Armenia Water Supply and Sanitation
Challenges, Achievements, and Future Directions
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In-Ho Keum
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Foreword

Armenia is a country that has taken bold actions to bolster water and sanitation service delivery. One of these actions was outsourcing the management functions to an international operator with a track record and experience in the sector. This measure was accompanied by long-term finance from the Asian Development Bank. Such finance will be used to invest in infrastructure, training, and reforms. This mix of professional management, finance, and reforms has delivered tangible results: coverage is up, quality has improved, and service delivery is more efficient. The work is commendable and the most appropriate way to serve customers. This report shares these experiences. We think they are relevant and meaningful to others in the region.

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Acknowledgement

This report benefited from discussions with and review by members of Asian Development Bank’s Water Committee, particularly the Urban Water Stream and the Sanitation Action Group.
Abbreviations

AWSC – Armenia Water and Sewerage Company
NRW – non-revenue water
O&M – operation and maintenance
PPP – public–private partnership
PSRC – Public Service Regulatory Commission
SCWS – State Committee of Water Systems
WSS – water supply and sanitation
YWSC – Yerevan Water and Sewerage Company
INTRODUCTION

Armenia is a mountainous country in the South Caucasus area, bordering Azerbaijan, Georgia, Iran, and Turkey. It has a population of around 3 million, with about 64% living in urban areas and the remaining in rural regions of the country.

With 10.2 billion cubic meters (m³) of water per year on average, of which 2.4 billion m³ is used for drinking purposes, the country indeed has abundant water resources. About 96% of drinking water is groundwater drawn through boreholes, wells, and springs. Most raw water is of good quality and requires only disinfection. The typical drinking water infrastructure includes water intakes, transmission mains, pumping stations, and distribution networks.
Typical wastewater infrastructure includes house connections, sewer networks, pumping stations, and wastewater treatment plants. However, since Armenia’s independence in 1991, the deterioration of water supply and sanitation (WSS) infrastructure and service delivery mechanisms has impacted the quality of water, making it a crucial issue on the development agenda. For almost all Armenians, low-pressure water, which sometimes failed to comply with biological water quality standards, was available for only a few hours a day.

Armenia became a member of the Asian Development Bank (ADB) in 2006. Since 2007, ADB has supported reforms and investments in the country’s WSS sector, working with the government and other international financial institutions and bilateral funding agencies.¹

The efforts of the government and development partners over the past decade resulted in improved water access, reliability, and quality. The institutional model adopted by Armenia, which combines public investments with private sector operation for the WSS utilities, has led to the country’s achievements.

This report looks at the challenges, achievements, and the future to facilitate WSS sector reforms in other ADB developing member countries facing similar challenges.

¹ The World Bank, European Bank for Reconstruction and Development (EBRD), KfW, and United States Agency for International Development (USAID)
HISTORICAL PERSPECTIVE

SECTOR CHALLENGES

**Impact of the transition.** Before the break-up of the former Soviet Union, the sector attracted large investments aimed at both urban and rural consumers. As investments slowed down just before and after Armenia gained independence in 1991, inadequate capital financing, together with operation and maintenance (O&M) costs, led to lowered quality and reliability of WSS delivery services because of deteriorating infrastructure, poor O&M, and weak institutions managing the services. Access to safe drinking water declined in rural and urban regions across Armenia, leading to negative impacts, including to the deterioration of public health, which mostly affected socially vulnerable groups.

**Quality of service.** All the residents of the capital, Yerevan, and about 95% of other urban residents were connected to centralized water service. However, after Armenia’s independence, only about 15% enjoyed continuous service, while the rest received water only for 2–3 hours a day.

Extremely lower recurrent budgetary allocations for O&M aggravated the situation and eroded institutional capacity in WSS utilities. As a result, non-revenue water (NRW) increased to an estimated 60–75% of the total water supplied in the network in the 1990s. This was four to five times above the norm for Western European cities and about double the average experienced in urban areas of the Commonwealth of Independent States.

Despite the good quality of Armenia’s raw water, water delivered to consumers often failed to reach the World Health Organization microbiological standards for water due to the neglect of disinfection

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2 Source: State Committee of Water Systems.
facilities, inadequate water pressure due to worn pumping stations and dilapidated networks, and poor management of utilities. Furthermore, larger urban centers experienced delivery and quality shortfalls that frequently resulted in secondary contamination.

