WORLD BANK GROUP

KOREA GREEN GROWTH TRUST FUND

2030 Water Resources Group

2030 Water Resources Group I Funded by the Korean Green Growth Trust Fund

OCTOBER 2024

Policy Recommendations to Scale Up Industrial Water Recycling

Abstract: Policy recommendations to increase wastewater reuse in Mongolia, based on the case study of Amgalan Thermal Plant expansion using treated wastewater from MCS Coca-Cola LLC and soilwater to reduce damages from aufeis.

ACKNOWLEDGMENT

Mongolia Wastewater Treatment and Reuse project and 2030 Water Resources Group Mongolia Program is supported by the Korea Green Growth Trust Fund (KGGTF), a partnership between the World Bank Group (WBG) and the Republic of Korea. As a technology-driven and implementation-focused trust fund, the partnership supports countries in their innovative and sustainable growth strategies and investments. KGGTF is fully committed to greening the post-COVID recovery and supporting multi-sectoral initiatives for Green, Inclusive, and Resilient Development (GRID). Find out more:
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EXECUTIVE SUMMARY

Water Context and Challenges in Ulaanbaatar

Ulaanbaatar's cold climate and growing population is creates water security challenges. Ulaanbaatar's cold climate stems from its location, local weather conditions, and the influence of the Siberian high-pressure region. This unique climate contributes to high levels of groundwater dependance as rivers freeze in cold months and Ulaanbaatar does not have major surface water storage. Ulaanbaatar is home to about half of Mongolia's 3.45 million inhabitants and urban population have expanded by over 70 percent over the last two decades and continues to increase. With a changing climate, existing pressures on Ulaanbaatar's water resources are likely to increase with a growing mismatch between water needs and sustainable yields of aquifers.

There is currently no accurate data of the total volume of industrial wastewater discharged into the central wastewater network or directly into the environment. However, based on estimates, there are approximately 500 factories connected to the central wastewater network discharging about 44,000 m^3/day of wastewater to the Central Wastewater Treatment Plant while a vast majority of entities do not currently have pre-treatment installed and are discharging with little to no treatment.

Institutional Setup for Water Management in Ulaanbaatar

Ulaanbaatar's water sector is fragmented with multiple public agencies and non-government entities mandated with decision-making as well as operational responsibilities. Regarding water resource management, approvals for abstraction and licensing are also fragmented across levels of administration based on abstraction amounts. The Water Service Regulatory Committee (WSRC) provides tariff regulation. River Basin Authorities (RBAs) lack resources and are not able to coordinate with ministries, agencies, and local governments to carry out their mandate. There are similar implementation challenges for River basin organizations (RBOs) as well, as a lack of funding and coordination challenges are apparent, especially as river basins span across jurisdictions and must deal with multiple local governments of *aimags*[1] with sometimes conflicting priorities. A National Water Council (NWC) was recently established to coordinate sector activities but is not yet fully effective. Interministerial, intergovernmental, and cross-sectoral coordination remains a central issue and is a priority, to scale-up water recycling. Other than Water Supply and Sewerage Authority of Ulaanbaatar (USUG), there are a total of 217 organizations (as at 2024), and among these, 51 are water supply and sewerage operators in *aimags* and 72 in Ulaanbaatar, including USUG.

Capacity Challenges in Coordination and Enforcement

Inadequate human and financial resources allocated for water resources management activities have reduced the sector's capacity to effectively manage its water resources. Although Mongolia allocates a sizeable share of public capital expenditure to the water sector, a significant investment gap still exists. Approximately 22 percent of the state budget allocated to key ministries were dedicated to the water related activities for 2024. Despite the allocation, the total final approved allocation to MECC was still seven times less than what was requested.[2] Meanwhile, only 291 water specialists were working in the public sector related to water in 2023.[3]

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[1] Aimag - first level administrative unit, province.

[2] Order A/47 issued by the Minister of Environment and Tourism on financing water management program, 2024

[3] Source. MET – 3, WA – 38, RBA – 250; MET presentation March 22, 2023. Mongolia has a land area of 1.564 million km^2, with a total population of close to 3.4 million (2022). In comparison to Singapore, where the land area is 734.3 km^2, with a total population of close to 5.64 million (2022) , the total number of employees of the PUB, Singapore's National Water Agency under the Ministry of Sustainability and Environment, was 3,242 in FY2021 Source: World Bank Data on Singapore and PUB Annual Report 2022

Tariffs for Water and Sanitation Services

Water Use Fee and Water Service Charge in Ulaanbaatar do not reflect the cost of delivering the service. In Ulaanbaatar, two charges are levied for water supplied and consumed from the central network: (i): Water Use Fee; and (ii) Water Service Charge. Water charges in Ulaanbaatar follow a flat (or single step) volumetric structure. However, prices currently does not reflect costs of delivering the service. The Water Use Fee is designed to reflect the value of the water abstracted from the source environment. Responsibilities for licensing, billing and collection are complex. Widespread unregulated groundwater abstraction poses significant challenges as well. Around 350 industries in the city do not pay any Water Use Fee for water consumed. (2030 Water Resources Group, 2019). In practice, the government does not have the capacity to monitor illegal drilling or enforce meter installation to register actual water use that is not bought from a utility.

The wastewater discharge is regulated by the different water agencies based on the volume of wastewater like that of the Water Use Fee. If the effluent quality parameters exceeded discharge standards, then a Water Pollution Compensation Fee is imposed in addition to the Water Pollution Fee. However, sector-specific discharge quality specifications require further development. As an estimate, about half of all commercial and industrial discharge into the central wastewater network is not registered or monitored, and not subject to any water pollution fees.

Enabling Conditions for Scaling up Water Recycling

Clearly articulated and context-specific policy goals can play an instrumental role in advancing the water recycling agenda. This would also provide a market signal on the magnitude of potential industrial recycling possible. Hence, including water recycling in national water policy documents is critical. All strategies and investment plans incorporating an analysis of all potential sources of water, including water recycling should be considered. Where a particular industrial water recycling opportunity is of strategic importance, appropriate public support on feasibility assessments for project development may be helpful.

Enforcement ensures that industries adhere to regulatory standards to reduce the impact of commercial and industrial activities to the environment, however significant capacity and enforcement gaps exist. Until these gaps are addressed, industries will have very little incentives to consider water recycling as cheaper options are available due to a lack of monitoring and enforcement. There is a lack of a register of polluters that should be imposed with a fee. The current reference list of pollutants, their permissible levels, and tariff per pollutant do not reflect actual impact to the receiving environment. The lack of coordination amongst agencies remains one of the core impediments to improving the enabling environment of industrial recycling. Consolidation of roles provide opportunities for administrative efficiencies could serve to improve coordination across agencies. Better coordination around industrial water recycling can be achieved by providing an overarching coordination mechanism focused on water recycling. The NWC could be well placed to perform such functions if provided with the right resources and mandate.

There is opportunity to improve the Water Service Charge to reflect the cost of investments and scarcity. Taking a long-run marginal cost approach in pricing methodologies could help reflect large future capital investments in the price of water. In addition, the Water Service Charge can also include volumetric stepped increments to discourage profligate use. The Water Use Fee is currently not applied universally due to a lack of monitoring and enforcement capacity. Despite the WA having water resources management responsibilities, allocation and licensing roles are fragmented across different agencies and levels of government. Registration of users and its enforcement remains a key impediment to increasing water recycling.

Water rights in Mongolia are governed under the Water Law of Mongolia 1995 but does not provide for the rights on water that is "manufactured" through water recycling activities. As such, commercial entities who recycles water do not have explicit rights to the water that it has just "manufactured". Principles of recycled water allocation can reflect that of ground or surface water in

the legislation (e.g. water for environment and drinking taking precedence over other uses). As future demand for recycled water grows, there could be cases where demand for recycled water exceeds supply. In such cases, allocation principles should be cognizant of the trade-off between each use.

Based on the learnings of the Amgalan Thermal Plant water recycling concept, by applying a cost-benefit analysis, indirect costs and benefits can be made apparent and assigned. This provides an opportunity for more sources of funding to close the financing gap. A cost-benefit analysis can help discover the costs and benefits external to the commercial arrangement between supplier and off-taker. These costs and benefits can then be assigned to the beneficiaries/polluters, encouraging these parties to contribute towards the financial viability of the proposal.

Policy Recommendations

The recommendations from the report can be further organized in terms of implementation timeframe and impact. This allows phasing and prioritization of the recommendations. As highlighted in the summary Table 6, the recommendations that have a short implementation timeframe and deliver a high impact can be considered 'no-regret' actions that should be considered with priority. It is important to engaging with various stakeholders, including local communities, industries, and non-governmental organizations, to ensure that the proposed policies are well-informed and have broad support. This could involve public consultations or workshops to gather input and foster collaboration through river basin multi stakeholder platform (RB MSPs) councils that already represent interests of various stakeholder groups.

Implementation Timeframes (IT)

Low <3 years (L)
Moderate >5 years (M)
High >10 years (H)

Impact Toward Increased Recycling

High Impact (H)
Moderate Impact (M)
Low Impact (L)

	Policy Recommendation	Responsible Agency	IT	Impact
CLEAR POLICY GOALS				
1	Include industrial water recycling considerations as part of the Tuul River Basin Integrated Water Resources Management Plan, and other future iterations of Ulaanbaatar's policy documents.	Tuul RBA, WA, MUB, Tuul RB MSP, private sector, SOEs	L	H
2	Consider an overarching time-bound industrial recycling target to guide policy.	MECC	L	M
3	Public finance to support feasibility assessments where a particular water recycling opportunity is of strategic importance	MECC, Municipality	M	H
REGULATORY ENFORCEMENT AND COHERENCE				
4	Develop sub-sector discharge standards specific to highly polluting sectors (for example, tanneries, sheep wool processing, oil extraction, food supplement, rubber, carpet, pharmaceutical production, spa, and public pool sauna centers) starting with the most highly polluting.	MECC	L	H

	Policy Recommendation	Responsible Agency	IT	Impact
5	Include considerations for more sub-sectors in MNS6734:2018 where treated wastewater can be reused and specify water quality requirements for them.	MECC	L	M
6	Ensure capacity of enforcement departments of each ministry are adequately resourced to adequately enforce discharge standards and unregistered groundwater abstraction.	NWC	M	H
	COORDINATION AMONGST AGENCIES			
7	Further provide resources (including dedicated staff and capacity) for the National Water Council to coordinate water recycling agenda across government ministries and between levels of government.	PMO, NSC	L	H
8	Develop and implement clear guidelines and frameworks for interagency collaboration, including a water recycling roadmap for industry.	MECC, MOFALI, MIM, MOE	L	M
	REDUCING THE PRICE DISTORTIONS OF WATER			
9	Ensure existing pricing methodology considers full costs of operating the network including cost of capital and depreciation.	WSRC	L	H
10	Strengthen groundwater monitoring with the help of remote sensing or Earth Observation technologies to identify unauthorized over-abstraction hotspots.	MECC, RBA	M	M
11	Increase resourcing for the registration and enforcement of water licenses for all groundwater users, and subsequent billing and collections.	MECC, RBA, Municipality, RB MSPs	M	M
12	Consider adopting a long-run marginal cost approach to water use fee to reflect future infrastructure investments.	WSRC	M	H
	WATER RIGHTS AND ALLOCATION			
13	Review of the provisions within the Water Law of Mongolia to be explicit on the water rights of “manufactured” or recycled water.	MECC	L	M
14	Update the provisions within the Water Law of Mongolia for recycled water allocation priority to reflect that of ground or surface water.	MECC	L	M
	INDUSTRY ENGAGEMENT			
15	Provide clear and accessible information on government agency roles and responsibilities around requirements for industry to install recycling schemes.	NWC	L	M
16	Enhance engagement and outreach to industry for greater awareness of water recycling.	MECC, WA, RBA, RB MSPs	L	M
17	Develop a water recycling and reuse toolkit to guide industries on relevant considerations, approvals along with which agencies to consult.	MECC	L	M
18	Industry recognition programs for businesses to incentivize recycling.	WA	H	M

