adequate 24-hour use and consumption. At the same time, we are ready to create a network of secure tap water production to adequately accommodate urban growth and enhance the security of the Thai economy and society through pushing for the 9th project to be completed by 2026.

With the MWA’s main mission of supplying clean and safe tap water, the MWA has managed water loss and water pressure with a goal to achieve a cumulative water loss reduction rate of 27.50% by 2023 through planning and replacing water pipes that start to show signs of damage or dilapidation with new water pipes. In addition, we have a goal to reduce the rate of water loss to only 22.50, which is a more challenging goal by 8.7%, by 2028 through a plan to renovate tap water pipes, proactively manage water loss and controlling and managing water pressure, in addition to precisely adopting technologies to survey and inspect pipe leaks and carrying out swift and effective maintenance, for example:

- Surveying pipe leaks in the water distribution system via satellite;
- Using sensor technology to manage water loss;
- Using AI to survey pipe leaks in collaboration with the National Electronic and Computer Technology Center (NECTEC) and developing portable tools to analyze the sounds of water leaks.

After replacing tap water pipes, in addition to ensuring that people have 24-hour access to clean and safe tap water, it enhances the local people’s happiness through higher tap water pressure, lack of need to suspend tap water supply in order to carry out pipe maintenance, and reduced traffic congestion during pipe maintenance activities. Moreover, the pipe replacements will help reduce the rate of breakage of tap water pipes, which causes large volumes of water to be wasted through leaks, thus conserving water resources and enhancing Thailand’s natural resource security to ensure their extensive and adequate availability for use.



Performance in Fiscal Year 2018-2023

Fiscal Year	Amount of Water Produced for Distribution (Megaliters)	Cumulative Rate of Water Loss (%)		Result of Damaged or Dilapidated Water Supply Pipe Renovation Work (km)
		Target	Performance	
2018	1,997,100	28.75	29.83	407.110
2019	2,075,200	29.29	29.29	784.558
2020	2,121,100	27.29	31.25	1,002.424
2021	2,116,500	30.20	33.09	1,130.722
2022	2,080,300	30.50	31.64	1,210.368
2023	2,042,412	27.50	27.12	1,271.474

Projects/Activities in Support of Water Conservation and Water Loss Reduction
“Water Conservation Label” Project



The MWA created the “**Water Conservation Label**” project to support and encourage manufacturers/businesses in developing innovations and equipment to conserve water while delivering satisfaction without losing any product effectiveness. As part of the project, they were to apply for registration to receive a certification label from the Trademark Office, Department of Intellectual Property, under the name “**Water Conservation Efficiency Label**”. These labels divide water conservation efficiency into 3 levels, namely Level 3, Level 4, and Level 5.

Presently, the MWA has created a standard by dividing water conservation efficiency levels into the water conservation labels for 4 product categories as follows:

- 1. Faucets for face/hand sinks;
- 2. Faucets for dishwashing sinks;
- 3. Shower faucets;
- 4. Flush toilets.

In addition, in fiscal year 2023, five manufacturing/import companies were awarded water conservation efficiency labels totaling 170 product models as follows:

- 1. Faucets for face/hand sink: 24 models;
- 2. Shower faucets: 42 models;
- 3. Flush toilets: 104 models.

Moreover, the MWA has invited both residential and non-residential real estate development operators from the public and private sectors to contribute in water resource and environmental conservation by inviting them to use or switch over to use products that bear the water conservation efficiency labels (water conservation labels) of the MWA in their real estate development projects. In the 2023 fiscal year, real estate operators expressed interest and signed a memorandum of cooperation on the promotion of the use of water conservation equipment or equipment bearing the MWA’s water conservation efficiency labels (water conservation labels) and have used water conservation equipment to install in projects consisting of 32 residential projects of a total of 6,705 households as follows:

- 1. Land and House Public Company Limited: 14 projects totaling 3,952 households.
- 2. AP (Thailand) Public Company Limited: 17 projects totaling 2,753 households.
- 3. Chao Phraya Siam (1975) Co., Ltd.: 1 project (Royal River Hotel), along with one business establishment, namely the Royal River Hotel.

The Water Conservation Label Project is the integration of public sector and private sector collaboration to help raise awareness about worthwhile use of water and promotes for entrepreneurs to develop new innovations to create and diversify water conservation equipment to meet consumer demand and allow impacts to be expanded widely from families to communities, society, and the country in every sector.

Water Loss Reduction Pineapple Eye Project

The **Pineapple Eye Project** is a project aimed at enhancing efficiency in reducing water losses due to water pipe leakage in service areas. As part of the project, people who encounter pipe leaks are to report information to the MWA via the MWA onMobile application to allow the MWA to more swiftly and effectively repair water pipes in order to reduce water loss, thereby mitigating impacts on the population while minimizing water wastage. In the 2020 fiscal year, the MWA launched the project under the name “**Pineapple Eyes Help Reduce Water Loss**” in collaboration with the Bangkok Metropolitan Administration in order to integrate water loss reduction collaboration by providing training and knowledge to the Bangkok Metropolitan Administration’s employees and contract workers about how to spot pipe leaks and how to detect leaking water pipes inside drainage pipes in 50 districts, in addition to creating a channel for timely reporting of news and information about leaking water pipes directly between the MWA and BMA.

To ensure the sustainable preservation of water resources and the environment throughout MWA’s service areas, the “**Pineapple Eyes Family (Season 2)**” initiative was introduced in fiscal year 2021 and has been ongoing into its third year in fiscal year 2023. This program invites residents of Bangkok, Nonthaburi, and Samut Prakan to actively monitor and report water pipe leaks using the MWA onMobile application.



Fiscal Year 2023 Performance Results (Season 3)

Number of Reports via MWA onMobile (People)	Number of Water Pipe Leak Reports (Cases)	Number of Repair Sites Reported via MWA onMobile (Points)	Amount of Reduced Water Loss (m³)
11,954	12,794	6,213	27,679,584

Energy and Emissions



Energy Consumption and Air Emissions (302-1, 302-3, 305-1, 305-2, 305-3, 305-4, 305-6, 305-7)

Energy Consumption and Air Pollution Emissions and Amount of Electricity Consumption and Carbon Dioxide Emissions by the MWA in the Fiscal Years 2019-2023

Fiscal Year	Water Treatment and Distribution (MWh)	CO ₂ Emissions (tCO ₂)	Administrative and Support Agencies (MWh)	CO ₂ Emissions (tCO ₂)	Total Electricity Consumption (MWh)	Total CO ₂ Emissions (tCO ₂)
2023	412,684.45	205,929.54	19,858.93	9,909.60	432,543.39	215,839.15
2022	435,451.76	217,290.43	19,064.68	9,513.27	454,516.44	226,803.70
2021	430,761.76	250,746.42	13,431.26	7,818.34	444,193.02	258,564.76
2020	426,237.77	248,113.00	12,697.90	7,391.45	438,935.67	255,504.45
2019	422,525.91	245,952.33	12,261.63	7,137.50	434,787.54	253,089.83

Remarks:

- The electrical units from October 2022 to September 2023 from the SAP system have already been verified by the State Audit Office of the Kingdom of Thailand.
- Water treatment and distribution** means the raw water systems, water treatment systems (filtration plans and transmission-distribution pumping from filtration plants), and pumping and distribution systems. **Administrative and support agencies** mean agencies supporting water treatment and distribution processes such as the Water Quality Department, Water Resources and Environment Department, Electrical Maintenance Department, Water Transmission and Distribution Control Department, etc. and MWA branch offices.
- The emissions factor for 2019 to 2021 was 0.5821, while the emissions factor for 2022 was 0.4999 with reference to the greenhouse gas emissions, value for assessing the enterprise's carbon footprint by the Thailand Greenhouse Gas Management Organization (Public Organization).