A total of 20 wastewater treatment plants, built before 1990, were designed and constructed for mechanical and biological treatment, including disinfection of effluents. Unfortunately, most of the plants were either not in operation or did not provide mechanical purification because of inadequate funds for repair and O&M. Most of the wastewater collected through centralized municipal systems reaches treatment plants by gravity flow. Treatment ratio was relatively low due to the poor operating conditions of the treatment plants. As a result, much of the wastewater used is discharged untreated into rivers.

**Water tariff and revenue collection.** All water utilities followed a flat rate based on consumption slabs. While utilities received subsidies to cover their capital and operational expenditures prior to the transition, cost recovery became a major issue immediately after. Most service providers depended on budgetary support from the government because a combined tariff for water and wastewater did not fully cover costs and, in most areas, except Yerevan, did not even cover operation costs. In 2002, the government’s subsidies to the WSS sector were 3.4% of the total budget expenditure.
The revenue from tariffs supplemented by budgetary support often resulted in shortfalls, which impeded infrastructure sustainability, private sector participation, and service provision.

Consumer dissatisfaction with the reliability and quality of service is a constraint in increasing tariffs. Surveys in Yerevan continuously indicated consumer willingness to pay for satisfactory services. The average affordable tariff was AMD465/m³, which exceeded the existing tariff of AMD140/m³. The affordable tariff for the lowest household income deciles was estimated to be AMD146/m³, slightly more than the existing average tariff. There was indeed scope to increase tariffs, while still making provisions for low-income households, so as not to jeopardize access to drinking water for the most vulnerable.

Tariff collection also had to be improved to improve cost recovery and commercial viability. In 2002, the tariff system was based on normative per-capita consumption of 200 liters per registered inhabitant for non-metered customers. Customers found it unfair that they had to pay for this amount of water regardless of usage. Domestic customers, therefore, had two reasons for not paying their water bill: bad quality of service and unrealistic consumption norm.

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4 There was/is no lifeline tariff in Armenia.
ACHIEVEMENTS

Against this background, the government embarked on policy, legal, regulatory, and institutional reforms in the late 1990s, supported initially by the World Bank and other development partners.

Legal and Institutional Set-Up

The country’s Law on Local Self-Government (2002) delegated responsibility for providing WSS services to local authorities, making municipalities and village administrations owners of water distribution networks within their administrative areas. The central government owns water resources and main infrastructure from source to the town or village entry point and delivers bulk water to WSS utilities. To facilitate systemic improvement of WSS services, the government adopted the Water Code in 2002, the National Water Policy in 2005, and the National Water Program in 2006.

The legal and policy frameworks enabled a comprehensive restructuring of sector institutions. Previously, supervision of the WSS sector was shared among various ministries, which led to coordination problems. In 2002, the government established the State Committee on Water Systems (SCWS), covering water resources, irrigation, hydroelectric resources, and drinking water and wastewater services. In January 2004, a law was passed that entrusted the Public Services Regulatory Commission (PSRC) to regulate public utilities and independently set tariffs in the energy, water, and telecommunications sectors.6

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Establishment of Utilities

As part of the ongoing sector reform, the SCWS formulated a model of corporatizing utilities and established five independent WSS companies, about 2 million people. The Yerevan Water and Sewerage Company (YWSC) was established to provide services to the capital city and 33 villages nearby. The Armenia Water and Sewerage Company (AWSC) was established to provide services to 37 towns and 268 villages outside Yerevan. Shirak Water and Sewerage Company, Lori Water and Sewerage Company, and Nor Akung Water and Sewerage Company are small regional service providers for towns and villages in their respective regions. Corporatization facilitated private sector entry into the WSS sector, which brought in technical and managerial know-how to improve efficiency in the management and delivery of services.

From 2000 to 2005, the YWSC was managed and operated through a management contract with Armenia Utility. It has been managed through a lease contract with an international water utility operator, Veolia of France, since 2006. The World Bank supported the introduction of these approaches and the critical WSS infrastructure investments through $50 million loans under its projects. The institutional model adopted and the resulting improvements in service delivery were the catalysts in attracting other international financial institutions, including ADB.