CONTENTS

LIST OF ABBREVIATIONS

2030 WRG	2030 Water Resources Group
ATP	Amgalan Thermal Plant
Capex	Capital Expenditure
CCDR	Country Climate and Development Report
CPP	Contribution to Problem Principle
CWWTP	Central Wastewater Treatment Plant
GDP	Gross Domestic Product
IFC	International Finance Corporation
IWRM	Integrated Water Resources Management
MBA	Mongolian Banking Association
MCUDH	Ministry of Construction, Urban Development, and Housing
MECC	Ministry of Environment and Climate Change
MOFALI	Ministry of Food, Agriculture and Light Industry
MIM	Ministry of Industry and Minerals
MNS	Mongolian National Standard
MSP	Multistakeholder Platform
MUB	Municipality of Ulaanbaatar
NITI	National Institution for Transforming India
NSO	National Standardization Office
OSNAAUG	Housing and Public Utilities Authority of Ulaanbaatar City
PPP	Polluter Pays Principle
PWC	Private Water Company
RBA	River Basin Authority
RBC	River Basin Council
RB MSP	River Basin Multistakeholder Platform
RBO	River Basin Organization
USUG	Water Supply and Sewerage Authority of Ulaanbaatar
SOE	State Owned Enterprise
WA	Water Authority
WEF	World Economic Forum
WHO	World Health Organization

1. PREFACE

1.1. Overall Project Development Objective

This policy recommendation paper is a deliverable of the Mongolia Wastewater Treatment and Reuse Project (P176394) of the 2030 Water Resources Group (2030 WRG) for the Government of Mongolia.

The development objective of this project is to support more sustainable and greener pathways for Mongolia's growth trajectory through exploring ways to increase water reuse and reducing the negative impacts from aufeis[4] phenomena in the Bayanzurkh District's 17th khoroo, situated in the east of Mongolia's capital city Ulaanbaatar. These measures will save freshwater while facilitating wastewater reuse and improving the standard of living for the approximately 343,000 residents within the aufeis area. This project will conduct needed technical assessments and develop policy recommendations to support this approach and its replication in the city of Ulaanbaatar.

Other activities within the project include: concept paper and methodology on green growth approach; knowledge products on water-energy nexus; technical assessment report; and capacity building activities. These activities contribute to the project's development objective by strengthening the technical assessment and knowledge of stakeholders, while also strengthening the networks and to build common understanding within the sector, with a particular focus on the Bayanzurkh District's 17th khoroo.

The implementation of this project aligns with Mongolia's long-term development policy 'Vision 2050' and economic growth policy, including in the New Recovery Policy 2030. It also aligns with Ulaanbaatar City's engineering preparatory master plan, the five-year general guidance for Mongolia's development from 2021–2025, and the implementation of the Mongolian Government's 2020–2024 action program.

1.2. Objective and Scope of This Report

As set out in the overall project development objective, "this project will conduct needed technical assessments and develop policy recommendations to support this approach and its replication in the city of Ulaanbaatar". This policy recommendation report draws heavily on the policy impediments experienced while facilitating the development of the Amgalan Thermal Plant (ATP) water recycling proposal in the Bayanzurkh District's 17th khoroo: to recommend policy actions that would enable more of such opportunities to be leveraged in Ulaanbaatar.

The Amgalan Thermal Plant (ATP) water recycling proposal is an industrial water recycling proposal that involves a commercial undertaking of industries located near to each other (further details on the ATP proposal can be found in Annex 1). Hence the objective of this report aims to respond to the development objective by developing policy recommendations for policy decision-makers to have clear and actionable steps toward **improving the operating environment for more commercially viable industrial water recycling schemes in Ulaanbaatar**. While the scope of the report will focus on scaling up industrial water recycling schemes in Ulaanbaatar, many policy recommendations also apply to large municipal recycling schemes.

1.3. 2030 Water Resources Group (2030 WRG) in Mongolia

This project is carried out by the 2030 WRG, a global multi-donor trust fund, established with the aim of bringing transformative change to water resources planning and implementation. The long-term engagement of 2030 WRG in Mongolia has allowed it to leverage its deep knowledge of the country and sector in the preparation of this report.

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[4] Aufeis is a sheet-like mass of layered ice that forms from successive flows of groundwater, spring water, or river water during freezing temperatures. This form of ice is also called overflow ice.

It was incubated at the World Economic Forum (WEF) and formally administered by the International Finance Corporation (IFC) from 2012–17, before moving to be hosted by the World Bank from January 1, 2018, based on a decision of the 2030 WRG Governing Council. 2030 WRG focuses on reducing the gap between water demand and supply in chosen countries by facilitating structured dialogue processes to drive water resources transformation, adopting the analyze-convene-transform process of engagement. Through the formation of high-level multistakeholder platforms (MSPs), consisting of senior decision-makers, 2030 WRG acts as a catalyst to incubate and innovate new solutions to address challenges in the water sector.

In response to the President of Mongolia's request in 2011, 2030 WRG began supporting the country in improving water management. A Memorandum of Understanding was signed with the Mongolian Ministry of Environment, Green Development, and Tourism (now the Ministry of Environment and Climate Change [MECC]) in 2013. 2030 WRG launched its Mongolia Program with a targeted analysis of the country's water challenges and opportunities. This led to the formation of an MSP Steering Board, comprising representatives from the public and private sectors, as well as civil society. The annual workplan was approved at MSP Steering Board meetings at the beginning of each year, and total 22 outputs (see annex 2) were delivered and disseminated to the Government of Mongolia and MSP members.

After nearly a decade, the 2030 WRG Mongolia Program was deemed mature, with the MSP able to carry the agenda forward independently. An MSP workshop was held in June 2022 to share lessons learned (KORUMO 2022) and 2030 WRG exited the MSP.

2. BACKGROUND

2.1. Water Context and Challenges in Ulaanbaatar

At an average elevation of 1,350 meters above sea level, Ulaanbaatar, the capital of Mongolia is known as the world's coldest capital city. Ulaanbaatar's climate stems from its location, local weather conditions, and the influence of the Siberian high-pressure region. It is situated in a valley along the Tuul River, originating from the Khentii Mountain, the city experiences a harsh continental climate due to its geographic location in the central Eurasian continent, characterized by mountain-dominated topography. This climatic condition results in four distinct seasons marked by significant fluctuations in air temperature. This unique climate contributes to high levels of groundwater dependance as rivers freeze in cold months and Ulaanbaatar does not have major surface water storage.

Ulaanbaatar's urban population have expanded by over 70 percent over the last two decades and continues to increase. It is home to about half of Mongolia's 3.45 million inhabitants. Several factors continue to influence migration from the steppes to the capital. Mongolia's 1994 Land Law, which entitles every Mongolian to 0.7 hectares of land within the limits of urban centers, free of charge, for a term of 15-60 years; better employment opportunities; and the loss of herders' livestock due to Mongolia's harsh winter cold spells, also known as *dzud*[5] and loss of pastureland due to overgrazing and desertification. By mid-century, Mongolia may experience dzuds once every three years, posing a significant threat to Mongolia's herders who make up one-fifth of its population (World Bank, 2024). In Mongolia, municipal water use represents the third largest water use, after industry and agriculture, with demand concentrated in urban areas. It is estimated that Ulaanbaatar city alone represents 70 percent of the total drinking water demand in the country (2030 Water Resources Group, 2019).

In Ulaanbaatar, groundwater use constitutes 84 percent (2030 Water Resources Group 2019) of total water abstracted. During the winter months, when the Tuul River freezes, the groundwater levels drop critically. Efforts to ease the pressures on groundwater are constrained by surface water quality, which does not meet consumption standards due to inadequate planning, regulation, and contamination from untreated domestic waste due to the lack of sanitation and wastewater management infrastructure (CCDR). The over-reliance on groundwater in Ulaanbaatar is a concerning trend. With a changing climate, existing pressures on Ulaanbaatar's water resources are likely to increase with a growing mismatch between water needs and sustainable yields of aquifers.

Climate change will further expose Ulaanbaatar to water security risks. Trends shown in climate change models points to higher temperatures in Mongolia reducing the size of glaciers (and affecting river flows) while also increasing evaporation and soil dryness. While precipitation is likely to increase nationally, models show that there is considerable uncertainty on the impact of climate change on water availability and expected spatial and temporal mismatch at the subnational level (Country Climate and Development Report [CCDR]). This means that areas that have good water endowment will receive more water, while areas of water stress could face further water stress. With water demand expected to triple by 2050, pressure on water resources could increase to unsustainable levels in some parts of the country – including Ulaanbaatar.

Efforts to develop Tuul River as a water source are severely constrained. This is due to the lack of storage, quality of surface water, which does not meet standards due to inadequate planning, regulation, and release of inadequately treated industrial and domestic wastewater; this is expected to further deteriorate (2030 WRG, 2014). The existing Central Wastewater Treatment Plant has been operating since 1964. Despite partial refurbishments and upgrades, overall operation of the plant has

[5] A *dzud* is characterized as a natural disaster phenomenon, unique to Mongolia, where summer droughts combine with harsh winters, that result in a slow-onset disaster with ground so frozen that animals cannot reach pasture.

deteriorated, while both quantity and quality of the incoming wastewater to the plant has surpassed what the plant can effectively treat. This further restricts the possibility of the Tuul River being a water source for Ulaanbaatar, as cost to treat the water becomes prohibitive. However, a new Central Wastewater Treatment Plant is currently being constructed and is expected to be operational in 2025, which should address municipal pollution to the Tuul River to a large extent. However, industrial pollution remains a concern.

About two-thirds (66.5 percent) of national Gross Domestic Product was generated from Ulaanbaatar in 2023 (National Statistics Office of Mongolia). As the country's population and economic center, its development is of outsized national importance. Main industries in Ulaanbaatar include services, gold mining in the north of the city, cashmere and leather, and meat and beverage processing. As Mongolia transitions away from coal exports and develop other industries (including industrial production in Ulaanbaatar), it places further pressure on water demand for industrial production as a critical input to economic growth and its carbon transition plans. In recent years, the number of light industries has experienced significant growth in Ulaanbaatar. Most medium and light industries are scattered across Ulaanbaatar, with some heavy industry clusters.