Fuel Consumption and Carbon Dioxide Emissions of MWA (Oil) for Fiscal Year 2023

Fuel Type	Fuel Consumption (Liters)	CO ₂ Emissions (tCO ₂)
Diesel	2,481.46	1,711.53
Gasoline	87,857.63	259.14
Compressed Natural Gas	446,874.38	9.77
Total	537,213.47	1,980.44

Remarks: The Greenhouse Gas Emission Factors (Emission Factor) for oil in 2023 are as follows: Gasoline is 2.2327, Diesel is 2.7406, and Compressed Natural Gas is 2.2609. These figures are referenced from the Greenhouse Gas Emission Factors for Corporate Carbon Footprint Assessment by the Thailand Greenhouse Gas Management Organization (Public Organization).

The Carbon Dioxide Emissions from MWA's Paper and Chemical Usage for the Fiscal Year 2023

Items	Paper Consumption	CO ₂ Emissions (tCO ₂)
Paper	32,050 reams	53.50
Chemicals		74,413.01
• Lime	85,211,274 KG	45255.71
• Alum	10,938,388 KG	11537.81
• Chlorine	32,790,197 KG	17414.87
• The transportation of chemicals (Lime, Alum, Chlorine)		204.62
Total		74,466.51

Remarks:

- The weight of one ream (500 sheets) of A4 paper is 2.5 kilograms (32,050 reams).
- The Greenhouse Gas Emission Factors for 2023 are as follows: Paper is 0.6677, Lime is 1.0215, Alum is 0.5311, and Chlorine is 1.0548. These figures are referenced from the Greenhouse Gas Emission Factors for Corporate Carbon Footprint Assessment by the Thailand Greenhouse Gas Management Organization (Public Organization).

Energy Conservation Measures ^(302-4, 305-5, 305-6, 305-7)

The MWA emphasizes operating with consideration to the environment and climate change and recognizes the significance of energy conservation. Thus, we have created the enterprise's **Energy Conservation Policy** in order to provide guidelines for energy management and have adopted an energy management system in our agencies in order to effectively and efficiently manage energy consumption in line with the Energy Conservation Promotion Act, B.E. 2535 (1992) (B.E. 2550 [2007] Amendment), with consideration to the energy management operation of the MWA's controlled factories and controlled buildings under the driving and supervision of the **MWA's Energy Management Work Committee**.

Fiscal Year 2023



the MWA decreased energy consumption by
11,240 megawatt-hours (MWh)



Decreased carbon dioxide emissions by
5,618.80 tons of carbon dioxide (tCO₂)

Moreover, we have constantly conducted the monitoring and analysis of data on electricity consumed by the water production and distribution processes. In the fiscal year 2018, total electricity consumption increased due to the increased distribution of water supply. As known, electricity is our major energy source that drives the water production and distribution processes from the raw water pumping systems to the water production and distribution systems, which vary according to the amount of water supply distributed, water pressure, and water level in the waterworks canals or clear water tanks. To manage energy conservation and energy efficiency, the MWA has implemented measures under the Energy Conservation Promotion Act, B.E. 2535, at MWA's headquarters' buildings, including the four water treatment plants, the ten water distribution stations, and the two raw water pumping plants. Of which those seventeen entities are classified as a control plant/control building. In conclusion, energy conservation measures are required to be implemented as defined by the Energy Management Working Group of each entity on an annual basis.

Conclusively, the implementation of energy conservation measures in the control plant/control building of the MWA in fiscal year 2022 resulted in the reduction of energy consumption by 6,961.25 MWh, while the Carbon Dioxide emission was reduced by 3,479.93 tons of carbon dioxide (tCO₂).



Energy Conservation Measures for Controlled Factories/Buildings for Fiscal Year 2023 ^(302-5, 305-5)

Controlled Factories/ Buildings		Measures	Savings		Total CO ₂ Reduction (tCO ₂) (0.4999 tCO ₂ /MWh)
			MWh	THB	
Controlled Factories	Bang Khen Water Treatment Plant	1. Changes to Bang Khen Pump Station 1's schedule after the morning peak (12:00 pm - 5:00 pm) and during off-peak hours (11:00 pm - 5:00 am)	1,182.60	5,002,398	591.18
		2. Changes to the air conditioning system operation at Bang Khen Pump Station 2	36.57	154,688	18.28
	Sam Sen Water Treatment Plant	Change the operation plan for HLP No. 3 water pump at Pump Station 8, Sam Sen 3 Water Production Plant	81.43	289,890.00	40.71
	Thon Buri Water Treatment Plant	Install solar panels to save electrical energy at the chemical dosing station	4.655	19,039.00	2.33
	Maha Sawat Water Treatment Plant	Valve opening along the water pumping line to decrease pipeline pressure	7,686.74	33,667,932.59	3,842.60
Control Buildings	Sam Lae Raw Water Pumping Station	1. Maintenance measures for split-type air conditioners	25.79	107,284	12.89
		2. Water supply canal level control via opening and shutting water gates	542.85	2,258,256.00	271.37
	Bang Sue Raw Water Pumping Station	Overhaul Pump No. 4	3.50	13,150.97	1.75
	Tha Phra Water Pumping Distribution Station	Operation of 3 water pumps at low speed during off-peak hours instead of running 2 water pumps at high speed	223.26	897,505.20	111.61
	Phet Kasem Water Pumping Distribution Station	Reduction in air conditioner operating hours	117.13	477,896.00	58.55
	Lumphini Water Pumping Distribution Station	Control and reduction in lighting operating hours at the station	2.88	11,476.33	1.44

Controlled Factories/ Buildings		Measures	Savings		Total CO ₂ Reduction (tCO ₂) (0.4999 tCO ₂ /MWh)
			MWh	THB	
Control Buildings	Khlong Toei Water Pumping Station	Using a bypass in place of the pump at night	30.37	127,925.78	15.18
	Lat Phrao Water Pumping Distribution Stations	Water pump operation with consideration to the overall sec. value each day to obtain the lowest sec. value	628.89	2,565,875.35	314.38
	Lat Krabang Water Pumping Distribution Station	Air conditioner replacements for greater efficiency	30.52	123,013.00	15.26
	Samrong Water Pumping	Sub-station lighting replacements with LED bulbs	7.88	36,975.96	3.94
	Bang Phli Water Pumping Distribution Station	Shutting off lighting in the building at the switch gear room	32.38	134,040.61	16.19
	Min Buri Water Pumping Distribution Station	Street lamp replacements from 110W HPS bulbs to 50W LED bulbs	9.64	39,323.73	4.82
	Rat Burana Water Pumping Distribution Station	Alternating switching on and off of air conditioners inside the switch gear room	224.12	885,566.00	112.04
	Head Office Building	1. Air conditioners will be operated from 8:00 am to 4:00 pm, with a break from 12:00 pm to 1:00 pm.	199.00	1,073,181.00	99.60
		2. Reducing operating hours for elevators No. 1 and No. 3.	1.00	5,111.00	0.47
Total			11,2400.00	48,885,669.00	5,618.80