The AWSC, which has 4 regional branches and 35 sector units, is government owned and has been operating under a management contract with an international water utility operator, Saur of France, since 2005. A World Bank project was instrumental in setting up the contractual model and getting initial infrastructure investments with a $43 million loan. ADB’s first project in Armenia is for the WSS sector, will support AWSC’s efforts through a loan of $36 million. The European Bank for Reconstruction and Development (EBRD) provided a loan of €8 million for projects covering different geographical areas within AWSC jurisdiction.

The three regional utilities, which previously operated as municipal entities, have been reestablished and operated under a single management contract with the consortium of MVV Decon GmbH, MVV Energie AG, and AEG Service LLC (MVV) since 2008. Current capital works funding for

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6 Closed Joint Stock Company
7 The remaining 1.1 million people are spread over 560 villages and are served by community WSS systems.
€36.2 million under the projects is provided by KfW, the German bilateral development agency.10

Table 1: Public–Private Partnerships in Armenia

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<tbody>
<tr>
<td>AWSC</td>
<td>Management</td>
<td>2005–2011</td>
<td>Saur</td>
<td>0.62</td>
</tr>
<tr>
<td>SWSC</td>
<td>Management</td>
<td>2008–2012</td>
<td>MVV</td>
<td>0.32</td>
</tr>
<tr>
<td>LWSC</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>NAWSC</td>
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Public–Private Partnership Development

The introduction of management and lease contracts unleashed an era of public–private partnerships (PPP) in Armenia. The government’s principal aim was to improve the overall quality of WSS through clear performance orientation. The objective of the PPP contracts was to increase the efficiency of water system operation, increase consumer willingness to pay by providing higher quality, provide more responsive service, and mobilize the best available managerial and technical know-how.

Yerevan Water and Sewerage Company Lease Contract. The first PPP model for the YWSC was a 4-year management contract, which was later extended by another year. This arrangement allowed critical initial investments by the public sector, supported by international partners, while collecting enough information on the utility’s conditions and performance parameters. Based on such assessments, a 10-year lease contract was developed, with the tenor chosen to facilitate adequate returns on the operational costs incurred by the operator.11

The transition from a management to a lease contract facilitated a gradual transfer of risks between the public and private sectors. In the lease contract, the private operator takes billing and collection risks in addition to risks related to the quality of infrastructure, which may increase operation and maintenance investments. Under the lease arrangement, the Yerevan Municipality retains overall responsibility for new investment

11 Operation costs include basic operation and maintenance equipment such as vehicles, computers, leak detection equipment, and equipment for repair and management of pipe works.
and ownership of all the fixed assets. However, the responsibility for implementation and disbursement of major international financed investment programs is transferred to the operator. The operator is in a better position to guide project design and implementation, directly affecting system efficiency.

In return for a lease fee, the operator has the right to use all the fixed assets and gets a customer tariff minus a lease fee. The operator, therefore, takes profit from tariff and good management and operation, but it also has to bear losses. A 10-year program of tariff levels, with rules for tariff adjustment procedures, was established at the contract stage. Tariff regulation is carried out by the PSRC based on submission by the operator and approved by the SCWS.

At the start of the contract, contractual obligations for management, operation, and service delivery are established with a developed business plan against which the contract is controlled; and a base year data report is prepared and agreed to as evidence for the state of the facilities. The operator is regulated through the terms of the contract, with developed reporting procedures. These include annual submission of full business plan for the next year’s operation, as well as full technical and audited financial details of the past year’s operation and performance. The operator prepares annual capital works plans, with reporting on procurement. Compliance with contractual terms is regulated by the SCWS and independent auditors are used to support this activity.

Figure 1: Lease Contract

[Diagram of lease contract with labels: Private Operator Veolia, Service Provider YWSC, Municipality of Yerevan, Regulator PSRC, Customers, Independent Auditors, and various arrows indicating financial and operational flows.]
Armenia Water and Sewerage Company Management Contract. Based on the positive experience of introducing the first private international operator to manage the YWSC and lessons learned, a 4-year management contract was made for the AWSC. Similar to the management contract for the YWSC, the objective of the contract was to bring the AWSC into good operational and financial standing so that by the end of the contract period, it will be possible to use the good performance to obtain a suitable long-term follow-on PPP arrangement. The contract was first extended to 2011, to 2013.