There is currently no accurate data of the total volume of industrial wastewater discharged into the central wastewater network or directly into the environment. In Ulaanbaatar, there are eight domestic wastewater treatment plants and seven industrial wastewater treatment plants (of which MCS Coca Cola LLC operates one of them). Ulaanbaatar's sewerage system has been in operation since 1959. About 60 percent of the city's population is connected to the central network. The central treatment plant is in the southwestern part of the city and receives wastewater from two trunk mains. Even though estimations of total wastewater discharge can be made based on water consumption, the water consumption data from the central network does not accurately represent industrial water consumption as industries may have unregistered wells that augment water consumption from the central network. However, based on estimates of the Water Supply and Sewerage Authority of Ulaanbaatar (USUG), there are approximately 500 factories connected to the central wastewater network discharging about 44,000 m^3/day of wastewater to the Central Wastewater Treatment Plant.

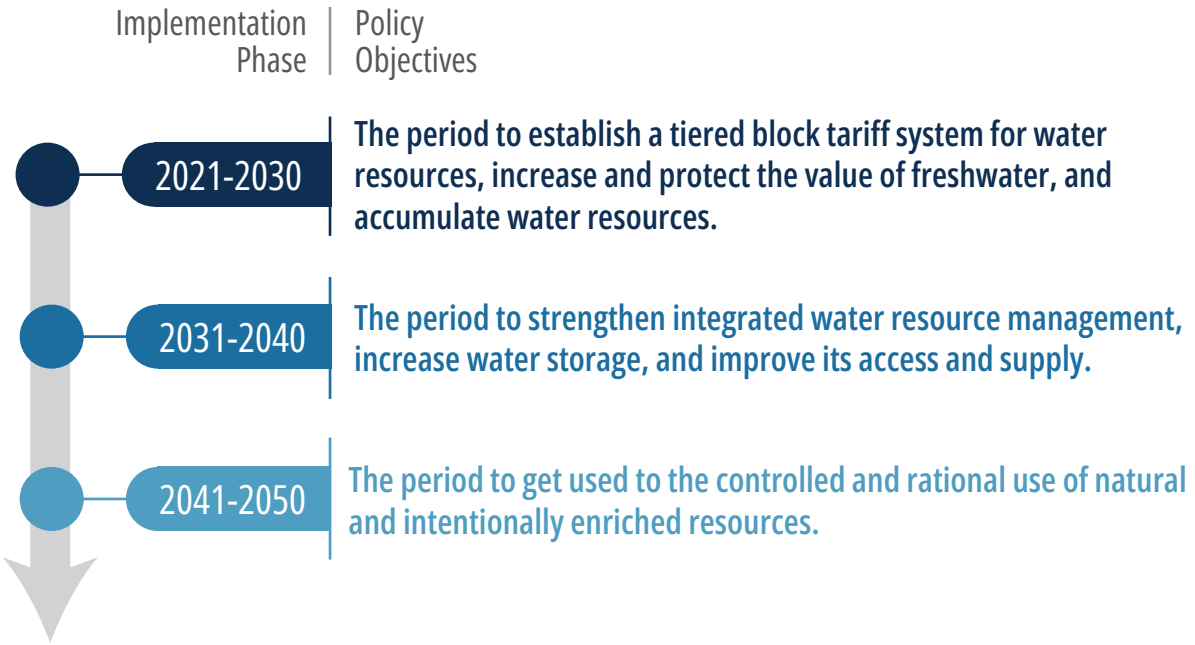
Industrial wastewater discharge quality remains a challenge to improve. All commercial and industrial customers are required to meet MNS 6561:2024 wastewater discharge standard prior to discharged into the central wastewater network. However, a vast majority of entities do not currently have pre-treatment installed and are discharging into the wastewater network or environment with little to no treatment. As part of the Millennium Challenge Corporation (MCC) Compact Agreement with the Government of Mongolia, an Industrial Pre-Treatment Plan is required as Conditions Precedent for the Compact Agreement – in order to ensure investments in the municipal water recycling plant receives feed water that is of suitable quality for recycling.

2.2. Policy Documents for Water Mongolia

Water rights in Mongolia are governed under the Mongolian Law on Water 1995. The Act makes provision with respect to the proper use, protection and restoration of water resources of Mongolia. This includes the use of water for the environment (including protection, conservation and restoration of waterways), municipal use, commercial and industrial use, and transboundary waters. The Act is the key legislation for the rights and allocations for water in Mongolia. Article 21 of the Act states that it as part of the basic requirements of the commercial use of water, that entities are required to "apply technology for reusing and saving water".

Mongolia has released a series of nationally significant policy documents. Mongolia's long-term national development policy 'Vision-2050' (Government of Mongolia 2020) forecasts infrastructure needs and phased investments. Within the Vision-2050 document, it sets out water-related infrastructure in decades as per Table 1.A gradual increase of water prices and along with a block tariff regime, coupled with the augmentation of sources is planned for the initial phase.

Figure 1: Vision-2050 Implementation Phases and Objectives



More recently released by the current term of government, the Government Action Plan for 2024–2028, includes 14 mega projects, notably the Orkhon-Ongi and Kherlen-Toono water transfer projects. Flood protection and water infrastructure investments are also included in the action plan. There is currently a draft National Integrated Water Resources Management (IWRM) Plan, which consolidates these sustainable water management activities for Mongolia, that was drafted and submitted to the parliament in 2022 by Ministry of Environment and Tourism (MET) (now Ministry of Environment and Climate Change, [MECC]) but has not yet been approved by the government. The National Adaptation Plan, approved on March 11, 2024, by the Standing Committee on Climate Change, targets eight sectors with 99 planned activities. Fifteen of these activities are on water resources, taking up nearly half of the total investment proposed (about US$3.9 billion) (Standing Committee on Climate Change, 2024). These activities include constructing reservoirs for storage of surface water, glacier meltwater, and ice overflow water.

Ulaanbaatar has also released several development plans. The ones closely related to water infrastructure activities are Ulaanbaatar City General Development Plan for 2040, Ulaanbaatar Mayor's Action Plan for 2020–2024 City's Engineering Preparatory Work Engineering Master Plan 2040, and Urban Land Administration and Use Plan 2022–2036. However, the Tuul River Basin Integrated Water Resources Management Plan, which aims to integrate all water-related activities in a coordinated manner in the river basin (including Ulaanbaatar), has been in development since the conclusion of the previous plan in 2021.

There have been major investments in water infrastructure in Ulaanbaatar in recent years, including Mongolia's first municipal water recycling scheme. This includes the investment of a new Central Wastewater Treatment Plant currently under construction and is expected to be operational by 2025. Recent investments under the Millennium Challenge Corporation (MCC) Compact Agreement with the Government of Mongolia included the expansion of groundwater abstraction by 50,000 megaliters a year (Millennium Challenge Account - Mongolia 2018), along with an advanced water treatment plant to treat groundwater to a high quality. Also included in the MCC Compact Agreement is the construction of a water recycling plant to take treated wastewater from the new Central Wastewater Treatment Plant and supply recycled water to Combined Heating and Power Plants 3 and 4 for cooling. This will offset groundwater that is currently being used at Combined Heating and Power Plants 3 and 4. When completed, this is expected to be Mongolia's first municipal water recycling scheme.

2.3. Institutional Setup for Water Management in Ulaanbaatar

Ulaanbaatar's water sector is fragmented with multiple public agencies and non-government entities mandated with decision-making as well as operational responsibilities. While the MECC is the lead ministry for water resources management responsible for overall policy formulation and planning, water management related funding is spread across multiple ministries, including the Ministry of Construction, Urban Development, and Housing (MCUDH), which has the largest allocation, and the Ministry of Food, Agriculture and Light Industry (MOFALI). The government implementing agency, Water Authority (WA), operates under the MECC, with responsibility for river basin authorities (RBAs). Regarding water resource management, the MECC is mandated with assessing and approving applications for water use in excess of 100 m^3/day. Approvals for water abstraction and use between 50 – 100 m^3/day in the city (which lies in the Tuul River Basin) are approved by the Tuul River Basin Authority (RBA); while those involving use of less than 50 m^3/day are administered by the Ulaanbaatar City Environment Department. Responsibilities for subsequent permitting and contracting are assigned to the Tuul RBA, City Environment Department and the city utility, USUG, based on volume of water. The Water Service Regulatory Committee (WSRC) provides tariff regulation.

RBAs lack resources and are not able to coordinate with ministries, agencies, and local governments to carry out their mandate. Tuul RBA is primarily responsible for implementing water resource management initiatives in the Tuul river basin. River basin organizations (RBOs) were created to overcome those challenges. However, similar implementation challenges with RBOs remain, as a lack of funding and coordination challenges are apparent, especially as river basins span across jurisdictions and have to deal with multiple local governments of *aimags*[6] with sometimes conflicting priorities. A National Water Council was recently established to coordinate sector activities but is not yet fully effective. Interministerial, intergovernmental, and cross-sectoral coordination remains a central issue and is a priority, in order to scale-up water recycling (CCDR).

For Ulaanbaatar, the Water Supply and Sewerage Authority of Ulaanbaatar (USUG) has 'catchment-to-tap' responsibility. This includes water abstraction, treatment, retail, and distribution through the central network, followed by wastewater collection, treatment, and final disposal—as an integrated utility. USUG also supplies a significant volume of wholesale bulk water (up to 60 percent of total volume produced) to the Housing and Public Utilities Authority of Ulaanbaatar City (OSNAAUG) and private water companies (PWCs) for onward retail distribution in the capital city. Additionally, USUG is solely responsible for supply to the ger areas, through water kiosks fed by both tankers and the water supply network. Altogether, USUG, OSNAAUG, and PWCs provide services to approximately 79 percent of Ulaanbaatar's population in the water supply service area: of these, 44.5 percent receive water through connections to the central network (including taps and water kiosks) while 34.0 percent receive services through truck-fed kiosks. The rest of the residents, approximately 21 percent, including some residents of ger areas, rely on private wells for water. Around 50 percent of USUG's water supply contracts are with industries and service entities connected to the central network and interact with USUG directly. The number and volume of water used by users contracted through OSNAAUG and PWCs are not fully reported.

Other than USUG, there are also many water supply and sanitation service providers in Ulaanbaatar. There are a total of 217 organizations (as at 2024), comprising municipality-owned entities and private companies with special license, that can provide water supply and sanitation services at a national level (Water Service Regulatory Committee [WSRC] 2024). Among these, 51 are water supply and sewerage operators in aimags and 72 in Ulaanbaatar, including USUG. The bulk and retail water supply services are provided in Ulaanbaatar, whereas in provinces, only bulk water is supplied to users including households and ger area residents. Figure 2 illustrates the institutional arrangements and functions for water supply in Ulaanbaatar.