Waste^(306-1, 306-2, 306-3, 306-4)

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

The Metropolitan Waterworks Authority has classified waste generated within the organization into 2 types, namely:



1. Effluent generated
by water production processes

It is a soil sludge generated by water production processes, managed as required by law [Notification of the Ministry of Industry on the Disposal of Sewage or Disused Materials, B.E. 2545 (2005), enacted on 27 December 2005, stipulating in the Gazette, page 14, volume 123, special section 11, dated 25 January 2006].



2. Solid waste generated
by activities within office buildings

It is a solid waste that occurs in MWA headquarters and its branches. This includes the four water treatment plants, managed in accordance with government policy.

Management Guidelines for Effluent Generated by Water Production Processes

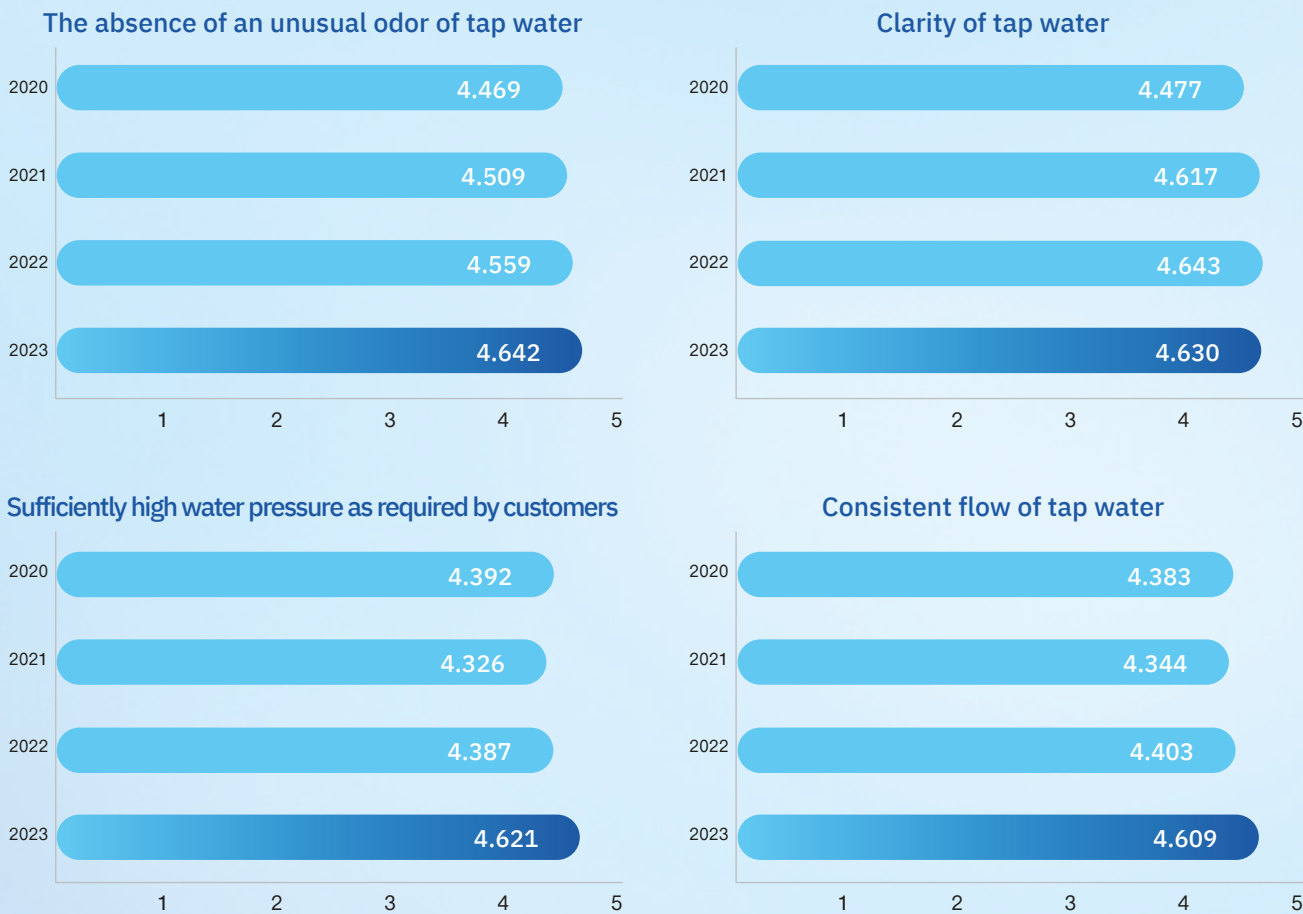
In general, effluent is generated by water production processes mainly arising from the processes of sludge drainage and pond flushing after being treated with a sludge removal system. Due to certain limitations of our effluent treatment systems by both natural and machinery methods, large quantities of sludge still remain in the system.

Once that sludge has been examined in the laboratory, there are no contaminants that significantly affect the environment. Thus, the MWA has hired contractors to collect those waste and proceed its disposal with landfill methods as required by laws.

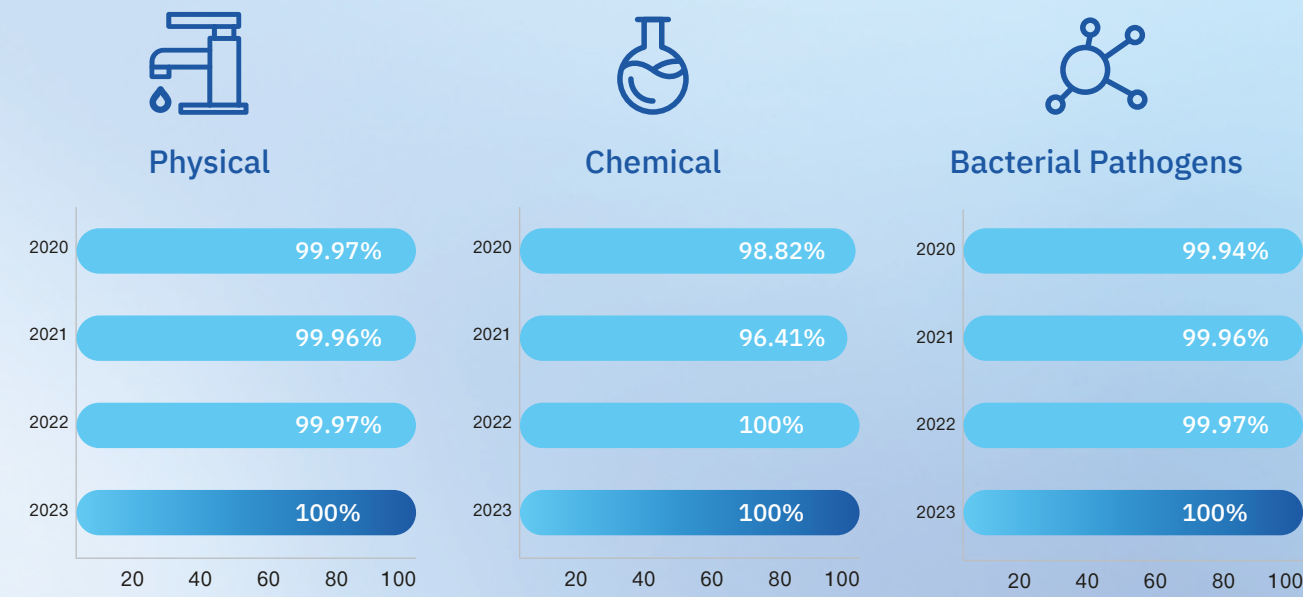
Total Sludge Generated by Water Production Processes