Under the management contract, services are provided to the AWSC by the private international operator, which takes responsibility for management of all the operational activities of the AWSC, including financial and personal management. The operator, in return, is paid a base fee subject to performance against contract. In addition, the operator is paid an incentive bonus for improvement above the contractual minimum. The AWSC appointed a company management board to implement and control the contract. The board provides all facilities, personnel, data, and materials necessary for the operator to manage the performance of the AWSC. Although the AWSC retains full responsibility for undertaking and financing new investment, the responsibility for implementation and disbursement of major international financed investment programs is transferred to the operator.

Under the management contract, the AWSC bears the risks related to tariff level and collection. The procedures for resetting tariffs involve the AWSC,
SCWS, and PRSC. The AWSC formally applies for a tariff revision, with support from the SCWS. After public hearings with interested stakeholders and invited media, the PRSC makes a final decision on a tariff. The operator provides support and justification for the proposed tariff. The operator is largely insulated from the financial performance of the utility and is generally unaffected by changes to the tariff revenue. Monitoring the operator’s performance is carried out by the AWSC.

Figure 2: Management Contract

**Comparison between Two Contract Models.** The main difference in the two forms of PPP arrangement is the level of risk taken by each PPP operator. Under the management contract, the PPP operator takes the management and operations risk only. It does not invest in working capital to meet operational expenses. The PPP operator also provides services for management of the investment programs financed by international financial institutions. Under the lease contract, the PPP operator takes all the responsibilities and risks of the management contractor but takes additional commercial risks: adequate collection and revenue generations.

**Regional Companies’ Management Contract.** The institutional arrangements for the three regional utilities are, in many ways, similar to that of the AWSC, except the municipalities are involved at board and overall management level together with the SCWS. The responsibility for assets and sector development remains with the SCWS, and project monitoring is carried out by the project monitoring unit situated in
the SCWS. Responsibility for developing and funding necessary capital program remains with the government. A 5-year management contract began in 2008.

**ADB CONTRIBUTIONS**

To support the investment program of the AWSC, ADB approved a loan project in 2007. The main objective of the project is to improve access to safe and reliable water services in the AWSC service area. The project comprises two components: municipal infrastructure rehabilitation and improvement and management improvement and capacity development. The project started in 2008 and is expected to be completed by 2013.

Project progress is highly satisfactory. As of May 2011, overall physical progress was 96%, with only 63% of the loan period lapsed. For municipal infrastructure rehabilitation and improvement, 24 subprojects have been selected and appraised, and these are in various stages of engineering design, bidding process, and construction. For management improvement and capacity development, the project has initiated and substantially completed several activities such as training, improving the financial management system, and increasing public awareness. The overall physical completion is expected to be one year ahead of schedule. Project design has several salient features. First, a sector loan approach was adopted to address

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the large number of small investment subprojects that are geographically dispersed and need to be implemented urgently.\textsuperscript{14} A standard loan project could not provide this flexibility in subproject selection, appraisal, and implementation.

Second, the project adopted a logical sequence of interventions that helped with implementation. Large investments were already made in the existing infrastructure yet did not deliver efficient services, therefore, the primary focus has been to optimize operation of existing infrastructure and maximize operating efficiency.

Finally, to demonstrate 100% water supply coverage, 100% metering, 24-hour water supply, and 100% collection efficiency, the project selected a pilot zone, fixed all the identified problems related to physical interventions, and improved governance. The purpose of this exercise was to help the AWSC apply lessons learned to other parts of the service area.

Altogether, ADB’s contributions to the sector can be summarized broadly as follows:

- Financed 80% of the total project cost of $45 million (counterpart contributions amounted to 9 million).
- Leveraged ADB extensive experience in WSS across the AWSC service areas, focusing on efficiency improvement in the systems.
- Strengthened capacity of the AWSC in project preparation of feasibility appraisal, engineering design, and environmental and social safeguards.
- Assisted the AWSC in initiating villages not previously covered by them. These villages will be covered after completion of construction by entering into service agreements.