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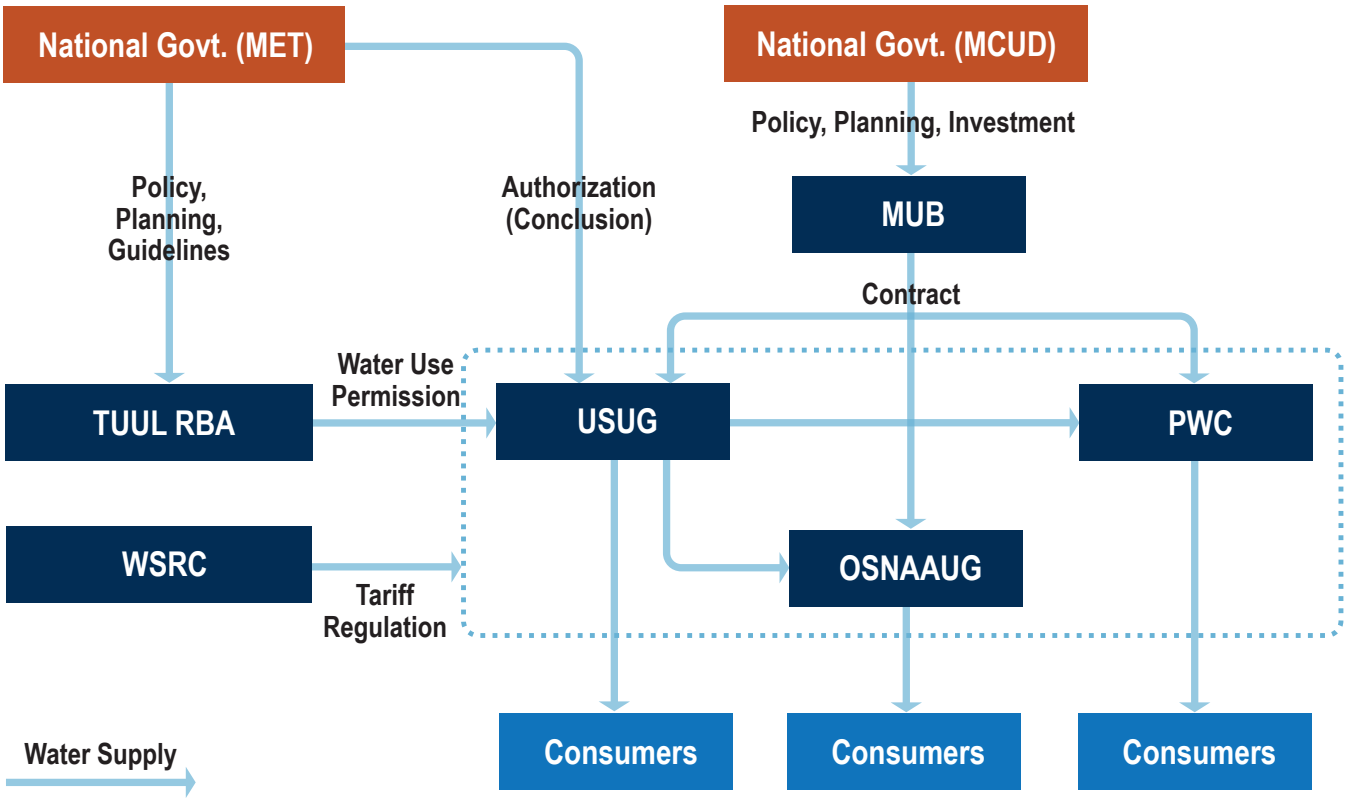
[6] *Aimag* - first level administrative unit, province.

Figure 2. Institutional Arrangements and Functions for Water Supply in Ulaanbaatar



Source: (2030 Water Resources Group, URBAN WATER TARIFF ASSESSMENT: Integrating Social Equity, Financial Sustainability, Resource Conservation, 2019)

2.3.1. Capacity Challenges in Coordination and Enforcement

Although Mongolia allocates a sizeable share of public capital expenditure to the water sector, a significant investment gap still exists. Approximately 22 percent of the state budget allocated to key ministries were dedicated to the water related activities for 2024. Key ministries that are involved in water management received in total US$36.5 million, for water infrastructure and management activities in 2024: the MECC – US$1 million; the MCUDH – US$29 million; the MOFALI – US$5.5 million. Despite the allocation, the total final approved allocation to MECC was still seven times less than what was requested.[7]

Meanwhile, inadequate human and financial resources allocated for water resources management activities have reduced the sector's capacity to effectively manage its water resources. These critical activities include protection zone establishment, monitoring, database maintenance and stakeholder consultations[8]. Understaffing poses significant challenges for the water sector.[9] Only 291 water specialists were working in the public sector related to water in 2023.[10] In a context of increased climate risks, this understaffing is a vulnerability to implement the country's policies and investment plans.

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[7] Order A/47 issued by the Minister of Environment and Tourism on financing water management program, 2024
[8] Briefing paper on river basin management by the German Development Institute, 2017
[9] World Bank Data on Mongolia
[10] Source. MET – 3, WA – 38, RBA – 250; MET presentation March 22, 2023. Mongolia has a land area of 1.564 million km^2, with a total population of close to 3.4 million (2022). In comparison to Singapore, where the land area is 734.3 km^2, with a total population of close to 5.64 million (2022) , the total number of employees of the PUB, Singapore's National Water Agency under the Ministry of Sustainability and Environment, was 3,242 in FY2021 Source: World Bank Data on Singapore and PUB Annual Report 2022

The lack of an effective cross-sectoral coordination mechanism impedes the country's objective to achieve sustainable water security. Key roles and mandates for water resources management and water services provision are allocated across local and national water institutions, especially for water permits and sustainable water use enforcement. In practice, it reduces total efficiency and widens the gaps for better cross-sectorial and organizational coordination and communication.[11] In addition to policy planning, the MECC is also responsible for cross-ministerial coordination at the national level. However, the MECC may not be adequately resourced to monitor and enforce water use and pollution regulation across all sectors. Moreover, the State Inspection Agency's inspection and enforcement functions were recently decentralized to the respective line ministries and have yet to be fully effective.[12]

2.4. Tariffs for Water Services

In Ulaanbaatar, two charges are levied for water supplied and consumed from the central network: (i): Water Use Fee (ii): Water Service Charge. The Water Service Charge further consists of: (a) Fixed Charge; and (b) Variable Fee. Additionally, a volumetric fee is applicable to water supplied to the Ger areas through kiosks and tankers. Water charges in Ulaanbaatar follow a flat (or single step) volumetric structure: the charge is directly proportional to the level of consumption and does not differentiate for high consumption.

In Mongolia, any entity that abstracts water or uses water for commercial purposes are "water users", while retail customers are "water consumers", both are subject to different tariffs. According to Article 31 of the Law of Mongolia on Water, "any individual, economic entity or an organization, using water and mineral waters shall be subject to a fee" (i.e., Water Use Fee). The Water Use Fee is applicable both for ground and surface water use; and for use of water supplied from the central piped water network. However, the Law also distinguishes between "Water Users" being those using water for commercial purposes; and "Water Consumers" being those using water for non-profit purposes "for drinking, domestic and household utility and for livestock and cultivation". Water consumers are charged a Water Service Charge.

The Millennium Challenge Corporation is currently undertaking a comprehensive tariff study. The study will address the holistic pricing of water to provide recommendations to the Government of Mongolia on tariff to ensure financial sustainability of the sector, including USUG's operations. Hence this report does not intend to duplicate the efforts of the MCC and will therefore not provide recommendations beyond the those that would encourage more industrial water recycling schemes in Ulaanbaatar. The current water tariff was modified in September 2023 based on the Millennium Challenge Corporation's Cost Recovery Plan Study. All water tariff categories were increased except for consumers from pipe-fed and truck-fed kiosks (that is, ger residents).

2.4.1. Water Service Charge

The water service charge is set by WSRC and is applicable to all customers receiving retail water supply from the central network. The charge consists of two components: (a) Fixed Fee, or Base Tariff, introduced in 2014 and which is meant to provide financial sustainability to the utility and its assets - the central network system. The amount of the Fixed Fee is based on the size of the connection provided to the central network; and (b) Variable Fee, or Service Fee, based on the volume of water consumed. Rates for the Variable Fee are set as per the four main customer categories: apartment households; offices, entities and industries; beverage industries; and polluting industries. The rates as per categories are uniform for the entire city, irrespective of service provider (USUG, OSNAAUG or PWCs).

The Water Service Charge currently do not reflect the costs of delivering the service. Theoretically, the tariff level is set based on costs incurred the previous year, which takes into account: operating costs and depreciation; interests on short term loan; and returns on investments based on weighted cost of capital. The tariff methodology adopts a cost reflective way of determining retail water

[11] The institutionalization of River Basin Management as politics of scale – Insights from Mongolia, Houdret, Dombrowsky, & Horlemann, 2013
[12] https://news.mn/en/798097/

tariff. However, in current actual practice, determination of tariff deviates from the methodology. Capital investments by USUG, Municipality of Ulaanbaatar/Government of Mongolia are currently not included in the calculation of revenue required. USUG's capital investment requirements have so far been met largely through loans, which are on-lent to the utility and reflected in its balance sheet. However, current tariff does not include the repayment of long-term debt (2030 Water Resources Group, 2019). While it is assumed that the full extent of depreciation is to be considered in tariff calculations as per the methodology, currently depreciation is only partly included in the estimation of revenue required. Only 8 percent of depreciation costs were covered by revenues in 2017 (2030 Water Resources Group, 2019).

Customers of industrial recycling schemes may use recycled water sources to offset water consumption from the central network. In such cases, the Water Service Charge is therefore reduced, as usage is reduced, and connection size can also potentially be reduced. Should the Water Service Charge be full-cost reflective, the financial incentive to reduce the Water Service Charge through water efficiency measures and recycling becomes more attractive.

2.4.2. Water Use Fee

The Water Use Fee is designed to reflect the value of the water abstracted from the source environment. The Law on Natural Resources Use Fee (Water Use Fee) stipulates that water users[13] must pay a fee based on the river basin from which water is abstracted, the type of economic activity, and the water source (surface water or groundwater). As per Government Resolution 326 (2013), the rate for Water Use Fee is established based on the "Ecology-Economic Evaluation of Water", on the basis of which each river basin is assigned an ecology-economic coefficient. The Water Use Fee rate is calculated according to this and varies based on purpose of use (or water use category). The resolution identifies 12 categories of water use. In the Tuul River Basin, the rates are set by Tuul RBA, for water consumption between 50 - 100 m^3/day; and WA for water consumption more than 100 m^3/day. For consumption less than 50 m^3/day, it is administered by the local administration. Water users are required to obtain water use permits, with different government agencies issuing permits based on the volume of water use specified in the application (Table 2).