Water Treatment Plant	Total Sludge (Unit: ton)			Waste Disposal Site	Meet the Standards
	2021	2022	2023		
1. Bang Khen	55,557	74,370	67,600	Title Deed No. 44655, Nong Suea, Pathum Thani, Ms. Sonthaya Chaichana, by landfill method	Pass
2. Sam Sen	3,904	6,934	7,293	Title Deed No. 11879, Naraphirom Subdistrict (Khlong Naraphirom), Bang Len District (Bang Pla), Nakhon Pathom Province, owned by Mr. Anuwat Kaewduangkae (Method of disposal: 082, filling in low-lying areas)	Pass
3. Thon Buri	1,691	2,315	2,452	Title Deed No. 3892, Sala Klang Subdistrict, Nonthaburi Province, owned by Mr. Paitoon Khumkram (Method of disposal: 082, filling in low-lying areas)	Pass
4. Maha Sawat	20,494	6,935	18,893	Filling in the area of the water treatment plant	Pass

Satisfaction with Product Quality (Tap Water) (Out of 5 Points)



Key Performance in Product Operations (Tap Water Quality)



Key Performance in Water Production and Distribution

	Fiscal Year				
	2019	2020	2021	2022	2023
Total number of samples from water distribution system used for water quality analysis	3,196	3,138	2,702	3,504	3,061
E. coli	1	2	1	1	0
Target Value	Zero E. coli				
Turbidity (unit: NTU)	0.23	0.19	0.30	0.33	0.25
Target Value	No more than 1.0				
pH	7.19	7.37	7.35	7.24	7.36
Target Value	6.5-8.5				
Free Residual Chlorine (unit: mg/L)	0.55	0.79	0.78	0.71	0.68
Target Value	More than 0.2				
Quality of Tap Water: Physical	100	99.97	99.96	99.97	100
Target Value	100	100	100	100	100
Quality of Tap Water: Chemical	99.81	98.82	96.41	100	100
Target Value	100	100	100	100	100
Quality of Tap Water: Bacterial Pathogens	99.97	99.94	99.96	99.97	100
Target Value	99.97	99.97	99.97	99.97	100

Remark: The reference criteria are based on the recommendations of the World Health Organization (WHO) “Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda (2022).”



Data and Statistics

Financial Information

Financial Information	2020	2021	2022	2023
Total Assets (million baht)	81,337.9	84,158.8	87,211.4	90,224.1
Current assets	13,653.8	10,356.4	11,431.1	13,315.7
Non-current assets	67,684.1	73,802.4	75,780.3	76,908.4
Total Liabilities (million baht)	15,055.4	16,761.1	17,683.0	18,982.9
Current liabilities	3,105.6	4,369.1	5,303.4	5,876.3
Non-current liabilities	11,949.8	12,392.0	12,379.6	13,106.6
Equity (million baht)	66,282.5	67,397.7	69,528.4	71,241.2
Total Revenues (million baht)	18,045.0	18,435.6	18,490.4	19,459.1
Operating revenues	17,559.8	18,061.1	18,067.4	19,043.2
Water charges and monthly meter fees	16,548.9	16,895.4	16,837.8	17,706.7
New connections	247.9	278.5	308.9	324.2
Other operating revenues	763.0	887.2	920.7	1,012.3
Non-operating revenues	485.2	374.5	423.0	415.9
Total Expenses (million baht)	12,422.0	13,600.3	14,380.0	15,598.6
Operating expenses	12,390.6	13,574.7	14,375.3	15,569.9
Direct operating expenses	7,536.1	8,339.3	8,840.2	9,914.9
Depreciation and amortization	4,829.0	5,210.6	5,515.3	5,639.9
Financial costs–interest expenses and bank fee	25.5	24.8	19.8	15.1
Non-operating expenses	31.4	25.6	4.7	28.7
Other expenses	33.6	25.6	4.7	28.7
(Profit) Loss on foreign exchange rate	(2.2)	-	-	-
Net Profit (million baht)	5,623.0	4,835.3	4,110.4	3,860.5
Rate of return on total assets (%)	6.91	5.75	4.71	4.28
Rate of return on equity (%)	8.48	7.17	5.91	5.42
Net profit margin (%)	32.02	26.77	22.75	20.27
Assets turnover (times)	0.22	0.21	0.21	0.21
Current ratio (times)	4.40	2.37	2.16	2.27
Ratio of liabilities on total assets (times)	0.19	0.20	0.20	0.21
Debt equity ratio (times)	0.23	0.25	0.25	0.27
Cost per unit sold (baht)	8.33	9.48	10.07	10.56