\textsuperscript{14} ASector loan is a form of ADB assistance to a developing member country for project-related investments based on considerations relating to a sector or sub-sector of the developing member country as a whole.
STATE OF SECTOR PRESENTED BY PERFORMANCE OF THE SERVICE PROVIDERS

Armenia Water and Sewerage Company: The international operator, Saur, has provided services for managing water operations and capital investment programs financed by the World Bank, ADB, and the EBRD under the management contract. The management contract includes a series of contractual measures and targets for performance improvement. The contract was based on information from a series of initial performance figures established under the previous management of the AWSC. Under the contract, 25 performance indicators were included and are regularly reviewed and monitored by the operator as part of normal managerial tasks. Of these 25 indicators, only 4 are used for calculating the bonus payment. These include continuity of supply (average hours/day), percentage of subscribers metered against billed, bacteriological drinking water safety, and company working ratio.15

Overall, the performance of the AWSC has improved, as shown by major performance indicators summarized below, with more details shown in Table 2:

- The duration of water supply has, on average, increased from 6 to 14 hours.
- The tariff collection ratio increased from 48% to 90%.
- The ratio of water connections provided with water meters increased from 40% to 77%.
- The compliance with water quality requirements increased from 94% to 98%.
- The NRW increased from 73% to 85%.16

15 Ratio of total operating expenses to total operating revenues.
16 This is presented by water production against water consumption and deviated from the typical NRW definition. NRW is defined by the difference between the volume of water put into a water system and the volume that is billed to customers (International Water Association).
Table 2: Major Performance Measures

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Baseline 2004</th>
<th>2010</th>
<th>Percentage Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily hours of Water Services</td>
<td>hour</td>
<td>6.04</td>
<td>13.6</td>
<td>125%</td>
</tr>
<tr>
<td>Revenue collected from domestic subscribers per registered inhabitant</td>
<td>ARD/month</td>
<td>166</td>
<td>446</td>
<td>169%</td>
</tr>
<tr>
<td>Tariff Collection Ratio</td>
<td>%</td>
<td>48</td>
<td>90</td>
<td>88%</td>
</tr>
<tr>
<td>Working ratio</td>
<td>%</td>
<td>195</td>
<td>102</td>
<td>48%</td>
</tr>
<tr>
<td>Energy Consumption</td>
<td>kwh/m³</td>
<td>0.43</td>
<td>0.26</td>
<td>39%</td>
</tr>
<tr>
<td>Total Staff – per 1000 subscribers</td>
<td>unit</td>
<td>9.45</td>
<td>6.30</td>
<td>33%</td>
</tr>
<tr>
<td>Metered Consumption – percentage of subscribers billed</td>
<td>%</td>
<td>40</td>
<td>77</td>
<td>93%</td>
</tr>
<tr>
<td>Water Safety Compliance</td>
<td>%</td>
<td>94</td>
<td>98</td>
<td>4%</td>
</tr>
</tbody>
</table>

Source: AWSC Annual Report 2010

Yerevan Water and Sewerage Company and Regional Water Utilities:
For the YWSC, the current performance of the water supply system operated by Veolia can be summarized as follows (first figures or base values refer to the situation in early 2006):\(^\text{17}\)

- The duration of water supply increased an average of 17 to 21 hours.
- The tariff collection ratio increased from 79% to 87%.
- The ratio of water connections with water meters increased from 88% to 97%.
- The compliance with water quality requirements increased from 94% to 98%.
- The NRW remained constant at around 83%.

The current performance of the three regional water utilities operated by MVV can be summarized as follows (with reference 2005 base figures):\(^\text{18}\)

- Duration of water supply increased from 4 to 14 hours.
- Ratio of water connections provided with water meters increased from 32% to 86%.
- Compliance with water quality increased from 95% to 97%.
- NRW decreased from 83% to 75%.

The PPP approach has shown substantial improvement. After decades without water in some areas, continuity of supply has improved dramatically. Compliance with water quality requirements and tariff collection ratio has also significantly increased. These service improvements were achieved through the effective coordination of investment programs with operations by the PPP operator, with the aim of improving operating efficiency and making more effective use of limited resources.