Table 2. Responsibilities for Water Use Permits

Wastewater Discharge Per Day	Authority for Assessment of the Applications and Issuance of Permissions	Licensing Authority
0 to 50 m^3	RBA	Governors of soums[5] and districts
Above 50 m^3 or presence of hazardous contaminants	WA	RBA

Responsibilities for billing and collection are equally complex. If water use is less than 50 m^3/day, USUG is responsible for billing and collection of the Water Use Fee. For water use between 50 -100 m^3/day, the Local Tax Office (or city tax office) is responsible for billing and collection of the Water Use Fee, based on information provided by the Tuul RBA. For water use that exceeds 100 m^3/day, the Local Tax Office (or city tax office) is responsible for billing and collection of the Water Use Fee, based on information provided by the Tuul RBA / Mongol Us (state owned enterprise).

Widespread unregulated groundwater abstraction poses significant challenges. Currently, USUG bills Water Use Fee only for small entities (small commercial business, excluding industry) consuming under 50 m^3/day. However, it is not authorized to charge Water Use Fee for industries using less than 50 m^3/day. Tuul River Basin Authority or Mongol Us (state owned enterprise) are also not authorized

[13] Individuals and entities using water for commerical, profit purpose.

to bill this category of water users, since the volume of water to be billed is outside of their assigned range. As a result, around 350 industries in the city do not pay any Water Use Fee for their water use (2030 Water Resources Group, 2019). Any water user or consumer is obliged to apply for and obtain borehole drilling permit from local environment departments of the capital city or *aimag*. In practice, the government does not have the capacity to monitor illegal drilling or enforce meter installation to register actual water use that is not bought from a utility. Based on current practices, these inspections are labor and time intensive. Unregistered water extraction activities undermine regulated water use and create a water resources management problem.

Fee exemptions and reduction terms are in place to financially incentivize sustainable water use practices (Table 3).

Table 3. Circumstances of Water Use Fee Exemptions and Reduction

WUF Exemptions	
1	If water is used for nonprofit purpose, such as drinking, household needs, herding, and household vegetable fields
2	If water is used for fighting fire and natural disasters
3	If water is reused for industrial technological process
4	If surface water is used for irrigation purpose
WUF Reductions	
1	If water was softened and hardness level was reduced for drinking and household purposes
2	If water was used for restoration activities
3	If wastewater was treated and reused
4	If snow and rainwater were accumulated and used for agricultural and livestock purpose

2.5. Tariffs for Sanitation Services

Mongolia's legislation on the sanitation services covers pollution and wastewater discharge, along with associated tariffs. The Law on Water Pollution Fee cover the wastewater discharge-related tariffs and regulations of which are overseen by the MECC and WA. The Water Pollution Fee is imposed on all polluters including entities and individuals that use water for commercial purpose and discharge their wastewater into the environment or to a central sewerage system. The wastewater discharge is regulated by the different water agencies based on the volume of wastewater (Table 4).

Table 4. Responsibilities for Wastewater Discharge Permits

Water Use Per Day	Authority for Issuance	Licensing Authority
0 to 50 m^3	Environmental departments of the capital city and aimag	Governors of soum and districts
50 to 100 m^3	RBA	Environmental departments of the capital city and aimag
Above 100 m^3	WA	RBA

However, certain circumstances that the water polluters will be exempted from the Water Pollution Fee are as shown in Table 5.

Table 5. Circumstances of Water Pollution Fee Exemptions

WPF Exemptions	
1	If the polluter treats and reuses or recycles wastewater, then it is exempted from the fee by the amount of reused or recycled treated wastewater.
2	If the polluter installs pretreatment equipment and treats wastewater aligned to the standard requirements, it is exempted from fee for 3 years from the exploitation commencement day.
3	If the polluter's organization is financed from the state budget and the quality of discharged wastewater is in alignment with standards, then it is exempted from the fee.

If the effluent quality parameters exceeded discharge standards, then a Water Pollution Compensation Fee is imposed in addition to the Water Pollution Fee. Depending on whether the wastewater is discharged to a sewage system (MNS[14] 6561:2024) or directly into the environment (MNS 4943:2015), different national standards for effluent quality are enforced. The government also has a national standard requirement for reuse of treated water (MNS 6734:2018). This standard defines the sectors in which treated water can be reused and the monitoring guidelines. Other than water pollution fee mechanisms and standards attached to it no other sector specific industrial pollution control regulation exists.

Sector-specific discharge quality specifications require further development. Further deterioration in water quality is expected in the absence of reforms (PricewaterhouseCoopers Private Limited 2014). It is difficult to determine exactly how much a firm is polluting and the type and quantity of contaminants due to the lack of testing, reporting, and enforcement. As an estimate, about half of all commercial and industrial discharge into the central wastewater network is not registered or monitored, and not subject to any water pollution fees. It is evident that based on the amount of under-treated and unmonitored industrial and municipal wastewater pollution that ends up in the Tuul River, that discharge quality specifications are inadequate, both in enforcement and providing clarity to industries on allowable limits specific to that industry.

[14] MNS = Mongolian National Standards.

3. ENABLING CONDITIONS FOR SCALING UP WATER RECYCLING

3.1. The Case for Scaling Up Water Recycling

When the enabling environment, coupled with the right incentives are present, water recycling schemes can bring benefits to all parties involved, while reducing impact to the environment. With the right water allocation and water rights regimes, as well as the appropriate policy, institutional, and regulatory frameworks in place, water recycling can provide an alternative source of water supply while reducing pollution from the discharge of untreated and partially treated wastewater. The reuse of treated wastewater presents a viable alternative or substitute to freshwater abstraction and can reduce the burden on limited freshwater resources. This is especially true in industrial settings where water recycling poses lower direct health risks, while substituting the use of groundwater – which could be used for other purposes like drinking. This however requires a strong policy on groundwater allocation priorities if demand exceeds supply. With the appropriate policy, institutional, and regulatory frameworks in place, water recycling can provide an alternative "new" source of water supply, that doesn't further deplete groundwater stores.

Water recycling can help defer large water infrastructure investments. Water source development are inherently "lumpy' investments, where large infrastructure is built (e.g. dams, wellfields, trunk network and treatment plants, etc.) to increase the capacity for some years. When demand is projected to outstrip supply capacity, the next water source is then built to augment existing sources to meet projected demand. As Ulaanbaatar faces challenges brought about by climate change, population growth and growing industrial demand, seeking ways to ensure supply and demand is balanced is becoming critically important. Large infrastructure investments have been planned to improve Ulaanbaatar's water security situation (as described in Chapter 2.2. However, by looking at ways to increase water productivity through ways of creating "new" water through water recycling, would go some ways in deferring the large infrastructure investments in the next supply option.

Locally, an industrial water recycling scheme could present a win-win situation for the recycled water supplier and off-taker. As with the case of ATP (see Annex 1), this presented a unique opportunity for financial savings for both supplier and off-taker, while alleviating aufeis impacts on nearby residents. The proposal allowed both parties to either reduce their tariff obligations or defer water source development infrastructure. With the right enabling environment and incentives, more opportunities for such initiatives can be discovered under the initiatives of industry. Industrial reuse presents an overall favorable economic case due to the opportunity to engage with limited, larger off-takers producing high-value outputs and with the willingness to pay for assured water supply[15].

Core constraints to reuse are usually linked to the enabling environment. In particular: (1) the lack of comprehensive and consistent regulations for wastewater reuse; (2) unclear or absent quality standards and criteria; (3) poor institutional capacity and coordination; (4) issues with social acceptability; (5) limited financial incentives and funding mechanisms to support reuse projects, and (6) the absence of water rights and allocation regimes.

Specifically for Ulaanbaatar, enabling conditions for more industrial water recycling predominantly involves two areas: policy effectiveness and reflecting the value water.

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[15] A United Nations Food and Agriculture Organization study highlighted the need for reuse projects to consider benefits to urban and industrial users, beyond agricultural users alone: "The benefits to urban and industrial users could be relatively sizeable, and in most cases would be the principal justification for the project." (https://www.who.int/docs/default-source/wash-documents/wastewater-use/using-human-waste---kit-2/the-wealth-of-waste---the-economics-of-wastewater-use-in-agriculture.pdf)

Policy effectiveness involves ensuring:

- clear policy goals;
- regulatory coherence and enforcement; and
- coordination amongst agencies.

Reflecting the value of water will require:

- reducing pricing distortions of water; and
- ensuring water rights and allocations are clear and enforced.

3.2. Conditions for Policy Effectiveness

3.2.1. Clear Policy Goals

Clearly articulated and context-specific policy goals can play an instrumental role in advancing the water recycling agenda. Having a clear overarching strategy that clearly states the role of water recycling will help steer government policies in that direction. Although recommendations for an integrated water resource management strategy is outside the scope of this report, it is an important element when considering water recycling as it is an important step towards better managing limited water resources. An overall industrial water recycling target could help set ambition and guide policy direction. An overarching time-bound recycling target can help set a sense of urgency to the policy goal. This would also provide a market signal on the magnitude of potential industrial recycling possible.

Policy documents are focused on large water supply infrastructure. Policy documents as set out in Chapter 2.2 do not lack the emphasis on water and help set the government's agenda on long-term water sector priorities. While important, water security considerations go beyond water supply infrastructure. They should provide a clear roadmap on how water can be used as an opportunity to improve industrial output, reduce the impact of climate change, and raise the standards of living and livelihoods of Mongolians. When scaled up, recycled water has the potential help defer large investments that can be diverted to other high-value investments. Hence, including water recycling as a potential water source option in national water policy documents is critical.

All strategies and investment plans incorporate an analysis of all potential sources of water, including water recycling be considered. Similar considerations are also recommended for future iterations of the Ulaanbaatar City General Development Plan for 2040, Ulaanbaatar Mayor's Action Plan for 2020–2024 City's Engineering Preparatory Work Engineering Master Plan 2040, and Urban Land Administration and Use Plan 2022–2036. Since Tuul River Basin Integrated Water Resources Management Plan, which aims to integrate all water-related activities in a coordinated manner in the river basin (including Ulaanbaatar), has been in development since the conclusion of the previous plan in 2021, this is a tangible opportunity to include considerations on water recycling, over and above the MCC investments.

Where a particular industrial water recycling opportunity is of strategic importance, appropriate public support on feasibility assessments for project development may be helpful. While large-scale industrial reuse projects may indeed benefit from combination of reduced/exempted tariffs and revenues from the sale of treated wastewater, this is rarely sufficient to cover the capital expenditure required for wastewater treatment and reuse infra, as the experience of many developed countries also shows. In these cases, the Government of Mongolia may want to consider financing the feasibility assessment of the proposal to support the transition towards fully financially viable wastewater treatment and reuse projects. In Ulaanbaatar, this could be the WA or the Municipality of Ulaanbaatar.

Recommendations for Clear Policy Goals

- Consider an overarching time-bound industrial recycling target to guide policy – MECC.
- Include industrial water recycling considerations as part of the Tuul River Basin Integrated Water Resources Management Plan, and other future iterations of Ulaanbaatar's policy documents. – Tuul RBA, WA, MUB, Tuul RB MSP
- Public finance to support feasibility assessments where a particular water recycling opportunity is of strategic importance. – MECC, Municipality

3.3. Regulatory Enforcement and Coherence

Enforcement ensures that industries adhere to regulatory standards to reduce the impact of commercial and industrial activities to the environment. This also improves the enabling environment for more recycling as industrial recycling becomes the most cost-effective way of managing water for the business. A core challenge of scaling up industrial water recycling in Ulaanbaatar is the lack of enforcement around unregistered groundwater abstraction and industrial wastewater discharge standards. As set out in Chapter 2.3.1, significant capacity and enforcement gaps exist. Until these gaps are addressed, industries will have very little incentives to consider water recycling as cheaper (albeit illegal) options are available due to a lack of monitoring and enforcement. The decentralization of enforcement functions from State Inspection Agency to the enforcement agencies of each ministry will require additional resources to ensure effectiveness. It would be prudent to ensure capacity of enforcement departments of each ministry are adequately resourced.