General Information

Items	Fiscal Year			
	2020	2021	2022	2023
Total Water Production (million m³)	2,121.1	2,116.5	2,080.3	2,042.4
Bang Khen Water Treatment Plant	1,410.0	1,427.6	1,394.0	1,386.4
Sam Sen Water Treatment Plant	102.4	92.2	86.4	87.3
Thon Buri Water Treatment Plant	36.4	40.1	39.9	40.4
Maha Sawat Water Treatment Plant	572.3	556.6	560.0	528.3
Total Water Consumption (million m³)	1,458.3	1,416.2	1,422.2	1,488.6
Residential	694.3	705.8	695.6	715.6
Commercial–business, state enterprise, government agencies, and others	717.8	643.2	640.5	679.6
Public consumption and others	46.2	67.2	86.1	93.4
Percentage of Water Consumption (%)	68.8	66.9	68.4	72.88
Number of Customers at Fiscal Year-End (connections)	2,479,547	2,517,486	2,558,418	2,606,167
Residential	2,010,824	2,062,299	2,109,493	2,155,257
Commercial–business, state enterprise, government agencies, and others	468,723	455,187	448,925	450,910
Small Customers (connections)	2,443,405	2,482,886	2,523,957	2,571,637
Meter diameter ½ inch	1,571,405	1,613,975	1,658,198	1,707,664
Meter diameter ¾ inch	803,240	798,621	795,051	792,845
Meter diameter 1 inch	68,760	70,290	70,708	71,128
Key Customers (connections)	36,142	34,600	34,461	34,530
Meter diameter 1½ inch	16,169	15,366	15,596	15,951
Meter diameter 2 inch	12,814	12,405	12,235	12,200
Meter diameter over 2 inch	7,159	6,829	6,630	6,379
Number of New Customers (connections)	67,916	60,241	62,379	66,408
Average Water Consumption per Customer per Month (m³)	47.98	44.99	43.86	44.99
Residential	29.16	30.09	27.78	27.94
Commercial–business, state enterprise, government agencies, and others	127.67	116.38	118.05	125.95
Average Water Tariff per m³ (baht)	10.93	11.31	11.69	11.81
Residential	8.96	9.40	9.85	9.94
Commercial–business, state enterprise, government agencies, and others	12.85	13.42	13.69	13.78
Total Number of Personnel	5,384	5,314	5,272	5,175
Total number of employees	4,339	4,250	4,252	4,154
Total number of subcontracted workers	1,045	1,064	1,020	1,021
Ratio of Customers per Personnel	461	474	485	504
Total Populations in Service Area at Fiscal Year-End	8,216,446	8,173,080	8,151,075	8,152,650
Total Households in Service Area at Fiscal Year-End	4,354,086	4,609,369	4,688,136	4,776,463

Total Number of Employees by Departments, Levels, and Gender

Line	Number of employees															
	Level 6-10 Holding Executive Positions				Level 6-10 Holding Equivalent Positions				Level 1-5				Total Employees			
	Male	Female	Total	Proportion M : F	Male	Female	Total	Proportion M : F	Male	Female	Total	Proportion M : F	Male	Female	Total	
Governor	11	37	48	23 : 77	13	53	66	20 : 80	15	31	46	33 : 67	39	121	160	24 : 76
Dep.Gov. (Admin.)	20	48	68	29 : 71	15	58	73	21 : 79	67	90	157	43 : 57	102	196	298	34 : 66
Dep.Gov. (Fin.)	6	47	53	11 : 89	3	38	41	7 : 93	15	50	65	23 : 77	24	135	159	15 : 85
Dep.Gov. (Eng. & Con)	90	33	123	73 : 27	31	10	41	76 : 24	126	61	187	67 : 33	247	104	351	70 : 30
Dep.Gov. (Prod. & Trans)	98	38	136	72 : 28	75	19	94	80 : 20	365	83	448	82 : 18	538	140	678	79 : 21
Dep.Gov. (Plan. & Dev)	10	20	30	33 : 67	26	43	69	38 : 62	15	28	43	35 : 65	51	91	142	36 : 64
Dep.Gov. (IT)	17	23	40	42 : 58	15	10	25	60 : 40	29	24	53	55 : 45	61	57	118	52 : 48
Dep.Gov. (Eastern Serv.)	100	114	214	47 : 53	38	49	87	44 : 56	544	331	875	62 : 38	682	494	1,176	58 : 42
Dep.Gov. (Western Serv.)	92	94	186	49 : 51	58	47	105	55 : 45	518	262	780	66 : 34	668	403	1,071	62 : 38
Total	444	454	898	49 : 51	274	327	601	46 : 54	1,694	960	2,654	64 : 36	2,412	1,741	4,153	58 : 42

(Data as of 30 September 2023)

Total Electricity Consumption and Total Carbon Dioxide (CO₂) Emissions in Fiscal Year 2023

Water Production and Distribution Processes													Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	35,307.074	33,378.326	33,639.848	34,111.958	31,975.636	35,600.080	33,963.248	36,456.176	34,524.973	35,227.983	35,446.351	33,052.802	412,684.455
Raw Water System													
East Side	Total Electricity Consumption (MWh)												
	348.461	67.774	187.774	1,100.695	1,871.903	1,199.633	1,165.069	1,268.494	1,296.882	1,336.129	1,323.911	1,164.030	12,330.658
Western Side	Total CO ₂ Emissions (tCO ₂)												
	173.882	33.819	93.651	549.247	934.080	598.617	581.369	632.979	647.144	666.728	660.632	580.851	6,152.998
	Total Electricity Consumption (MWh)												
Production System	9.409	8.882	8.599	8.453	8.361	9.302	12.178	15.422	16.879	13.702	13.329	13.056	137.572
	Total CO ₂ Emissions (tCO ₂)												
Bang Khen	4.695	4.432	4.291	4.218	4.172	4.642	6.077	7.696	8.423	6.837	6.651	6.515	68.648
Maha Sawat	Total Electricity Consumption (MWh)												
	17,593.453	17,074.782	17,349.936	16,889.857	15,367.530	17,381.160	16,653.714	18,041.165	17,039.216	17,427.846	17,236.749	16,159.815	204,215.223
Sam Sen	Total CO ₂ Emissions (tCO ₂)												
	8,779.133	8,520.316	8,657.618	8,428.039	7,668.397	8,673.199	8,310.203	9,002.541	8,502.569	8,696.495	8,601.138	8,063.748	101,903.396
Thon Buri	Total Electricity Consumption (MWh)												
	7,128.879	6,514.124	6,416.916	6,407.923	5,969.923	7,058.916	6,536.945	6,686.000	6,334.000	6,476.000	6,561.000	6,162.901	78,253.527
Bang Phli	Total CO ₂ Emissions (tCO ₂)												
	3,557.311	3,250.548	3,202.041	3,197.554	2,978.992	3,522.399	3,261.936	3,336.314	3,160.666	3,231.524	3,273.939	3,075.288	39,048.510
Khlong Toei	Total Electricity Consumption (MWh)												
	1,466.752	1,390.338	1,499.010	1,489.927	1,256.832	1,578.373	1,466.439	1,643.232	1,539.095	1,493.128	1,665.930	1,514.544	18,003.600
Sam Rong	Total CO ₂ Emissions (tCO ₂)												
	731.909	693.779	748.006	743.474	627.159	787.608	731.753	819.973	768.008	745.071	831.299	755.757	8,983.796
Distribution System	Total Electricity Consumption (MWh)												
	1,088.298	1,053.190	1,102.483	1,104.271	999.250	1,108.269	1,072.280	1,112.254	1,029.604	1,065.177	1,088.432	1,080.271	12,903.779
Bang Khen	Total CO ₂ Emissions (tCO ₂)												
	543.061	525.542	550.139	551.031	498.626	553.026	535.068	555.015	513.772	531.523	543.128	539.055	6,438.986
Sam Rong	Total Electricity Consumption (MWh)												
	696.000	684.000	684.000	649.001	586.000	671.000	617.000	666.000	601.114	616.000	673.131	635.224	7,758.470
Khlong Toei	Total CO ₂ Emissions (tCO ₂)												
	347.304	341.316	331.336	323.851	292.414	334.829	307.863	332.334	299.956	307.364	335.892	316.977	3,871.477
Bang Phli	Total Electricity Consumption (MWh)												
	402.117	341.116	323.153	330.107	303.137	350.101	339.175	464.112	422.115	381.114	401.117	328.184	4,385.548
Distribution System	Total CO ₂ Emissions (tCO ₂)												
	200.656	170.217	161.253	164.723	151.265	174.700	169.248	231.592	210.635	190.176	200.157	163.764	2,188.388
Bang Khen	Total Electricity Consumption (MWh)												
	975.000	975.000	938.000	1,022.000	937.000	1,083.000	1,107.089	1,291.000	1,274.000	1,219.000	1,226.000	1,092.038	13,139.127
Distribution System	Total CO ₂ Emissions (tCO ₂)												
	486.525	486.525	468.062	509.978	467.563	540.417	552.437	644.209	635.726	608.281	611.774	544.927	6,556.424