\(^\text{17}\) Source: Yerevan Water and Sewerage Company.
\(^\text{18}\) Source: KfW
However, the level of NRW is one of the highest encountered internationally and remains almost constant. The current contracts are mainly aligned to achieve increased continuity of supply and do not include NRW as one of the performance indicators. The original asset condition is poor, as evidenced by high levels of leakage and frequent pipe bursts. Management time and operational resources were used to deal with emergency repairs and to keep the aged system working. Rehabilitation under the investment programs financed by the international financial institutions, including ADB, focused mainly on emergency maintenance and some routine maintenance.

NRW reduction requires an intense and comprehensive long term asset management program, based on an increased understanding of the system conditions and operations. Emergency repair and/or limited maintenance alone will not provide dramatic changes in NRW. For example, increasing flows and pressure in some parts of the system also increases leakage, so positive improvements in service levels can have a negative effect on system loss. This is partly the reason for the increase in NRW since the AWSC operation of the management contract. Effective NRW reduction requires not only adequate investment but also continued O&M in the system.

The use of PPP in the WSS sector in Armenia is a good example of progressive sector development. Private sector participation is increasingly seen by the government as a key component of sector reform strategies. The PPP schemes successfully implemented in several of the country’s water utilities yielded good results for the sector and made Armenia one of the few countries in the region with such a successful PPP experience.
FUTURE OUTLOOK

FUTURE MAJOR CHALLENGES

Public–Private Partnership: The relative scarcity of public funds and gradual decrease in concession lending to Armenia makes it essential, over the medium term, to introduce measures to create conditions more conducive to private sector participation and investment. The government committed to take measures to continue and deepen reforms through private sector participation in the sector’s management. Initiatives are also aimed at improving reliability and efficiency, as well as reducing losses and improving service quality.

Universal access to safe drinking water and basic sanitation will require a significant investment program, under which public funds will be used to leverage private sector investment and to shift the public sector towards being a facilitator and regulator.
**Investment Need:** The state of infrastructure and assets is still very poor, with a need for major investments in physical assets and service expansion. Over the next 10 years, the investment needs in the sector are estimated at $1.7 billion to bring the systems to adequate service standards and improvements in infrastructure conditions.\(^\text{19}\) Immediate investment needs over the next 5 years were estimated at $250 million ($80 million for the YWSC, $100 million for the AWSC, and $70 million for the regional utility).\(^\text{20}\) Mobilizing adequate funds is a key challenge.

The skills provided by an international operator to improve management ensures that the existing system can meet maximum operating efficiency, but this can’t reduce existing system constraints without an adequate investment program. The PPP schemes can only improve performance to a certain level; beyond this, additional investments are required to expand operations.

**Reduction of Non-Revenue Water:** The current high NRW level places high demands on water production. Reduced levels of NRW are not key performance measures under the PPP contracts, possibly given the relative abundant availability of potable water resources.\(^\text{21}\) While it may be possible to operate with such high levels in the short term, operating with high levels of NRW in the long term given the vulnerability of water resources to climate change is not considered good practice for utility effectiveness and sustainability.\(^\text{22}\) Issues related to NRW include the following:\(^\text{23}\)

- Lack of accurate measurement means that the actual level of NRW is unknown and only an order of magnitude.
- Approximately 40% of NRW is estimated to be through commercial losses including theft, illegal connections, or inaccurate billing; yet, without adequate measurement, it is not possible to effectively manage this.
- Approximately 40–45% is estimated to be through technical losses such as leakage due to the poor condition of the existing infrastructure.

Managing a system with a high level of NRW diverts scarce resources from system improvements; a high level of water loss also has operational and financial costs. Most of the activities related to reducing commercial losses (e.g., meter replacement and updating customer databases) have quick payback since they require limited investment and rapidly translate into

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\(^{19}\) Service standards are represented by continuity of supply, which varies from one area to another.
\(^{21}\) About 71% of water produced is extracted from springs, 23% from boreholes, and 6% from surface water.
\(^{23}\) World Bank. *Armenia: Water Sector Note.*
additional revenue. Currently, there is limited and inaccurate measurement of water flow in the systems, and major investment is needed for metering and pressure measurement to determine actual consumption by customers and for better system management.