To encourage industrial recycling, different regulation should be coherent in encouraging such activities. At a minimum, the regulations should not conflict nor hinder implementation. Regulatory levers for industrial recycling in Ulaanbaatar are currently applied through standards embedded in tariffs. As described in Chapter 2.4, the Water Use Fee and the Water Pollution Fee currently allows for exemptions for water recycling initiatives. This exemption recognizes the benefits of reduced impacts of abstraction and discharge by implementing a recycling scheme.

However, in practice, discharge standards for industries are still inadequate. Industrial wastewater discharge quality is recognized as a priority to reduce impact to environment, but despite a series of legal and regulatory updates in 2019, 2023, and 2024, implementation and enforcement has faced hurdles. Some of the issues impeding implementation include the following: lack of a register of polluters that should be imposed with fee; the current reference list of pollutants, their permissible levels, and tariff levels that do not reflect actual impact to the receiving environment; the list of pollutants' permissible levels[16] does not include light industries that can be highly polluting such as tanneries, sheep wool processing, oil extraction, food supplement, rubber, carpet producers, and other service entities such as hairdressers, saunas, and spas; many medium and light industries do not have capacity to design and install pretreatment to meet discharge standards; and the lack of enforcement capacity to collect, verify, and enforce laboratory result of the effluent quality tests.

Beyond discharge standards, other areas of enforcement remain weak. Areas of enforcement that would benefit from strengthening include ensuring that groundwater usage is monitored, and licensing requirements are adhered to. Current enforcements are labor intensive as it involves inspectors to physically check on-site.

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[16] Joint Ministerial Order A-816/218. December 27, 2019. *Standard Levels of Pollutants in Wastewater from Industrial and Service Units that Produce Less than 50 cubic meters Wastewater without Hazardous Substances Per Day*. https://legalinfo.mn/mn/detail?lawId=14960.

Recommendations for Regulatory Enforcement and Coherence

- Ensure capacity of enforcement departments of each ministry are adequately resourced to adequately enforce discharge standards and unregistered groundwater abstraction. – NWC
- Develop sub-sector discharge standards specific to highly polluting sectors (for example, tanneries, sheep wool processing, oil extraction, food supplement, rubber, carpet, pharmaceutical production, spa, and public pool sauna centers) starting with the most highly polluting. – MECC
- Include considerations for more sub-sectors in National Standards for Treated Wastewater Reuse (MNS6734: 2018) where treated wastewater can be reused and specify water quality requirements for them. – MECC

3.3.1. Coordination Amongst Agencies

The lack of coordination amongst agencies remains one of the core impediments to improving the enabling environment of industrial recycling. Water recycling cuts across the water and wastewater functions of the water sector which poses coordination challenges across the various agencies. Having an effective coordination mechanism is critical to reduce the administrative burdens of industries looking to recycle and reduces the burden of already stretched public agencies. Local-scale industrial recycling initiatives rely on the efforts of industry to innovate and implement, the situation is much more complex, and navigating the convoluted regulatory and institutional landscape still proves too burdensome for industries. USUG being an integrated utility in Ulaanbaatar, it can identify and implement larger end-of-pipe water recycling solutions, working with the MECC, MCUDH, and other ministries. One example is the new CWWTP, which when completed will supply treated wastewater to a new water recycling plant that will then supply recycled water to Combined Heating and Power Plants 3 and 4. However, as with the ATP water recycling example (Annex 1), coordination across agencies was challenging.

Consolidation of roles provide opportunities for administrative efficiencies. While broad water sector institutional reform is outside the scope of this report, it is evident that institutional fragmentation has created significant inefficiencies that can be alleviated with the consolidation of the number of water service providers (51 are water supply and sewerage operators in aimags and 72 in Ulaanbaatar, including USUG). In a similar vein, the fragmentation of roles for the issuance of abstraction licenses, tariff collection, enforcement and oversight create inefficiencies and regulatory loopholes as described in Chapter 2.3.

Better coordination around industrial water recycling can be achieved by providing an overarching coordination mechanism focused on water recycling. In the absence of broad sector institutional reform, a coordination mechanism in the form of a dedicated task force or coordination committee with dedicated resources and mandate to coordinate across agencies for water recycling activities, including for industrial water recycling. Based on the existing institutional setup for the water sector, the NWC is well placed to continue to coordinate across the sector. With necessary resources, staff and capacity, the NWC can perform this coordinating function. The NWC would then be able to develop and implement clear guidelines and frameworks for interagency collaboration, including a water recycling roadmap for industry.

Recommendations for Coordination Amongst Agencies

- Further provide resources (including dedicated staff and capacity) for the National Water Council to coordinate water recycling agenda across government ministries and between levels of government. – PMO, NSC
- Develop and implement clear guidelines and frameworks for interagency collaboration, including a water recycling roadmap for industry. – PMO, NSC

3.4. Reflecting the Value of Water

3.4.1. Reducing the Price Distortions of Water

There is opportunity to improve the Water Service Charge to reflect the cost of investments and scarcity. As set out in Chapter 2.4, the Water Service Charge do not reflect the actual costs to deliver the service. The Water Service Charge currently underprices the water as the pricing methodology omits a large portion of the capital costs (and costs of borrowings for that capital), along with depreciation. Taking a long-run marginal cost approach in pricing methodologies could help reflect large future capital investments in the price of water. In addition, the Water Service Charge can also include volumetric stepped increments to discourage profligate use. This is practiced in many countries and is an accepted way to cater for access to water as a basic human right, while reflecting scarcity and discouraging excessive use by increasing the tariff block for large users.

The Water Use Fee is currently not applied universally due to a lack of monitoring and enforcement capacity. This undermines the value of the water source and creates a "tragedy of the commons" problem, where groundwater faces the risks of over-abstraction. As mentioned in Chapter 3.3.1, opportunities exist for further streamlining the management of licensing, charging and administration of the Water Use Fees for groundwater uses. Despite the WA having water resources management responsibilities, allocation and licensing roles are fragmented across different agencies and levels of government. To help address this challenge, 2030 WRG collaborated with the MECC and the WA, to develop an interactive groundwater monitoring digital dashboard in 2021. However, registration of users and its enforcement remains a challenge. To this end, advances in remote sensing, and Earth Observation technology may help identify hotspots in unauthorized abstraction. However, a well-resourced registration and enforcement regime is still required which include effective collection of tariffs.

As described in Chapter 3.3, improved monitoring and enforcement of industrial discharge, and subsequently charging a fee that reflects the damage to the environment, will go a long way in demonstrating the costs of water disposal.

Recommendations for Reducing the Price Distortions of Water

- Ensure existing pricing methodology considers full costs of operating the network including cost of capital and depreciation. – WSRC
- Consider adopting a long-run marginal cost approach to water consumption tariffs to reflect future infrastructure investments. – WSRC
- Strengthen groundwater monitoring with the help of remote sensing or Earth Observation technologies to identify unauthorized over-abstraction hotspots. – WA RBA
- Increase resourcing for the registration and enforcement of water licenses for all groundwater users, and subsequent billing and collections. – MECC, RBA, Municipality, RB MSPs

3.4.2. Water Rights and Allocations

Water rights in Mongolia are governed under the Water Law of Mongolia 1995. As described in Chapter 2.2, the Act does not provide for the rights on water that is "manufactured" through water recycling activities. As such, commercial entities who recycles water do not have explicit rights to the water that it has just "manufactured". This legislative ambiguity may hamper the development of further market opportunities like trading of the water rights, or even the legality of the water sold in a supply agreement should a legal dispute arise. Hence a review of the provisions within the Water Law of Mongolia to be explicit on the water rights of "manufactured" or recycled water will improve the

regulatory clarity for future investments and exploration of trading entitlements within a basin.

Principles of recycled water allocation can reflect that of ground or surface water. As future demand for recycled water grows, there could be cases where demand for recycled water exceeds supply. In such cases, allocation principles should be cognizant of the trade-off between each use. The current Water Law of Mongolia 1995 provides a framework for the protection of water for the environment and drinking, which implies the inherent importance of these uses and its allocation priority. The Act can be updated to follow allocation principles of recycled water in the same way as ground or surface water is prioritized (e.g. water for environment and drinking are prioritized).

Recommendations for Water Rights and Allocation

- Review of the provisions within the Water Law of Mongolia to be explicit on the water rights of "manufactured" or recycled water. – MECC
- Update the provisions within the Water Law of Mongolia for recycled water allocation to reflect that of ground or surface water. – MECC

3.5. Industry Engagement

Industries present an opportunity to be major 'suppliers' and 'off-takers' of recycled water. Engaging with private enterprises, especially large ones contributing significant loads in the sewer network, to reduce their wastewater and water use footprint, would go a long way in identifying opportunities for opportunities for industrial water recycling. This is also true for engaging with industries with high water demand.

Based on anecdotal evidence, businesses in general have little knowledge on how to install a recycled water scheme when considering one. Information on policy, regulations, and guidelines are held by the relevant institutions who developed them, many times hosted only on their websites (2030 Water Resources Group 2019). To increase awareness of water recycling, access to complete information is important. Engagement and outreach to businesses will improve awareness around the regulation and approvals process when considering industrial water recycling. To this end, development of a recycling toolkit to provide businesses on what to consider when considering water recycling can help fill in knowledge gaps.

Industry recognition programs can help to incentivize recycling. This can also then be linked to industry recycling targets, providing recognition for companies that are meeting and/or exceeding reuse targets. Similarly, such programs could introduce industries with a certified labelling/branding scheme where companies can label their products as being produced using recycled water.

Recommendations for Industry Engagement

- Provide clear and accessible information on government agency roles and responsibilities around requirements for industry to install recycling schemes. – NWC
- Enhance engagement and outreach to industry for greater awareness of water recycling. – MECC, WA, RBA, RB MSPs
- Develop a water recycling and reuse toolkit to guide industries on relevant considerations, approvals along with which agencies to consult. – MECC
- Industry recognition programs for businesses to incentivize recycling. – WA

3.6. Improving Financial Viability by Assigning Costs/Benefits to Stakeholders

Beyond the impediments to creating an enabling environment for industrial recycling, improving financial viability of proposals is also important. For most industrial water recycling schemes, a commercial agreement must be reached between the supplier and the off-taker. Therefore, in majority of the cases, financial viability becomes the overriding consideration in the decision-making process between the recycled water supplier and off-taker. Water recycling projects are often capital intensive and may involve high operating and maintenance requirements further increasing life cycle costs of the proposal. When considering the financial viability of an industrial water recycling proposal, often a financing gap remains due to high capital and/or operating costs.