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Lat Krabang	Total Electricity Consumption (MWh)	476.000	458.000	445.085	449.000	455.000	519.053	502.000	524.101	481.041	507.193	532.000	509.000	5,857.473
	Total CO ₂ Emissions (tCO ₂)	237.524	228.542	222.097	224.051	227.045	259.007	250.498	261.526	240.039	253.089	265.468	253.991	2,922.879
Min Buri	Total Electricity Consumption (MWh)	679.025	670.173	690.146	684.003	625.003	718.054	716.018	734.149	691.143	721.029	720.003	686.128	8,334.874
	Total CO ₂ Emissions (tCO ₂)	338.833	334.416	344.383	341.317	311.876	358.309	357.293	366.340	344.880	359.793	359.281	342.378	4,159.102
Prachanukun	Total Electricity Consumption (MWh)	0.244	0.353	0.368	0.367	0.308	0.344	0.340	0.358	0.178	0.179	0.182	0.178	3.399
	Total CO ₂ Emissions (tCO ₂)	0.122	0.176	0.184	0.183	0.154	0.172	0.170	0.179	0.089	0.089	0.091	0.089	1.696
Lumphini	Total Electricity Consumption (MWh)	550.581	608.649	638.319	643.350	577.329	620.269	638.229	656.235	658.326	693.255	666.282	642.255	7,593.079
	Total CO ₂ Emissions (tCO ₂)	274.740	303.716	318.521	321.032	288.087	309.514	318.476	327.461	328.505	345.934	332.475	320.485	3,788.946
Lat Phrao	Total Electricity Consumption (MWh)	553.000	516.000	529.000	539.000	497.000	562.000	532.000	586.000	635.000	657.000	668.000	638.000	6,912.000
	Total CO ₂ Emissions (tCO ₂)	275.947	257.484	263.971	268.961	248.003	280.438	265.468	292.414	316.865	327.843	333.332	318.362	3,449.088
Phahonyothin	Total Electricity Consumption (MWh)	2.346	2.417	2.421	2.509	2.545	2.973	3.086	2.811	2.632	2.653	2.587	2.625	31.605
	Total CO ₂ Emissions (tCO ₂)	1.171	1.206	1.208	1.252	1.270	1.484	1.540	1.403	1.313	1.324	1.291	1.310	15.771
Tha Phra	Total Electricity Consumption (MWh)	397.420	356.519	343.580	334.430	291.412	283.487	305.561	320.614	245.556	325.538	327.490	312.514	3,844.121
	Total CO ₂ Emissions (tCO ₂)	198.313	177.903	171.446	166.881	145.415	141.460	152.475	159.986	122.532	162.443	163.418	155.944	1,918.216
Rat Burana	Total Electricity Consumption (MWh)	1,594.066	1,466.000	1,466.155	1,414.043	1,277.019	1,392.021	1,346.108	1,424.047	1,333.123	1,361.039	1,376.008	1,225.013	16,674.642
	Total CO ₂ Emissions (tCO ₂)	795.439	731.534	731.611	705.607	637.232	694.618	671.708	710.599	665.228	679.158	686.628	611.281	8,320.646
Phet Kasem	Total Electricity Consumption (MWh)	1,346.023	1,191.009	1,035.000	1,043.022	950.084	1,062.125	950.017	1,020.182	925.069	932.001	964.200	887.026	12,305.758
	Total CO ₂ Emissions (tCO ₂)	671.665	594.313	516.465	520.468	474.092	530.000	474.058	509.071	461.609	465.068	481.136	442.626	6,140.573
Administration and Support Entity (including the services entity that supports the work of water production and distribution, and all MWA branches)	Total Electricity Consumption (MWh)	1,807.897	1,737.423	1,607.229	1,448.198	1,471.075	1,490.341	1,708.000	1,658.990	1,925.058	1,715.529	1,688.988	1,620.204	19,858.932
	Total CO ₂ Emissions (tCO ₂)	902.141	866.974	802.007	722.651	734.066	743.680	852.292	827.836	960.604	856.049	832.825	808.482	9,909.607
All units in MWA	Total Electricity Consumption (MWh)	37,114.971	35,115.749	35,247.077	35,560.156	33,446.711	37,090.421	35,671.248	38,115.166	36,450.031	36,943.512	37,115.339	34,673.006	432,543.387
	Total CO ₂ Emissions (tCO ₂)	18,520.371	17,522.759	17,588.291	17,744.518	16,689.909	18,508.120	17,799.953	19,019.468	18,188.565	18,434.812	18,520.554	17,301.830	215,839.150

GRI CONTENT INDEX

Statement of use	Metropolitan Waterworks Authority (MWA) of Thailand has reported in accordance with GRI Standards for the period Oct 1, 2022 to Sept 30, 2023.
GRI 1 used	GRI: Foundation 2021
Applicable GRI Sector Standard (s)	-

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
General Disclosure							
GRI 2: General Disclosures 2021	The organization and its reporting practices						
	2-1	Organizational details	12-14				
	2-2	Entities included in the organization's sustainability reporting	14				
	2-3	Reporting period, frequency and contact point	8				
	2-4	Restatements of information	65				
	2-5	External assurance	135-136				
	Activities and workers						
	2-6	Activities, value chain and other business relationships	12-13, 19				
	2-7	Employees	14				
	2-8	Workers who are not employees	14				
	Governance						
	2-9	Governance structure and composition	39				
	2-10	Nomination and selection of the highest governance body	40				
	2-11	Chair of the highest governance body	39				
	2-12	Role of the highest governance body in overseeing the management of imapcts	41-42				
	2-13	Delegation of responsibility for managing impacts	41-42				
	2-14	Role of the highest governance body in sustainability reporting	41				
	2-15	Conflicts of interest	46				
	2-16	Communication of critical concerns	8-9				