**Water Tariff:** Despite increases in tariff levels in recent years, levels are still low. Consequently, funds are insufficient to adequately deal with asset rehabilitation. Tariffs are set separately for each of the five service providers, based on recommendations from the SCWS. The PSRC deals with tariff applications and reviews the tariffs submitted. Tariff levels in Yerevan, Shirak, and Lori are currently set to recover all O&M costs. However, an affordable tariff level in Nor Akung still requires a government subsidy. High energy costs associated with high levels of pumping mean that an O&M cost recovery tariff may be double the existing tariff, which would cause a problem with affordability, making it difficult to implement. Tariffs in the AWSC are set below O&M cost recovery levels and currently require government subsidies to fill the shortfall.24

**Wastewater Management:** Current investments for the expansion of sewer systems are limited. The current contracts do not explicitly deal with wastewater as a major issue. High investment costs for wastewater treatment and disposal implies that wastewater management will only be addressed

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once major investments in the water systems are completed. However, a comprehensive strategic plan with associated policy reforms should be initiated in 2–3 years to address even bigger challenges faced by this part of the sector. Continuous delay in investment without a proper plan will cost more in the future.

Villages: There are currently 560 villages not served by water supply and sanitation companies. Instead, local communities are responsible for such services. Water supply systems are in critical condition due to lack of financial sources, required technical skills, and proper maintenance. In some villages, water is supplied without disinfection once every 3–4 day. Only 5% of these communities are connected to the central sewerage system. The rest of the communities make their own provision for sanitation such as latrines and septic tanks. The quality and types of institutional, operational, and technical arrangements are extremely variable. A coordinated approach is required to develop this part of the sector. An approach could be a consolidated service provider seeking economics of scale.
POLICY OPTIONS IN THE CONTEXT OF THE ARMENIA WATER AND SEWERAGE COMPANY

Despite the progress in improving water supply in areas supported by private sector participation, the institutional framework for sustainable water supply delivery in most parts of the country remains poor. The current management contract with the AWSC culminates by the end of 2013. The subsequent PPP arrangements for the AWSC are at a crucial point, with various options, including the option to convert the current management contract into a lease contract with an international private operator. The decision should be made in consideration of not only the current set-up of the AWSC, but also a broad sector-wide strategic approach. The elements for consideration include the best PPP structuring option, level of service, long term sustainability of the sector, and affordability of services to users toward full cost recovery.

PPP Models: The experience with Yerevan proves that the lease structure provides an effective step forward from a management contract. The use of a lease contract would be the logical next stage for both the AWSC and the three regional utilities when their current contracts end in 2013 and 2012. Other forms of PPP, such as a full concession contract, do not seem viable because the operator would be required to fund its investment solely through tariff collection; this would be unrealistic given the massive investment backlog and for the lack of full cost recovery tariffs.

Although a single PPP operator for the whole country is possible, the complexity of establishing a single operator appears to outweigh possible benefits provided by economies of scale. The existence of two or more operators also offers positive competition versus the monopoly of a single operator. It would also be a huge challenge to combine with or terminate the existing Yerevan lease contract, which still has until 2016.

Level of Service: The main sector objective is to provide an acceptable level of service. However, different costs for different levels of service make it necessary to determine what level of service is affordable. Under the current management and lease contracts, the continuity of supply is used as the main measure of level of service, which is a key performance indicator.
The initial long term goal was to have each area eventually reach 24/7 supply on average, but with lower interim goals during the life of the individual PPP contracts. For example, the targets are 95% continuity of supply by the end of the current contract for the YWSC and 16 hours for the AWSC.

Improved continuity of supply requires increased investment in rehabilitation of the existing infrastructure; Investment should not be driven solely by this single measure, as the use of investment in attaining planned levels of service needs to be balanced against affordability, as well as balanced with investment in other areas offering increased operational and financial effectiveness, such as NRW reduction. Since 24/7 supply across the whole region may not be affordable, a reduced target for increased continuity of supply should be considered in the medium term.