Based on the learnings of the ATP water recycling concept, by applying a cost-benefit analysis, indirect costs and benefits can be made apparent and assigned. A cost-benefit analysis can help discover the costs and benefits external to the commercial arrangement between supplier and off-taker. These costs and benefits can then be assigned to the beneficiaries/polluters, encouraging these parties to contribute towards the financial viability of the proposal. In the case of the ATP water recycling proposal, benefits to the residents living in the aufeis area were quantified and the residents and municipality were part of the consultation process throughout the discussions on how the proposal can be financed. By extension of this approach, should a different proposal be considered, then a willingness-to-pay survey may be helpful in determining possible contributors to the proposal based on the cost and benefits that are available to be assigned.

Case Example: Amgalan Heating Plant Cost and Benefits Estimates

In the case of the Amgalan Heating Plant industrial water recycling example, it can be estimated that the simple payback period for the proposal would be less than 4 heating seasons* (capital cost divided by net benefits per heating season). Should the benefits to residents be included, the payback period will be decreased further.

Benefits (total estimated: US$87,300)

- The avoided sewage service fee for Coca-Cola is estimated to be about US$83,000 per heating season.
- The avoided groundwater use fee for ATP is estimated to be about US$4,300 per heating season.

Capital and Operating Costs (total estimate: US$332,800)

- The capital investment cost of treatment was estimated at US$330,000.
- The operational cost is US$2,800 every year for recharge filtering material.

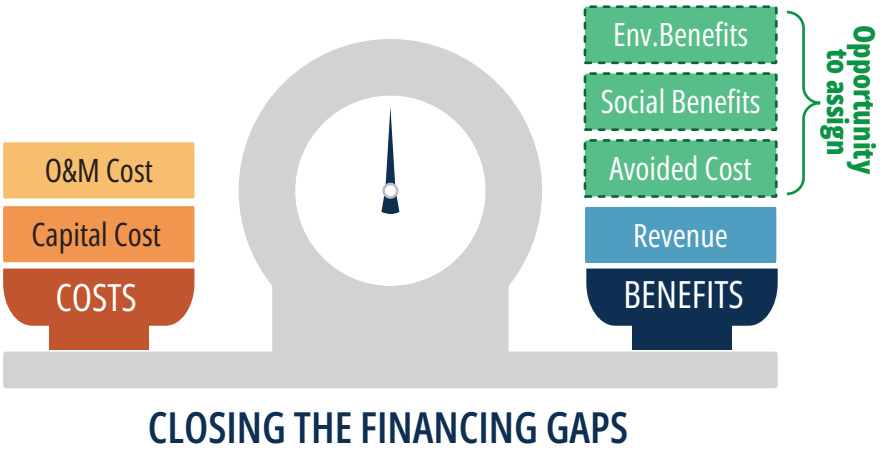
Externalities (estimate: US$55,000)

- The avoided social cost for households and the MUB on ice overflow mitigation was estimated at US$55,000 per winter season.

**It is useful to note that as the pipeline route for the proposal has not yet been fixed, capital costs may increase depending on the route selected. Costs for the avoided costs for Amgalan Heating Plant expansion of the groundwater abstraction network is also yet to be estimated and should be taken into account.*

Figure 7 highlights the components of the cost and benefits that are not directly accrued to the supplier or off-taker. This underscores the importance of equitable cost and benefit distribution among stakeholders. This provides an opportunity for more sources of funding to close the financing gap.

Figure 2. Balancing Costs and Benefits to Close the Financial Gap



4. POLICY RECOMMENDATIONS

The recommendations from the report can be further organized in terms of implementation timeframe and impact. This allows phasing and prioritization of the recommendations. As highlighted in the summary Table 6, the recommendations that have a short implementation timeframe and deliver a high impact can be considered 'no-regret' actions that should be considered with priority. It is important to engaging with various stakeholders, including local communities, industries, and non-governmental organizations, to ensure that the proposed policies are well-informed and have broad support. This could involve public consultations or workshops to gather input and foster collaboration through river basin multi stakeholder platform (RB MSPs) councils that already represent interests of various stakeholder groups.

Implementation Timeframes (IT)

Low <3 years (L)
Moderate >5 years (M)
High >10 years (H)

Impact Toward Increased Recycling

High Impact (H)
Moderate Impact (M)
Low Impact (L)

	Policy Recommendation	Responsible Agency	IT	Impact
	CLEAR POLICY GOALS			
1	Include industrial water recycling considerations as part of the Tuul River Basin Integrated Water Resources Management Plan, and other future iterations of Ulaanbaatar's policy documents.	Tuul RBA, WA, MUB, Tuul RB MSP, private sector, SOEs	L	H
2	Consider an overarching time-bound industrial recycling target to guide policy.	MECC	L	M
3	Public finance to support feasibility assessments where a particular water recycling opportunity is of strategic importance	MECC, Municipality	M	H
	REGULATORY ENFORCEMENT AND COHERENCE			
4	Develop sub-sector discharge standards specific to highly polluting sectors (for example, tanneries, sheep wool processing, oil extraction, food supplement, rubber, carpet, pharmaceutical production, spa, and public pool sauna centers) starting with the most highly polluting.	MECC	L	H
5	Include considerations for more sub-sectors in MNS6734:2018 where treated wastewater can be reused and specify water quality requirements for them.	MECC	L	M
6	Ensure capacity of enforcement departments of each ministry are adequately resourced to adequately enforce discharge standards and unregistered groundwater abstraction.	NWC	M	H

Policy Recommendation	Responsible Agency	IT	Impact
COORDINATION AMONGST AGENCIES			
7 Further provide resources (including dedicated staff and capacity) for the National Water Council to coordinate water recycling agenda across government ministries and between levels of government.	PMO, NSC	L	H
8 Develop and implement clear guidelines and frameworks for interagency collaboration, including a water recycling roadmap for industry.	MECC, MOFALI, MIM, MOE	L	M
REDUCING THE PRICE DISTORTIONS OF WATER			
9 Ensure existing pricing methodology considers full costs of operating the network including cost of capital and depreciation.	WSRC	L	H
10 Strengthen groundwater monitoring with the help of remote sensing or Earth Observation technologies to identify unauthorized over-abstraction hotspots.	MECC, RBA	M	M
11 Increase resourcing for the registration and enforcement of water licenses for all groundwater users, and subsequent billing and collections.	MECC, RBA, Municipality, RB MSPs	M	M
12 Consider adopting a long-run marginal cost approach to water use fee to reflect future infrastructure investments.	WSRC	M	H
WATER RIGHTS AND ALLOCATION			
13 Review of the provisions within the Water Law of Mongolia to be explicit on the water rights of “manufactured” or recycled water.	MECC	L	M
14 Update the provisions within the Water Law of Mongolia for recycled water allocation priority to reflect that of ground or surface water.	MECC	L	M
INDUSTRY ENGAGEMENT			
15 Provide clear and accessible information on government agency roles and responsibilities around requirements for industry to install recycling schemes.	NWC	L	M
16 Enhance engagement and outreach to industry for greater awareness of water recycling.	MECC, WA, RBA, RB MSPs	L	M
17 Develop a water recycling and reuse toolkit to guide industries on relevant considerations, approvals along with which agencies to consult.	MECC	L	M
18 Industry recognition programs for businesses to incentivize recycling.	WA	H	M

ANNEX 1. AMGALAN THERMAL PLANT (ATP) WATER REUSE CONCEPT

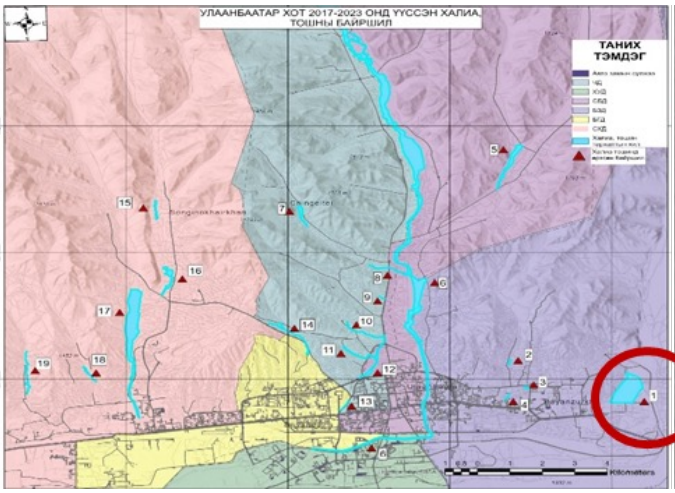
A prefeasibility study (KEITI 2021) was completed in 2021, followed by a detailed technical study (ITEIE 2024) completed in 2024. In both studies, the water reuse concept for the expansion of ATP was assessed, with options of using treated wastewater from MCS Coca-Cola LLC and intercepted spring water (that causes aufeis in winter) from nearby wells, for the increased water demand after ATP's expansion.

Context

Climate change risks are amplified for the urban population in ger areas of Ulaanbaatar, with high exposure to natural hazards. The challenges of flooding and pollution are particularly apparent in Bayanzurkh District's 10th khoroo, which covers the largest area of melted ice overflow[17] in the ger districts (Figure A1.1). Covering 20 ha, overflow of melted ice flushes into local streams or infiltrates into groundwater in warmer seasons, whereas in winter, it accumulates ice sheets, affecting household property. Simultaneously, the city's heat generation is at risk from the depleting groundwater reserves.

Considering these problems in a still sprawling Ulaanbaatar, urban planning must urgently address melting ice and a secure water source for heating. This has implications for Ulaanbaatar's economy, which accounts for 63 percent of national gross domestic product (GDP), with vital economic and social infrastructure located in the city. A key solution is treating the overflow of melted water from ice along with treated wastewater from industry to augment water supply to heat the eastern part of Ulaanbaatar. This will save freshwater abstraction for heat generation, reduce significant amount of wastewater discharged into the already over-capacity sewerage system, and directly improve the standard of living for 159 households.

Figure A1.1. Aufeis Locations in Ulaanbaatar and in the Project Area



Source: Geodesy and Water Facility Agency of the Municipality of Ulaanbaatar, 2023.