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
GRI 2: General Disclosures 2021	2-17	Collective knowledge of the highest governance body	42-43				
	2-18	Evaluation of the performance of the highest governance body	42-43				
	2-19	Remuneration policies	43-44				
	2-20	Process to determine remuneration	43-44				
	2-21	Annual total compensation ratio	43-44				
	Strategy, policies and practices						
	2-22	Statement on sustainable development strategy	7				
	2-23	Policy commitments	7, 18, 21-23				
	2-24	Embedding policy commitments	7, 18, 21-23				
	2-25	Processes to remediate negative impacts	27-30				
	2-26	Mechanisms for seeking advice and raising concerns	27-30				
	2-27	Compliance with laws and regulations	21-22				
	2-28	Membership associations	78-80				
	Stakeholder engagement						
	2-29	Approach to stakeholder engagement	27-30				
	2-30	Collective bargaining agreements	98				
Material Topics							
GRI 3: Material Topics 2021	3-1	Process to determine material topics	8				
	3-2	List of material topics	9				
Economic Performance							
GRI 3: Material Topics 2021	3-3	Management of material topics	62-63				
GRI 201: Economic Performance 2016	201-1	Direct economic value generated and distributed	61				
	201-2	Financial implications and other risks and opportunities due to climate change	62				
	201-3	Defined benefit plan obligations and other retirement plans	63				
	201-4	Financial assistance received from government	62				

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
Indirect Economic Impacts							
GRI 3: Material Topics 2021	3-3	Management of material topics	64				
GRI 203: Indirect Economic Impacts 2016	203-1	Infrastructure investments and services supported	64				
	203-2	Significant indirect economic impacts	65				
Procurement Practices							
GRI 3: Material Topics 2021	3-3	Management of material topics	58-59				
GRI 204: Procurement Practices 2016	204-1	Proportion of spending on local suppliers	58				
Anti-corruption							
GRI 3: Material Topics 2021	3-3	Management of material topics	44-45				
GRI 205: Anti-corruption 2016	205-1	Operations assessed for risks related to corruption	46-47				
	205-2	Communication and training about anti-corruption policies and procedures	47-50				
	205-3	Confirmed incidents of corruption and actions taken	50				
Energy							
GRI 3: Material Topics 2021	3-3	Management of material topics	114, 116				
GRI 302: Energy 2016	302-1	Energy consumption within the organization	114-115				
	302-2	Energy consumption outside of the organization	N/A				
	302-3	Energy intensity	114-115				
	302-4	Reduction of energy consumption	116				
	302-5	Reductions in energy requirements of products and services	117-118				

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
Water and Effluents							
GRI 3: Material Topics 2021	3-3	Management of material topics	106-107				
	303-1	Interactions with water as a shared resource	106-107				
	303-2	Management of water discharge-related impacts	106-107				
GRI 303: Water and Effluents 2018	303-3	Water withdrawal	106, 108				
	303-4	Water discharge	109				
	303-5	Water consumption	108				
Emissions							
GRI 3: Material Topics 2021	3-3	Management of material topics	114				
GRI 305: Emissions 2016	305-1	Direct (Scope 1) GHG emissions	114-115				
	305-2	Energy indirect (Scope 2) GHG emissions	114-115				
	305-3	Other indirect (Scope 3) GHG emissions	114-115				
	305-4	GHG emissions intensity	114-115				
	305-5	Reduction of GHG emissions	116-117				
	305-6	Emissions of ozone-depleting substances (ODS)	114-115				
	305-7	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	114-115				
Effluents and Waste							
GRI 3: Material Topics 2021	3-3	Management of material topics	109				
GRI 306: Effluents and Waste 2016	306-1	Water discharge by quality and destination	109, 119				
	306-2	Waste by type and disposal method	109, 119				
	306-3	Significant spills	119				
	306-4	Transport of hazardous waste	119				
	306-5	Water bodies affected by water discharges and/or runoff	109				

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
Waste							
GRI 3: Material Topics 2021	3-3	Management of material topics	119				
	306-1	Waste generation and significant waste-related impacts	119				
GRI 306: Waste 2020	306-2	Management of significant waste-related impacts	119				
	306-3	Waste generated	119				
	306-4	Waste diverted from disposal	119				
	306-5	Waste directed to disposal	N/A				
Occupational Health and Safety							
GRI 3: Material Topics 2021	3-3	Management of material topics	81				
	403-1	Occupational health and safety management system	81-83				
	403-2	Hazard identification, risk assessment, and incident investigation	83				
	403-3	Occupational health services	81, 87				
	403-4	Worker participation, consultation, and communication on occupational health and safety	85-86				
	403-5	Worker training on occupational health and safety	85				
	403-6	Promotion of worker health	87				
	403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	84				
GRI 403: Occupational Health and Safety 2018	403-8	Workers covered by an occupational health and safety management system	81				
	403-9	Work-related injuries	86-87				
	403-10	Work-related ill health	86-87				

GRI STANDARD/ OTHER SOURCE	DISCLOSURE		LOCATION (PAGE)	OMISSION			GRI SECTOR STANDARD REF. NO.
				REQUIREMENT(S) OMITTER	REASON	EXPLANATION	
Training and Education							
GRI 3: Material Topics 2021	3-3	Management of material topics	92				
GRI 404: Training and Education 2016	404-1	Average hours of training per year per employee	95				
	404-2	Programs for upgrading employee skills and transition assistance programs	92-95				
	404-3	Percentage of employees receiving regular performance and career development reviews	96-98				
Local Communities							
GRI 3: Material Topics 2021	3-3	Management of material topics	88				
GRI 413: Local Communities 2016	413-1	Operations with local community engagement, impact assessments, and development programs	88-91				
	413-2	Operations with significant actual and potential negative impacts on local communities	88-91				
Customer Health and Safety							
GRI 3: Material Topics 2021	3-3	Management of material topics	68-69				
GRI 416: Customer Health and Safety 2016	416-1	Assessment of the health and safety impacts of product and service categories	70-71				
	416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	70-71				
Non-GRI Topics							
Customer Relationship Management							
GRI 3: Material Topics 2021	3-3	Management of material topics	72-77				
Policy Involvement							
GRI 3: Material Topics 2021	3-3	Management of material topics	60				



Independent Assurance Statement

To Metropolitan Water Authority Regarding the Sustainability Report 2023

The Metropolitan Water Authority (MWA) requested Thaipat Institute (the Foundation for Thailand Rural Reconstruction Movement under Royal Patronage) to conduct an assurance engagement for the Sustainability Report 2023.

Criteria for Report Preparation

- GRI Sustainability Reporting Standards: “In accordance” requirement.

Criteria for Assurance Standards

- The AA1000 Assurance Standard (AA1000AS v3).

Addressee

The intended users of this assurance statement are the management of MWA and its associated stakeholders.

Scope of Assurance

The scope of this assurance engagement is based on Type 1 of the AccountAbility Principles: an evaluation of adherence to the AA1000 AccountAbility Principles and the GRI Sustainability Reporting Standards: “In accordance” requirement. This assurance engagement does not provide conclusions on the reliability of performance information.

Disclosures Covered

The assurance engagement is based on information publicly disclosed in MWA’s Sustainability Report 2023 for the year ended 31 December 2023.

Methodology

We conducted a Type 1 moderate assurance engagement in accordance with AA1000AS. This Type 1 engagement requires us to report on the nature and extent of adherence to the AA1000 AccountAbility Principles (AA1000AP). To achieve a moderate level of assurance, we used the criteria in AA1000AS to evaluate adherence to AA1000AP. We undertook the following procedures:

- Reviewed the policies, practices, management systems, processes, and performance information to be included in the MWA’s Sustainability Report 2023.
- Analyzed the performance information provided in MWA’s Sustainability Report 2023 as evidence to evaluate adherence to the principles and guidelines.
- Inquired about the processes MWA has undertaken to adhere to the principles of inclusivity, materiality, responsiveness, and impact.
- Assessed the extent to which MWA has applied the GRI Sustainability Reporting Standards, including the Reporting Principles.