Although original targets were based on average for the whole utility, it is more realistic to plan for continuous improvement across the region, but with short term targets for individual towns and villages. The AWSC has a large spread of urban and village supply, where infrastructure conditions and the level of existing continuity of supply vary significantly. Having different targets for continuity of supply, according to individual towns or regions, allows investment to be more focused.
Sustainability and Tariff: Current tariff levels of around AMD 200/m³ in the AWSC still appear low compared to regional or international norms of around AMD 400/m³. A tariff policy must ensure the sector’s long-term sustainability. An analysis by the World Bank indicates that the current tariff level needs to increase by 33% in 2014 to achieve full cost recovery for O&M, debt service, and depreciation by 2022. It should be noted that the analysis assumed substantial efficiency gains, including NRW reduction, billing and collection improvement, and decrease in operational expenses.

Regional tariffs are expected to remain because a single national tariff level, as recommended by a national policy on tariff setting, is not realistic at this stage of evolution. A single national tariff level requires cross subsidies between areas and would raise practical and potential political difficulties. While the average tariff will be lower, tariffs in some cities and towns (e.g. Yerevan) will need to increase despite lower operating costs. However, it may be practical to consider consolidating operations in similar areas (i.e. the AWSC and three regional utilities) to obtain efficiency through economies of scale, with expected reduction of management and operating costs. This could be achieved without using a single regional tariff for the combined areas, where towns currently on a lower tariff may not accept the higher tariff.

TOWARD THE FUTURE

Taking the example of the YWSC, the AWSC intends to transform the current management contract into a lease contract. While options for the exact timing for transition to the lease contract (e.g. from early 2014) are currently under consideration, a properly planned course of decisions and actions need to be made and implemented to ensure that this transition is smooth and effective.

Based on the policy options discussed above, the following actions should be prioritized:

- **Level of Service**: Targets for the continuity of supply should be progressive. In the long term, a 24/7 target can be achieved for the whole utility by focusing either on towns and villages where investments target NRW

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26 Overall NRW reduction by 20% by 2022 at 2% annual reduction for 10 years
reduction by replacing aged pipes completely or on newly developed areas
where new pipelines are required. Meanwhile, the continuity of supply can be
increased to an average of 18 hours or more through investments spread over
entire service areas. Targets need to be carefully set as they will vary according
to the condition of existing infrastructure in individual towns and villages and
the proposed investment level.

- **Investment Program:** A medium term investment program, with a total cost
  estimated at $100 million, should be developed and implemented by the
  AWSC with support from the current management contractor. The objective
  of the program is to provide necessary infrastructure improvements linked to
  further improvements in service and operating efficiency.

- **Operation Efficiency:** The investment program will focus on improved fl ow
  measurements and performance improvements through the reduction of NRW
  and associated infrastructure rehabilitation and expansion. The investment
  program will also serve as a basis for preparation and documentation of the
  lease contract. For the reduction of NRW, it is essential to create an asset
  management and maintenance plan, which includes specific requirements for
  the creation of district metering areas, relevant zoning of network, as well as
  specific maintenance planning and execution. NRW reduction should also be
  one of the performance indicators in the lease contract.

- **Tariff Increase:** An effective tariff mechanism should be established that will
give an adequate revenue stream. This includes elimination of subsidies, defined
cost recovery, debt service, and affordability and social acceptability.

ADB recognizes the investment needs and is working on a follow-on
project, which partly covers the immediate investment program and
associated policy agenda under the lease contract. Strategic directions
of the follow-on project include NRW reduction and adequate cost
recovery. ADB plans to assist the government in developing strategies for
wastewater management and village water supply and sanitation. ADB is
also coordinating closely with other international financial institutions and
bilateral funding agencies, recognizing that strong coordination is essential
to maximize benefits, avoid unnecessary and costly overlaps, and prevent
confusion in policy matters.
Armenia Water Supply and Sanitation: Challenges, Achievements, and Future Directions

This report shows how Armenia improved its water supply and sanitation (WSS) infrastructure and services. Government reforms in the early 2000s encouraged public–private partnerships in the sector, with WSS utilities using private operators to improve service quality and efficiency. International financial institutions and bilateral funding agencies financed investment. Private sector engagement has been governed through management and lease contracts. The result has been considerable improvement in the delivery of WSS services.

About the Asian Development Bank

ADB’s vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region’s many successes, it remains home to two-thirds of the world’s poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.