Source: ITEIE (2024)

Addressing the overflow of melted ice using appropriate technologies for water treatment and reuse requires understanding the unique climatic conditions of Ulaanbaatar. As the coldest capital city in

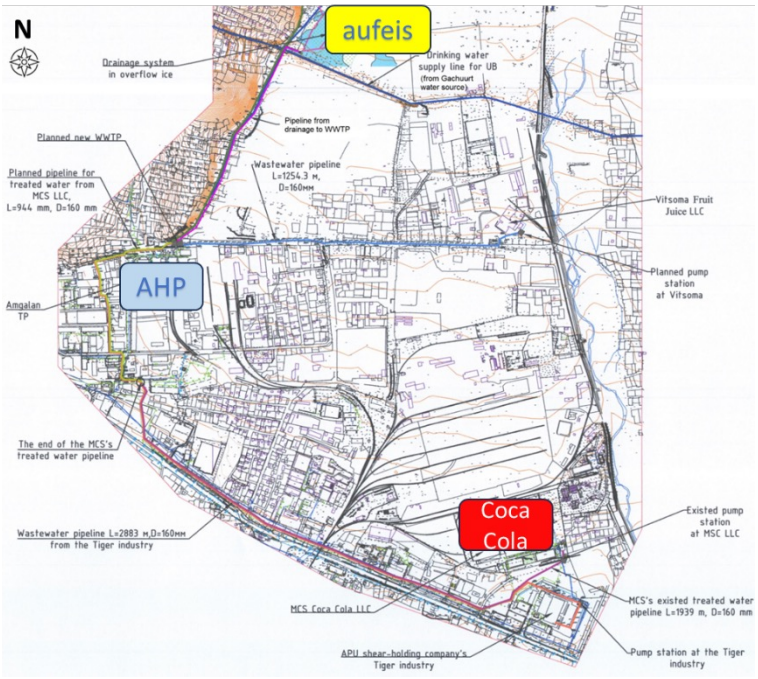
[17] Aufeis is a sheet-like mass of layered ice that forms from successive flows of groundwater, springwater, or river water during freezing temperatures. This form of ice is also called overflow ice.

the world, Ulaanbaatar experiences an annual average temperature of −1.3°C, and temperatures in January are as low as −36° to −40°C. The city has short, warm summers while winters are cold and dry. In addition, the annual water consumption in the ger area of Ulaanbaatar ranges between 9.1 and 10.5 liters per day per capita (USUG 2021), which is much less than the World Health Organization (WHO) standard (15–20 liters per day).

Current Situation

MCS Coca-Cola LLC is one of the leading beverage companies in Mongolia with pretreatment before discharge into sewers. Its factory and office are located within 1 km to the south of the ATP (Figure A1.2). The factory's production has been increasing considerably, with average daily discharge of 511 m^3 treated wastewater.

Figure A1.2. Map of the Project Main Components



To meet the growing demand for urban heating in the eastern part of the city, due to increasing residential apartments and industries, the Government of Mongolia expanded the ATP by adding a boiler with a capacity of 116 MW.[18] This expansion increased the plant's total output capacity to 464 MW, further intensifying the demand for water. The ATP, situated downstream of the ice overflow, requires about 1,264 m^3 per day of water during the heating season to secure the heat supply for the largest and most populated district of Ulaanbaatar (Parliament 2021).

The average flow of the spring water that causes the ice accumulation on the surface in subzero temperatures is 362 m^3 per day. The annual cost of ice overflow damage recovery and protection measures (Figure A1.3) is approximately US$55,000,[19] which is borne by the Municipality of Ulaanbaatar (MUB) and the directly affected 159 households.

When temperature gets warmer, the accumulated ice sheets melt and cause spring floods. The MUB spent US$660,000[20] to clear and transport ice sheets from 33 hotspot locations to mitigate spring floods that did not cause high risk in 2024.

[18] New Recovery Policy, project 7.
[19] 2030 WRG Technical Assessment Report, 2024.
[20] https://isee.mn/n/62853.

Figure A1.3. Photos of Ice Overflow Impact to the Properties and Measures Taken by Cities

Source: KEITI (2021)

Source: News article at https://montsame.mn/mn/read/335133.

In 2022, Coca-Cola's water use increased to 541,000 m^3, while wastewater generation reached 298,000 m^3 per year. For discharging its treated wastewater into the central sewer, Coca-Cola paid US$102,000 in 2022 for sewerage service fees to the MUB. Coca-Cola admits this practice as inefficient as it discharges its well-treated wastewater to the central system where it gets mixed with untreated effluent from the residents and industries across the entire city. Although Coca-Cola's annual discharge of treated industrial wastewater (815 m^3 per day) to the sewage system takes up less than 1 percent of the CWWTP's daily treatment capacity (250,000 m^3 per day), the MUB's cost for wastewater treatment would account to almost US$10,000 per year.

In a typical heating plant with closed cycles, water and steam losses occur naturally between generation and distribution. These losses need to be replaced by adequately treated makeup water once the cycle is closed. The current makeup water use amount is 720 m^3 per day which is supplied by its own groundwater wells, for which ATP pays US$3,500 as WUF per heating season to the WA. If supply to the ATP was from a central water supply network, the water supply service fee would be approximately US$88,000 per heating season.

Technical Solution

The technical solution proposed was assessed in the detailed technical study and considers seasonal supply and demand scenarios. During the winter months, ATP reaches peak output capacity, leading to its maximum water demand. This is also when property damage from aufeis is the highest. The spring thaw results in floods from ice melt and requires additional flood protection measures (Capital City Citizen Representative Council 2023). Conversely, during summer months, water use for processing (and subsequent wastewater discharge) peaks due to increased production, and MCS Coca-Cola discharges treated wastewater into the sewer network.

The technical solution was designed to reduce the impacts of ATP's increased water demand, property damage due to aufeis impacts, and MCS Coca-Cola LLC's wastewater discharge. The technical solution recommends using intercepted groundwater to meet some of ATP's water demand across the heating season (eight months) to reduce spring water overflow causing aufeis. The rest of the water demand is made up from treated wastewater from MCS Coca-Cola, piped to a treatment plant on the ATP's premises. Where there is still a shortfall, water will be purchased from the water utility USUG.

Key Infrastructure Components

- **Wastewater reuse.** The project proposes the reuse of pretreated wastewater from MCS Coca-Cola LLC's bottling plant to supply to the ATP. This pretreated wastewater (510.7 m^3 per day) during the heating season, is expected to meet approximately 40 percent of the plant's water demand, significantly reducing reliance on groundwater (KEITI-World Bank Joint Technical Assistance Report 2021). The construction of a new 720 m long pipeline is also proposed to transport the treated wastewater to ATP. Although the routing of this pipeline is still in the planning phase, it is pivotal to the project's success (KEITI-World Bank Joint Technical Assistance Report 2021).
- **Aufeis reduction.** Aufeis will be managed through a vertical and horizontal groundwater interception system designed to collect the spring water before it reaches the surface. The intercepted groundwater (average 362 m^3 per day) is anticipated to contribute an additional 29 percent to the plant's water supply, further alleviating pressure on groundwater resources (2030 Water Resources Group 2020).
- **Onsite water treatment:** An onsite water treatment plant is proposed to be installed at the ATP's premises, to treat 873 m^3 per day of blended groundwater and pretreated wastewater from MCS Coca-Cola LLC's plant. The treatment is designed to be able to supply ATP's boilers with water of appropriate quality considering the inflow water quality from MCS Coca-Cola LLC's bottling plant and groundwater.

Financial Considerations of the ATP

An initial financial analysis of the ATP proposal reveals a delicate balance between costs, revenues, and avoided expenses. The primary costs include capital expenditures (Capex) required for infrastructure development, operation and maintenance costs, and broader social and environmental costs. These costs are offset by revenue streams generated from treated water sales and other services as along with avoided costs related to flood damage, public health, and environmental degradation.

The financial analysis underscores the importance of considering both direct and indirect benefits when evaluating the project's viability. Direct costs, such as those for infrastructure and maintenance, are necessary for the project's immediate implementation. However, the long-term sustainability of the initiative hinges on its ability to generate revenue and avoid costs through innovative practices such as wastewater reuse and pollution prevention. This approach ensures that the project not only meets its financial obligations but also contributes to broader environmental and social goals.

Preliminary Cost Benefit Estimation

Based on the ATP's preference as the end-user of the technical solution, the treated wastewater from Coca-Cola was considered for further financial analysis as a supply augmentation for the heating plant. The capital investment cost of this selected solution was estimated at US$331,872. Of this amount, three types of water tanks account for 34 percent (US$113,200) of the cost, conveyance pipeline installation accounts for 14 percent (US$49,320), softening equipment accounts for 11 percent (US$37,800), and other costs account for 2 percent (US$7,100). The operational cost is US$2,803 every year for recharge filtering material.

This technical solution has several positive impacts (Table A1.1).

Benefits

- The avoided sewage service fee for conveying treated wastewater from Coca-Cola to the CWWTP is estimated to be US$82,778 per heating season.
- The avoided groundwater use fee at the ATP is estimated to be US$4,298 per heating season.

Externalities

- The avoided social cost for households and the MUB on ice overflow mitigation was estimated at US$55,000 per winter season.

Figure A1.3. Photos of Ice Overflow Impact to the Properties and Measures Taken by Cities

Activity	Stakeholder	Cost
Capex (equipment)	ATP/Coca-Cola	US$331,872
Opex	ATP/Coca-Cola	US$2,803
Pipeline 720 m	ATP/Coca-Cola	US$49,320
Treated wastewater softening facilities (2)	ATP	US$37,800
Water tanks (3)	ATP	US$113,200
Groundwater interception network installation	ATP	US$2,057
Activity	**Stakeholder**	**Benefit**
Avoided WSF	Coca-Cola	US$82,778 per heating season
Avoided WUF	ATP	US$4,298 per heating season
Avoided property damage	Residents	US$54,000 per heating season
Total avoided cost	Coca-Cola, ATP, residents	US$141,076

ANNEX 2. LIST OF OUTPUTS OF 2030 WRG MONGOLIA PROGRAM

	Output	Type	Year	WS
1	Targeted Analysis on Water Resources Management Issues in Mongolia	Report	2014	n.a.
2	Price and Water Valuation	Report	2015	2
3	Revised and Improved Methodology for Water Ecological-Economic Valuation	Report	2016	2
4	Hydroeconomic Analysis in Ulaanbaatar	Report		1
5	Hydroeconomic Analysis in Southern Gobi	Report		1
6	Improving Incentives and Related Regulations for Water Saving in the Mongolian Mining Sector	Report	2017	1
7	Improved River Basin Council (RBC) Guidelines	Report	2018	3
8	Improved Capacity and Knowledge Dissemination at the Stakeholder Level to Ensure Adequate Performance of the RBC	Report		3
9	Approval of National Standard for the Treated Wastewater Reuse	Report		1
10	Assessment and Recommendations for Improving Urban Water Tariff System	Report	2019	2
11	Water pollution fee Law Amendments	Report		1
12	Demo Project on Treated Wastewater Reuse, Implementation in Ulaanbaatar	Report, facility		1
13	National Water Policy Priority Definition	Report	2021	3
14	Hydroeconomic Analysis in Southern Gobi	Report		1
15	KEITI-World Bank Joint Technical Assistance Report_mongolia	Report		1
16	Mongolia revised water pollution fee Law	video		
17	Digital Water Platform: Development of a Groundwater Monitoring Portal using Disruptive Technology	Report, demo web page	2022	2
18	Water Accounting Plus in Kherlen River Basin	Report		3
19	Water Accounting, Roadmap	Report		3
20	2030 WRG Mongolia Program: Key Results	Video		
21	Technical Assessment of the Selected Wastewater Treatment and Reuse Option	Report	2024	1
22	Report on Capacity Building	Report	2024	1

[21] The workstream number the output refers to.

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