- Provided observations and recommendations to MWA in accordance with the scope of assurance based on defined criteria.

Findings and Conclusions

- Based on the scope of assurance using the AA1000AS v3, we concluded that MWA has applied processes and procedures that adhere to the principles of inclusivity, materiality, responsiveness, and impact as set out in the AA1000AP (2018).
- Based on the scope of assurance using the GRI Sustainability Reporting Standards, we found that MWA has adhered to the Reporting Principles and Standard Disclosures, presenting information in a reasonable and balanced manner while considering the underlying processes involved in preparing the report.

Observations and Recommendations

Nothing came to our attention that would lead us to believe the MWA’s Sustainability Report 2023 did not adhere to the Principles. To enhance future sustainability reporting in accordance with AA1000AP, we have made following observations:

Inclusivity: The report demonstrates various approaches to engaging with and understanding stakeholders’ interests and expectations. It also indicates key topics and concerns raised by stakeholders, and provides descriptions of how to respond to these key topics and concerns.

Materiality: The report clearly illustrates its reporting process and the linkage between material topics and their relevant disclosures. However, MWA should apply the Double Materiality Principle in the next reporting period.

Responsiveness: The report demonstrates MWA’s significant responsiveness through its management approaches and disclosures related to material topics. Nonetheless, MWA should adopt the S.M.A.R.T. concept (Specific, Measurable, Achievable, Relevant, and Time-Bound) when setting targets, timelines, outcomes, and lessons learned related material topics.

Impact: The report outlines a lack of measures to evaluate and manage the organization’s impacts. However, MWA still governs according to SE-AM, GRC, and COSO-Enterprise Risk Management.

To enhance future sustainability reporting in according to the GRI Sustainability Reporting Standards, we have put forth the following recommendations:

In General Disclosure

- [Disclosure 2-12, 2-13, 2-14, 2-16, 2-17, 2-18] The role of the highest governance body should be clearly indicated, including

- its management of impacts and sustainability reporting, delegation of responsibility for managing impacts, communication of critical concerns, and evaluation of the sustainability performance of the highest governance body.
- [Disclosure 2-16] Communication of critical concerns should specify the approach and provide details on the total number of concerns related to the organization's potential and actual negative impacts on stakeholders that were reported to the Board of Directors during the reporting period.
 - [Disclosure 2-21] The annual total compensation ratio should indicate the ratio of the annual total compensation and the percentage increase in annual total compensation for the organization's highest-paid individual compared to the median annual total compensation for all employees (excluding the highest-paid individual).
 - [Disclosure 2-23] Policy commitments should specify the commitments that stipulate the conduct of due diligence in accordance with internationally recognized guidelines, such as the OECD Due Diligence Guidance for Responsible Business Conduct.
 - [Disclosure 2-24] Embedding policy commitments should indicate how each commitment for responsible business conduct is integrated throughout the organization's activities and business relationships.
 - [Disclosure 2-25] Processes to remediate negative impacts should provide details on grievances mechanisms, MWA's participation and how effectiveness is tracked.
 - [Disclosure 2-26] Mechanisms for seeking advice and raising concerns should specify the mechanisms for individuals to seek advice on implementing the organization's policies and practices for responsible business conduct.
 - [Disclosure 2-27] Compliance with laws and regulations should indicate the total number of significant instances of non-compliance with laws and regulations during the reporting period.
 - [Disclosure 2-30] Collective bargaining agreements should specify the percentage of total employees covered by collective bargaining agreements.

In Material Topics

- [Disclosure 3-1] The process to determine material topics should align with the guidance provided by GRI Standards in GRI 3: Material Topics 2021: including the four steps for determining material topics.

In Performance Disclosure

- [Disclosure 201-1, 201-3] Economic performance disclosures should indicate the amount of economic value distributed and the amount of economic value retained, including defined benefit plan obligations and other retirement plans.
- Anti-corruption disclosures should clearly include the total number and percentage of operations evaluated for corruption-related risks, covering overall risk assessment, and the total number and percentage of business partners who received anti-corruption policies and procedures communication.
- [Disclosure 204-1] Procurement practices disclosures should indicate the percentage of the procurement budget used for significant locations of operation that is spent on local suppliers.
- [Disclosure 205-1, 205-2] Anti-corruption disclosures should clearly include the total number and percentage of operations evaluated for corruption-related risks, covering overall risk assessment, and the total number and percentage of business

partners who received anti-corruption policies and procedures communication.

- [Disclosure 302-3 and 302-4] Energy disclosures should indicate the energy intensity ratio, such as energy consumed per unit of revenue, sales, or full-time employees. Additionally, the type of energy reduction achieved should be specified.
- [Disclosure 305] Emission disclosures should indicate greenhouse gas (GHG) emissions across scope 1, 2, and 3, as well as ozone-depleting substances (ODS), nitrogen oxides (NOx), and sulfur oxides (SOx). The GHG emission intensity should be reported, and GHG reduction activities should specify the type of GHG reduced, including scope 1, 2, and 3.
- [Disclosure 306-4, 306-5] Waste disclosures should indicate both the amount of waste diverted from disposal and the amount of waste directed to disposal.
- [Disclosure 403-1, 403-2, 403-4, 403-7, 403-8 and 403-10] Occupational Health and Safety (OHS) disclosures should include the scope of workers, activities, and workplaces covered by the occupational health and safety management system, the processes used to identify work-related hazards and assess risks on a routine and non-routine basis, the application of the hierarchy of controls to eliminate hazards and minimize risks, and to apply the hierarchy of controls in order to eliminate hazards and minimize risks, details on worker participation, consultation, and communication regarding occupational health and safety, and information on work-related ill health.
- [Disclosure 404-1] Training and education disclosures should indicate the employee categories that receive training.
- [Disclosure 413-1, 413-2] Local communities disclosures should include the percentage of operations with implemented local community engagement, impact assessments, and/or development programs, as well as operations with significant actual and potential negative impacts on local communities.
- [Disclosure 416-2] Customer health and safety disclosures should indicate incidents of non-compliance related to the health and safety impacts of products and services.

Competencies and Experiences

Thaipat Institute is a public organization established in 1999 specializing in research, training, and consulting on corporate responsibility and sustainability practices. We are licensed providers of AA1000AS (2008), a designation granted by AccountAbility, the creator and proprietor of the AA1000 Assurance Standard. Since 2013, Thaipat Institute has been a GRI training partner, offering certified training programs in Thailand. Our team possesses extensive professional and technical competencies and experience in corporate responsibility and sustainability. During FY2023, we did not provide any services to MWA that could conflict with the independence of this work.

Thaipat Institute



By Vorranut Piantam

Bangkok
16 September 2024



Survey on Satisfaction towards MWA Sustainability Report 2023



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